DRIVERS, BARRIERS AND STRATEGIES FOR BIOENERGY DISSEMINATION IN EU RURAL CROSS-BORDER REGIONS

A case study of the border region between Germany, Poland and the Czech Republic

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For my husband Stephan and my children Dominik and Lena

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ABSTRACT

A growing global energy demand resulting from an ever increasing world population and scale of economic activity poses one of the world's main challenges for the future. The consequences of this rise in population and economic development include, among others, 'excessive' fossil fuel energy consumption and increasing greenhouse gas emissions. The use of renewable energy sources (RES) can help to mitigate this pressure on energy demand. In connection with this, the European Union`s climate policy strategy, in tandem with a reduction in greenhouse gases (GHGs), presses for the development of renewable energy. The generation of renewable energy, in particular biomass, contributes to economic development through the creation of employment opportunities. In particular, rural regions with limited development opportunities can benefit from renewable energy production and dissemination. European rural border regions are disadvantaged primarily because of their location, poor infrastructure and smaller populations. Border regions with a significant division of agricultural land and forest, however, can benefit from the increase of biomass and bioenergy generation. There are, nevertheless, many barriers associated with bioenergy development in general, and in cross-border regions in particular. Despite the fact that they are a unique category and require special consideration there is almost an academic void in respect of research focusing on renewable energy linked to border regions.

This research addresses the following key aspects: the crucial factors required for bioenergy dissemination and the special characteristics of European border regions, and analyzes stakeholders´ perceptions along the bioenergy supply chain. Using the two-phase design inspired by Barton and Lazarsfeld (1984) in a mixed research design, semi-structured expert interviews and online/offline surveys were conducted with stakeholders based in the border regions between Poland, the Czech Republic and Germany, with their opinions measured using a *Likert scale* questionnaire. Both strands of data collection delivered similar perceptions, especially in the case of the stakeholders´ motivation for biomass use and bioenergy generation, in addition to differing assessments regarding the barriers for the growing of biomass, and bioenergy generation – mainly prompted by the diverse economic and legal environments in each country. Among other findings, the study identified the fact that current market barriers resulting mostly from different financial incentives could be reduced if, at a European level, the various financial incentives were harmonized. In addition, common sustainable standards for bioenergy generation are required, in order to support the sustainable use of biomass and bioenergy generation. Moreover, the intensification of the transfer of knowledge and communication between cross-border parties, with the support of regional energy agencies, seems to be necessary, in order to improve knowledge of market opportunities across border regions, and hence reduce the transaction costs in relation to bioenergy cooperation.

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GLOSSARY

Bio-GEPOIT	Biomass German-Polish Implementation Task
BMU	German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt)
CZ	Czech Republic
DE	Germany
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EEG	Renewable Energy Sources Act (Erneuerbare Energien Gesetz)
EEWärmeG	Renewable Energies Heat Act (Erneuerbare Energien Wärme Gesetz)
EJ	Exajoule
ENPI	European Neighborhood and Partnership Instrument
ERDF	European Regional Development Fund
EU	European Union
Eurostat	Statistical Office of the European Communities
GDP	Gross Domestic Product
GHG	greenhouse gas
GIS	Geographical Information System
IEO	International Energy Outlook
IPA	Instrument for Pre-Accession Assistance
J	Joule
LAU	Local Administrative Unit
NFOŚiGW	Polish National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Środowiska i Gospodarki)
NUT 3	Nomenclature of Territorial Units for Statistics, by regional level

NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
OZE	renewable energy sources (PL: Odnawialne Zródła Energii)
PL	Poland
QUAGOL	Qualitative Analysis Guide of Leuven
R 1	respondent No. 1
R 2	respondent No. 2
R 3	respondent No. 3
R 4	respondent No. 4
R 5	respondent No. 5
R 6	respondent No. 6
R 7	respondent No. 7
R 8	respondent No. 8
R&D	research and development
RES	renewable energy sources
RQ	Research Question
SWOT	Strengths and Weaknesses, Opportunities and Threats
TFUE	Treaty on the functioning of the European Union
UK	United Kingdom
WFOŚiGW	Polish Regional Fund for Environmental Protection and Water Management (Wojewódzki Fundusz Ochrony Środowiska i Gospodarki)
WFS	Saxony Economic Development Corporation (Wirtschaftsförderung Sachsen)
WWG	Wohnbau und Wärmeversorgung Großschönau GmbH

1 Introduction

The main goal of this chapter is to explain the subject matter and the relevance of the research in the field of renewable energy. The principal purposes of the chapter are:

- to present a general background of renewable energies generation;
- to present the overall objectives and methodological approach;
- to offer reasons for the important role of renewable energies from a climate and economic point of view
- to explain the structure of the thesis.

The chapter introduces the subject matter of renewable energy generation and bioenergy, in tandem with the methodology used. The climate and economic arguments for the application of renewable energy emphasize the significance of the subject matter.

1.1 General Background

Currently, the annual global primary energy consumption amounts to the equivalent of twelve billion tonnes of oil (1toe = 41.87 GJ). More than 80 percent of this global energy supply is achieved by the fossil fuels of crude oil, coal and natural gas. According to the latest predictions, the world's population will grow steadily from 6.8 bilion (stand: October 2009) to around 9 billion by 2050. One of consequences of this population increase is a fast growing global energy demand (Andreas 2010:4663).

Assuming the continuing economic growth, world energy demand is projected to rise to 1000 EJ (EJ = 1018 J) or more by 2050. This will lead to increasing greenhouse gas emissions as well as excessive fossil fuel energy consumption and requires a turnaway from fossil fuels as the dominant energy source. Nuclear power is at present unlikely to increase its current modest share (Moriarty and Honnery 2012:244).

Worldwide increasing fossil fuel prices from 2003 to 2008 and a concern regarding the environmental consequences of greenhouse gas emissions have fueled renewed interest in alternative energy sources, especially in the areas of nuclear power and renewable resources. Supported by government incentives and by higher fossil fuel prices, power generation from both nuclear and renewable energy generation have increased, and according to current projections will continue to grow in the coming years (International Energy Agency 2010:19). RES can face up to this challenge in a sustainable way. It, in fact, currently amounts to around 13 percent of the global energy supply (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:61).

The global development and implementation of renewable energy systems is still slow and the distribution of energy supplies is unbalanced, creating risks for the global climate and the economic stability of those countries wholly reliant on energy imports. Currently, the most important task for energy policy makers is the development and implementation of a strategy to address both the increasing demand for energy and climate change concerns (O'Keefe, O'Brien, and Pearsall 2010:9).

Because of the ever pressing need to turn away from fossil fuel-based energy sources to environmentally friendlier energy sources, and the potential for their further development and expansion, renewable energy technologies and their important role in future energy generation have gained wide acceptance (O'Keefe, O'Brien, and Pearsall 2010:9).

According to the latest predictions, electricity generation in the Organisation for Economic Co-operation and Development (OECD), that is, Europe, will increase by an average of 1.1 percent per year, with renewable energy the fastest growing source of electricity generation, increasing 2.6 percent per year from 2008 through 2035 (US Energy Information Administration 2010:84).

Taking energy security and climate change into account it is essential for the development of the European energy system to improve energy efficiency and to help to expand renewable energy (McCormick and Kaberger 2007:443). Renewable energy plays a critical role in the European Union (EU) energy strategy, which is based on the move towards a low carbon economy. The present day development of global renewable energy technology is lead in the main by approximately 1.5 million employees in European industry, with this figure expected to rise to three million by 2020 (European Commission 2011b:2).

The main goal of the European strategy for 2020 is smart, sustainable and inclusive growth. Climate and energy policy promoting the application of low-carbon technologies and intensified utilization of renewable energies make the greatest contribution to sustainable development. The EU Directive 2009/28/EC sets out an indicative target path for the share of final energy consumption from renewables. The Member States are obligated to ensure that their share of energy from renewable sources meets the national guidelines of the target path as a minimum requirement.

The awareness of the environmental consequences of existing energy systems, especially problems with waste from nuclear power plants, and the growing threat of nuclear disaster (Jacobsson and Johnson 2000:625) as confirmed by the recent nuclear catastrophe at Fukushima, Japan, in March 2011, will accelerate the reconstruction of European energy systems towards "green energies".

Further the main potential in dissemination of renewable energies within the EU exists in electricity production (International Energy Agency 2010:10), as Figure 1 and Figure 2 show.

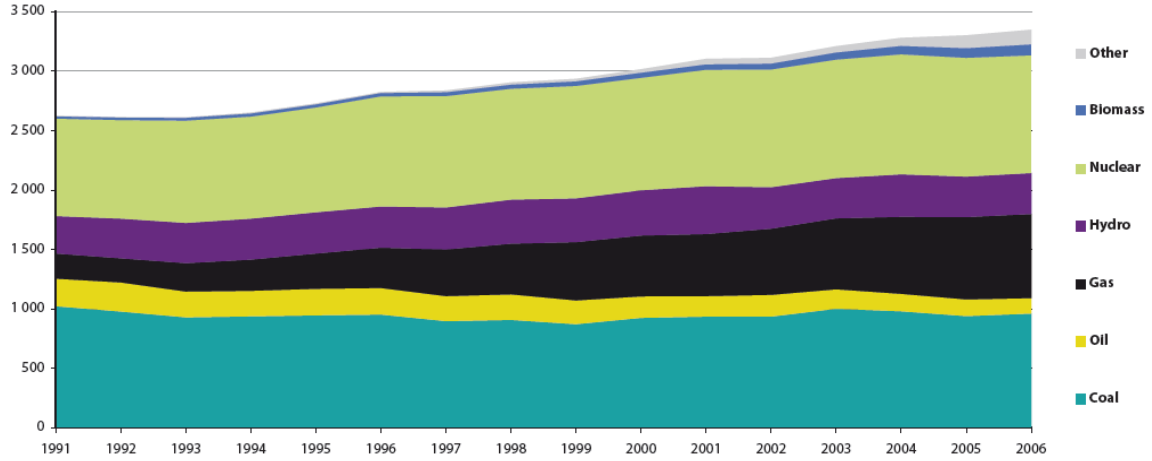


Figure 1: EU-27 electric power generation, in TWh (Eurostat Statistical Books 2009:15)

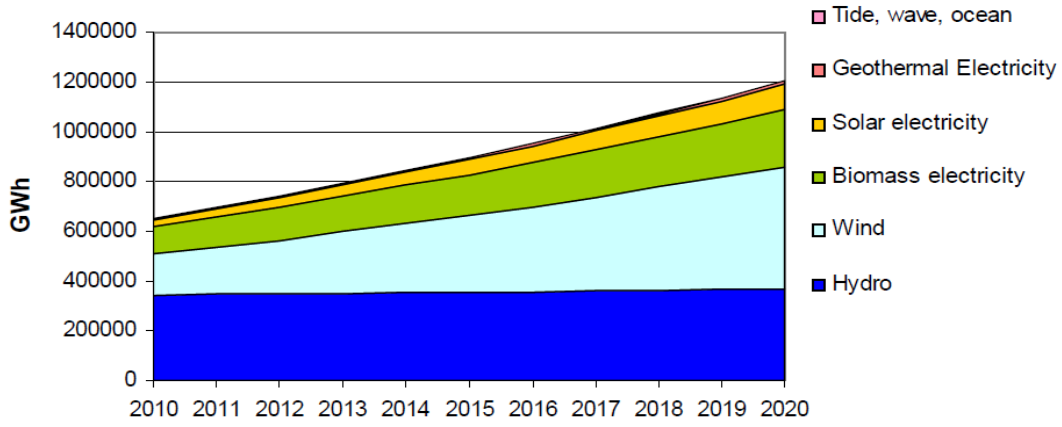


Figure 2: EU development of renewable energy in electricity (European Commission 2011b:5)

Electricity production is a priority among the majority of EU countries endeavouring to achieve the 2020 renewable energy goals. Geographical features and natural resources are not alone responsible for the implementation of renewable energy technologies – just as important is the political will and the strategic orientation of European countries. Profitable financial incentives, however, are not a guarantee for market development (Erneuerbare Energien. Das Magazin 2011).

One of the main modalities of renewable energy is energy based on biomass. Biomass includes organic matter that can be processed to produce energy for heating purposes, for electricity generation and for transport fuels (Fräss-Ehrfeld 2009:4079–4092). Further elaboration of the bioenergy subject matter follows in chapter two.

Bioenergy from forestry and agriculture plays a key role in EU policy and is focused on combating climate change and increasing the security of the EU energy supply. In 2008 RES amounted to around ten percent of the EU total energy consumption, and according to EC projections, biomass should contribute to at least half of the RES 20 percent target by 2020 (European Commission 2011b:6).

Bioenergy production should preferably take place in those regions where the best natural conditions exist (Mittelstands Magazin 2011:16) and where it is able to contribute, not only to the arrest of detrimental climate change, and energy security, but also to agricultural and rural development (Food and Agriculture Organization of the United Nations 2011). Forestry and agricultural products are the most important biomass supply sources for renewable energy generation, as they are able to enhance cooperation in rural areas by opening up economic opportunities beyond the agricultural sector. Bioenergy production in agriculture offers new economic perspectives, contributing to new employment in rural areas (Plieninger, Bens, and Hüttl 2006:126). Moreover bioenergy, in addition to its climate protection benefit, contributes also to energy security and sustainable development, especially in rural areas (Thrän et al. 2011:1).

Those European border regions, dominated by agriculture and forestry, can benefit from the cultivation and utilization of biomass for energy production as an innovative way to create regional value and thereby support regional economic development (Borsig, Knappe, and Kriszan 2007). Due to the fact that border regions are neighboring regions of different countries (European Union 2010:16; 61), the development of bioenergy projects in cross-border areas requires special consideration. According to the Directive 2009/28/EC on the promotion of the use of energy from renewable sources, which entered into force in June 2009, Member States are obliged to address or remove non-cost barriers to the increased deployment of renewable energy sources (European Union 2009:41)

An analysis of the subject matter shows that already much research has been undertaken on renewable energy, and especially on drivers and barriers for bioenergy dissemination, but very little research has been conducted on the special features of European border regions. Some of the research, such as Marks and Czerpowicki (2010), Lewis and Wiser (2007), Oikonomu et al. (2009) or Mondal et al. (2010) focuses on drivers and barriers to renewable energy growth, whereas other publications such as Adams et al. (2011) and McCormick abd Kaberger (2007) treat of the critical factors of bioenergy implementation or of energy efficiency such as Granade et al. (2009) or Rohdin et al. (2007). Within this mounting literature on renewable energies, there seems to have been little or no published material linking border regions and bioenergy dissemination at the time the research confirming this thesis was initiated. There are some reports on special features of border regions and disadvantages

caused by their location and some recent attempts to place more emphasis on the cross-border impact on the internal energy market in the EU. The new "Energy Roadmap 2050"[1] of European Commission recommends a rethink on energy markets and especially in the field of electricity management it sends a clear message:

> *"There are national constraints when choosing national energy mix. Our joint responsibility is to ensure that national decisions are mutually supportive and avoid negative spillovers**. The cross-border impact on the internal market deserves renewed attention**. These create new challenges to power markets in the transition to a low-carbon system providing a high level of energy security and affordable electricity supplies"* (European Commission 2011a:14).

The European Commission in the Communication "Energy Roadmap 2050" does not recognize in particular drivers or obstacles which are typical for European border regions. However it does emphasize the need for an integrated approach:

> *"[…] coordination is required. Energy policy developments need to take full account of how each national electricity system is **affected by decisions in neighboring countries**"* (European Commission 2011a:14).

The research gap regarding the existing barriers and drivers in border areas is addressed by this research work.

1.2 Overall Objectives and Methodological Approach

Considering the high importance of bioenergy from environmental and economic points of view on the one hand, and the perceived research gap in the field of bioenergy in cross-border regions on the other, the overall goal of this research is to explore the different classes of drivers and barriers for bioenergy generation in rural European cross-border regions using as an example the German-Czech-Polish border region. Obstacles and supporting factors for biomass-based energy generation are affected by diverse stages of project implementation. Therefore, four groups of stakeholders along the value chain of bioenergy production - **feedstock suppliers, energy plant developers and owners, policy advisors**, and **primary end users** are considered. Their opinions and knowledge contribute to the identification, assessment and classification of the main classes of drivers and barriers as

[1] on 15th December 2011 adopted by the European Commission Communication "Energy Roadmap 2050" is a guideline for developing a long-term European framework together with all stakeholders and especially includes the EU's commitment for reduction of greenhouse gas emissions to 80-95 percent below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group (European Commission 2011a).

well as being a significant starting point in the formulation of possible strategies with which the barriers can be overcome and the drivers strengthened.

The main aims of the research are pictured in Figure 3.

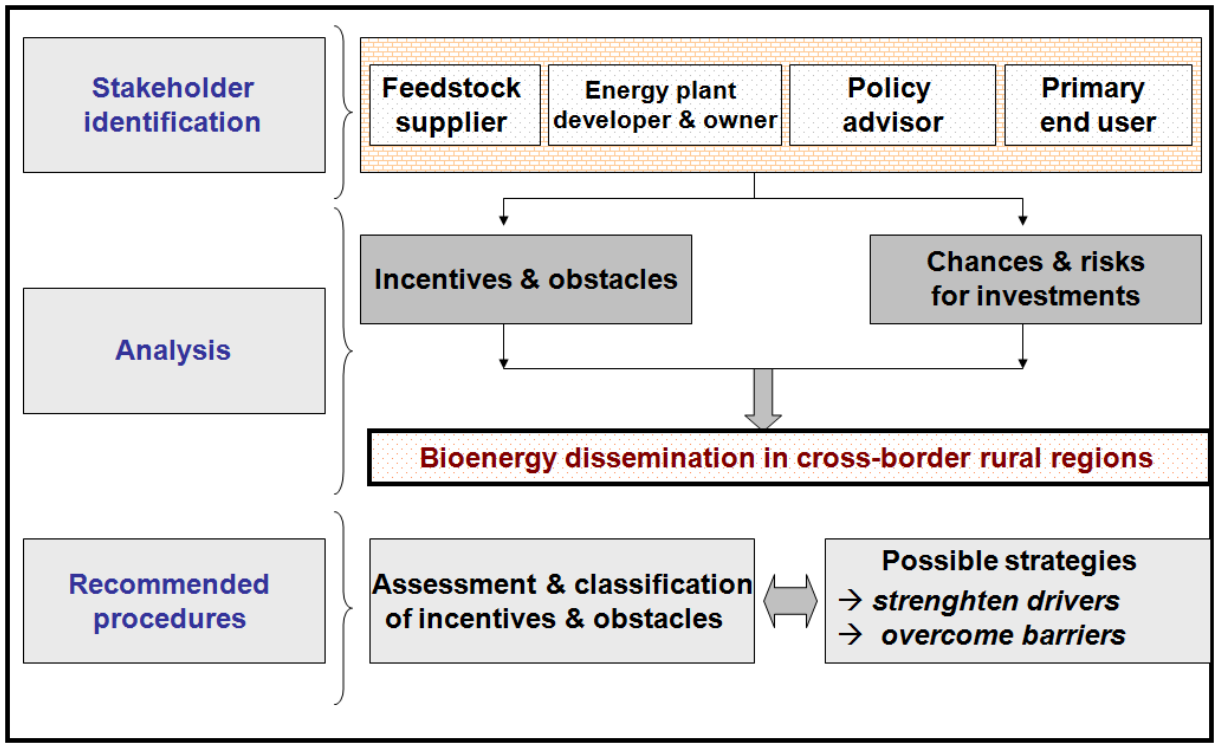


Figure 3: Aims of the research (own design)

The research focuses particularly on the border region between Poland (PL), Germany (DE) and the Czech Republic (CZ) and examines different stakeholders´ perceptions of existing barriers regarding investment in bioenergy, taking into consideration the location in this border region. Further elaboration of the research objective has been included in chapter 3.3.2.

This research is based on a theoretical framework which refers mainly to two approaches. The first approach is based on **Adam et al. (2011)** and **Granade et. al. (2009)** and aims to explore the different categories of drivers and barriers regarding bioenergy planning, and the production process based on an integrated view of the relevant stakeholders. The second approach, the **analysis of European Union** (European Union 2010:12–16; 61), argues that European border regions are disadvantaged on account of their border location and refers to the research on particular characteristics of border regions.

The following study is based on a **multiple cross-sectional design** and develops the theory on drivers and barriers in border regions according to the Two-Phase-Design, introduced by Barton and Lazarsfeld. In order to overcome current research deficits, secondary data based on already published research literature and case study reviews will also be used. In the exploration of research questions, primary data will be analyzed because of the lack of

knowledge on drivers and barriers for biomass-based electricity production in border regions. To accomplish the research objectives, **expert interviews** are used to explore stakeholders' perceptions. The opinions of experts will be assessed using the grounded theory approach. A further **survey** is necessary to accomplish the stakeholder´s assessment of existing barriers. The perceptions of different stakeholders will be assessed by means of a Likert scale questionnaire. The research design, methods used, and data types are summarized in Figure 4 below.

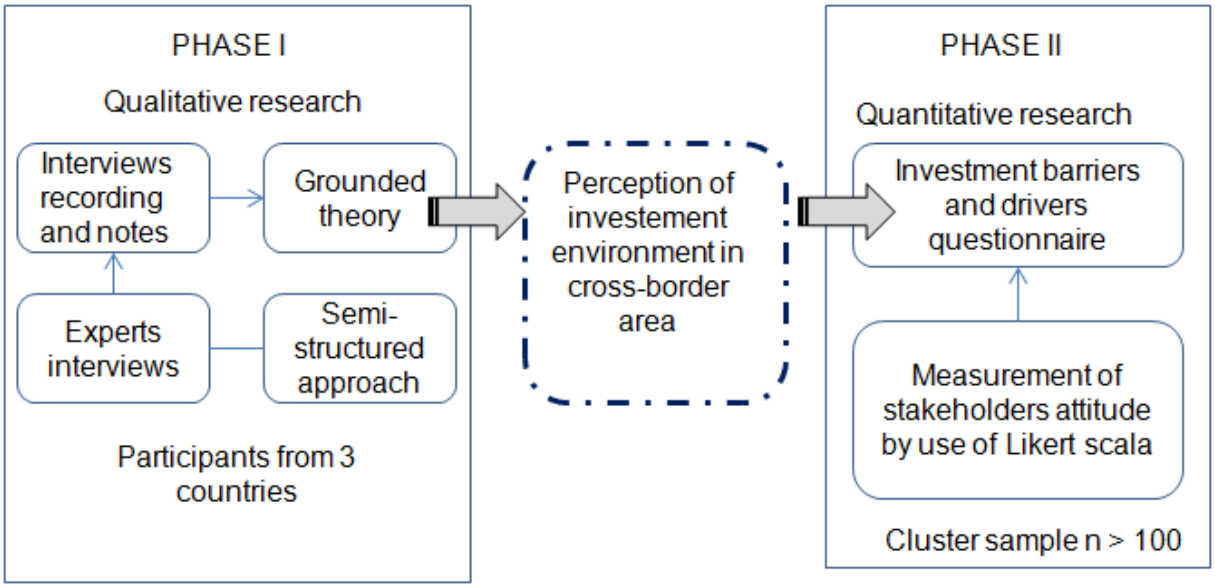


Figure 4: Procedure of mix methodological design used (own design)

Further arguments for the theoretical approach and applied methodology follow in chapter 4.2. The wide use of bioenergy and other renewable energy sources in the European Union can be explained by climate and economical arguments, as follows in the next section.

1.3 The Climate Arguments for Renewable Energy Use

The use of renewable energy reduces the dependence on the import of expendable and more expensive fossil fuels, contributing, in consequence, to climate protection (Hirschl 2009:4407). In the face of climate-damaging greenhouse gas emissions, aggravated by climate change, renewable energy dissemination, set in the targets of the Kyoto Protocol, is essential (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:61). The Kyoto Protocol is an international agreement specific to the United Nations Framework Convention on Climate Change. It contains binding targets for 37 industrialized countries, and the European community, for reducing greenhouse gas (GHG) emissions by an average of 5 % against 1990 levels over the five-year period 2008-2012 (United Nations 1998:§3).

The European Union`s climate policy strategy contains the most ambitious worldwide goals on GHG reduction - a 20 percent emission reduction by 2020, compared to 1990 levels. The EU policy called “20 20 20 by 2020” also contains the development of renewable energies as one of the “two key targets”, together with GHG reduction. Because of the lower GHG emissions per unit of energy, renewable energies play a key role in driving climate protection (Boeters and Koornneef 2011:1024), and in addition to the ecological advantages, the use of renewable energy has economical benefits.

1.4 The Economic Arguments for Renewable Energy Use

With the ever-increasing industrial development of countries world-wide, world energy demand is expected to grow, despite the possibility of significant improvements being made in energy efficiency. In the face of this expectation, renewable energy technologies could meet a large part of this global energy demand, provided that its development received enough support. The cost of renewable energy production may even be lower than that for conventional energy. In comparison to the conventional energy technology, renewable energy installations are small and therefore more flexible in their technological development. While innovations in the development of large energy facilities are cost intensive and productivity increases are difficult to achieve, most of the renewable energy technologies can be used on a small scale and therefore can indicate cost reductions (Johansson et al. 1992:1–3).

One of the main reasons of renewable energy use in the EU is the security of the supply. The use of RES reduces EU dependence on imports of oil and gas and improves EU robustness against political and cultural volatility and the rise in international energy prices (Boeters and Koornneef 2011:1024).

The deployment of conventional energy supplies is in some cases impossible in developing countries due to the lack of transmission grids. Decentralized renewable energy can provide a basic supply, especially of electricity - for example, off grid photovoltaic plants for domestic demands, and can improve the quality of life, as well as contribute to economic development (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:61). The development and use of renewable energy technology contributes to the creation of a green industry market and is connected with a high export potential in growing international markets (Hirschl 2009:4407).

Due to the above-average labor intensity of renewable energy, their dissemination is connected with the creation of employment. Moreover technological progress in this field improves the EU technological leadership and competitive advantage and foster regional development in rural and isolated areas (Boeters and Koornneef 2011:1025). The production of

renewable energy and especially biomass can support economical development through employment opportunities. Rural regions, in particular, which have limited development opportunities, can benefit from renewable energy dissemination. Growing employment reduces poverty and therefore the pressure for urban migration (Johansson et al. 1992:4).

On the one hand EU cross-border areas are usually characterized by less dynamic economic development in comparison to other regions (Fontes, Ribeiro, and Silva 2014:927). On the other hand, bioenergy generation in rural areas seems to be more reasonable than in urban areas because of the resource availability and market penetration (Jenssen, König, and Eltrop 2014:74).

1.5 Thesis Structure

The present work investigates the possible barriers, drivers and strategies for bioenergy generation in a European border region taking as an example the border area between Germany, Poland and the Czech Republic and endeavours to close the research gap on this border area theme by means of the following structure:

- **Chapter One** provides a general background on renewable energy, bioenergy, and the princpal climate and economic arguments for the use of renewable energy. The main objectives and the methodology used for the research are also introduced.
- **Chapter Two** clarifies the terms used, presents comprehensive background information on global and European bioenergy generation, showing its possible future development. The main advantages and challenges of biomass use for energy generation are discussed. The particular characteristics of border regions and why this Germany-Poland-Czech Republic region was chosen for the analysis is also presented.
- **Chapter Three** positionates this thesis within the broad field of current research on energy systems, and provides problem statements by means of a critical review of current published research literature on the key concepts relating to renewable energy dissemination, drivers and barriers for the development of biomass as an energy source, focusing in particular on border regions. Reasons for the relevance of the research work undertaken are provided. And on the basis of the theoretical framework research questions are defined.
- **Chapter Four** concentrates primarily on the methodology and provides arguments for the suitability of the chosen research paradigm and the methodological instruments for the empirical examination of the research questions.

— **Chapter Five** presents the results of the analysis and the interpretation of results from interviews carried out with experts from the Polish-German-Czech border region. The outcome of this section, PHASE I of the analysis, is a Likert scale questionnaire, which has been used for the collection of data gathering in PHASE II of the analysis.

— The prime emphasis of **Chapter Six** is the analysis and assessment of the main findings based on surveys conducted with biomass suppliers, policy advisors and energy producers in the cross-border area between Poland, the Czech Republic and Germany (PHASE II).

— **Chapter Seven** summarises the main findings and outlines the extent to which the undertaken research contributes to current knowledge. Moreover, recommendations for policy makers regarding possible strategies to strengthen drivers and overcome barriers existing in European border regions regarding bioenergy dissemination are made. The limitations of the research as well as the need for further study are also identified.

— **Chapter Eight** includes references of the used and reviewed literature.

Ultimately, this research addresses the need for research on stakeholders´perception on the environment of bioenergy generation in rural cross-border regions.

2 The Relevance of Bioenergy Generation in the Context of Cross-Border Areas

2.1 Introduction

This chapter aims to explain the role of bioenergy dissemination with the focus on the EU. The overall goals of this chapter are:

- to outline the relevance and urgent nature of the subject matter;
- to clarify the main terms used;
- to explore the significance of bioenergy in global and European energy systems;
- to point out the main trends in the future development of bioenergy in EU;
- to provide justification for the research undertaken.

This research regards biomass as a significant source in European renewable energy generation. As a result, the arguments for and against electricity generation, based on biomass, do not occur here to any great extent. However, some criticism is directed at bioenergy in the context of its contribution to safe, secure, sustainable and affordable energy.

2.2 Definition and Classification of Renewable Energies and Bioenergy

Renewable energies are here defined as primary energies, which have not yet undergone any technical conversion, inexhaustible in terms of human time dimensions (Kaltschmitt, Streicher, and Wiese 2007:2). The main modalities of renewable energy are (Fräss-Ehrfeld 2009:4079–4092):

- Solar energy means capturing and harnessing the sun`s energy, including passive solar design used for reducing the need for artificial light and heating, active solar water heating, converting solar radiation into heat and solar PV panels or solar cells, converting daylight into electricity;
- Wind power results from harnessing the power contained in moving air, by means of turbine rotors with aerodynamic blades, connected to an electrical generator, producing energy;
- Biomass includes organic matter that can be processed to produce energy with application for heating purposes, for electricity generation and for transport fuels;

- Geothermal energy is the thermal energy generated and stored in soil, continuously conduced in the form of heat from the earth`s core to the surface and can be used for heating and electricity generation;
- Hydropower results from the utilization of rainfall which flows into rivers. The flow energy, so-called kinetic energy drives generators by means of a turbine wheel and the generators produce electricity.

One of the main types of renewable energy is energy from biomass, which has a special importance in regions of rural character.

Biomass is a non-fossil material of biological origin, such as energy crops, agricultural and forestry wastes and by-products, manure or microbial biomass (Cushion, Whiteman, and Dieterle 2010:8).

This renewable energy source can be subdivided by type in solid, liquid and gas and by origin in forests, agriculture and municipal waste (Food and Agriculture Organization of the United Nations 2011).

Biomass energy (or bioenergy) is here defined as the conversion of complex carbohydrates in organic matter into energy either by using it as a fuel or by processing it into more efficient liquids and gases (Chase 1998:6) and can be produced from any type of plant, animal or other biological carbon sources (Doty and Turner 2009:443). Biomass can be burned for heat or to produce electricity or can be fermented to alcohol fuels, anaerobically digested to biogas or gasified for high-energy gas (Rosillo-Calle and Woods 2012:2). The bioenergy system includes biomass resources, supply system, conversion technology and energy service (McCormick and Kaberger 2007:450). The main classification of biomass is presented in Figure 5 below.

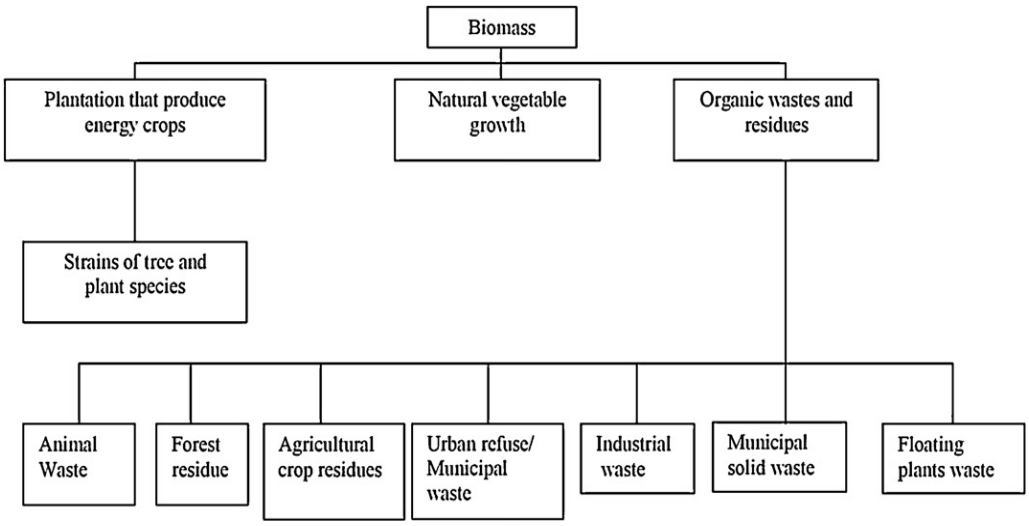


Figure 5: Biomass classification (Panwar, Kaushik, and Kothari 2011:1803)

Bioenergy is generated from biomass of different origins. There are different supply chains for bioenergy connected to different origins of biomass. Bioenergy is influenced by different policies such as the common agricultural policy, the Kyoto Protocol, the waste and land filling policy, and the forest policy. Moreover the bioenergy supply chain consists of agricultural, transport and industrial sectors as well as final consumers. Therefore in order to overcome the existing barriers and strengthen the potential drivers for bioenergy dissemination, it is essential to consider the entire bioenergy chain, from resources to the end-use market (Sipilä and Wilén 2012:3).

2.3 Typical Bioenergy Supply Chain

The resources which can be used to produce bioenergy originate primarily from agriculture and forestry, and different biomass-processing industries. Moreover, other sources like grass cutting from roadside maintenance, organic residues from milk processing, as well as organic fraction of household waste can be used for bioenergy generation. However, only the part of biomass left over after its use for food, fodder and as industrial feedstock (e.g. in paper industry), can be used for energy generation (Kaltschmitt and Thrän in Bullinger 2009:346).

Bioenergy is characterized by a multistage supply chain, from collection of feedstock, biomass processing, and storage and transportation. Industrial conversion processes result in the generation of secondary energy carriers or biofuels which can be transformed into different forms of useful energy like power and heat (Kaltschmitt and Thrän in Bullinger 2009:346). The main conversion paths for biomass to secondary energy carriers are outlined in Figure 6.

There are several conversion options for biomass (Kaltschmitt and Thrän in Bullinger 2009:346–347):

- thermo-chemical conversion – process based on heat, where solid biofuels are mixed with an oxidizing agent (e.g. air, water) below the stoichiometric concentration under defined conditions (e.g. temperature) and converted into solid, liquid and/or gaseous secondary biofuels;
- physic-chemical – biomass containing oils and fats (e.g. rape seed) is converted into liquid biofuels by means of mechanical pressing and/or extraction;
- bio-chemical conversion – the conversion of biomass is based on biological processes.

In European border regions characterized by a significant area of agriculture and forestry, the cultivation and utilization of biomass for energy generation is associated with the creation of additional income and regional economic development (Borsig, Knappe, and Kriszan 2007).

2.3.1 Definition and Special Features of European Border Regions

The term “border region” has been specified in the European Union as Nomenclature of Territorial Unit for Statistics on the level three (NUT 3) region eligible for cross-border cooperation programs under the European Regional Development Fund (ERDF) regulation (European Union 2010:16) and has been chosen for further analysis of bioenergy dissemination across border regions. The NUT classification is a classification established by the Statistical Office of the European Communities (Eurostat) to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union and makes possible the collection, development and harmonization of EU regional statistics and for socio-economic analyses of the regions (European Union 2010:I–XIII). The NUTS is a three-level hierarchical classification - each Member State is subdivided into a whole number of NUTS 1 regions, each subdivided into a whole number of NUTS 2 regions (Eurostat 2011:9–11).

European border regions consist of the internal borders of the EU, some external borders, maritime borders separated by a maximum distance of 150 km, and regions that share borders with European Free Trade Area countries (European Union 2010:61).

Border regions are important regions in terms of the European integration process and reflect the results of European Union integration. Moreover, cross-border cooperation is an integral part of European regional policy and aims to boost the integration of EU Member States. EU border regions are characterized in the main by particular challenges - weak economic struc-

ture, sparse population and are eligible therefore for EU, national and regional development programs (Leibenath, Korcelli-Olejniczak, and Knippschild 2008:13).

Cross border areas are characterized by language diversity, often combined with institutional, cultural, and legal differences, making the cooperation between them more difficult. National boundaries, however, remain significant barriers despite the European integration process (Scherer and Zumbusch 2011:102). Border regions are important areas in the European Union with a high permeability of internal borders. Typical problems of border regions are also emigration and being far from the centre of political decision-making (Leibenath, Korcelli-Olejniczak, and Knippschild 2008:6–13). A further disadvantage of border locations is often lower grade transport infrastructure and less access to services and markets. Low population density, which is often the case in cross-border regions, could exacerbate development problems. Because of the different Gross Domestic Product (GDP) per capita, the levels of development between regions located on both sides of the border are sometimes very different. On average, GDP per capita is less than the EU average (89 percent of the average in 2007) and less in the external border regions (65 percent of the EU average) than in internal border regions (92 percent of the average). Further access to the basic services e.g. airport or universities is in border regions limited (European Union 2010:61).

In order to overcome the existing political and administrative barriers that hinder regional integration further cross border cooperation between internal border regions should be intensified. In the case of external borders expanding and improving basic infrastructure, cross border transport and communication links are required to face the challenges of disproportional development. Cross-border cooperation can mitigate the problems, but it may generate relatively high transaction costs due to different institutional systems, cultures and languages (European Union 2010:61). Cross-border cooperations are mostly based on functional orientations. Border regions join forces and cooperate on a superregional level, using different kinds of proximities (cognitive, organizational, social, institutional and especially spatial proximity) assuming that they give them a specific solidarity. Cross-border cooperation takes place between regions of neighboring states with the focus on dealing with similar challenges, on benefiting from complementary assets, on using synergies and critical masses to improve their competitive advantages. There are a lot of national and European funding schemes available for cross-border cooperation (Scherer and Zumbusch 2011:102).

2.4 Bioenergy in the Global Energy System

Industrialised countries (OECD) with nearly a fifth of the world's population are responsible for almost half the world's primary energy consumption, caused by the two and a half times higher per capita consumption in the OECD countries in comparison to the global average (Figure 7). Accepting the urgent need for energy efficiency improvement, it is essential to develop renewable energies in order to meet the challenges of climate change, as well as global energy supplies (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:82).

Figure 7 shows the increase in world population and the global energy consumption from 1971 to 2008.

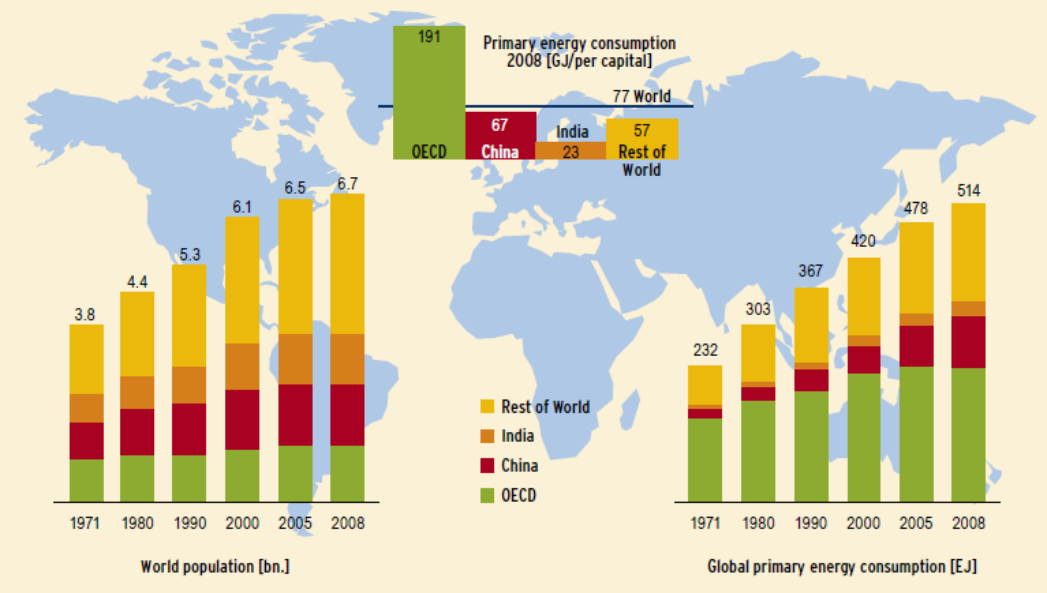


Figure 7: Development of world population and global primary energy consumption (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:83)

Increasing prices worldwide from 2003 to 2008 and concern about the environmental consequences of greenhouse gas emissions have been the main factors for renewed interest in alternative energy sources, especially in nuclear power and RES. Supported by government incentives and by higher fossil fuel prices, power generation from both nuclear and renewable energy generation have increased and, according to recent projections, will continue to grow in the coming years (US Energy Information Administration 2011:86).

Since 1990 renewable energies have grown approximately 1.9 percent year on year. However since the 1980s their share of global primary energy consumption has remained stable: 12 and 13 percent (2008: 12.9 percent). This means that the growth in energy supplies from RES has been insignificant, when we consider the increase in total primary energy consumption.

Figure 8 shows the renewable share of global final energy, which is larger than the renewable share of global primary energy, because of traditional biomass, which consists wholly of final energy consumption (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:83–84).

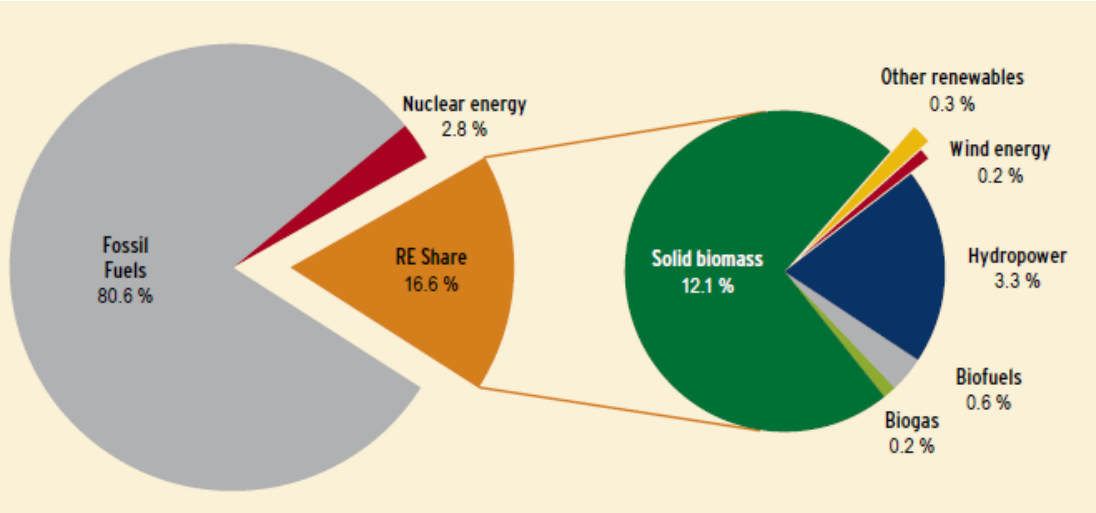


Figure 8: Structure of global final energy consumption in 2008 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:84)

From a global point of view, the most common use of biomass is the use of solid biofuels for heating and cooking. For this reason most of the energy produced from renewable energies is based on biomass (Bullinger 2009:351). In 2008 about 17 percent of global final energy was already produced from RES. Biogenic energy sources were the dominant renewable resource with a total share of around 12.9 percent because of the mostly traditional use of biomass (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:84).

In the case of electricity generation in 2008 18.5 percent of worldwide electricity production was generated using renewable energy technologies. In comparison to European electricity production biogenic energy sources in the electricity sector play only a minor role, with a share of 1.1 percent. Renewables-based electricity supply in the EU in 2008 has increased, and amounted to 19 percent (European Commission 2012:14).

Figure 9 shows shares of worldwide renewable electricity generation in 2008.

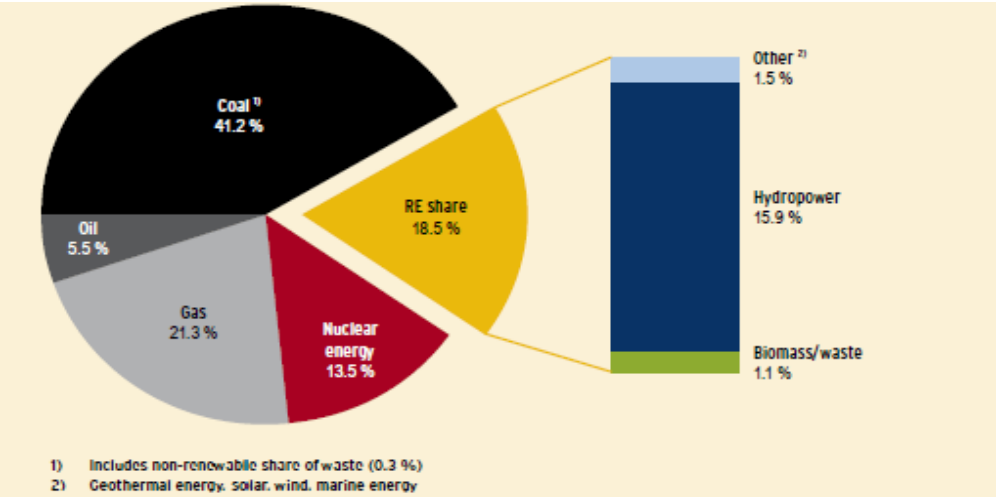


Figure 9: Renewable energies: shares of worldwide electricity generation in 2008 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:90)

Renewable energy and bioenergy demand is expected to rise in the future. Electricity is the world's fastest-growing form of end-use energy consumption. It will rise by 2.3 percent per year on average from 2008 to 2035, while total world energy demand grows by 1.6 percent per year. In non-OECD countries, electricity generation increases by an average annual rate of 3.3 percent in comparison to the much slower growth in OECD countries, averaging 1.2 percent p.a. from 2008 to 2035 (US Energy Information Administration 2011:11).

Coal is the main energy carrier for world electricity generation. However its share declines 40 percent of total generation in 2008 to 37 percent in 2035. In contrast to coal and liquids, RES will increase their share of global generation from 19 percent in 2008 to 23 percent in 2035. RES generation is the world's fastest-growing source of electric power (annual rate of 3.0 percent in the reference case) according to the International Energy Outlook (IEO) 2011. Moreover, the greater part of renewable energy growth in OECD countries comes from wind and biomass. Most of their economical and environmental acceptable hydroelectric re-sources have been already exploited (US Energy Information Administration 2011:11; 89).

Figure 10 shows world net electricity generation by fuel, 2008 - 2035.

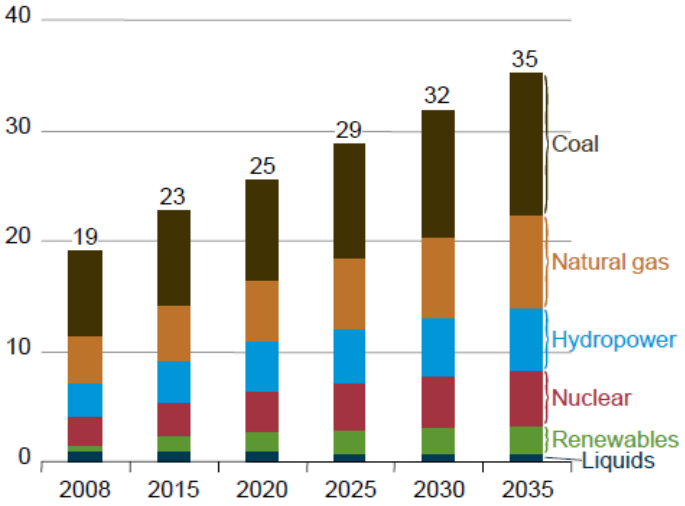


Figure 10: World net electricity generation by fuel, 2008-2035 (in trillion kilowatthours) (US Energy Information Administration 2011:12)

From a global perspective, biomass can contribute to meeting the given energy demand. It is possible to meet approximately 20 percent to over 100 percent of present levels of primary energy consumption using biomass. The amount of bioenergy generation depends on the anticipated yield of various energy crops and the availability of additional arable land, which is not needed for food and fodder production. By means of improved methods for the production of plants for food and fodder, Western industrialized countries will be able to enhance the land area availability for growing energy crops, among others, biomass. In comparison to the biomass residue potential, by-products and waste materials are likely to remain stable (Bullinger 2009:346).

In the case of further fluctuating energy prices, it can be expected that demand for biomass-based energy solutions will increase globally. Other forms of land use for the production of food, fodder and industrial feedstock remain always competitive used paths for biomass. Therefore it is essential to increase the productivity of agriculture and forestry land by means of improved seed materials and management schemes (Bullinger 2009:351).

This research focuses on electricity generation based on biomass, because of the fact that this particular usage is associated with minor emission reduction costs and with high green house gas reduction (Gawel and Purkus 2012:18). Moreover electricity plays an increasing role in the current and future European energy system (European Commission 2011a:6). The scientific consultants of the Federal Government in Germany recommend the orientation of German and European bioenergy policy towards climate protection. From the climate perspective the biomass in Europe should be used for the substitution of coal for the electricity generation using cogeneration (Gawel and Purkus 2012:18).

2.5 Bioenergy in the European Energy System

Rising energy prices and the increasing dependence on energy imports affect energy security and competitiveness in the European Union. A future European energy market needs a pan-European energy infrastructure and further support in order to remain innovative. Moreover the geopolitical strength of the EU, the world's largest energy market with 500 million people and one-fifth of the world's energy use, should be better exploited by means of a coordinated policy (European Commission 2010b:1). The central goals of an energy policy (security of supply, competitiveness and sustainability) are defined in the Lisbon Treaty[2]. Despite some progress having been made in the direction of these goals, Europe's energy systems are adapting too slowly in comparison to the ever-increasing challenges. As a result, in 2007 the European Council adopted ambitious energy and climate change targets for 2020. These targets, known as the "20-20-20" targets, set three key objectives for 2020 (European Commission 2010b:4):

- to increase the share of renewable energy to 20 percent;
- to encourage a 20 percent improvement in energy efficiency;
- to reduce EU greenhouse gas emissions by 20 percent from 1990 levels.

The European Council has committed to reducing greenhouse gas emissions to 80 - 95 percent below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group. These EU energy and climate goals have been incorporated into the "Europe 2020 strategy for smart, sustainable and inclusive growth" and adopted by the European Council in June 2010. A climate and energy policy supporting the use of low-carbon technologies and a stronger utilization of renewable energies contribute to sustainable development (European Commission 2010b:4).

The first step in the promotion of a European policy advocating renewable energy development has already been taken in 2001 with the adoption of the European Directive 2001/77/EC on the promotion of electricity from RES in the internal electricity market - the so-called "RES-E directive". According to this comprehensive regulatory framework, EU Member States have adopted national targets for renewable electricity consumption and are working to achieve their goals (Arasto et al. 2012:109).

The legal framework has been upgraded by implementing the new "EU Directive 2009/28/EC (RED Directive) for promoting renewable electricity". This directive defines an ambitious indicative target path for the share of final energy consumption from renewable energies, e.g. 20 percent share of energy from RES by 2020 (European Union 2009:L 140/21). In tandem

[2]Article 194 of the Treaty on the functioning of the European Union (TFUE).

with this directive, the Member States are obliged to ensure that their share of energy from RES meets the national guidelines of the target path as a minimum requirement by the end of 2020 (European Union 2009:L 140/26). Figure 11 shows national targets for the share of energy from RES in gross final consumption in 2020 for selected countries and 27 Member States.

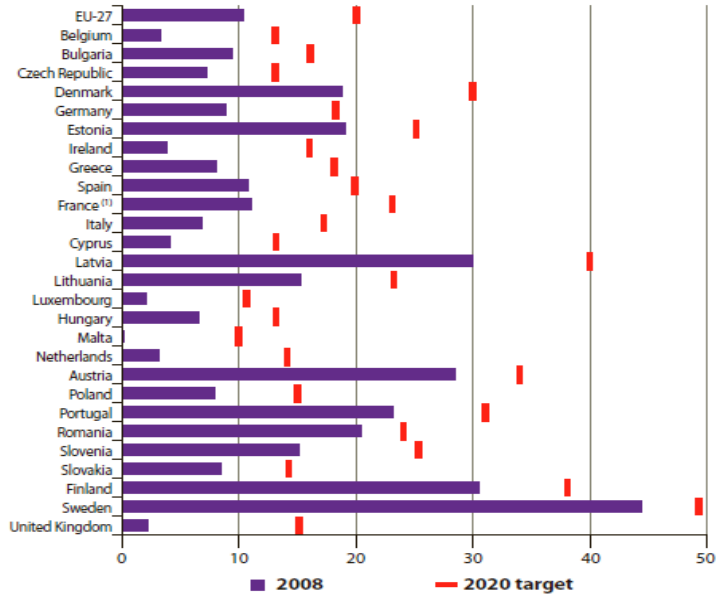


Figure 11: Share of renewable energy in gross final energy consumption and target for 2020 (in percent) (Eurostat Pockebook 2011:71)

In 2008 gross final energy consumption from RES amounted to 10.3 percent of EU-27 energy consumption, where the highest share of consumption from RES was recorded in Sweden (44.4 percent) and the lowest in Malta (0.2 percent) (Eurostat Pockebook 2011:71).

Further efforts towards a carbon-free economy were implemented by the EU via the Communication “Energy Roadmap 2050” adopted on 15th December 2011. The European Commission sought the commitment from developed countries as a group to reduce greenhouse gas emissions to 80 - 95 percent below 1990 levels by 2050. On the basis of the Energy Roadmap 2050 a long-term European framework should be developed in cooperation with all stakeholders (European Commission 2011a:2).

Next to energy efficiency, renewable energy plays a key role in achieving the European targets by 2050. According to the latest predictions, the biggest share of energy supply technologies in 2050 will come from renewable energies. A more sustainable and secure energy system requires a higher share of renewable energy beyond 2020. It is essential to reduce the costs of renewable energy through innovative technologies and processes by research and development (R&D), industrialisation of the supply chain and more efficient policies and support schemes e.g. by means of a higher convergence in support schemes (European Commission 2011a:10).

Renewable energy will play a significant role in the energy mix in Europe and move from technology development to mass production and deployment, from small-scale to larger-scale. It is imperative then that the nature of renewable energy policy changes. Incentives have to become more effective, taking account of economies of scale. Moreover more market integration and a holistic European approach is required. Member States can make demands on common principles of cooperation among themselves and other measures (European Commission 2011a:10). Further the decarbonisation process of the European Union will require a large amount of biomass for heat, electricity and transport (European Commission 2011a:11).

Electricity generation in the European Union is based mostly on fossil energy sources – more than 50 percent comes from gas, oil and other solid fuel, as in Figure 12 pictured (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:68).

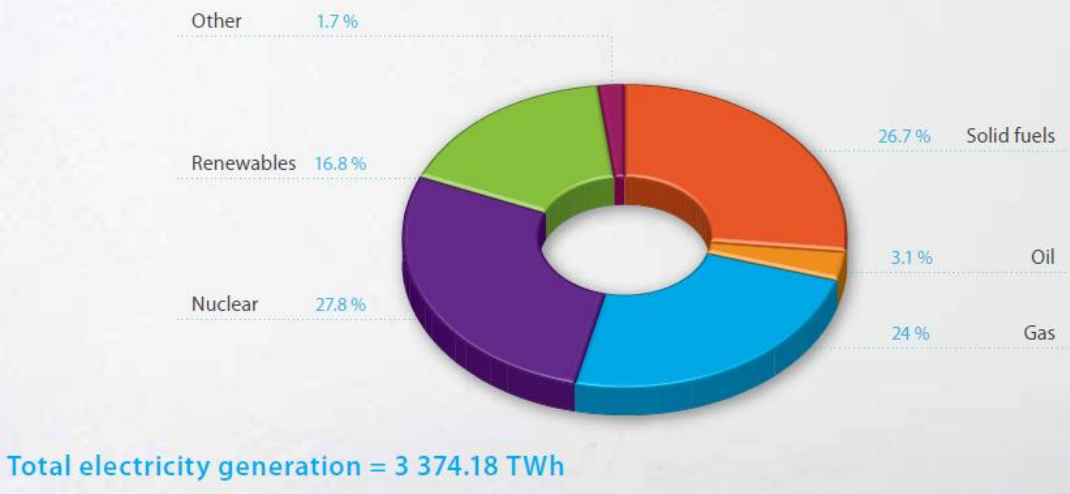


Figure 12: EU-27; Electricity generation by fuels in 2008 (in percent) (European Commission 2011b:21)

Due to the promotion of renewable energy by means of the EU Electricity Directive, which came into force in 2001, the expansion of renewable energy in the electricity sector is now more visible. On average, electricity generation has increased by 3.4 percent per year to approximately 583 TWh in 2009 contributing to approximately 17.2 percent of the total electricity supply in 2009 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:68).

Figure 13 shows a continuous growth in gross electricity generation up to 2010.

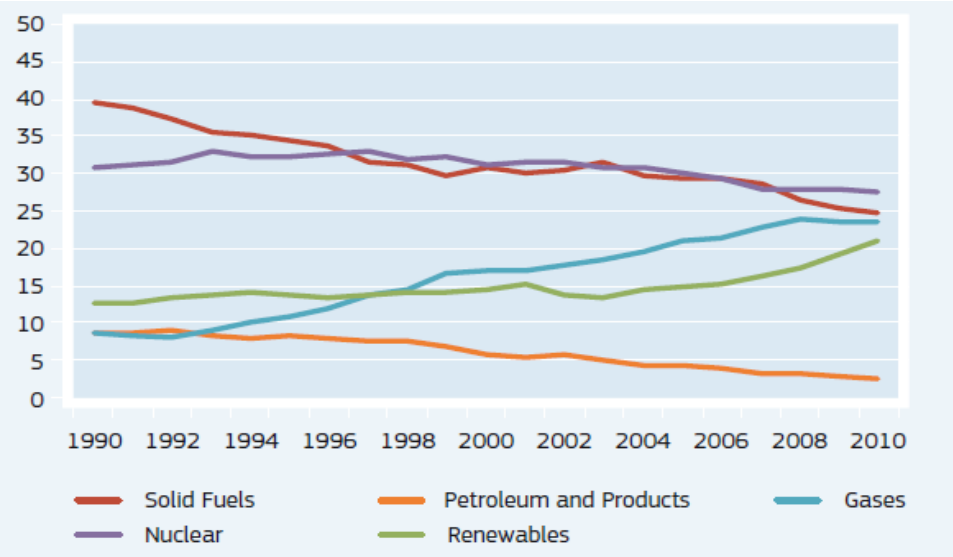
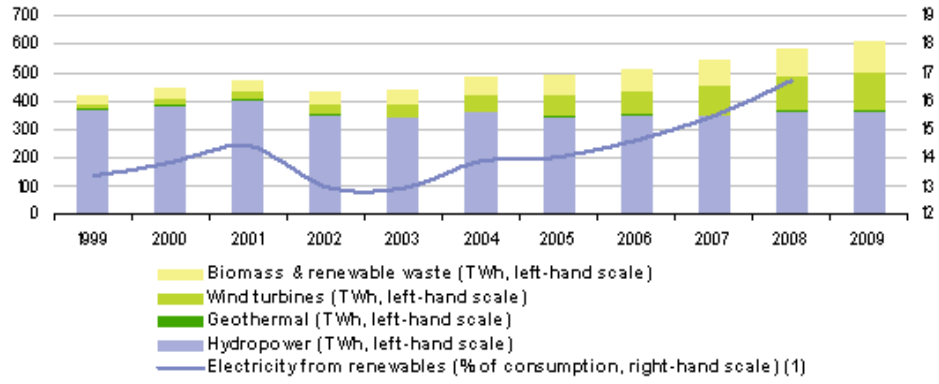


Figure 13: Gross electricity generation EU-27 – by fuel (European Commission 2012:85)

The annual growth of the installed capacity for electricity generation from renewables between 1998 and 2008 in the EU-27 amounted to 6.4 percent p.a. The strongest growth was recorded in wind energy and contributed to the total share of 26 percent in 2008 (in comparison 1998: 4 percent). In 2008 hydro capacity still remains the largest energy source among other RES with a 58 percent share in 2008 compared to 90 percent in 1998, although its share has been constantly decreasing since 1990 (Eurostat Pockebook 2011:73). The strong development of renewables-based electricity generation was possible mostly due to the growth of wind energy and biomass (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:68). Figure 14 shows the development of electricity generated from RES in EU-27 from 1999 to 2009.



(1) 2009, not available.
Source: Eurostat (online data codes: nrg_105a and tsdcc330)

Figure 14: Electricity generated from RES EU-27, 1999-2009 (Eurostat, 2012)

In 2008 the share of electricity from biomass in gross electricity consumption amounted to 19 percent as presented in Figure 15 below.

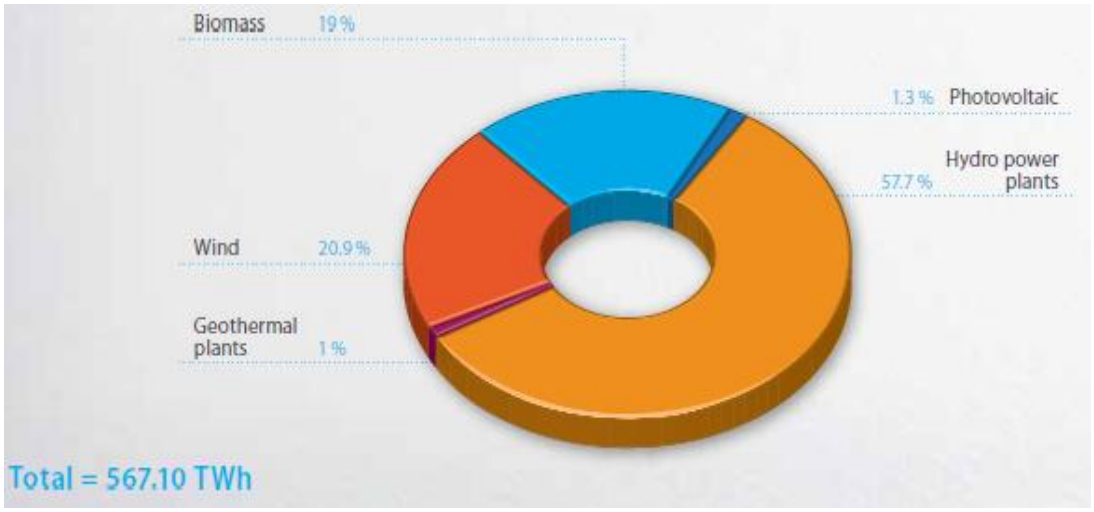


Figure 15: Electricity from renewable energy in gross electricity consumption in 2008 EU-27 (in percent) (European Commission 2011b:24)

This overview of renewable energy use in recent years in the EU confirms the growing interest in electricity generation based on biomass.

Renewable energy plays an important role in the path to a low-carbon European economy in 2050. According to the most recent communication from the “Energy Roadmap 2050” Commission, the share of RES will rise in all scenarios. The share of RES in electricity consumption rises from 64 percent to 97 percent in 2050 (European Commission 2011a:7). In order to meet reductions in European green house gas emissions and energy security targets, it is necessary to achieve fast and broad dissemination of RES in all EU countries (Fouquet and Johansson 2008:4079–4092).

According to the most recent predictions, electricity generation in OECD countries will increase by an average of 1.2 percent per year.

In this process renewable energy is the fastest growing source of electricity generation, growing by 2.5 percent per year through 2035 (US Energy Information Administration 2011:94), as shown in Figure 16 below.

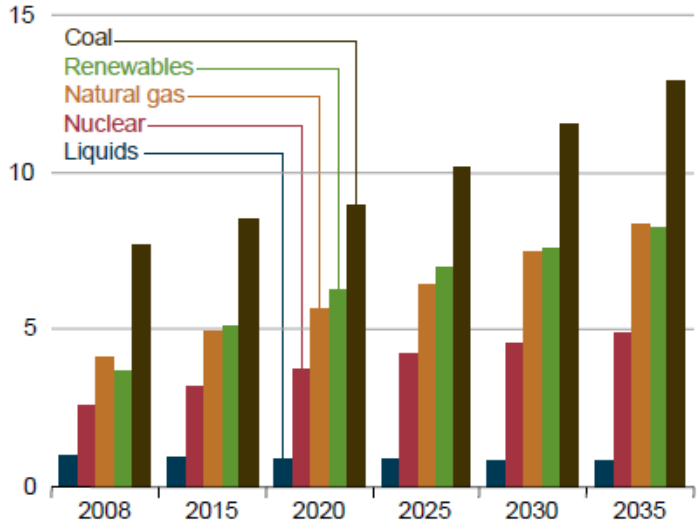


Figure 16: OECD Europe net electricity generation by fuel, 2008-2035 (trillion kilowatthours)(US Energy Information Administration 2011:87)

In order to secure progress in the European decarbonisation strategy, a large quantity of biomass for heat, electricity and transport is required (European Commission 2011a:11). Bioenergy from forestry and agriculture plays a key role in EU policy aims focused on combating climate change and increasing the security of the EU energy supply. In 2008 bioenergy had a 10 percent share of the EU final energy consumption. According to European Commission (EC) projections, biomass would contribute to at least 50 percent of the RES 20 percent target by 2020 (European Commission 2010a:2).

The structure of total renewable energy supplies in the EU in 2005 and 2020 of the EU Member States is pictured in Figure 17.

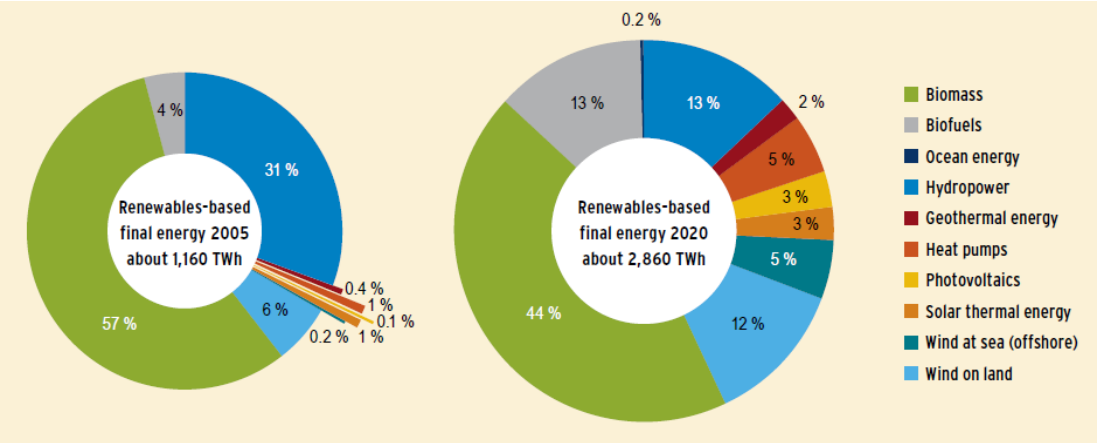


Figure 17: Structure of total renewable energy supplies in the EU in 2005 and 2020 according to the National Action Plans of the EU Member States (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011:61)

One of the challenges of a European future energy system is to enable market participants to reduce the costs of renewable energy by means of, among other things, more efficient policies and support schemes, which require stronger convergence (European Commission 2011a:10). The markets for energy technologies do not work in an efficient way and even when the external climate cost is completely internationalized by means of political action, the investment decision will be biased. The information and transaction costs are still not included in energy prices (Gawel and Purkus 2012:20). With regard to investment in the border regions additional information and transaction cost can be expected.

Future incentives for the dissemination of renewable energies should be more efficient, create economies of scales and contribute to higher market integration. Building on the existing legislation, stronger cooperation among Member States and with neighboring countries is essential (European Commission 2011a:7).

According to the latest predictions, biomass use for energy generation is expected to increase significantly in the EU by 2020 and become the most important energy source in comparison to other RES in the EU. Current biomass potential is sufficient to ensure the biomass demand for reaching the proposed bioenergy targets. However some biomass imports are also expected. Thanks to biomass mobilization further development of bioenergy in the EU is still possible (Scarlat, Dallemand, and Banja 2013:603–604). Biomass for energy use is one of the most important RES in the EU. There are high expectations on bioenergy and its contribution to the climate friendly European energy system. Biomass can be stored and flexibly applied by means of its conversion to a solid, fluid and gaseous energy source. It can support structurally weak rural European regions by means of the generation of new income channels, for example, crop growing for biomass feedstock, biomass conversation, installations construction, services. However the sustainable biomass capabilities for energy use are limited. Moreover, the ever-increasing demands on biomass and land that can be cultivated puts pressure on agriculture. It becomes more attractive to convert green belt areas into agricultural land. There are real risks – ecological, economic, and social - which the political drive for bioenergy dissemination intensifies. However, sustainable energy generation based on biomass is possible, but it requires the appropriate regulations and economical incentives (Gawel and Purkus 2012:17).

2.6 The Main Advantages and Challenges of Bioenergy Generation

There are many advantages as well as many challenges associated with bioenergy generation. Figure 18 presents the steps of bioenergy generation process as well as different areas of conflict, connected to the use of biomass for energy production.

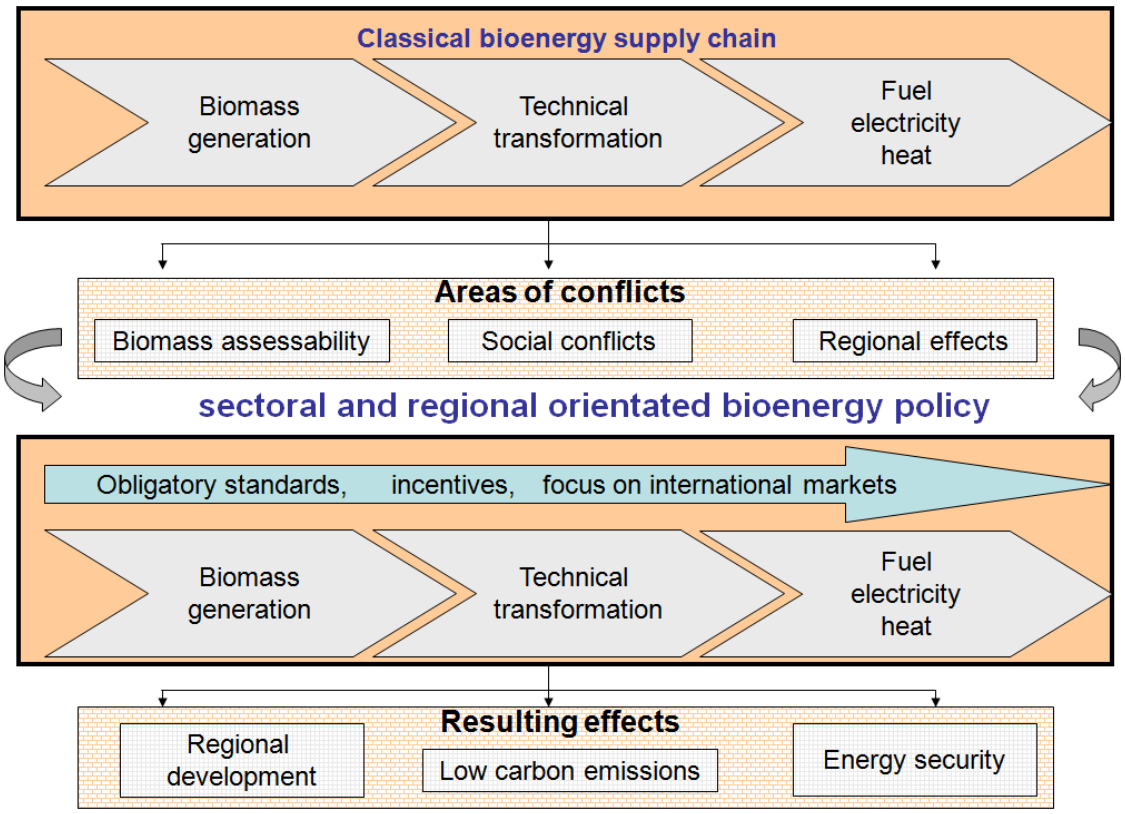


Figure 18: Advantages and critical aspects of bioenergy generation (own design)

On the one hand biomass can be used for additional value added generation in the rural regions. On the other, it is associated with different areas of conflicts of a social, economic and ecological nature.

2.6.1 The Main Benefits of Bioenergy Generation in Rural Regions

The main advantages of bioenergy generation include:

i. **Environmental benefits** – the use of biomass in rural regions is an opportunity to create low carbon rural areas with the bioenegy supply chain based on local resources. Recent studies show that it is possible to meet the heat and electricity demands of a bioenergy village without causing significant land use conflict (Jenssen, König, and Eltrop 2014:78–79). Bioenergy contributes to the reduction of energy related “global” greenhouse gas emissions (Jenssen, König, and Eltrop 2014:75).

ii. **Energy security** – bioenergy reduces the dependency on fossil fuels and increases energy security as a result (Söderberg and Eckerberg 2013:112).

iii. **Flexibility** - biomass for energy generation may be produced from agricultural and pasture land of high quality without putting the world´s food and feed supply at risk assuming increased efficiency of agricultural land-use (Bassam 2010:7). Moreover, biomass can be converted into heat, electricity and fuels by means of different technical processes. It is, therefore, a very flexible renewable energy source (Kaltschmitt & Thrän in Bullinger 2009:351).

iv. **Regional development** - biomass as an input material with high volume and weight should be treated regionally where the best natural conditions are found (Mittelstands Magazin 2011:16), in order to reduce transport costs and external costs like noise and/or smell for the local population. Regional use is connected with additional value added in the regions on account of additional job creation in the bioenergy facilities and biomass suppliers and other participants of the bioenergy supply chain (e.g. logistics companies). Bioenergy generation stimulates the regional and rural economy (Jenssen, König, and Eltrop 2014:75). Bioenergy generation takes place mostly in decentralized energy systems because of the features of biomass. Decentralized bioenergy systems can drive local development through local ownership, and the creation of local employment (Mangoyana and Smith 2011:1286).

Bioenergy generation provides opportunities not only for global and regional development, but also causes conflicts with many interests between diverse players being involved in the complex bioenergy supply chain.

2.6.2 The Main Challenges of Bioenergy Generation in Rural Regions

As ealier stated, there are many challenges associated with bioenergy generation. Some of them are:

i. **Accessibility** and **availability** – biomass, in the case of agricultural crop usage, for energy generation competes with food and fodder production or recreational land use (Beck and Martinot 2004:5; Söderberg and Eckerberg 2013:117). While rural regions have at their disposal enough resources, low settlement density is associated with higher specific costs and higher losses for heat distribution (Jenssen, König, and Eltrop 2014:79).

ii. **Regional negative impacts** – high land use for biomass increases particular emissions in the region as well as having a negative impact on land use (Jenssen, König, and Eltrop 2014:74). Subsidies on domestic bioenergy crop production contribute to the increase of regional food and feed prices and of land prices (Stürmer et al. 2013:570).

iii. **Social conflicts** – bioenergy projects are mostly situated in existing residential areas and their success requires social acceptance (Acosta-Michlik et al. 2011:2791; Jenssen, König, and Eltrop 2014:74–75) and may cause conflict because of additional noise and/or smell.

iv. **Additional initial capital and transaction costs** – bioenergy projects are mostly run on a smaller scale in comparison to conventional energy projects. In border regions, because of the unfamiliarity with technologies and/or cultural differences, more time and information may be required (Beck and Martinot 2004:5). Bioenergy investments generally require higher financing efforts than traditional energy sources. Therefore an additional premium for financing projects with higher risks may be demanded by the capital markets (Reddy and Painuly 2004:1432–1437).

In order to prevent international and intersectoral relocation of emissions, worldwide agreement for reductions of emission would be essential. However a global “Kyoto-mechanism” and therefore a global orientation of energy and land allocation on a standardized carbon dioxide price woul not be expected to be successful, because of low chances for its implementation. Therefore, among others a new focusing of sectoral and regional orientated bioenergy policies is required, involving international markets and the international division of labor (Gawel and Purkus 2012:20).

2.7 A study of the German, Polish and Czech Border Region

2.7.1 Modalities of Renewable Energies

According to the Energy Roadmap 2050 there is a need for rethinking energy markets and paying more attention to the cross-border impact on internal markets. Each national energy system is affected by decisions in neighboring countries (European Commission 2011a:12).
The Directive 2009/28/EC of the European Parliament and of the Council of April 23rd 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC EU point out, that Members Countries are obliged to increase the share of energy from renewable sources in the EU final energy balance by 20 percent in 2020. For Poland the share is to reach 15 percent, for Germany 18 percent and for the Czech Republic 13 percent.

Figure 19 below presents Poland's, the Czech Republic's and Germany's growth of renewable energy in gross final energy consumption from 2006 to 2008, and their renewable energy targets for the year 2020 (final energy consumption).

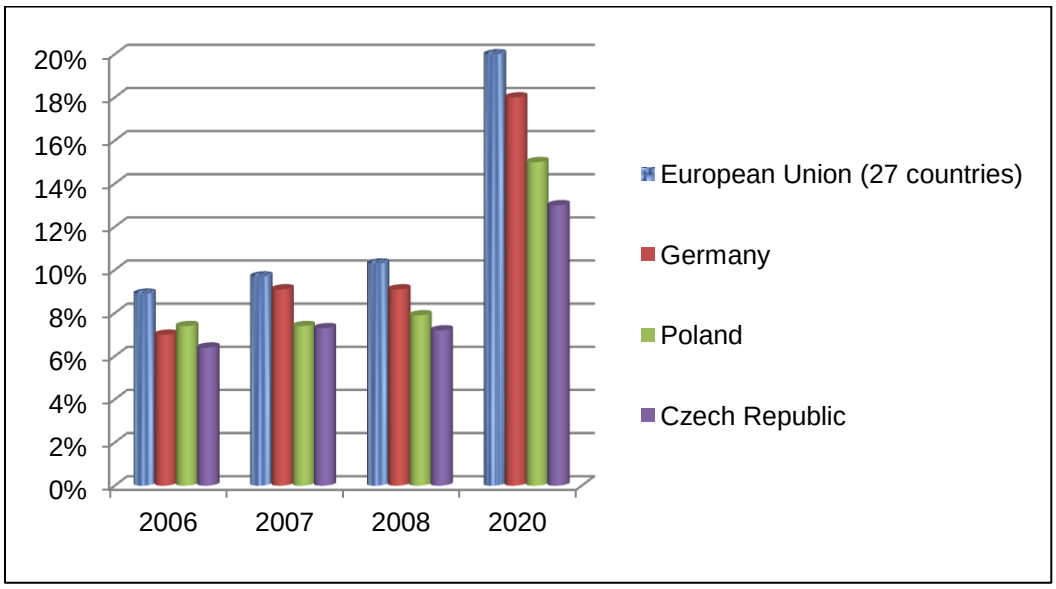


Figure 19: Share of renewable energy in gross final energy consumption (own design based on Eurostat, 2012)

Each of the three countries has different natural conditions regarding renewable energy development. In consequence, not every technology for renewable energy is suitable for each country.

The best opportunity for the successful development of the Polish renewable energy market would be in biomass and wind energy. Due to its current energy resources the important elements of the Polish renewable energy mix by 2020 (25.8 percent in electricity consumption) would be onshore and offshore wind energy (15 percent in electricity consumption) as well as biomass and biogas (8.4 percent in electricity consumption). Hydro energy development, especially small hydro power facilities will also remain a significant part of this energy mix (1.5 percent in electricity consumption). According to the latest predictions, geothermal resources and solar energy for heating will be used much more than in previous years. In the Czech Republic the highest projected electricity consumption from RES comes from biomass and biogas and accounts for seven percent, followed by hydro power, photovoltaic and onshore wind (each three percent in electricity consumption). Germany's 2020 energy policy provides for a constantly growing share of renewable energy, especially in the expansion of offshore and onshore wind energy (25.1 percent in electricity consumption) as well as bioenergy (9.2 percent in electricity consumption). Hydropower, geothermal and photovoltaic energies are projected to amount to 12.7 percent in electricity consumption by 2020 (European Renewable Energy Council 2010a; European Renewable Energy Council 2010b; European Renewable Energy Council 2010c).

This research study focuses on biomass electricity generation, in order to prioritize RES electricity generation in the majority of EU countries working to achieve renewable energy goals by 2020 (see chapter 3.1).

Poland, the Czech Republic and Germany differ not only in retaion to population and land mass, but also in relation to their per capita energy consumption. Germany has the highest electricity consumption / population (7.08 MWh/capita in 2011), followed by the Czech Republic (6.29 MWh/capita in 2011) and finally Poland with approximately half of the German electricity usage (3.88 MWh/capita in 2011) (International Energy Agency 2011).

Figure 20 shows the per capita electricity consumption in the three countries in 2011.

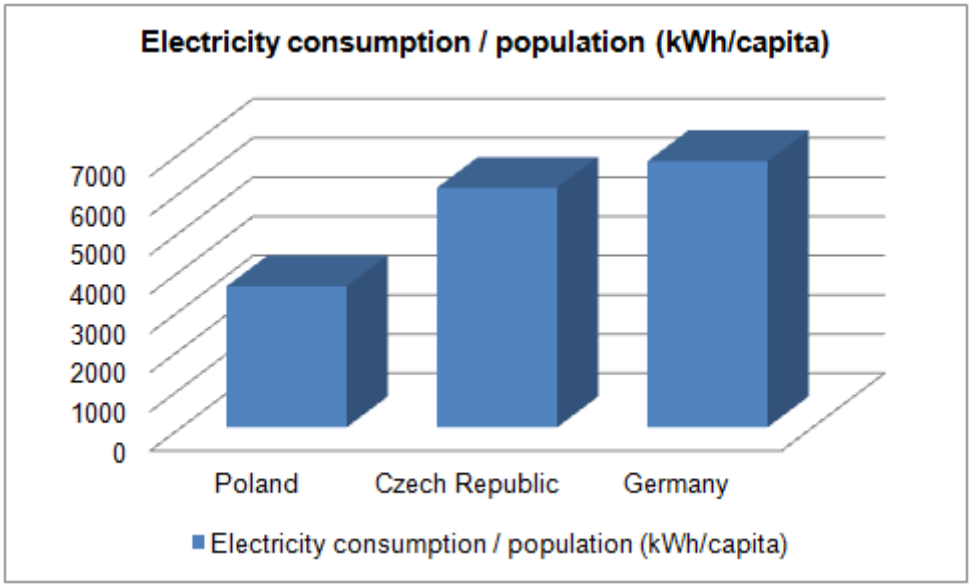


Figure 20: Electricity consumption per capita in 2011 in Poland, the Czech Republic and Germany (own design based on International Energy Agency, 2011)

Polish energy production is based mostly on coal and counts for almost 90 percent of their total electricity production. The main sources of electricity production in the Czech Republic are coal and nuclear energy. Coal counts for almost 60 percent of the total production of electricity and nuclear energy for over 30 percent. Renewable energy amounts to almost 4.5 percent, with the main part hydro energy followed by bio-energy. The German electricity supply is based mostly on brown coal, hard coal, followed by nuclear energy, natural gas and renewable energy (International Energy Agency 2009).

Figure 21 shows the breakdown of electricity generation in Poland and the Czech Republic in 2009, and in Germany in 2010.

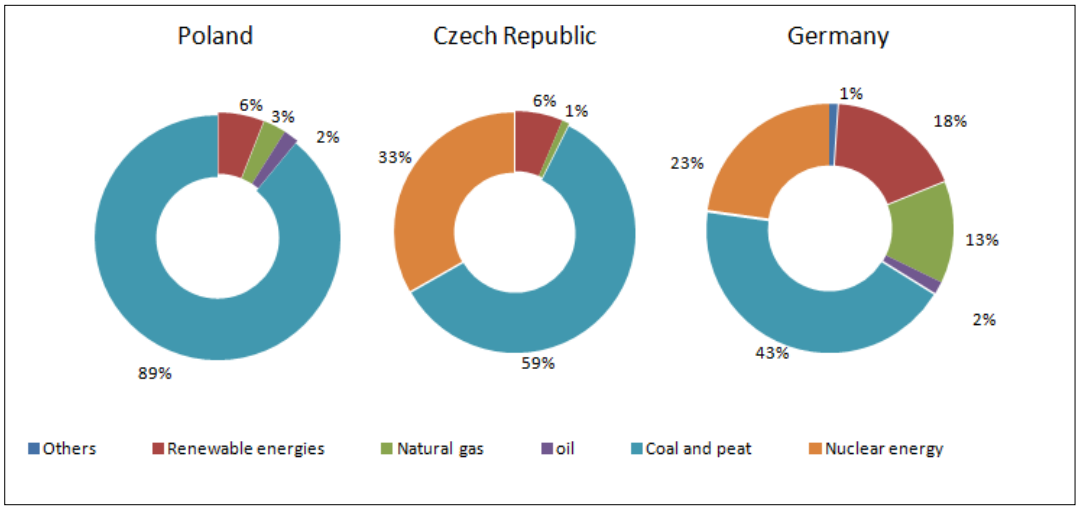


Figure 21: Share of electricity generation in 2009 in Poland, Czech Republic and Germany in 2010 (own design based on International Energy Agency, 2009)

Due to the different energy needs and natural conditions it is important to characterize the electricity generation based on RES in relationship to these factors. With regard to RES electricity production, Germany is the leader in comparison to Poland and the Czech Republic (see Figure 22 below).

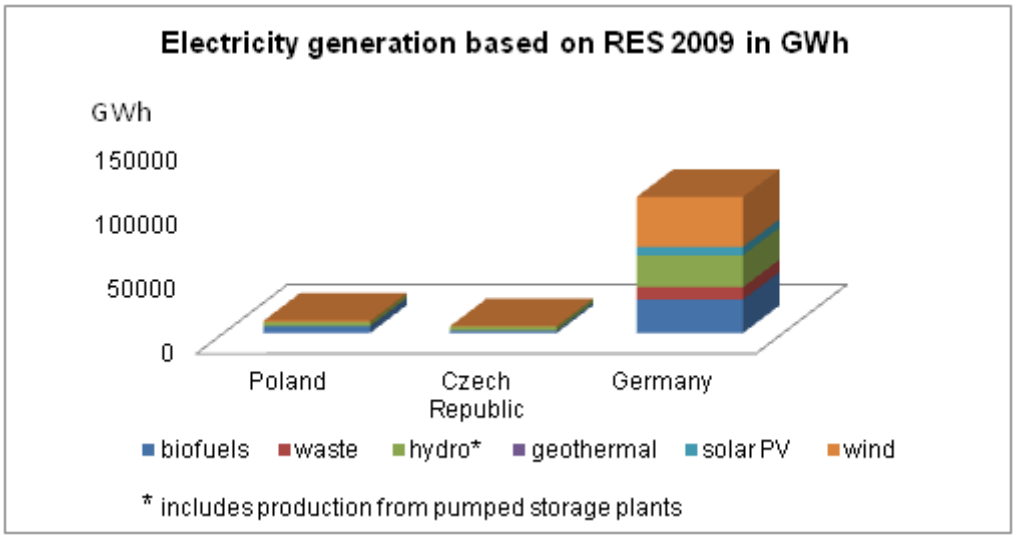


Figure 22: Electricity production based on RES in 2009 (in GWh) (own design based on International Energy Agency, 2009)

The electricity production breakdown from renewable energy in 2009 in the three countries is shown in Figure 23 below.

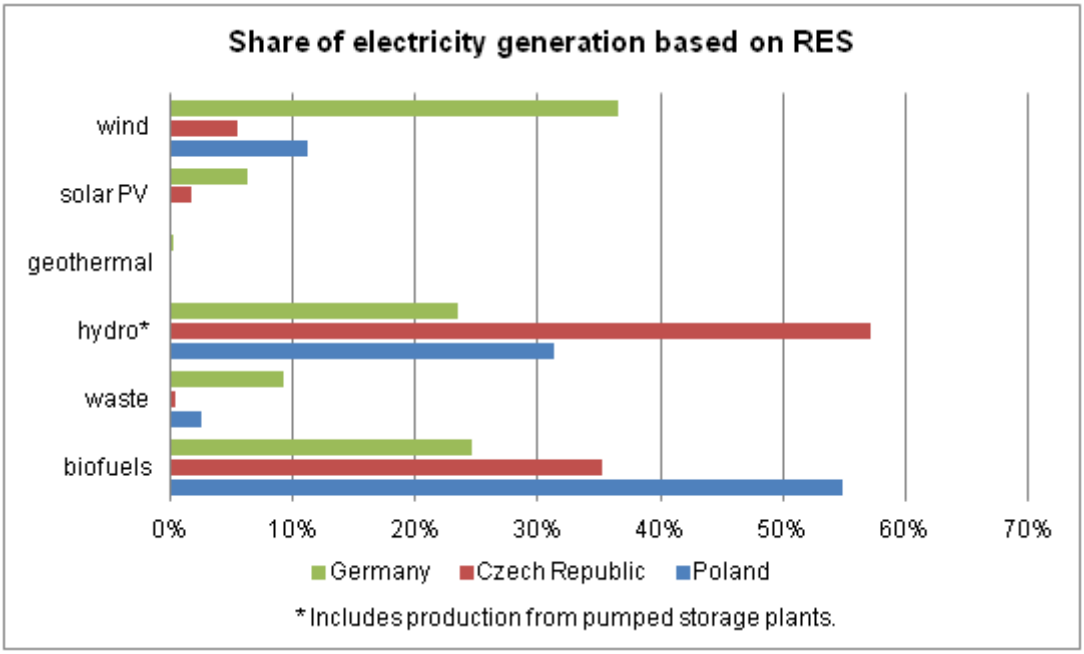


Figure 23: Electricity production from renewable energies by sources in 2009 in Poland, the Czech Republic and in Germany in 2010 (own design based on International Energy Agency, 2009)

Despite the differences in the total amounts of RES electricity production, electricity from biofuels and waste forms a significant part of the renewable energy mix in all three countries. In addition, as the following section shows, in all these countries bioenergy plays an important role in the effort to achieve the 2020 targets.

2.7.2 Electricity Generation based on Biomass in Germany

According to the German government's initial energy plan, renewable energy would form the biggest part of their future energy profile. Conventional energy sources would gradually be replaced by renewable and nuclear energy, with, in time, the intention of only using renewable energy. By 2020 renewable energy use would account for about 18 percent of their gross final energy consumption (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2010:5). The catastrophe at the nuclear reactor in Fukushima, Japan, in March 2011, however, prompted a swift political re-think, with the government advocating a much faster than planned nuclear phase-out. On 30th June and 1st July 2011 the German parliament decided that the use of nuclear power for industrial electricity production would cease by 2022 (Deutscher Bundestag 2011).

The German government confirmed the reorientation of its energy policy, based on the September 2010 energy plan[3]. Next to an accelerated phase-out of nuclear power, further renewable energy dissemination, the rapid expansion and modernization of electricity grids, in tandem with energy efficiency improvements, especially in the areas of buildings, mobility and electricity consumption would be achieved (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:7).

The Free State of Saxony, the German part of the border region location chosen for this research analysis, has created even more ambitious goals - with 28 percent of renewable energy of gross final energy consumption in electricity. Bioenergy generation is expected to increase approximately 30 percent in the next 20 years (Saxon State Ministry for Economy, Technology, Transportation and Saxony State Ministry of the Environment and Agriculture 2012:36–40).

The expansion of renewable energy is a key element of Germany's energy strategy. The rapid development of renewable energy since 1990[4], supported by the introduction and advancement of many effective measures and instruments, is to be continued in the future (Bundesrepublik Deutschland 2010:1).

Development of electricity supply from renewable energy sources in Germany since 2003 is pictured in the Figure 24 below.

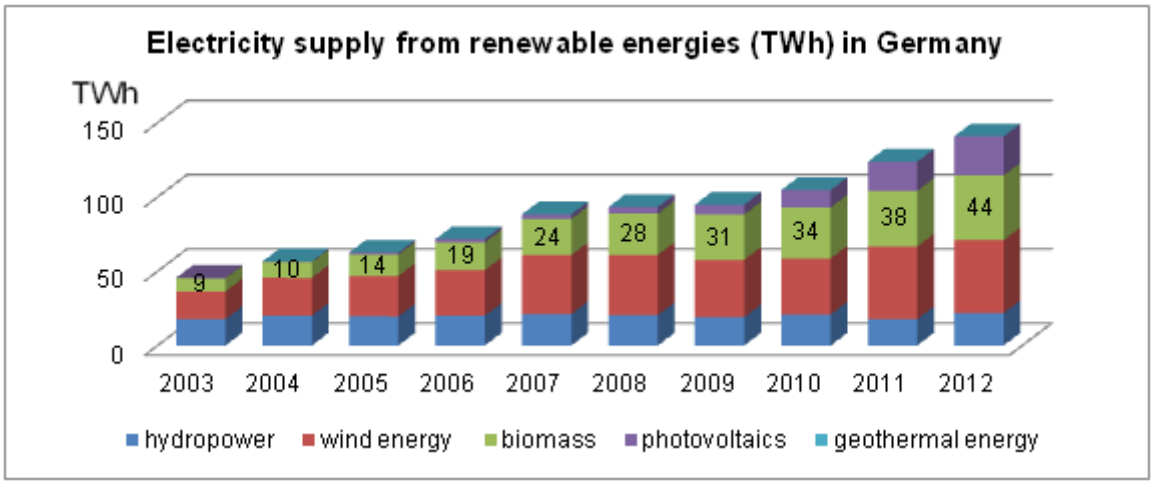


Figure 24: Development of electricity supply from renewable energy sources in Germany (own design based on Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:18)

[3] The Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply from 28th September 2010 (so called *Energy Concept 2050*) emphasizes the need for renewable energy dissemination broader than the national action plan and also identified energy efficiency development as a key factor. The Concept presents a long-term overall strategy from the period up to the year 2050 to achieve an environmentally sound, reliable and affordable energy supply, underlining the growing role of renewable energy as a driver of innovation and modernization in the energy infrastructure (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2010).

[4] Total renewable energies consumption has increased fivefold, from two percent in 1990 to approximately ten percent in 2009.

The renewable energy share of gross electricity consumption in Germany rose from 3.4 percent in 1990 to 23.6 percent in 2012 and is expected to achieve a minimum target of 35 percent by 2020. Electricity generation based on biomass plays an important role in current German energy supplies (see Figure 25 below). Moreover, this trend of power generation from biomass has continued over several years (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013a:11–13).

Measures to promote the production of electricity from renewable energy sources, taking into account the action resulting from the 2005-2010 climate change commitments in the European Union are showing positive effects. The German target to achieve an RES share in its national electricity market of at least 12.5 percent by 2010 was actually surpassed and reached 17 percent. This growth in the renewables sector has been improved thanks to, among others, a number of federal-level support schemes (e.g. Market Incentives Program) and other such schemes at land and local authority level, in addition to the Renewable Energy Sources Act (Erneuerbare Energien Gesetz - EEG) and the Renewable Energies Heat Act (Erneuerbare Energien Wärme Gesetz - EEWärmeG) (Federal Ministry for the Environment (BMU) and Nature Conservation and Nuclear Safety 2011:4). Since the enactment of the EEG in 2000, installed capacity for electricity generation based on renewable supply has increased more than six-fold (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:21). The contribution of biomass to final energy (electricity, heat, motor fuels) of renewables in Germany by 2050 is expected to remain dominant (Pregger, Nitsch, and Naegler 2013:354).

The trends in electricity production from whole biomass (including biogenic solid fuels and liquid biomass, biogas, sewage gas and landfill gas and the biogenic fraction of waste) in Germany since 1990 are presented in Figure 25 below.

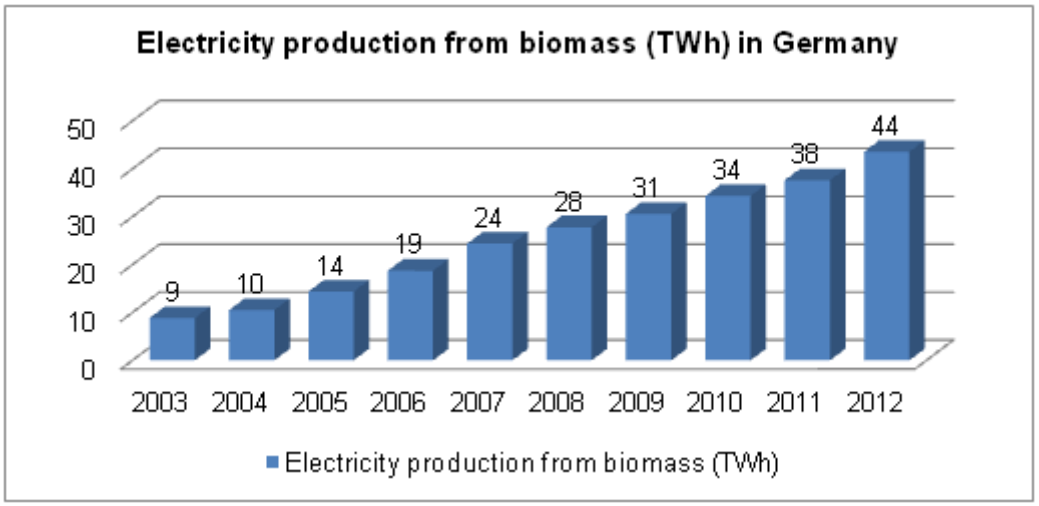


Figure 25: Electricity production from total biomass in Germany (own design based on Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:18)

The production of electricity from biomass in Germany has seen rapid growth since 2003, fostered, in part, by the numerous improvements initiated by the 2004, 2009, and 2012 amendments to the EEG, particularly in relation to biogas. The largest share of the total bioenergy supply was based on solid biomass. Electricity generation from the total biomass rose from 19 percent of total electricity generation in 2003 to 31 percent (43.5 TWh) of total electricity generation in 2012 (142.41 TWh). The average growth rate of installed capacity in the electricity sector based on biomass amounted in 2012 to 16.9 percent, lower than photovoltaic (60.2 percent), but higher than other RES like hydropower,(1.2 percent) and wind energy (14.6 percent) (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:16–21).

On 8th April 2014 the German government introduced a new amendment to the EEG. And whilst the new legislation has proved a great success, further changes are still required in order to facilitate the better coordination of renewable energy dissemination. The new amendment aims to temper the increase in costs of renewable energy dissemination, it aims to distribute these costs more fairly, and it aims to further develop renewable energy market integration (Federal Ministry for Economic Affairs and Energy 2014a). In the case of biomass, the direction in Germany is to focus the financial support on residual materials, along with implementing more financial incentives for biogas installation in order to increase the flexibility of generated electricity on the market (Federal Ministry for Economic Affairs and Energy 2014b:12).

2.7.3 Electricity Generation based on Biomass in Poland

The Polish energy economy is based mostly on coal. More than 60 percent of its energy generation comes from coal and 88 percent of its electricity generation is also based on coal. The reason for this high Figure is the availability of coal as a local natural resource and the low energy production costs associated with coal. On the one hand, the use of coal is positive when one considers Poland's security in relation to national energy. On the other, however, it is negative when one considers the associated high CO_2 emission (Polish Ministry of Economy, Ministry of Environment 2011:4).

The Polish energy policy is nonetheless aligned to the European strategy of encouraging the increase of RES in all energy areas. In accordance with the "Energy Safety and Environment - Strategy 2020" of 4th May 2011, the Polish government has set new 2020 goals for the energy sector in an effort to ensure a reliable and competitive energy supply. Renewable energy plays an important role in meeting these energy goals and is expected to reach 15 percent of RES by 2020 (Polish Ministry of Economy, Ministry of Environment 2011:24). Already passed into law, the "2030 Polish Energy Policy" of 10th November 2009 requires RES dis-

semination to reach at least 15 percent by 2020 (Polish Minister of Economy, Ministry of Economy 2009:19). Moreover, in the "National Action Plan" of 7th December 2010, prompted by the EU Directive 2009/28/WE, the Polish government has laid out specific plans and goals for RES dissemination. According to the latest forecasts, by 2020 around 15.5 percent of energy usage will come from RES, with the highest usage from electricity production (19.13 percent), followed by heating and cooling energy (17.05 percent) and transport (10.14 percent) (Polish Minister of Economy, Ministry of Economy 2010a:21). Furthermore, the Polish government has prepared a very ambitious strategy paper on the development of biogas installations. According to the "Directions for the Development of Agriculture Biogas Plants in Poland 2010 – 2020," in each village in Poland there should be at least one agriculture biogas installation built, which would result in approximately one GW installed electricity capacity - 11-times more than that of 2010 (90 MW) (Polish Minister of Economy, Ministry of Economy 2010b:3). However, it is a very ambitious plan and will be difficult to achieve.

Figure 26 below shows the development of electricity generation based on RES in Poland since 2003.

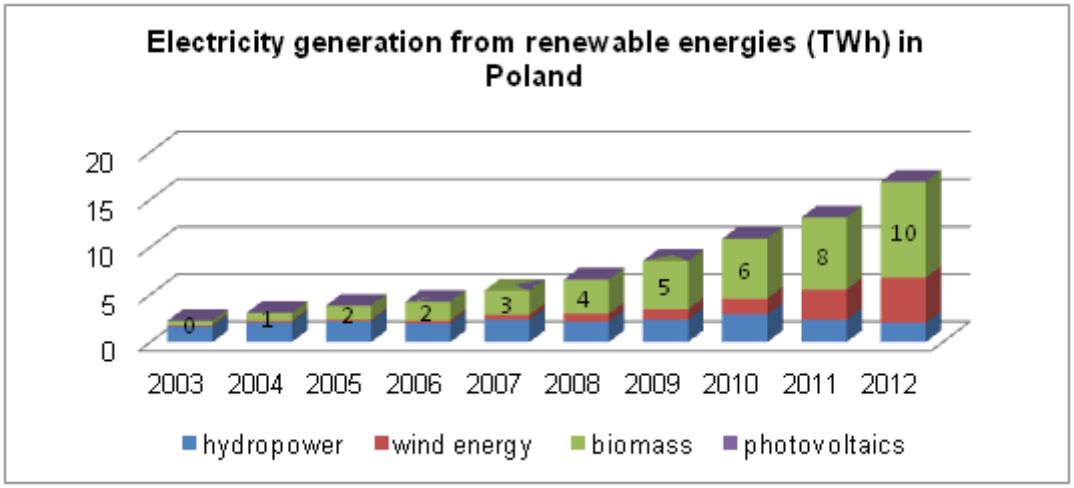


Figure 26: Electricity generation based on RES in Poland (own design based on Polish Central Statistical Office 2013:57)

Only 10.9 percent of primary energy came from renewable energy sources in 2011. Around 60 percent of electricity generation based on renewable energy was generated from biomass in 2012. The main contribution had energy based on solid biomass (94 percent of which 76 percent was co-incineration) (Polish Central Statistical Office 2013:57). Even though the market for renewable energy in Poland is still not significant and the government supports rapid dissemination of nuclear power, the market for RES does have significant potential. The main driver for renewable energy in Poland is biomass, mostly in co-firing applications, followed by wind energy (Warsaw Business Journal 2010:22). The Polish biomass market is concentrated primarily on wood residues and is continuously developing, especially in rela-

tion to the use of biomass in co-firing with coal for electricity production and heat (Burcz et al. 2010:21). Figure 27 below shows the main trends in electricity production based on biomass.

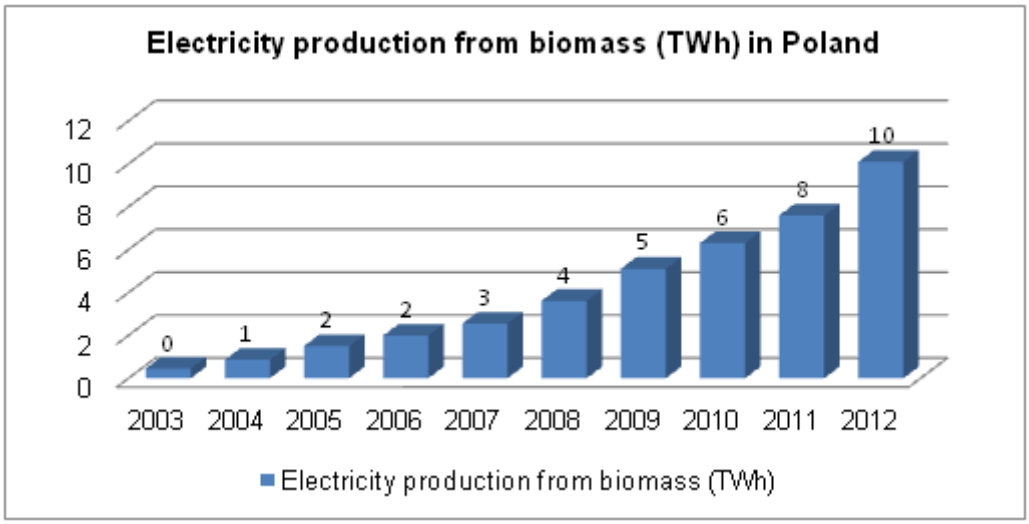


Figure 27: Electricity production in plants using biomass in Poland from 2005 to 2010 Poland (own design based on Polish Central Statistical Office 2013:57)

However, if we consider generating capacity excluding co-incineration installation, at the end of 2010 the total installed generating electricity capacity from biomass amounted to only 356 MW. This relates specifically to dedicated units, not including co-incineration installations, given the large variations in the percentage share of biomass (in the entire fuel stream) in respect of those sources. According to the latest forecasts, the growing trend for electricity production from biomass is set to continue, especially due to the growth of a distributed generation on the basis of the combined production of electric power and heat. In the biomass co-incineration process, biomass from waste and energy crops should be used more often in order to encourage the use of biomass other than forest biomass. Forest biomass should be used primarily in the wood, pulp and paper, and plywood industries, before it can be used for energy generation (Polish Minister of Economy, Ministry of Economy 2011:15–16).

2.7.4 Electricity Generation based on Biomass in the Czech Republic

Due to its own natural resources, the Czech Republic has one of the lowest energy import dependencies in the European Union (Costa Jordão et al. 2011) and is the world's sixth largest exporter of electricity (Sivek, Kavina, Jirásek, et al. 2012:650).

Current electricity production in the Czech Republic is based largely on coal (54.7 percent) and nuclear power (32.7 percent) (Sivek, Kavina, Jirásek, et al. 2012:650). Renewable energy sources supplied approximately 5.66 percent of the gross electricity generation mix in 2009, with the highest share achieved through hydropower, followed by biomass (Sivek, Kavina, Malečková, et al. 2012:471–472). The country is highly dependent on the import of

crude oil and natural gas, mainly from Russia. According to the its National Energy Conception, the safe supply of energy at reasonable prices shall be guaranteed primarily by the use of all available domestic energy sources and the best available global technologies in the most environmentally friendly manner. The Czech Republic does plan to increase its production and use of renewable energy in electricity, heating, cooling and transport. By 2020 renewable energy should account for 13 percent of the Czech final energy consumption (Czech Ministry of Industry and Trade 2010). The government has actually increased this target of 13 percent to 13.5 percent for renewable energy (Vobr 2011). Figure 28 below shows the development of electricity generation based on RES in the Czech Republic since 2004.

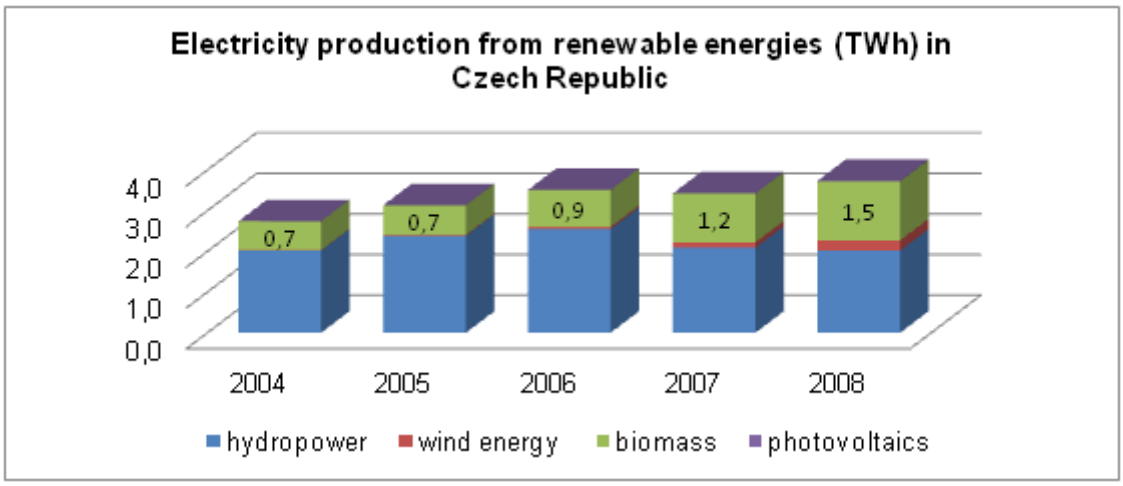


Figure 28: Electricity generation based on RES in the Czech Republic (own design based on Czech Ministry of Industry and Trade, Energy Regulatory Office, and Ministry of Environment of the Czech Republic 2009:8)

Biomass in the Czech Republic is mostly used in heat production. The use of fossil fuel has meant there are no problems in relation to the supply of biomass. In 2008 total production of biomass-based electricity amounted to 1,5 GWh which is 20 percent more than the previous year, as indicated in Figure 34 below (Czech Ministry of Industry and Trade, Energy Regulatory Office, and Ministry of Environment of the Czech Republic 2009:8). According to the latest forecasts, it is expected that, by 2030, biomass will contribute to approximately 80 - 85 percent of the total amount of renewable energy sources used both in electricity generation and heat generation (Havlíčková, Weger, and Knápek 2011:1946).

Figure 29 shows electricity generated in the Czech Republic from 2004 to 2008.

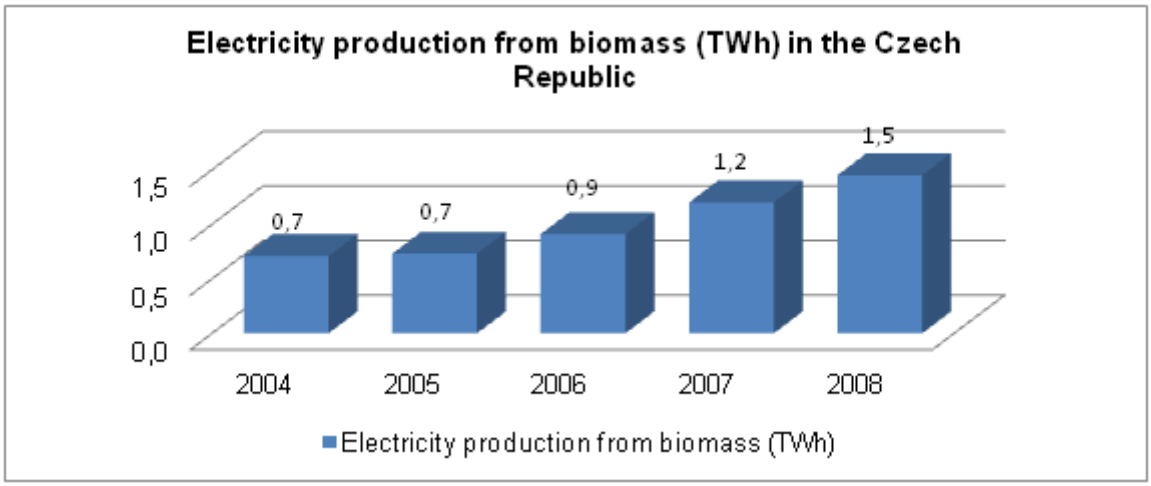


Figure 29: Electricity production and in plants using biomass in the Czech Republic from 2003 to 2008 (own design based on Czech Ministry of Industry and Trade, Energy Regulatory Office, and Ministry of Environment of the Czech Republic 2009:8)

Up to 70% of biomass in the Czech Republic is used to produce heat, mostly from waste biomass in the form of sawdust, wood chips and cellulosic ethanol, resources which have the advantage of being annually available. Biomass is also exported from the Czech Republic (Czech Ministry of Industry and Trade, Energy Regulatory Office, and Ministry of Environment of the Czech Republic 2009:9–11). Currently the most important ways of using biomass for energy purposes in the Czech Republic is the combustion, biogas production or production of methyl and ethyl alcohol (Tluka and Jelínek 2009:17).

In 2010 the Czech Republic achieved 8.24 percent of gross electricity consumption and met the indicative percentage target of renewable energy in gross electricity consumption, by implementing the EU Directive 2001/77/EC. The largest share, next to electricity, came from hydroelectric power plants (47.7 percent) and biomass power plants (25.8 percent) (Sivek, Kavina, Malečková, et al. 2012:469).

In Germany, Poland, and the Czech Republic, biomass plays an important role in the effort to achieve the EC directed 2020 renewable energy targets. In the electricity generation sector based on renewable energy especially, biomass is the most important and sustainable energy source. In all three countries the prioritisation of renewable energy can be keenly observed (Bundesrepublik Deutschland 2010:1; European Renewable Energy Council 2010a:1; Stryjecki 2010:23). Therefore the following analysis concerning possible obstacles and supporting factors for bioenergy dissemination in the context of a border region location is focused on the border regions between Poland, Germany and the Czech Republic.

2.7.5 The Geographical Scope and Character of the Cross-Border Research Area

Germany, the Czech Republic and Poland are divided into the following NUT levels:

Country	NUT1	No.	NUT2	No.	NUT3	No.	LAU[1] 1	LAU 2
Germany	Länder	16	Regierungs-bezirke	38	**Kreise**	412	Verwaltungs-gemeinschaften	Gemeinden
Czech Republic	Území	1	Oblasti	8	**Kraje**	14	Okresy	Obce
Poland	Regiony	6	Województwa	16	**Podregiony**	66	Powiaty i miasta na prawach powiatu	Gminy

Table 1: Correspondence between the NUTS levels and the national administrative units in 2007 (own design based on Eurostat 2011:9–11)

According to the so-called "BioEnergyNet" study regarding biomass' potential and its use in relation to energy generation, transport distances are limiting factors, from both an economical and ecological point of view. The long-distance transport of silage especially (up to 100 km), prompts high green house gas emissions, and diminishes, in consequence, the ecological advantages of biomass use for energy production (BioEnergyNet 2011). The economic efficiency of the transport of biomass depends on how the customer views the situation. Different studies advise that the distance between 30 km and 50 km is economically viable (IfaS Institut für angewandtes Stoffstrommanagement am Umwelt-Campus Birkenfeld 2007:48–49). Therefore, the following analysis has been confined to a region with a radius of approximately 50km from the German, Polish and Czech borders (see Figure 30 below).

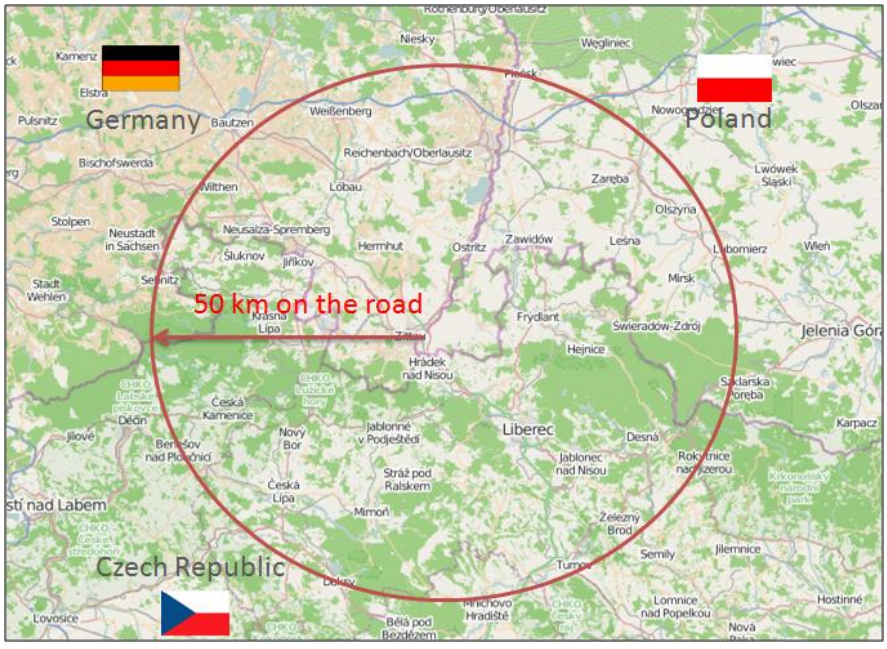


Figure 30: 50 km radius in the three-corner border region of Poland, Germany and the Czech Republic (own design based on Google Map)

Those NUT 3 regions of Poland, Germany and the Czech Republic, which are located in this 50 km radius, have been chosen for further analysis, as follows.

Code / Region	NUT1	NUT2	NUT3
CZ0	ČESKÁ REPUBLIKA		
CZ04	Severozápad		
CZ042			Ústecký kraj
CZ05		Severovýchod	
CZ051			Liberecký kraj
DED	SACHSEN		
DED2		Dresden	
DED2C			Bautzen
DED2D			Görlitz
PL5	REGION POŁUDNIOWO-ZACHODNI		
PL51		Dolnośląskie	
PL515			Jeleniogórski

Table 2: Selection of subregions in the German-Czech-Polish border area (own adaptation based on Eurostat 2011:29;35;109)

In Germany as well as in the Czech Republic, the NUT3 regions comply with administrative unities and therefore corresponding participants in the stakeholder group “policy advisors and permission bodies” can be easily identified. In order to achieve the same position with regard to stakeholders in Poland, the infrastructure of the Polish NUT3 region has to be further developed. The following Local Administrative Units (LAU) belong to the Jeleniogórski NUT3 region.

No.	LAU 1 regions being part of the Polish NUT3 Jeleniogórski region
1	Zgorzelecki
2	Lubanski
3	Lwówecki
4	Miasto Jelenia Góra
5	Jeleniogórski
6	Kamiennogórski
7	Jaworski
8	Złotoryjski
9	Boleslawiecki

Table 3: LAU 1 regions being part of the NUT3 Jeleniogórski region (own design based on(Polish Central Statistical Office 2014)

In the following analysis the term ***German border region*** refers to the NUT3 regions of Bautzen and Görlitz; the term ***Polish border region*** refers to the NUT3 region of Jeleniogórski, and the term ***Czech border region*** refers to the NUT 3 regions of Liberecký and Ústecký.

Figure 31 shows the geographical scope of the regions chosen for the case study.

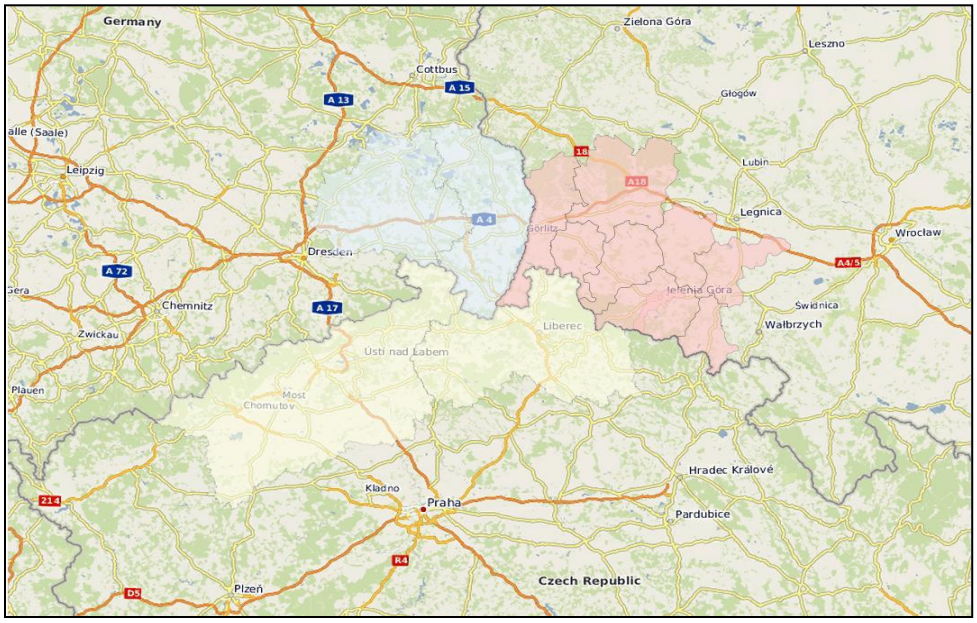


Figure 31: Map of the cross-border area between Germany, Poland and the Czech Republic (Map: © OpenStreetMap and contributor, CC-BY-SA).

The border regions in the EU provide an interesting opportunity for investigation. There is great potential to expand cross-border cooperation, via the EU Cohesion Policy. In an effort to overcome typical border region obstacles, such as lower grade transport infrastructure or less access to services and markets, the EU provides significant support in the area of cross-border cooperation (European Union 2010:16; 61).

On the world stage Western and Eastern Europe play an important role in international trade (Lehmann and Steinbrecher 2012:5). In Saxony's (East German Province) neighboring countries (Poland and the Czech Republic) there is much promise regarding the dissemination of renewable energy. In the recent study "GreenTech – Made in Saxony", the current main market for Saxon environmental technology is Western Europe, followed by Central and Eastern Europe. However, Saxon companies have predicted that by 2020 the opposite trend will materialize, with Central and Eastern Europe becoming the core markets for green technology. According to Saxon company forecasts, Poland and the Czech Republic hold, and will continue to hold, the leading positions within Central and Eastern European countries. In the field of renewable energy technology, German Saxony's most important growth markets will be located in Poland and the Czech Republic (Roland Berger Strategy Consultant 2009:59). Saxon companies have experienced great advantages due to their long-term private and business contacts from the 1990ies, their geographical proximity to the east and the fact that Saxon companies are more familiar with the business cultures of Eastern Europe compared with their competitors from Western Germany and other European countries. As a

result of a high demand for green technology, directly, or indirectly, from the state, this industrial sector is less affected by economic fluctuation (Roland Berger Strategy Consultant 2009:83).

Regarding the energy outlook for Lower Silesia, where the Polish border region is located, the rate of renewable energy production will increase by 2020, in line with the rest of the country. The economic potential of RES in Lower Silesia is comparable with the rest of the country, due to the impact of similar basic conditions. According to forecasts, all RES will increase by 2020 – electricity production tenfold, heat production twofold and biofuels almost twentyfold. Additional taxes for coal and for natural gas make them less attractive, while fossil fuel prices are also likely to rise. On the other hand, according to forecasts, new technologies will become more favorable (Graczyk 2010:17–19). There is great potential to exceed renewable energy production in Lower Silesia, but a lack of modern technology and experienced operators is slowing down this development. Having established a new cooperation with the Saxon environment technology provider, Lower Silesian companies, municipalities and decision makers are now using local business development offers e.g. participation in excursions and trade promotion meetings (Saxony Economic Development Corporation 2011).

As a result of the regional energy plan for the Czech Liberec region, the highest potential for RES dissemination by 2025 is bio-energy production, followed by wind energy. Solar, geothermal and hydro energy remain insignificant. Biomass is expected to be the most popular RES in the Liberec Czech border region as well as in the Czech Republic. The regional municipality intends to support green technologies with spatial planning due to increase the energy self-supply (Henelová, Jakubes, and Hrubý 2010). According to the Liberec Region Development Program 2007-2011, the utilization of renewable energy resources and energy savings should be further supported (Liberecky Kraj 2011).

There are several programs, so called cross-country cooperation agreements, for the utilization of biomass and renewable energies between the Czech Republic and the neighbouring countries of Poland and Eastern Germany (Saxony). These subsidies are based on EU structural funds (Tluka and Jelínek 2009:17). An example of German – Polish cooperation is the Bio-GEPOIT project (Biomass German-Polish Implementation Task). In April 2009, the German and Polish Ministers of Agriculture initiated a German-Polish working group for the utilization of renewable energies, focusing on the energy use of biomass. The main goal of this bi-lateral cooperation was the exchange of information and experience on the subject of renewable energy and the identification of possible future projects (Tempel 2009:36). In the border region between Germany and the Czech Republic, there is an initiative to coordinate

bioenergy production in a sustainable way. The BioEnergyNet – Network for Biomass and Renewable Energies in Lusatia and Northern Bohemia aims to support and influence the mass flows, especially for bioenergy production in the border region, through networking and an interactive map. Moreover, to support cooperation between universities, research organizations and companies in the field of bioenergy and other renewable energies in this cross-border region, the Competence Centre for Bioenergy and Renewable Energy has been established at the University of Supplied Science in Zittau/Görlitz, Saxony (BioEnergyNet 2011). Moreover the Saxony Economic Development Corporation (Wirtschaftsförderung Sachsen -WFS) regularly supports contacts between establishments to provide access to domestic and foreign markets. It also provides support in the field of environmental technology, with the aim of creating sales and cooperation opportunities for Saxon companies in Central and Eastern European markets. In cooperation with the Polish Centre for Technology Transfer in Wroclaw, the WFS has encouraged eleven Saxon environmental companies to establish contacts through co-operation and technology transfer with the Polish market in the Lower Silesia region under the slogan "*Renewables made in SAXONY!"* In the follow-up project "*Environment – Poland '11*" cooperation, focused on the biogas and waste market, is planned with Polish agriculture, technology presentations, company excursions and cooperation meetings (Saxony Economic Development Corporation 2011).

3 Literature Review and Theoretical Framework

3.1 Introduction

This chapter aims to provide a problem statement by means of a comprehensive review of the literature on key concepts relating to drivers and barriers for renewable energy and especially bioenergy dissemination with the focus on European border regions. In addition, it explains the need for the research undertaken and underlines its relevance in the context of the current research gap.

The overall purposes of this chapter are:

- to point out the interdisciplinary and international character of the research work;
- to indicate where the thesis is situated within the existing knowledge about renewable energies, bioenergy and border regions;
- to consider theoretical frameworks through which the barriers and drivers for bioenergy generation in border regions will be examined;
- to elaborate theoretical approaches adopted in order to find out potentially existing drivers and obstacles for bioenergy typical for border regions as well as strategies to overcome the barriers and to strengthen the drivers;
- to reiterate the main aims of the research, formulate the research questions as a basis for exploration in the empirical part of the thesis.

This chapter situates the research in the context of the existing literature and research in the field of bioenergy, barriers and drivers for its dissemination as well as the meaning of bioenergy in EU border regions by critical literature review. Finally, a list of main research questions follows and an overview is given, about what kind of approach was implemented to answer them.

The research work is characterized by an interdisciplinary character presented by different socio-economic and behavioral drivers and barriers for bioenergy generation. In addition, the empirical part of the research takes place in three border regions in three different countries. The international character of the study allows for the comparison of country specific results leading to a comprehensive subject matter overview.

3.2 Literature Review

3.2.1 Barriers and Drivers to Renewable Energies and Bioenergy

For the success of future energy systems it is essential to ensure a sustainable bioenergy generation as well as a high efficient allocation of biomass and land resources. However the current market for bioenergy is not able to manage these challenges due to existing barriers (Gawel and Purkus 2012:18).

The term *"barrier"* can be defined as a constraint negatively impacting on the implementation of bioenergy systems (McCormick and Kaberger 2007:450) and *"driver"* as a incentive for bioenergy development (Adams et al. 2011:1217).

Studies on key barriers and drivers to expand bioenergy in the EU such as Adam et al (2011), Mondal et al. (2010), Marks and Czerpowicki (2010), Rohdin et al. (2007) and Roos et al. (1999) are undertaken from different perspectives and identify distinct kinds of incentives and obstacles. Depending on the stages of the project's development chain there are different drivers and barriers for bioenergy dissemination. Stakeholders' perceptions of drivers and barriers, as well as barrier-removals and measures, vary across the groups. It is necessary therefore to involve different stakeholders in their identification and building of strategies to overcome the barriers (Adams et al. 2011:1219)

An analysis of the subject matter shows that there has been much research carried out on drivers and barriers for renewable energies and bioenergy generation, for instance:

i. **Adams et al.** (2011) treats of the main barriers and drivers for the United Kingdom bioenergy development. This study has identified a range of barriers and drivers for UK bioenergy development by means of literature review and case study review. The assessment of possible barriers and drivers was based only on online questionnaires, reducing direct contact with the respondents. Further analysis of critical factors based solely on exsisting literature do not enable the researcher to identify new impact factors. Finally, the focus on the UK market does not include the international impact on the internal market and does not allow for a comparison with other regions.
ii. **Marks and Czerepowicki** (2010) treats of the main non-cost barriers of renewable energy growth in the EU Member States. The main goal of this paper is to identify barriers exsisting in all EU Member States and to propose possible measures to deal with them. This study focuses not only on non-financial and non-technical factors, but includes results from different countries and presents international differences. Structured interviews with stakeholders from different EU Member States allow for the col-

lection of international points of view on the matter, but it is limited to subjective views of small group of stakeholders.

iii. **Granade et al.** (2009) – in this paper, the authors, by means of an analysis of existing literature discuss the benefits of energy efficiency and the barriers that negatively impact on energy efficiency. Barriers are categorized both from an overall system perspective and at the level of individual opportunities. Results of this research include the possible implementation of strategies to capture energy efficiency in a holistic way.

iv. **Lewis and Wiser** (2007) – this research focuses on an analysis of national and subnational policies supporting the wind industry and offers comparisons in different countries. The motivation of establishing a local wind power industry and the different ways to increase attraction of large wind turbine manufacturing companies are also investigated. The methodological approach is based on literature review and the analysis of statistical data. In consequence, the motivations of wind sector companies can be deduced only indirectly.

v. **McCormick and Kaberger** (2007) – this study investigates the main barriers for bioenergy in the EU. The applied methodological design based on the triangulation of three methods is quite interesting: industry interactions with industrial stakeholders, research workshops with participants from research institutes around bioenergy as well as six case studies located in six different Member States. However the number of participants is very limited and the different case studies are difficult to compare because of the diversitiy in bioenergy systems.

vi. **Altman and Johnson** (2008) analyzes the arguments for the importance of market organization in the development of agro-bioenergy industries. In this study, the authors focus only on the importance of market organization in the development of bioenergy industries, omitting other existing barriers.

vii. **Roos et al.** (1999) discusses barriers and drivers in bioenergy market growth. The authors used interviews with representatives at different levels of the bioenergy chain. Further, they analyzed reports, statistics and scientific analysis concerning these five real bioenergy markets. The opinions of different stakeholders brought new insights to the problem, however the number interviewed was very limited.

viii. **Reddy and Painuly** (2004) treats of the diffusion of renewable energy technologies using different stakeholders´ perspectives. This is relevant because of the applied methodological approach, using surveys administered to households, captains of industry, commercial enterprises and policy experts. This study presents results based on opinions across a broad range of participants.

Previous studies of bioenergy development have identified different kinds of barriers and drivers and classify them according to diverse categories. The most common classification of drivers and barriers for renewable energy and bioenergy development contains the following five categories (Beck and Martinot 2004:3–5; Oikonomou et al. 2009:4879–4881; Reddy and Painuly 2004:1437; Rohdin, Thollander, and Solding 2007:674; Rösch and Kaltschmitt 1999:348–355; Tsoutsos and Stamboulis 2005:754–756):

i. technological;
ii. environmental;
iii. social/ public opinion;
iv. economic;
v. regulatory.

This classification is based on a different method of analysis, similar to the socio-economic indicators provided annually by Eurostat (Oikonomou et al. 2009:4880).

Another classification offers the approach of **Granade et al.** (2009), which explores the different kinds of barriers of U.S. energy efficiency and suggests that to unlock the full potential of any given opportunity, barriers should be addressed in a holistic way. The authors seperated the individual barriers into three main categories:

i. **Structural barriers** are those barriers which prevent the end-user from having the choice to capture what would otherwise be an attractive energy efficiency option.
ii. **Behavioral barriers** occur when the lack of awareness or inertia of an end-user blocks the creation of an opportunity.
iii. **Availability barriers** appear when an end-user interested and willing to pursue an opportunity but cannot access it in an acceptable form.

This categorization leads to the formulation of opportunity-specific solution strategies in the form of an overarching strategy (Granade et al. 2009:7).

The use of biomass for energy generation in rural border regions has not only many advantages; there are also some limitations.

3.2.2 Advantages and Limitations of Bioenergy in Cross-Border Areas

Those European border regions of a rural character dominated by agriculture and forestry, can benefit from the cultivation and utilization of biomass for energy generation. Bioenergy generation is an alternative and additional way for agriculture and forestry to create regional value and a new source of income. Therefore, it can be said that bioenergy generation supports regional economic development in structurally weak regions (Borsig, Knappe, and Kriszan 2007; Nienaber and Neumann 2008:1).

Bioenergy and other renewable energy technologies can contribute to the reduction of the human influence on climate change, the growth of sustainability in the power sector and the growth of power supply security (Eltawil, Zhengming, and Yuan 2009:2245). Hence bioenergy deployment increases regional and rural development opportunities, based on a domestic industry and employment opportunities. Further benefits include income generation which complement and diversify the sources of income of the local population (Plieninger, Bens, and Hüttl 2006:123).

Regions with a high dependence on the agricultural sector, high unemployment rates and a scarcity of regional development alternatives should be supported by regional development policies in order to reduce regional differences and enhance life quality. These policies can take advantage of the deployment of renewable energy projects. However, it is not always possible to pursue renewable energy deployment due to political reasons. Environmental technology investment policies may also have considerable costs; some of these may be paid by the local population (i.e. increasing negative environmental externalities) while others (the costs of promotion) are paid by consumers and taxpayers (del Río, Tarancón Morán, and Albiñana 2010:1172).

3.2.3 Drivers and Barriers for Bioenergy in Germany, Poland and the Czech Republic

According to Marks and Czerepowicki (2010), renewable energy non-cost barriers in the EU can be classified into 6 groups, with each group showing a different degree of barrier – the lowest for group 1, and the highest for group 6. Figure 32 below shows the barrier classification pertinent to Poland, Germany and the Czech Republic.

EU Members are obliged to implement a European legal framework supporting the development of renewable energy in order to achieve the common RES goal by 2020. In Germany, Poland, and the Czech Republic the EU Directive 2009/28/EC has been incorporated into law. However, in each of these countries different drivers and obstacles for bioenergy dissemination have been identified, decribed now in the following section.

3.2.3.1 Drivers and Barriers in Germany

One of the drivers for renewable energy and bioenergy development in Germany is that stakeholders consider the **administrative procedures** involved quite favourable. Smaller installations, if authorization is required at all, are eligible for so called “one-stop shopping”. Most of the larger installations (like large biomass and biogas plants) require the relevant authorisation according to the Federal Immission Control Act (from 26th September 2002). This procedure is considered rather complex, but contains a so-called “concentration effect”, that is, it includes almost all the other necessary authorizations and therefore allows one-stop shopping for large installations also. This makes the procedure very time efficient (Brückmann, Piria, and Tupy 2010:11).

Further support factors for bioenergy dissemination include still remarkable biomass **potential** for bioenergy production in Germany and their use can be expanded in a considerable way (Tempel 2009:27;31).

A positive consequence of renewable energy dissemination in Germany is significant **employment creation** and employment security, with employment in the sector having increased steadily in recent years (Lehr, Lutz, and Edler 2012:359). Over 39,000 new jobs were created between 2004 and 2008 (a rise from 56,800 to 95,800), and according to the latest forecasts, the trend is set to continue over the next number of years. The current expectation is that there could potentially be around 400,000 employees by 2020 working in the renewable energy sector (Tempel 2009:31). Agricultural bioenergy production offers possibilities also in the area of **income diversification** for farmers, increasing the value of farm resources (Grundmann, Ehlers, and Uckert 2012:118).

According to the latest forecasts, by 2050 **costs** in relation to electricity generation based on biomass **will fall**, accelerating as a result the development of bioenergy (Selder 2014:305).

One barrier, however, is that the rapid development of energy crops for bioenergy generation has caused both negative as well as positive **impacts on the environment and land use sustainability**. While significant net reduction in greenhouse gas emissions and fossil energy consumption can readily be observed when bioenergy replaces fossil energy, an increase in biomass cultivation could strengthen the competition between energy crops and the production of food and fodder, leading to uniform and monotonous landscapes (Lupp et al. 2014:297).

A second barrier of bioenergy dissemination relates to **multi-purpose biomass usage**. Most experts agree that a cascading approach should be used when it comes to biomass: 1. food, 2. forage, 3. material use, 4. energy use. The German government supports the use of residues, by-products, and waste material in the creation of energy as these do not compete with food/fodder or material biomass resources. German legislation, the Renewable Energy Act, promotes the use of these resources (Tempel 2009:34).

Another obstacle for bioenergy generation is that biomass is ubiquitous and in abundant supply. It can therefore be reasonably expected, especially in the area of biogas, that plant productions would decrease, and biomass prices increase (Selder 2014:308).

A further barrier relates to the federal system in Germany, and the fact that there are **two different authorization procedures**: the first for large scale systems (i.e. the federal procedure), in accordance with the Federal Immission Control Act, and the second for small scale systems, with a regional authorization process, in accordance with the respective building

legislation of each German Federal State. Federal procedures apply if a biomass plant has a larger impact on the environment and allows one-stop shopping. As a consequence, paradoxically, the installation of a small system with a lower environmental impact can be more complicated than a larger one, because the authorization process is subject to the regional permission process, according to the law of the individual Federal States. In most cases, however, most plants are large scale plants and fall under the scope of the Federal Immission Control Act (Brückmann, Piria, and Tupy 2010:14).

While appropriate regulations have been established in recent years in Germany in order to ensure optimum conditions for the grid access of biogas (Brückmann, Piria, and Tupy 2010:10), a **knowledge and experience** deficit at local government level regarding biomass plant authorization processes can still be observed, resulting in poor decisions being made, and in higher requirements for one installation in comparison to another (Brückmann, Piria, and Tupy 2010:14). In the case of biogas systems, for example, there is so much **competing legislation** (e.g. building legislation, waste material legislation, fertilizer legislation, water legislation, on top of European legislation), that at times, the legislation does not complement one another. Moreover, each Federal States applies the law differently (Brückmann, Piria, and Tupy 2010:15).

Another barrier is **inexistent or insufficient spatial planning** – for example, in the case of biogas systems, the definition with regard to which installations are privileged is unclear. Privileged buildings are those which can be installed or renovated without the need of a spatial planning process. According to the Federal Building Code (“Baugesetzbuch”) biogas plants can be installed in the outer zone as privileged buildings. If the biogas plant is not classified as privileged according to § 35 para 1 Federal Building Code, permission is only granted if the spatial plan foresees no priority areas for the utilization of biogas and if the biogas plant fulfils certain requirements. These requirements are included in the Federal Building Code in a quite unspecific way (Brückmann, Piria, and Tupy 2010:21).

In the case of biomass systems and the need for the protection of the environment, **competing public interests** can be observed. Environmental Impact Assessments can lead to application procedures over a very long term – as much as to two years sometimes. In the case of the injection of biogas into the natural gas grid, the main barrier is the lack of cooperation on the side of the grid operators (Brückmann, Piria, and Tupy 2010:10–26).

In the case of biomass plant authorization, **lower acceptance** is a barrier for bioenergy dissemination in comparison to more popular renewable energy technologies. Biogas installations have the reputation of being emitters of smell and promotors of traffic congestion. Re-

gional municipalities can therefore tend to impede the construction of these technologies (Brückmann, Piria, and Tupy 2010:12).

3.2.3.2 Drivers and Barriers in Poland

One of the drivers for bioenergy development in Poland is the **climate and soil condition** for plant cultivation, which is favorable for energy crop cultivation. Due to its agricultural character, Poland has good conditions for the development of technologies based on biomass (Budzianowski 2012:343; Igliński et al. 2011:3000; 3006). In the Polish rural regions, the most common energy supply sources, such as coal or wood, are not expensive and are easily accessible (Polish Ministry of Economy, Ministry of Environment 2011:1–26).

The most important renewable energy source in Poland is solid biomass – this amounted to 86.9 percent of total RES production in 2008, and is expected to be the fastest growing future energy source (Burcz et al. 2010:3).

A further driver is the **information** on support measures for bioenergy development available to investors. Information is usually distributed and managed either locally, via the internet, or at contact centres at the various institutions (Marks and Czerepowicki 2010:27).

Another positive factor is the fact, that bioenergy production based on local resources, offers **opportunities for the development** and activation of small regions and improving the self-supply of electrical energy and heat (Igliński et al. 2012:4898).

One of the obstacles to the dissemination of RES in a political region like Lower Silesia is the instability of the Polish legal system (Nowakowski 2010). Guidelines for the development of energy systems in this region are ineffective, with poor economic supervision generating economic risk (Szalbierz 2010). There are also a lot of barriers within the **legal framework**, itself which have a negative impact on direct foreign investment in Poland. The most significant obstacles are those relating to the taking advantage of the available forms of financial support. Moreover, complex taxation regulations and difficulties in communicating with the institutions providing support, greatly hinder investment planning (Igliński et al. 2012:3006; Polish Information and Foreign Investment Agency 2010:6–8). A long waiting time in relation to the obtaining of environmental decisions, and problems with getting agricultural biogas plants connected to the grid can also be keenly observed (Igliński et al. 2012:4898). The main obstacles to the development of RES installations in Poland are of a legal character, mostly connected with tiresome and troublesome procedures. In the case of biomass combustion facilities administrative procedures are perceived as unclear and long lasting be-

cause of the fact that authorities in different regions or with other responsibilities sometimes apply common regulations in a different way (Marks and Czerepowicki 2010:8;19).

Another barrier is the **high investment capital** needed for biogas technology implementation and it is therefore unattractive financially to farmers (Marks and Czerepowicki 2010:10).

The **Polish support system** for RES expansion based on quotas (tradable certificates) is also an obstacle. Quotas are unfavorable for bioenergy dissemination - for example, for small-scale biogas power plants the Polish premiums are only 49 percent of German premiums (Budzianowski 2012:343). According to Polish law[5], companies which produce and sell energy are obliged to obtain and present for redemption certificates of origin. If they do not show for redemption enough RES certificates or alternatively do not pay substitution fees, they receive a penalty fee, which is not lower than 130 percent of the the substitution fee, fixed for the given year by the Energy Regulatory Office. Also, investors still have difficulties in relation to funding sources (Igliński et al. 2012:4894–4898). In the case of some national support schemes - for example, projects financed by national and regional funds (NFOŚiGW – National Fund for Environmental Protection and Water Management and WFOŚiGW – Regional Fund for Environmental Protection and Water Management), only small-scale investments (in the case of biomass technology < 3MW units) are eligible for support, which causes a barrier for the development of medium size projects (Marks and Czerepowicki 2010:16).

A further obstacle in the successful diffusion of renewable energies in Lower Silesia is the difficulty in the development of appropriate **distribution grids**, caused by a lack of real heat supply plans in municipalities, deficencies in legal regulations concerning land property, a lack of new investment coordination, and strong land holders rights (Sobański 2010). Moreover, existing energy distribution grids are of bad quality. All these factors complicate the dissemination of renewable energy and its connection with the grid (Polish Ministry of Economy, Ministry of Environment 2011:1–26).

Even though regional municipalities are responsible for the planning of energy supply, they neglect their duty because of financial obstacles, **skills shortages** and a lack of conviction (Polish Ministry of Economy, Ministry of Environment 2011:1–26). Further, there is no national appointed certification body that would be a centre for excellence, training and assessing the quality of the system or equipment in Poland (Marks and Czerepowicki 2010:31).

Long decision-making processes of local authorities can be a consequence of **insufficient knowledge** on the benefits of RES (Marks and Czerepowicki 2010:9) and impede further the

[5] Ordinance of Ministry of Economy of 14th August 2008 specifying a range of obligations of obtaining and presenting for redemption certificates of origin, paying a substitution fee, purchasing electrical power and heat from renewable energy sources and an obligation to confirm the data on electrical power produced in a renewable energy source. Journal of Law, no 156, item 969.

possibility of bioenergy development. There is still only a limited number of specialist companies and qualified specialists working on designing, constructing and exploiting biomass plants (Igliński et al. 2012:4898). A further lack of coordination between the different authorities responsible for spatial planning can also be observed. There are local spatial development plans in the case of only approximately 20 percent of the area of Poland (Marks and Czerepowicki 2010:20).

Another barrier is the **low level of environmental awareness** that does not accept the dissemination of green technology, nor the initial costs involved in taking a different direction in the development and provision of energy (Sobański 2010). In the main, due to a lack of knowledge, local inhabitants are skeptical biomass plants (Igliński et al. 2012:4898). One of the most difficult barriers of biogas dissemination in Poland is the lack of regional acceptance, prompted specifically by a lack of knowledge (Licznerski, Polskie Stowarzyszenie Biogazu, and Pomorza 2011) and the lack of communication with the local community (Marks and Czerepowicki 2010:12).

Despite the different obstacles, energy producers in Poland plan to increase bioenergy generation in the coming years (Igliński et al. 2011:3006). Especially in the biogas sector, forecasts indicate an increase in the planned power of installed biogas plants (Igliński et al. 2012:4897). The Polish border region of Lower Silesia recognizes also the need for the dissemination of RES, especially hydro-electric power stations, and the extension and modernization of power grids for the distribution of electricity and heat production (Regional Operational Program for the Lower Silesian Voivodship for 2007-2013) (Sobański 2010).

3.2.3.3 Drivers and Barriers in the Czech Republic

One of the drivers for bioenergy dissemination in the Czech Republic is the existing support system for renewable energy. As a result of the implementation of a support system for renewable energy (Act on the Support of Electricity from RES, 2005) and **feed-in tariffs** and **green bonuses on RES electricity**, further expansion especially in the electricity sector can be observed (Dodokova and Ouwens 2010:9).

A further driver is the fact that **biomass is still available** for energy generation. The potential of arable land available for the development of non-food production is still considerable. The development of the non-food use of biomass has also positive regional effects - it can contribute to the development of agriculture and rural areas, enhance employment and improve the efficiency of farm management (Tluka and Jelínek 2009:16–17). However, about 45 percent of the agricultural land is located in mountainous and sub-mountainous areas with a lower potential for conventional production. This land can be used for the growing of

biomas, such as fast growing trees or canary grass. Other sources of biomass can be difficult to access (Havlíčková, Weger, and Knápek 2011:1946; 1954).

A further supportive environment in the Czech policy can be observed. The Ministry of the Environment is responsible for the promotion of bioenergy and other renewable energies in the Czech Republic. However the Ministry of Industry and Trade prepares the State Energy Policy, and has recently been showing a **positive attitude** towards biomass in comparison to the Ministry of Environment (Dodokova and Ouwens 2010:29).

One of the barriers for biomass use for energy purposes is the **competition of use** in relation to biomass sources. The increased use of biomass for energy purposes in the Czech Republic could be a factor contributing to the rise in food prices (Sivek, Kavina, Malečková, et al. 2012:474).

One of the principle barriers to the further deployment of RES, also bioenergy in the Czech Republic, is the **discrepancy between the formally declared support of RES and the actual actions of the Czech Government** (Ministry of Environment). Insufficient public awareness has been raised through campaigns on RES conducted by the central state administration (one in 2009, with little effect). Moreover, official state representatives have cast a damning light on RES, in public speeches, as the reason for energy price increases. Strong lobbying from the biggest Czech electricity producer ČEZ, influences the official government position, which stresses the need for the further development of nuclear power plants and the further utilization of coal (Dodokova and Ouwens 2010:9).

A further obstacle is the fact that operators of biogas and biomass power plants have to deal with **costly, prolonged and unclear guidelines in relation to Environmental Impact Assessment Reports** (EIA). Such environmental screening procedure can be especially difficult and result in a negative opinion, when the relevant authorities do not favour the particular technology (Dodokova and Ouwens 2010:14).

Another recent barrier to bioenergy and other renewable energies, which has been in place only since February 2010, is the **ban on connecting new RES power plants**. The Czech company TSO CEPS, which is in charge of maintaining the reliability and stability of the electricity network, claims that the network cannot accept further unreliable sources of electricity without risking black-outs. Unofficially it is presumed that due to the slight decrease in its profits, energy suppliers are interested more in building new nuclear power plants and maintaining the operation of coal power than in the dissemination of RES. New RES power plants are being operated and run, mainly by foreign investors, something which might be a great challenge to the national operators, especially as the Czech Republic is already an energy exporter (Dodokova and Ouwens 2010:9).

A further barrier is a **lack of legal support** (feed-in tariff / green bonus) for the process of **upgrading biogas** to green gas, although this process was identified as costly. Biogas plant operators don´t have sufficient knowledge of the technology and support programs. Infrastructure owners are not willing to move towards green gas. They are only interested in the promotion of natural gas. There are **no incentives** for them to **accomodate biogas** (Dodokova and Ouwens 2010:39–40).

In the biogas sector the officials' lack of information leads to a negative approach to bioenergy. Moreover, in biomass utilization stakeholders express concerns about the input quantities and have fears concerning the need for biomass imports. Due to a **lack of information and awareness on the part of local government officials** concerning bioenergy technology administrative procedures can be negatively affected. Biogas installations are not favoured by officials - they claim that such installations are smelly or attract flies, which transmit several diseases (Dodokova and Ouwens 2010:10–11; 28).

RES projects may be also difficult to carry out close to tourist sites, given the local economy is greatly dependent on tourism. In the cross-border region between Poland, the Czech Republic and Germany, where tourism is a strong service provider, renewable energy projects can encounter resistance from local municipalities and residents, especially if they are not effectively communicated.

Table 4 offers a summarized view of the barriers and drivers in each country

Country	Germany	Poland	Czech Republic
Drivers	▪ availability of legal framework for renewable energy dissemination ▪ availability of biomass potentials ▪ value added in rural regions and securing employment ▪ effective administrative procedure ("one-stop shopping") ▪ good legal regulations for grid access for biogas ▪ falling costs of biomass electricity production	▪ availability of legal framework for renewable energy dissemination ▪ agricultural character (climate and soil conditions) and availability biomass potentials ▪ sufficient availability of information on support measures ▪ chances for regional development in rural areas	▪ availability of legal framework for renewable energy dissemination ▪ biomass potentials from marginal agricultural lands ▪ positive regional effects ▪ positive attitude of Ministry of Industry and Trade
Barriers	▪ competition of biomass use ▪ possible negative impact environment ▪ inefficient general administrative procedures: — inconsistent application of authorization law — lack of knowledge and experience in the administrations — complexity of investment process ▪ inexistent or insufficient spatial planning ▪ competing public interests ▪ missing acceptance of regional municipalities	▪ availability of natural resources: coal and wood ▪ high investment costs and difficult access to the funding ▪ legal framework and its instability ▪ poor economical incentives ▪ infrastructure development ▪ missing acceptance of regional municipalities and skills shortages ▪ low level environmental awareness	▪ competition of biomass use ▪ accessibility of biomass potentials ▪ government`s negative approach ▪ unclear administrative procedures ▪ difficulties with connection to the grids ▪ no encouragement for biogas upgrading ▪ lack of incentives for infrastructure owners to open to biogas ▪ lack of information and official awareness

Table 4: Overview of main drivers and barriers for bioenergy expansion in Germany Poland and the Czech Republic according to the current studies (own design)

It can be seen that there are some common problems and drivers, but also some unique ones seen only in particular countries. In all three countries a legal framework for renewable energy dissemination is perceived as positive. Moreover, each country seems to have some biomass potential for biomass generation still available. Competition of biomass use and administrative procedures occur in each country as a barrier for further bioenergy dissemination. This analysis offers the researcher a solid basis for the preparation and conducting of expert interviews. Those aspects, which will be not confirmed by the interviewed experts in the first phase of the research, will be also considered in the questionnaire in the second phase of the analysis.

3.3 Theoretical Framework

3.3.1 Research Approach Adopted for the Analysis

Building on previous conceptual and empirical research, this research work argues also for the perspective of different stakeholders of the bioenergy generation process. Therefore among others the approach of Adams et al. (2011) has been adopted and developed for the further research in this work, analyzing different stages of bioenergy projects implementation: technical and project development; project modification; design approval and construction monitoring; performance testing and handover; as well as operation and maintenance. The four main stakeholders that have an influence on the supply chain of bioenergy generation and use are: feedstock supplier, plant developers/owners, government department policy advisors and primary end-users (Adams et al. 2011:1219). However this research focuses only on critical factors and drivers within the UK, without consideration of international inter-dependences. Because of the fact that supply chains become increasingly inter-regional, sustainable energy generation is even more difficult. Based on the fact that there are different obstacles for a European sustainable bioenergy strategy, a single country policy has only a small chance to be successful when it comes to sustainable and efficient resources allocation. Moreover the scope of this policy is only regional (Gawel and Purkus 2012:18). Therefore it is necessary to search for **international approaches** to solve these problems. The supply chain of bioenergy generation can be in this case affected, not only by legal, political and economic frameworks, but also the framework of neighboring countries.

This research extends the approach of Adams et al. (2011) and focuses on biomass-based electricity generation in the context of the inter-regional and international field of action. Political and legal frameworks influence not only the region where they have been implemented originally, they can have impacts also on other regions' social, economic and ecological dimension of sustainability. Therefore it is important to assess the development of pathways for bioenergy including different regions (Acosta-Michlik et al. 2011:2791). The focus of this research is on **border regions**, which are disadvantaged due to their border location and eligible for support programs in the frame of the European Regional Development Fund (European Union 2010:61).

There is a limited amount of academic research linked to renewable energy in border regions. This research makes a contribution to these strategic considerations by means of focusing on the special role of border regions in the process of renewable energy dissemination as well as of analysis of applicable strategies for bioenergy increase in a common economic European region.

In comparison to the **Adams et al.** (2011) approach, **Marks and Czerepowicki** (2010) approach and **Granade et al.** (2009) approach this research study:

(1) after critical literature reviews, explores the perception of existing drivers and barriers typical for European rural border regions by means of in-depth expert interviews conducted with stakeholders from different countries. This approach was chosen, similar to Marks and Czerepowicki (2010) because it is more important to identify the current and probably future problems, than trying to find out which already known barriers can occur in each country. Reliable and comparable data on existing barriers for bioenergy growth like e.g. data on the impact of administrative procedures in terms of costs and/or time are not available in most EU countries. Therefore subjective evaluation of affected stakeholders is necessary to explore the issue (Marks and Czerepowicki 2010:18).

(2) offers not only a list of possible drivers and barriers but also measures to overcome existing barriers will be assessed by means of survey in order to formulate applicable strategies for European, national and local policy and government. In comparison to ADAMS et al survey was conducted not only online but also during conferences and postal, considerate the special features of each stakeholder group.

(3) classifies and analyzes identified barriers and drivers, and formulates appropriate strategies and measures to deal with them. An analysis of the existing obstacles to bioenergy development is important in order to recognize the opportunities to overcome the barriers and to formulate strategies and recommend possible policies to deal with them (Beck and Martinot 2004; Kaltschmitt, Streicher, and Wiese 2007; Tsoutsos and Stamboulis 2005). This approach suggests that in order to unlock the full potential of any given opportunity, it is necessary to address all drivers and barriers in a holistic way rather than each barrier separately. Different barriers occur both at the individual opportunity level and at the overall system level (Granade et al. 2009:6–7). Because of the fact that bioenergy potential is also fragmented and spread across many biomass producers (forestry, agriculture, waste management) similar to energy efficiency potential, drivers and barriers can be seen as opportunity-specific drivers and barriers. These drivers and barriers require opportunity-specific solution strategies and an overarching strategy.

The individual opportunity, obstacles and incentives will be grouped in three broad categories: structural, behavioral and availability, as Figure 33 shows.

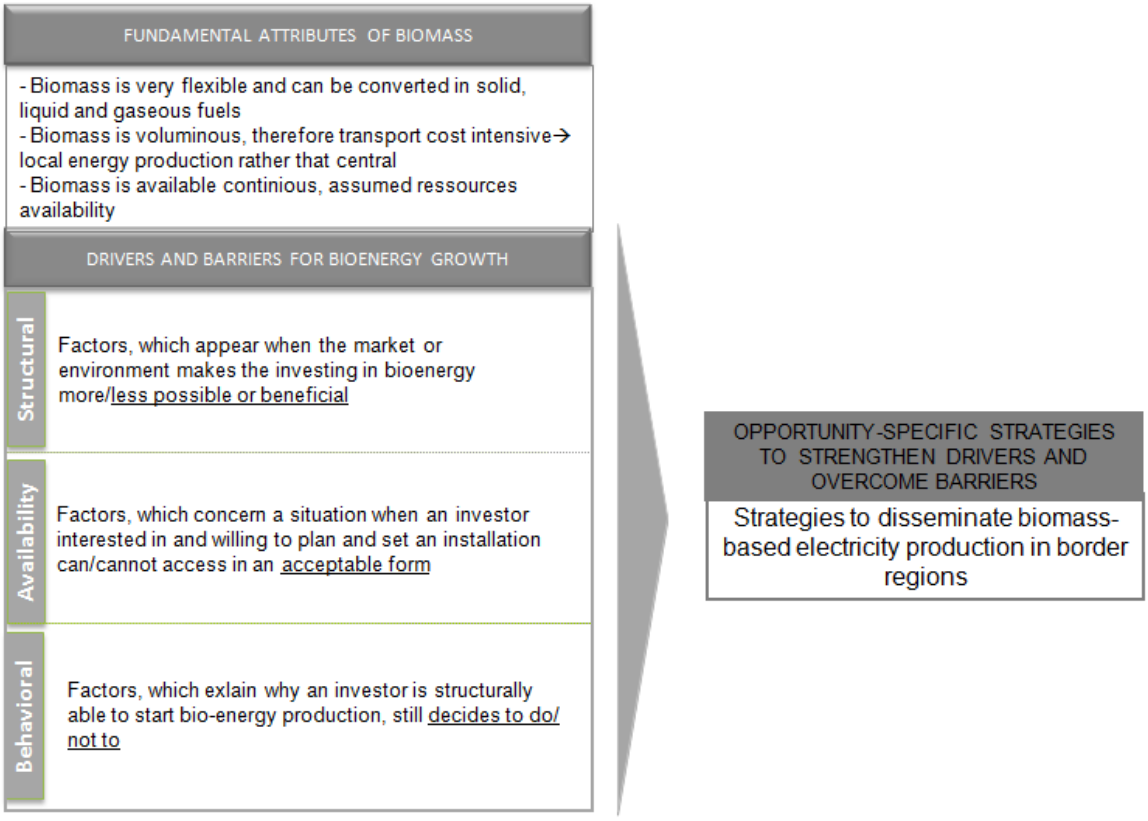


Figure 33: Scheme for barriers and strategies for dissemination of biomass-based electricity in rural border regions (own design based on Granade et al. 2009:7)

The classification of barriers is based on the **Granade et al.** (2009) approach and has been adopted for bioenergy generation as follows:

i. **Structural drivers** support the bioenergy stakeholders to produce biomass and energy as well as the use of bioenergy as an attractive biomass sales, investment and energy supply option. **Structural barriers** occur in a situation where the market or the environment makes the investing in biomass less possible or beneficial e.g. because of existing transaction costs. Bioenergy projects are mostly smaller than conventional energy projects and especially in cross-border regions may require additional information and additional time or attention to finance or to permit, because of the unfamiliarity with the technologies or cultural differences in international cooperation (Beck and Martinot 2004:3).

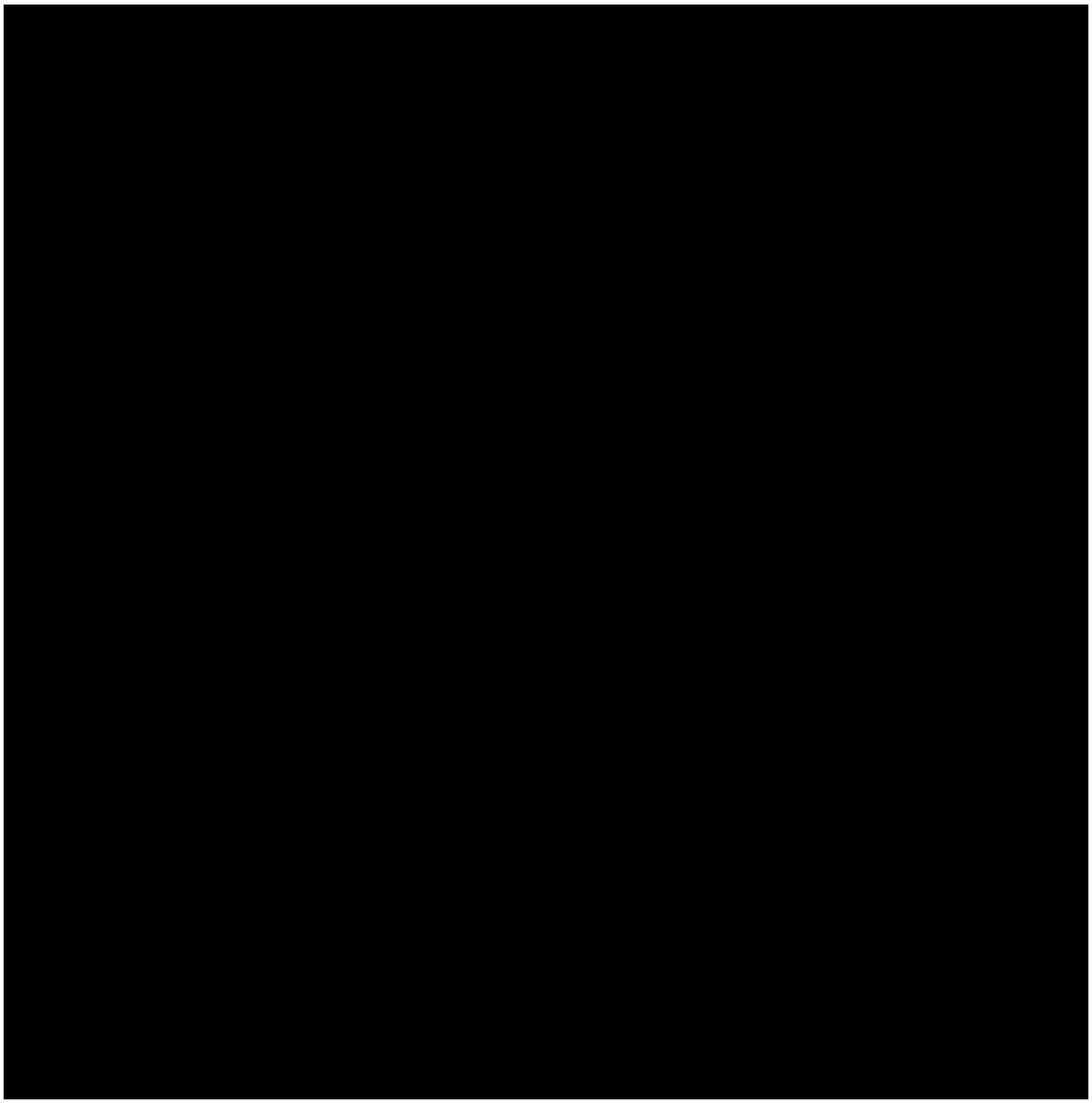
ii. **Availability drivers** promote bioenergy production because of the availability of the relevant resources (financial, human and land). **Availability barriers** occur when the stakeholders along the bioenergy supply chain are interested and willing to develop bioenergy but are impeded from doing so - for example when an investor intends to build and run a bioenergy installation, but does not have enough feedstock for his/her plant (Adams et al. 2011:1220).

iii. **Behavioral drivers** are incentives which aim to enhance the perception of an investor concerning bioenergy. **Behavioral barriers** explain why an investor who is structurally able to start bio-energy generation, still decides not to. For example in the case of little experience with new technologies in a new application or region, even proven and cost-effective technologies may still be perceived as technically risky in comparison to conventional energy sources (Adams et al. 2011:1220).

Based on this categorization, opportunity-specific solution strategies as an overarching strategy will be drawn.

In the approach of **Adams et al.** (2011) drivers for and barriers to the bioenergy dissemination have been identified by means of a literature review as well as an analysis of existing case studies from the United Kingdom (UK) bioenergy project. Online surveys were carried out for each of the four stakeholder groups in which the respondents were asked to assess the importance of listed barriers and drivers.

The main drivers and barriers to bioenergy development identified by Adams et al. (2011) for the four main stakeholder groups are reproduced in Table 5 and 6 below.



Feedstock Supplier	Plant developers / Owners
i. Attractiveness of a growing bioenergy market ii. Availability of financial support iii. Good technique for waste utilization iv. Market diversification v. Meeting governmental energy/carbon/waste targets vi. Other environmental benefits (other than CO2 reduction) vii. Possible reduction in carbon emissions viii. Profitable return on investment ix. Reduction in fossil-based fuels	i. Availability of financial reward/support mechanisms ii. Bioenergy supply consistency vs. other intermittent energy options iii. Bioenergy use versatility iv. Increased bioenergy interest from end-user v. Market diversification/opportunity vi. Possible reduction in carbon emissions vii. Reduction in fossil-based fuels viii. Variety of feedstock use for bioenergy (resource diversification)
Primary End-users of Bioenergy	**Government / Policy Stakeholders**
i. Ability to penetrate most energy markets (versatile) ii. Bioenergy use consistency vs. other intermittent energy options iii. Direct substitute of fossil-based fuels iv. Good technique for waste utilization v. Help in supporting governmental schemes vi. Investment opportunity into renewable energy vii. Positive effects on image viii. Possible reduction in carbon emissions ix. Reduction in fossil-based fuels	i. Bioenergy supply consistency vs. other intermittent energy options ii. Bioenergy use versatility iii. Decentralisation of energy capability iv. Good technique for waste utilization v. Increase rural development and economy vi. Increased fuel security vii. Possible reduction in carbon emissions viii. Reduction in fossil-based fuels ix. Variety of feedstock use for bioenergy (resource diversification)

Table 6: Drivers to the bioenergy development from stakeholders' perspective (Adams et al. 2011:120–1221)

The different barriers and drivers were considered in the preparation of the questionnaire for different stakeholder groups for the empirical elaboration of the research questions. At different stages of the bioenergy generation process different kinds of barriers and drivers occur. Further, the perception may vary depending on the stakeholder, as well as the country of origin.

Figure 34 displays the sequential stages of a typical bioenergy project as a supply chain with external influences including inter-regional connections, which a project developer needs to consider.

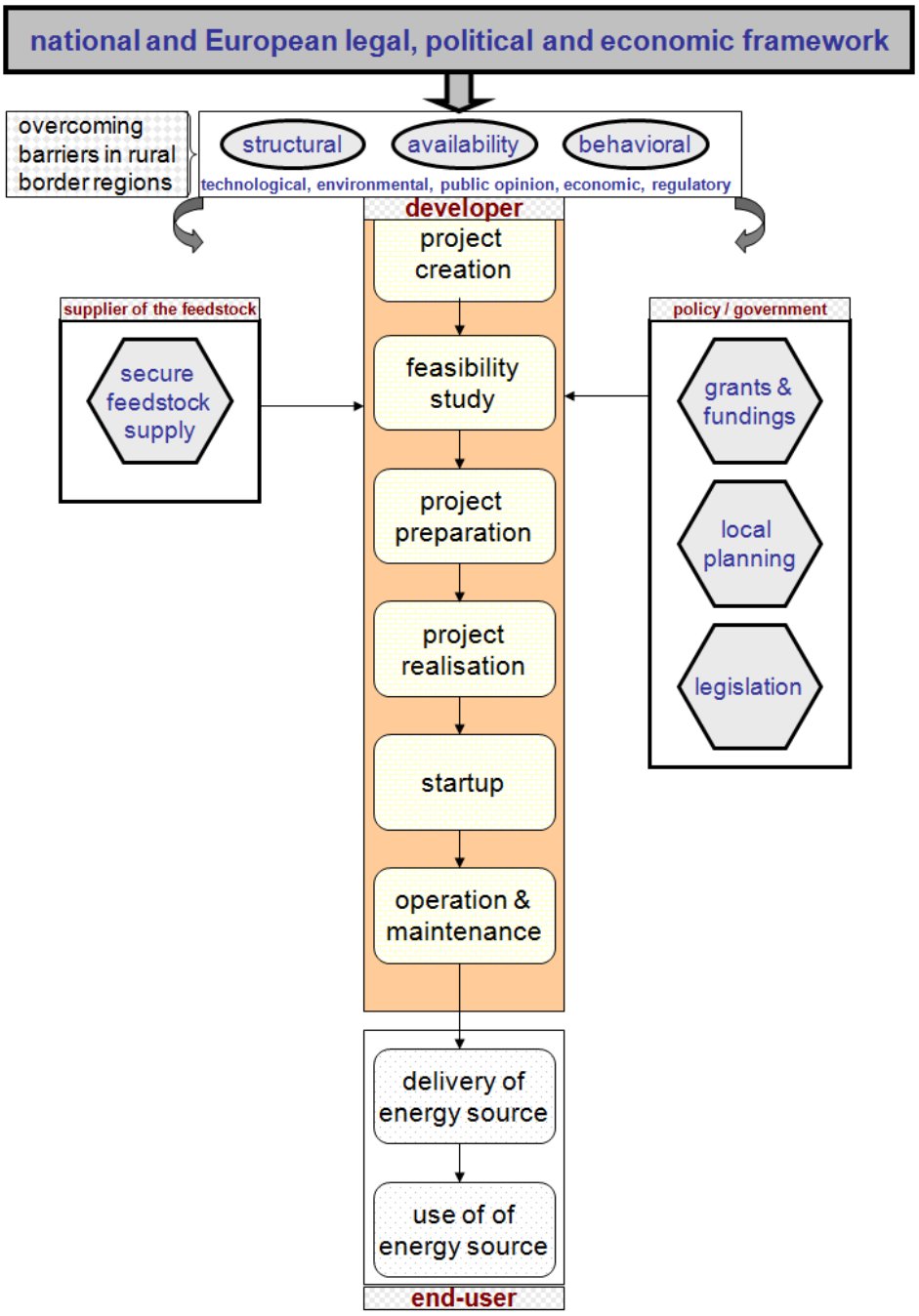


Figure 34: Drivers and barriers for bioenergy dissemination project in a European context with different stakeholder groups (own design based on Adams et al. 2011)

This research work is focused on the different stages of the bioenergy generation process and includes different stakeholders´perspectives of barriers and drivers in order to deduce an appriopriate overall strategy for bioenergy dissemination in border regions.

3.3.2 Aims of the Research

Because of the importance of research on bioenergy on the one hand, and on the perceived need for research on cross-border regions on the other, the overall objective of this research is to explore different classes of drivers and barriers for biomass based electricity production in rural European cross border regions using as an example the German-Czech-Polish border region from different perspectives. Drivers and barriers for bioenergy dissemination differ at varying stages of implementation. Four groups of stakeholders along the value chain of bioenergy production: from **feedstock suppliers, energy plant developers and owners, policy advisors** as well as **primary end users** are considerated and their experience and opinions contribute to answering the research questions. This research work intends to close the research gap, which exists concerning current knowledge about incentives and obstacles for bioenergy dissemination and the chances and risks for an investment caused by the location in cross-border rural regions. The main emphasis of the research is an assessment and classification of incentives and obstacles for the wide spread dissemination of bioenergy production in rural border regions. Moreover possible strategies to strengthen the drivers and overcome the barriers will be identified. The literature on drivers and barriers for renewable energy dissemination is broad. There is also a lot of scientific research on key drivers and barriers to expand bioenergy in the EU, undertaken from different perspectives. Previous literature has discussed the chances and difficulties for the expansion of renewable energy in European countries, excluding the special characteristics of border regions caused by, for example, the different national incentives for renewable energy. There has been little research in the area of incentives and obstacles for investments in bioenergy production, carried out especially for European border regions. Therefore, there is an academic void in the research linked to border regions, which are a special spatial category and require a different type of consideration. These deficiencies will be addressed by this research.

The present study has **five key goals**:

i. to identify the factors having an impact on biomass-based electricity production in cross-border rural regions among feedstock suppliers, plant developers and owners, policy advisors and primary end users in the German-Czech-Polish border region;
ii. to identify the influence of political, legal and social frameworks for biomass-based electricity production at national level on the decision making processes adopted by feedstock suppliers, energy plant developers and owners, policy advisors and primary end users related to bioenergy production;
iii. to establish and classify the different classes of drivers and barriers for cross-border investment in European rural regions for electricity production;

iv. to determine the impact of a border region location on stakeholders´ activities and their enthusiasm to investment in such a region;
v. to recommend appropriate strategies to take advantage of incentives and to overcome obstacles for policy makers in order to contribute to the European integrated energy, environment and structural policy.

The research focuses particularly on different stakeholders: feedstock suppliers, plant developers, owners, government department policy advisors and primary end-users and examines their perception of the existing obstacles for investment in bioenergy in connection with the location in the border region of Poland (PL), the Czech Republic (CZ) and Germany (DE). These groups have been chosen because they are involved in different stages of the bioenergy project's development chain and therefore they are experts with high practical knowledge. The stakeholders will be asked for their opinion on how the border location affects the existing incentives and obstacles for bioenergy dissemination and what possible strategies there are to improve the investment environment. In the second part of the analysis an assessment of the investigated drivers and barriers as well as appropriate strategies for bioenergy dissemination follows.

3.3.3 Rationale for the Research

The rationale for this research is based on three main considerations:

i. European border regions are disadvantaged, because of the risks for regional development caused by their location, therefore they receive EU support for cross-border cooperation;

ii. there are specific incentives and obstacles for bioenergy production in border regions, caused by the investment location in a border region;

iii. a new approach with appropriate strategies at local, national and European level to improve the investment environment in rural border regions is needed.

Border regions are important geographical areas within the European Union, due especially to the openess of the Union's internal borders. Typical problems of border regions include weak economic structures and infrastructure, emigration, and an area far from the centre of political decision-making. Europeanisation, however, encourages cross-border cooperation and makes the integration process irreversible (Leibenath, Korcelli-Olejniczak, and Knippschild 2008:14). Often, border regions try to reduce the disadvantages created by diverging fiscal or labor market regulation through intensified cross-border cooperation (Charbit 2009:131). As an essential part of the cohesion policy of the EU, territorial cooperation

should mitigate the barriers and strengthen the competitiveness of the cross-border regions (European Union 2010:XXXIII). Despite the current European integration process national boundaries still prompt significant barriers (Scherer and Zumbusch 2011:102). Border regions, dominated by agriculture and forestry policies, can take advantage of the cultivation and utilization of biomass for energy production, and thereby contribute to the region's economic development (Borsig, Knappe, and Kriszan 2007). Bioenergy production and its use for energy purposes provide many benefits for European energy systems. A harmonized European internal energy market would increase planning reliability and improve investment efficiency in the field of renewable energy production (Energiewirtschaftliche Tagesfragen 2011:1). There is already a lot of cooperation between European border regions within the field of renewable energy, financially supported by the EU - the region between Vienna and Bratislava, which is intended to be a European model region for renewable energy supply. Apprenticeships and research in this field would encourage cross-border cooperation and stronger renewable energy utilization (Ruland, Kavalek, and Pailleron 2007:46). The development of new technology within a border region normally happens independently in one country, with the neighboring countries then lagging behind. A technology gap is thus created and, in consequence, irregular border area economic growth patterns (Heiduk 2004:153). However, bioenergy's potential (Figure 11) remains still not complete tapped. These facts raise the following question: why has the economy sector not already exploited this potential? There is an urgent need to overcome the existing barriers for bioenergy production by means of an investment-oriented political, economic and social framework.

3.3.4 Research Questions

This work will elaborate on the following research questions:

Research Question 1: What are the main drivers, barriers and possible strategies for bioenergy generation in European border regions from the perspectives of different stakeholders along the bioenergy supply chain? In particular:

- What are the main opportunities for, and barriers to, an investment in bioenergy generation from the point of view of feedstock suppliers, policy advisors and energy producers?
- How does the border location affect the investment decision in relation to bioenergy generation?
- To which extent are drivers and barriers typical for the country in general?
- How does the border location impact on the trade of biomass?

- How transparent is the cross-border biomass market?
- How do involved stakeholders deal with the drivers and barriers?
- How do the stakeholders consider their engagement in the improvement process?
- What are the main suggestions for improvement?
- What strategies and measures could be implemented to strengthen the incentives and overcome the problems?

Research Question 2: How strong do these factors affect the crop supply as well as the bioenergy generation process? In particular:

- How strong is the actual border location impact on the bioenergy generation process?
- To which extent are drivers and barriers typical for different stakeholders and different border areas?
- How significant are different strategies for assuring the equal chances of biomass production and bioenergy production in different border regions?
- How significant are the strategies and measures in strengthening the incentives and overcome the problems?
- How different strategies increase the attractiveness of biomass growing for energy purposes as well as for bioenergy production?

In order to find the answers to the research questions and close the current research gap, the appropriate methodology and techniques need to be chosen, both of which are elaborated upon in the following chapter.

4 Methodology

This chapter outlines and justifies the methodology adopted to answer the research questions described in chapter 3.3.4. The overall purpose of this chapter is:

- to outline the qualitative and quantitative research design and its relation to the research questions;
- to describe the appropriateness of the research design for barrier and drivers analysis in the field of bioenergy dissemination;
- to present the research techniques, types of data gathering and the data analysis approach;
- to provide justification for the chosen research region;
- to position the research in the context of a philosophical position.

The main goal of this chapter is to elaborate the approach by means of which the research questions are answered and recommended procedures are developed. At the beginning an analysis of the current literature on research methods is presented. Then the research design's advantages are contrasted with the disadvantages, with the rationale for the applied method further elaborated. The applied methods consist of in-depth interviews and survey research in the Polish-German-Czech cross-border region. Next, there follows an integrated analysis of data handling as a part of the integrated analysis. The limitations of the methodological approach are also identified. An overview of the current political and legal framework for renewable energy in Poland, the Czech Republic and Germany will be used to underline the meaning of bioenergy in the energy systems of each country. There is an analysis of recent statistical data concerning energy generation based on biomass in order to show the significant meaning of bioenergy in the renewable energy mix in each of the three countries currently on the path to achieve goals for renewable energies by 2020. The chapter summarizes the methodological approach and offers a bridge to the next part of the empirical and analytical work in the subsequent chapters. Finally this chapter situates the research in the context of the exploratory research paradigm and its theory-building character. It argues that this approach is appropriate in relation to the investigation of bioenergy dissemination.

4.1 Literature Review on Research Methods

Typical methods applied for the analysis of barriers and drivers for renewable energy dissemination focus mostly on the review of case studies with an open data gathering approach (Altman and Johnson 2008; Granade et al. 2009; Lewis and Wiser 2007), as well as the analysis of existing literature supported by the interaction of stakeholders (Mondal, Kamp, and Pachova 2010; McCormick and Kaberger 2007; Painuly 2001; Roos et al. 1999). Some researchers applied questionnaires in order to assess the importance of barriers and drivers by means of a ranking system (Reddy and Painuly 2004; Rohdin, Thollander, and Solding 2007).

Reliable and comparable data on the impact of different factors, like administrative procedures presented as costs and/or time essential for complying with the procedures, are not available in some EU countries. Moreover, the assessment of significant and feasible quantitative benchmarks is very difficult (Marks and Czerepowicki 2010:18). Therefore it is meaningful to ask affected stakeholders for their subjective opinion. In the situation where there is insufficient knowledge concerning the research subject matter, a qualitative and explorative research approach is suitable. This approach aims to understand, while a quantitative approach's aim is to explain the research questions. In the social science those two requirements are not competitive, but rather complement one another in representing two steps of the knowledge gain (Flick 2004:18; Seipel and Rieker 2003:214–221). To survey a statistically significant number of stakeholders in different border regions of EU Member States makes it possible to undertake a meaningful quantitative benchmarking of the situation.

Next to the analysis of secondary data, qualitative research is a major methodological approach, applied in exploratory research (Malhotra 1996:41–88; 174–177). The insights gained from exploratory research can be verified by conclusive research, which aims to test specific hypotheses and examine specific relationships between variables. In comparison to the exploratory research, conclusive research is more formal and structured. Both research designs have a cross-sectional character, which involves the collection of data from any given sample of population elements only once (Malhotra 1996:86–88).

By means of a mixed research design, research results using one method can validate results from another (Seipel and Rieker 2003:214–221). In the triangulation method different kinds of methods (qualitative and/or quantitative) can be combined in the study of the same empirical unit. The complex process of different application methods reduces weaknesses of different approaches in order to maximize the validity of field studies (Bryman 2006:105; Seipel and Rieker 2003). Methodological triangulation incorporates significant benefits, that

is, it does not exclude other methods. An empirical analysis in an open system is valid (Fullbrook 2008:139).

In the literature on research method design three types of mixed research design are dominant (Prein, Kelle, and Kluge 1993:9–10; Taylor 2005:250):

- *The Two-Phase-Design:* assumes that qualitative research incorporates lower validity than the quantitative and therefore a qualitative approach should be used for the generation of hypothesis and the quantitative for the hypothesis testing. Qualitative study should be followed by quantitative analysis.
- *Dominant/Less-Dominant Design:* one of the designs (quantitative or qualitative) dominates, while another complements the first one to enhance the validity of research results.
- *Mixed Methodology Design:* very complex design where different aspects of methodological steps can be combined. This approach acts on the assumption that both paradigms follow different goals and therefore can only complement each other and do not contribute to the improvement of their validity.

Mixed methodology design with a qualitative study at the beginning is advantageous, because by means of a circular investigation framework (repeated analysis of new empirical materials), the first conception drafts can be systematically checked. For the validation of theoretical assumptions the most suitable is a quantitative paradigm with a linear research process, which provides the most comparable data set (Seipel and Rieker 2003:214–221).

A qualitative approach using exploration is suitable for theoretically less explored social relationships and makes possible hypothesis formulation, which can be verified by means of quantitative and statistical methods (Prein, Kelle, and Kluge 1993:9–10). Exploratory research is appropriate in cases where the problem has to be defined more precisely in order to identify relevant courses of action and contributes to the development of priorities for further research. The adopted research process is flexible and unstructured (Malhotra 1996:174–177). Exploration can be used in qualitative research among others, to hypothesis and build theories. Explorative research is suitable for the preparation of quantitative research (Lamnek 2010:84). The exploratory approach is not conducive to understanding what happens, but it does answer the question by exploring to which extent the barriers appear (how?) and illustrates the motivations of different stakeholders (why?). In the situation where a complex or unusual set of phenomena should be thoroughly understand and a high volume of data would be necessary, improbability sampling techniques are often applied. The improbability sample should, in general, be as large as possible, large enough to present both

typical and atypical features of the group (Anastas and MacDonald 1994:271–275). Moreover written questionnaires are free of bias, caused by the presence of the researcher, and in comparison to other types of research, are more cost-effective (ten Klooster, Visser, and de Jong 2008:513).

In the case of an exploratory approach the small and non-significant sample is a base for the generation maximum insights (Malhotra 1996:364–365). The expert sample is a sample that has been selected not to approximate representativeness but because of the fact that respondents are nontypical in some way and therefore especially useful as information suppliers (Anastas and MacDonald 1994:271–275). An expert sample is appropriate in order to produce the cultural differences among group members. Experts are not scholars, but rather people who are the most competent and the most immersed in a culture or research problem (Kitayama and Cohen 2010:212). In expert sampling the researcher decides that a group of people with a wide knowledge or with significant experience on the investigated topic, can as “experts” give an appraisal on an issue (Amedeo, Golledge, and Stimson 2008:102). Expert interviews are qualitative interviews with a special group of people, who are seen as representatives of organizations or institutions. They are of interest for the researcher not because of their personal opinions as individuals, but because of their professional role in a task context (Lamnek 2010:658). A snowball sampling technique is used in the situation where the access to the identifiable sample members is very limited. People meeting the sampling criteria are requested to identify other people like themselves who would be qualified for the study (Anastas and MacDonald 1994:271–275). The qualitative research approach is suitable for exploration research to hypothesis and build theories and for the preparation of a quantitative research (Lamnek 2010:84).

An expert interview as a method to obtain qualitative data has diverse advantages. When the potential respondents are scattered over a common economic cross-border region and the nature of the investigation is not associated with any sensitive issues, expert interviews are a suitable technique for data gathering (Kumar 2005:124). The principle of the open approach contributes to the structuring and assessment of the research topic by the expert. Interviews based on a guide is conducted in the professional frame and therefore concentrated on the expert’s professional knowledge. On the other hand it gives the expert free space for specific perceptions and unexpected statements about the research topic. In comparison to other population samples, experts are inured to explain their points of view and to transfer their knowledge (Lamnek 2010:658). The method of expert interviews is useful in cases where less information is available from other sources. Experts are able to provide valuable insights on the research problem definition (Malhotra 1996:174–177). In the case of a research de-

sign based on triangulation, expert interviews can be applied as an integral part of the triangulation design for the thematic structuring of the research field (Lamnek 2010:656).

In order to obtain qualitative data such as the underlying motivations, beliefs, and attitudes on a particular theme, an in-depth interview is an appropriate technique. It is unstructured, direct and personal. In-depth interviews can be conducted with professional people (Malhotra 1996:174–177). Expert interviews should be conducted as guided interviews. The preparing of an interview guide means an intensive examination of the subject matter. The interviewer should be well informed in advance in order to make a qualified impression on the expert (Lamnek 2010:658). Expert information is typically gained by means of unstructured personal interviews, without using a formal questionnaire. However it is beneficial to prepare a list of topics to be addressed during the interview. The sequence of the questions should be decided as the interview progresses. This flexibility contributes to a higher yield of expert knowledge (Malhotra 1996:174–177).

There are many approaches for the analysis of qualitative data resulting from interviews, (Broom 2005:71), among others, Likert scales. A Likert scale is mostly used in a situation where the research treats of a belief, perception or affect, and where respondents cannot express clear and concise opinions (Chimi and Russell 2009:1). In order to overcome the difficulty of measuring attitudes, character and personality traits and transfer these qualities into quantitative measures for data analysis purposes, Likert (1932) developed a procedure for measuring attitudinal scales (Likert 1932 in Boone and Boone 2012) in Boone & Boone, 2012). In addition, Clason and Dormody (1994) extended this approach and differentiated between Likert-type items as single questions that use some aspect of original Likert response alternative. A Likert scale uses items in order to provide a quantitative measure of character or a personality trait (Clason and Dormody 1994:31–35 in Boone and Boone 2012). Due to its simplicity and reliability this technique is well accepted for the measuring of attitude (ten Klooster, Visser, and de Jong 2008:513).

The Likert scales consist of a non-comparative scaling technique, measuring a single trait in nature and are unidimensional. A participant´s preference or degree of agreement with a statement or set of statements is mapped on a psychometric response scale, used primarily in questionnaires (Bertram 2007:1). A total numerical value can be calculated from all responses because of the fact that each agreement is given a numerical value. The result of the measurement has an ordinal character – the response categories have a rank order, but intervals between values cannot be presumed equally. Likert scales are especially appropriate for cross-cultural research and allow for the collection of many different items from people of various professions and backgrounds (Sahud, Bruvold, and Merino 1990:334–335).

In order to develop a Likert attitude questionnaire, an extensive item pool had to be constructed. In the first phase of this research by means of expert interviews, a large volume of opinions and statements has been collected. Pre-testing among potential respondents is used to construct the Likert scale with items representing the attitude construct. By use of items analysis weak statements are identified and excluded from the scale. The final scale consists of the remaining statement with half of them representing a positive attitude towards the research object and the other half a negative attitude (ten Klooster, Visser, and de Jong 2008:513). This type of construct is useful in order to check for acquiescence bias (Friborg, Martinussen, and Rosenvinge 2006:873).

There exist no common standards within the scientific community for the correct interpretation and analysis of data measured in Likert scales. In general attitudes measuring scales should be considered as ordinal scales. Ordinal measure scales can be compared in terms of the order relation but there is no measure for the distance between two scale values. Measurements by means of a specific scale have to be analyzed by appropriate statistics which reflect their meaning taking into consideration the characteristic transformation of the scale. Therefore acceptable statistics for ordinal data are frequencies, histograms and order statistics. There are studies using cardinal statistics like e.g. arithmetic, weighted means or t-tests to analyze attitude data, however proper approach to measure attitudes should consider the attitude scale as ordinal one (I. Altman and Johnson 2008; Göb, McCollin, and Ramalhoto 2007:602–603). Likert scales show different advantages: they are efficient, simple to use, have good reliability as well, and they can be adapted to different contexts (Janhunen 2011:1). These types of instruments are expected to provide reliable results and are familiar to most respondents, which reduce the risk of errors (ten Klooster, Visser, and de Jong 2008:513). The analysis of the pattern of non-response can provide useful information for the researcher if the pattern of non-response are not random. It can mean that respondents had difficulties because of wording or they did not have any opinion due to a lack of information. Therefore non-responses are a potential source of bias which can be revealing information, or it has to be checked for randomness to exclude bias (Ryan and Garland 1999:108).

4.2 Rationale for the Research Method

According to the applied mixed methodological design the collected data will be analyzed in two phases, as depicted in Figure 35 below.

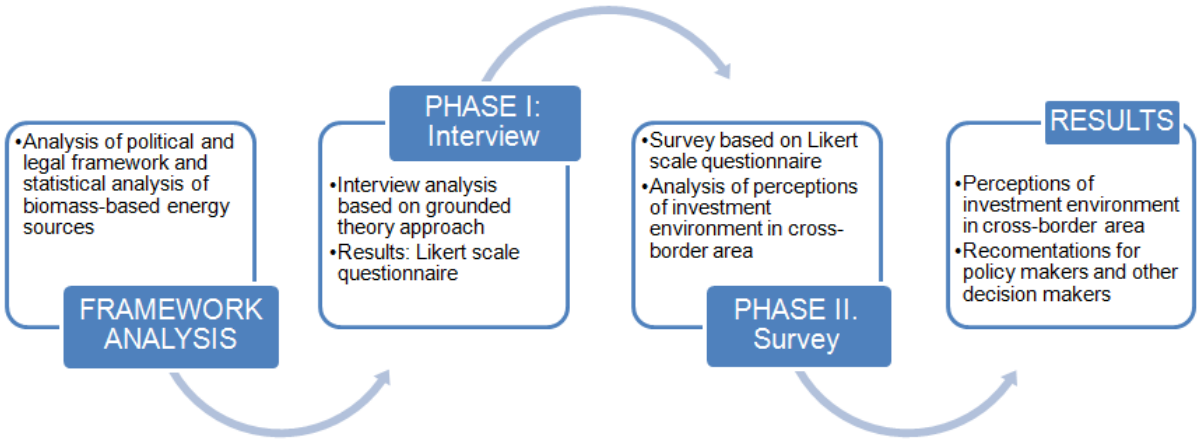


Figure 35: Overview of mixed methodological design used (own design)

Experts` perceptions of the bioenergy investment environment have been solicited by means of unstructured personal interviews, without using a formal questionnaire. However, a list of topics to be addressed during the interviews has been prepared. For the analysis of the data, the grounded theory approach has been applied, and elaborated upon in detail in chapter 5.2.

For the cross-cultural research, a Likert scale questionnaire was used for data gathering from stakeholders of various professions and backgrounds. Some pre-testings among potential respondents was used to construct the Likert scale and to exclude weak statements. In order to analyze this ordinal measure scale and evaluate the stakeholders´ perceptions, frequencies and histograms have been used.

In order to build theories on barriers and drivers in border regions the Two-Phase-Design has been implemented in this research work. The main rationale for the applied research method are described in Table 7 below.

Step	Method used	Application	Rationale
1.	Analysis of political and legal framework as well statistical analysis of biomass-based energy generation	potential of biomass for energy use in cross border region	— to demonstrate similar natural conditions for bioenergy production and the different uses of the existing potential caused by existing barriers.
2.	Data collection using guided expert interviews and data analysis by means of the grounded theory	repeated analysis of new empirical materials	— there is little available reliable and comparable data on the topic; — therefore it is necessary to ask the different stakeholders for their subjective evaluation; — potential respondents are scattered over a common economic cross-border region; — represent different stakeholders in each of the three chosen border regions; — in order to formulate theoretical assumptions (the current incentives and obstacles for bioenergy production); — in order to specify research questions, which can be verified by means of quantitative and statistical methods.
3.	Data gathering by means of an online survey and data evaluation using a Likert scale	carried out in the three border regions between Poland, the Czech Republic and Germany	— an overview over the dimension of existing drivers and barriers for bioenergy dissemination and the scale of their impact on location decision, business efficiency and on regional development; — answer to the question on the potential for strategies to overcome the existing barriers by gathering the assessment of their effectiveness and efficiency by different stakeholders.

Table 7: Rationale of the methods used (own design)

In most EU Member States there is a paucity of available, reliable and comparable data on the impact of such issues as administrative procedures regarding investment processes in terms of cost and/or time (Marks and Czerepowicki 2010:18). It is necessary therefore to ask the different stakeholders about their subjective evaluation. In this research both qualitative design (micro) and quantitative design (macro) have been applied to answer different research questions. Beginning with the qualitative approach is appropriate, because it is more important for the research project to identify the current obstacles for bioenergy production than trying to influence stakeholder's perceptions by suggesting the assignation of their heterogeneous answers to a specified design.

At the micro (qualitative) level, the research uses expert interviews which represent different stakeholders in each of the three chosen border regions. This research section focuses on the exploration of the relations between the border location and the incentives and obstacles in the business arena and the management of businesses in the field of electric bioenergy production. The expert interview aims to explore how the site decisions are affected by being located in cross-border areas as well as the potential for overcoming the existing barriers and

the potential for strengthening the drivers. A meaningful quantitative benchmarking of the situation in different EU border regions will be possible by surveying a statistically significant number of stakeholders in a reference border region. Therefore, the second section of the analysis is based on a quantitative survey carried out by the author in the three border regions between Poland, the Czech Republic and Germany.

At the macro (quantitative) level the research uses a survey to give an overview of the dimension of existing drivers and barriers for bioenergy dissemination and the scale of their impact on the location decision, on business efficiency, and on regional development (economical, ecological and social) in the chosen border region. The survey contributes also to answering the question regarding the potential of different strategies to overcome the existing barriers and to strengthen drivers by assessing their effectiveness via different stakeholders.

4.3 Applied Research Methodology

The research design displays the link between research questions and data gathered and analyzed. This investigation is based on a theoretical framework which refers to two approaches; one connected with the research on barriers for renewable energy dissemination and the second, referring to the research on the special characteristics of border regions:

— The first approach from **Adam et al. (2011) as well as from Granade et. al. (2009)** was used to explore different categories of barriers and drivers for bioenergy planning and the production process based on an integrated view of the relevant stakeholders. The first research takes an in-depth view of barriers from different point of view: feedstock supplier, energy plant developer, owners, government department policy advisors and primary end-users depend on the stages of the project's development chain (Adams et al. 2011:1219). The second investigation, which focuses on different categories of barriers typical for energy efficiency in the U.S. economy (Granade et al. 2009), has been applied for the following research in order to categorize the obstacles and drivers into possible classes: structural, availability and behavioral. This approach allows for the classifying of appropriate strategies to enhance the incentives and overcome the barriers. In order to overcome structural barriers, existing political and structural frameworks have to be reassessed and changed. An improvement in the existing investment environment is necessary in order to reduce the availability barriers and to better the possibility of overcoming behavioral barriers a more effective information strategy is required.

— The second approach, the report of European Union[6] (European Union 2010:12–16; 61) shows that the European border regions are disadvantaged because of their border location. Moreover the **Nomenclature of Territorial Units for Statistics**, a classification established by the Eurostat office of the European Union has been applied to define the scope of the statistical analysis as well as the surveys. This classification provides a single uniform breakdown of territorial units for the production of regional statistics for the European Union and therefore a comparable analysis of different European border region is possible.

The theoretical framework of this research combines the key aspects of both of these approaches and intends to contribute to the understanding of the current difficulties in bioenergy dissemination in this three-country-region. This research is based on generally admitted empirical findings, which allows for the building of new recommendations for adaptive strategies to deal with existing barriers. Therefore these results can be adapted for other European regions. It is important to overcome the existing political and administrative barriers that hinder regional European integration of the energy system (European Union 2009).

The following analysis is based on a multiple cross-sectional design. The multiple samples of respondents consist of stakeholders from the Polish, Czech and German border region, which provide the information only once (Malhotra 1996:92). In order to build the theory on barriers and drivers in border regions the Two-Phase-Design, introduced by Barton and Lazarfsfeld in the 1950s has been implemented in this research work. This approach, further elaborated in the chapter 4.5.1, consists of a qualitative study with an open and explorative character in order to formulate a hypothesis, and of a quantitative analysis based on a hypothetic-deductive model (Barton and Lazarsfeld 1984; Prein, Kelle, and Kluge 1993:9). The following steps have been undertaken:

— **Step 1:** An overview of the current political and legal framework for renewable energies in Poland, the Czech Republic and Germany will be use to underline the meaning of bioenergy in the energy systems of each country.

— **Step 2:** An analysis of recent statistical data, concerning renewable energy potentials, especially biomass potentials and their utilization for electricity generation in Germany, Poland and Czech Republic in order to show the important role of biomass in the renewable energy mix in these three countries and the potential for further development will also be presented.

[6] Investing in Europe's Future: Fifth report on Economic, Social and Territorial Cohesion.

— **Step 3:** In-depth qualitative interviews with experts and representatives of different stakeholders in the process of bioenergy production will highlight their perception of existing barriers, drivers and possible strategies to improve the usage of biomass for energy production.

— **Step 4:** A survey undertaken among all identified stakeholders in the border regions between Poland, the Czech Republic and Germany will confirm the perception of interviewed experts or indicate a different trend and other strategies and measures to overcome the barriers.

The research objectives, investigated in the chapter 3.3.2 are depicted in Figure 36 below.

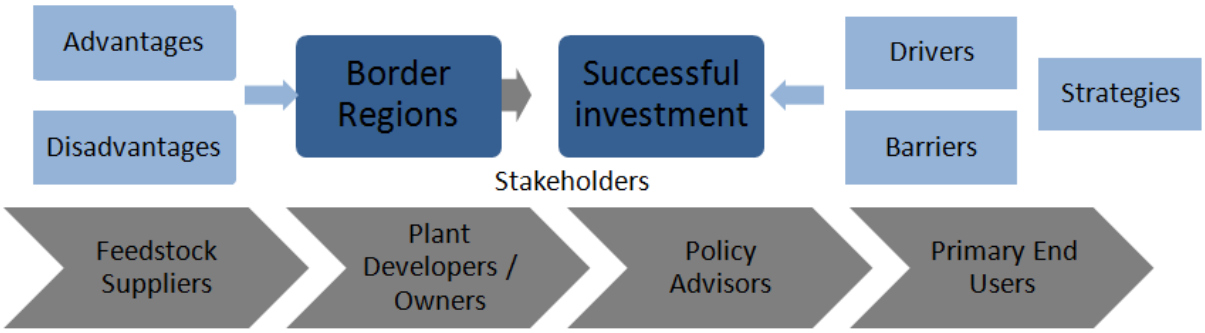


Figure 36: An overview of the research objectives (own design)

In this research method triangulation has been applied by using a mixture of qualitative and quantitative methods. A multiple cross-sectional design was applied with multiple samples of respondents: stakeholders from the German, Czech and Polish border region. In the multiple cross-sectional designs each sample provides the information only once (Malhotra 1996:92).

4.3.1 PHASE I: Research Questions Design Based on Expert Interviews

Based on the statement of earlier chapters, concerning the insufficient examination of existing barriers and drivers for energy production in border areas, further investigation is essential. Therefore an exploratory approach is suitable to close this research gap, which primarily aims to provide insights into and an understanding of the research problem.

In this research the **expert sample** has been investigated. The selection criterion is the membership of one of the stakeholders group: (1) feedstock supplier, (2) plant developers and/or owners, (3) policy advisors and (4) primary end users in at least one of the chosen border areas between Germany, Poland and the Czech Republic. The exclusion criterion is

the lack of influence in the investment process along the supply chain of bioenergy production. Access to such samples can be received through networking, institutional affiliation and group membership or in snowball sampling. For the needs of this research participation in the BioEnergyNet - Network for Bioenergy and Renewable Energies in the Upper Lusatia and North Bohemia[7] and consequential networking with other regional organizations from the German-Polish-Czech border region were essential.

Responding stakeholders in each group were identified through the intensive literature review, and from attending a number of bioenergy-related events in the border region during 2010 – 2012. Moreover the researcher is an active member of the network BioEnergyNet. Respondent suitability was assessed based on previous experience or a relevant interest in the bioenergy field.

Results from the expert interviews during PHASE I contribute to the selection of sample participants with relatively high level of skill or knowledge for the investigation in PHASE II.

Qualitative data were gained by interviewing key stakeholders using an open approach with unstructured personal interviews. The main goal of the analysis is to specify and to define the research problem – potential drivers and barriers for biomass-based electricity production, which are typical for European border regions.

The guide sheets for the interviews are placed in the APPENDIX 1 List of Topics for Interviews. The results of the theory building research section of the study consists of data including text and counts in the research notes, interview recording and documents received from the participants.

For the following data analysis a technique of editing is applied. Editing is termed editing because the “interpreter enters the text much like an editor searching for meaningful segments, cutting, pasting and rearranging until the reduced summary revals the interpretive truth in the text” (Gebken 2006:71). Data from guided interviews are analyzed, based on a modified approach of the Qualitative Analysis Guide of Leuven (QUAGOL), developed by de Casterle, Gastmans, Bryon and Denier. This method is comprehensive and systematic as well as flexible because it offers the researcher space for intuition and creativity (Dierckx de Casterlé et al. 2012:360). This method, applied for the needs of the research, is conducted by the re-

[7] BioEnergyNet is a regional German-Czech network supporting use of biomass for energy production in the German-Czech border area of Lusatia and North Bohemia (www.bioenergynet.eu access on 27.06.2012).

searcher herself without the support of a team. The modification is justified by the cost and available means arguments.

The process of analysis starts with (STAGE I) preparation of the coding process and follows with (STAGE II) the actual coding process using coding plans developed by the researcher and applied in an Excel application. Finally the research questions can be specified and by means of a Likert scale questionnaire (STAGE III) prepared for further data gathering.

Figure 37 illustrates the stages of the undertaken qualitative analysis.

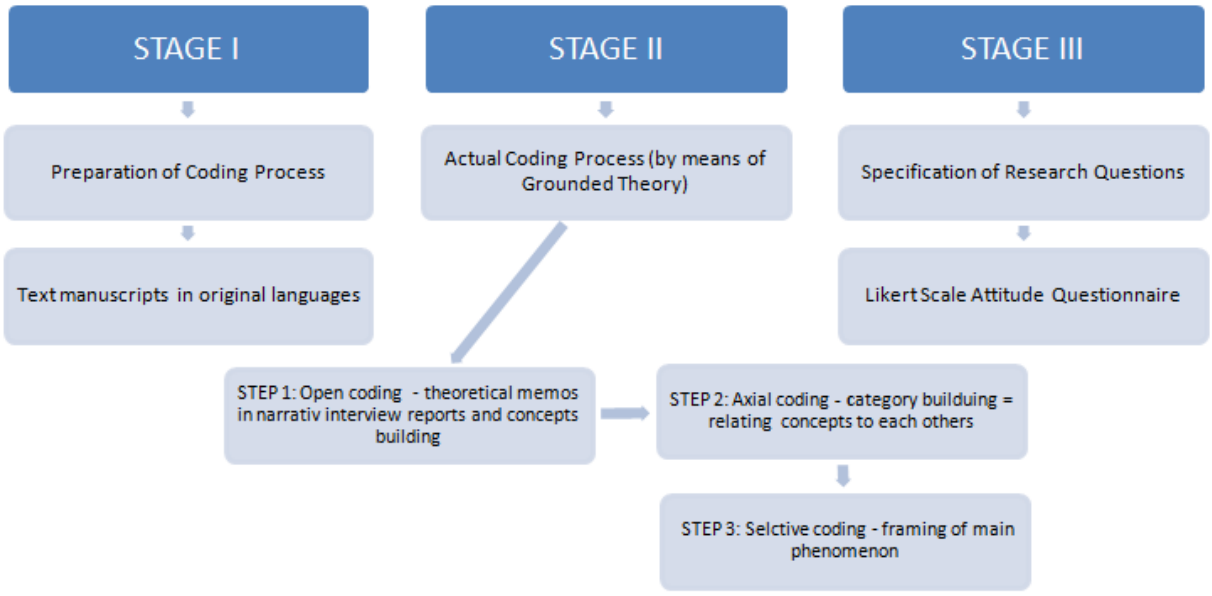


Figure 37: Stages of the qualitative analysis based on the modified approach of Qualitative Analysis Guide of Leuven (QUAGOL) (own design based on (Dierckx de Casterlé et al. 2012:364; Kardorff, Steinke, and Flick 2004:476–484))

The following qualitative data analysis is based on the approach of grounded theory by Glaser and Strauss (1967) in order to generate a new theory “grounded” in the empirical data. This kind of analysis can be used for the validation of data as well as the generation new theories. Glaser and Strauss consider both these activities relevant and strive for a comprehensive review of data and results, and at the same time a theoretical framing (Glaser and Strauss 2009 in Lamnek 2010:90–94). The grounded theory method contributes to the theory generation in a systematic way and offers flexible guidelines for collecting and analyzing data in order to build theories “grounded” in the data themselves (Charmaz 2006:2; Starrin et al. 1997:9).

The applied method based on a modified approach of QUAGOL has many advantages, for example, a case-orientated approach characterized by a continual balancing between within-case and cross-case analysis; a forward-backward application of the comparative method;

the combination of analytical approaches as well as its focus on people skills rather than software (Dierckx de Casterlé et al. 2012:368).

The main goal of STAGE II is the actual coding process. “Back to the ground” means linking all relevant fragments to the appropriate codes. The coding process means to “*codify”* and to *“translate”* data and consists of the formulation, description and discussion of concepts. Descriptions result in code notes which can be called “*coding list*”. A “*code*” characterizes named concept and is an indicator for the phenomenon in the data. Formulated concepts are preliminary in the first stage of the analysis and will be distinguished during the further analysis resulting in so called “*categories*” (Kardorff, Steinke, and Flick 2004:476–477). The actual coding process will be elaborated in detail in the next chapter 5.2.

4.3.2 PHASE II: Eliciting Stakeholder Opinions and Attitudes by Means of the Likert Scale Attitude Questionnaire

The research population is comprised of individuals that have an impact on the decision making, planning and implementation process of bioenergy production in European cross-border regions: (1) feedstock suppliers, (2) plant developers and/or owners, (3) policy advisors and (4) primary end users. It is not possible to prepare a list of all the members of the population of interest, due to the fact that there is no data available on exact crop production of farmers, lumberjacks or other feedstock suppliers, on planning offices preparing bioenergy projects, on policy advisors influencing the political frame for bioenergy production and users of biomass-based electricity. Therefore the application of a probability sampling in order to select a random sample is not appropriate in this case. Data collected from all individuals from the different stakeholders groups from different European countries would produce a very large volume of data with no guarantee that the participants are affected by existing barriers and drivers.

For the needs of this research **snowball sampling** was applied to identify as much as possible participants as members of the above mentioned four stakeholders groups. During the in-depth interviews in PHASE I respondents for the further study were identified. Due to experience in the “BioEnergyNet”, the author was able to assess the relevance of the other interview participants, suggested by those who had already been interviewed. Moreover at least one representative from each considerated stakeholder group should be surveyed in order to ensure balance between them.

Next, all participants were asked to complete either an online or offline questionnaire. The questionnaire consisted of statements concerning the perception of existing markets, the investment environment for bioenergy production in European border regions, the stakehold-

ers` evaluation of the economical and legal frameworks, as well as an assessment of their behavioral incentives and barriers regarding the dissemination of bioenergy. The participants were asked to assess the degree to which they agreed or disagreed with the statements. Their perception of the existing obstacles for dissemination of biomass-based electricity production in border regions was measured. In addition the participants were asked how valuable the proposed improvement strategies and measures could be. The study focused on the more superior aspects of the investment environment as opposed to specific or plant-dependent issues.

Barriers and drivers were identified from existing literature and from the analysis of expert interviews carried out for each of the four stakeholder groups in the Polish, German and Czech border region. This knowledge provided a basis for the formulating of a hypothesis about existing barriers and drivers typical for electricity production based on biomass in European border regions. In order to assess the perceived obstacles and positive factors for investments in bioenergy production in border regions, questionnaires will be applied, which is an instrument suitable for the measurement of attitudes (Bajpai 2011:74). The online and offline questionnaire survey postulated a list of possible barriers and drivers regarding the development, use and support of bioenergy and has been sent to all identified stakeholders in the Polish-Czech-German border region who have been chosen. The questionnaire generated categorical data, based on closed questions.

A Likert scale (Corbetta 2003:170) method was chosen as an appropriate research method to study the phenomenon of perceived barriers for bioenergy production in European border regions. This research aims to assess different stakeholders' points of view regarding existing obstacles for investment which are specific to border regions. There is insufficient knowledge so far available regarding this issue. Therefore the perceptions of stakeholders, affected by this problem, should be addressed first and assessed. Respondents were asked to assess the importance of each of the barriers and drivers on a 4-point scale and 5-point scale and could indicate if they were "undecided", as well as having the opportunity to amend the list of these factors. It is meaningful to use a non-response option in the questionnaire design.

The written questionnaire is translated into the native language: German, Polish and Czech, achieved with the assistance of a professional translator. Every item was checked for accuracy in meaning and grammatical precision by a bilingual member or associate of the BioEnergyNet network before asking the sample participants for a response.

Quantitative data were obtained from the surveyed key stakeholders using a questionnaire. The appropriate method for handling missing data will be applied, after an analysis of the

reason for the missing data as well as an assessment of the randomness of the missing data, in order to improve their quality. According to the missing data mechanism, the handling of missing data depends on whether the data was missing at random. Data are ***missing completely at random (MCAR)*** if the fact that they are missing does not depend on either the observed or missing value in the matrix of the complete data. A subject is missing for a completely random reason when, for example, questions are accidently skipped when answering a survey. Data are ***missing at random (MAR)*** if the fact that they are missing depends only on observed part of the matrix of complete data. Missing data are related to the observed data, but there is no relation to unobserved data – for example, in the age analysis, older respondents are more likely to skip questions. In the case of data, which are either MCAR nor MAR, they can be ***missing not at random (MNAR)***, for example, unanswered questions related to such sensitive topics as respondents' income. (Hedeker and Gibbons 2006:281; Lee 2007:24) .

In order to improve the quality of data for the analysis, one **ad hoc method** for missing data handling will be applied, subject to the type of data absence. Ad hoc methods are simple to apply, however they can generate poor estimates (Lee 2007:26). There are different methods to address missing data, such as removing those cases with incomplete data, completing the missing values. The removal missing-data cases can be applied in the case of data MCAR, where the absence is unrelated to any measured variable. In other cases, the analysis will result in biased parameter estimates. The imputation methods are not suitable in the case of MCAR data (Enders 2012:37).

For the handling of missing data ***available case analysis*** will be applied. This kind of analysis, also known as ***pairwise deletion (PD),*** uses all available data with no missing values. The use of all the available data, instead of only complete cases, allows for the use of useful information. This method can be applied for MCAR data and leads to unbiased estimates (Lee 2007:26). Pairwise deletion is one of the most common missing data handling approaches in the different areas of social and behavioral sciences. The most important advantage is that this method is simple to implement, however, the assumption of MCAR data has to be fulfilled (Enders 2012:35). Due to pairwise deletion, only those summary statistics will be computed where all cases are available. The disadvantage of this method is that test statistics with conventional software are biased using data handled with pairwise deletion (Allison 2002:8). However, for the needs of this research, no special statistic software will be applied. A standard Excel Worksheet application for statistic calculations has been applied, which allows for the manual modification of a number of variable cases.

Likert Scale response categories applied for the questionnaire describes the perception of respondents. These categories are ordinal categories as the intervals between them cannot

be assumed as equal. For the purpose of this research, Likert-type data are used to measure personality traits, but also the respondents' perception of various aspects associated with bioenergy production.

For the correct analysis of Likert data, the understanding of the measurement scale is essential. Likert-type items belong to an ordinal measurement scale, because the numbers assigned to Likert-type items express a "greater than" relationship. However, how much greater the relationship is, is not implied and the numbers only indicate the order. Therefore **descriptive statistics** are suitable for the data analysis procedure of ordinal measurement scale items. Central tendency can be measured by **median or mode** and variability by **frequencies**. Additional analysis for associations measurement can be made (Boone and Boone 2012). Ordinal data can be analyzed via the counting of the number of responses in each category, called frequencies and a further calculation of percentages based on these frequencies. Moreover the frequencies can be further analyzed by means of a comparison between the categories (Blaikie 2003:54).

There are two very different approaches when it comes to analyzing the ordered categorical response variables. The first ignores the categorical nature of the response variable and applies standard parametric methods for continuous response variables such as linear regression and analysis of variance. The second applies only these methods based on ordering information about the categories, e.g. nonparametric methods using rank and models for cumulative response probabilities. According to nonparametric or distribution-free methods the samples are not associated with any prespecified family of distributions. Nonparametric methods are suitable for data, which specify ranks or counts of the number of events or individuals in different categories (Agresti 2012:3–4). In the following analysis of the Likert-scale data the second approach with **nonparametric methods** will be applied. After the handling of missing data, the actual data analysis takes place. First, the differences in the responses between respondents from different countries were analyzed. Further consideration was given to the differences between different stakeholders composed of respondents from all three border regions.

4.4 SWOT Analysis of the Applied Research Design

SWOT analysis (Strengths and Weaknesses, Opportunities and Threats) is a widely used tool analyzing external and internal factors in order to assess marketing data and information. This type of analysis enables the researcher to integrate and synthesize diverse information and structure the planning process (Ferrell and Hartline 2012:85–87). The following caption summarizes the main strengths and weaknesses, and the opportunities and

threats of the multi-cross sectional design. The analysis of previous studies in the literature, as well as the researcher` approaches to address the difficulties connected with the mixes-methodology applied, have been elaborated in chapter 4.1. Table 8 shows the results of SWOT analysis of the methodology.

Strengths	Weaknesses
Mixed-approach: ▪ reduction of weaknesses of different approaches in order to maximize of the validity of field studies. Expert interviews: ▪ suitable for theoretically less explored social relationships; ▪ contribution to the structuring and assessment of the research topic by the expert. Qualitative data analysis: ▪ case-orientated approach characterized by a continual balancing between within-case and cross-case analysis; ▪ a forward-backward application of comparative method; ▪ the combination of analytical approaches as well as its focus on people skills rather than software. Survey research: ▪ verifying insights received from expert interviews as well as check and complementation of the first conception drafts; ▪ systematic validation of the theoretical assumptions, providing the most comparable data set; ▪ suitable for measurement of attitudes. Likert scales: ▪ especially appropriate for cross-cultural research allowing the collection of many different items from people of various professions and backgrounds; ▪ efficient, simple to use and reliable; ▪ can be adapted to different contexts and are expected to provide reliable results and are familiar to most respondents, which reduce the risk of errors.	Mixed-approach: ▪ complex process of different application methods and therefore time and effort intensive; Expert interviews: ▪ cost and time intensive; ▪ preparing of an interview guide is connected with an intensive examination of the topic; ▪ quality and the completeness of the results highly depends on interviewers skills; ▪ data gained are difficult to analyze and interpret; ▪ limited validity and generalization of the interviews results. Qualitative data analysis: ▪ strongly depends on skills of the researchers.
Opportunities	**Threats**
Expert interviews: ▪ appropriate where reliable and comparable data missing. Interview sampling: ▪ expert sample appropriate for the interviews in order to produce the cultural differences among group members ▪ snowball sampling technique where the access to the identifiable sample members is very limited. Survey sampling: ▪ improbability sampling techniques suitable when a complex or unusual phenomena would be thoroughly understood and a high volume of data would be necessary	Interview sampling: ▪ by use of expert sampling no guarantee, that chosen sample members are real experts Survey sampling: ▪ the validity of Likert scales relies on the representativeness of the respondent sample, a large respondent sample is necessary to receive useful results. Survey responses: ▪ written questionnaire - generally low response rate and possible consequence of non-response bias; ▪ not possible to avoid confounding errors in the responses of written questionnaire; ▪ a possible bias between different cultural or professional groups answering the questionnaire.

Table 8: SWOT Analysis for the applied research analysis (own design)

Despite some weeknesses, the applied methodology is based on a solid two-phase design. Also, the researcher has already a broad experience and network in the field of bioenergy and due to participation and work in the regional network for biomass use for energy purposes. Recommendations and networking of policy makers and regional energy agencies have supported the data gathering and increased the number of survey responses.

4.5 Philosophical Approach and Epistemology

The research work has an explorative character and identifies, describes and analyzes the main incentives and obstacles for energy production on a biomass basis and explores the possible strategies that could weaken the barriers and strengthen the drivers in European border regions. The research project is characterized by a multi-disciplinary approach. In consequence, the theoretical framework for the analysis of different classes of drivers and barriers for renewable energy penetration will be also multi-disciplinary. The analysis of stakeholders' behavior and their motivation to invest in a cross-border area can be classified under the term *social science*, which studies the behavior and institutions of human beings, the human and social world and includes the fields of psychology, sociology, anthropology and economics. According to one area of philosophy – epistemology - which overlaps with scientific philosophy, the following question has been addressed: in order to secure knowledge in terms of a justifiable true belief, what scientific method is suitable? (Ladyman 2001:4).

Drawing on the investment decision and cross-border literature, the theory of location decision and the transaction costs theory have been used in order to empirically test barriers for bioenergy production in cross-border areas. Because of the fact that the location decision is part of an investment decision process, the theory of *company* needs to be explained. A company functions by taking part in various activities, and gains value via the application of production (labor, land, capital and entrepreneurship) and the distribution of the resulting output. The performance of the *company* has been conceptualized in many different theories and classified into three types: neoclassical, behavioral and managerial (institutional). In geography these theories explain industrial location decisions (Hayter 1997:80).

The theoretical framework for the research is linked to the theory of location decision focusing on optimal location choice under consideration of location factors determining the attractiveness of a site for a company location. The production location theory addresses the relationship between geography and production behavior and discusses how the production relationships of a firm will affect its geographical behavior. The theory attempts to explain how the optimum location of the firm can be affected by changes in spatial economic costs themselves. Spatial economic costs are generated at a point in space (e.g. local labor and land prices) or in the overcoming of space itself (e.g. transportation and communication costs). The location production models are suitable for the analysis of firm behavior, which produce and distribute physical goods (McCann 2002:111–112). The specific location of border regions in the centre of the integration area might be an advantage in attracting resources. Moreover their spatial proximity to the foreign market improves their location conditions. On the other hand, according to the traditional location theory, national borders are important

barriers for cross-border economic relationships (Niebuhr and Stiller 2002:22). The neoclassical approach of the industrial location theory, which is based on the standard classical economic theory originated by Adam Smith, arguing that the firm is able to make a profit in any location where the total revenues exceed total costs (McCann 2002:111–112) is not enough when it comes to explaining barriers in relation to investor decisions regarding investment in cross-border areas. The father of the neoclassical industrial location theory, Weber, argued that the optimal location for the factory can be found by minimizing the costs of importing raw materials and exporting the end products. In other words, companies select particular locations for their factories where there are minimum transport costs involved (Rubenstein 2002:10).

The main barrier categories in relation to bioenergy production have been defined according to the behavioral approach of the location theory via the understanding of the motives of decision makers and the goals of companies (Rubenstein 2002:10). The behavioral approach of the location theory takes into account the assumption of imperfect information and uncertainty in the behavior of companies in economic terms (McCann 2002:114). The behavior of the economic landscape is characterized by information flows in the company's mental maps' in order to make decisions (Hayter 1997:80).

According to the institutional approach of the location theory, companies operate in an institutional environment which significantly influences their location behavior. Companies have to negotiate with different peoples in their environment - suppliers, governments and other institutions. Their location decision therefore is a result of these negotiations (McCann 2002:114). The institutional approach has been used to discuss the main structural class of barriers for bioenergy production. Moreover one particular organizational economic theory, the transaction cost theory, is selected to demonstrate an organizational perspective in the context of investment decisions regarding bioenergy production. The transaction cost theory plays an important role in the international approach, analyzing investment decisions in cross-border regions. This theory is based on a fundamental criticism of the neoclassical paradigm of balance under which merely price mechanism regulates factor allocation. The transaction cost theory is based on the Coase model, which claims that, not only the market itself, but institutions also affect economic activity. Transaction costs are the costs that arise in connection with identifying, transferring and exercising disposal rights (Jäger 2008:3).

The next section, Chapter 5, includes results and discussion from data analysis based on expert interviews with an assessment of the factors impacting on bioenergy production in cross-border regions, in order to specify survey questions in the questionnaire.

5 Results from PHASE I of Data Analysis and Discussion – Identification of Barriers, Drivers and Strategies for Bioenergy Generation

The main goal of the first phase of the analysis is to **identify** the main barriers and drivers for bioenergy dissemination in a cross-border region and the possible impacts of border location on the stakeholders´ activities as well as the possible strategies to expand bioenergy.

The overall purpose of this chapter is:

- to analyze expert opinion - what main barriers and drivers are specific to each stakeholder group in each country and what do the participants suggest with regard to how the barriers of bioenergy production in their particular country could be overcome, and how the drivers could be strengthened;
- to incorporate these findings and results of already published literature data analysis to formulate questions for a written questionnaire for the further data collection and analysis.

This chapter investigates the perceptions of stakeholders concerning drivers and barriers in border regions, classifies them according to the research approach and explains the possible strategies for bioenergy dissemination according to the respondents. Finally, a discussion on the results takes place, giving a solid base for the building of a Likert scale questionnaire used in PHASE II of the research, to assess the stakeholders´ perceptions. This chapter answers the following research question:

> **<u>Research Question 1:</u> What are the main drivers, barriers and possible strategies for bioenergy generation in European border regions from the perspectives of different stakeholders along the bioenergy supply chain?**

The first phase of the data analysis proceeds according to the schema in Figure 37 in Chapter 4.3.1 and contains three main sections:

I. Preparation of Coding Process
II. Actual Coding Process
III. Specification of Research Questions

5.1 STAGE I: Preparation of Coding Process

All (eight) interviews (APPENDIX 2 List of Interviews) have been conducted in German and Polish because the chosen experts come from Germany, Poland and the Czech Republic and were more comfortable answering the questions in either their native tongue, or in German. The interviewed experts represent four key groups of stakeholders; along the bioenergy supply chain:

(1) biomass suppliers
(2) consultants and administration personnel working in the bioenergy field
(3) (bio) energy producer
(4) (bio) energy consumer

All interviews have been transcribed in for interviews in the native language (APPENDIX 3 Interview Transcriptions). Through the rereading of the interviews a holistic understanding of the respondent's experience has been achieved. The key aspects of the interview questions are presented in Figure 38 below.

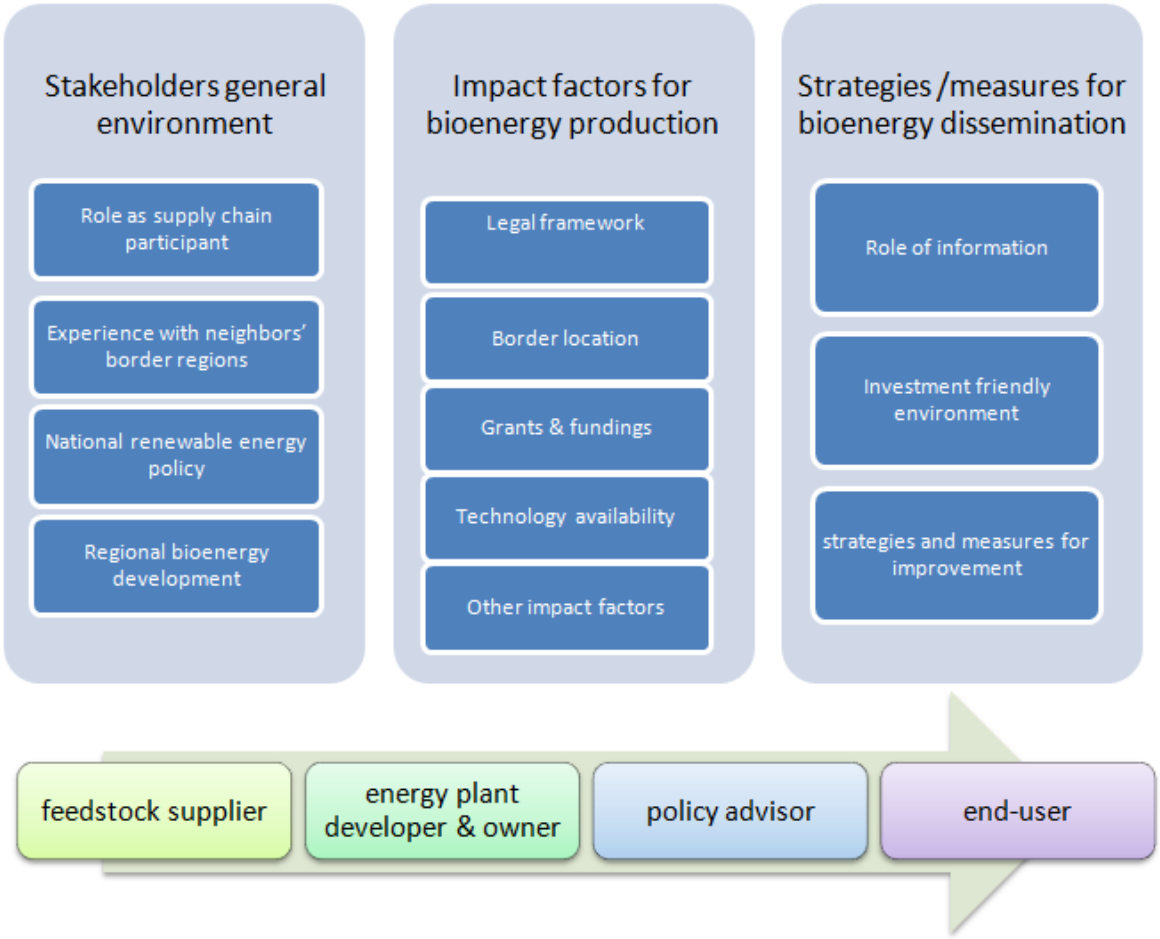


Figure 38: Key aspects of interview questions (own design based on developed interview guidelines)

For the needs of this research a snowball sampling has been used to identify as much as possible participants as members of the above mentioned four stakeholders groups (see chapter 4.2.1.1).

The **category "end user"** will be used for the analysis of interviews in order to identify a general view of bioenergy users´ perceptions. However this stakeholder group in the investigated cross-border area is of a significant size. There are already 120,000 private household energy consumers in 2011 in the German border region. The number of private households in the administrative district Görlitz amounted to 55,000, and in Bautzen 64,300 (Statistical State Office of the Free State of Saxony Kamenz 2012:4–6). There are no statistics concerning these energy consumers using bioenergy, and in order to make contact with these potential bioenergy users it would have been necessary to survey a very large population. To survey more than 120 thousand potential energy consumers is not feasible from a financial and time position. Therefore further analysis consists of one good practical example of a bioenergy user (based on one interview), which admittedly diminishes an integral part of the analysis of bioenergy end user perceptions in the selected border region.

5.2 STAGE II: The Actual Coding Process via the Grounded Theory Coding Process

According to the multiple cross-sectional approach (see chapter 4.3) used for this analysis, the possible barriers and drivers have been investigated from different stakeholder´s points of view, and classified into structural, availability and behavioral sections and investigated in the three NUT 3 areas between Poland, Germany and the Czech Republic.

In order to frame survey questions essential for PHASE II of this research, already posited theories regarding barriers, drivers and strategies for bioenergy generation in border regions that have emerged from literature review will be validated and new theories prompted by the interviews will be integrated into the analysis.

The main goal here is the actual coding process – "back to the ground", linking all relevant fragments to the appropriate codes. A common list of concept as preliminary codes has been drawn up (APPENDIX 4 Category System for Interview Analysis).

According to the Glaser and Strauss approach, in the frame of the grounded theory coding process is a move towards the systematization and control of theory building. A permanent comparison of generated theoretical concepts and analyzed data facilitates the coding of the data (Strübing 2004:19).

This coding process consists of three phases, as seen in Figure 39 below.

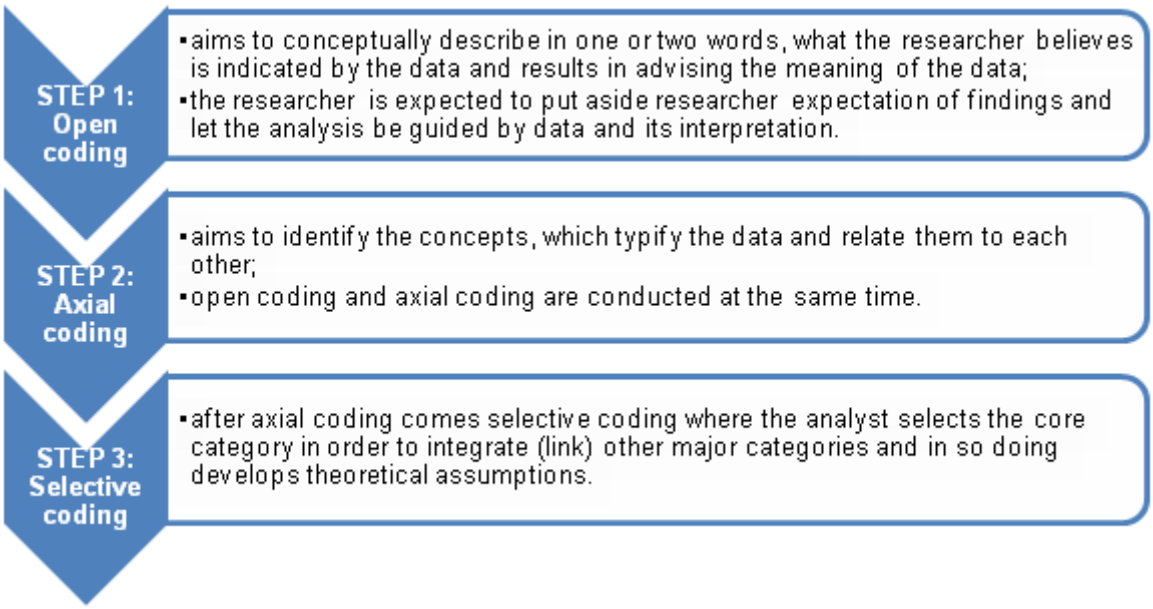


Figure 39: Coding process in 3 steps (own design based on Corbin and Strauss 2008:198; Kardorff, Steinke, and Flick 2004:476–483)

STEP 1: Open coding and STEP 2: Axial coding

Brief abstracts of the key storylines of each interview have been included. For the purpose of further analysis, the English language has been used. This phase consists of eight narrative interview reports (APPENDIX 5 Interview Reports).

On the basis of the narrative interview reports, as well as a constant comparison process (forwards-backward movements) the concrete experience of the stakeholders has been replaced by concepts. These results and findings based on literature analysis allowed for the creation of a common list of concepts (APPENDIX 4 Category System for Interview Analysis).

On the basis of the category system all the interview reports have been coded according to coding plans and further analyzed (APPENDIX 6 Interview Coding). The main results of this analysis follows.

In the formal categories serial number, kind of stakeholder and country of origin have been correlated, as Figure 40 below shows.

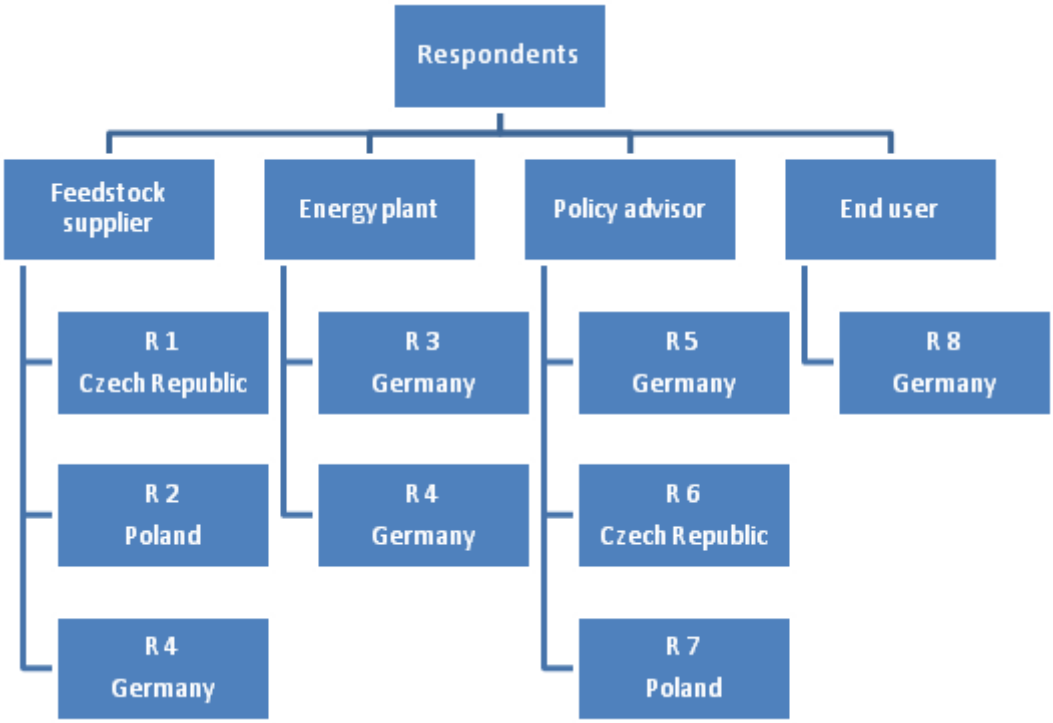


Figure 40: Formal categories of interviewed stakeholders (own design)

Next, content categories on three levels for all stakeholder groups have been classified and according to the coding plans coded. The following levels have been considered:

- barriers for bioenergy dissemination (structural, availability, behavioral),
- drivers for bioenergy dissemination (structural, availability, behavioral),
- impact of border location,
- opportunity-specific strategies to overcome barriers and strengthen drivers.

The main results are summarized in the sections to follow. A detailed coding process is described in the APPENDIX 6 Interview Coding.

5.2.1 Perceptions of Feedstock Suppliers

These perceptions are based on three interviews - respondent No. 1 (R 1), an agricultural biomass supplier from Poland (mostly maize silage) delivering biomass for energy utilization in a German installation; respondent No. 2 (R 2), a forest biomass supplier and installation operator from Germany, and respondent No. 4 (R 4), a biomass broker from the Czech Republic, operating in the German-Czech border region. All the interviews took place at the end of 2012.

Following categories were used for the identification of barriers for feedstock suppliers:

Possible barriers for feedstock suppliers		
Structural Barriers	**Availability Barriers**	**Behavioral Barriers**
Competition vs. other investments	Lack of feedstock experience	Perceptual challenges of feedstock supply
Limited/uncertain return on investment	Physical resource limitations (land availability)	Uncertain European energy strategy
Possible negative environmental impact	Other availability barriers	Uncertain of financial support for agriculture
Possible negative impact on food production		Unsettled bioenergy market (unreliable biomas/energy buyer)
Resource intensive feedstock		Unclear and complex legislation concerning cross-border transport of residual materials
Other structural barriers		Other behavioral barriers

Table 9: Possible barriers for feedstock suppliers according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

Both respondents from Poland, as well as the one from the Czech Republic recognize that currently investments in biomass installations are economically uninteresting for farmers. Moreover the economically meaningful distance for biomass transports, approximately 30 km - 50 km (IfaS Institut für angewandtes Stoffstrommanagement am Umwelt-Campus Birkenfeld 2007:48–49), has an negative impact on the return on investment of biomass installations. However the bigger players in the market are better placed when it comes to biomass supply in comparison to the market minnows. Only respondent R 4 refers to the environmental impact, admitting that he has already transported biomass over a distance of 100 km, but he immediately recognized the absurdity of this situation. R 1 is also skeptical about the fact that biomass is grown in a field where food can be produced. His experience with crop harvests was also connected with a higher effort - *"special technological machines are needed".* Another obstacle is the Polish supplier's lack of financial support in relation to bioenergy production. In the case of financial incentives, some farmers would consider investment in bioenergy generation - *"some guarantees are needed"*. Moreover some legal obstacles have been mentioned by the R 4 in relation to the cultivation of fast growing trees.

These answers have an impact on question No. 2 *„How does bioenergy impact in your opinion (global, local environment; food production)?"* and No. 5 "*What in your opinion makes the crop growing and the selling of biomass less attractive…?"* in the questionnaire for feedstock suppliers. Moreover the aspect of preconceptions such as the aversion to challenges (here *other barriers*) is also reflected in question No. 5. All mentioned barriers have been incorporated into the questionnaire as well as the aspect of "*financial support"* for energy production

(here mentioned as "*other barrier"*) is reflected in the questionnaire for energy producers, question No. 4. "*Legal obstacle for cropping fast growing woods"* is very specific and can be reflected in the questionnaire as *"other barrier".*

The interviewees did not mention a lack of feedstock experience or land availability as barriers, as they had all already garnered some experience in biomass supply for energy purposes. However the categories *"Lack of feedstock experience"* and *"Land availability"* have been incorporated into the questionnaire despite the lack of confirmation by the interviewed experts because of their importance as a barrier in the literature on barriers to bioenergy development (Adams et al. 2011:1220–1221). Land use competition is mostly visible in the case of use of agriculture crops for energy production (Beck and Martinot 2004:5) For the research the perceptions of farmers, without biomass supply experience are also interesting, because they could be potential future biomass suppliers.

In the case of behavioral barriers, respondents mentioned perceptual challenges of feedstock supply such as the scepticism of farmers or the more labour-intensive effort required in comparison to conventional crops. They are also not confident on how the political position or the financial support in relation to renewable energy will develop in the future. Both the respondent R 1 from the Czech Republic and R 2 from Poland recognize the market as *"insufficiently developed"*. According to the R 1 *"there is no bioenergy development in the Liberec region"* and the legal position concerning the cross-border transport of the material from biogas installations is unclear: *"it disturbs […] cooperation beween biomass plant in Seifhennersdorf (DE) and heat installation in Varnsdorf (CZ)".*

There are also some other behavioral barriers, such as the preconceptions in the Czech border region *"renewable energy makes energy more expensive"* as well as the Polish border region's aversion to change "*the mayors: […] why should I build [biomass installation], in the situation when I have one near?"*

These answers have an impact on question No. 5 (see above) and No. 6: *"To what extent do you agree with the statements concerning bioenergy production…?"* in the questionnaire. All named categories have been incorporated into the survey in view of their confirmation by the interviewers. Moreover the aspect of preconceptions aversion to challenges (here *other barriers*) are also reflected in the question No. 5.

Following categories were used for the identification of drivers for feedstock suppliers:

Possible drivers for feedstock suppliers		
Structural Drivers	**Availability Drivers**	**Behavioral Drivers**
Market diversification/opportunity	Good technique for waste / residual materials utilization	Attractiveness of a growing bioenergy market
Profitable return on investment	Other availability drivers	Other behavioral drivers
Meeting governmental energy/carbon/waste targets		
Other environmental benefits (other than CO_2 reduction)		
Other structural drivers		

Table 10: Possible drivers for feedstock suppliers according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The respondent from the Polish border region perceives the opportunity to sell biomass over the border as a positive opportunity, because the domestic market for biomass is not so well developed as the German one and the farmers can achieve in Germany higher prices for biomass. R 1 recognizes also the possibility for waste and residual materials as a possible input for bioenergy production *"for the waste a new line of use should be found"*. R 1 and R 2 are satisfied about the existing information on biomass technologies and judge this position as positive. These answers have an impact on question No 3: *„How important is the impact of bioenergy for you on the following environmental aspects*….?" and No. 4 "*What does, in your opinion, make crop growing and the selling of biomass more attractive…?"* in the questionnaire for feedstock suppliers. Other drivers are summarized in the category *"Other* reason" in question No. 4.

Following categories were used for the identification of cross-border impact according to feedstock suppliers:

Possible cross-border impact for feedstock suppliers
No impact
Market transparency
Transaction costs
Additional markets
Market distortion caused different subsidies for agriculture
Insufficient cross-border infrastructure
Other impacts of border location

Table 11: Possible cross-border impact for feedstock suppliers according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

According to all respondents a border location has no impact on their activities *"nowadays there is no border"*. Their first impression is positive in connection with the border location and they do not recognize any disadvantages and they perceive the market as transparent

"the market is common". However further analysis shows, that there are indeed both advantages and disadvantages typical for the border region, such as longer transport distances *"transport distances are longer"* (R 1) and the lack of infrastructure *"there are relative few crossing points at the border"* as well as language barriers: *"I don´t know the language, but […] we have translators"* (R 2). On the other hand due to the open market, there are new markets for agriculture products like biomass also across the border: *"the farmers are looking for new possibilities on the market"* (R 1). These answers have an impact on question No. 7: *"How does the cross-border situation of your farm influence your activities?"* in the questionnaire for biomass suppliers. Language problems and the land's natural condition are summarized under the category *"Other reason".*

Following categories were used for the identification of the main strategies and measures which could be used to strengthen the incentives and to overcome the problems according to the feedstock suppliers:

Possible strategies and measures for feedstock suppliers
Continuous integrated European long term energy strategy
Clearer legislative concerning cross-border residual materials transport
Equal subsidies in different cross border area for agriculture
Cross-border infrastructure development
Dissemination of best practice examples
Information strategy concerning bioenergy production
Other opportunity-specific strategies

Table 12: Possible opportunity-specific strategies to overcome barriers and strengthen drivers according to the feedstock supplier (own design based on interviews 2012)

According to R 4 from the German border region, current legislation concerning renewable energy was very supportive and it is essential to continue this in the coming planned amendment. In R 2 from the Polish border region, the subsidies in all EU countries should be equal *"in the EU the same financial support should be available".* R 4 from the German border region recognizes the need for further infrastructure development, especially in relation to energy grids. Moreover, language barriers should be removed.

These answers have an impact on question No. 8: *„What can be done to increase the attractiveness of biomass growing for the purpose of energy production?"* and No. 9: *"How significant are the following strategies for assuring the same opportunities for both the biomass producer and the biomass supplier in the border regions you live in?"* in the questionnaire for feedstock suppliers.

The aspect *"clearer legislation concerning cross-border transport of residual materials"* has been incorporated into the questionnaire even though these stakeholders did not mention them as a possible improvement strategy. However reviewer No. 1 stated that the legal

framework *"disturbs […] cooperation between the biomass plant in Seifhennersdorf (DE) and the heat installation in Varnsdorf (CZ) - there are problems with the output of the biomass plant"*.

Moreover the aspect of "*broaden information about opportunities and risks"* of biomass crop growing included in question No. 8, is one of the most significant barriers for feedstock suppliers mentioned in previously published literature ((Adams et al. 2011:1220–1221) and could be the result of insufficient knowledge on the opportunities and risks of supplying biomass for energy purposes. The aspects of *"infrastructure development"* and *"language support"* have been also incorporated in question No. 8.

5.2.2 Perceptions of Policy Advisors

These perceptions are based on three interviews with policy advisors, the first one from Germany representing a part of the regional administration- agency for regional development (R 5), the second one from the Czech Republic representing also the agency for regional development, but not directly connected to the regional administration (R 6) and the third one from Poland – part of the administration on the voivodeship level under the Marshal of Lower Silesia (R 7). All interviews took place in September 2012.

Following categories were used for the identification of barriers for biomass-based electricity generation from the perspective of policy advisors:

Possible barriers for policy advisors		
Structural Barriers	**Availability Barriers**	**Behavioral Barriers**
Competition vs. other investments	Lack of feedstock supply (resource availability)	Unclear and complex legislative processes in relation to plant authorisations
Potential negative environmental impacts	Physical resource limitations (land availability)	Perceptual challenges of bioenergy plants
Potential negative impacts on food production	Other availability barriers	Other behavioral barriers
The conversion technology is to expensive		
Other structural barriers		

Table 13: Possible barriers for policy advisors according to the cross-sectionals-approach adopted for this analysis (own design based on interviews 2012)

Currently, potential investors in the Polish border region prefer to invest in other fields. R 7 stated that *"there is some money for investments, but no willing investors"*. One of the reasons for this could be the lack of a financial support system for bioenergy investment in com-

parison to the German support system. All respondents recognize also the potential negative impact of bioenergy generation on the environment with different reasons such as long transport distances or insufficient legislation. The potential negative impact on food production was also mentioned. The Polish expert underlines the lack of financial support for bioenergy producers, and that the conversion technology proved to be too expensive in comparison with other investment possibilities. The German expert thinks the financial support for bioenergy generation is disturbing because *"it leads to a development which does not belong to the real market"*. All experts perceive the instability of legal regulations as a barrier for further development.

In the case of possible availability barriers, currently there is sufficient input for the existing biomass plants, but the experts from the German and Polish border region are fearful of the future biomass supply and resource availability, especially the industrial investor R 5 who stated that *"industrial investors in the main do not pay enough attention to the feedstock supply in advance". The* German expert is also concerned about the long-term obligations of farmers and indirectly of land availability.

The experts from Poland and Germany complained about the complexity of legal regulations for bioenergy producers. All respondents mentioned the perceptual challenges of bioenergy plants such as the impact of climate change on the producing process, insufficient use of produced heat or potential problems with feeding into the electricity grids.

These answers have an impact on question No. 2 *„How does bioenergy impact in your opinion …(global, local environment; food production)?"* and No. 5 "*What does makes in your opinion bioenergy production less attractive…?"* in the questionnaire for policy advisors. All mentioned structural barriers have been incorporated into the questionnaire for policy advisors.

Moreover under *"other structural barriers"* respondent No. 5 named *"ups and downs"* concerning funding and the legal environment, which is reflected under *"development and operation costs of bioenergy plant are uncertain"* in question No. 5. Other aspects such as *"legal regulation"* and *"subsidies / financial support"* are included in question No. 6: "*To what extent do you agree with the statements concerning bioenergy production…?"* under *"financial support"*, "current legal environment" and *"access to the funding"*.

Under the category *"other availability barriers"* respondents mentioned *"governmental support for energy production", "insufficient energy grids"* or *"transparency for society".* These aspects have been reflected in question No. 6 (see above) as well as No. 9: *"What do you think about the following possibilities to increase the attractiveness of bioenergy production?"*

Following categories were used for the identification of drivers for biomass-based electricity generation from the perspective of policy advisors:

Possible drivers for policy advisors		
Structural Drivers	**Availability Drivers**	**Behavioral Drivers**
Decentralisation of energy capability	Good technique for waste / residual materials utilization	Bioenergy supply consistency vs. other intermittent energy options
Increase in rural development and economy	Variety of feedstock use for bioenergy (resource diversification)	Ability to penetrate most energy markets (versatile)
Increased fuel security	Other availability drivers	Other behavioral drivers
Meeting governmental energy/carbon/waste targets		
Other environmental benefits (other than CO_2 reduction)		
Other structural drivers		

Table 14: Possible drivers for policy advisors according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The German expert recognized bioenergy generation as a possibility for the regional development *"farmers receive an additional source of income"* as well as contributing to the meeting of energy goals. Moreover he perceived the German Görlitz region as offering a variety of feedstock use for bioenergy because *"the landscape is well able for bioenergy production"*. All experts considered the existing know-how and support from professionals as available R 6: *"know-how is available".*

In the case of behavioral drivers, all experts recognized the flexibility of bioenegy for heat and electricity generation as an important advantage. The Czech expert assessed the proximity to the German technology as positive *"we are lucky to be near the German technology".*

These answers have an impact on question No 3: *„How important is the impact of bioenergy for you on the following environmental aspects*….?" and No. 4: "*What in your opinion makes bioenergy production more attractive…?* in the questionnaire for policy advisors. *"Decentralization of energy capability"* is correlated with the aspect of *"input diversity"*. *"Increased fuel security*" has been reflected in question No. 4 under the aspect "*continuity of bioenergy in comparison with other fluctuant renewable energies"*.

Biomass use as a way to waste utilization was not confirmed by the respondents. However in the literature it belongs to the important drivers to bioenergy development (Adams et al. 2011:1220–1221). Therefore question No. 3 (see above) consists of the aspect *"other envi-*

ronmental advantages" where the respondents have the chance to fullfill this possible or other environmental driver and to assess it.

Following categories were used for the identification of the border location impact on the policy advisors:

Possible cross-border impact for policy advisors
No impact
Market transparency
Impact of neighbor energy policy (green energy vs. nuclear power)
Unclear legal legislation: cross-border residual materials transport
Other impacts of border location

Table 15: Possible cross-border impact for policy advisors according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

Similar to the answers of energy producers, all policy advisors did not recognize any impact of border location on the development of bioenergy generation. They judged the cross-border market as very transparent – the Polish expert did not recognize any obstacle to sell biomass from Poland to Germany because of the *"free flow of human capital, work and land".* However the German expert was concerned that Germany plans to move away from nuclear energy at the same time that its neighbor, Poland, plans to build new nuclear plants. Also the Czech expert mentioned some legal difficulties with the cross-border transport of residual materials from biogas production. According to the German expert, investors have perhaps lower investment costs in border regions which have not as much development as high population areas, but then there is also a lower demand for energy.

These answers have an impact on question No 7: *"How does the cross-border situation of a farm influence its activities?" and No. 8: "To what extent do you agree with the statements concerning cross-border activities?*"

Following categories were used for the identification of the main strategies and measures which could be used to strengthen the incentives and overcome the problems according to policy advisors:

Possible strategies and measures for policy advisors
Continuous integrated European long term energy strategy
Dissemination of best practice examples
More information on chances and risks of bioenergy production
Other opportunity-specific strategies

Table 16: Possible opportunity-specific strategies to overcome barriers and strengthen drivers according to the policy advisors (own design based on interviews 2012)

For all the experts a long term policy with appropriate legal solutions is essential for further bioenergy development. The development of best practice examples also plays an important role - *"some demonstration installations are necessary"* (R 7). Moreover, according to all the

experts, an information policy is essential - *“better communication of local advantages needed”* (R 5). The Czech policy advisor suggested that the communication would be more successful if it would *“take place cross-border”.*

These answers have been incorporated into question No. 9: *„What do you think about the following possibilities to increase the attractiveness of bioenergy production?”* and No. 10: *“How significant are the following strategies for assuring the same opportunities for bioenergy producers in the border regions you live in?”* in the questionnaire for policy advisors. Other strategies mentioned by the respondents as *“tax reductions”* and *“energy grid development”* are also reflected in the questionnaire.

5.2.3 Perceptions of Energy Producers

These perceptions are based on two interviews with operators of industrial biomass installations generating electricity and heat, both reviewer No. 3 and respondent No. 4 (R 3 and R 4) based mostly on agriculture biomass (maize silage). R 3 processes biogas into the quality of natural gas and feeds it into the gas grids. Heat is offered to the local heat system. R 4 feeds in the electricity generated by the installation into the grids and heat uses for heating of market garden in the neighborhood as well as for wood drying. This so called “bioenergy farm” offers different kinds of fire wood for sale. Both operators come from Germany. All interviews took place at the end of November 2012.

In the Polish border region, only one installation using biomass for co-firing with coal and in the Czech border region one installation producing bioenergy from maize were identified. Both plant managers from the Polish and Czech border region answered the questionnaire and will be evaluated in the next part of the data analysis.

Following categories were used for the identification of barriers for biomass-based electricity generation from the perspective of energy producers:

Possible barriers for energy producers		
Structural Barriers	**Availability Barriers**	**Behavioral Barriers**
Competition vs. other investment	Lack of feedstock supply (resource availability)	Perceptual challenges of bioenergy plant
Limited/uncertain return on investment	Other availability barriers	Unclear and complex legislative process of plant permission
Low primary-end-user demand		Uncertain development and operational costs
Potential negative environmental impacts		Uncertainty of conversion technology/equipment
Potential negative impacts on food production		Uncertainties of financial support
The conversion technology is to expensive		Other behavioral barriers
Other structural barriers		

Table 17: Possible barriers for energy producer according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

Neither respondent R 3 nor respondent R 4 mentioned that other investments are financially more interesting than bioenergy production. It may be that in Germany there already exists sufficient financial support for bioenergy production, making investment attractive for potential energy producers. However, respondent R 3 is concerned about the future development of EEG and market prices because of their impact on the Return of Investment (ROI) *"after EEG: our hope is that the gas price level will change"*. Low-primary user demand was not mentioned as a barrier. Currently, electricity generation in Germany can be fed into the grids and it is legally guaranteed. Therefore these kinds of concerns are not relevant in Germany. Potential negative impacts of biomass growing on energy production as well as on food production were mentioned by the respondent R 3: *"under local aspects there are some additional emissions […] agriculture was always the food producer".*

Both respondents are concerned about the availability of feedstock supply in consideration of existing bioenergy installations in the German border region *"there are a lot of bioenergy installations in the region. […] there is not very much biomass left".*

In the case of behavioral barriers, both respondents expressed some perceptual challenges of bioenergy plants, such as the negative image of bioenergy operators - "*we experienced that opinion: we invest to receive subsidies […]"* (R 3). Changes in the legal environment make the investment process more complicated and expensive - *"because of the change in the regulation […] we had additional costs"* (R 3) and therefore less attractive.

These answers have an impact on question No. 2: *„How does bioenergy impact in your opinion …. (global, local environment; food production)?“* and No. 5: “*What makes in your opinion bioenergy production less attractive…?”* as well as No. 6: *“To what extent do you agree with the statements concerning bioenergy production…?”* in the questionnaire for energy producer.

All mentioned structural barriers have been incorporated into the questionnaire. The category *“investment competition”* has been incorporated in the questionnaire despite the lack of confirmation in the interviews, because the interviewed experts decided already to produce bioenergy and in order to explore the perception of other energy producers, this aspect is necessary. Bioenergy investments are characterized mostly by higher amounts of financing for the same capacity than traditional energy sources (Reddy and Painuly 2004:1432). These higher initial capital costs make bioenergy technology more expensive for the farmers. Other aspects like “*low interest of end user in bioenergy”* and *“expensive technology”* are also included in the survey because of their importance as a barrier in the literature on barriers to the bioenergy development (Adams et al. 2011:1220–1221).

Moreover, in question No. 5 the aspect of insufficient financial means for the conversion of technology *“technology of bioenergy production is too expensive”* has been included in the survey despite the lack of confirmation by the interviewed bionenergy producer. However expert R 2 (feedstock supplier) stated that *“farmers can’t afford to build biomass installations on their own”*. This aspect is also worth considering among other energy producers, like a small scale agricultural bioenergy producer based on wood pellets who wishes to develop in size. Insufficient support systems for bioenergy and other RES have been identified as an obstacle for their further development in different studies (Reddy and Painuly 2004:1432–1437; Tsoutsos and Stamboulis 2005:757; Związek Pracodawców Prywatnych Energetyki and Związek Pracodawców „Forum Energetyki Odnawialnej” 2011:24).

The category *“land availability”* has been termed as a barrier for feedstock suppliers (Adams et al. 2011:1220–1221) though it has been included in the questionnaire for energy producers, because of the fact that there are some agricultural bioenergy producers. These energy producers are at the same time feedstock suppliers - farms producing biogas based on animal residual materials and maize silage.

The interviewd experts seemed to be well informed on the possible technologies for bioenergy production as they did not confirm the category *“uncertainty of conversion technology/equipment”*. However uncertainty on future price structures of renewable energy development was identified in other studies (Reddy and Painuly 2004:1432–1437; Związek Pracodawców Prywatnych Energetyki and Związek Pracodawców „Forum Energetyki

Odnawialnej" 2011:24). Respondent R 3 confirmed that the company he works for received higher financial subsidies because innovative technology was used in the plant: *"we got the funding because we were the first installation in Saxony, which produced biogas, which was prepared and injected into the natural gas pipelines"* and that *"I think the biogas production technology is easy".* More interesting for further analysis is the question: are the potential plant developers and owners able to run an installation without financial subsidies? This aspect is reflected in question No. 5 under following aspects: *"technology of bioenergy production is too expensive"* and *"without financial support from state, it is not possible to use biomass for energy production".*

Following categories were used for the identification of drivers for biomass-based electricity generation from the perspective of energy producers:

Possible drivers for energy producers		
Structural Drivers	**Availability Drivers**	**Behavioral Drivers**
Market diversification/opportunity	Availability of financial reward/support mechanisms	Bioenergy supply consistency vs. other intermittent energy options
Meeting governmental energy/carbon/waste targets	Variety of feedstock use for bioenergy (resource diversification)	Bioenergy use versatility
Other environmental benefits (other than CO_2 reduction)	Other availability drivers	Increased bioenergy interest from end-user
Other structural drivers		Other behavioral drivers

Table 18: Possible drivers for energy producer according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The possibility for market diversification as well as the contribution of bioenergy to national renewable energies goals were mentioned by reviewer R 3: "*if I consider just Zittau, we almost achieved the goals"*. He recognized also the non-financial support from the regional municipality as a supporting location factor.

Financial support was from both respondents´ points of view very important for investment - *"EEG was for us the most important regulatory frame"* (R 3). They considered also resource diversification for their installations, like grass silage or resources from Poland. Moreover they perceived the proximity to Poland as an opportunity - *"we went towards Poland and there the condition were surprisingly even better"* (R 3) and possibility to generate win-win situations - for energy producer input supply security and for farmers *"high stability for the farmers against price fluctuations"* (R 3).

In the case of behavioral drivers, investment in bioenergy was considered a strategic one. Due to bioenergy versatility, it gave the producers more flexibility when it came to generating heat and electricity or feeding in the gas into the natural gas grids. The university proximity to

the German border region was also deemed important for knowledge transfer reasons assessed as positive.

These answers have an impact on question No 3: *„How important is the impact of bioenergy for you on the following environmental aspects*….?" and No. 4 "*What in your opinion makes crop growing and the selling of biomass more attractive…?"* in the questionnaire for energy producers. The aspect of local support and proximity has been summarized in the category *"Other reason"* in question No. 4.

The aspect of *"increased bioenergy interest from end-user"* has been incorporated into the questionnaire because of its importance as a driver in the literature on drivers for bioenergy development (Adams et al. 2011:1220–1221).

Following categories were used for the identification of the border location impact on the energy producers:

Possible cross-border impact for energy producers
No impact
Market transparency
Unclear legal legislative: cross-border residual materials transport
Transaction costs
Low population caused border location
Market distortion caused different subsidies for bioenergy production
Higher costs caused cross-border infrastructure
Other impacts of border location

Table 19: Possible cross-border impact for energy producer according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

Both respondents, when asked directly about the border impact on their activities, saw no influence. However in further consideration, different impact factors were indeed recognized. For respondent R 3 the market is transparent and he is well informed about the cost structures on both sides of the border. The second reviewer R 4 conceded that he doesn´t have sufficient information *"we are in the dark".* Further there were various legal problems with the cross-border transport of residual materials from biogas installations, which caused a *"complex certification process"*. He recognized that cross-border cooperation encourages additional efforts. However, the border location has also a positive impact as a possibility for additional markets. R 3 stated that the *"border location gave us the possibility to secure enough input to build an installation".*

These answers have an impact on question No 7: *"How does the cross-border situation of your plant influence your activities?"* in the questionnaire for energy producers. The aspect of "*low population caused border location"* is not reflected in this question because of a lack of

confirmation by the experts as well as being a marginal role in already published literature concerning barriers and drivers for bioenergy dissemination.

Following categories were used for the identification of the main strategies and measures which are applicable to strengthen the incentives and overcome the problems according to the energy producer:

Possible strategies and measures for energy producers
Continuous integrated European long term energy strategy
Clearer legislation concerning cross-border residual materials transport
Clearer legislation concerning plant permission
Equal cross-border subsidies for bioenergy production
Cross-border infrastructure development
Sharing of best practice procedures
Information strategy concerning bioenergy production
Other opportunity-specific strategies

Table 20: Possible opportunity-specific strategies to overcome barriers and strengthen drivers according to the energy producer (own design based on interviews 2012)

For reviewer R 3 it was important to rely on the current legal framework - *"continuity is critical".* He recognized the legal situation concerning cross-border residual materials transport as complex. The second reviewer perceived the need for equal subsidies on both sides of the border regarding bioenergy production - *"the condition should be the same"* as well as the need for cross-border infrastructure development. Both experts judged the sharing of best practice procedures as positive.

These answers have an impact on question No. 9: *„What can be done to increase the attractiveness of bioenergy production?"* and No. 10: *"How significant are the following strategies for assuring the same opportunities for bioenergy producers in the border regions you live in?"* in the questionnaire for energy producers. The aspect on "*broaden information about opportunities and risks"* of biomass crops growing has been included in the questionnaire even though stakeholders did not mention it as a possible improvement strategy. However reviewer No. 4 said that there were some *"reservations from farmers regarding the growth of energy crops".* In this case an expanded information strategy might be an appropriate way to work against these fears. Unfamiliarity with the new technologies may cause skepticism (Tsoutsos and Stamboulis 2005:757). The positive image of RES and its benefits as well as a cultural acceptance are essential for the successful development of RES (Marks and Czerepowicki 2010:10).

5.2.4 Perceptions of End Users – Best Practice Example

The respondent is a municipal residential building and heat supplier in the city of Großschönau, in Germany. The company Wohnbau und Wärmeversorgung Großschönau GmbH (WWG), was chosen for the interview because it is a good practice example of bioenergy use in the investigated border region. In 2010 the company had to modernize its heating system and decided to install cogeneration, a so-called block heat and power station.

On 3rd April 2010 a 400,000 euro installation was inducted into the grid. WWG received 10 percent of the build costs in the form of public subsidies. The cogeneration works with biogas and provides heat and warm water for the inhabitants, commerce and industry, as well as other properties. Generated energy is fed into the energy grids. Thanks to the installation, price stability should be possible. The biogas based on biomass is used virtually. This means the WWG does not produce biogas itself, but buys it from different energy suppliers (interview with the manager Tobias Steiner (R 8) on 23rd November 2013 in the firm head office in Großschönau, Germany).

Following categories were used for the identification of barriers for biomass-based electricity generation from the perspective of end users:

Possible barriers for end users		
Structural Barriers	**Availability Barriers**	**Behavioral Barriers**
Bioenergy costs vs. fossil-fuel	Low supply of bioenergy	Perceptual challenges of bioenergy use
Potential negative environmental impacts	Seasonal effects of bioenergy supply	Preferential over other renewable energy options
Potential negative impacts on food production	Other availability barriers	Uncertainty of adaptability
Infrastructure and other costs		Unsettled/changing bioenergy market
Other structural barriers		Unclear and complex legislative concerning bioenergy use
		Other behavioral barriers

Table 21: Possible barriers for end users according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The main reason for implementing the heating system based on bioenergy was to ensure price stability in comparison with rising natural gas and oil prices. Thanks to the regional resource use, the heat supplier expects relatively stable price levels. According to the company manager, there was a consideration to build a bioenergy installation on their own. However insufficient heat usage caused the opposite decision for virtual biogas use: "*the problem is in the meaningful concepts for energy use*". The main barrier for the individual energy user to

use bioenergy is according to the firm manager the high price of bioenergy in comparison with energy based on fossil fuels.

The interviewee criticized the lack of appropriate conceptual planning regarding an energy plant according to the resources available, though he did not inform himself sufficiently on the existing potential in the neighboring region - the Czech Republic. Großschönau, because of its border location, would be more disposed to using feedstock from the Czech border region.

Other barriers mentioned by the interviewee were more from an investor's point of view. The company director expressed concerns about the lack of energy grids as well as the legal consistency in relation to possible investments.

Following categories were used for the identification of drivers for biomass-based electricity generation from the perspective of end users:

Possible drivers for end users		
Structural Drivers	**Availability Drivers**	**Behavioral Drivers**
Cost reduction via direct substitute of fossil-based fuels	Good technique for waste / residual materials utilization	Bioenergy supply consistency vs. other intermittent energy options
Investment opportunity into renewable energy	Other availability drivers	Ability to penetrate most energy markets (versatile)
Meeting governmental energy/carbon/waste targets		Positive effects on image
Other environmental benefits (other than CO_2 reduction)		Other behavioral drivers
Other structural drivers		

Table 22: Possible drivers for end users according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The respondent supported the use of renewable energy, and especially bioenergy. He saw an opportunity for farmers, where additional income as biomass supplier could be generated - *"farmers have an additional business area".* The investment environment, was according to him, investor-friendly because of the financial support (EEG directive), the availability of biomass, a developed technology for bioenergy production, and the knowledge from research institutions.

Following categories were used for the identification of the border location impact on the end users:

Possible cross-border impact for end users
No impact
Market transparency
Other impacts of border location

Table 23: Possible cross-border impact for end users according to the cross-sectionals-approach adopted for the analysis (own design based on interviews 2012)

The respondent did not recognize any negative impact regarding border location *"we have a single European market".* Rather he saw the border location as an advantage because of possible knowledge exchange opportunities and the use of region-specific capabilities: *"each of our regions has its own competences"*. However he is not able to specify these opportunities and admitted his limited experience *"we didn´t take a look to see how the situation was in Poland or the Czech Republic".*

Following categories were used for the identification of the main strategies and measures which could be used to strengthen the incentives and to overcome the problems according to the end users:

Possible strategies and measures for end users
Continuous integrated European long term energy strategy
Sharing of best practice examples
Information strategy
Other opportunity-specific strategies

Table 24: Possible opportunity-specific strategies to overcome barriers and strengthen drivers according to the end users (own design based on interviews 2012)

The respondent suggested the legal regulation of renewable energy at the European level as a possible solution to disseminate bioenergy and hence contribute to CO_2 reduction - *"we have to think in the European dimension."* He also admitted that the knowledge about neighboring countries should be increased in order to better understand - *"we should extend the information on the European level".* A higher coordination at European level would be supportive in this case. In the investigated area of three border countries between Poland, Germany and the Czech Republic there were no other good practice examples identified. There are certainly many private bioenergy users, especially using wood combustion for heating. However, it is not meaningful to describe one single private user behavior pattern.

The next step of the analysis is the selective coding, as follows.

STEP 3: Selective coding

The main goal here is to conclude theoretical assumptions, current incentives, obstacles and strategies for bioenergy production, on the basis of coded text fragments. The central phenomenon according to the grounded theory approach can be described as "**the main category**" and is a result of the selective coding (Kardorff, Steinke, and Flick 2004:482). The main phenomenon of this analysis can be named as ***Crucial Factors,*** which mean the answers to the question: *"How are the actors (stakeholders) affected by external and internal factors (barriers and drivers) in their decision process whilst participating in the supply chain of bioenergy production and how can their behavior be impacted (strategies)?"*

This analysis concludes with a conceptual framework and description of the essential findings, which builds a solid foundation on which the next section, STAGE III, can begin.

5.3 A Summary of the Results from PHASE I

The experiences and opinions of the interviewed respondents as well as results from already published literature analysis have been incorporated in the written questionnaire used in PHASE II. In order to assess the perception of stakeholders a Likert Scale was used. This rating scale, named after its author Rensis Likert [1932] is a category scale built in two parts: a declarative statement, and a list of response categories ranging from *"strongly agree"* to *"strongly disagree"* (Peterson 2000:75). Because of its flexibility this scale is widely applied to the measurement of perceptive items. The Likert scale enables the respondents to express their opinion in a continuum within the range from low negative responses to high positive responses. According to statistical studies responses based on the Likert scale are more reliable than categorical Yes or No responses (Madu 2003:7). Five is the most common number of answer alternatives, however fewer or more alternatives are also possible. Five answers offers respondents a sufficient range of possibilities, without the "unnecessary minute distinctions in attitudes" (Monette, Sullivan, and DeJong 2010:354). In the applied questionnaire **four categories** have been used in the main to elicit clear opinions on the requested subject. However in those questions where the respondents may have problems with answering because of a lack of knowledge on the specific subject, **five categories** were used.

In STAGE III the findings of the analysis of coded materials as well as arguments from literature analysis are integrated into the specification of the research questions in the Likert Scale Questionnaire (APPENDIX 7 Likert Scale Questionnaires).

Figure 41 below shows the key points of the survey questionnaire.

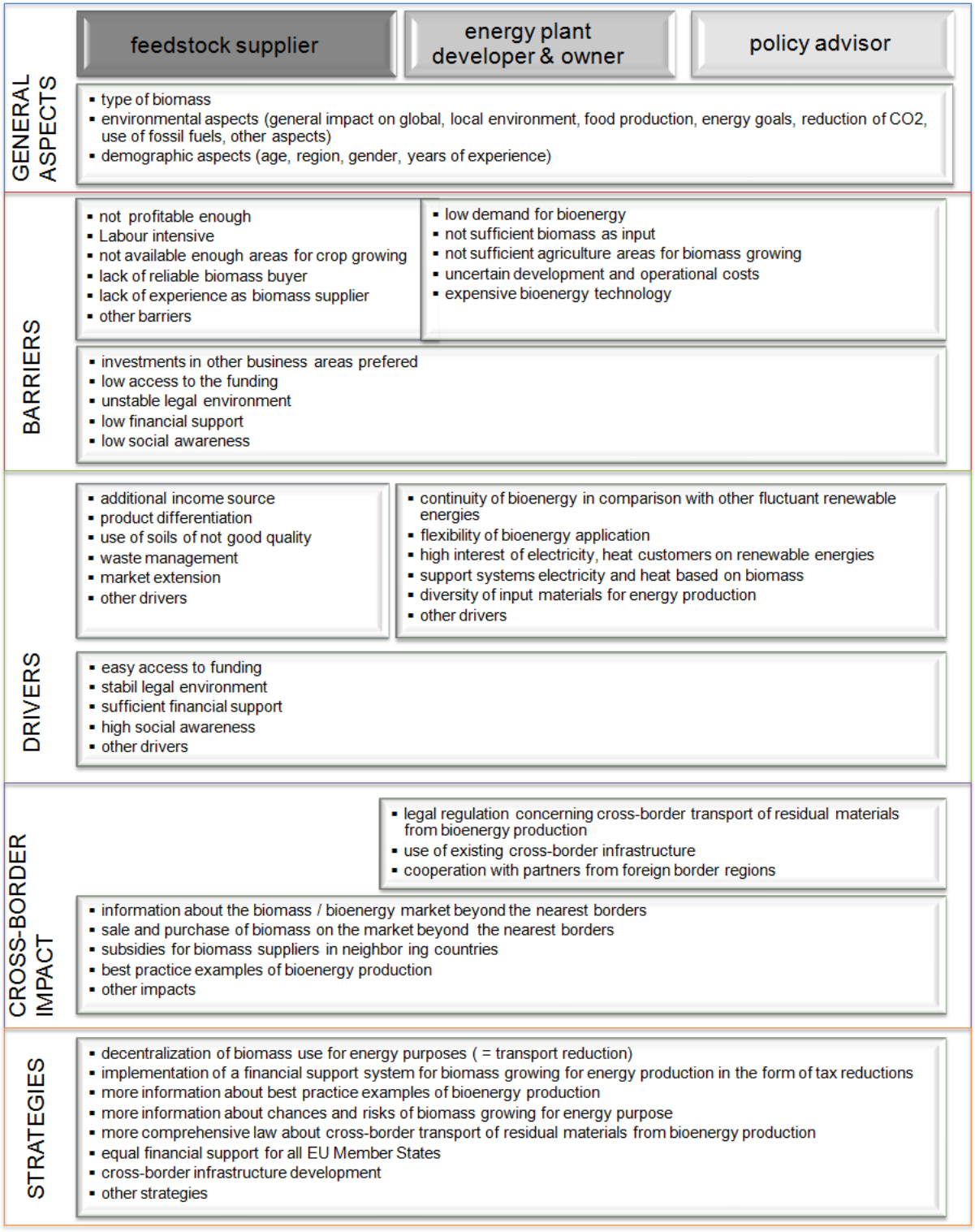


Figure 41: Key aspects of survey questions (own design based on interviews 2012)

The results of the interview analysis were used to prepare a survey questionnaire for survey offering the first perceptions of selected stakeholders.

6 Results from PHASE II of Data Analysis and Discussion – Assessment of Barriers, Drivers and Strategies for Bioenergy Generation

The main goal of the second phase of the analysis is to assess the main barriers and drivers and possible impacts of a border location on bioenergy dissemination in a cross-border region as well as the possible strategies to expand bioenergy, as identified in the first phase of the data analysis. Finally a discussion of these results takes place and offers a solid base for the formulation of recommendations for policy makers.

This chapter includes the answers on the following research questions:

> **Research Question 2: How strong do these factors affect the crop supply as well as the bioenergy generation process?**

After data preparation follows data analysis and critical discussion on the results based on survey.

6.1 Preparation of Data Analysis

Data for the second part of this analysis has been collected using online and offline surveys, conducted between June 2013 and February 2014 in the German, Polish and Czech border region. All the surveys were prepared in the native language and the results incorporated into an English data matrix. The total response rate of the survey was, without the missing data, **11 percent,** and with all responses, **19 percent**. Table 25 below shows the responses according to each stakeholder group.

	Survey Response			
	Polish border region	German border region	Czech border region	Total border region
Total (n)	**53**	**62**	**43**	**158**
Suppliers	60%	42%	19%	42%
Advisors	36%	27%	70%	42%
Producers	4%	31%	12%	16%

Table 25: Survey responses (own design based on survey 2013)

There were no questions in the questionnaire related to sensitive topics. The missing data from all respondents can be assumed as missing completely at random (MCAR), because there is no relationship between the missing data and observed or not observed data. For the handling of missing data **available case analysis** will be used, as specified in chapter 4.

6.2 Perception of Feedstock Suppliers

In the following section has been analyzed how strongly the support factors have an impact on farmers´ attitudes as (potential) crop suppliers towards bioenergy in general as well as for the individual farm. Figure 42 shows respondents' structure.

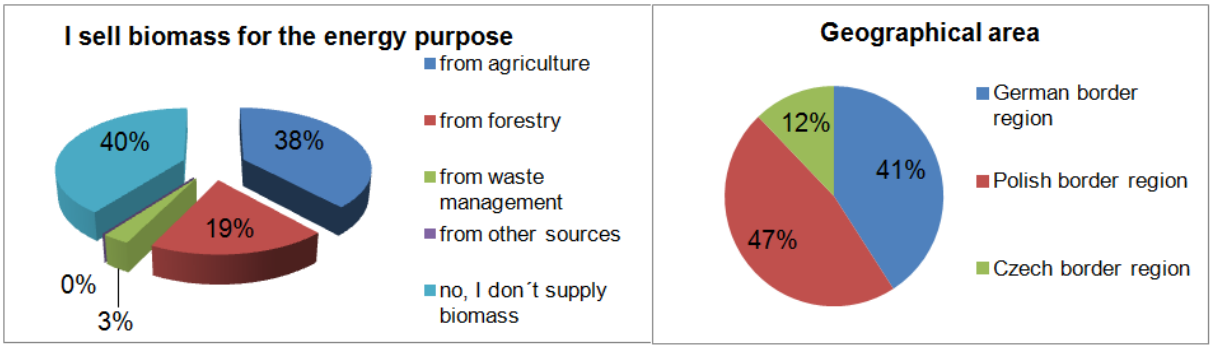


Figure 42: Structure of feedstock suppliers (own design based on survey 2013)

Most respondents had experience already with biomass from agriculture (38 percent) and from forestry (19 percent). This structure is similar to the country structure of biomass use for energy generation. In Germany and Poland, the largest share of total bioenergy supply was based on solid biomass (agriculture and forestry) (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2013b:16–21; Polish Central Statistical Office 2013:57) and in the Czech Republic most biomass for electricity generation comes from agriculture and waste from wood (Sivek, Kavina, Malečková, et al. 2012:472).

According to farmers there were also 40 percent which currently do not sell biomass for energy purposes. Those opinions are nevertheless relevant for the analysis, because these participants are possible biomass suppliers in the future.

Biomass based on waste management plays a marginal role according to the respondents. However in the Polish border region it can be expected that biomass of waste origin will become more important, especially in the process of biomass co-incineration, because of mechanisms to be implemented enforcing the use of biomass rather than the more popular forest biomass (Polish Minister of Economy, Ministry of Economy 2011:15–16). Also, in Germany, in the new EEG law amendment, it is planned to focus financial support more on residual materials (Federal Ministry for Economic Affairs and Energy 2014b:12). In the Czech Republic waste biomass is a very popular source in the production of heat (Czech Ministry of Industry and Trade, Energy Regulatory Office, and Ministry of Environment of the Czech Republic 2009:9–11). Globally thinking bioenergy produced from waste and residues has to receive more attention and priority in order to minimize the negative impacts of bioenergy-driven land use changes (Miyake et al. 2012:650).

Most (93 percent) of the respondents were over 30 years old, with more than ten years working experience (88 percent). The majority (93 percent) were men. The German border region

was represented by 41 percent, the Polish by 47 percent and the Czech by twelve percent of respondents.

Assessment of bioenergy goals achievement by feedstock suppliers presents the Figure 43.

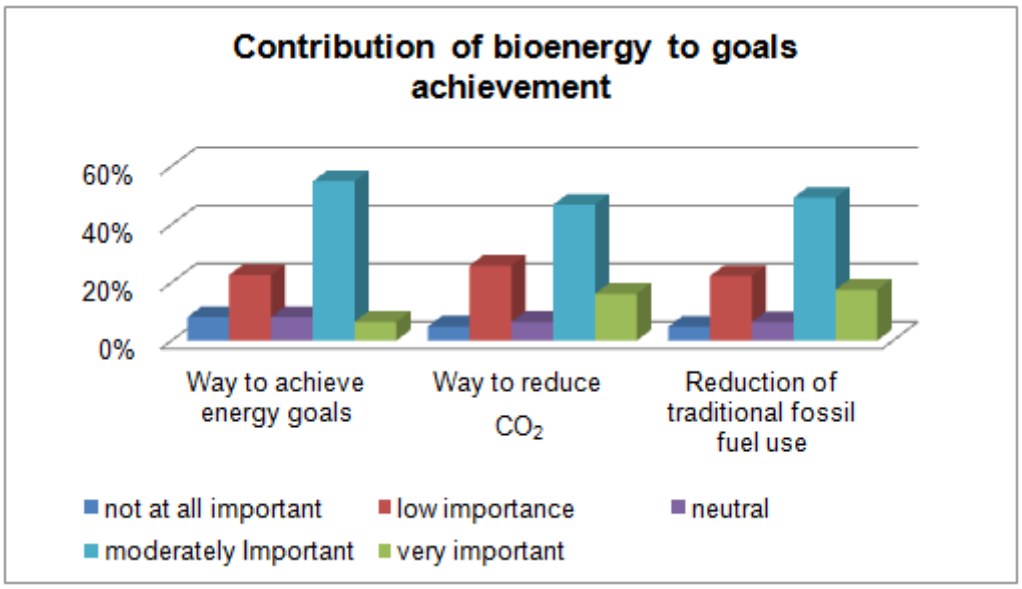


Figure 43: Attitudes of feedstock suppliers towards impact bioenergy goals achievement (own design based on survey 2013)

For the majority of respondents all kinds of contribution to goals achievement are quite relevant – over 60 percent perceived it is as moderately or very important. Comparing the perception of respondents from the three border regions, a lot of similarities can be observed (APPENDIX 9 Stakeholders Perceptions). In the case of the contribution of bioenergy to the achievement of energy goals, the majority of respondents assessed it as moderately or very important. Also, the reduction of fossil fuels plays an important role for more than half of the respondents from the Polish and German border region and 88 percent from the Czech border region. In the Polish border region this is very interesting, in view of its current dependency on fossil fuels, especially coal. Coal and wood are not expensive and easily accessible (Polish Minister of Economy, Ministry of Economy 2011:1–26). This confirms that the respondents are aware of the advantages of biomass use for the environment. When bioenergy replaces fossil energy, net reduction in greenhouse gas emissions and fossil energy consumption can be achieved (Lupp et al. 2014:297).

Figure 44 below shows the assessment of drivers for crop growing and biomass sale by the respondents.

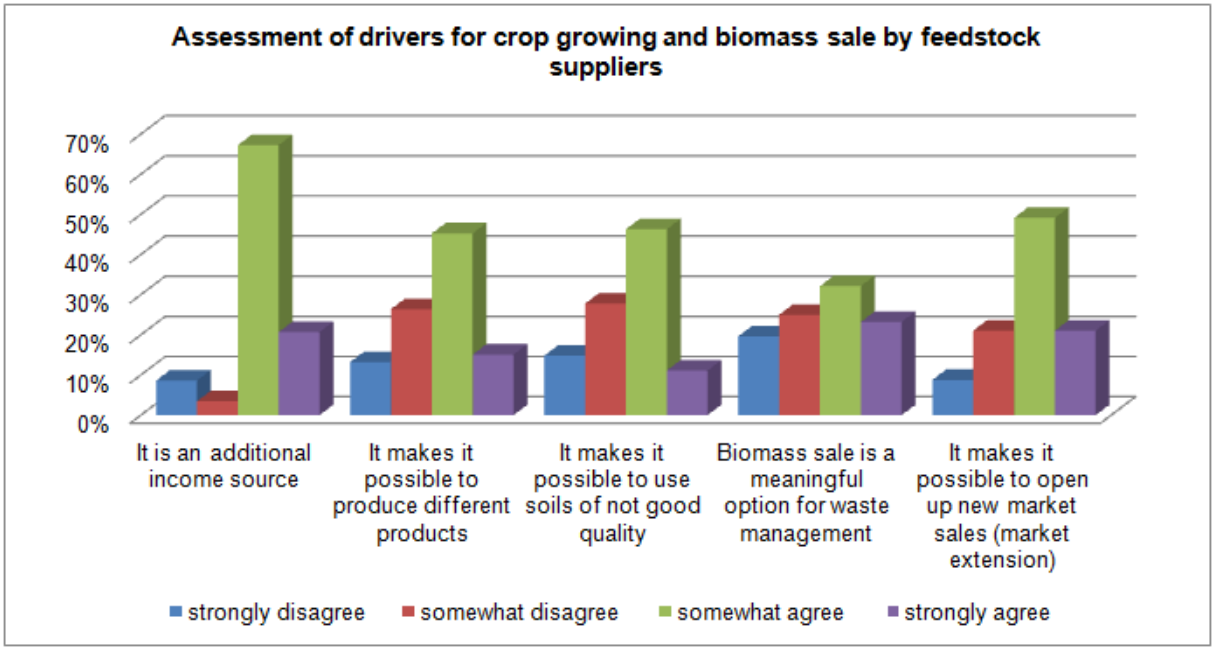


Figure 44: Drivers for crop growing and biomass sales according to biomass suppliers (own design based on survey 2013)

The majority of respondents recognized in the selling of biomass an opportunity for additional income – 88 percent agreed or strongly agreed, only 12 percent disagreed with this statement. More than 50 percent thought that the growing of biomass was possible in poor quality soil; 60 percent thought biomass a good opportunity for farmers to diversify production, and 70 percent agreed with the argument regarding market extension. In the case of the use of residual material as biomass for energy purposes, stakeholders were more skeptical – 45 percent disagreed with the statement that biomass sale is a worthwhile option for waste management. Agricultural biomass use for energy purposes allows farmers to create additional income (Grundmann, Ehlers, and Uckert 2012:118). In rural border regions especially, the growing of biomass and its use for energy purposes may be a way for agriculture and forestry to generate additional income (Borsig, Knappe, and Kriszan 2007; Nienaber and Neumann 2008:1).

Comparing the three border regions, the perceptions of feedstock suppliers are quite similar, (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 115:). When it is a matter of using poor quality soil, however, there are significant differences between the border regions. Half of the German respondents disagreed that because of bioenergy dissemination, poor quality soil could be used for this purpose. In contrast, more than 60% of Polish and Czech respondents perceived the use of such soil as positive. It is possible that these differences are associated with the already high use of agriculture and forest areas as well as residual mate-

rial in Germany for biomass preparation and bioenergy generation, that in Poland and Czech Republic is not the case (International Energy Agency 2009).

Stakeholders in the German border region are more skeptical about the selling of biomass from waste management. According to the new EEG amendment the use of residual materials for bioenergy generation should receive more financial support (Federal Ministry for Economic Affairs and Energy 2014b:12). In contrast, all the stakeholders in the Czech border region had a more positive attitude on this position and agreed with the positive role of biomass waste use for energy generation. However, in the Polish border region, opinion is split – 46 percent did not agree and 54 percent agreed with the statement. Farmers and forest owners in Germany are far more concerned about the impact of biomass on the environment and food production, (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 116), as a result of the significant experience they have gained as biomass suppliers (see Figure 27).

The general perception of bioenergy's influence on the environment and on food production was quite positive, as Figure 45 shows below.

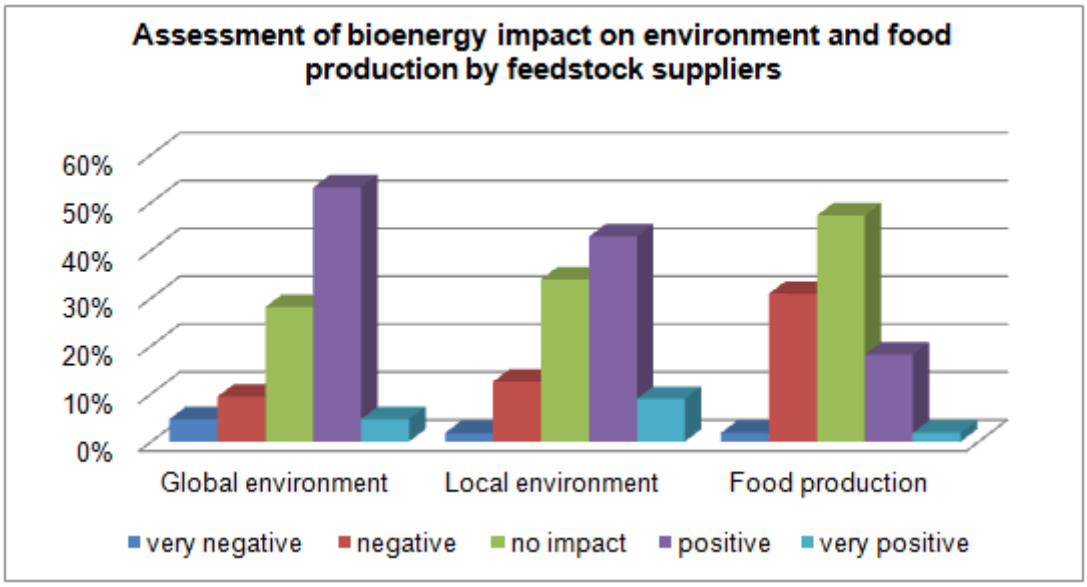


Figure 45: Impact of bioenergy on environment and food production – perceptions of biomass suppliers (own design based on survey 2013)

In all three border regions the structure is similar with a positive attitude regarding the environmental impact and a rather neutral one in the case of the impact on food production (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 116). Subsidies on domestic bioenergy crop production often result in higher regional food and feed prices as well as impacting negatively on land prices (Stürmer et al. 2013:570). German legislation promotes with boni the use of residues, by-products and wastes, not competing with food/fodder or material biomass resources (Tempel 2009:34). Also in the Czech Republic increased use of biomass

for energy purposes can lead to a rise in food prices (Sivek, Kavina, Malečková, et al. 2012:474).

In this section has been analyzed how strong the obstacles have on farmers´ attitude as (potential) crop suppliers towards bioenergy in general as well as for the individual farm. Figure 46 shows the attitude of feedstock suppliers in such areas as experience with biomass, and the buying and selling of biomass as a possible source of income.

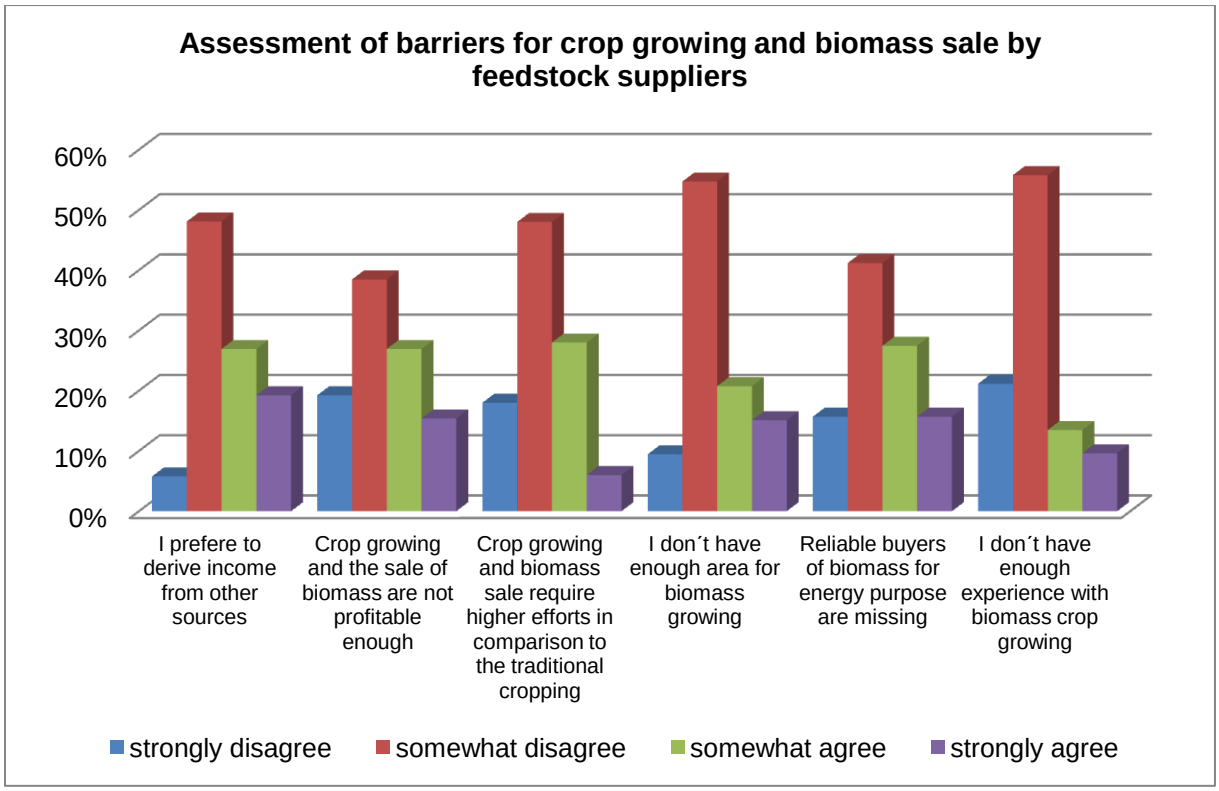


Figure 46: Attitudes of feedstock supplier towards potential barriers for biomass growing and sale (own design based on survey 2013)

All the mentioned potential obstacles, keeping farmers from growing biomass for energy purpose, were rejected. According to the majority of respondents (77 percent) their experience with biomass growing is sufficient enough and is not a barrier. Other factors such as higher efforts in comparison with traditional cropping or lack of reliable buyers of biomass for energy purposes were not confirmed by farmers. It can be assumed that the market for biomass is sufficiently developed and the special machinery deployment is insignificant in the decision-making process. Moreover crop growing and the sale of biomass are considered to be sufficiently profitable and possible income source. The bioenergy sector in Germany has seen increasing employment in recent years (Lehr, Lutz, and Edler 2012:359). Bioenergy generation in Europe is seen to have economic benefits for rural areas and farming regions. However, there is a critical discussion on how it is possible when sustainable criteria for biomass are missing (Söderberg and Eckerberg 2013:118).

Analysis of the border region specific answers shows that the border regions in the research area are very similar in their assessments (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 117). Crop growing and the sale of biomass are for over 60 percent of all respondents sufficiently profitable. German and Polish farmers and other biomass suppliers consider this option as a possible income source. However, the Czech respondents prefer to secure their income from other sources other than biomass growing. This can be explained as a general negative approach to bioenergy in the Czech Republic, supported by a lack of awareness on the part of officials and a negative public approach (Dodokova and Ouwens 2010:10–11;28). The same reason can justify the belief of Czech respondents (50 percent), that biomass crop growing is labour-intensive. The Czech expert (R 1) interviewed on the subject said:

> *"The problem is the technology can be used specifically for maize harvest and nothing else. […] Moreover to produce high quality maize, special machines are needed" (interview with Jirka Zahradnik, Zittau, Germany, 14th December 2012)*.

However, these concerns were not confirmed by the respondents in the German and Polish border region. According to all respondents, there is still some biomass potential available. The majority of Polish and Czech respondents (each 83 percent) generally to strongly disagreed with the statement that they do not have efficient areas for biomass growing. However half of the German respondents agreed with this statement. This is a result of an already high usage of biomass for energy production in the German border region. There are much more installations generating energy from biomass in the German region than in the Czech (two) or Polish (one) regions. Figure 47 below shows the current biomass installations generating heat and electricity (blue dots = biogas installations; brown dots = other biomass installations) in the border region between Germany and the Czech Republic. In the Polish border region, there is currently only one installation using co-firing of biomass for energy generation (BioEnergyNet 2011). However the natural climate and soil conditions for biomass growing are favorable in Poland (Budzianowski 2012:343).

Biogas and biomass installations which are situated in the German and Czech border regions are pictured in Figure 47 below.

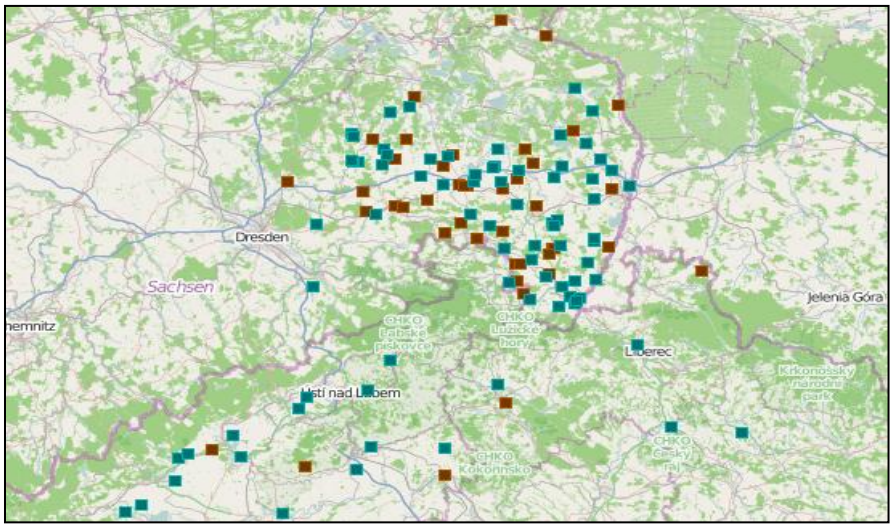


Figure 47: Biogas and other biomass installation in the German-Czech border region (BioEnergyNet, 2011)

Polish and German respondents perceive the market for biomass selling and buying as more trustful, than the Czech respondents. Half of the Czech respondents were not sure whether the buyers of biomass for energy purposes are reliable or not. In contrast, over 60 percent of Polish and German farmers do not confirm this opinion. This can be explained with an overall negative attitude towards RES in the Czech Republic, as previously mentioned.

In reference to other factors, which can be considered as barriers as well as drivers (social awareness, access to the funding, legal environment and financial support), the following perceptions of feedstock suppliers in the three-country region can be observed:

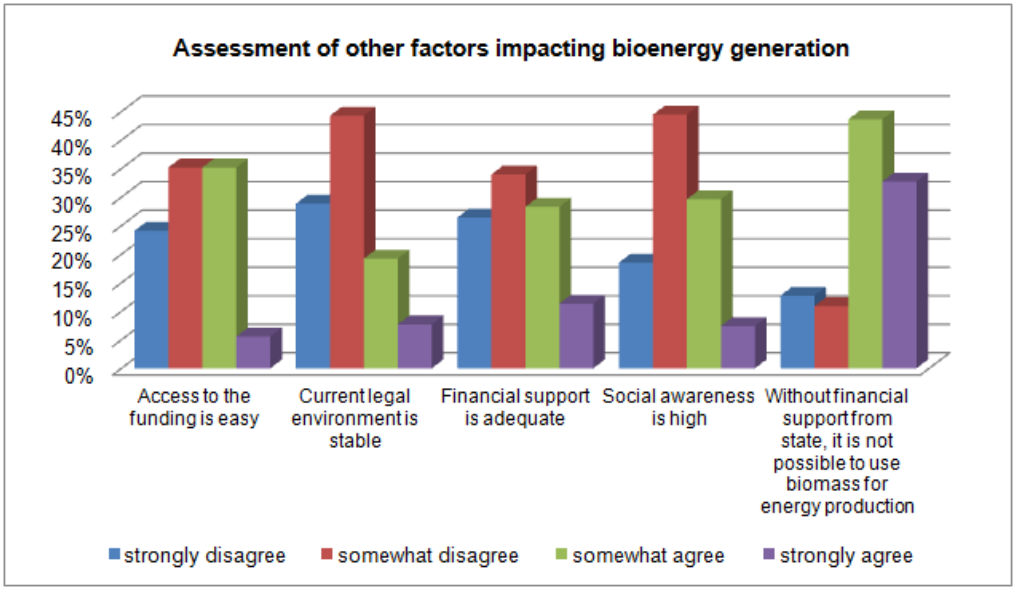


Figure 48: Assessment of factors impacting bioenergy generation in the research area by feedstock suppliers (own design based on survey 2013)

Three main trends can be observed. Firstly, the majority of stakeholders (76 percent) generally to strongly agreed with the statement that without financial support from the state, it is not possible to use biomass for energy production. This is quite alarming, because state support is primarily start-up funding and is not designed as an ongoing financial incentive. Moreover for 60 percent of the respondents the existing financial support is insufficient and only 41 percent of respondents assessed access to the financial support as easy. In the case of biogas technology implementation significant investment capital is required. This form of investment is therefore financially unattractive to farmers in Poland (Marks and Czerepowicki 2010:10). In the Czech Republic a lack of legal financial support for the costly process of upgrading biogas to green gas can be observed (Dodokova and Ouwens 2010:39–40). Secondly, the respondents disagreed (63 percent) with the statement that social awareness concerning bioenergy generation is high. This confirms that this can be a significant barrier for bioenergy dissemination. Thirdly, the majority of respondents (73 percent) are convinced that the current legal environment for bioenergy generation is not stable. This can be a serious barrier blocking the potential consideration of a feedstock supplier to become an investor and run a biomass installation on their own.

The analysis of stakeholders' perceptions in the three border regions shows some differences and affinities (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 118). In case of the Polish respondents, most (80 percent) perceived **access to funding** as difficult. For 85 percent of Polish and 67 percent of Czech respondents the financial support for energy generation is insufficient. In contrast, 52 percent of German respondents agree with this statement. This opinion confirms the general perceived barrier that poor financial support systems for energy generation in Poland are much less favorable than in Germany (Budzianowski 2012:343). Half of the German farmers considered the existing funding access as easy. The positive role of the financial subsidies has been also confirmed by the expert interviewed for the analysis (R 4):

> *"EEG – it was eerily supportive. […]The model has worked and brought some good examples" (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012).*

In the case of poor **economical incentives** in Poland, the opinion regarding the need for stronger financial support for bioenergy dissemination is justified. The Polish expert (R 2) confirms:

> *"In the case of good conditions for investment, there would be some installations […]. Agriculture doesn´t have such money to invest for 15-20 years, some guarantees are needed" (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012).*

However, it is worrying that most respondents (84 percent from Czech, 81 percent from German and 58 percent from Polish border region) endorse the permanent need for public

financial support and confirm the statement that without financial support from the state, it is not possible to use biomass for energy production.

The current **legal environment** was assessed by all respondents as unstable. The majority of Czech respondents (83 percent), 79 percent of German respondents and 74 percent of Polish respondents generally to strongly disagreed with the statement that the legal environment is stable. This trend can be found in the general opinion concerning barriers for bioenergy dissemination in all three countries (see chapter 3.3 Table 3) as well as by the opinion of interviewed experts:

> *“EEG was eerily supportive. Everything that was built here is down to the EEG. Now it is important to find some good change over” (interview with Andre Birner, Berthelsdorf, Germany 30th November 2012);*

> *"I don´t know how it will continue […]. If it continues there and here with the institutions” (interview with Jirka Zahradnik, Zittau, Germany 14th December 2012).*

The majority of respondents are convinced that **social awareness** concerning bioenergy generation is low – 74 percent of Polish, 67 percent of Czech and 62 percent of German respondents generally to strongly disagreed with the statement that social awareness is high. In Poland the lack of knowledge of the local inhabitants leads to skepticism towards biomass plants (Igliński et al. 2011:4898). In the Czech border region it can be explained by the overall negative approach to bioenergy, and consequently the lack of a holistic information strategy (Dodokova and Ouwens 2010:10–11; 28). This was also stated by the Czech interviewee:

> *"[…] renewable energies make the energy more expensive" (interview with Jirka Zahradnik, Zittau, Germany 14th December 2012).;*

Also, in Germany insufficient knowledge and experience concerning authorisation procedures of biomass plants can be still observed (Brückmann, Piria, and Tupy 2010:14).

In the following section has been analyzed how the border location does have an impact on the possible biomass growing and trade for energy purpose, under consideration of factors as subsidies in neighboring regions, best practice installations, market transparency, market knowledge and others.

Figure 49 below presents the perceptions of feedstock suppliers in the whole research area.

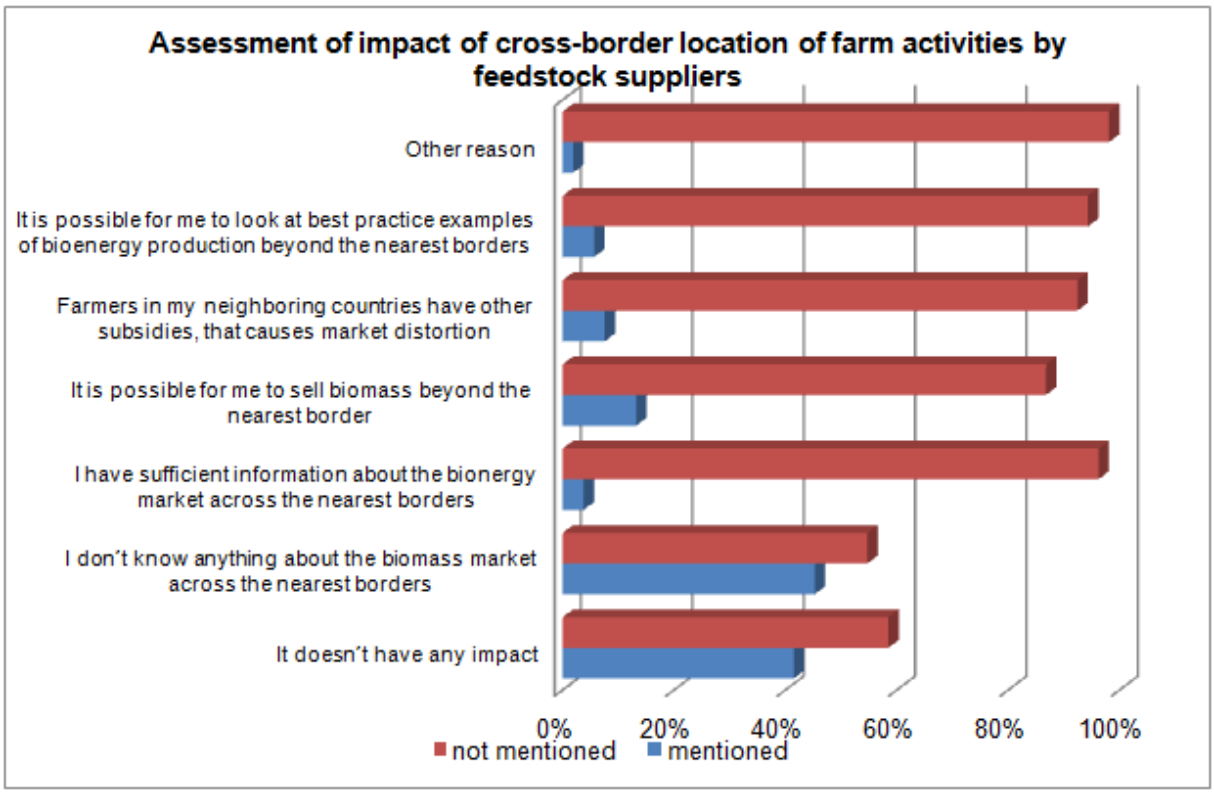


Figure 49: Assessment of impact of cross-border location of farm activities by feedstock suppliers in the research area (own design based on survey 2013)

The majority of all respondents did not recognize any direct impact of farm border location on their activities – 42 percent mentioned that the border location did not have any impact. However, 58 percent expressed uncertainty when it came to this statement. The respondents did have some knowledge concerning biomass market across the nearest border, but almost half (45 percent) did not know anything about this market and only four percent thought their information in relation to what was happening in their neighboring country was adequate. Only 13 percent of all respondents were aware that they could sell their biomass in the neighboring countries and just six percent that they could look at best practice processes of bioenergy production over the border. These results confirm the lack of farmers´ knowledge of foreign biomass markets, despite the geographical proximity. Under "other reason" only one of 53 respondents mentioned the fact that thievery of agricultural vehicles was a problem, if living in a border area. Differences in the language in cross border regions often combined with institutional, cultural and legal discrepancies make the cooperation between participants even more difficult (Scherer and Zumbusch 2011:102).

The analysis of stakeholders´ perceptions in different border regions shows some differences (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 119). Most German (63 percent) and Czech (57 percent) respondents did not see any impact of the border location on their

activities. In contrast only 14 percent of Polish respondents confirmed this opinion. The general opinion that the market is open was also confirmed by the interviewees - the Polish expert (R 2):

> *“Nowadays there is no border […] the market is a common market” (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012).*

However, in all three border regions, the participants do not have sufficient knowledge about the market over the nearest border, confirmed by one interviewee:

> *“I can´t say why is it so in Poland and Czech Republic – why so much wood goes there and exactly where. We are in the dark” (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012).*

On the other hand, the lack of sufficient knowledge of all respondents can be due to language barriers, as confirmed by one interviewee.

> *"[…] there are some language barriers" (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012).*

However, in the case of economically interesting conditions, the participants overcame the language barriers and took advantage of the neighboring border region. Polish respondents (32 percent) especially, recognized the possibility of selling in the neighboring country. In the Czech and German border regions, this option did not play a significant role for biomass suppliers. This is understandable in view of the number of existing biomass installations in the border regions (see Figure 47). Moreover the German biomass market is more attractive to the Czech and Polish biomass suppliers because of the better German economic conditions. Both Polish and Czech interviewees confirmed:

> *"Biomass from Liberec (CZ) is input in Zittau (DE) because of the feeds for electricity and heat production" (interview with Jirka Zahradnik, Zittau, Germany 14th December 2012);*
>
> *"Price and reliability are most important […] Germans have better economical conditions” (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012).*

These statements confirm that additional efforts in the form of transactional costs (language barriers, longer business times or longer transport distances) can easily be overcome when a sufficient economic incentive is present. On the one hand it is positive that the market participants are so flexible, on the other, the best economic climate is the main attraction, at the expence of other aspects such as the environmental impact caused by long transport distances or the strong regional concentration of bioenergy generation. In this instance regions (such as the Polish border region) remain at a disadvantage. The generation of value and its impact on regional development take place in the German border region. The Polish and Czech farmers use the opportunity to sell their biomass in the neighboring region and receive

additional income. However, if the same economic conditions were present in their own regions, biomass could be sold there also. In the absence of state influence on the market (such as obligatory sustainable standards at EU level), the price is the most significant factor in the decision-making process. Currently, standards in relation to biomass in the EU are still lacking. A sustainable policy in this field should be implemented (Marks and Czerepowicki 2010:41). The outcome of this would be that biomass would be processed not where it could be produced at lower prices and with a lower environmental impact, but where higher prices could be realized. This has implications also for long transport distances, as confirmed by the following interviewee:

> *"Once we were forced (because of the lack of materials) to buy and transport the wood over more than 100 km. Does it make sense?" (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012).*

Recent studies show that a harmonized certification system for biomass and bioenergy in Europe is essential in order to generate sustainable energy based on biomass. It is also important to link an EU standard system to existing international declarations. In order to implement successfully such a European standard system, the participation and commitment of the relevant stakeholders active in the bioenergy chain are required (Miyake et al. 2012:650; van Dam and Junginger 2011:4051:4056). The development of sustainable criteria would contribute to the improvement of environmental and social aspects of bioenergy generation (Söderberg and Eckerberg 2013:118). Cross-border cooperation can contribute to regions' development, but it is also often connected with relatively high transaction costs due to different institutional systems, cultures and languages (European Union 2010:61).

In the next section has been analyzed how different strategies may increase the attractiveness of the growing of biomass for energy purposes.

Figure 50 below shows an assessment of those possible strategies from the perspective of feedstock suppliers.

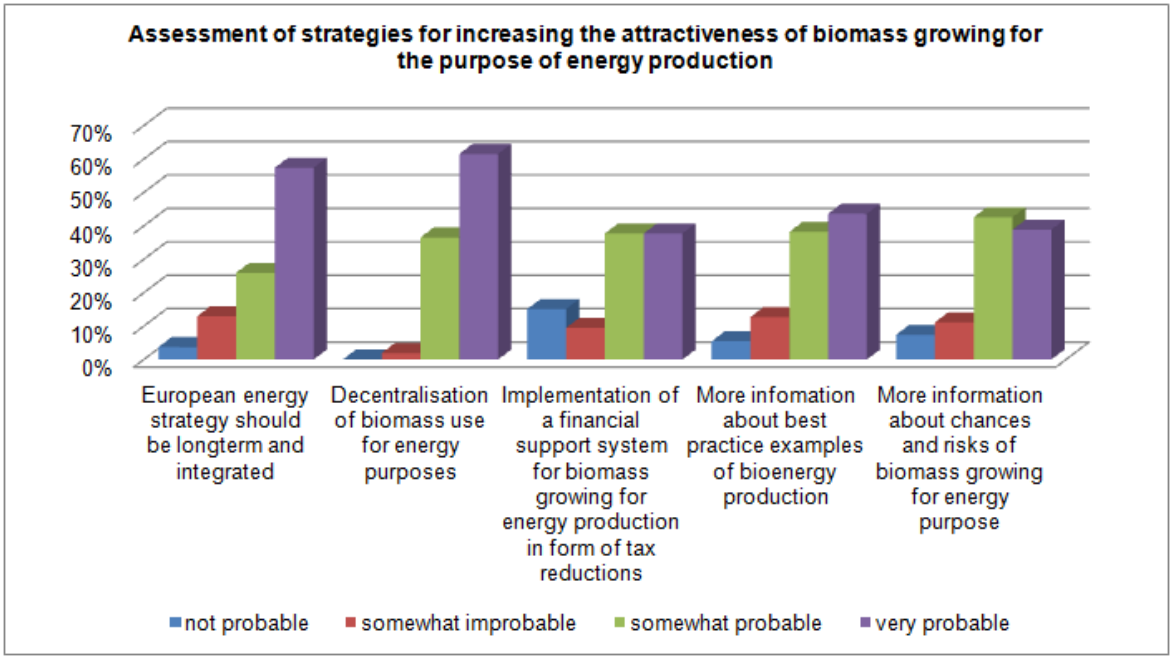


Figure 50: Assessment of strategies for increasing the attractiveness of biomass growing for the purpose of energy production by feedstock suppliers (own design based on survey 2013)

For the majority of respondents (83 percent), it was quite probable to very probable, that the **European energy strategy** should be a long-term integrated strategy. This thinking is understandable in view of the perceived unstable legal environment barrier - 73 percent of respondents were convinced that the current legal environment for bioenergy generation is not stable (see Figure 48). Also, the **decentralization of biomass use** for energy purposes in order to reduce transport distances is a good measure for bioenergy development – 98 percent thought that this strategy would quite to very probablly increase the attractiveness of biomass growing for the purpose of energy production. A further 75 percent of respondents thought that **financial support** in the form of tax reductions for biomass growing is a good idea – understandable when one considers that for 60 percent of respondents the existing financial support is insufficient (see Figure 48). Interestingly, for over 80 percent of respondents more **information** on bioenergy production best practice processes as well as on the opportunities and risks associated with the growing of biomass for energy purposes would be quite probably to very probably helpful, although 77 percent of respondents judged their experience with biomass crop growing as adequate (see Figure 46). However, the following interviewee admitted:

> *"With the first installation the company didn´t have any experience […] the farmers were skeptical and for the farmers it was to high a risk" (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012);*

> *"We produce for the Germans; here [in Polish border region] there is no biogas plant" (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012);*
>
> *"There is no bioenergy development in the Liberec region" (interview with Jirka Zahradnik, Zittau, Germany, 14th December 2012).*

When comparing the three border regions, the perceptions of farmers and other biomass suppliers are quite similar (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 120). For the majority of Czech respondents (71 percent), 52 percent of German respondents and 58 percent of Polish, it is somewhat probable to very probable, that the European energy strategy should be a long-term integrated strategy. In Germany successful legal regulations have been established in recent years, however there are several different laws, which sometimes do not complement one another and the single Federal States apply these laws in different ways (Brückmann, Piria, and Tupy 2010:10–15; Lupp et al. 2014:229). Also, both in Poland and in the Czech Republic there are still a lot of legal barriers to RES dissemination (Dodokova and Ouwens 2010:39–40; Igliński et al. 2011:3006).

For the majority of respondents from all three border regions decentralization of biomass use for energy purposes with the consequence of reduction of transport distances seems to be a meaningful instrument on the way to bioenergy development. Interviewed expert confirms this opinion:

> *"Max 50 km is economically meaningful to transport biomass"" (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012).*

Transport costs differ according to the type of biomass and in the case of silage biomass the transport costs are between 23 percent and 43 percent of the whole supply costs (BioEnergyNet 2011). Other factors were also analyzed regarding cross-border bioenergy dissemination (see Figure 51 below).

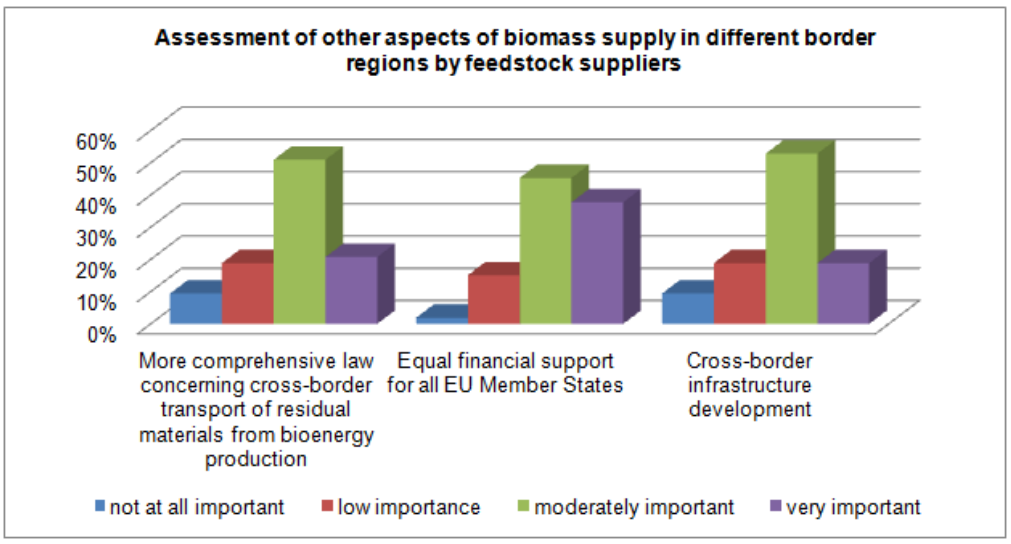


Figure 51: Assessment of other aspects of biomass supply in different border regions by feedstock suppliers (own design based on survey 2013)

For the majority of respondents (83 percent) it would be moderately to very important to have the same initial conditions regarding financial incentives for crop producing as in other EU Member States. This is understandable if one considers that the biomass supply cost differences are minimal between the German, Czech and Polish border regions (BioEnergyNet 2011). Moreover, non-compliant promotion schemes in different EU countries have been identified as an important barrier for bioenergy dissemination (Marks and Czerepowicki 2010:54). The legal regulations of the cross-border transportation of residual materials from bioenergy production (so called “digestat”) also seems to play an important role for stakeholders. For over 50 percent of respondents it is moderately important and for 21 percent very important to have a clear legal framework. Further cross-border infrastructure development also plays an important role for stakeholders – 72 percent of respondents pay moderately to high attention to this aspect. The situation in relation to cross-border infrastructure could still be improved, although thanks to European funding, such as the European Regional Development Fund, a lot of infrastructure projects in the German – Polish – Czech border area have already been implemented (Saxon State Ministry of the Environment and Agriculture 2014).

Comparing the perception of stakeholders from each border region, very similar thinking can be observed (APPENDIX 9.1 Perceptions of Feedstock Suppliers Table 118). For the majority of respondents (68 percent and more) from all three border regions, these analyzed aspects are moderately to very important. This thinking was confirmed by the following interviewees:

> *"In the EU there should be the same financial support" (interview with Tadeusz Mochalski, Sulikow, Poland, 14th December 2012);*
>
> *“It is important to expand the energy grids and networks between participants [...]. The infrastructure in the Czech Republic and Poland should be developed" (interview with Andre Birner, Berthelsdorf, Germany, 30th November 2012);*
>
> *"There are problems with the border crossing: there are relatively few crossing points at the border" […] [legal framework] disturbs […] cooperation biomass plant in Varnsdorf (DE) and heat installation in Rumburk (CZ) - there are problems with the output of biomass plant" (interview with Jirka Zahradnik, Zittau, Germany, 14th December 2012).*

6.3 Perceptions of Policy Advisors

This section consists of an analysis of assessment of possible drivers in the bioenergy generation supply chain for policy advisors, identified in the first phase of this data analysis. Figure 52 shows the respondents' structure.

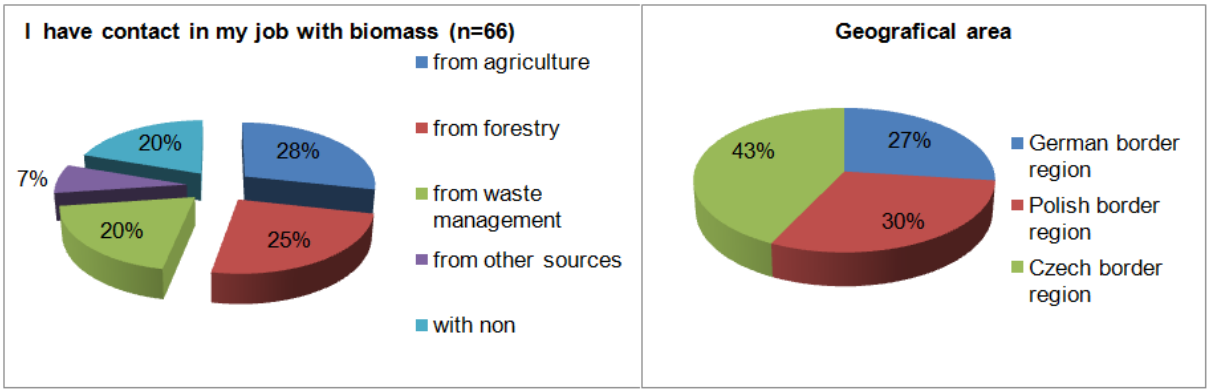


Figure 52: Structure of policy advisors (own design based on survey 2013)

The structure of the respondents is quite balanced – over 20 percent of policy advisors represent each biomass source: agriculture, forestry and waste management. Only 7 percent represent another area such as protected wood and grassland. Some (20 percent) of the respondents have not yet had contact with this subject, despite their responsibilities in municipal administration. The majority of representatives of the municipal administrations and local authorities who are responsible for opinion and decision-making in relation to the authorisation for biomass installations, were asked to answer the survey. Farmer associations, regional business development authorities and other consulting bodies such as representatives of research institutions and universities were also respondents.

Each border region was represented by a similar number of respondents: 30 percent from the Polish, 27 percent from the German and 43 percent from the Czech border region. Most (84 percent) of respondents were older than 30, with more than ten years experience (67 percent) with 65 percent men, and 35 percent women.

An assessment of bioenergy goals achieved by policy advisors is presented in Figure 53 below.

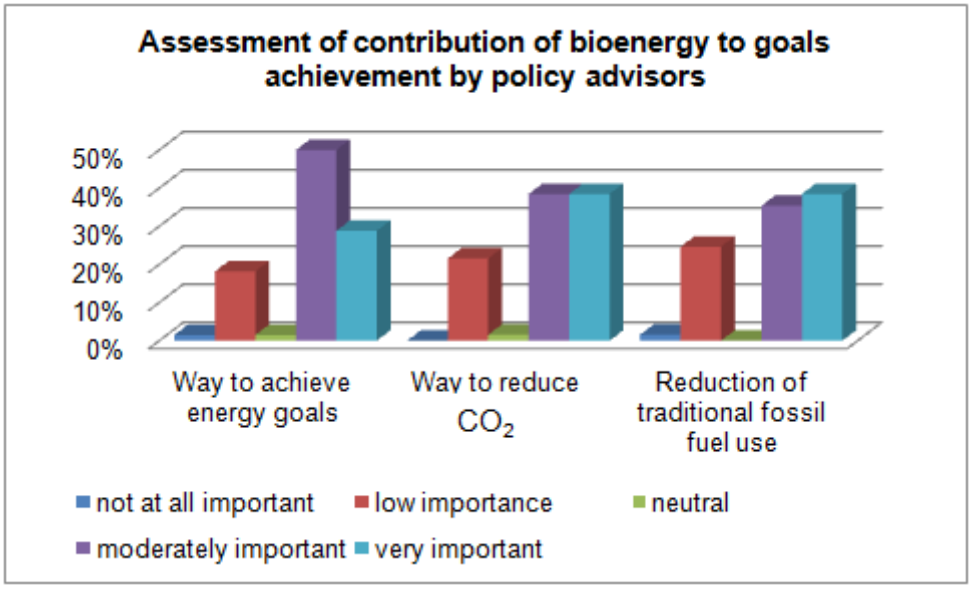


Figure 53: Attitudes of policy advisors towards impact bioenergy goals achievement (own design based on survey 2013)

For the majority of respondents all contributions to goal achievements are relevant – over 70 percent perceived it as moderately to very important. Comparing the perception of respondents from the three border regions, a lot of similarities were observed (APPENDIX 9.2 Perceptions of Policy Advisors Table 122). In the case of the contribution of bioenergy to the achievement of energy goals and CO_2 reduction the majority of all respondents assessed it as moderately to very important. However, in the Polish border region 32 percent of respondents paid little attention to the contribution of bioenergy to the development of RES and only 12 percent to CO_2 reduction. This can be seen by the fact that the Polish energy generation is based mostly on fossil fuels and that the policy advisors are aware of this energy dependency. However the reduction of fossil fuels by more than 50 percent in the Polish border region and by more than 70 percent of respondents in the Czech and German border region plays an important role.

Figure 54 shows the assessment of drivers for bioenergy generation by the respondents.

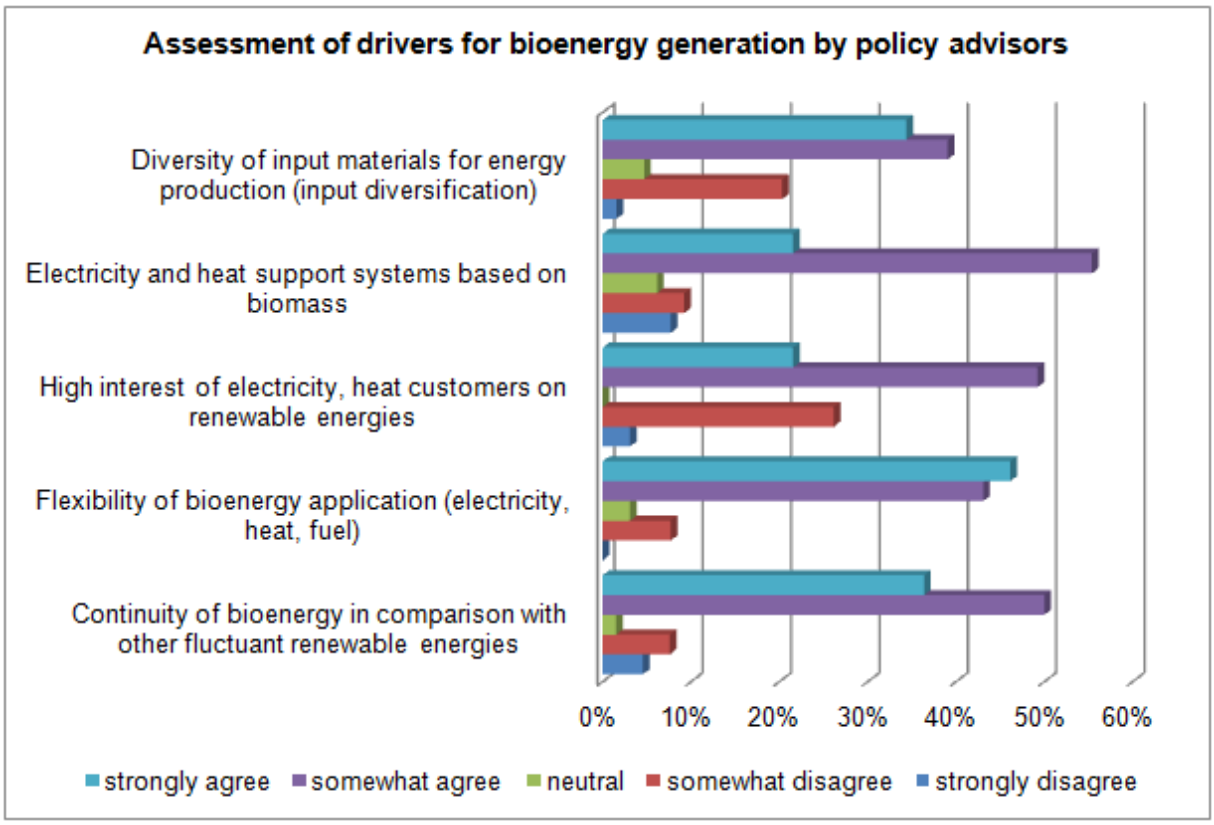


Figure 54: Drivers for bioenergy generation according to policy advisors (own design based on survey 2013)

The most important driver, according to the policy advisors, is the continuity of bioenergy in comparison with other fluctuant renewable energies – 86 percent of the respondents generally to strongly agreed with this advantage. Also the flexible use of bioenergy seems to be an important factor for 89 percent of stakeholders. In the case of electricity support systems and heat based on biomass input diversification, over 70 percent of respondents generally to strongly agreed that these factors enhance bioenergy generation. However, 27 percent of stakeholders were skeptical or neutral about the diversity of input materials. Also 29 percent of respondents generally to strongly disagreed that a customer's increased interest had a positive impact on bioenergy dissemination. This is understandable when we consider that bioenergy is more expensive than energy based on fossil fuels.

Comparing the three border regions (APPENDIX 9.2 Perceptions of Policy Advisors, Table 123), the perceptions of policy advisors are very similar. A significant part of the stakeholders in the Polish border region (32 percent) and the Czech border region (39 percent) do not recognize high interest of end customers on renewable energy. This could explain the fact, that the energy supply in Poland is mostly based on fossil fuels, which is less expensive than renewable energy sources (Polish Ministry of Economy, Ministry of Environment 2011:1–26), as is also the case in the Czech Republic (Sivek, Kavina, Jirásek, et al. 2012:650). Regarding attitudes to input diversification there are some differences between the border regions.

Polish respondents were more skeptical than the Czech or German respondents concerning this factor. The reason for this could be explained by the current focus of biomass use in the form of wood residues on co-firing applications (Burcz et al. 2010:21). Moreover Czech and Polish respondents did not recognize the high interest of electricity customers on renewable energy. This is understandable if we consider that Germany generates much more electricity based on RES than the Czech Republic or Poland (Figure 22).

The general perception of the influence of bioenergy on the environment is positive, but on food production neutral or negative, as seen in Figure 55 below.

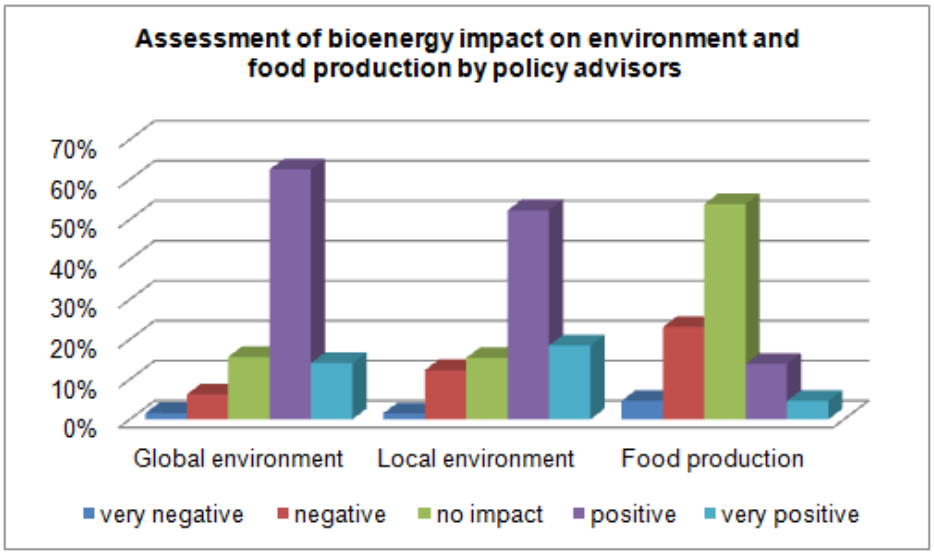


Figure 55: Impact of bioenergy on environment and food production – perceptions of policy advisors (own design based on survey 2013)

In all three border regions this structure is similar, with a positive attitude regarding the environmental impact and a neutral one regarding the impact on food production (APPENDIX 9.2 Perceptions of Policy Advisors Table 124). These perceptions do not confirm the assessments of interviewed experts, who recognized the potential for a negative impact on the environment. However, the potential negative impact of bioenergy production on food production has also been noticed by the interviewed experts:

> *"When biomass is grown on better fields to achieve a higher yield then these good areas are blocked for food production - it is wrong" (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*

> *"A miturex of different plants is important; otherwise there is competition with food production" (interview with Pavel Grmela, Liberec, Czech Republic, 18th September 2012).*

In the following section perception of possible barriers by policy advisors in bioenergy generation, has been analyzed. Perceptions of policy advisors concerning factors enhancing bioenergy generation are presented in Figure 56 below.

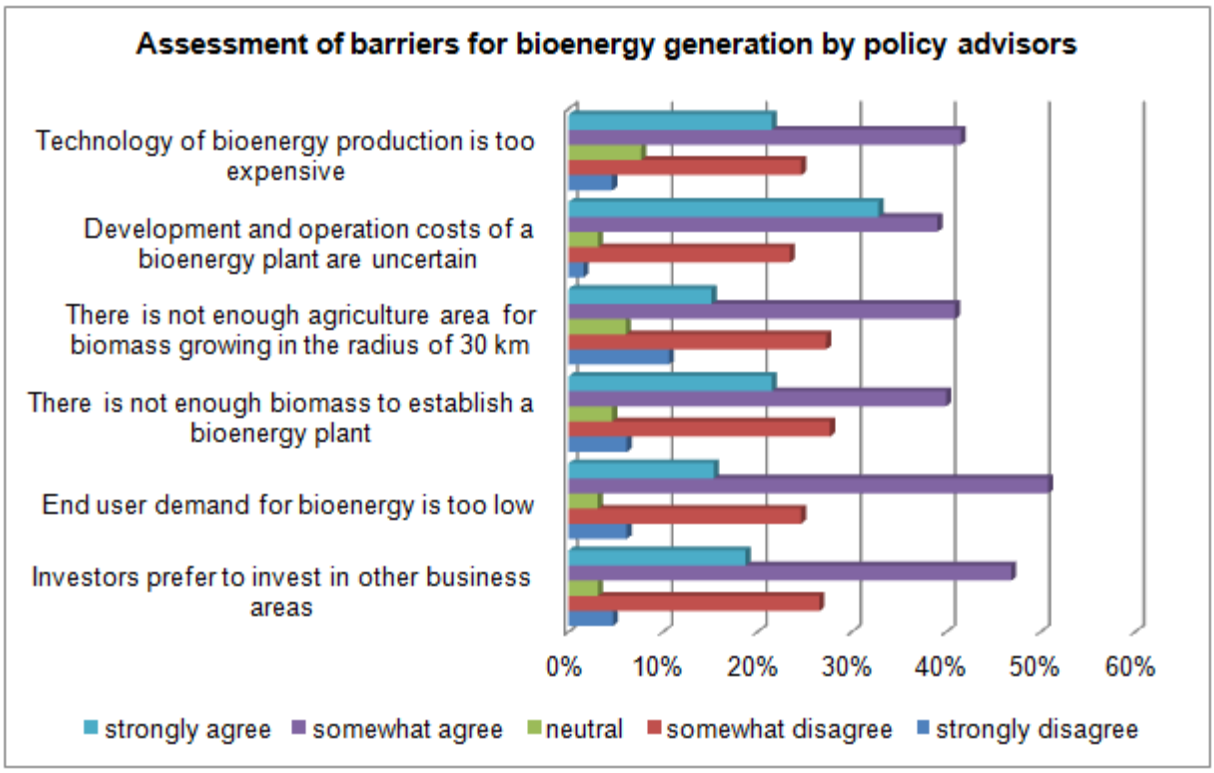


Figure 56: Barriers for bioenergy generation according to policy advisors (own design based on survey 2013)

All mentioned factors were assessed by the policy advisors as possible barriers for bioenergy generation. The most important barrier (according to 72 of the respondents) seems to be the uncertainty surrounding the development and operation costs of biomass plants. Over 50 percent of respondents generally to strongly agreed with the statement that other factors are blocking bioenergy development. However, in the case of biomass potential from agriculture, 44 percent of respondents did not agree with the statement, that there is not enough land for biomass growing. They recognized that the potential is still there. Available potential from agriculture, forestry and waste management were also confirmed by a recent study by the BioEnergyNetwork in the German-Czech border region. The developed spatial planning instrument called “Energy Map Lusatia” is based on the Geographical Information System (GIS) and allows for the analysis of biomass potential and bioenergy installation in the German-Czech border region (BioEnergyNet 2011). GIS-functionality offers planners the ability to evaluate a range of reasonablly good solutions for the special planning of biomass installations (Blaschke et al. 2013:15).

The analysis of the border region-specific answers shows that the border regions in the research area are in some aspects different in their assessments (APPENDIX 9.2 Perceptions

of Policy Advisors Table 125). In the Polish border region 32 percent of the stakeholders disagree with the statement that investors **prefer to invest in other business** areas. There are still a lot of barriers within the legal framework which have a negative impact on investment (Polish Information and Foreign Investment Agency 2010:6–8). The interviewed experts explain:

> *"As long as there is no new regulation regarding renewable energy, there will be zero [bionenergy], furthermore, with no new regulation, nobody [from municipalities] wants to get involved" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013);*

> *In the case of a lack of appropriate connection points [...] high investment cost needed to build the connection" (interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

The majority of Polish and Czech respondents (over 60 percent) share the opinion that the **technology** of bioenergy production is **too expensive** and the development of biomass plant costs is uncertain. High investment capital required for biogas technology implementation makes the investment financially unattractive to farmers (Marks and Czerepowicki 2010:10). This perception has been also confirmed by interviewed an expert:

> *"[Investments in biogas installation] are expensive and the return of investment is a long time [...]. Companies have problems with feeding in the energy into the grids […]. There are any subsidies for energy" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013).*

Most respondents from the Polish (69 percent) and Czech (71 percent) border region agreed with the statement that the **end user demand** for bioenergy is too low. This is understandable in view of the available, easily accessible and less expensive energy sources such as coal or wood in Poland (Polish Ministry of Economy, Ministry of Environment 2011:1–26) and coal or nuclear power in the Czech Republic (Sivek, Kavina, Jirásek, et al. 2012:650). Polish interviewed expert explains:

> *"There is some possibility to buy 'clean energy' from the companies, which sell it. But nobody wants to do this, because the individual customers, they still have subsidies for prices from the government [...]. Companies do not want to change often the energy supplier, because they are afraid that in one year the prices will rise" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013).*

In the case of **available area for biomass growing** and existing potential of biomass for energy generation, German respondents are more skeptical than Polish and Czech ones. The majority of German respondents (75 percent) and only 37 percent Polish and 38 percent Czech respondents are fearful, that there is not enough agricultural land for biomass growing within the radius of 30 km. This is understandable in view of the already over 20 existing biomass installations generating electricity based on biomass in the German border region,

with only one plant in the Czech border region and no installation in the Polish border region (BioEnergyNet 2011). These concerns are specific to the German border region. In the whole country there are still biomass potential available for bioenergy production (Tempel 2009:27;31).

Polish as well as Czech farmers are mostly open-minded regarding the opportunity of the biomass supply over the border. Over 80 percent of Polish and Czech feedstock suppliers consider biomass growing and sale for energy purposes as a possible additional income source (see Table 115). This was confirmed by the interviewed Polish expert:

> *"In the case of feedstock growing – the people grow what the funding is for […]. We are lucky to be near the German technology" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 201313).*

Only 32 percent of Polish and none of Czech feedstock suppliers, however, mentioned the possibility of selling their biomass in the neighboring country (see Figure 49). The situation could, in the future, be more difficult for industrial installation owners, as the following interviewed experts explain:

> *"The investors and planners mostly do not have sufficient information about the input, the resources. Farmers know what they cultivate and what they can use for the bioenergy production; industrial investors do not pay enough attention to the feedstock supply in advance" (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*
>
> *"Industrial investor will have problems with biomass availability in the future. Currently there is no demand [in Polish border region], nobody wants biomass […]" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013).*

With regard to other factors, which could be considered barriers as well as drivers (social awareness, access to funding, the legal environment and financial support), the following perceptions of policy advisors in the three-country region can be observed:

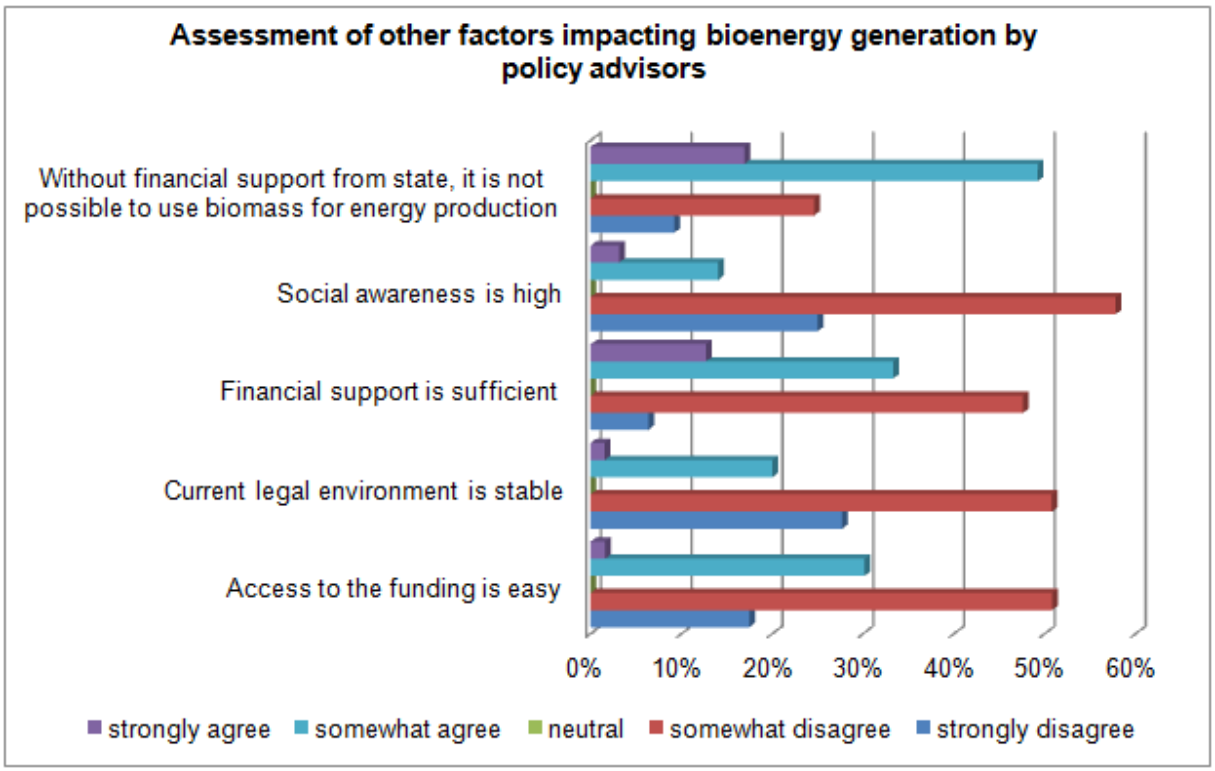


Figure 57: Assessment of other factors impacting bioenergy generation in the research area by policy advisors (own design based on survey 2013)

Similar to the feedstock suppliers´ assessment, the majority of policy advisors (66 percent) generally to strongly agreed with the statement that without financial support from the state, it is not possible to use biomass for energy production. Moreover for 54 percent of respondents the existing financial support is insufficient and only 32 percent of respondents assessed access to the financial support as easy. Most respondents (86 percent) disagreed with the statement that social awareness concerning bioenergy generation is high. Most respondents (78 percent) were convinced that the current legal environment for bioenergy generation is unstable. These perceptions are alarming and confirm that there are many factors blocking the further development of bioenergy.

The analysis of policy advisors' perceptions in the three border regions shows in the main affinities with the occasional difference (APPENDIX 9.2 Perceptions of Policy Advisors Table 130). Similar to the feedstock suppliers´ perceptions, most of the Polish and Czech (over 70 percent) respondents identified **access to funding** as difficult. For 66 percent of Polish and 75 percent of Czech respondents the financial support for energy generation is inadequate.

The following Polish interviewed expert confirmed:

> *"In the rural regions – there has to be an investor. But why should an investor build such biomass installations and have problems then with energy feeding into the grids? [...] There are no subsidies" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013).*

In contrast, only 31 percent of German respondents agree with this statement. A German interviewed expert warned of the possible consequences of permanent subventions:

> *"[The funding of energy prices] leads to a development which does not belong to the real market […]. Investors do not consider the local and regional conditions, just the financial support" (Interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

Similar to feedstock suppliers, the current **legal environment** has been assessed by policy advisors from all border regions as unstable. The majority – 88 percent of the German, 78 percent of the Polish and 75 percent of the Czech respondents generally to strongly disagreed with the statement that the legal environment is stable. This opinion has been echoed also by interviewed experts:

> *"The legal situation is not supportive for investors, who want to do something: these ups and downs: it is not optimal" (interview with Pavel Grmela, Liberec, Czech Republic 13th September 2012);*
>
> *"As long as there are no new regulations regarding renewable energy, it will be zero [bionenergy]" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013);*
>
> *"If there are grants, policies should be consequent" (interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

The majority of policy advisors, similar to feedstock suppliers are convinced that **social awareness** concerning bioenergy generation is low – 69 percent of German, 83 percent of Czech and even 100 percent of Polish respondents strongly or somehow disagree with the statement, that social awareness is high. A German interviewed expert explains the possible reason for this:

> *"At the municipal level public information and transparency is lacking" (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*
>
> *"Currently renewable energies in the Czech Republic have very negative image" (interview with Pavel Grmela, Liberec, Czech Republic, 13th September 2012).*

In Germany biogas installations still seem to have a reputation of being emitters of smell and traffic (Brückmann, Piria, and Tupy 2010:12).

The next section consists of an analysis of the answers relating to the possible impacts of border location on policy advisors, identified in the first phase of this data analysis. Different factors such as subsidies in neighboring regions, best practice installations, market transparency and market knowledge have been considered. Figure 58 below presents the perceptions of policy advisors in the whole research area.

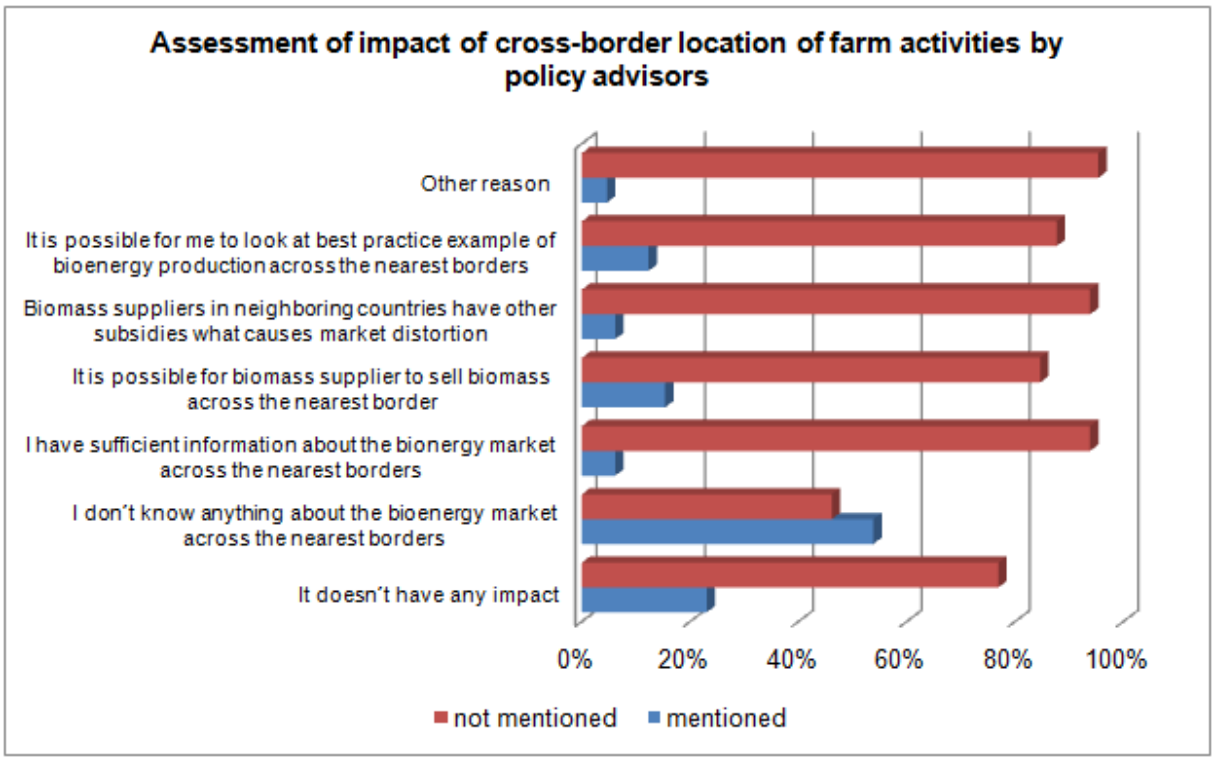


Figure 58: Assessment of impact of cross-border location of farm activities by policy advisors in the research area (own design based on survey 2013)

More than half of the respondents (54 percent) do not know anything about the bioenergy market over the nearest border – it is even 9 percent more in comparison to farmers and other biomass suppliers who took part in the survey. Only 23 percent of the respondents mentioned that the border location does not have any impact on farm activities (42 percent of feedstock suppliers held the same opinion). The very marginal positive answers on the questions concerning the impact of border locations may be consistent with a lack of knowledge on the border regions, but not the subject itself. The interviewed experts in their general assessment do not see any connection with border location and success of farm activities:

> *"The border situation does not impact negatively on the dissemination of bioenergy (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*
>
> *"It doesn´t have any impact (interview with Pavel Grmela, Liberec, Czech Republic 13th September 2012);*
>
> *"I wouldn´t combine the border position with bioenergy dissemination" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28th September 2013).*

On one hand the border location is associated with additional obstacles such as lower energy demand caused by a smaller population. On the other, there are European financial means available for cross-border activities, as the interviewed experts emphasizes:

> *“[In border regions there is] a lower energy demand than in other regions with higher number of citizens e.g. Dresden” (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*
>
> *"For such activities like PR or studies European funding for cross-border cooperation can be used […]" (interview with Pavel Grmela, Liberec, Czech Republic, 13th September 2012).*

An analysis of different border regions shows differences as well as similarities (APPENDIX 9.2 Perceptions of Policy Advisors Table 127). In contrast to biomass suppliers, only a minority of policy advisors do not recognize any impact of the border location on their activities. Almost all Polish (89 percent) respondents mentioned that they do not know anything about the bioenergy market over the nearest borders and only 18 percent of German and 3 percent of Czech policy advisors recognize that they have sufficient information about the bioenergy market over the nearest borders. Most of the respondents in the Czech (97 percent) and Polish border region (87 percent) do not seem to recognize the possibility of biomass suppliers selling biomass across the nearest border. In contrast, 18 percent of German policy advisors mentioned this opportunity. Interestingly 29 percent of German respondents and only 6 percent of Polish and 7 percent of Czech respondents mentioned the possibility of looking at best practice examples of bioenergy production over the border, however there are much more bioenergy plants in the German than in the Polish and Czech border regions.

Considering further factors connected with activities in cross-border locations, there are some difficulties perceived by the respondents, as presented in Figure 59 below.

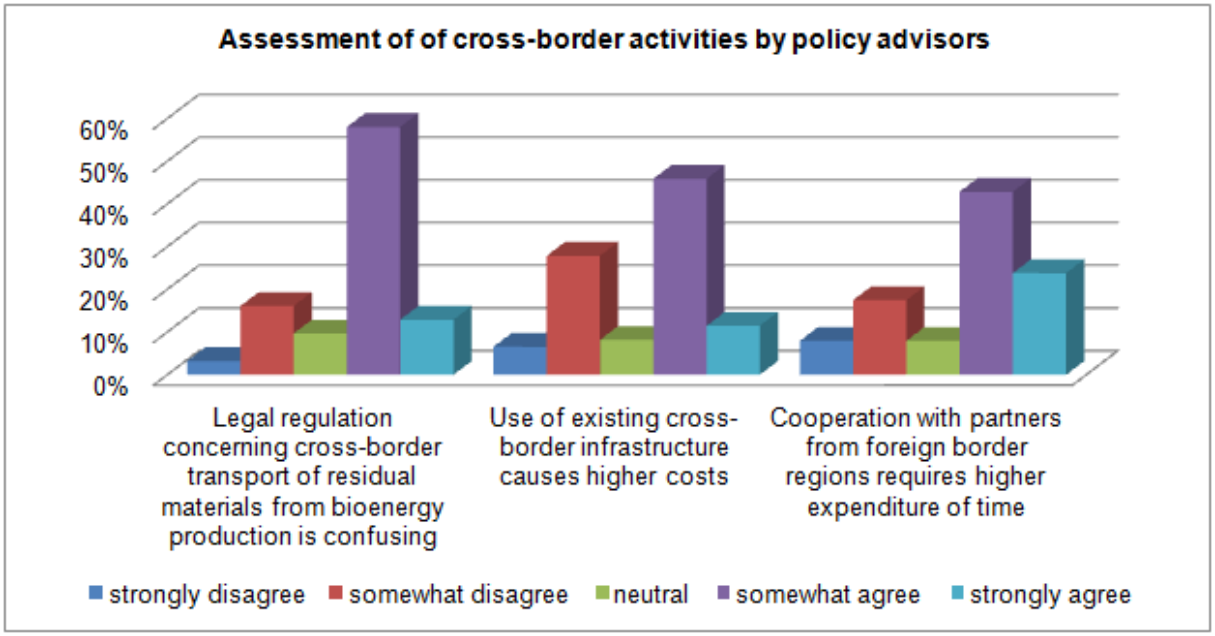


Figure 59: Assessment of cross-border activities by policy advisors in the research area (own design based on survey 2013)

Most of the respondents confirmed that additional efforts are necessary when interacting with foreign partners via cross-border activities. Cooperation with partners from foreign border regions is, according to 67 percent of respondents, more time-consuming. More than half (57 percent) of respondents confirm that the use of existing cross-border infrastructure prompts higher costs and 71 percent of policy advisors generally to strongly agreed with the statement that the legal regulations concerning cross-border transport of residual materials from bioenergy production is confusing. The first impressions of respondents do not show concern about the border location and difficulties connected with it. However, the assessment of cross-border activities confirms the existing **transaction costs,** which participants have to deal with. Cross-border cooperation can mitigate the problems, but it may generate relatively high transaction costs because of different institutional systems, cultures and languages (European Union 2010:61).

> *"Cross-border transport is a problem: with the waste from bioenergy installation [in Germany to Czech Republic] – there was a legal problem" (interview with Pavel Grmela, Liberec, Czech Republic 13th September 2012).*

The analysis of stakeholders´ perceptions in different border regions shows that in each border region, the assessments are very similar (APPENDIX 9.2 Perceptions of Policy Advisors Table 128).

The following section consists of an analysis of policy advisors´ answers relating to the possible strategies for bioenergy dissemination, identified in the first phase of this data analysis. Figure 60 below shows the assessments of policy advisors concerning possible strategies and measures to increase the attractiveness of bioenergy production.

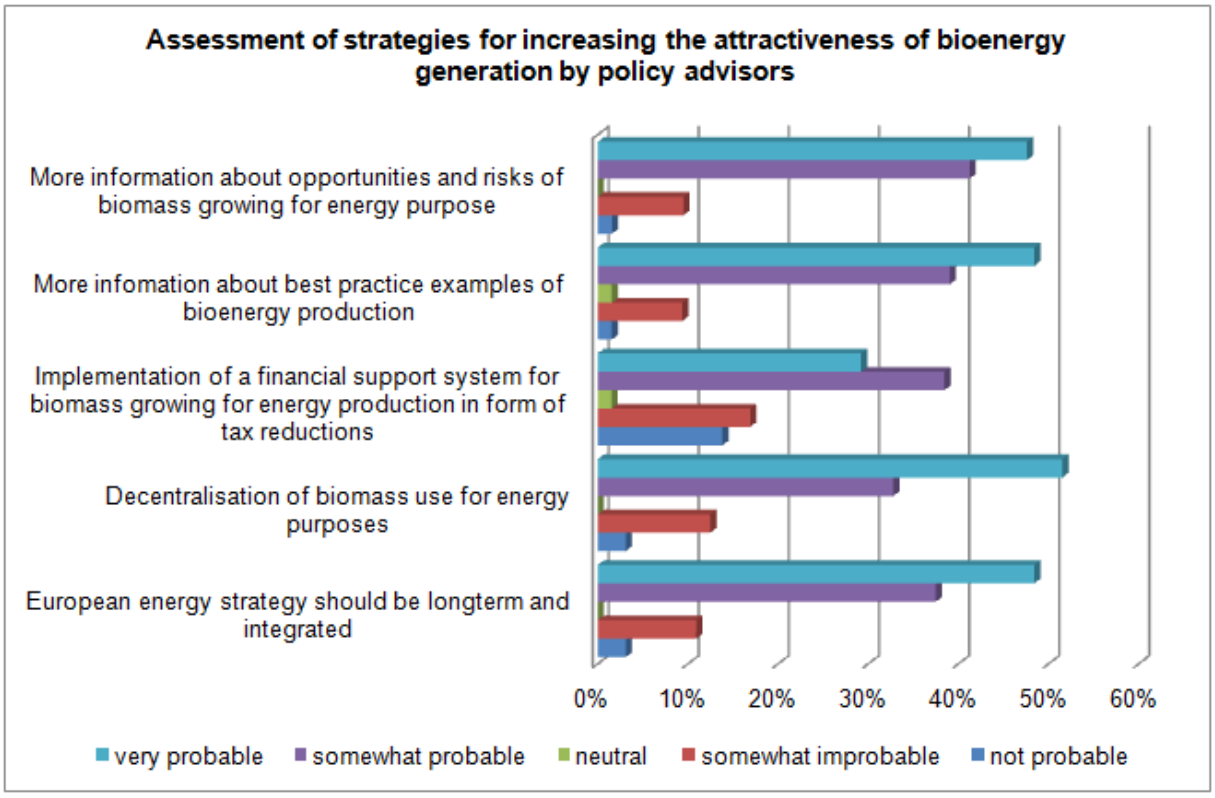


Figure 60: Assessment of strategies for increasing the attractiveness of bioenergy generation by policy advisors (own design based on survey 2013)

For the majority of policy advisors (86 percent), similar to the position held by feedstock suppliers, it is generally to very probable that the **European energy strategy** should be a long-term integrated strategy. In view of the perceived unstable legal environment by 78 percent of respondents this assessment is traceable (see Figure 57). Also the German interviewed expert emphasizes the need for policy at a European level with regard to regional differences:

> *"We need a clear and stable political commitment, not nonpermanent [...] it should be cross-border [...] need to be managed by European policy: the framework, but regional approaches [...]. We have to see ourselves in the European context" (interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

Decentralization of biomass use for energy purpose seems to be for 84 percent of respondents a good strategy for bioenergy development. For a cross-border region an integrated strategy should created, which considers such regions as one economic region.

The German expert concluded:

> *"In a cross-border region: resources [should be considered] not to the border, but in circle" (interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

According to 68 percent of respondents opinions, **financial support** in form of tax reductions for biomass growing is a good idea, what is comprehensible, if it is considered that for 54 percent of respondents the existing financial support is insufficient (see Figure 57). Also the German expert confirmed in the interview:

> *"A better way to support bioenergy dissemination is via taxes privileges: it does not put a strain on society, it offers immediate results" (interview with Holger Freymann, Niesky, Germany, 13th September 2012).*

The majority of the respondents (over 80 percent) consider **more information** about best practice examples of bioenergy production as well as about opportunities and risks of biomass growing for energy purposes as improving the attractiveness of bioenergy production. This can be explained by the fact that the social awareness has been assessed by 83 percent of policy advisors as low (see Figure 57). The interviewed experts confirmed the need for further information:

> *"Better communication of local advantages needed [...] information policy on the regional level very important [...] target group orientated; age-based information; global and cross-border information policy" (interview with Holger Freymann, Niesky, Germany, 13th September 2012);*
>
> *"Regional agency – partner who knows well the region and condition. It should take place cross-border" (interview with Pavel Grmela, Liberec, Czech Republic, 13th September 2012);*
>
> *"I think some demonstration installations are necessary. In this way people can see that it works" (interview with Dr. Mieczysław Ciurla, Wroclaw, Poland, 28.09.2013).*

Effective awareness raising campaigns and sufficient information on support schemes for bioenergy generation are essential for the social acceptance and development of bioenergy (Marks and Czerepowicki 2010:63). Promotion of the building of networks in rural areas of different potential conflict partners is recommended in order to develop a sustainable bioenergy scheme (Nienaber and Neumann 2008:6).

When comparing the three border regions, the perceptions of farmers and other biomass suppliers are quite similar (APPENDIX 9.2 Perceptions of Policy Advisors Table 129).

Other factors have been also analyzed in view of cross-border bioenergy dissemination, as in Figure 61 below.

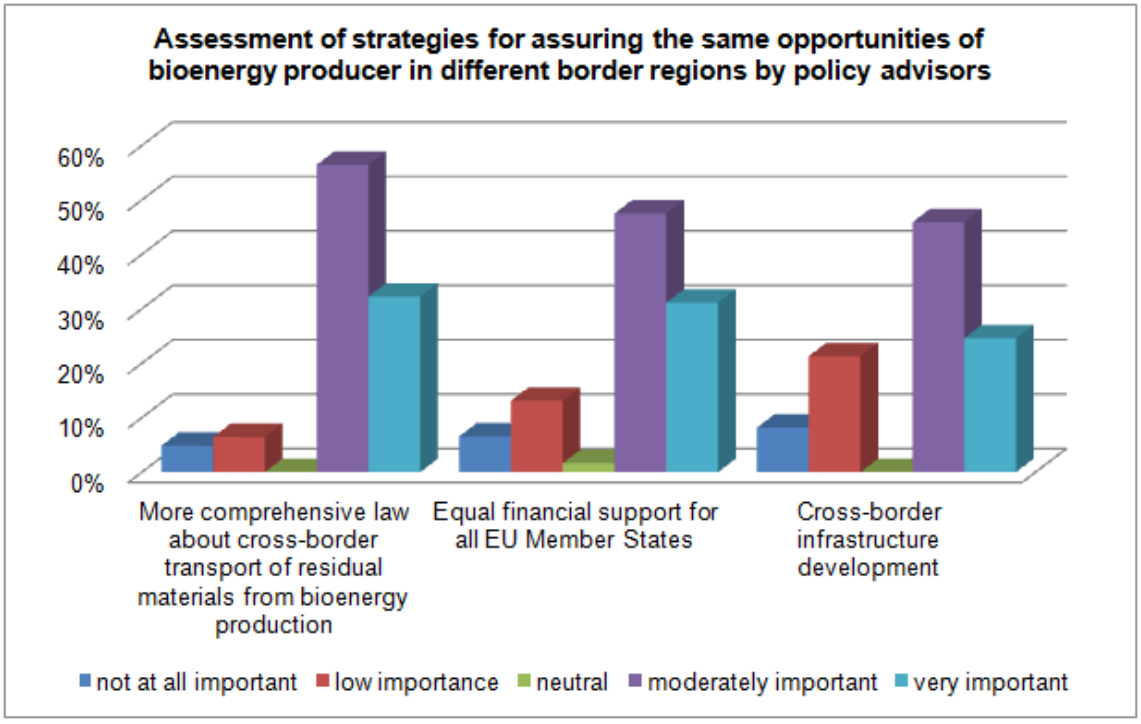


Figure 61: Assessment of other strategies for assuring the same chances of bioenergy producer in different border regions by policy advisors (own design based on survey 2013)

For the majority of policy advisors (79 percent) it would be generally to very important to have the same initial situations regarding financial incentives for crop producing as in other EU Member States. For 56 percent of respondents it is generally important and for 32 percent it is very important to have a clear legal regulation of cross-border transport of residual materials from bioenergy production. Cross-border infrastructure development also plays an important role for stakeholders – 70 percent of respondents pay moderate to great attention to this aspect. The perceived situation regarding cross-border infrastructure could still be improved, similar to the perceptions held by feedstock suppliers.

Comparing the perception of stakeholders from each border region, some similarities and differences can be observed (APPENDIX 9.2 Perceptions of Policy Advisors Table 130). The majority of respondents (77 percent and more) from all three border regions assessed more comprehensive law about cross-border transport of residual materials from bioenergy generation as moderately to very important. For all Polish respondents and for 83 percent of Czech respondents it is moderately to very important, that they receive equal financial support as their neighbors. In the assessment of cross-border infrastructure there are some differences between the respondents. Most of the German (84 percent) and Polish (83 percent) respondents, but only 47 percent of Czech recognized the need for further cross-border development.

6.4 Perceptions of Energy Producers

This section consists of an analysis of answers relating to the possible drivers in the bioenergy generation supply chain for energy producers, identified in the first phase of this data analysis. Figure 62 below shows respondents' structure.

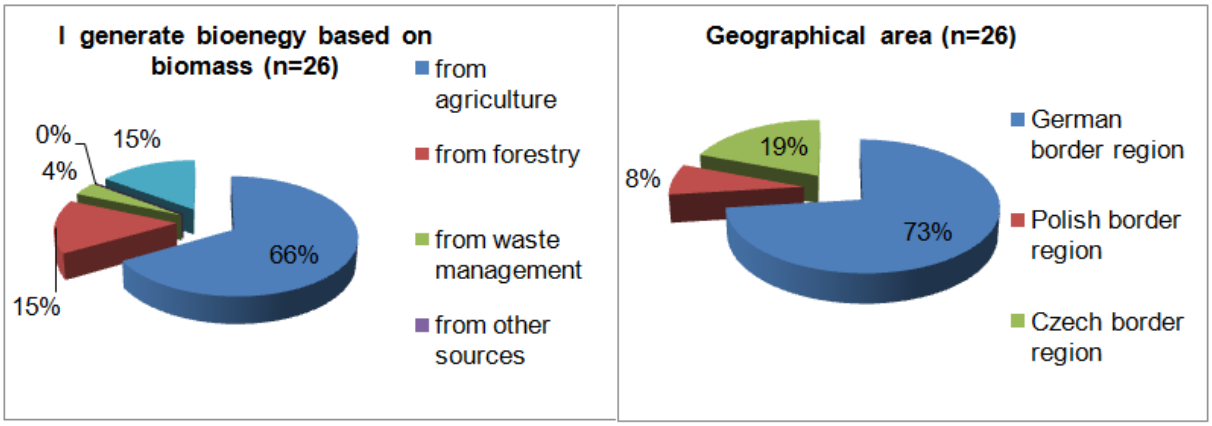


Figure 62: Structure of energy producer (own design based on survey 2013)

As previously mentioned, there are over 20 existing biomass installations generating electricity based on biomass in the German border region, only one plant in the Czech border region and any pure biomass installation (only using co-firing with coal) in the Polish border region (BioEnergyNet 2011). Therefore most of respondents (19) come from the German border region and only two from the Polish border region and five from the Czech border region. The majority of respondents (66 percent) generate energy based on agriculture biomass, and 15 percent based on forest. An assessment of the achievement of bioenergy goals achievement by energy producers is presented in Figure 63 below.

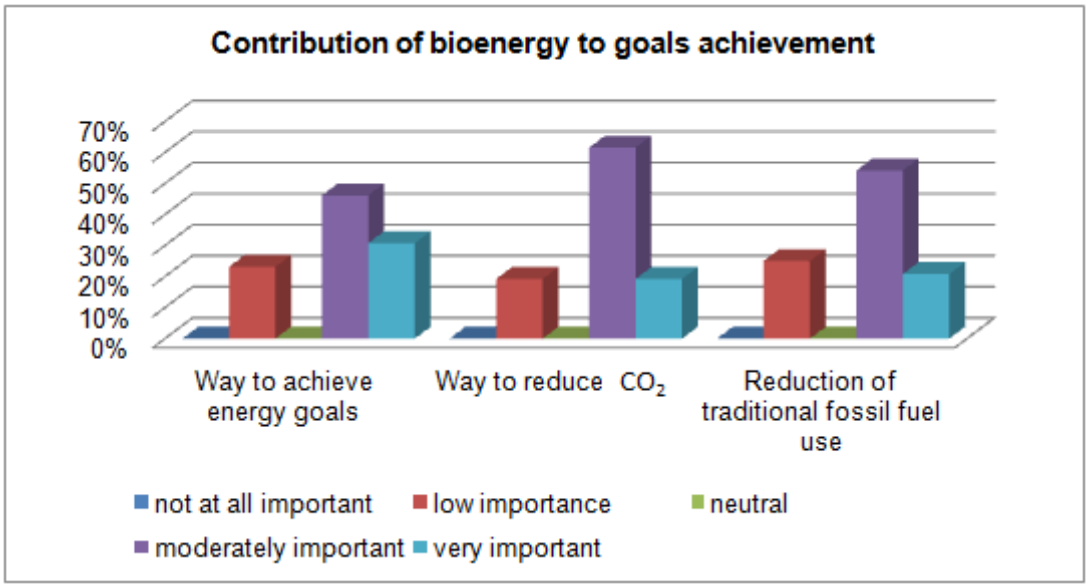


Figure 63: Attitudes of energy producers towards impact bioenergy goals achievement (own design based on survey 2013)

For the majority of respondents every contribution to the achievement of goals is relevant – over 75 percent perceived it as moderately to very important. Comparing the perception of respondents from the three border regions, some similarities and some differences can been observed (APPENDIX 9.3 Perceptions of Energy Producers Table 131). Polish respondents are more skeptical concerning the contribution of bioenergy to the achievement of CO_2 reduction and dissemination of renewable energies. Regarding the impact of bioenergy on the reduction of traditional fossil fuel all respondents paid little attention to this possibility. For German and Czech respondents the influence of bioenergy on mentioned goals is also mostly of moderate importance.

Figure 64 shows the assessment of drivers for bioenergy generation by energy producers.

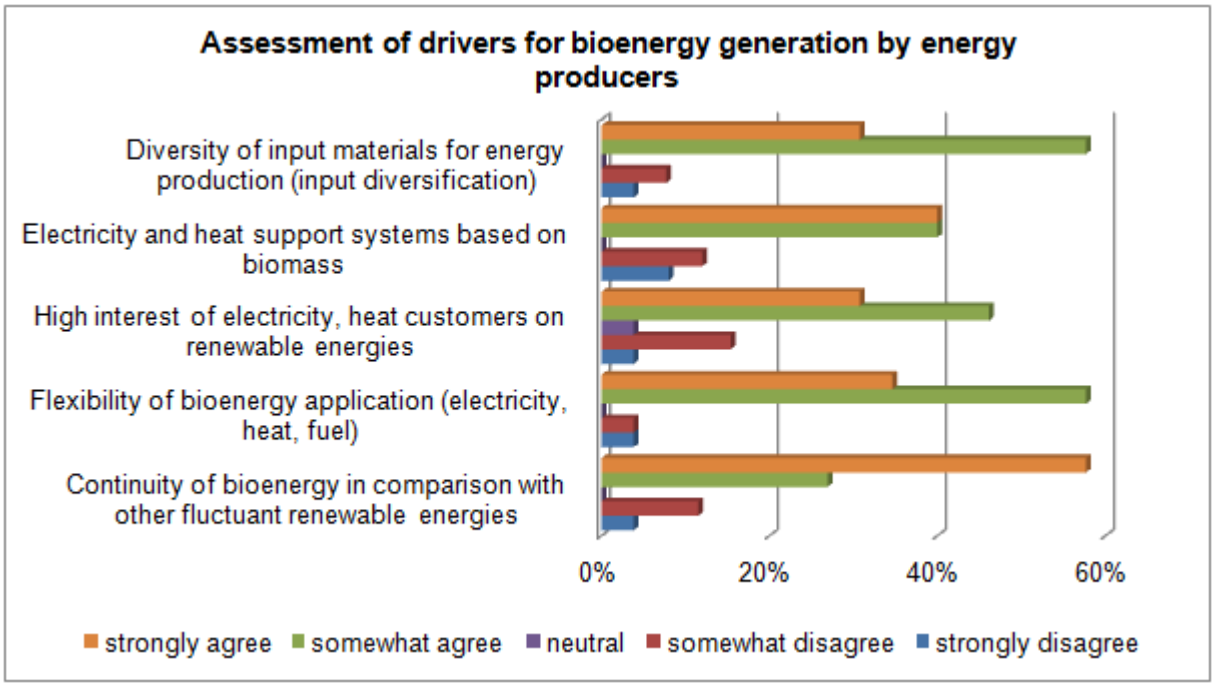


Figure 64: Drivers for bioenergy generation according to energy producers (own design based on survey 2013)

The most important driver according to the energy producers is the continuity of bioenergy in comparison with other fluctuant renewable energies – 58 percent of the respondents strongly and 27 percent somewhat agree with this advantage. Also the flexible use of bioenergy seems to be an important factor for 92 percent of energy producers. In the case of diversity of input materials also for the majority (88 percent) of respondents it is an important advantage of bioenergy. However 19 percent of stakeholders strongly disagree or somewhat disagree that high interest of customers has a positive impact on bioenergy dissemination. Also 20 percent of the energy producers are skeptical or neutral about the role of support systems for electricity generation and heat based on biomass.

An assessment of drivers for bioenergy generation made by energy producers in three border regions shows some similarities in the German and Czech responses and very different

answers from Polish respondents (APPENDIX 9.3 Perceptions of Energy Producers Table 132). The majority of respondents - over 80 percent of German and over 60 percent of Czech respondents somewhat or strongly agree with the positive impact of the mentioned drivers on bioenergy dissemination. In contrast, Polish energy producers do not recognize high interest of end customers on renewable energies as well as input diversification as a potential advantage for bioenergy dissemination. This is understandable in view of any bioenergy generation installation in the Polish border region, as well as the use of biomass only for co-firing with coal for energy generation. Regarding other factors, Polish opinion is very divided.

The general perception of the influence of bioenergy on the environment is positive, but on food production neutral or negative, as Figure 65 below shows.

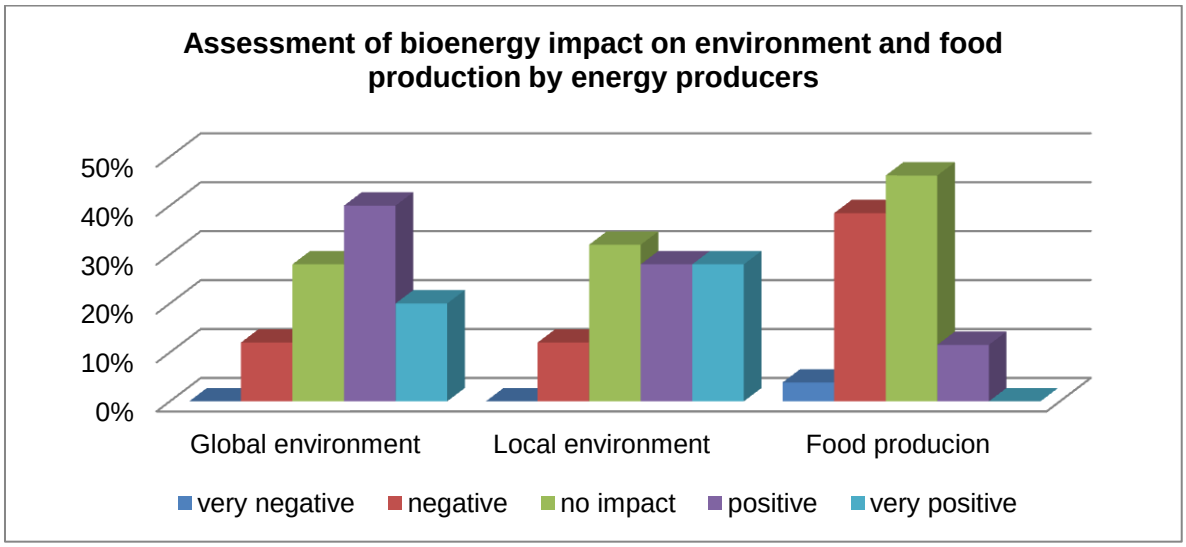


Figure 65: Impact of bioenergy on environment and food production – perceptions of energy producers (own design based on survey 2013)

Most of the respondents in the German border region perceive the global (77 percent of respondents) and local (55 percent of respondents) environmental impact as positive to very positive. Czech and Polish respondents are more skeptical about this influence – 20 percent of Czech energy producers assess the local impact as negative. Polish respondents do not believe in the positive role of bioenergy for the environment and food production. A significant part of German (37 percent) and Czech (60 percent) respondents is also critical about the bioenergy impact on food production and assess it as negative to very negative (APPENDIX 9.3 Perceptions of Energy Producers Table 133). The potential negative impacts of bioenergy production on food production and environment have been also noted by the interviewed experts:

> *"Under local aspects there are some additional emissions, because the fields are local. The part of the emission is not so large in relation to the grown and harvesting of biomass. […] [there are] reservations from farmers against growth of energy crops,*

because the agriculture was always the food producer" (interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012);

"But we are asking ourselves whether the wood from the Ukraine still makes sense" (interview with André Birner, Berthelsdorf, Germany, 30th November 2012).

The next section shows an analysis of answers concerning perception of possible barriers in the bioenergy generation by energy producers, identified in the first phase of this data analysis. Perceptions of energy producers concerning factors enhancing bioenergy generation are presented in Figure 66 below.

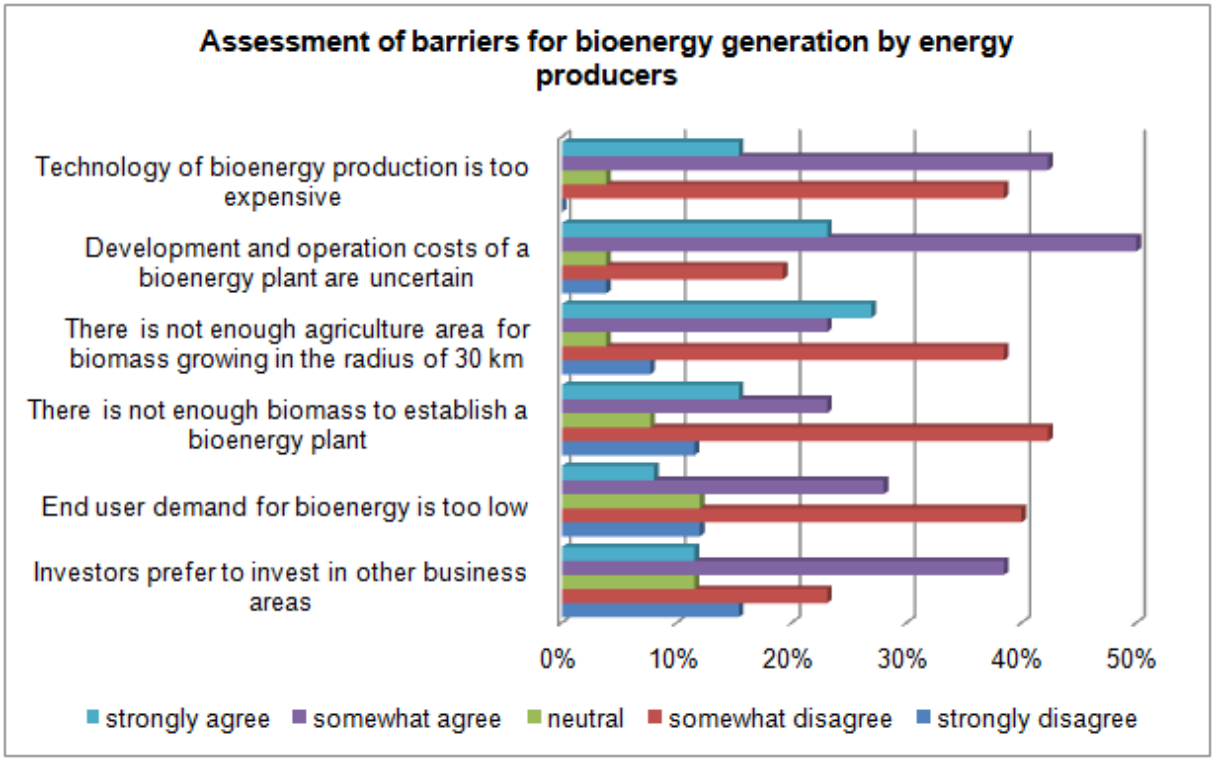


Figure 66: Barriers for bioenergy generation according to energy producers (own design based on survey 2013)

The respondents do not assess all factors as possible barriers. Similar to policy advisors, a sizeable number of energy producers (46 percent) are not fearful of insufficient biomass for bioenergy plant establishment and 46 percent think that there is enough agricultural land for biomass growing within a radius of 30 km. However, 38 percent have doubts. The most important barrier (according to 73 percent of respondents) seems to be the uncertainty regarding the development and operation costs of a bioenergy plant. The majority of energy producers (58 percent) perceive the technology for energy generation as too expensive and 50 percent of all respondents prefer to invest in other areas. The low demand of end users for bioenergy was not recognized as a significant barrier by 52 percent of respondents.

An analysis of the border region specific answers shows that the border regions in the research area are in some aspects different in their assessments (APPENDIX 9.3 Perceptions of Energy Producers Table 134). In the case of investment, development and **operation costs** of a bioenergy plant, most respondents (50 percent and more) from all three border regions are of the same opinion that these factors are blocking further bioenergy dissemination. The majority of German (52 percent) and Czech (60 percent) respondents prefer to invest in other areas than bioenergy. This perception was also confirmed by the following interviewed expert:

> *"[After EEG] our hope is that the gas price level will change; otherwise we will have a problem with the installation" (interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012).*

German and Polish energy producers are more skeptical than Czech energy producers about the **availability of biomass** as input for energy generation. German interviewed expert explains:

> *"There are a lot of bioenergy installations in the region […]. There is not very much biomass left" (interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012).*

In all three countries there is still some potential available for bioenergy generation (Tluka and Jelínek 2009:16–17; Budzianowski 2012:343; Tempel 2009:27;31). However in the Czech Republic and Germany the lack of a reliable feedstock supplier has been identified as a potential barrier for bioenergy dissemination (Marks and Czerepowicki 2010:118). Most energy producers from all border regions do not recognize the low energy demand of end user as a significant barrier for further development – 42 percent of German and 20 percent of Czech respondents think it can impact negatively on bioenergy dissemination. Current political goals for dissemination of renewable energies in all three countries provide the demand on bioenergy. The end user is interested only in low prices and stable electricity and heat supply.

In reference to other factors, which can be considered as barriers as well as drivers (social awareness, access to funding, legal environment and financial support), the following perceptions of energy producers in the three-country region can be observed:

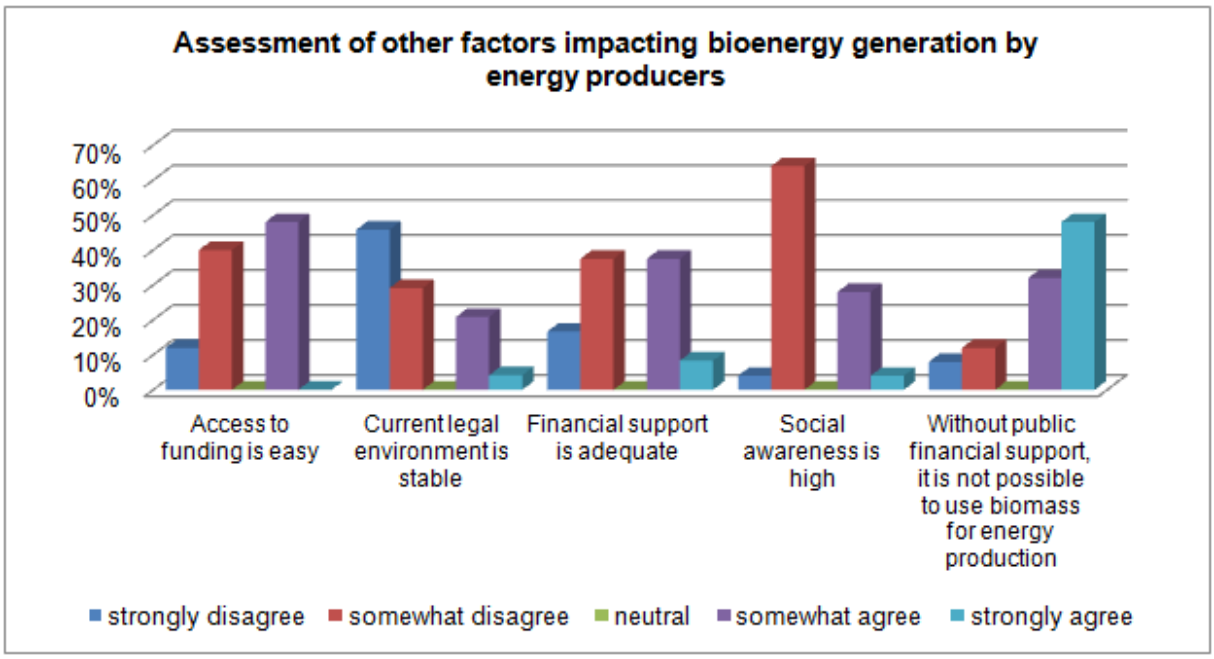


Figure 67: Assessment of other factors impacting bioenergy generation in the research area by energy producers (own design based on survey 2013)

Similar to the feedstock suppliers´ and policy advisors´ assessments, the majority of energy producers (80 percent) generally to strongly agreed with the statement, that without financial support from the state, it is not possible to use biomass for energy production. Moreover for 54 percent of respondents the existing financial support was inadequate and only 48 percent of respondents thought access to financial support was easy. Most respondents (68 percent) disagreed with the statement that social awareness concerning bioenergy generation is high. Also the current legal environment for bioenergy generation has been assessed as unstable by 75 percent of the respondents. These perceptions are worrying and confirm that there are many possible factors blocking the further development of bioenergy.

The analysis of energy producers´ perceptions in the three border regions shows several differences (APPENDIX 9.3 Perceptions of Energy Producers Table 135). Similar to the feedstock suppliers and policy advisors´ perceptions, most of Polish and Czech (over 80 percent) respondents perceive **access to funding** as difficult. The majority of German (59 percent) and Polish (100 percent) respondents but only 20 percent of Czech respondents recognize the financial support for energy generation as inadequate. The Czech support system for renewable energy based on feed-in tariffs and green bonuses on RES electricity supports further expansion especially in the electricity sector (Dodokova and Ouwens 2010:9). All of the Czech and more than half of the Polish and German respondents thought

that without financial support from the state, it is not possible to use biomass for energy production. Polish support system for bioenergy is based on quotas, which are unfavorable for its dissemination, especially in comparison to the German support system (Budzianowski 2012:343).

Similar to other stakeholders, the current **legal environment** has been assessed by energy producers from all border regions as unstable. All the Polish and Czech respondents, as well as the majority of German energy producers (64 percent), generally to strongly disagreed with the statement, that legal environment is stable. The Polish legal system concerning RES is also seen as unstable (Nowakowski 2010). This opinion was confirmed by the following interviewed expert:

> *"There are problems with the new EEG […]. Because of the change in the regulation to the new EEG we had higher requirements to fulfill […], we had to change plans in a short time and had additional costs […]. The question is: in which direction does the change go?" (Interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012).*

The Directive 2009/28/EC[8] requests Member States to remove non-transparent, lengthy, costly, badly coordinated legal barriers, as well as discriminatory authorisation, certification and licensing procedures between different administrative bodies (Marks and Czerepowicki 2010:16).

Most energy producers, as with other stakeholders, are convinced that **social awareness** concerning bioenergy generation is low – 67 percent of German, 60 percent of Czech and all Polish respondents generally to strongly disagreed with the statement that social awareness is high. In Poland local authorities are not well-informed on the benefits of RES, often resulting in lengthy decision processes (Marks and Czerepowicki 2010:9). Similarly, in the Czech Republic the reservation and lack of acceptance of the officials leads to negative attitudes towards biogas installations (Dodokova and Ouwens 2010:10–11; 28).

[8] Directive 2009/28/EC of the European parliament and of the council of 23rd April 2009: on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

Figure 68 presents the perceptions of energy producers in the whole research area.

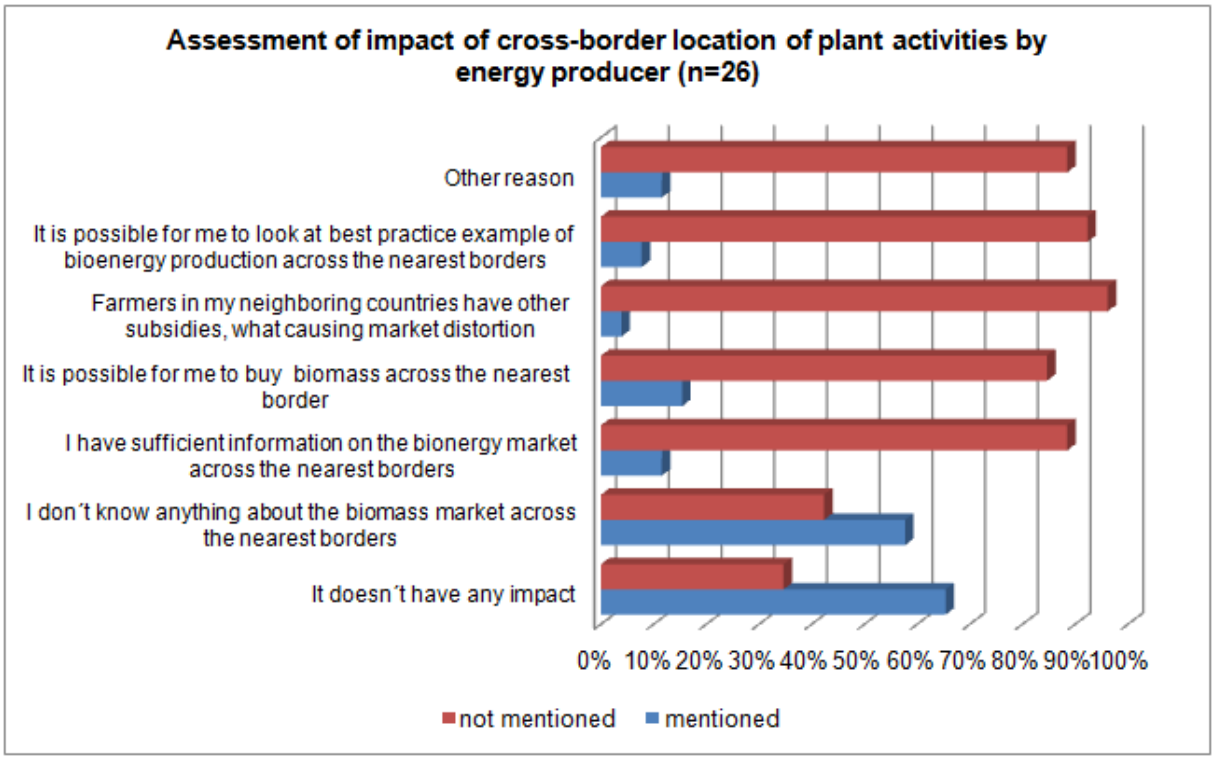


Figure 68: Assessment of impact of cross-border location by energy producers in the research area (own design based on survey 2013)

The majority of energy producers (64 percent) in contrast to policy advisors (only 23 percent) do not recognize any impact of border location on their activities. More than half of the respondents (58 percent) do not know anything about the bioenergy market across the border – it is 13 percent more in comparison to farmers and other biomass suppliers and 4 percent more than policy advisors. Only 15 percent of energy producers, similar to feedstock suppliers (13 percent) and policy advisors (15 percent) recognize the possibility of biomass buying and selling over the border. Other aspects like subsidies in the other border regions and best practice examples of bioenergy production do not seem to affected the energy producers – less than 10 percent mentioned these aspects. However some respondents seem to note negative impacts of border location under *"other aspects"*:

> *"Biomass is bought by neighboring energy producers and there is not enough for regional, Polish energy producer - they can´t offer such high price as the German neighbors" (comment of Polish energy producer No.1);*
>
> *"There are higher costs caused by security against thievery" (comment of German energy producer No. 3).*

Analysis of different border regions shows some differences and similarities between them (APPENDIX 9.3 Perceptions of Energy Producers Table 136). The majority of Czech (80 percent) and more than half of Polish and German respondents mentioned that they do not know anything about the bioenergy market across the nearest borders. Only 16 percent

of German energy producers stated that they are sufficiently informed on the bioenergy market across the border. Also only a minority of German (19 percent) respondents seemed to recognize the possibility of buying biomass across the border. In contrast, Polish respondents are concerned by the fact that currently farmers from the Polish border region sell their biomass to foreign energy producers *(see the above mentioned comment of Polish energy producer No.1).* However, this is specific for the border region. In Poland investors are sufficiently informed regarding support measures for bioenergy dissemination in general (Marks and Czerepowicki 2010:27). However if considering further factors connected with the activities in a cross-border location, there are some difficulties perceived by the respondents, as Figure 69 below shows. The first impressions of energy producers do not show concern about the border location and difficulties connected with it. The assessment of cross-border activities confirms the existing transaction costs, similar to other biomass suppliers and policy advisors, as in Figure 69 below.

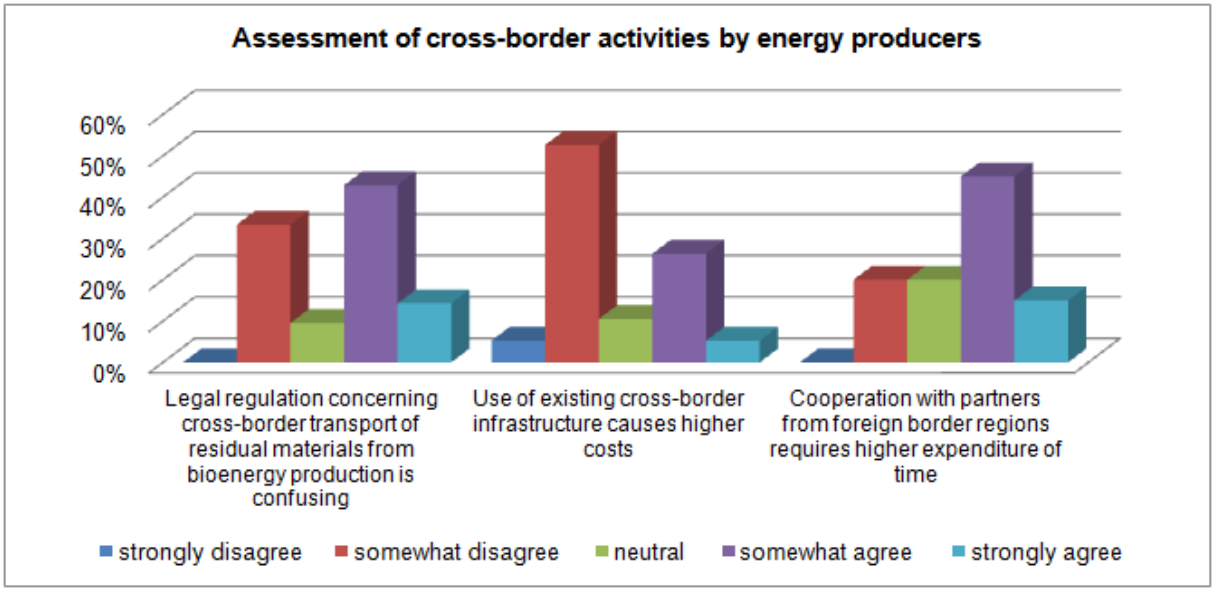


Figure 69: Assessment of cross-border activities by energy producers in the research area (own design based on survey 2013)

Most of the energy producers, similar to other stakeholders, admit that there are additional efforts necessary by cross-border activities connected with the interaction of foreign partners. Cooperation with partners from foreign border regions is, according to 60 percent of respondents, more time-consuming. Also for 57 percent of respondents, the legal regulations concerning the cross-border transport of residual materials from bioenergy production is confusing. In contrast to policy advisors (57 percent) only 32 percent of energy producers generally or strongly agreed with the statement that the use of existing cross-border infrastructure causes higher costs. This is important if you consider that biomass plants should be far from population centers (Beck and Martinot 2004:5).

The analysis of energy producers´ perceptions in different border regions shows similar thinking, but also differences (APPENDIX 9.3 Perceptions of Energy Producers Table 137). Respondents from all border regions agree with the fact that cooperation with partners from foreign border regions requires higher expenditure of time. The majority of Czech and German energy producers do not recognize higher costs caused use of cross-border infrastructure and only one Polish respondent does. In the case of legal regulations concerning the cross-border transport of residual materials from bioenergy production the situation is more confusing for Czech (80 percent) than for German (50 percent) respondents. One Polish producer recognizes this factor as a barrier, another does not.

The following section consists of the analysis of energy producers´ answer relating to the possible strategies for bioenergy dissemination, identified in the first phase of this data analysis. Figure 70 shows the assessments of energy producers concerning possible strategies and measures in order to increase the attractiveness of bioenergy production.

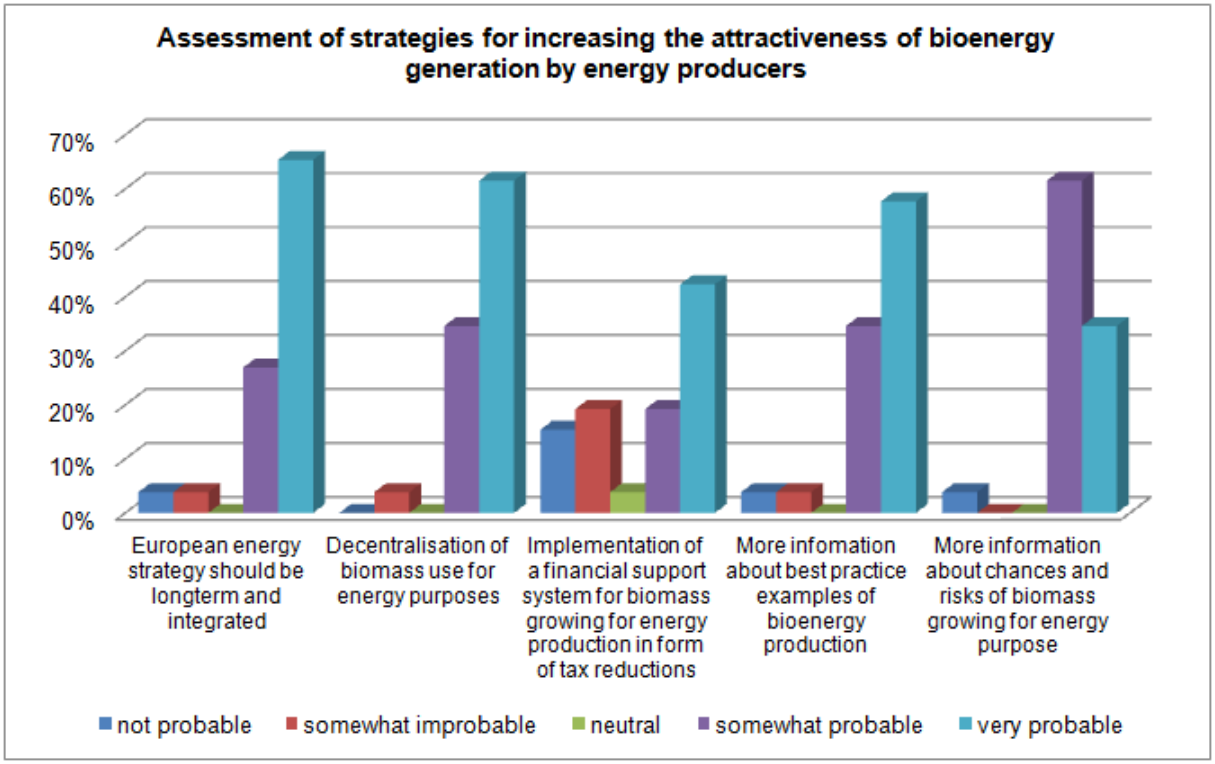


Figure 70: Assessment of strategies for increasing the attractiveness of bioenergy generation by energy producers (own design based on survey 2013)

For the majority of energy producers (92 percent), similar to feedstock suppliers and policy advisors, it is generally to very probable, that a long-term integrated **European energy strategy** would help to disseminate bioenergy. In view of the perceived unstable legal environment by 75 percent of respondents this assessment is understandable (see Figure 67).

These opinions have been confirmed by the following interviewed German expert:

> *"A reliable legislation framework is essential […] continuity is critical" (interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012).*

Decentralization of biomass use for energy purposes seems to be for 96 percent of respondents a good strategy for bioenergy development. This strategy can contribute to the reduction of respondents´ concerns regarding the potential for negative impacts of bioenergy on the local environment (12 percent). The following German interviewed expert confirmed that they use the advantage of local proximity to other biomass markets and use the local advantages:

"The cross-border location gave us the possibility to gain enough input to build an installation" (interview with Matthias Hänsch, Zittau, Germany 23.11.2012).

In the case of the implementation of a **financial support** system for biomass growing for energy production in the form of tax reductions for farmers, the opinion of energy producers was quite divided. According to 62 percent of respondents this kind of financial support would be a good idea; however 38 percent are skeptical or neutral about this strategy.

The majority of the energy producers (over 90 percent), similar to other stakeholders, consider **more information** about best practice examples of bioenergy production as well as about opportunities and risks of biomass growing for energy purposes as improving the attractiveness of bioenergy production. This is understandable when one considers that the social awareness has been assessed by 68 percent of energy producers as low (see Figure 67). Thefollowing interviewed experts confirmed the need for further information:

> *"It is essential to create examples, where it works" (interview with Matthias Hänsch, Zittau, Germany, 23rd November 2012);*
>
> *"Companies, which already have experience cross border- they are helpful" (interview with André Birner, Berthelsdorf, Germany, 23rd November 2012).*

A lack of consideration for the use of bioenergy and other renewables and their integration into district heating networks when planning new industrial or residential areas (e.g. biomass district heating networks) has been also identified in the EU as a possible barrier for the further development of RES. Moreover, there is insufficient knowledge about support schemes and pilot or demonstration projects in the EU Member States (Marks and Czerepowicki 2010:18).

When comparing the three border regions, the perceptions of energy producers are quite similar (APPENDIX 9.3 Perceptions of Energy Producers Table 138). Only in the case of the

possible implementation of a financial support system for biomass growing for energy production in the form of tax reductions are Czech respondents more skeptical in comparison to their Polish and German counterparts. The German and Czech respondents also assess the further information about best practice examples of bioenergy production as well as opportunities and risks of biomass growing for energy purpose as positive for further bioenergy dissemination. One Polish energy producer confirms the opinion, another not.

Other factors were also analyzed regarding cross-border bioenergy dissemination, as seen in Figure 71 below.

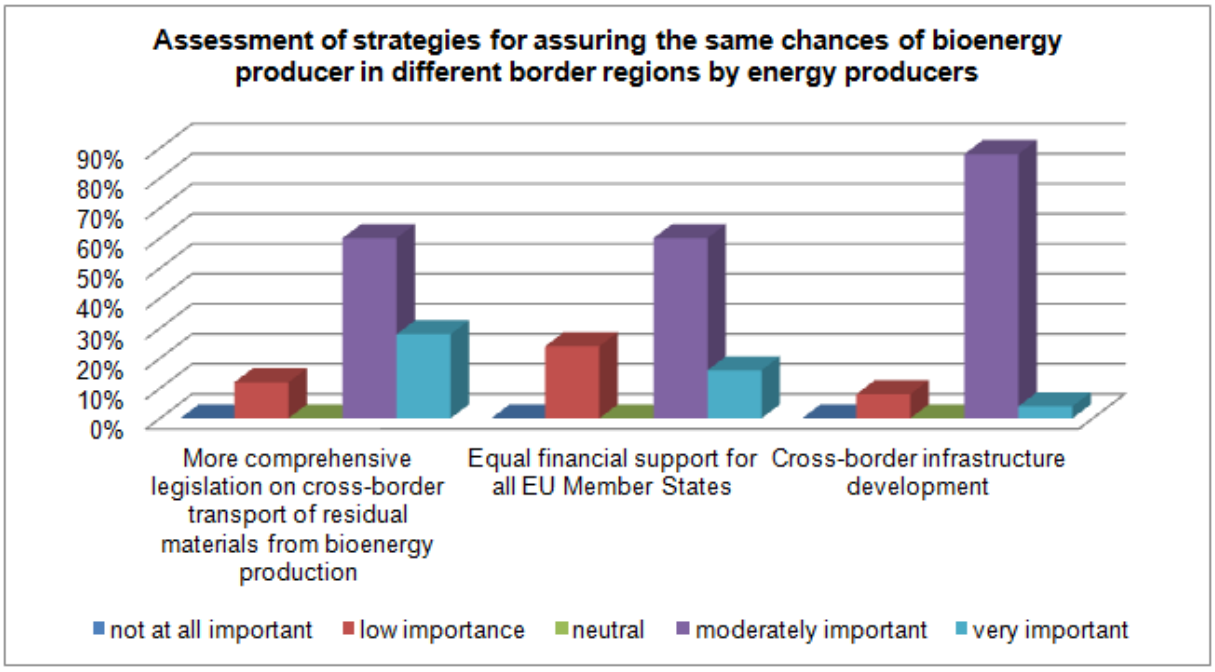


Figure 71: Assessment of other strategies for assuring the same chances of bioenergy producer in different border regions by energy producers (own design based on survey 2013)

All mentioned measures seem to play an important role for energy producers in order to disseminate bioenergy generation. The use of cross-border infrastructure does not cause additional costs according to 58 percent of respondents. Despite that, similar to policy advisors, the majority of energy producers (92 percent) pay moderate to great attention to cross-border infrastructure development. The situation regarding cross-border infrastructure could still be improved. The German interviewed expert confirms, as follows.

> *"It is important to expand the energy grids and networks between participants" (interview with André Birner, Berthelsdorf, Germany, 23rd November 2012).*

For the majority of energy producers (79 percent) it would be moderately to very important to have the same initial conditions regarding financial incentives for energy generation as in other EU Member States, as the following interviewed expert confirms:

> *„For the bioenergy production – the conditions should be the same" (interview with André Birner, Berthelsdorf, Germany, 23rd November 2012).*

For 56 percent of respondents it is moderately to very important to have clear legal regulations regarding the cross-border transport of residual materials from bioenergy production. The following German interviewed energy producer admits that:

> *"There are some problems – the return delivery of the waste from the fermentation process" (interview with Matthias Hänsch, Zittau, Germany 23rd November 2012).*

The perceptions of stakeholders from each border region are very similar to each other and complied with the main tendencies as described above (APPENDIX 9.3 Perceptions of Energy Producers, Table 139).

6.5 Summary of Results from PHASE II

This section consists of perceptions of existing drivers, barriers, border impacts of location as well as ossible strategies to deal with them made by stakeholders along the bioenergy supply chain: feedstock suppliers, policy advisors, and energy producers for the German, Czech and Polish border region.

Drivers for bioenergy dissemination assessed by different stakeholders from the German, Polish and Czech border region have been summarized in the Table 26 below.

Stakeholders / Region	Type of driver	German border region	Polish border region	Czech border region
Feedstock Suppliers	structural	▪ meeting governmental energy and carbon targets ▪ reduction of traditional fossil fuel use ▪ additional income source ▪ market diversification/opportunity ▪ profitable return on investment		
	availability	▪ availability of reliable buyers of biomass for energy purposes ▪ availability of experience with biomass crop growing		
			▪ possibility to use soils of poor quality ▪ good technique for waste / residual materials utilization ▪ feedstock availability	
	behavioral	▪ continuity of bioenergy in comparsion with other fluctuant renewable energies ▪ flexibility of bioenergy application (electricity, heat, fuel) ▪ high interest from customers regarding renewable energies		
Policy Advisors	structural	▪ meeting governmental energy and carbon targets ▪ reduction of traditional fossil fuel use		
	availability	▪ availability of financial support systems on electricity and heat based on biomass		
	behavioral	▪ continuity of bioenergy in comparsion to other fluctuant renewable energies ▪ flexibility of bioenergy application (electricity, heat, fuel) ▪ high interest of electricity, heat customers on renewable energies ▪ diversity of input materials for energy production (input diversification)		
Energy producer	structural	▪ meeting governmental energy and carbon targets		
		reduction of traditional fossil fuel use		▪ reduction of traditional fossil fuel use
	availability behavioral	▪ availability of financial support systems on electricity and heat based on biomass ▪ continuity of bioenergy in comparison to other fluctuant renewable energies ▪ flexibility of bioenergy application (electricity, heat, fuel)		
		▪ high interest from customers regarding renewable energies ▪ diversity of input materials for energy production (input diversification)		▪ high interest of electricity, heat customers on renewable energies ▪ diversity of input materials for energy production (input diversification)

Table 26: Assessment of drivers for bioenergy dissemination by stakeholders in different border regions (own design based on survey 2013)

Barriers for bioenergy dissemination assessed by different stakeholders from the German, Polish and Czech border regions have been summarized in the Table 27 below.

Stakeholders / Region	Type of barrier	German border region	Polish border region	Czech border region
Feedstock Suppliers	structural	▪ potential negative impacts on food production		
				▪ competition vs. other investment ▪ resource intensive feedstock (higher efforts)
	availability	▪ low social awareness		
			▪ inadequate financial support for biomass growing and bionergy generation	
	behavioral	▪ uncertainties of legal environment (instability) ▪ perceptual challenges of feedstock supply and bioenergy generation (need for financial state support)		
			▪ uncertainties and difficult access of financial support for bioenergy generation	
Policy Advisors	structural	▪ potential negative impacts on food production ▪ competition vs. other investment		
	availability	▪ low social awareness		
		▪ physical resource limitations (land availability)	▪ low end user demand for bioenergy ▪ lack of feedstock supply (resource availability) ▪ insufficient financial support for biomass growing and bionergy generation	
	behavioral	▪ perceptual challenges of feedstock supply and bioenergy generation (need for financial state support) ▪ uncertainties of legal environment (instability)		
		▪ uncertain development and operation costs of a bioenergy plant ▪ expensive technology of bioenergy production		
			▪ difficult access to the financial support for bioenergy generation	
Energy producer	structural	▪ potential negative impacts on food production		
			▪ potential negative impacts on global and local environment ▪ competition vs. other investment	
	availability	▪ low social awareness		
			▪ physical resource limitations (land availability)	
		▪ insufficient financial support for bioenergy generation		▪ lack of feedstock supply (resource availability)
	behavioral	▪ uncertain development and operation costs of a bioenergy plant ▪ expensive technology of bioenergy production ▪ uncertainties of legal environment (instability) ▪ perceptual challenges of feedstock supply and bioenergy generation (need for financial state support)		
		▪	▪ difficult access to the financial support for bioenergy generation	

Table 27: Assessment of barriers for bioenergy dissemination by stakeholders in different border regions (own design based on survey 2013)

Impact of border location assessed by different stakeholders from the German, Polish and Czech border region has been summarized in the Table 28 below.

Assessment of impact of border location on stakeholders´activities			
Stake-holders / Region	**German border region**	**Polish border region**	**Czech border region**
Feedstock Suppliers	▪ perception of an open market ▪ insufficient information about the bioenergy market across the border ▪ insufficient knowledge about direct trade possibilities (by feedstock suppliers) ▪ insufficient knowledge about best practice example of bioenergy production across the border ▪ acceptance of different subsidies for farmers in different border regions ▪ transaction costs (language barriers, longer time of doing business, longer transport distances) ▪ unsustainable biomass use caused long transport distances		
	▪ any impact ▪ lower operation costs in other border regions ▪ additional costs caused thievery of agriculture vehicles		▪ any impact
Policy Advisors	▪ insufficient knowledge about direct trade possibilities (by feedstock suppliers) ▪ insufficient knowledge about best practice example of bioenergy production over the nearest borders ▪ acceptance of different subsidies for farmers in different border region ▪ transaction costs (language barriers, longer time of doing business, longer transport distances, cross-border infrastructure, expenditure of time for cross-border cooperation) ▪ confusing legal regulations concerning cross-border transport of residual materials from bioenergy production		
	▪ possibility to get stable input from neighbor suppliers for a biomass installation	▪ lack of knowledge about the biomass market over the nearest borders	
Energy producer	▪ any impact ▪ insufficient information about the bioenergy market across the border ▪ insufficient knowledge about direct trade possibilities (by energy producers) ▪ acceptance of different subsidies for farmers in different border region ▪ insufficient knowledge about best practice example of bioenergy production over the nearest borders ▪ transaction costs (longer time of doing business)		
	▪ higher costs caused security against thievery ▪ sales market for the residual material of biogas production		▪ confusing legal regulation concerning cross-border transport of residual materials from bioenergy production

Table 28: Assessment of impact of border location by stakeholders in different border regions (own design based on survey 2013)

The following **strategies** are meaningful according to the different stakeholders in the German, Polish and Czech border regions.

Assessment of strategies for bioenergy dissemination			
Stake-holders / Region	German border region	Polish border region	Czech border region
Feedstock Suppliers	▪ European energy strategy should be long-term and integrated ▪ decentralization of biomass use for energy purposes (= transport reduction) ▪ implementation of a financial support system for biomass growing for energy production in form of tax reductions ▪ more information about best practice examples of bioenergy production ▪ more information about opportunities and risks of biomass growing for energy purpose ▪ more comprehensive legislation about cross-border transport of residual materials from bioenergy production ▪ equal financial support for all EU Member States ▪ cross-border infrastructure development		
Policy Advisors	▪ European energy strategy should be long-term and integrated ▪ decentralization of biomass use for energy purposes (= transport reduction) ▪ Implementation of a financial support system for biomass growing for energy production in form of tax reductions ▪ more information about best practice examples of bioenergy production ▪ more information about opportunities and risks of biomass growing for energy purpose ▪ more comprehensive legislation about cross-border transport of residual materials from bioenergy production ▪ equal financial support for all EU Member States		
	▪ cross-border infrastructure development		
Energy producer	▪ European energy strategy should be long-term and integrated ▪ decentralization of biomass use for energy purposes (= transport reduction) ▪ more information about best practice examples of bioenergy production ▪ more information about opportunities and risks of biomass growing for energy purpose ▪ more comprehensive legislation about cross-border transport of residual materials from bioenergy production ▪ equal financial support for all EU Member States ▪ cross-border infrastructure development		
	▪ implementation of a financial support system for biomass growing for energy production in form of tax reductions		

Table 29: Assessment of strategies for bioenergy dissemination by stakeholders in different border regions (own design based on survey 2013)

7 Conclusion

The main aim of this chapter is to outline the key findings of the research undertaken and show this in the context of today's knowledge. Recommendations for policymakers on the possible strategies and measures that could be used to strengthen the drivers and overcome the barriers in European border regions for bioenergy dissemination will be discussed. The limitations of the study and required further research will also be identified.

7.1 Contribution of the Key Findings to Current Knowledge

The main findings from the research can be summarized as follows:

a) There is great potential for bioenergy generation in cross-border areas.
b) The geo-economic difficulties inherent in energy generation in these areas pose a major barrier to its development.
c) Each investigated cross-border region has its potential and limitations, but lack of research hinders a clear view of the extent to which differences may be compensated via legislation and economic incentives.
d) The engagement of stakeholders is essential in order to fully realize biomass potential of border regions.

In terms of the contribution this study makes to current knowledge, there is a lot of scientific research on barriers and drivers for renewable energy and bioenergy in a global and European context. However, there has been limited research undertaken with respect to the border regions in the EU. These regions are special, and demand particular attention. The academic gap concerning the perceived barriers and drivers for bioenergy generation in cross-border rural Europan areas has been closed by this research. The perceptions of stakeholders involved in the bioenergy generation process – biomass suppliers, policy advisors and energy producers have been analyzed in a cross-border context using as an example the German-Polish-Czech border area. A further assessment of possible strategies and measures by stakeholders offers the basis for recommendations for policymakers with a will to improve existing political and economic frameworks.

The results of this research supplement not only the limited current literature on the subject, but gives impetus also to the European legislative, in cooperation with a Member of the European Parliament from the Free State of Saxony in Germany. This thesis applies to a wide range of phenomena, if we consider that the European Union consists of 28 member states, with numerous cross-border areas. Further, it also specifies predictions concerning barriers and drivers for investment in electricity generation from biomass. Identification of crucial fac-

tors (e.g. legal framework, financial support, language barriers) for bioenergy generation contributes to better understanding of possible key aspects in other European border regions.

7.2 Recommendations for Policymakers

On the basis of the conducted analysis, barriers to and driving factors for investment, as well as its contribution to regional development, were determined. Furthermore, the impact of a border location, possible measures and strategies to strengthen these factors and to break down the barriers were formulated.

7.2.1 European Policy and the Legal Environment in terms of Bioenergy

Energy policy should not be considered a matter for individual European countries, rather, it should be **considered at European Union level**. Germany has decided to move away from nuclear energy and instead support the dissemination of renewable energy. Germany's neighbours, however, Poland and the Czech Republic, focus their resources on coal or wood materials, and plan to move closer to nuclear energy. By rejecting nuclear power, a once very important energy source for Germany, there is now a strong need for an energy concept that includes an affordable energy supply for industry and the general population. The results from this research show that the majority of respondents (83 percent of feedstock suppliers, 86 percent of policy advisors and 92 percent of energy producers) believe that a long-term integrated **European energy strategy** would contribute to the enhancement of bioenergy generation, is "somewhat probable" to "very probable".

Border regions belonging to countries with different energy priorities are subjected to different political agendas**. Polish and Czech biomass suppliers can profit from the high biomass demand in Germany, and higher prices**. Thanks to the cross-border trade of biomass, biomass suppliers can expand their markets, winning **additional sources of income**. Most feedstock suppliers recognize in the selling of biomass an opportunity for additional income – 88 percent agree to strongly agree, with a mere 12 percent disagreeing with the statement. 70 percent agree with the reasoning that the selling of biomass makes it possible to expand their market. This means **additional jobs** for economically challenged border regions. As the analysis showed, according to the majority of feedstock suppliers, their experience with growing biomass is sufficient enough and does not hold them back in using the growing of biomass as an additional income source. It can be assumed that the market for biomass trade is sufficiently developed, that crop growing and the sale of biomass are considered sufficiently profitable, and that it represents a potential source of income.

The general perceptions of all stakeholder groups regarding the influence of bioenergy on the environment and food production are positive. The **decentralization of biomass use** for energy purposes in order to reduce transport distances is for the majority of respondents (98 percent of biomass suppliers, 84 percent of policy advisors and 96 percent of energy producers) a positive step for bioenergy development. It makes sense that biomass is handled where it is grown at low cost. Cross-border biomass trade is still a feasible option **when transport distances are not too long** (not more than approx. 50 km). However, the market orientates itself only on price and in order to ensure the sustainable use of biomass for energy generation, a common legal framework and guidelines with **sustainable criteria** for biomass use are essential. It makes no sense to increase bioenergy use for energy goals while damaging the environment and agriculture. This is a very complex system with many interfaces. Sustainable criteria for bioenergy require **quality standards along the whole supply chain** in order to sustain crop growing and biomass use.

In the case of electricity generation based on biomass, the European Union has set obligatory sustainable criteria only for liquid and gaseous biomass use9. For solid biomass only a few recommendations for sustainable use have been formulated by the European Commission10 (European Union 2009:L 140/17 – L 140/23; European Commission 2010a). The criteria already set contribute to climate protection by reducing CO_2 emissions, as well as reducing the reliance on biomass imports and so securing supply. There is also consequent job creation, support for rural regions, as well as an indirect development of the bioenergy sector (Thrän et al. 2011:1).

Each EU member state **has different natural conditions and other preconditions** for bioenergy dissemination. It should be relinquished each country the way how they want to achieve the renewable energy goals, what is the current regulation. However, in the case of sustainability standards, recommendation turned out to be not sufficient due to ensure sustainable biomass use. Therefore, obligatory standards at an EU level should be established and implemented through national law.

Sustainable bioenergy generation is possible, but it requires **appropriately regulated measures** and **economic incentives**. A sectoral and regional orientated bioenergy policy is essential, involving international markets and an international division of labour. Obligatory standards and positive incentives are required for climate friendly applications and to avoid usage competition (Gawel and Purkus 2012:17–20). Sustainable frameworks and standards

[9] DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23rd April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealed Directives 2001/77/EC and 2003/30/EC.

[10] Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling.

can reduce the potential for adverse effects on bioenergy production (Intergovernmental Panel on Climate Change 2012:52).

7.2.2 Special Treatment of Border Regions in the European Union

Those border regions of an agricultural character **can profit from synergy effects** and take advantage of the agricultural character of neighbouring regions for a more intense bioenergy generation. This **additional value** in the structurally weak regions contributes to the establishment of new jobs and regional development, e.g. the biomass installation in Zitttau, Germany, which is supplied with biomass from the Polish border region or the installation in Seifhennersdorf, Germany, supplied with biomass from the Czech border region. However, **cross-border cooperation has associated transaction costs- additional efforts like time efforts or additional costs**. Most of the energy producers, similar to other policy advisors, are aware of the additional work needed in cross-border activities associated with the interaction with foreign partners. Cooperation with partners from foreign border regions is, according to the majority of those respondents, more time consuming. More than half of the policy advisors and energy producers are convinced that the legal regulations concerning the cross-border transport of residual materials from bioenergy production is confusing.

In order to improve regional development in the structurally weak border regions, there are already some **EU financial support programmes**, such as the European Regional Development Fund (ERDF) and the European Agricultural Fund for Rural Development (EAFRD) or special finance for cross-border cooperation. These programmes have been successful in aiding cross-border cooperation or structural development, **though they do not encourage the stakeholders to use biomass in a sustainable way for energy production**. More **intensive communication between stakeholders** in cross-border regions is necessary in order to enhance the information on bioenergy markets across borders and increase the **acceptance for bioenergy dissemination**. Further **support for the reduction of language barriers is needed** in order to strengthen the communication between those involved and intensify further cooperation. Fewer language barriers and enhanced knowledge about the possibilities of bioenergy generation in border regions contribute to a **reduction of transaction costs** involved in cross-border activities and to an increase in the attractiveness of bioenergy in cross-border areas.

7.2.3 European Harmonization of Economic Incentives for Bioenergy Generation

In order to enhance the social acceptance of new policies, management schemes and farm operations in relation to renewable energy dissemination, appropriate subsidies and incentives are still required (Arodudu, Voinov, and van Duren 2013:362).

The majority of feedstock suppliers (76 percent) somehow agree to strongly agree with the statement that without financial support from the state, it is not possible to use biomass for energy production. This is quite worrying because state support aims to give only initial funding and is not designed as a permanent ongoing financial support. Most of the Polish feedstock suppliers (80 percent) perceive access to initial funding as problematic. For 85 percent of Polish and 67 percent of Czech feedstock suppliers financial support for energy generation is insufficient. In contrast, 52 percent of German respondents agree with this statement. On the one hand, similar to the perceptions of feedstock suppliers and policy advisors, most of the Polish and Czech energy producers (over 80 percent) perceive access to funding for bioenergy generation as problematic. On the other hand, for more than half of German energy producers (59 percent) existing financial support for bioenergy generation is sufficient.

To achieve the national goals for renewable energy dissemination, member states have implemented **different economic incentives** – for example, the German border region has more favorable legal conditions for bioenergy generation than is the case in the Polish and Czech border regions. This results in a **higher demand for feedstock in the German rather than the Czech and Polish border regions** and consequently **longer transport distances for biomass**. Another consequence is that energy producers in the Czech and Polish border regions **are forced to pay higher prices for biomass than in other parts of their own countries** due to a higher level of competition with regards to the available biomass potential. They have to compete with German energy producers under less favorable political conditions in their home regions. Experts who were interviewed and survey respondents suggest:

> *"Investors do not consider the local and regional conditions, just the financial support. (interview with policy advisor Holger Freyann, Niesky, Germany, 13.09.2012);*
>
> *“Biomass is bought by neighbouring energy producers and there is not enough for the regional (PL) energy producer - they can´t offer such high prices as their neighbours (DE)” (comment of Polish energy producer No.1).*

For the majority of all respondents it would be moderately important to very important to have **the same initial conditions for financial incentives** for crop production and bioenergy generation as in other EU Member States.

Respondents from the Czech and Polish border regions recognized a restricted availability of land and resources in spite of a verifiable existing potential for biomass. This perception is connected more **with the financial than the physical biomass accessibility**. In the case of the biomass potential from agriculture, 62 percent of policy advisors and 38 percent of energy producers are concerned that there is not enough area for growing biomass.

Therefore, it would be meaningful to implement to some **degree a harmonization of economic incentives for renewable energy dissemination**, especially for bioenergy at EU level, in order to reduce market barriers based on different economic incentives. These barriers prevent those in the market from investing in bioenergy generation (for example, in the Czech and Polish border regions there are only a few installations in comparison to over 20 in the German border region) or encouraging others to use biomass potential in unsustainable ways (for the transport of biomass over 100 km in the German border region). These possible common regulations should not to be overly detailed in order to take into consideration the different features of the different regions.

7.2.4 Other Measures and Strategies

Despite many infrastructure projects in the German-Czech-Polish cross-border area, there is still a perceived need for further development, especially with regards to building the **electricity grid**. This was confirmed by one of the experts interviewed:

> *“The government has not done its homework: building the electricity grid" (interview with policy advisor Holger Freymann, Niesky, Germany, 13.09.2012).*

The analysis of stakeholders’ perceptions confirms also that the perceived situation in the cross-border infrastructure for those stakeholders could still be improved.

The majority of respondents recognized a low level of **social awareness** concerning renewable energy dissemination. For most of the respondents every contribution bioenergy makes towards the achievement of goals is relevant, eg. a reduction in the use of fossil fuels – over 60 percent of feedstock suppliers, over 70 percent of policy advisors and over 75 percent of energy producers perceived it is as moderately to very important.

Some of the respondents have some knowledge concerning the biomass market over the nearest border, but almost a half (45 percent) of biomass suppliers and 54 percent of policy advisors and 58 percent of energy producers do not know anything about this market and only less than ten percent of all respondents regard their level of knowledge about the situation over the border as sufficient. Further, most respondents (86 percent of feedstock suppli-

ers, 68 percent of energy producers and 83 percent of policy advisors) disagree with the statement that social awareness of bioenergy generation is high.

While most feedstock suppliers assess their experience with biomass crop growing as sufficient, for over 80 percent of them, more **information** about best practice examples of bioenergy production, as well as the opportunities and risks of growing biomass for energy purposes would be somehow probably to very probably.

Not only is the strengthening of an information policy at national level essential to overcome this barrier, but also a more **regional information policy**, adapted to different stakeholder groups like biomass supplier, energy producer and energy user is required. Better communication of the local advantages of bioenergy generation is needed. A Czech expert who was interviewed suggests:

> *“A local energy agency which lays out an information policy and deals with information brokering and cooperates with a central energy agency" (interview with Pavel Grmela, Liberec, Czech Republic, 18.09.2012).*

Such a kind of regional information centre or **regional energy agencies** should act across borders and with a regional scope dealing with such aspects as feedstock management, knowledge transfer between universities and potential investors, as well as provide information about existing heat demand in order to support heat use concepts. The establishing of contacts would be helpful for the participants, like the expert interviewed suggests:

> *"The main problems are the language barriers. The participants have to start from the bottom up" (interview with André Birner, Berthelsdorf, Germany, 30.11.2012).*

Currently there are energy agencies at a national level, funded by the individual states or federal states e.g. Saxonian Energy Agency (SAENA). However, for regional agencies such as the Energy Agency for the three-border-region based in Liberec (Czech Republic) there are no institutional financial means for their activities and it is financed by project funding. It would be meaningful to secure some financial basis from the EU for their cross-border activities and cooperation with other agencies. Otherwise there are no incentives to act across borders. Such agencies could also contribute to the reduction of other barriers such as language barriers by means of establishing cross-border contact.

All stakeholders in all three border regions recognized that a low level of social awareness constrains further bioenergy dissemination. It is necessary to distinguish between different renewable energy sources in the **information strategies** and place more attention on the advantages of bioenergy in comparison to other RESs like wind or solar energy.

A minority of the respondents (eight percent of energy producers, twelve percent of policy advisors and six percent of biomass suppliers) mentioned the possibility to look at best prac-

tice processes of bioenergy production across borders. The exchange of cross-border knowledge including **best practice transfer** of already existing and successful technologies in the German border region with the Czech and Polish border regions would be necessary to reduce the insufficient knowledge regarding available technologies. This could encourage Polish and Czech energy producers to strengthen their engagement in biomass based energy in their border regions.

7.3 Limitations of the Study and Suggestions for Future Research

7.3.1 Limitations of the Study

During the research work the author has experienced and addressed the following difficulties:

i. **End user accessibility** - this research is based on stakeholders´ perceptions, which include the view of participants along the bioenergy supply chain - biomass suppliers, policy advisors, energy producers. The opinions of end users are not incorporated in the research because of the size of this stakeholder group and the required financial and time effort. However, a good practical example of the bioenergy consumer has been put into the analysis of possible perceptions of end users.

ii. **International character of the study** – an empirical part of this research took place in the cross-border region between Poland, Germany and the Czech Republic. Each country is characterized by a different language, different legal environment and a different cultural background. The researcher speaks all three languages at least to a communicative level and is familiar with the cultural differences. Long term professional and private experience in the region enabled the researcher to build a wide network of contacts in the cross-border area. The researcher is a member of the professional network BioEnergyNet, which is active in the field of bioenergy in the reviewed border region and is therefore well positioned to further the investigation. Difficulties were overcome through personal recommendations from selected stakeholders on the filling out of the questionnaire, as well as providing email and phone contact with the researcher when questions and doubts arose. Furthermore, the researcher allowed the respondents to answer via different channels: email, fax, post and online and use a wide contact data base for sending the questionnaire adapted for a single stakeholder group (mostly via post and in person for feedstock suppliers, for policy advisors mostly by means of emails and for energy producers by either email or post).

iii. **Interdisciplinary character of the study –** perceptions of barriers and drivers are based on personal experience and knowledge of different stakeholders with diverse professional and cultural backgrounds. Furthermore the critical factors are of an economic, structural, political, social or other character. This interdisciplinary character of the study requires from the researcher a networked and all encompassing thought process.

Comprehensive experience in the field of bioenergy led the researcher to socialise in the cross-border region between Poland, Germany and the Czech Republic in order to gain a better understanding of cross-border interaction and the specific specific character of the regions.

7.3.2 Suggestions for Future Research

Future research can contribute to the further understanding of the area investigated, especially in the following fields:

- analysis of bioenergy end user perceptions within a broader cross-border study;
- investigation of possible measures to improve the negative image of RES in the Czech Republic;
- design of EU regional funding programmes in order to take into consideration the special feature of bioenergy generation in border regions;
- concept of regional communication of RES information including responsibilities, funding and integration of regional bodies such as energy agencies.

Further assessment comparing stakeholders´ perceptions along the bioenergy supply chain in other European border regions could be analyzed in more depth.

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APPENDIX 1 List of Topics for Interviews

Central Question: What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

1. How do you assess the bioenergy development in the region Usti/ Liberec / Bautzen/ Görlitz / Lower Silesia?
2. What experience do you have with neighbors' border regions?
3. How do you assess the Czech renewable energy policy?
4. What is in your opinion the role of legal framework for bioenergy dissemination?
5. What is in your opinion the cross-border impact on legal framework?
6. What is in your opinion the role of grants and funding for bioenergy dissemination?
7. What is in your opinion the role of funding in cross-border context?
8. What are in your opinion the environmental impacts of bioenergy production and use?
9. How do you assess the bioenergy technology and information availability?
10. What do you think about biomass as feedstock for energy production?
11. How would you describe the feedstock supply in a cross-border area?
12. What is your experience with biomass installations development in the area you live in?
13. What do you know about the bioenergy use in the region you live in?
14. What other impacts on bioenergy dissemination do you recognize?
15. What are in your opinion strategies due to disseminate bioenergy?
16. What is in your opinion the role of information in bioenergy dissemination?
17. What other strategies and measures for bioenergy growth would you suggest?

APPENDIX 2 List of Interviews

Respon-dent No.	Name of the organization	Represen-ted by	Art of stake-holder	Country	Place and date of inter-view
R 1	Biomass Scout	Jiri Zahradnik	feedstock supplier	Czech Republic	Zittau 14.12.2012
R 2	WORPOL	Tadeusz Mochalski	feedstock supplier	Poland	Sulików 14.12.2012
R 3	Biomethan Zittau GmbH	Matthias Hänsch	plant owner	Germany	Zittau 23.11.2012
R 4	Bioenergiehof Oberlausitz	André Birner	feedstock supplier & plant owner	Germany	Berthelsdorf 30.11.2012
R 5	Amt für Kreisentwicklung	Holger Freymann	policy advisor	Germany	Niesky 13.09.2012
R 6	Energetická Agentura Trojzemí o.p.s.	Pavel Grmela	policy advisor	Czech Republic	Liberec 18.09.2012
R 7	Urząd Marszałkowski Województwa Dolnośląskiego	Dr. Mieczysław Ciurla	policy advisor	Poland	Wroclaw 28.09.2012
R 8	Wohnbau und Wärmeversorgung Großschönau GmbH	Tobias Stei-ner	primary end user	Germany	Großschönau 23.11.2012

Table 30: List of guided expert interviews (P2P)

APPENDIX 3 Interview Transcriptions

APPENDIX 3.1 Exploratory Interview No. 1

Name of R 01: Jirka Zahradnik
Place: Zittau
Duration: 33 min
Date: 14.12.2012
Interviewer: Maria Meyer #00:00:00-0#

START
I: Wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung der Region Liberec? #00:00:08-5#

R 01: In der Region Liberec kommt es eigentlich zu gar keiner Entwicklung in diesem Bereich. Ganz einfache Antwort: ich bin unzufrieden. #00:00:24-6#

I: Ich weiß, dass in Krizany eine Biogasanalge gibt. Gibt es andere in der Region Liberec? #00:00:32-9#

R 01: keine im Betrieb und die Anlage in Krizany hat auch Schwierigkeiten. Sie verarbeiten vor allem Maissilage. #00:00:49-5#

I: Und welche Erfahrung haben Sie mit den Nachbarlandkreisen (Usti und weiter Richtung Prag) in Bezug auf die Bioenergieerzeugung gemacht? #00:00:55-5#

R 01: Das sind landwirtschaftliche Regionen im Gegenteil zu Region Liberec ist die Lage besser. Da entstehen mehrere Biogasanlagen und der Trend ist auch anders. Da suchen die Landwirte nach weiteren Möglichkeiten wie man sich auf dem Markt etablieren kann. Ab 2013 wird ein neues Gesetz geben in Tschechischen Republik: man bekommt eine Genehmigung zur Bau einer Biogasanlage, wenn man die Abwärme und die Restwärme nutzt - über 60 Prozent Ansonsten wird es nicht genehmigt. Die Landwirte suchen nach Möglichkeiten, wie man die Wärme nutzen kann. #00:02:25-0#

I: In Deutschland und in Sachsen sind sehr ambitionierte Ziele, was den Ausbau der erneuerbaren Energien angeht. In Tschechien ist geplant für 2020 13 Prozent Strom aus EE. Wie beurteilen Sie die Klima und Energiepolitik in Tschechien in Bezug auf Bioenergie? #00:02:45-9#

R 01: Die erneuerbare Energien machen allgemein die Energie teuer. In Tschechien gibt es ja zwei Atomkraftwerke und es gibt zwar Bestrebungen, dass der Anteil der erneuerbaren Energien steigt - man hat sehr viel auf Wind und Solarenergie gesetzt. Mit Solar gibt es immer noch sehr viele Probleme. Wie es sich weiter entwickeln wird, das weiß ich nicht, aber es gibt zwei Strömungen: eine Richtung sagt, was die Biomasse betrifft: warum sollte man auf den Feldern jetzt energetische Pflanzen anbauen, wenn die Platz für Lebensmittel nehmen. #00:03:55-3#

I: Haben Sie das Gefühl dass die rechtliche Rahmenbedingungen für den Bioenergieausbau den Ausbau fördern oder hemmen? und warum? #00:04:11-8#
R 01 eher hemmen. Ich kann jetzt ein ganz konkretes Beispiel nennen, was ich jetzt erlebe, das ist die Zusammenarbeit der Biogasanlage in Seifhennersdorf und der Heizwerke in Varnsdorf. Die Heizwerke wollen den getrockneten festen Output der Anlage verbrennen - das hat einen guten Heizwert. Man hat auch über Verbrennung beantragt, aber die Behörden haben es abgelehnt - die feste Gärreste. Man hat das Probeverbrennen es beantragt, denn

Output fest nicht als Biomasse gilt. Es gab da ein Gerichtsverfahren gemeinsam mit dem Ministerium für Umwelt und Landwirtschaft. Dabei hat man festgestellt, dass Output fest auch eine reine Biomasse ist, da haben wir auch vom Deutschen Biomassezentrum in Leipzig ein Gutachten bekommen, aber es ist ständige Spielerei mit den Behörden. #00:05:44-2#

I: Die Regionen Liberec und Usti befinden sich in Grenzlage. Wie beeinflusst das den Ausbau der Bioenergie? #00:06:07-7#

R 01: Wenn ich mir die Karte der gesamten Tschechischen Republik anschaue, dann Mehrheit der Anlagen liegen in Mähren, Mittel Böhmen, Süd- und Westböhmen. Liberec und Usti sind eher am Rande des Geschehens. Es hängt mit landwirtschaftlicher Lage. Liberec ist noch spezifischer - es ist eine Gebirgsregion, dazu noch eine kleine. In Usti ist es anders. Usti ist eine größere Region die zieht sich ziemlich lang. Ein Teil der Region hat Erzgebirge - da sind dort auch keine gute Bedingungen für die Landwirte, aber es gibt auch entlang der Elbe viele gute Regionen, wo man gut Landwirtschaften kann. Ich denke die Grenzlage hat keinen Einfluss auf die Erfolgschancen. Jetzt in heutiger Zeit gar keine. #00:07:46-4#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie im Kraj Liberec und im Kraj Usti? #00:07:58-0#

R 01: hmm das was ich am Anfang gesagt habe: ab 2013 das hängt aber mit der Genehmigung, nicht mit Förderung. Zur Förderung kann ich nichts Genaues sagen. #00:08:21-3#

I: Sie haben gesagt, dass die Biomasse häufig von Tschechien nach Deutschland gefahren wird. **Welche Rolle spielen aus Ihrer Sicht die Umweltauswirkungen der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse in Region Liberec und Usti? #00:08:35-6#**

R 01: Es spielt eine gewisse Rolle. Es ist Preisfrage und auf größere Entfernungen. Ich habe schon erlebt, dass man Biomasse auf größere Entfernungen wie 200 km transportiert hat. An der Entladestelle viel Wasser aufgelaufen ist. Die Biomasse im LKW - es läuft Wasser aus und das führt zu Problemen bei den unten. #00:09:26-8#

I: Und welche Rolle spielt der Transport über die Landesgrenze? #00:09:32-4#

R 01: Biomasse als Handelsware ist kein Problem. Das Problem sind die Grenzübergänge. Es gibt nur relative wenige Grenzübergänge, die zum Transport geeignet sind. Die Tonagebeschränkung. Das verlängert die Transportwege. #00:10:11-2#

I: Sie meinten dass in der Region Liberec nur eine Anlage vorhanden ist zur Bioenergieproduktion. **Haben sie das Gefühl, dass die Technologien für Bioenergieproduktion welche auf dem Markt verfügbar sind, gut bekannt sind? #00:10:30-4#**

R 01: Es gab auch Anlagen bei Minon (im Kraj Liberec). Früher war dort Truppenübungsplatz. Die Anlage steht seit 20 Jahren. Die war eine der ersten Anlagen in Tschechien. Sie arbeitet nicht mehr, weil es kein Input dort gibt. Es gab schon zwei Versuche - das letzte von einem holländischen Unternehmen, diese Anlage auf die Beine zu stellen. Die Preise für Biomasse sind fast identisch. Es gibt nur kleine Unterschiede, die sich dann durch die Transportwege ausgleichen. Es ist für die Landwirte nicht wirtschaftlich die Biomasse einzukaufen. #00:12:24-1#

I: Warum ist es, bei fast gleichen Biomassepreisen, diese Biomasse in Zittau und nicht in Liberec zu verarbeiten? #00:12:25-1#

R 01: ich denke das hängt mit der Vergütung vom Strom mit den Boni für Strom und Wärme. Dazu kommt noch, dass der Anbau von Mais technisch schwieriger ist als Anbau von anderen Pflanzen. Wenn Sie gute Maissilage haben wollen, brauchen sie spezielle landwirtschaftliche Technik. #00:13:20-7#

I: Haben Sie das Gefühl dass es genug Informationen zu dem Thema Bioenergieproduktion im Kraj Liberec und Usti gibt? #00:13:20-7#

R 01: Ja, das Wissen hat man, aber das Problem ist, wenn sie in so eine Maschine investieren, kann man diese nur für Mais verwenden. Für andere Pflanzen braucht man diese nicht. #00:14:15-4#

I: Jetzt kommen speziell Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion und so weiter betrifft. **Was wirkt hemmend und was unterstützend beim Anbau und bei der Bereitstellung der Biomasse für Energiezwecke?** #00:14:42-0#

R 01: Nur Preis motiviert die Landwirte. Wobei es gibt auch Landwirte, die seit 20 Jahren Gerste oder was anderes angebaut haben und dann sagen "warum soll ich jetzt was anderes anbauen"? Das sind eher die älteren Landwirte- über 55 Jahre alt. Bei jüngeren ist es anders- man richtet sich nur nach dem Preis, man denkt nicht an die Zukunft: dieses Jahr kann ich gut Mais verkaufen, da wird Mais angebaut. nächstes Jahr wird zum Beispiel Preis für Gerste steigen, dann wird wieder Gerste angebaut. #00:16:01-9#

I: Und haben Sie das Gefühl, das Landwirte und Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, **aufgrund dessen dass die Flächen auf der Grenze liegen oder ist das von Vorteil? #00:16:00-1#**

R 01: Aufgrund der Grenzlage bestimmt nicht. Soviel ich weiß, die Landwirte in Mähren denken eher langfristiger in die Zukunft. Aber das hab ich erfahren. #00:16:39-1#

I: Was denken Sie, was hemmt und was fördert bei Planung und Umsetzung einer Biomasseanalage? #00:16:57-1#

R 01: Ich kenne nur eine einzige Anlage, die sich darüber nachgedacht hat. Man hat ja auch ein Projekt gemacht. Diese landwirtschaftliche Anlage hatte den Vorteil, dass da zwei Häuser angeschlossen waren und könnten die Wärme nutzen. Diese Anlage sollte Biomasseverbrennen und Wäre nutzen. Es hat sich gezeigt, dass es nicht wirtschaftlich war man müsste wesentlich mehr Wärmeabnehmer finden. Auch Nutzung der Gärreste als Düngemittel nicht rentabel ist. Man denkt aktuell darüber nach, dass keine neuen Deponien errichtet werden und für die Abfälle neue Nutzung gefunden werden soll. #00:21:18-8#

I: Was die rechtliche Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der Umfeld investitionsfreundlich ist? #00:21:38-8#

R 01: ich denke man in EU als Ziel gesetzt, dass die erneuerbare Energien bei 20 Prozent liegen sollten. Aktuell liegt der Stand in Tschechien ca. 13 Prozent- weiß ich nicht. Es gibt Befürworter für Atomenergie, die behaupten Tschechien ist ein energetisch selbständiges Land, kann auch Energie exportieren. Warum sollte man etwas mit Wind, Solar und Bioenergie machen. Es gab auch Versuche mit Geothermischer Energie und Wasserenergie- dafür sind die Bedingungen nicht so gut. **Die natürlichen Bedingungen in Region Liberec sind für die Landwirtschaft ungünstig.** Die Erträge von einem Hektar sind im Durchschnitt niedriger als in anderen Regionen - es hängt mit der Lange zusammen. Ich denke dass es auch der **Grund dafür**, warum es in Region Liberec wenige landwirtschaftliche Betriebe sind. In den anderen Regionen hat man Tschechien weit 260 Biogasanalgen. Diese sind überwie-

gend in Mähren und Süd-und Westböhmen. **Man plant in den nächsten Jahren rund 250 Biogasanlagen. Davon aber keine in Region Liberec**. Wie es in Usti aussieht weiß ich nicht. In Liberec wahrscheinlich wegen Mangel an Input für eine Anlage. Es gibt dort zwar Biomasse, es würde aber nicht ausreichen um eine Biomasseanlage zu versorgen. Bestimmt nicht. Für Agratec holen wir jetzt Material sogar aus der Region von Prag. Die Bedingungen in Liberec für Mais sind nicht optimal. In Usti ist es schon anders. Ich weiß aber nichts Genaues. #00:26:15-8#

I: Wie wichtig ist die Informationspolitik um Fortschritt in Bioenergieausbau zu erzielen? #00:26:36-7#

R 01: Es gibt bestimmt viele Stellen wo man Informationen zu dem Thema holen kann. In Liberec kenne ich vier Stellen, wo man sich Informationen holen kann. Das reche ich allgemein über erneuerbare Energie. #00:27:19-6#

I: Stellen Sie sich vor, dass man einheitliche Förderung europaweit für Bioenergie einführt. Was halten Sie von dem Vorschlag? #00:27:33-2#

R 01: Es wäre nicht schlecht, aber man müsste dann gleiche Rahmenbedingungen für alle Landwirte in der EU haben. Es dürften keine Unterschiede zwischen Polen, Tschechien und Deutschland. Nicht nur betreffend Energienutzung, aber auch in anderen Bereichen der Landwirtschaft. Der jetzige Stand ist so, wenn die Landwirte kombinierte Produktion haben, da lohnt sich für die zwei Mal Gras abzuernten und die sind nicht gezwungen "Geld zu verdienen" weil die ihre Förderung bekommen. Wenn die nichts tun, bekommen sie Geld (Zuzahlung) als wenn sie Getreide anbauen würden. Wenn Sie aber was anbauen würden, müssten sie Leute einstellen. Landwirte in Tschechen werden gefördert nicht zu tun, nicht zu arbeiten. #00:30:23-1#

I: Und was halten Sie von besonderer Behandlung der Grenzregionen in EU? #00:30:30-7#

R 01: Das kann ich mir nur schwer vorstellen. Das muss nicht sein. #00:31:26-9#

I: Sehen Sie andere Maßnahmen, welche man unternehmen kann um den Bioenergieausbau zu beschleunigen? #00:31:43-6#

R 01: Es hängt mit dem Punkt was ich vorher gesagt habe: ich würde die Förderung für die Landwirte anders darstellen und würde mich mehr mit den Abfällen befassen. Die Abfälle sollte man anders behandeln, dass die Wiederverwertung mehr passiert. Mehr Unterstützung ist notwendig. Man sollte die Landwirte nur unterstützen, welche arbeiten wollen. #00:33:00-6#

I: Vielen Dank. Bitte noch ein paar demografische Angaben zu machen und bitte um Ihre Unterschrift zur Verarbeitung der Daten. #00:48:57-2#

END

APPENDIX 3.2 Exploratory Interview No. 2

Name of R 02: Tadeusz Mochalski
Place: WORPOL Sp. z o.o. Sulikow
Function: Director of the WORPOL Sp. z.o.o.
Duration: 44 min
Date: 14.12.2012
Interviewer: Maria Meyer
#00:00:00-0#

START
R 02: #00:00:00-0#
I: W jakiej mierze jest Pan zadowolony z rozwoju wytwarzania bioenergii w regionie jeleniogorskim? #00:02:22-4#

R 02: Bioenergia- to zalezy o czym my tu mowimy. Produkujemy biomasy, z biomasy produkujemy prad, ale na terenie Dolnego Slaska jest jedna biogazownia. My produkujemy dla Niemcow, tutaj nie ma biogazowni. Mamy kontrakt 5 letni na powierzchni 130 ha rocznie. Nie ma mozliwosci zeby to w kraju wykorzystywac. Do Zittau jest ok 35 km. Najblizsza w Dolnym Slasku jest niedaleko Wroclawia. Wie Pani, inwestorzy poszli w kierunku wiatrakow, gdzie jest latwo. To mozna tu zrobic, ale rolnictwo jest biedne. Rolnik nie postawi sobie biogazowni. Moze nie sa zainteresowani (inwestorzy), bo to jest duzo pracy. Zaangazowanie pieniadza jest troche inne. Klopoty organizacyjne, klopoty z praca. Przy biogazowni trzeba kukurydze produkowac, przerobic, proces technologiczny stwarza problemy organizacyjne. Przy wiatrakach to jest prosta rzecz. #00:05:23-2#

I: Jakie doświadczenia miał Pan z sąsienimi podregionami do jeleniogorskiego jeśli chodzi o wytwarzanie bioenergii? #00:05:49-9#

R 02: Kolo Wroclawia jest jedna - i to na caly Dolny Slask biogazownia. Dla nas to sie nie oplaca przewiesc biomase. Jak rzesmy rozmawiali z Biomethanem, to wychodzi do 50 km. To juz max. zeby dowiesc kiszona czy tez zielona mase. Dlatego poszlismy w tym kierunku, zreszta oni o nas zabiegali. To jest i dla nas i dla nich latwiej. My nie jestesmy bogata firma, sami nie jestesmy w stanie sami wybudowac taka biogazownie. #00:07:02-1#

I: Wedlug planu w kazdej gminie ma zostac zbudowana jedna biogazownia? #00:07:42-4#

R 02: No tak ale z planami musza isc pieniadze. Zwrot kapitalu po 15-20 latach. Nie ukrywam ze rozmawialam z wojtami zeby znalesc inwestora i zbudowac biogazownie. Z drugiej strony po co mamy budowac, jak mamy blisko. Jezeli nasi nie chca, po bedziemy produkowac tam. **Nie ma dzisiaj granicy.** I niewazne czy produkcja pojedzie za Nyse. Jezeli bylyby korzystne warunki, to powstawaly by biogazownie. Musza isc za tym pieniadze. W rolnictwie nie ma takich pieniedzy zeby mozna bylo inwestowac na 15-20 lat. Jakies gwarancje musza byc. Nas nie interesuje transport. My produkujemy mase zielony. Mamy podpisana umowe, ze produkujemy na 130 ha biomase dla Biomethan. To jest kukurydza na kiszone. W momencie zbioru (wrzesien, pazdziernik) oddajemy ta produkce na polu. Kiedys firma niemiecka robila kiszone, zmieniono to. Od dwoch czy trzech lat robi to firma polska z Poznania- oni kosza ta kukurydze, transport, kisza i dostarczaja do biogazowni. Ja oddaje kukurydze na polu. Kiszonki sa w silosach dawne po peggerowskie. Roznie bywa- u rolnikow w silosach, wykorzystuje sie stara infrastrukture. Jest mniej pieniedzy, ale jest latwiej. Z drugiej strony Biomethan potrzebuja ok 900 ha. Gdyby kazdy zaczal sam bierac, to bez sensu. Dlatego jest firma, ktora tobi to dla wszystkich. Na terenie powiatu zgorzeleckiego i lubelskiego, to jest 900 ha dla Zittau. Zabiegac o polska biogazownie? przeciez mamy biogazownie w Zittau. #00:14:27-5#

I: Jak ocenia Pan dostepnosc technologii do wytwarzania bioenegii w woj. dolnośląskim? #00:14:42-8#

R 02: tu technologia jest bardzo prosta. Pozniej przerob biometanu na biogaz troche. technologia nie przeszkadza. Liczy efekt ekonomiczny koncowy. Gdyby nawet powstala biogazownia po stronie polskiej. Czy bylaby ona konkurencyjna w stosunku do niemieckich czy nie? Nawet gdyby tu bylo bliziutko, jesli bylo **by tam lepiej to wole sprzedac tam gdzie mam lepsze pieniadze z tego.** Nie mam teraz porownania. Dzisiaj tam sie sprzedaje gdzie partner WIARYGODNY i DOBRZE PLACI. to sa najwazniejsze rzeczy. #00:17:00-2#

na pewno troche na to wplynela struktura zasiewu u nas sie zmienia. Ulatwia. bo po kukurydzy jestesmy w stanie posiac pszenice w terminach agrotechnicznych. W rolnictwie to bardzo wazna rzecz. Zeby dobrze zalonowalo zboze musi byc w pewnym terminach zasiane. #00:19:19-2#

I: Jak Pana zdaniem położenie przygraniczne wojewodztwa dolnoslaskiego wplywa na szanse na rozwóju bioenergii? #00:19:32-1#

R 02: Nie mozna tak powiedziec. Jest wspolny rynek. Jezeli jest cena dobra u Niemcow, to sprzedajemy dla Niemcow. Jezeli jest cena dobra u nas, to sprzedajemy u nas. to nie ma tak. Dzisiaj przy dobie internetu to jaki ma Pani problem? he he. Dzisiaj sa inne czasu. Dzisiaj sie patrzy na gieldy, prowadzi monitoring gield. Takim wyznacznikiem jest mativ, gielda franscuska. Tu sie korzysta z tego. U nas to jest wyznacznikiem. Dzisiaj te ceny sa te same. Niekiedy u nas sa ceny lepsze niz w Niemczech i odwrotnie. I tu nie ma przeciwskan, zeby rzepak wyjechal za granice. Jaka granca? #00:21:23-9#

I: Jaka role odgrywa dla Pana transport przy produkcji biomasy? #00:21:32-3#

R 02: Jak producent sprzedaje swoja produkcje to mowi sie zawsze o cenie z magazynu. Cena na magazynie- to moze jechac fo Honkongu, to mnie nie interesuje. Koszty transportu nie liczymy. To robia firmy powiazane lub z firmami transportowymi. Rynek jest transparentny. #00:22:31-6#

I: Jak oddzialuje polityka wsparcia na rozbudowę bioenergii w regionie województwie dolnośląskim? #00:23:05-7#

R 02: Sa dotacje, kredyty ale nie wiem dokladnie. I dla biogazowni i innych . Sa rozne programy. #00:23:30-7#

I: Jakie byly inne trudnosci przy **produkcji i sprzedazy biomasy**? #00:24:38-3#

R 02: Jak trzeba to sie dogadamy. Stadtwerke maja pracownikow polsko jezycznych. Zawsze sa jakies problemy. Byly bledy laboratoriow. Jakosc okazala sie inne zielonej masy niz byla tak naprawde. W czasie transportu sa pobierane probki. I to idzie do laboratorium. i nie pasowaly nam wskazniki. My wyslalismy do naszego laboratorium do Lublina i wyszly nasze wyniki ktore znacznie odbiegaly. To poszlo srednio- podwyzszylismy i to zostalo dodane przez strone niemiecka, nie bylo oporow. To wplynelo na podejrzenia ze cos jest nie tak. I w tym roku tez walczylisy o cene. Naszym zdaniem zle wyliczono nam cene bazowa. mysmy to przeliczyli i nam nie pasowalo. #00:26:53-7#

I: Umowy sa na jakis czas? #00:26:55-5#

R 02: umowy mamy na piec lat. juz sa dwa lata juz trwa. Co roku moga byc ceny negocjowane. Cena zalezy od wskaznikow srodkow produkcji. W zaleznosci czy poszly do

gory czy nie. Od tego tworzy sie cene bazowa. Placimy za jakosc. Wydajnosc substratu. zeby to okreslic musimy robic proby. Z Niemcami zyjemy juz troche. Ja nie znam jezyka, ale nie ma problemu. Jak nie potrafimy sie dogadac to rysujemy sobie. #00:28:50-6#

I: Ja wczesnije pracowalam w projekcie na temat bioenergi.gdzie na mapie byly oznakowane biogazownie. **Jak wplywa położenie przygraniczne na uprawe biomasy**? #00:30:05-5#

R 02: Nie, dlatego ze nie ma roznic. WIARYGODNOSCI i CENA. a zawsze myslalem ze ludzie sa tacy sami po tej i tamtej stronie. Z pewnymi decyzjami ja sie moge nie zgadzac. Uwazam ze tutaj tez jest dobrze. Niemcy mieli lepszy start ekonomiczny, nie ukrywajmy. I Niemcy mieli wiecej czasu. #00:31:50-0#

I: Jakie inne działania według Pana/Pani należy podjąć aby przyspieszyć rozbudowe bioenrgii? #00:32:01-2#

R 02: Nie odpowiem na to pytanie. Nie znam warunkow ekonomicznych biogazowni tutaj, jakby powstawaly. Dla mnie nie problemu ze sprzedaje do Niemiec. Jakby tu blizej byla biogazownia, tez moglbym dostarczac tutaj biomase. Najpierw musialbym wykonac umowe. Umowe dokonczyc, i przeszedlbym do Polski gdyby ona byla. Zeby sam zastanowic sie nad budowa biogazownie, musialbym wygrac w toto lotka. he he he. Kapital - tylko i wylacznie. Rolnikow nie stac dzisiaj zeby postawic biogazownie. Musi sie znalesc inwestor. Obojetnie czy on bedzie krajowy, czy zagraniczny. Dzisiaj znajduja sie inwestorzy ale na energie wiatrowa, gdzie jest prosto it. Biogazownie jest to jedno z lepszych rozwiazan, bo generuje stanowiska pracy. 1 biogazownia zajmuje 900 ha produkcji ktorej mozna sprzedac. Wiatak zajmuje tylko powierzchnie a produkcji nie ma. #00:34:14-2#

I: Jaką rolę odgrywa według Pana polityka w rozwoju bioenergii w obszarze przygranicznym? #00:34:32-8#

R 02: Dla rolnictwa sa jakies pieniadze, ale dalej sa dwa swiaty jesli chodzi o doplaty w uni starej i w nowej. albo doplaty powinny byc jednakowe albo zliwkidowac doplaty calkowicie. wtedy bedziemy mogli sobie konkurowac. Wtedy nikt nie bedzie patrzyl, ile ja mam oplat, tylko kazdy bedzie produkowal. wowczas powstana takie biogazownie. Mamy Turow tutaj ktory goni, ale kilka lat i sie skonczy. Bez atomu nie zabezpieczymy energii.
Dla calego rolnictwa musza byc jednakowe warunki. Jak ma Pani trojke dzieci, to co da Pani jednego mniej a drugiemu wiecej. Jezeli rozwoj to jednakowy wszedzie. My sie w ogole nie wstydzimy co robimy na polu. sa tez gospodarstaw socjalne 5-6 ha. Ale tam gdzie jest produkcja towarowa, to niemamy sie czego wstydzic. Nie ma roznicy. To bylo zlodne myslenie, jak otworza granice to bedziemy mogli sprzedac do Czech, do Niemiec. A tu rynek zrobil sie RYNKEIM SPOLNYM. NIE A GRANICY. Ceny sa takie same tu jak i tu. Przez trzy cztery lata taka niemiecka firme, ktorej my sprzedawlismy. Nie ma przeciwskazac w handlu. Z Czechami sie ciezej handluje. Nie wiem dlaczego. Malo znaczace ilosci sa sprzedawane. Mysle ze cenowe warunki sprzedazy. #00:41:12-5#

END

APPENDIX 3.3 Exploratory Interview No. 3

Name of R 03: Matthias Hänsch
Place: Zittau, Biomethan GmbH
Duration: 68 min
Date: 23.11.2012
Interviewer: Maria Meyer
#00:00:00-0#

START
I: Herr Hänsch, wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung im Landkreis Görlitz und Bautzen? #00:00:57-7#

R 03: Ich denke es gibt im Landkreis Görlitz inzwischen eine ganze Reihe Anlagen. Angefangen haben die Landwirte selber mit den rein landwirtschaftlichen Anlagen. In der Regel direkt am Standort. Inzwischen gibt es ja auch eine Reihe solche industrielle Anlagen, wie wir sie quasi aufgebaut haben. Und damit ist zumindest das was Potenzial, Biomassepotenzial sind die Möglichkeiten relativ gut ausgeschöpft. Sage ich mal. Es gibt nicht sicherlich noch was zu ernten aber nicht mehr in dieser Größenordnung. #00:01:43-9#

I: Welche Erfahrung haben Sie mit den Nachbarlandkreisen in Bezug auf die Bioenergieerzeugung gemacht? #00:01:52-8#

R 03: Auf der deutschen Seite sind wir bis in den Nachbarlandkreis nicht unbedingt gegangen. Wir bewegen uns an der Grenze des Landkreises. Das hängt natürlich mit den wirtschaftlichen Transportentfernungen zusammen. Wir haben uns natürlich mehr in Richtung polnischer Seite bewegt weil für uns interessanterweise die Einkaufsmöglichkeiten besser waren. Nicht unbedingt preislich gesehen, sondern von der Bereitschaft her langfristige Verträge abzuschließen. Und das was in Deutschland etwas schwieriger. Das hängt damit zusammen, das viele größeren landwirtschaftlichen Einrichtungen über eigene Biogasanlage verfügen und die sind ja in der Regel so gebaut, dass sie Ihre Flächen nicht komplett ausbilanziert haben, weitgehen aber eine Nutzung haben und viele der Produktionseinheiten lassen sich gerne um 20 Prozent um relativ flexibel auf den Markt reagieren zu können und diese wollen sie dann nicht vertraglich binden. Dann wollen sie jonglieren. Wenn man dann kommt, dann sagen sie "ok, wir können was machen, aber ob wir nächstes Jahr wieder passt, weiß ich nicht. Das ist die Schwierigkeit auf der deutschen Seite gewesen und das war auf der polnischen Seite noch anders. Die haben praktisch die Landwirte nicht die Basis gehabt und wir hatten die Möglichkeit diese Basis zu bieten- diese fest vertraglich verankerte Basis. Und die Landwirte hatten dann trotzdem ihre Flexibilität. #00:04:04-5#

I: und mit Tschechien haben Sie auch probiert? #00:04:04-5#

R 03: Wir haben dann nicht mehr mit den Tschechien probiert. Es hätte auch funktioniert und ich habe auch Angebote gehabt, aber aufgrund der gesamten Vertragsproblematik haben wir uns insgesamt auf die polnische Seite beschränkt und ich muss noch sagen wir haben ausreichend Substrat. #00:04:21-7#

I: In Sachsen gibt es sehr ambitioniertes Ziel 30 Prozent Strom aus erneuerbaren Energien in 2020. Das ist sogar höher als in Deutschland und Europa. **Wie beurteilen Sie die sächsische Klima- und Energiepolitik in Bezug auf den Ausbau der erneuerbarer und speziell der Bioenergie?** #00:04:48-3#

R 03: Die Gesamtbeurteilung ist ein wenig schwierig für mich. Wenn ich von Zittau ausgehe, dann sind wir ja schon fast am Ziel. Es gibt ja in Zittau zwei solche Anlagen- eine die direkt Strom erzeugt.und wir. (Unterbrechnung: Handy klingelt, B telefoniert). #00:09:05-4#
I: Wie wirken die rechtlichen Rahmenbedingungen auf den Bioenergieausbau?

#00:09:16-3#

R 03: Vom Grundsatz her, dass EEG für uns die wichtigste gesetzliche Grundlage war, um den Schritt zur Anlage zu gehen, weil es ist ja nach wie vor, dass Biogas teurer ist als das normale Gas. Und wie ich das abschätze wird es so auf absehbare Zeit so bleiben. Das Erdgas hat sich deutlich preislich abgekoppelt vom Heizöl, Ölmarkt generell. Früher waren die stärker gekoppelt. Jetzt ist das aufgeweicht und damit ist natürlich Gas günstig- das Erdgas. Das Biogas liegt natürlich viel drüber. Das ist einfach bedingt durch die ganze Produktionskette. Dieses Preisniveau von Erdgas werden wir mit einer Biogasanlage aus meiner Sicht nicht erreichen können. #00:10:38-9#

I: Was denken Sie: wie werden sich die Preise nach Ablauf des EEG verhalten? #00:10:43-3#

R 03: Das ist die Hoffnung sag ich mal, ansonsten hätten wir ein Problem, was wir mit der Anlage in 20 Jahren machen sollen. nach den 20 Jahren. Vom Grundsatz her ist es zu erwarten, dass die Gasvorräte sind im Moment ganz auskömmlich. Je mehr andere regenerative Energien in den Markt gebracht werden, desto mehr Energie ist auf dem Markt und größer werden automatisch die Reichzeit und die Formel. Da muss man schauen. Im Moment passiert nicht allzu viel auf dem Gasmarkt. Das sah mal anders aus. #00:11:42-3#

I: Die Region Görlitz befindet sich in Grenzlage. Wie beeinflusst das den Ausbau der Bioenergie? #00:11:55-5#

R 03: Für uns war es in dem Fall ein Vorteil. Ich denke wir sind nicht die einzigen, die den Vorteil nutzen. Deswegen würde ich auch das verallgemeinern, dass das so generell gilt. Für uns sind natürlich die Rohstoffe und Dienstleistung: Ernte, Transport, Lagerung. Wir nutzen die mehr als nur reine Rohstofflieferung. #00:12:55-4#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie? #00:13:08-9#

R 03: Förderpolitisch gesehen, wie gesagt gibt es aus meiner Sicht gibt es Probleme mit dem neuen EEG. Wir haben auch Kontakt mit dem Anlagehersteller. Seit dem die 60 Prozent für den Maiseinsatz gelten, hat der Zubau der Biogasanlagen an Fahrt verloren, zumindest hier in Deutschland. Es werden noch welche gebaut, die brauchen aber andere Basis und das ist noch schwierig. Ich denke da wird es viel in der Zukunft passieren. Wir erleben das ja auch von den Informationen die man kriegt, bei der Entwicklung der Energiepflanzen da viel Bewegung gibt. nicht nur Mais, sondern auch andere Kulturen zu nutzen. Wir selber sind auch am Denken, ob man hier auch andere Wege geht. Zuckerrüber wären auch ein Thema bspw. oder Grassilage. Das ist eine Reglementierung: Du darfst jetzt max. 60 Prozent Mais anwenden. Für uns gilt es nicht, wir orientieren uns aber daran, weil wir versuchen die Anlage mit hoher Effizienz zu nutzen. Wir haben noch Förderung bekommen, weil wir eine der ersten Anlagen in Sachsen waren die mit Gasaufbereitung und Einspeisung gearbeitet haben. Ich denke mal das wird eher abnehmen. Was noch gefördert wird ist der Ausbau der Kraftwärmekopplung und wenn Sie eine Anlage bauen mit Biomethannutzung, dann gilt die Förderung auch. Das läuft ja auch noch weiter dieses Förderprogramm: Anlagenbau und Nutzung von Biomethananlagen das läuft noch weiter. Und es gibt inzwischen auch noch Markt für Biomethan. Es ist verfügbar. #00:16:08-9#

I: Welche Rolle spielen aus Ihrer Sicht die Umweltauswirkungen der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse in Region Görlitz? #00:16:41-0#

R 03: Ich denke da muss man differenzieren: wenn man von gesamten Ökobilanz sieht, ist natürlich der Vorteil einer Biogasanalage unbestritten. Wenn man begrenzt regional sieht, gibt es an bestimmten Stellen schon zusätzliche Emissionen. Da die Anbauflächen regional

liegen. Der große Vorteil einer Biogasanlage ist ja der, dass man gegenüber anderen regenerativen Brennstoffen, sehr kurze Zykluszeit hat zwischen Wachstum der Pflanze und Aufnehmen von CO_2 durch die Pflanze. Es liegt ja 1 Jahr, maximal 1,5 Jahre die Lagerzeit des Substrats bis zum Wiedereinsatz. Und aus dem eigentlichen Prozess kommt ja nur CO2 was von der Pflanze aufgenommen worden ist. Zusätzlich natürlich was mit fossilen Brennstoffen transportiert wird. Wobei wir haben jetzt so eine Bachelor Arbeit machen lassen, um eine Ökobilanz zu machen. Das interessante für uns war, dass der Teil des Transportes doch eher gering ist. Das hatte ich nicht so erwartet. Der Anteil ist nicht so groß für Anbau und Ernte im Verhältnis zu Einsparung zu fossilen. #00:19:02-5#

I: Haben sie das Gefühl, dass die Technologien für Bioenergieproduktion welche auf dem Markt verfügbar sind, gut bekannt sind? #00:19:19-6#

R 03: Ich denke schon, dass bei jenigen die sich damit beschäftigen ein guter Wissenstand da ist, weil ja auch eine Reihe Informationen verfügbar sind. Es gibt eine Reihe an Anlagen da und ich kenne das auch von meinen Kollegen, die Anlagenbetreiber sind. Die machen auch eine Führung. Wir selber machen wir auch. Auch für die Hochschule. Da gibt es schon Wissensvermittlung. Es gibt viele Informationen verfügbar und wenn man sich auch ein wenig bemüht, dann kriegt man auch die. #00:20:15-5#

I: Jetzt kommen speziell Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion und so weiter betrifft. **Was wirkt unterstützend beim <u>Anbau</u> und bei der Bereitstellung der Biomasse für Energiezwecke?** #00:21:05-3#

R 03: Ich bin nicht selber Produzent, wir haben aber viele Kontakte zu den Produzenten. Wir haben immer als Vorteil gesehen, dass ich einen stabilen Anteil an meiner Wertschöpfungskette habe. Ich habe einen verhältnismäßig langen Vertrag und der kann eine Basis bilden für mein landwirtschaftlichen Betreib als Grundsicherung. Weil die Landwirtschaft ansonsten ein wenig der Schwankungen des Marktes ausgeliefert wird. dazu kommen natürlich jetzt noch Wettergeschäfte. Die Energiepflanzenproduktion bringt mir (I: als Landwirt) eine große Stabilität. gegen Preisschwankung schon. #00:22:11-2#

I: Und haben Sie das Gefühl, dass die Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, aufgrund dessen dass die Flächen auf der Grenze liegen oder ist das von Vorteil? #00:22:14-6#

R 03: der Effekt ist ähnlich, nicht spezifisch für die Grenzregion. Ich denke mal, was erwartet wird, dass noch großes Preisgefälle in der Produktion gibt, das würde ich nicht bestätigen. Die Kostenstrukturen sind inzwischen sehr ähnlich. Es ist auch normal, wenn man sieht wo die polnischen Bauern ihre Geräte und Traktoren kaufen, sind ja gleiche Produzenten wie die deutschen Bauern. #00:23:36-5#

I: Was wirkt hemmend beim Anbau und bei der Bereitstellung der Biomasse für Energiezwecke? #00:23:42-5#

R 03: Es gibt natürlich objektive und subjektive Gründe. Subjektiv ist mit Sicherheit, dass es Vorbehalte gibt in Richtung Energiepflanzenanbau, weil ja die Landwirtschaft immer Ernährungsmittelproduzent war. Die Diskussion ist ja nicht neu: Konkurrenz zu Lebensmittelproduktion. Das kann ja den einen oder anderen Landwirt davon abhalten, Energiepflanzen zu produzieren. Objektive Gründe: Es gab in Polen ganz wenig Nachfragen nach Energiepflanzen. Diesen Schritt Bauen einer Anlage nicht gegeben hat. Es ja ein Programm geben, aber im Moment das war nicht das. und das war für uns natürlich der Vorteil. Es ist noch eine Grenze dazwischen und wenn man grenzüberschreitend agieren, man muss die Spielregeln einhalten. Und das ist schon etwas aufwendiges. Weil sie brauchen für jede Lieferung 10

fache Briefe, damit die ganzen Nachweise für die Steuern möglich sind. Sie brauchen natürlich einen zweiten Steuerberater, der diesen Part Mehrwertsteure etc. behandelt. Sie brauchen ein Konto in Polen, weil das wieder die Bedingung ist, wenn man dort mit Mehrwertsteuer hantiert.

Es gibt paar Probleme und letztendlich war das Problem die Rücklieferung des Gärrestes. Unser Ziel war ein Kreislauf zu schaffen. Und der Gärrest ist ja nach dem polnischen Recht ein Abfall. Abfall darf man nicht über die Grenze fahren- da war ein relativ **aufwendiges** Zertifizierungsverfahren notwendig. Der Gärrest ist inzwischen als Bodenverbesserungsmittel zertifiziert im um im polnischen Landwirtschaftsministerium Geständnisse zu erzielen. Es hat auch eigenen Produktnamen und damit können wir das fahren. Der Landwirt braucht das Zertifikat, dass er das rausbringen darf und wir damit wir das über die Grenze fahren dürfen. Ohne diese Papiere wird es schwierig. Wir haben reichlich ein HALBES Jahr gebraucht, bis wir die Zertifizierung hatten. Es geht gar nicht weil wir die Analyse von dem Gärrest gebraucht, damit wir überhaupt dieses Zertifikat kriegen. Und dann haben wir die Gärreste in einer anderen Anlage machen lassen, weil wir hatten ja noch nichts. #00:27:50-4#

I: mit der Biogasanlage hier vor Ort haben Sie bereits Erfahrung mit der Planung und Bau so einer Anlage. **Was denken Sie, was fördert bei Planung und Umsetzung einer Biomasseanalage?** #00:27:59-5#

R 03: ich denke, dass reine Genehmigungsprozedur betrifft, da gibt es keine Unterschiede ob die Anlage in einer Grenzregion ist oder generell in Sachsen befindet. Sachsen an viele Stellen war die Genehmigungsprozedur schon sehr aufwendig. Ich kenne viele Anlagen, die sind nach dem Baurecht gebaut worden und nicht nach dem BImsch Verfahren. Das ist natürlich wesentlich einfacher dann. Wir haben noch zusätzliche Auflagen bekommen, was Immissionsschutz etc. betrifft, die deutlich höher waren als bei den sonstigen Anlage üblich war. Das hat mit der Grenzlage nicht zu tun. Die Flusslage hat uns paar Probleme gemacht da plötzlich Klimafragen waren. #00:30:08-0#

I: Was unterstützt und was hemmt beim Ausbau der Bioenergie im Bereich der Genehmigung der Biomasseanlagen? #00:30:46-5#

R 03: Wie gesagt, die gestellten Anforderungen im Genehmigungsverfahren waren hoch und die haben auf der kostenstrecke Wirkung gehabt. Wir mussten auch durch den Wechsel in EEG Mitte 2012 und damit waren höhere Anforderungen. Da gab noch einen Sprung und mussten kurzfristig umplanen. Mussten neuen Grenzwerte einhalten. Haben ein eine Teil gekauft. das kostet gute 300.000 Euro. Das ist natürlich das wo wir natürlich in Schwitzen kommen, weil das Geld ich ja nicht geplant. Ansonsten gab es keine Probleme. Wir sind dabei noch eine Lagune für Gärreste zu bauen. Die ist nach dem polnischen Recht zu bauen. Wir haben zwei Kollegen die polnisch sprechen eigestellt. das macht die ganze Prozedur nicht einfacher und es gibt einen **ERHÖHTEN AUFWAND** durch diese notwendige **Zweisprachigkeit**; **Kommunikation**. Das ist in der Buchhaltung nicht einfach, da dort vieles anders läuft als man das auf der deutschen Seite sich bewegt. Wir haben vielleicht einen geringen Vorteil bei den Substraten, aber der wird auf der anderen Seite kompensiert durch solche Sachen. #00:34:32-6#

I: Inwieweit sehen Sie sich in der Position, Bioenergieausbau voranzutreiben? #00:34:51-2#

R 03: Ich denke schon, was wir vorangetrieben haben. Wenn man selber so eine Anlage baut, dann hält man auch die Produktion. Wir haben als Stadtwerke dann auch das Gesamtkonzept verfolgt. #00:35:24-7#

I: Was war der Beweggrund für den Bau der Anlage? #00:35:30-5#

R 03: Wir wollten eine strategische Aufstellung, weil es eine ganze Reihe Rahmenbedingungen, die jetzt nicht so sehr für Biogasanlage interessant sind, aber natürlich für die Stadtwerke interessant sind. Wir haben ja als Stadtwerke verhältnismäßig stark ausgebautes Fernwärmenetz und wenn ich dort die ganzen rechtlichen Rahmenbedingungen, die sich in den letzten Jahren deutlich verändert haben, sehe, da muss ich mich natürlich bewegen. das fängt an beim Emissionshandel, den wir ja unterliegen mit der Anlage. die Zertifikate werden nur noch in der dritten Handelsperiode eingeschränkt kostenlose zugeteilt. Dann müssen die zugekauft werden. Und die kostenfreie Zuteilung ist deutlich reduziert worden vom Umfang her, so dass dort ein Grund da ist, sich bewegen zu müssen. Die gesamte Stromerzeugungsseite ist aus der kostenlosen Zuteilung generell ausgeklammert worden, auch aus der Kraftwärmekopplung. Dieser Teil wird ja nicht mehr frei zugeteilt. Das ist die eine Seite. Es gibt ja Energieeinsparverordnung. Es gibt ja Erneuerbare Energien Wärmegesetz, wo also zwar die Fernwärme noch zugelassen ist, Neubauten bzw. Rekonstruktionen von öffentlichen Gebäuden müssen nach dem Gesetz bestimmte Bedingungen erfüllen. Wir müssen einen bestimmten Prozentsatz erneuerbaren Energien auch für die Wärmeerzeugung einsetzen. So das können Sie direkt im Gebäude machen, in dem Sie Pelletkessel hinsetzen oder Solaranlage aufs Dach setzen oder ein eigenes Biogas einsetzen. Oder sie nehmen Fernwärme- dann muss die Fernwärme bestimmte Bedingungen erfüllen. die sie relativ straf. Und dort haben wir ja versucht, die Möglichkeit zu schaffen, dass wir mit der Fernwärme die Bedingungen auch anbieten können. Und das die Kunden auch einfacher haben. Weil grade innenstädtische Gebäuden: man kann nicht in jedem innenstädtischen Gebäude irgendwo eine regenerativ Anlage setzen. Man kann ja auch nicht immer, wenn man im Denkmalschutzbereich sich bewegt, dann unbedingt eine Solaranlage aufs Dach legen. Und dafür wollten wir ein Angebot schaffen, was natürlich Vorteil für den Absatz haben. Es gibt insgesamt um eine Strategische Entscheidung: A. ANGEBOT langfristig halten zu können für die Kunden. B. PREISLICH nicht billig, aber relativ stabil- STABILITÄT zu schaffen und auf bestimmten Bedingungen wie Forderung nach Energieeffizienz. Der primäre Faktor ist: die Fernwärme ist relativ günstig, weil der Bioanteil nicht so reinschlägt. Da kann man das so bisschen zarter halten und erfüllt die Bedingung trotzdem und das wird jetzt noch angenommen. #00:40:16-5#

I: Mit der Entscheidung die Biogasanlage in der Grenzregion zu bauen, welche Vor- und Nachteile sehen Sie aufgrund der Lage? #00:40:49-6#

R 03: es ist schwierig weil man nicht in die Kostenstruktur anderen Biogasanalgen reinschauen kann. Man kann sich am Biogaspreisen die man anbietet. Da würde ich sagen, da liegen wir doch im oberen Bereich. Für uns war der Vorteil der Grenzregion, dass wir überhaupt noch die hingekriegt haben, noch eine Biogasanlage zu platzieren. Wirtschaftlich zu platzieren. Für uns ist es auch eine strategische Entscheidung. Wir haben den Vorteil, dass wir den Großteil eigenen Wertschöpfungskette in eigener Regie haben. #00:41:59-0#

I: Was die rechtlichen Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der Umfeld investitionsfreundlich ist? #00:42:11-5#

R 03: für einen Investor sind verlässliche Rahmenbedingungen ganz wichtig. die Kontinuität ist entscheidend. und das was wir im Moment erleben, die Gesetzgebungsstecke wo das eine EEG das nächste jagt, ist nicht besonders hilfreich. Das ist ja nun Version 4. EEG in seiner Historie. Es wird noch eine 5 und bestimmt noch eine 6. Da kriegt man jedes Mal so ein bisschen das Schwitzen. Wir hoffen immer noch, dass es einen gewissen Standschutz zumindest geben wird. Die Inbetriebnahme der Erzeugung ist der geltende Tag, also sprich des BHKWs z.B. das ist der Zeitpunkt für den Vergütung für den BHKW bestimmt wird. Wir haben Anlagen die 2010 und die letzten 2012 in Betrieb genommen wurden, obwohl die Anlage 2011 in Betrieb genommen wurde. Die ganze Prozedere ist relativ komplex. Wenn Sie in der Planung für so eine Planung sind, dann fangen sie wieder neu an, wenn neues EEG kommt. Dann müssen Sie ihre Rechnung noch mal über den Haufen werfen und schauen: passt das noch? Das ist schwierig. KONTINUITÄT wäre ganz wichtig. #00:45:59-2#

I: Welche Rolle spielt Ihrer Meinung nach die Informationspolitik beim Bioenergieausbau in unserer Grenzregion? #00:46:07-9#

R 03: das was wir als Informationspolitk erleben, ist kontraproduktiv - Bundesebene. Regional würde ich gar nicht Nachteile sehen, weil die Einflussmöglichkeiten vom Landkreis auf die Politik sind natürlich begrenzt. Man muss immer schauen, die lokale Ebene, allein durch die Stadt Zittau Unterstützung. Und der Landkreis war auch immer im Boot. Wir waren bei Herrn Freymann gewesen und haben geschaut, dass wir von der unteren Schiene mit dem regionalen Planungsverband gute Abdeckung bekommen. Da kann man relativ gut agieren und die Nähe ist von Vorteil. da gibt es relativ gute Zusammenarbeit. Die Bundesebene macht uns schon Probleme. Die Preisdiskussion ist nicht sachlich. Das ist generell Problem. Ich weiß nicht ob das dem Ausbau der Erneuerbaren gut tut. Es ist schwierig. Wir leben jetzt noch mit dem Touch, dass die Reichen unterstützt werden, die investieren und dann noch "Geld absaugen". Wenn man so eine Diskussion anfängt, dann muss man aufpassen, wohin das weiter geht, weil dann verliert die erneuerbare Energie das Image was bisher hatten, als positiver Beitrag zum Klimaschutz, was bisher wir hatten. Der wird ins Gegenteil verkehrt und dann wird einer der sich eine Solaranlage aufs Dach setzt noch schief angeschaut- ich halte es nicht für glücklich. #00:48:38-5#

I: was halten Sie von Idee einer einheitlichen rechtlichen Rahmenbedingung auf EU Ebene? #00:48:53-5#

R 03: ich bin ein Verfechter das nicht zu sehr zu zentralisieren. Vielleicht kann man dann nicht auf die räumliche Spezifika eingehen kann. Jedes Land hat so eigene Besonderheiten A. in der Geschichte B. in der Entwicklung. Wenn man das versucht mit Gewalt auf ein Level zu heben, ist nicht unbedingt zu empfehlen. Ich halte eine ganze Menge davon, dass man auf der EU Rahmenbedingungen setzt wo man hinwill, aber die Wege muss man nicht 1:1 reglementieren. Das halte ich schon für ein vernünftiges Konzept. #00:49:53-6#

I: Brauchen Grenzregionen in Europa eine spezielle Betrachtung? #00:50:03-8#

R 03: Es gibt in Grenzregionen spezielle Probleme. Es ist alles nicht 1:1, das hängt mit der Entwicklung und Historie zusammen, es hängt mit Mentalitäten zusammen. Wir merken das ja in den Gesprächen mit den Bauern. Es ist sicherlich schwierig beim Dolmetschen 1:1 Dolmetschen hinzukriegen. Es kommt vielleicht nicht alles so an, wie man in deutschen gemeint hat. Das kann ja zu Missverständnissen führen Ich denk dort gibt es schon Besonderheiten aus so einer Grenznähe. Man kann bloß dafür sorgen, dass das nicht dazu führt, die Kontakte zurückgefahren werden oder auf einen niedrigen Level bleiben. Wir haben natürlich bewiesen, dass es geht, da muss man natürlich ein bissel Vertrauen schaffen, auf beiden Seiten. Man muss sich trauen den Weg zu gehen, weil man wird nicht unbedingt so beglückt angeschaut, wenn man sagt "man hat polnische Produzenten“, weil die dann irgendwelche Gefahren sehen, sicherlich auch aus der Historie. Da gibt es schon Hemmnisse, denke ich mal, bei den Banken z.B. Wir haben es mit der Commerzbank hingekriegt, aber es gab Banken, wo es Vorbehalte gab mit der polnischen Produzenten. Genauso von der polnischen Seite gab es Vorbehalte mit Deutschen zusammenzuarbeiten. Unter Landwirten. Nicht alle haben das von Anfang an Wohlwollen begleiten. Sie brauchen Beispiele schaffen, wo es funktioniert. Man muss natürlich auch achten, dass die Beispiele auch funktionieren. Man muss Vertrauen schaffen. Das spricht sich dann rum. Anderen Bauer schauen, wie es läuft. Wir kriegen jetzt zusätzliche Angebote. Daran merkt man dass wir auf dem richtigen Weg sind. #00:55:26-1#

I: Ich würde gerne Biomethal als Best Practice nennen. Ist das i.O.? #00:55:42-8#

R 03: Ja, das ist geeignet. auf jeden Fall. Wir haben den kurzen Weg genommen und es hat funktioniert. Dieses Bsp. ist schon "Innovationspreis Euroregion 2011 " als Best Partnership ausgezeichnet. #00:57:09-8#

I: Darf ich die Webseite nutzen? oder andere Informationen #00:57:23-1#

R 03: Auf der Stadtwerkeseite sind besser. Das können wir offiziell nennen, das ist offizielle Auszeichnung. Verliehen September 2011, weiß ich nicht so genau. #00:58:25-1#

I: Sehen Sie andere Maßnahmen, welche man unternehmen kann um die Situation zu verbessern? #00:58:45-4#

R 03: Was natürlich immer noch Problem ist, wenn man wirklich was schief läuft. Sie haben dann ein rechtliches Problem zu lösen. Dann ist natürlich unheimlich schwer zu lösen. Die brauchen immer noch rein formell. Unsere Verträge sind so, dass bei den Verträgen deutsches Recht gilt und Gerichtstandort Zittau haben. Aber es ist für den polnischen Bauer ein kompliziertes Geschäft. Es ist aber sehr komplex. Das ist auch was die Banken sagen: wenn was schief geht, dann das ist ja so kompliziert. Unsere Zielstellung dass es nicht dazu kommt. Es gibt einen Landwirt mit dem wir Probleme hatten. Das ist schwierig. Es ist Patt. Es wird schwierig. Für Dienstleistungserbringung - was ist, wenn ich kein Geld für die Dienstleistung bekommen. Das ist keine Einbahnstraße- gilt in beide Richtungen. Und das fördert nicht die Zusammenarbeit. #01:01:49-5#

END

APPENDIX 3.4 Exploratory Interview No. 4

Name of R 04: Andre Birner
Place: Berthelsdorf
Duration: 73 min
Date: 30.11.2012
Interviewer: Maria Meyer #00:00:00-0#

START
#00:00:00-0#
I: Herr Birner, wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung im Landkreis Görlitz und Bautzen? #00:00:18-1#

R 04: Es läuft insgesamt schleppend. Es ist ganz gut losgegangen. Ich kann jetzt nur aus unserer Sicht sprechen. Es wurde viel angekurbelt aber viel auch relativ schwergängig läuft: das betrifft jetzt Biogasanlagen und Herstellung von Pellets. Auch die Biomasseheizkraftwerke. Es gibt da eine Menge Probleme. Aktuell ist da ein leichtes Umdenken. Es war euphorisch die ganze Sache vor etwa drei Jahren und so langsam setzt sich das Ganze und das Blatt dreht sich bisschen. Es ist halt alles umstritten. Die Maissilage, die verwendet wird. Die Biogasanlage - wie rentabel läuft das. Es ist alles nicht so einfach aus dem Bereich was ich sprechen kann. Auf Dauer kann der Rohstoff knapp werden da in dem Dreiländereck große Akteure geben.

Es geht auch viel nach Tschechien. Der Rohstoff ist im Preis sehr hoch und für die kleinen schwer zu bekommen (wir zählen uns zu den kleinen). Wir kriegen keine Rabatte bzw. kriegen fast gar nicht mehr ab - feste Brennstoffe. Unser Schwerpunkt ist Ostsachsen ab Bautzen bis zur Grenze. Es gibt Nachfragen von außen (Leipzig) aber von Transport ist das transporttechnisch sprengt den Rahmen. Ganz viel Hackschnitzel über Hamburg. #00:06:49-7#

I: In Sachsen gibt es sehr ambitioniertes Ziel 30 Prozent Strom aus erneuerbaren Energien in 2020. Das ist sogar höher als in Deutschland und Europa. **Wie beurteilen Sie die sächsische Klima- und Energiepolitik in Bezug auf den Ausbau der Erneuerbarer und speziell der Bioenergie?** #00:07:19-9#

R 04: Das ist schon anzustreben- sehe ich auch so. man muss schauen, welche Bereiche man ausbauen soll. Es muss noch viel Erfahrung gesammelt werden. Bei Biomasse liegt es schon vor- die Probleme sind uns bekannt, was die Biogasanlagen angeht, das ist schon ein Auslaufmodell. Die Energie, die Vernetzung (Netze ausgebaut und Akteure untereinander) ist es entscheidend. In welcher Form, da bin ich gar nicht so sicher. Es ist noch zu kleinteilig hier. ich glaube in den nächsten Jahren wird es eher Richtung Windkraft und Photovoltaik gehen. #00:10:07-1#

I: Wie wirken die rechtlichen Rahmenbedingungen auf den Bioenergieausbau? #00:10:15-3#

R 04: Sowohl als auch. wenn ich Biomasseausbau aus meinem Bereich: Kurzumtriebsplantagen: seit vielen Jahren wird es gehemmt. Der Anbau auf Ackerfläche, das kann man vergessen, das macht kein Landwirt. Es gibt aber unzählig viele grüne Landflächen, die dafür genutzt werden können. Es gibt da Hochrechnung, Prof. Bermann, TU Dresden. Es gibt viele Landwirte, die würden grüne Landwirtschaftsflächen dafür nutzen auf der extensiven Bewirtschaftung- aber das wird ja nicht anerkannt. Dort liegen viele Gesetze die das hemmen. Dort gibt es seit Jahren Streit und da kommen wir nicht voran. Für uns würden wir die Rohstofffrage verbessern. (...Unterbrechung - ein Telefonat) #00:14:12-7#

I: Und was ist hier fördernd? #00:14:19-8#

R 04: Naja, es gibt ja das EEG, was natürlich unheimlich gefördert. Fast alles was hier ent-

standen ist, wurde durch EEG gefördert. Also es hat schon sehr viel bewirkt und jetzt muss schauen, dass man gute Übergänge findet. Man hat viel aus dem Boden gestampft und teilweise haben diejenigen zu kämpfen um es fortzusetzen. (z.T. Photovoltaik). #00:15:44-7#

I: Die Regionen Görlitz und Bautzen befinden sich in Grenzlage. Wie beeinflusst das den Ausbau der Bioenergie? #00:16:05-4#

R 04: Gute Frage. Rein preislich: hier ist schon ein Preisdruck da. Die Nachfrage ist schon da, aber die Großen hier, gegen sie hat man hier keine Chancen und können ganz andere Mengen und abnehmen. Und das ist schon ein Problem. Und das ist eben der Dreiländereck. Wir haben aber auch einen tschechischen Lieferanten für Buchenholz, aber in der Regel ist es so, dass eine Menge Energieholz nach Polen und Tschechen ausgefahren wird. Letztes Jahr sind wir preislich nicht rangekommen an den polnischen Abnehmern. Wir hatten letztes Jahr unheimlich viele Schwierigkeiten ans Material zu kommen. Hinter Dresden hätten wir anderes Drehkreuz. Dort wäre es einfacher da wir mehr Möglichkeiten hätten Rohstoff aus Brandenburg zu bezeichnen. Man kann das pauschal nicht so sagen. Das wechselt vom Jahr zu Jahr. Das Gefüge ist in Sachsen, es gibt zu viele Großverbraucher, was uns schwer machen. Es gibt Phasen wo nicht kaufen können, weil die Preise so hoch schießen. Es gibt keine Logik mehr. Das ist so seit 2 Jahren wo sich das so entwickelt hat -so gewisse Panik. Ich vermute es liegt an Liquidität der Einkäufer. Gleichzeitig kann ich nicht genau sagen, warum in Polen und Tschechien so ist. Warum so viel nach Polen und Tschechien geht und wohin. Wir tappen dort im Dunkeln. #00:22:01-7#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie? #00:22:10-7#

R 04: Ich kann jetzt nur über EEG reden. Das hat unheimlich gefördert. Das hatte sehr starke Wirkung, wahrscheinlich zu starke, deswegen ist ja gedrosselt worden. Es hat schon paar Leuchttürme gesetzt. Es wurde auch bestimmt viel Geld in Sand gesetzt, letztendlich hat das Modell funktioniert. Jetzt sind die ganzen Kraftwerke da, jetzt muss man schauen, wie die wirtschaftlich funktionieren. Der Bereich Biomasse wird gleich bleiben es wird nicht sehr stark ausgebaut werden, es sei denn in Kurzumtriebsplantagen. Ich meine Holzverbrennung. Die Privatwaldforste werden dementsprechend ausgereizt. Das wird es ganz schön ausgekehrt. Man kann dem entsprechend gegensteuern wenn man selber Energieholz anbaut, wie KUP (Kurzumtriebsplantagen). #00:26:55-7#

I: Welche Rolle spielen aus Ihrer Sicht die **Umweltauswirkungen** der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse in Region Görlitz und Bautzen? #00:27:04-8#

R 04: Wir haben ein Einzugsbereich von 100 km. Das ist aus unserer Sicht noch im Rahmen. Das kann man kostentechnisch und grundsätzlich von Philosophie her: erneuerbare Energien. alles was darüber ist, wird skeptisch gesehen, z.B. Kaminholz aus der Ukraine - da muss man sich noch überlegen ob das noch Sinn macht. Das sehen wir fraglich und versuchen in unserem Rahmen zu bleiben. Wir müssen natürlich schauen, dass wir irgendwo wirtschaftlich das betreiben können. Wir haben letzten Jahr KUP aus Mittelsachen geholt- das waren mehr als 100 km, weil hier in der Region nichts zu bekommen war. Dann fragt man sich dann natürlich auch: steht das auch noch im Verhältnis. #00:28:52-5#

I: Und sie haben gesagt, Heizkraftwerke - Technologien gut bekannt sind. Haben sie das Gefühl, dass die **Technologien für Bioenergieproduktion welche auf dem Markt verfügbar sind, gut bekannt sind?** #00:29:12-3#

R 04: Die Gemeinden oder Investoren die sich dafür interessieren, das ja. Bei privaten Haushalten das setzt sich nach und nach durch, dass es Alternativen zu Öl gibt. Ein Umdenken seit kurzem stattfindet. In anderen Bereichen gibt es innovative Gemeinden, die schon

sehr weit sind, wie Herrnhut, Radibour. Wenn man sich kümmert, dann im Internet gibt es genug Anlaufstellen. So dass die Leute drüber fallen so ist es nicht. #00:32:00-9#

I: jetzt kommen speziell Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion und so weiter betrifft. **Was wirkt hemmend und was unterstützend beim Anbau und bei der Bereitstellung der Biomasse für Energiezwecke**? #00:32:31-2#

R 04: Der Anbau von Biomasse wie KUP: von 2007 wurde das so angekurbelt. Das ging das mal los. Da konnten einige Landwirte überzeugt werden. von Sachsen stark gefördert, Bund und EU, ein Leuchtturm Projekt. KOREN Firma haben ganz viele Verträge mit Landwirten unterschrieben. das hat NICHT funktioniert. Es wurden ganz viele Kurzumtriebsplantagen angelegt, die existieren jetzt, sind seit letzten Jahr erntereif und die sind alle im Freiberger Raum angesiedelt. Bei der ersten Anlage gab es null Erfahrung, die Landwirte waren skeptisch und es ist viel daneben gelaufen. 2007 wurden die gegründet. Für viele Bauern war es dann gegessen, da es zu risikohaft war.

In der Anlage gab es zu wenig Erfahrung. Es war zu trocken und das Unkraut hat sich gut durchgesetzt hat und es ist nichts geworden. In Ostsachsen ist uns fast nichts bekannt. Auf landwirtschaftsflächen, Ackerland lohnt es sich nicht. Grünland geht nicht - dort liegen verschiedene Gesetze drüber, wie Naturschutzgesetz, die das verbietet. Da passiert nicht mehr. Die Bauer sind skeptisch. Dazu kommt noch KOREN sind Insolvenz gegangen. das war das Ende. Ausschlaggebend für die Forstwirte ist der Preis. Für den privaten Waldbesitzer ist es nicht so lukrativ Energieholz. #00:39:23-5#

I: Und haben Sie das Gefühl, dass die Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, aufgrund dessen dass **die Flächen auf der Grenze** liegen oder ist das von Vorteil? #00:39:30-2#

R 04: Es ist insofern anders in der Region, es hat nicht direkt mit der Grenzregion was zu tun, sondern mit der Waldbesitzerverteilung. hier ist ein hoher Anteil an privaten Waldbesitzer in der Region. Das wiederum erleichtert die ganze Sache. Während dessen in sonstigen Gebieten Sachsen, Sachsenforst Waldbesitzer ist und die wiederum das ganze erschweren. Gleichzeitig Rohstofffrage in Polen -da bin ich nicht so fit- wird viel über Versteigerung gemacht. Es ist sehr viel unter staatlicher Kontrolle, auch was die Randbereiche betrifft. Die geben ihr Holz zu recht hohen Preisen raus. Sie müssen nicht unbedingt verkaufen und machen über Versteigerung sehr clever, so dass die Nachfrage in Sachsen bei den Privatwaldbesitzern recht hoch ist, weil sehr viel Holz dort mobilisierbar ist. **Weil es einfacher ist an den privaten Waldbesitzer hier ist ranzukommen als an den polnischen Staatsforst**. Das ist der negative Punkt für uns. Das war letztes Jahr so. Jetzt funktioniert es, warum wie auch immer. Das sind ja Schwankungen drin, wo ich jetzt nicht sagen kann woran es liegt. Wir arbeiten mit der Firma LES in Tschechien - Holzernte. Wir sind kein Produzent, wir kaufen zu. #00:44:52-4#

I: Mit der Biogasanlage hier vor Ort haben Sie bereits Erfahrung mit der Planung und Bau so einer Anlage. Was denken Sie, was hemmt und was fördert bei **Planung und Umsetzung einer Biomasseanalage**? #00:45:02-8#

R 04: Die Biogasanlage wird mit Maissilage betreiben. Ich weiß es nicht woher die Biomasse kommt. #00:46:14-6#

Fragen z.T. Anlagebetreiben - ausgelassen. #00:46:42-2#

I: Und wie sehen Sie das beim **Stromverbraucher**, gibt es Befindlichkeiten oder nutzen sie gerne den Biostrom auf Biomassebasis? #00:46:45-3#

R 04: Wärme - erst mal günstige Preis und das EEG. Das wird sicherlich kippen. Jetzt grade wenn der Strom steigt, viele sind interessiert Strom zu produzieren. #00:47:21-9#

I: Inwieweit sehen Sie sich in der Position, **Maßnahmen** zu unternehmen, welche Ausbau der Bioenergie fördern? #00:47:35-1#

R 04: Die Biogasanlage soll erweitert werden. noch ein Blockheizkraftwerk soll dazu gestellt werden. Herr Diele ist der Ansprechpartner. #00:48:18-1#

I: Was die rechtlichen Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der **Umfeld investitionsfreundlich** ist? #00:48:31-8#

R 04: **das EEG war schon gut angedacht, dass man leistungsabhängig einspeisen kann und Entgelt bekommen hat**. Herr Diele ist eher der Ansprechpartner. #00:49:47-4#

I: und in Bezug auf die Grenzregion- kann man hier was verbessern? #00:49:50-7#

R 04: Hauptprobleme sind die Sprachbarrieren. Man muss klar sagen, dass viele Firmen deutschsprachige Leute haben (I: aus Polen oder Tschechien), was umgekehrt noch schwer funktioniert. Davon profitieren wir. Grade mit kleinen Firmen, mit deren man sich austauschen würde, ist es verdammt schwer. Und dort sehe ich, da müsste man schon in der Schule angesetzt. Solche Leute werden auch gefragt. Viel wird über Englisch gemacht aber bei kleinen Unternehmen ist es schwierig. Herr Blesak LES spricht perfekt Deutsch und da sind wir sofort ins Geschäft gekommen. Preislich wird es sich irgendwie vermischen. #00:52:15-1#

I: Was halten Sie von einheitlichen rechtlichen Rahmenbedingungen auf EU Ebene? #00:52:21-6#

R 04: Halte ich nicht so viel davon. Eher angepasst zu Entwicklungsstand. Es geht von West nach Ost. Infrastruktur muss in Tschechien und in Polen entsprechend ausgebaut werden. Das muss ja entsprechend gefördert werden. Entwicklungstechnisch sind wir nicht auf gleichem Stand. Was die Rahmen für Bioenergieproduktion müsste man schon gleiche Rechte haben. #00:54:25-7#

I: Teilweise sind noch unterschiedliche rechtliche Voraussetzungen, wie z.B. Reste von einer Biogasanlage #00:54:57-3#

R 04: Ich bin davon ausgegangen, dass die Bedingungen gleich sind. Grade Tschechien hätte ich gedacht, dass es schon erledigt ist. #00:55:34-3# nicht zu Thema #00:56:57-2#

I: Sehen Sie andere Maßnahmen, welche man unternehmen kann um die Situation zu verbessern? #00:57:04-4#

R 04: Es wird eine ganze Menge angekurbelt. Ich habe das Gefühl dass teilweise nicht koordiniert passiert. 1000 Studien, Netzwerke wo versucht werden Leuten überzukrempeln. Es ist nie was Gescheites rausgekommen, z.B. Cluster Forst und Holz. Es muss einfach die Akteure müssen sich finden. Von unten nach oben. #00:58:52-0#

I: wie kann man das fördern? #00:58:54-3#

R 04: Das ist die große Frage. in der Grenzregion, muss man gewisse Sachen abstellen muss: SPRACHE, INFRASTRUKTUR ausgleichen muss. Die Akteure müssen sich selber finden, aber es muss irgendwie indirekt passieren. **Es ist sehr schwer über Netzwerke da was zu erreichen. Multiplikatoren können sein**. Über Spedition erfahren wir eine Menge,

solche übergreifende Firmen sind ein guter Ansatz. Firmen, die schon Fuß über die Grenze gestellt haben und das nutzt. #01:01:38-7#

I: Könnten sie sich vorstellen über z.B. EU Projekte so eine Kooperation anzuschieben? #01:02:14-5#

R 04: Es müssen für die einzelnen Akteure konkrete Anreize geschaffen werden. Die wollen nicht komplette Netzwerke kennenlernen, sondern ein konkretes Vorteil. Wenn es wirtschaftlich funktioniert, dann spielt das keine Rolle. #01:03:37-2#

I: Vielen Dank. Bitte noch ein paar demografische Angaben zu machen und bitte um Ihre Unterschrift zur Verarbeitung der Daten. #00:48:57-2#

END

APPENDIX 3.5 Exploratory Interview No. 5

Name of R 05: Holger Freymann
Place: Amt für Kreisentwicklung, Robert-Koch Str. 1, 02906 Niesky
Duration: 130 min
Date: 13.09.2012
Interviewer: Maria Meyer

START
I: **Herr Freymann, wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung im Landkreis Görlitz?** #00:00:47-0#

R 05: Also im Landkreis Görlitz bin ich **SEHR** zufrieden mit der Entwicklung der Bioenergieerzeugung. Das zeigen auch die Ergebnisse und die Steigungsform, wie wir von letzten zwei, drei Jahren gemacht haben, also es ist genügend Biomasse, genügend Biomasseanlagen wie jetzt nach dem vorhandenen Potenzial im Landkreis installiert sind; wir sind mit der Leistung sehr zufrieden auch mit der Nutzung von den Rohstoffen die da sind, von den lokalen Kreisläufen. Wir haben eher das Problem, dass große Anlagen Wirkungskreise vielleicht nach außen haben, die vielleicht zu groß sind; dass man also Biomasse doch über weite Entfernung transportieren oder eben tendenziell zu sehr in bestimmte Erzeugerform geht, also bestimmte Sachen zu stark erzeugt Maisanbau zum Beispiel. (..) Von der Entwicklung her, ich denke dass wir auch durch die gesamte Entwicklung der Region, da ich kleinflächig Gemeinden hatten, die sehr **früh** das Thema **erkannt hatten**: Zittau (.), Niesky (..) und die Gemeinden die den EEA Prozess machen, die wir begleiten, sind sehr früh auf den Bioenergiezug aufgesprungen, haben das sehr frühzeitig erkannt und haben durch die kommunale, auf den kommunalen Weg da der Weg dafür geebnet da was dafür zu tun und natürlich von der Ausprägung der Landschaft prädestiniert dafür für eine Bioenergieerzeugung, weil landschaftlich einfach das landwirtschaftlich geprägter Kreis ist und damit einfach hoher Anteil der Landwirtschaft ist und gerade (..) nicht bloß auf guten Böden sondern grade auf diesen nicht so nährstoffreichen Böden eben was angebaut werden kann wie Mais zum Beispiel, was einer energetischen Erzeugung zugeführt werden kann. Das macht schon Sinn, aber mit der Entwicklung bin ich sehr zufrieden (..) wäre jetzt zu prüfen, wie kann es weiter gehen, können wir wirklich noch höhere Werte erfüllen? ist die Region überhaupt in der Lage das dann zu verkraften? (..) denn im Vergleich zu dem was wir ja so in der alternativen Energieerzeugung sind wir weit bei dem was Sachsen und Deutschland vorgibt, so weit über 36 Prozent und die 36 Prozent (..) da spielt die Bioenergie eine entscheidende Rolle. #00:03:00-4#

I: Gut, danke. Und welche Erfahrung haben Sie mit den Nachbarlandkreisen in Bezug auf die Bioenergieerzeugung gemacht? #00:03:09-1#

R 05: versuchen wir mit den deutschen Landkreisen zu machen also (..) Bautzen (..) ja, es ist immer eine Investition, die getätigt wird in der Region und da ist man natürlich daran interessiert einfach zu sagen die Investition soll in dem Landkreis stattfinden, für den man auch Verantwortung zeigt (..) und da nimmt man die Nachbarinvestition zwar wahr, aber wir sind eben nicht so dass man sich im Gegenteil im Wege steht. Das sind die großen Investitionen suchen sich den Standort aus und Gemeinden die engagiert sind haben wir auch genügend (..). Die Erfahrung sind, es wird wenig nachgefragt, also man stimmt sich wenig ab, es sei denn es gibt ein überregionales Konzept wie das Thema Energiekonzept zusammen mit dem Landkreis Bautzen. Auf regionalplanerischer Ebene da gibt es gewisse Abstimmung, aber es gab bisher noch keine Abstimmung zu Einzugsbereichen, zu Nutzungsbereichen, "wo kriege ich meine Rohstoffe überhaupt her", das gab es noch nicht. Hmm (bejahend) ja, Brandenburg noch weniger Kontakte (..) muss man sagen (.), eher auch dann im Grenzraum zu den polnischen und tschechischen Kollegen einfach über auf der Projektbasis. Das hat aber weniger mit dem wirtschaftlichen Aspekt zu tun, sondern wenn man eben gemeinsam einen Energieprojekt als solches macht, ist das ja mit dem Thema EMIX zum Beispiel oder mal die

Idee Energieagentur auf dem polnischen Territorium zu machen, was nicht geworden ist, aber zumindest redet man über das Thema und da ist die Abstimmung mit den Landkreisen natürlich sehr stark (..) und sogar vielleicht das Interesse bei den tschechischen und polnischen Kollegen einfach aufgrund des Neulandes auch größer als auf der deutscher Seite. Auf deutscher Seite ist es immer so (..) aufgrund der politischen und gesellschaftlicher Diskussion gibt es für und wider und das wird ja politisch natürlich auch in die Region getragen. Und da wir die Verpflichtung zu EEA haben, müssen wir uns das Thema annehmen. Wenn man die Verpflichtung nicht hat, nicht diesen politischen Auftrag, wird es dann ganz schwer. (..) Vielleicht ist überhaupt die regenerative Energie bei uns einen anderen Stellenwert als woanders eben unter dem Aspekt der Braunkohle und da vielleicht doch als Landkreis doch ein gewisses Gegengewicht zu erzeugen, nicht in der Energiebilanz, aber zumindest zu zeigen "wir können es beides (.) vereinbaren, nebeneinander machen, die Braunkohleenergie erzeugen aus fossilen Brennstoffen eben noch diesen Zeitraum wie wir es brauchen und trotzdem nebenbei so aufbauen, dass nicht ein Schaden in der Landschaft entsteht. Aber die Erfahrung mit den Nachbarlandkreisen, wie gesagt, man stimmt sich ab, wenn es kein gemeinsames Konzept gibt, tut man auch nichts gemeinsam und zu den Polen und den Tschechien weil es gemeinsame Projekt gab, hat man das Thema noch beackert. Und wir haben natürlich als Landkreis sowieso einen energetischen Bezug. Wesentlich ist immer eine wissenschaftliche Begleitung, wenn man Hochschule hat, die das Thema auch aufgreift, dann ist man einfach gut beraten und die Unterstützung merkt man einfach auch. Ich denke auch viele Experten vor Ort und (.) auch das Thema "Energieerzeugung" als solches ist schon ein Thema was Landkreis weil das eine Energieregion war, egal aus was ich die Energie erzeugt habe. Also es gibt viele, die dem Thema Energieerzeugung eigentlich positiv gegenüber stehen. Und (.) wenn wir auf reine Biomasse gehen, denke ich sind wir aufgrund der landschaftlicher Prägung, habe ja ich schon gesagt, als einer Agrarkreis haben wir andere Voraussetzung als die Nachbarlandkreise. Wo es Waldgebiete wäre, bei den Polen sicherlich ein Thema, da muss man gucken, es ist ja nicht immer gleich Landwirtschaft, aber wenn man auf die Landwirtschaft herunterbricht, . #00:06:39-5#

I: Das stimmt, dass ist auch so. Mir ist im Laufe der Arbeit aufgefallen, dass die Region sehr landwirtschaftlich geprägt ist. Das muss man als Vorteil sehen und nutzen. Die nächste Frage: das was wir schon so angesprochen haben: in Sachsen gibt es sehr ambitioniertes Ziel 30 Prozent Strom aus erneuerbaren Energien. Das ist sogar höher als in Deutschland und Europa. **Wie beurteilen Sie die sächsische Klima- und Energiepolitik in Bezug auf den Ausbau der Erneuerbarer und speziell der Bioenergie?** #00:07:19-8#

R 05**:** Sachsen hat sicherlich sehr frühzeitig erkannt, dass das Thema ist. Hat es deswegen die SAENA gegründet, hat doch das Thema angenommen. (..) Als Land (unv.) eigene Energieagentur auf Landesbasis hat man sicherlich Vorteile. Man hat aber wirklich verkannt, dass das Leben sich auf der anderen Ebene abspielt. Da glaube ich schon dass es so ist, dass man sagt "ich kann ja gute Vorgaben machen, aber die Realität spielt sich eben auf Landkreis- oder Kommunalebene ab, weil dort die Umsetzungsfaktoren sind. Da kann man sich hohe Ziele aufstellen, die man versucht im gesamten Land zu verteilen, es greift aber zu kurz. Und ich glaube es nicht, dass das was jetzt als sächsische Klima- und Energiepolitik ist, auch mit dem jetzigen Entwurf, was eben als Energieschutz, Energieprogramm machen wollen, ist zwar gehört worden, zeigt es aber wirklich **Diskrepanz zwischen dem was man will und was auch im Augenblick fachlich und politisch auf der Landesebene umsetzbar ist.** Einfach der Widerspruch: man spielt da so eine gewisse (unv.) Stelle zwischen Wirtschaftsministerium und Umweltministerium, die ist einfach spürbar und ich glaube auch nicht, dass es dauerhaft vermittelbar ist zu sagen wir nennen jetzt für eine regenerative Energie oder erneuerbare Energieerzeugung nur die Flächen die dafür bereit stehen, weil das geht es wieder zu Lasten des ländlichen Raums, dann geht es wieder zu Lasten der Region und ich kann sagen, alles gut mit euren Zielen ich hab mein Prozentsatz mit 33, 34 Prozent je nach Bruttoenergieverbrauch im Landkreis erfüllt. Ich brauche nichts mehr zu erfüllen, ich brauche also keine Windräder, ich brauche keine Sachen um jetzt zu sagen: "ok, Du musst aber dein Beitrag dazu bringen, andere Regionen mehr zu versorgen". Das kann man poli-

tisch sicherlich wollen, aber ich sage wir haben das Ziel was Europa und Sachsen will, ERFÜLLT und sehen eigentlich keine Notwendigkeit, aber die sächsische Energiepolitik sagt natürlich "Du MUSST" und will mich dazu zwingen auf einer Flächenbasis das zu machen, müssen sie vernünftig Argumente liefern. #00:09:21-5#

I: Kann Sachsen die Kommunen dazu zwingen #00:09:25-5#

R 05: Landesentwicklungsplan, Regionalplan die Aufgabe gibt die sächsische Energie- und Klimaschutzprogramm umzusetzen, wo drin steht Summe X. und das verteilt der Landesentwicklungsplan nach Fläche auf die Region und sagt dem Regionalen Planungsverband "ihr MUSST das machen" nach dem Flächenfaktor. Ich gebe Ihnen mit die Stellungnahme zum Landesentwicklungsplan. Wir haben das analysiert. [nicht z.T.] das Problem ist eigentlich der STEIGENDE Energieverbrauch. Ich renne also ständig mehr erneuerbaren Energien hinterher um 30 Prozent zu halten weil wir ständig höhere Energieverbräuche haben und wir hatten jetzt das Beispiel ich weiß es nicht 22 33 Prozent und das Jahr drauf 31 Prozent nicht weil wir weniger erneuerbaren Energie hatten, sondern was das andere so exorbitant gestiegen ist. Und jedes neue Gerät was auf den Markt kommt verbraucht mehr Energie, da kann mir einer erzählen was er will. Es ist einfach so. Also wir haben steigende Energieverbräuche und rennen diesem Prozentzahl immer hinterher und ich habe noch keinen Konzept gefunden, auch nicht das sächsische, was darauf Bezug nimmt. (..) Ich glaube dass der Weg falsch ist. Die sächsische Energie- und Klimapolitik versucht das zu breit aufzustellen. und handhabt das mit unterschiedlichen Sachen. Die große Bioenergieanlage hat einfach jetzt nicht optisch aber gleichen menschlichen, persönlichen Auswirkungen auf das Umfeld wie eine Windenergieanlage. Solaranlage hat gleiche Auswirkungen zu (unv.) wie eine Bioenergieerzeugungsanlage, weil eine Bioenergieerzeugungsanlage immer mit etwas Negativem durch die Bevölkerung in Verbindung gebracht wird. Die sind relativ groß, damit sie effizient sind, ich habe höheres Transportaufkommen, ich habe eine Logistik (..) des Hinbringens, des Wegbringens von den Reststoffen. Und das erzeugt natürlich // und die sagen einfach da erfülle ich Wert, das muss ich machen und gut. Und dann mit Energie wird so und so gehandhabt, da gibt es Vorrangsgebiete. Keiner sagt "es gibt Vorrangsgebiet für Bioenergie", (nicht z.T.) keiner sagt "eine Bioenergieanlage gewisser Größenordnung darf dann dort und dort sein“, wenn ich wirklich im Einzugsbereich von 50 Kilometer das und das Bioaufkommen habe, damit es noch rentabel und nicht irgendwo steuerliche Vorteile nutzend für irgendetwas in der Einspeisevergütung hinzubekommen. Das ist der IRRWITZ. Diese FÖRDERUNG lässt eben mal zu, dass man also Transportwege macht etc. und ich bin schon DAFÜR dass man VORRANGSGEBIETE ausweist und sagt es muss bestimmte Prämissen haben, ab einer gewissen Größenordnung - nicht bei einem Bauern, das nicht- aber schon was etwas größeres ist, wo ich das Thema Abwärme etc. (unv.) aber sächsische Energie- und Klimapolitik immer auf dem Stillstand. Energie- und Klimaschutzprogramm ist auf dem Weg- gab es Anhörung dazu - seitdem still ruht der See keine Ahnung. WIDERSPRUCH zwischen den Ministerien eindeutig ersichtig, haben wir auch gemacht und wir können wie gesagt unsere Stellungnahme zum Energie- und Klimaprogramm zur Verfügung stellen. #00:12:56-1#

I: Sie haben auch Ihre Vorschläge dazu gebracht? #00:12:56-1#

R 05: wir haben zu dem Entwurf von Sachsen Stellung bezogen und da steht schon einiges drin, was man dann sicherlich in Detail verwenden kann. Es ist auch die offizielle Meinung nach draußen, die genau diese Sachverhalte vielleicht nicht so deutlich wie ich jetzt gesagt habe, sicherlich mit den nötigen Respekt auch dem Werk gegenüber. Ich glaube das Werk an sich von seitens des SMULs also von der Umweltseite ist es sehr gut, von Seite der Wirtschaft sicherlich verbesserungswürdig (.) weil dort eine Bruchstelle da ist, man merkt auch in der Formulierung in der Aussage dass es einfach kein stimmiger Werk ist, müsste aber ein stimmiger Werk sein. (..) und damit mit allen Problemen die damit zusammenhängen. #00:13:32-3#

I: Spannend. Haben Sie das Gefühl dass die rechtlichen Rahmenbedingungen für den

Bioenergieausbau den Ausbau fördern oder hemmen? Und warum ist es so? #00:13:46-4#

R 05: Mit den rechtlichen Bedingungen ist es so eine schwierige Sache. Es gibt auf der einer Seite die, die vom Bund vorgegeben werden, Bundesgesetzgebung. Bundesgesetzgebung hat sich - ich fange bei dem einfachen an - beim Baugesetzbuch, hat sich in den letzten Jahren immer instrumentalisieren lassen und wir haben immer gesagt: wir springen auf den Zug auf und wir klären es weil es geklärt werden muss. Man hat also relativ LEICHTFERTIG gesagt, ok wir machen jetzt Bioenergieanlagen erst mal als privilegierte Formen in Außenbereich ohne groß darüber nachzudenken hat man danach festgestellt: was ist denn jetzt überhaupt, was passiert da überhaupt? Ist es nicht doch eher industrielle Produktion? und nicht was wir uns vorgestellt haben? der Landwirtschaft kommt (.) daher ein komplett ANDERES Landwirtschaftsbild. In den westlicher liegenden Bundesländern gibt es ganz andere Strukturen, bei uns gibt es wirklich viele Großbetriebe, die große Anzahl der Fläche an sich binden und demzufolge ein hohes Potenzial haben und große Anlagen in die Landschaft setzten können und ganz andere Wirkungskreise haben. Also dann ganz anders in die Gesetzgebung hinein reflektieren. Man macht das an irgendwelchen Kennziffern, Leistungsfähigkeit, Kilowatt etc. irgendetwas fest. Man sagt: bis dahin ist es das Verfahren, bis dahin ist es das Verfahren. Macht sicherlich mal Sinn. Es gibt da aber keine klare Vorgabe, weil es eben den Privilegierungstatbestand gibt. Es kommt ja aus der Landwirtschaft, wir tun der Landwirtschaft was Gutes. Es ist so was ähnliches wie (...) der elektrische Bauer oder k.A. weiß ich jetzt nicht, also der nicht mehr auf dem Feld was macht, sondern mehr sein Strom mit Gülle oder mit sonst was verdient. Das ist schon sehr (.) sehr spannend und man kann es schlecht vermitteln, weil damit wird es schwierig handhabbar und das Großproblem ist, wenn man eben auf diese Vorteilsrolle setzt. (unv.) Bauer im Außenbereich außerhalb der Ortslagen, hat man trotzdem nicht die Probleme geklärt. Das ist ja nur aus dem Verfahren freigestellt. Wir haben die Erfahrung gemacht, alles was aus dem Verfahren freigestellt wird, gibt es Probleme die holen mich irgendwann ein, die kommen irgendwie trotzdem die Probleme, weil ich sie nicht geklärt hab. Also es ist besser und das sagen wir auch wir sehen für jede Biogasanlage für jede Solaranlage auch klare Erfordernisse: es muss geplant werden, weil ich nur an dieses Planverfahren, diese rechtliche Rahmenbedingungen gibt es. Weil das Baugesetzbuch sagt Biogasanlagen sind eben privilegiert in einer gewissen Größenordnung, unabhängig davon dass sie eine Bundesimmissionschutzgesetz brauchen, physisch als Bau darf man sie dort hinsetzten. man kann ja sagen ich hab eine eigene landwirtschaftliche Produktion und in der gewissen Größenordnung, mit einer gewisser Leistung, darf ich sie einfach so hinsetzen ohne dass ich jetzt Plan dafür machen muss? Die Probleme haben wir hinterher, da der Bürger das genauso sieht und sagt: warum, das stinkt doch, die fahren was dorthin, was passiert da überhaupt? (..) da hat man mit der Priviligierung sich nur (..) teilweise geholfen. Man hat es aber in das BUNDESGESETZ reingeschrieben. #00:16:45-5#

Dann auf Länderebene sicherlich alles was immissionschutzrechtliche Regelungen sind, halte ich für schwierig. Es ist von Ländern zu Ländern unterschiedlich. Auch wenn ich jetzt Sachsen, Brandenburg nehmen: unterschiedliche Zuständigkeiten durch den Übergang der staatlichen Aufgaben zu den unteren Behörden, zu dem Landkreis. Da der Landkreis viele staatliche Aufgaben übernimmt, sind wir natürlich bis auf die ganz ganz großen Anlagen die jetzt genehmigungspflichtig sind, müssen auch entsprechendes Potenzial vorhalten und die doch sehr schwierigen rechtlichen Rahmenbedingungen abschätzen zu können. (..) **Es gab bis jetzt noch kein einziges Gesetz, Verordnung, irgendetwas, was wirklich Bürokratie abgebaut hätte in den letzten Jahren, es gab NICHTS was das Verfahren erleichtert hätte,** (...) es ist mir nichts untergekommen. Es ist alles viel komplexer geworden. Ein großes Problem ist zu den rechtlichen Rahmenbedingungen, die jetzt nicht nur anlagentechnisch wirken, sondern auch "wie wirkt die Anlage auf die Umwelt"? ein ganz spannendes Thema. Ich glaube dass die EU mit Ihren EU-Gesetzgebungsverfahren zu Vogelschutz, Flora-Fauna-Habitate-Gebieten (..) auch diesen Zwang, dass wir jetzt Schutzgüter untersuchen müssen, Schutzgut Mensch, Schutzgut Umwelt in der Planung, Umweltberichterstattung, Ausgleich, diese ganzen Bilanzierung machen, hat die EU was Gutes gewollt. ABER die Staaten, die

Bundesrepublik und dann natürlich auch die Länder haben daraus ganz anderes gemacht. Sie haben es **überreglementiert**, sie haben es ausgewalzt bis zum geht nicht mehr. Es sind viel komplexere Verfahren raus gekommen, die eigentlich in der Sache nicht mehr beherrschbar sind. Also heute die Umweltverträglichkeitsprüfung am Rande von einem FFH Gebiet für eine Biogasanlage zu machen - das überfordert schon die meisten. das ist einfach so, weil das versteht keiner mehr. Und dann sage ich da habe ich nicht darüber gesprochen. Und damit ist die Energiewende als solches nicht zu machen, da steht da ständig dieser Widerspruch (..) "wir schützen FAST ALLES auf einem sehr hohem Level, machen wir den Aufwand dafür, RECHTLICH SEHR KOMPLIZIERT - und das greift natürlich alles aneinander. Es fängt also an (.): welche Auswirkungen hat das wirklich, wie ist die Reststoffverbringung, wie sind die Außenwirkungen. Und da habe ich nicht mal über die Negativszenarien Katastrophen oder so etwas gesprochen, die viel zu wenig beleuchtet werden. Sie können ja passieren als solches. Also RISIKOMNAGEMENT findet KAUM STATT. Dafür wir schützen die Art, wo wir denken: wir müssen die schützen. Das wird räumlich nach Gebieten festgelegt, weil Wissenschaftler bestimmt haben, eine gewisse Art schützen zu müssen, die eben auf der hohen Liste ist oder eben was anderen was besonders schützenwert ist. Das ist alles richtig, (.) aber es findet keine Abwägung mehr statt. Es findet nur noch diese hohe Latte fürs Umwelt und siehe mal zu, wie Du damit zurechtkommst, schau mal was Du daraus machen kannst. Und diese Latte, die immer höher liegt zum Darüberspringen, die liegt immer HÖHER, die kriege ich nicht mehr weg. Früher hat immer eine Abwägung stattgefunden. Man hat ja geschaut, was ist mir nun wichtig und immer mit der Maßgabe: weil es mir das so wichtig ist, und es dient irgendeinem Ziel, z.B. CO_2 im gesamten Kontext um zwei Prozent zu senken oder etwas anderes Gutes zu tun oder ich sage ich nutze die Energie und die Wärme und mache Nahwärmeversorgung für die Eigenheimsiedlung und die brauchen kein Gas mehr zu kaufen und keine fossile Brennstoffe mehr zu machen. Da sehe ich die gesamt ökologische Bilanz besser. Es wird also alles projiziert auf diese Sache- FFH, schauen wir das wir das schützen. Ja, vielleicht ist das FFH doch NICHT SO WICHTIG in seinem Bestandteil, wenn man den ganzen Komplex Überregion sehen würde. Und das haben die rechtlichen Rahmenbedingungen überhaupt nicht erreicht. #00:20 :43-9#

Im Gegenteil, es gibt kein Verfahren was einfacher geworden ist, es gibt keine Sache die besser geworden ist. Es dauert LÄNGER. Aufgabenverlagerung von der staatlichen Ebene zu kommunaler Ebene, ohne die nötige finanzielle Unterstützung führt zu einem gewissen FACHKRÄFTEDEFIZIT. Und die schwierigen Sachverhalte man nicht mehr beurteilen kann, d.h. wir müssten jemanden vorhalten, der Ahnung hat von Biogasanlagen, weil wir vielleicht zwei Genehmigung im Jahr haben. Früher da gab es in Sachsen ein - der war top, der war super, der hat auch für ganz Sachsen 30 Genehmigung gemacht. Das hat sich auch gelohnt. #00:21:13-4#

Diese rechtliche Rahmenbedingungen und natürlich es gibt ein gewisser Ländergehorsamer, der sagt "ich muss zu den EU Sachen immer noch (..)“ jeder muss immer noch ein Senf dazu geben. Jeder muss noch mal sagen "ich möchte noch dazu was beitragen" und dann wird noch mal dazu geschrieben und noch was. Was die EU sich da ausgedacht hat - ich stelle mir dann immer vor: die große EU - wie wirkt das mal. Ich fange gar nicht mal erst mit den Staaten, die zuletzt dazu gekommen sind, die wirklich noch ganz große Schwierigkeiten haben. Ich denke immer an Italien und Spanien: "ey cool, wenn das in Italien und Spanien funktioniert, dann bin ich aber gespannt". Wenn sie das mit sich machen lassen und sagen: die müssen jetzt die Liste ausfüllen. Ich brauche gar nicht so weit zu schauen, ich schaue über die Grenze. Wenn ich das sehe wie unseren polnischen Kollegen sagen: wir bauen einen Radweg. (..) Ihr baut den aber auf dem Rand eines FFH Gebietes, ihr dürft nicht mit dem Asphalt". Die fahren raus und da ist der Radweg da. Ich glaube auch nicht dass die Natur irgendwo darunter leidet. das kann mir keiner erzählen, weil dieser Weg dort asphaltiert ist, da kann die Kröte nicht drüber hüpfen. Alles Quatsch, wir wissen es gar nicht. Eine Veränderung in der Infrastruktur in den Gefügen gab es immer; vielleicht nicht mit der hohen Umweltbelastung aber früher wo die Urmenschen Feuer entdeckt haben und haben überall Feuerstellen angezündet und da gabs CO_2 und da irgendwas musste sich die Umwelt verändern.

Und Waldbrände haben sie Natur zerstört und alles - das haben wir gar nicht mehr. **Aber rechtliche Rahmenbedingungen, ich denke im Augenblick HEMMEN sie eher DEN AUSBAU**. Ich glaube NICHT das mit der jetzigen Leseart wie man es gemacht hat. Wir müssten mal sagen: wir ändern bloß das was da ist. Keiner hat den Mut zu sagen: wir machen es mal weg wir machen es komplett neues. Beurteilen wir mal die Prioritäten neu. Schätzen wir das neu ein. Kriegt man wahrscheinlich aber auch aufgrund des demokratischen Staatswesens auch nicht so hin, weil es sehr viel auf Kompromissen aufbaut. Und mit Kompromissen ist es immer so: zwar alle sind für Lösung, aber vielleicht in dem Fall, wenn man was Neues bewegen kann auch nicht die optimale Lösung. Es ist so. Man muss es einfach feststellen, zur Kenntnis nehmen, d.h. wir haben klare Verfahren. Ich glaube in Anfangsphase wir haben wir ein Planverfahren von einem und dreiviertel Jahr unter zwei Jahren, sage ich heute. Wenn Du es richtig machst, in schwierigen Gebieten, ist nichts drin. Also von den ersten Schritten, wenn Du einen Bebauungsplan machen musst, wissen wir auch, den habe ich früher innerhalb dreiviertel Jahr gemacht, heute brauche ich heute immer anderthalb, zwei Jahre dazu. #00:23:47-0#

I: Weil die Dichte an Vorschriften so hoch ist? #00:23:49-9#

R 05: Die Vorschriften sind zu viel, es weiß jeder etwas Schlaues dazu zu sagen in SEHR sehr umfangreicher Form, es wird alles SEHR sehr detailliert behandelt, weil der Plan schon alles klären soll. Also ich muss wissen was mache ich wirklich, bis zur letzten Sache wird alles ausgehandelt. Es gab früher keine Umweltprüfung in den Plänen - das ist dazu gekommen. Wir hatten früher - ich mache ein Beispiel- ein Bebauungsplan hat 5.000 Euro gekostet hat, dann waren die 5.000 Euro für den Plan, für die Erläuterung und noch für ein paar Anlagen. Heute kostet der Plan 25.000 Euro, davon sind 20.000 für den Umweltteil - ich übertreibe mal jetzt - und 5.000 für den ehemaligen Plan, weil alles was umwelttechnisch untersucht werden muss. Gutachten - sie werden keine Biogasanlage bauen müssen, ohne dass Sie emissionsschutzrechliches Gutachten machen. Sicherheitsdenken in Gesetzen - "ich muss das ja mal prüfen", mal schauen was passiert, wo man früher gesagt hat: "es passt schon". Es ist weit genug weg - 500 Meter, brauche ich nicht zu untersuchen. Heute wird alles ganz genau untersucht - Gutachten und noch ein Gutachten- man sichert sich noch so ab - und das kommt noch zu den rechtlichen Rahmenbedingungen dazu. #00:25:02-6#

I: Ja, spannend. Was denken Sie: ist der Landkreis Görlitz im Vergleich zu anderen Regionen benachteiligt was der Ausbau der Bioenergie angeht oder nicht, wenn man die Grenzlage berücksichtigt. #00:25:20-4#

R 05: **Das hat mit der Grenzlage nicht zu tun**. Wir haben die Voraussetzungen dafür, Bionenergie zu nutzen und zu verarbeiten und zu erzeugen. Es liegt mehr daran, wenn man die Voraussetzungen dazu hat und ein bisschen noch den Willen dazu und die Philosophie die Energieerzeugung als Landkreis im Kopf, sind wir NICHT benachteiligt. Im Gegenteil: wir hätten die hohen Anteile nicht erreicht, wenn wir die gewissen Vorteile nicht gehabt hätten. Also die Region, die zu dem energetischen Gedanken steht, in irgendeiner Form, weil sie historisch aus der Energieerzeugung kommt, weil sie daraus einen gewissen WANDEL möchte. Also es ist einfach ich glaube schon, dass die die Braunkohle miterleben mit allen "wenn und aber" und verbrauchen diese in den nächsten 20-30 Jahren, dazu steht auch die Region. Das ist energetisch ansonsten nicht hinzubekommen. Ansonsten aus unserer Sicht dieser Weg muss beschritten werden. Aber dass man andere Modelle hat, da ist die Bevölkerung ein Stückchen offen und sagt: "ja, cool wir machen etwas anderes als Braunkohle". Das hat also auch historische Wurzeln, vermute ich mal. #00:26:26-0#

I: Das wäre sogar ein Vorteil? #00:26:26-0#

R 05: Genau, benachteiligt nicht, weil wir haben die besseren Ressourcen, wir haben die besseren Standortbedingungen, wir haben die Erfahrung auf dem Gebiet, wir haben wissenschaftliche Begleitung. Das sind alles solche Bausteine, dass ich sagen kann: im Gegenteil

da müssen andere erst mal hinkommen. Da sind andere viel mehr benachteiligt. #00:26:44-3#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie im Landkreis Görlitz? #00:26:53-9#

R 05: Schwieriges Thema: die Förderpolitik passt sich dem Markt regulierend in irgendwelcher Form. Das ist immer ganz SCHLECHT. Wenn irgendjemand eingreift und sagt "wir fördern das, wir machen das" muss man konsekvent sein. Die Entwicklung des Energiepreises ist so eine typische Sache. Das hat nichts damit zu tun, dass wir jetzt erneuerbare Energien erzeugen, sondern das hat viel damit zu tun, wie hat sich das entwickelt. Die überteuerte Abnahme, die Festlegung der Einspeisevergütung ist ein wesentlicher Teil davon. Das ist eine FÖRDERUNG, nicht eine Förderung der Anlage sondern eine Förderung des Staates. Die Anlagenförderung das ist ja landesabhängig. Wenn das Geld da ist, fördern sie es. Es gibt Sachen die werden gut gefördert. **Ich glaube schon, dass es dort wo es passt, wo der Landwirt sich eine zusätzliche Einnahmequelle sich erschließen kann, und das nicht zu Lasten seiner landwirtschaftlichen Produktion, sondern als Ergänzung geht, macht SINN**. Aber es müsste sich so eine Anlage rechnen wo ich sage er hat eine Verwertung von seinen Stoffen, er hat eine Aufbereitung und es bedarf es gar keine oridinäre Förderung. Was aber gefördert werden muss, wenn sie die ganzen im Vorfeld Bedingung haben, aus meiner Sicht immer, die Vorplanung, die Beratung: "hast Du genügend Rohstoffe zu Verfügung" - das muss weiterhin gefördert werden, weil das die Region von sich aus nicht leisten kann. Das wäre eine zusätzliche Leistung. Oder man schreibt ins Gesetz und sagt "das ist eine Pflichtaufgabe, Du bist für die Bereitstellung der Biomasse für eine Anlage zuständig in Deiner Region, weil wir das so wollen" da kann sich der Kreis darum kümmern. Ansonsten die Förderpolitik der Anlagen - weiß ich nicht. **Förderpolitik der Planungen, der Vorbereitungen, der Begleitung, der Umsetzung der Sicherung der Ressourcen außen rum halte ich für wichtig (..).** Förderung der landwirtschaftlichen (Anlagen) als Anbauprämie klärt sowieso die EU, wird sowieso zurückgefahren, es ist jetzt im Wandel. Es war ja früher so, dass Monokulturen extrem gefördert worden sind teilweise. Das ist jetzt nicht mehr ganz so schlimm aus der EU Förderung heraus. Die Grundlagenförderung ist ja da, aber die ist ja sehr sporadisch. Selbst wenn heute als Biomasse weit angesehen wird und Kurzumtriebsplantagen, die können ja auch gefördert werden nicht der Kurzumtrieb, sondern etwas Ökologisches aufgebaut wird in der Richtung. Es ist schon sehr vielfältig. **HEMMEND ist die ganze Sache bei Einspeisevergütung**, weil ich denke die hat zu so einer Entwicklung geführt, die nicht mehr marktreal ist. Bei Biogasanlagen wenn man schon sagt "ich muss annähernd 100 prozentige Verwertung dessen haben was da rauskommt haben, also von dem Strom, der Wärme etc. "muss man auch dafür die Bedingungen dafür schaffen". Das muss nachgesteuert werden. Sonst kann er sich irgendwo hinsetzen und dann hat er ein Haufen Wärme. "Jetzt sagt man "pass auf Du musst mind. 20 oder 30 prozent Deiner Wärmeversorgung sicherstellen" entweder für eigenen Betreib oder für Fernwärme. Da gibt es tolle Sachen: vor allem öffentliche Einrichtungen, Schulen, Kindergärten die mit Fernwärme beheizt werden aus Biogasanalgen. Das ist schon der richtige Weg - und das kann man wieder fördern. Weil wenn man das Level relativ hoch legt, da noch ein gesellschaftlicher Effekt entsteht, den Gemeinden wohl zur Verfügung gestellt wird, das kann auch die Gemeinde-Einheimsiedlung sein, die eben nicht auf das andere angewiesen ist. Ich würde den Strom selber nicht so hoch subventionieren, weil so lange wir uns leisten können die Anlagen irgendwo hinzusetzen und lange Kabel hinzuziehen bis zum nächsten Einspeisungspunkt. Wenn das Kabel doch noch eine erhebliche Investitionssumme und dann meine ich nicht bloß 15.000 Euro da meine ich schon 200-500.000 Euro und da sich leisten kann den Kabel irgendwo zu legen, da mein Strom irgendwo eingespeist bekomme, da muss die Rendite sehr hoch sein. So eine Anlage ist ja immer gewinnorientiert. Warum soll die Fördermittelpolitik hier eingreifen und soll den Gewinn noch maximieren? Man muss wieder zum gesunden Maß zurückfinden. Dann hört nämlich das auf, dass **Förderpolitik hemmend** ist immer **Aktionismus**. (..) Dann mache ich die ganze Woche nur noch Solarberatung. Das ist ein so typisches Beispiel und darf natürlich bei Bioenergieerzeugung NICHT passieren. Es ist nicht

ganz so extrem, aber es ist letztendlich auch. Ich glaube schon, wenn sie jetzt sagen würden: **"ich vergüte den Strom ganz toll, ganz weit und dann fangt ihr mal Bio(masse)"** und dann bauen sie erst mal an und versuchen das einspeisen. Dann sage ich "woher wollt ihr das herkriegen, was ihr da reingebt und wo wollt ihr das hinschaffen was da rauskommt? **STOFFKREISLÄUFE sind viel mehr zu beurteilen**. Wenn man sagt „**pass auf ich beurteile die Stoffkreisläufe, wie sichere ich das in der Region" - das wäre die Förderpolitik, die wäre gezielt**. Und vielleicht gar nicht mehr immer vordergründig auf so technische Förderung: so jetzt fördere ich die Anlage, sondern ich bin der große Freund **durch steuerlicher Vergünstigung**. Wenn er das macht, kann er eben die steuerliche Vergünstigung kriegen. Das belastet das Allgemeinwohl nicht so sehr, es ist anders verteilt und er hat einen sofortigen Vorteil. Nicht das er jetzt sagt "ich baue das eben und die Investition bekomme ich zu 90 Prozent gefördert"- das halte ich für falsch. Und man muss sich selber die Investitionsmodelle ausdenken, wo er sagt "es ist nachhaltig und langfristig". #00:32:52-2#

I: Apropos Stoffkreisläufen, es ist spannend wenn man an die Grenzregionen denkt, wie z.B. in Zittau haben wir eine Anlage, dort bezieht man die Biomasse aus Polen und Tschechien. **Sehen Sie hier eine Benachteiligung der Möglichkeit Fördermittel zu bekommen, wenn die Stoffkreisläufe grenzüberschreitend sind?** #00:33:35-8#

R 05: Da müssen Sie die polnischen und tschechischen Kollegen fragen. Wenn der deutsche Staat deutsche Standorte fördert- das kann ich nicht einschätzen. Natürlich ist es so, ich glaube nicht - **wenn es keine Förderung gebe, würde sich der Standort nach wirtschaftlichen Bedingungen richten, unabhängig von der Grenzlage**. Das ist schon ein gewisser Eingriff in die Wirtschaft - sie können den Standort nur in Zittau errichten, obwohl vielleicht jeder sagt". Ok, wir hätten das in Bogatynia (PL) oder sonst irgendwo anders errichten können. Aber wir haben ja hier die Fördermittel, wir müssen das ja HIER bauen". **Das ist schon eher ein Hemmnis, weil das nicht mehr tatsächlich den LOKALEN und REGIONALEN Erfordernissen folgt, sondern es folgt dieser Fördermittelpolitik.** #00:34:18-0#

I: Die Biomasse wird nicht vor Ort verarbeitet. Wenn z.B. die meiste Biomasse aus Bogatynia kommt, die wird nach Deutschland transportiert. #00:34:25-1#

R 05: Ich halte es für sinnvoller, dass es (die Anlage) dort ist, wo **der größte LOKALE VORTEIL** ist. Der Standort, den sich Zittau rausgesucht hat, der ist ja nicht unbedingt unumstritten gewesen. Und wir haben ja lange geackert, gemacht und (..) die Zukunft wird es zeigen, ob der Kompromiss, zu den wir alle bereit waren, den wir auch gemacht haben ob der haltbar ist. Ich weiß es nicht. Es gäbe bessere Standorte. Wenn die Förderpolitik gesagt hat, wir geben DIESER REGION im Umkreis von 200 Kilometer oder 100 km das Geld. Macht gefördert eine Standortanalyse, wo das (Anlage) idealerweise hinkommt, Transportwege beachten, das ganze Theater - Lagerflächen, Lagerkapazitäten. Und nicht auf der grünen Wiese, das habe ich nicht gesagt, aber wenn man sich den idealeren Standort sucht. Das wäre natürlich gut. **Die Förderpolitik zwingt einen zu einer Standortsache und der muss es eben dort machen.** Das ist einfach (..) DUMMHEIT. Mir ist letztendlich EGAL, es ist mir wirklich, weil ich denke - selbst wenn der eine was abgeben muss - von seiner Wirtschaftskraft abgeben muss und dem anderen geben muss. Das kann ja von Liberec nach Deutschland genauso passieren, das kann ja von Deutschland nach Bogatynia passieren. Die brauchen uns natürlich aufgrund der anderen Industrie die sie dort haben sowieso im Augenblick nicht in den nächsten 30 Jahren oder 20 Jahren weil sie einfach andere Großkonzerne ansässig haben, die einfach eine finanzielle Stabilität bringen. Es ist ja bei uns im Norden auch nicht anders. **Aber (..) wenn es der Grenzregion nicht gut geht und das soziale und wirtschaftliche Gefälle da ist oder das ökologische Gefälle groß ist, da geht es der GESAMTEN Grenzregion nicht gut.** Es ist egal ob das in Polen oder Tschechien passiert. Wenn es sozialen Missstand gibt in Tschechien, dann habe ich eine hohe Kriminalität hier. Wenn es ökologischen Missstand in Polen gibt, wenn sie eben der Meinung sind, sie müssen zumindest darüber nachdenken, theoretisch man kann im Dreiländereck kein Kraftwerk zu bauen, dann habe ich ökologischen Missstand. Den habe ich nicht nur in Polen, den habe

ich in der gesamten Grenzregion. Wenn es in Zittau in der Bioenergieerzeugung zu irgendwelchen Vorfällen kommt, hätte man bessere Standorte gewählt. Das sind alles Sachen wo ich sage, das wäre mal eine GLOBALE EUROPÄISCHE FÖRDERUNG gewesen, wo man sagt "wir fördern, aber wir fördern bewusst, aber mache was EINHEITLICHES aus der Region". Diese hängen natürlich auch mit den Investitionskosten, mit Rückläufen, mit Steuereinnahmen der Kommunen zusammen. Und da über den Tellerrand zu schauen, das gelingt uns auf der deutschen Seite schon nicht. Von den Städten zu einander, das kriegen auch die Landkreise nicht weil jeder kämpft darum ich glaube schon dass wir Gewerbeansiedlungen, die aus Richtung Dresden kommen, erst bekommen wenn sie Bautzen übersprungen haben und die wirklich nicht wollen. Die werden nie sagen, "wir geben euch mal eine größere eine gewerbliche Ansiedlung", jeder kämpft um seinen wirtschaftlichen Vorteil - jede Kommune, jeder Landkreis. Es ist auch ein Stückchen legitim. Aber es hätte durch RECHTLICHE RAHMENBEDINGUNGEN, durch rechtliche FÖRDERPOLITIK das steuern können. Jetzt nicht mehr. Sehr spannend. Sehr zukunftweisendes Feld, aber (..) vielleicht gibt es mal in zehn Jahren die Möglichkeit, dass man das anders sieht. #00:38:15-4#

I: Sie haben die Umweltauswirkungen einer Biogasanlage erwähnt. **Welche Rolle spielen aus Ihrer Sicht die Umweltauswirkungen der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse im Landkreis Görlitz?** #00:38:32-8#

R 05: Ich glaube, dass es uns gelungen ist, TROTZ aufkeimenden Widerstände, auch aus der Bevölkerung zu sagen "es ist immer noch ein Kompromiss gefunden worden", dass die großen Anlagen Transportstrecken aufweisen, die noch beherrschbar sind. (..) das ist nur darum, wie ist der Einfluss. Die kommen ja aus allen Richtungen, fahren dann und das kanalisiert sich auf wenigen Straßen. Da ist das Aufkommen nicht so groß, dass ich sage. Machen wir ein Beispiel: wenn jemand der Meinung ist, er muss dorthin einen großen Supermarkt setzten (theoretisch) und da geht eine Straße vorbei. An der Straße wohnen Menschen die sagen "hey, ich wohne in einer Stille, einwandfrei". Und dann ganz hinten ist ein Supermarkt und fahren auf einmal ganz viele Autos lang. Da kann er auch nichts machen. Das ist eine Straße und auf der Straße steht auch nicht drauf "hier dürfen nur 20 Autos durchfahren". Da steht "ich bin ne Straße, ich bin eine Bundestraße, hab die Breite und auf der Bundesstraße können 5-20.000 Autos durchfahren; keine Ahnung, ganz viele. Wenn es zu viele werden, muss ich sie ausbauen. (unrel.) Diese Umweltauswirkung von dem Transport ist ja **eine subjektive Wahrnehmung**. Das kann ich steuern. Ich kann schon sagen, "Du Biogasanlagebetreiber, wenn Du den optimalen Standort hast, dann schaffe die Logistik so, dass Du wenigstens in den Nachtstunden nicht fahren musst, dass Du gewisse Fahrfenster einhältst". Das kriegen wir hin. Es ist im Vergleicht zu anderen Sachen wo ich sage "es kommt meist in relativ geschlossen Transportbehältern, es geht in relativ geschlossenen Transportbehälter weg. Es ist ja nicht so dass der Erntewagen, der ja vom Feld fährt, der das Heu hat, das ganze Heut auf der Straße verliert- so ist es ja nicht. Ich habe zumindest noch nicht gesehen. Die sind ja daran interessiert, wenn die Biomasse einmal da drauf ist, auch fast vollständig in das Werk zu bekommen. Ich habe keine Lust, dass ich die Hälfte unterwegs verliere. Das funktioniert schon ganz gut. Ich glaube das Transportaufkommen ist nicht das Problem. Man muss solche Transportmöglichkeiten schaffen, dass Lärm und Geruch minimiert wird. Lärm kann man minimieren, in dem man auf die Tageszeit ausweicht, dass man Nachtzeiten, Ruhezeiten, Wochenenden versucht freizuhalten. Man muss schauen ob das logistisch geht, hält wieder eine andere Lagerhaltung vor Ort- da bin ich wieder in dem Geruchsektor drin, weil das ist schon ein Problem. Sobald ich den LKW weg habe und zwischenlagern muss, da wird es schwierig, technologisch alles machbar aber höhere Aufwendungen - bin ich bereit diese zu machen? Oder ich suche mir von vorne so einen Standort, wo ich die Geruchsbelästigung nicht habe. Dass ich von vorne sage "es gibt eine gewisse Bedingungen, ich fördere das nur, wenn Du höhere Umweltauflagen erfüllst, als der Gesetzgeber sowieso schon vorschreibt. Und gehe dorthin wo Du das geringste Umweltschaden machst und nicht dorthin wo Du gesetzlich grade noch so zulässig bist. Gehe dorthin wo Du auch vielleicht gewollt bist, und gesetzlich noch mehr als zulässig bist". Das wäre so eine Sache. Transportaufkommen kann man steuern - bei den normalen Anlagen. Man muss na-

türlich verhindern eine gewissen Größenordnungsverhinderung: weil ich die Wärme sowieso nicht wegkriege. **Riesenanlagen, die Haufen Wärme produzieren, dürften irgendwann nicht mehr gefördert werden**. Es sei denn ich habe die Wärmeabgabe in einer Großstadt, dann habe ich aber so eine Logistik außerum, dass die Transportströme aufkommen werden. Wenn ich eine Biogasanlage an einer Kreisstraße hab, das ist dann eine Kreisstraße. Wenn die Leute dort langfahren, dass fahren sie eben mit den Autos lang. Wenn da ein LKW fährt, da fährt eben LKW lang. Ich rede nicht ja von 500 LKWs am Tag. Das ist ja eine subjektive Wahrnehmung der Umweltauswirkungen. Geruchsbelästigungen durch Transport ist zu minimieren, das ist machbar. Bei einer normaler Biogasanlage der normale Ablauf bei einer Biogasanlage ist beherrschbar. Nachts ist schon schwierig. **In Bezug auf Ortslagen, Sensibilität entwickeln.** Wir haben so ein Fall in Greba (uv.) - gibt es doch 300 Meter vom Ort und es gibt schon Bürgerproteste. Aber die wollen dorthin und haben günstig Gewerbeland gekriegt, vielleicht gibt es gegenüber eine Industrie die die Wärme abnimmt. Es macht Sinn, ist technologisch machbar. Die können das was rauskommt in dem Klärwerk der Gemeinde weiterverarbeiten. Das Klärwerk der Gemeinde profitiert wieder davon weil es höhere Auslastung hat und dann passt schon alles. Der Bevölkerung gefällt es nicht und dann sagen die "die wollen die Straße". Und dann sage ich " ey, das ist eine Kreisstraße". Wenn wir jetzt die niederschlesische Magistrale bauen und dann machen wir drei Bahnübergänge zu, dann fährt bei Euch auf der Straße drei oder vier Jahre lang 200 Prozent des Verkehrs. Und dann können sie auch nicht sagen "wir wollen das nicht" Das ist aber beherrschbar- ihr könnt mit dem reden, ihr habt ja ihn vor Ort und könnt sagen "Deine LKWs fahren zu laut, Deine Pumpen sind zu laut, es hat gestunken wo die abgeladen haben". **Es gibt KEIN NACHHALTIGES RISIKOMANAGEMENT**, da hab ich bissl Angst davor. Das sind ja alles Anlagen, die entsprechend zwar den technischen Standard haben, aber wir haben ja veränderte Katastrophenlage in Deutschland. Biogasanlagen haben schon eine besondere Herausforderung #00:45:21-3#

Im Hochwasserbereich gar nicht, aber es gibt ja Niederschlagereignisse, die nicht beherrschbar sind. Da muss mehr Wert drauf gelegt werden, z.B. beim Starkregen. Ich habe meine Bedenken bei den ganzen Sturmsachen die übers Land ziehen. Wenn so ein Ding (Biogasanlage) kaputt geht, dann habe ich eine Umweltkatastrophe, weil was da drin passiert in den Aufbereitungsanlagen, gleich nach welcher Technologie - das ist schon gut, dass es da drin stattfindet und das es nicht nach draußen geht. Wenn man da dort reinschaut, was dort drin vor sich hin passiert, das möchte ich nicht auf der Wiese haben. Da sind schon genug kaputt gegangen. Genau weiß ich nicht- da kann das Grundwasser betroffen sein kann, Geruchsbelästigung, Emissionsauswirkungen wirklich in Größenordnung, die dann hinströmen, an irgendwelchen Gasformen, die dann Lebenszustände in Biotopen etc. angreifen können. Das glaube ich das sollte man höher rechnen - höhere Standards: Sturm, Starkregenereignisse, wie wirken sie auf Anlagen. Das ist ja wirklich ein Umweltrisiko, was zu wenig beachtet wird, bei allen Sachen aber. Also so ein RISIKOMANAGEMENT findet nicht genügend statt in Bezug auf die Entwicklungen, die stattfinden. Hochwasser sage ich, weiß man einigermaßen. Aber bei Niederschlagereignissen nicht - wenn man z.B. Hagelereignisse hat- diese Plane die drauf ist- weiß nicht ob diese dann aushält. Schneelasten sind eine schwierige Sache. Ansonsten Umweltauswirkungen von einer Biogasanlage, wenn sie vernünftig geführte Biogasanlage - da sind bestimmt schlimmere Sachen auf der Welt und in Deutschland, die höhere Umweltauswirkungen haben. Es ist absolut verträglich - es ist immer wichtig einen aktuellen Stand der Technologie zu haben, das ist so eine Forderung zu haben und Transportketten kurz zu halten. #00:47:30-5#

I: Zum Thema aktueller Stand der Technologie. **Haben sie das Gefühl, dass die Technologien welche auf dem Markt verfügbar sind, gut bekannt sind?** #00:47:42-6#

B: Ja. Wer sich mit der Materie beschäftigt, muss ein Profi sein. Die Zeiten wo irgendwelche Geldgeber durchs Land gezogen sind und gesagt haben "ich habe jetzt Geld und will das investieren, mache ich eine EE" das ist schon vorbei. Das sind schon Profis, sie wissen auch genau, was sie tun. Sie wissen zumindest anlagentechnisch wovon sie reden, wissen viel-

leicht nicht woher sie das Zeug kriegen, was sie dort reinmachen wollen, aber anlagentechnisch sind sie gut. Sie holen sich nicht immer die regional vorhandene Unterstützung, das könnten wir uns mehr wünschen. Man sagt "hier wärst Du mal zur Hochschule gegangen", da kriegst Du zwar nicht ganz umsonst, aber Du kriegst mit einem höheren wissenschaftlichen Anspruch, manchmal auch zu hohen, aber zumindest die Technologien sind ja bekannt. Es gibt ja genug auf dem Markt. Wenn ich zu allem fahren würde was mit Bioenergie und Technologie ist, da denke ich mal es gibt sogar manchmal eine Überforderung. Ich bin ja kein Anlagenbetreiber. Wenn ich eine Einladung zu einem Symposium bekomme und soll mir 2-3 Stunden von rein technologischen Prozessen anhören, ich habe das nicht studiert und will das gar nicht wissen, dann wird es schwierig. Das ist ja ein hohes technisches Level was ich anhören muss. Also viel verfügbar, ausreichend bekannt, manchmal zu viel Veranstaltung. aber man muss sowieso auf das einzelne Projekt eingehen. Beratung ist über alles. #00:49:08-8#

I: Und wenn man ein Projekt umsetzt, wo sehen Sie die Defizite an Informationen? Sie haben gesagt, dass die Planer nicht wissen, woher sie die Biomasse herkriegen. Gibt es andere Defizite? #00:49:31-6#

R 05: Sie sagen "es wird gefördert, es lohnt sich, ich habe Beziehung zu dem Bürgermeister kenne, weil ich gerne dort machen möchte, weil A, B, C das gerne wollen, weil man sich große Renditen davon verspricht und weiß man etwas: das könnte ich technologisch brauchen". Man beschäftigt sich aber sehr spät damit "woher kriege ich die Eingangsstoffe?“ Der Bauer nicht, der Bauer weiß "meine 40 Kühe machen das und das und das passt". Aber alles was man mit größeren Mengen ist, dann geht man zu Leuten, wo man denkt "sie wissen es", sie wissen aber meistens auch nicht. Ich glaube schon, dass die Agrargenossenschaften mit so was teilweise überfordert sind. **Der Bedarf ist noch nach STAATLICHER LENKUNG. Man muss so klar und deutlich sagen**. #00:50:21-0#

I: Jetzt kommen spezielle Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion und so weiter betrifft. **Was wirkt hemmend und was unterstützend beim <u>Anbau und bei der Bereitstellung</u> der Biomasse für Energiezwecke? #00:00:33-8#**

R 05: Das kommt immer auf die Art der Biomasse an, die man anbaut. Es ist schon so: wir haben unterschiedliche Ausgangsvoraussetzungen: unterschiedliche Bodentypen, Ackerertragszahlen auf den landwirtschaftlichen Nutzflächen und ich glaube schon, solange das so läuft, das man sagt" man baut auf den Flächen an, die dafür auch geeignet sind ohne bessere Flächen zu blockieren" ist es so. Wenn man sagt "ich muss einen hohen Ertrag haben", was auch ein Ziel ist einer Anbauform ist und blockiert damit bessere Böden, dann entsteht natürlich eine Diskrepanz zwischen " ich kann die Flächen nicht für etwas anderes nehmen“. Die Bereitstellung selber - ich denke es gibt eine gewisse **Überzeichnung**. Die Landwirte sind schon aufgrund der Vertragssituation die sie eingegangen sind, auch langfristig genötigt, langfristig das und das anzubauen. Ich weiß es nicht ob das so gut ist. (..) Ich weiß es von dem anderen Betreiber, der hat die polnischen Landwirte für die Anlage in Zittau relativ langfristig gebunden. Da hab ich gesagt "aha, wer weiß denn heute in der schnelllebiger Zeit, was denn in 5 Jahren ist". #00:01:56-3#

I: Das stimmt. #00:01:56-9#

R 05: Ich weiß weder was mit der Europäischen Union passiert, ich weiß weder was mit der Förderpolitik passiert. Es kann sein, dass es eine Blockade für Förderung gibt, in dem irgendeiner sagt "wir fördern das nicht mehr. Im Gegenteil, wir versuchen das wieder in das Normalmaß zurückzufahren, wieder landwirtschaftliche Produktion zur Nahrungsmittelerzeugung". **Dabei es ist nicht so schlimm.** Man denkt "wir haben sonst wie viel Maisflächen" also so schlimm ist es nicht. Wir bauen vordergründig Weizen an, in der Hoffnung dass der

Weizen der Nahrungskette zur Verfügung geführt wird. Das ist auch da ein spannendes Thema. Aber ich denke: wir können viele Anbausachen als Landkreis gar nicht mehr nachvollziehen. Ich weiß nicht was damit ist, ich weiß nicht was mit dem Anbau auf dem Feld, was damit rauskommt. Bei Weizen z.B. ich will nicht sagen, dass sie den Weizen irgendwo zur Bioenergieerzeugung einsetzten, aber wir haben einen hohen Anteil an Getreideflächen (..) und mal schauen, was damit passiert. **Ich glaube schon dass diese langfristige Bindung ein Problem ist.** Das ist wirklich eine Barriere. Ich verstehe auch die Anlagebetreiber, sie wollen langfristige Verträge, sie brauchen diese für die Nachhaltigkeit. Für den Landwirt ist das ein Nachteil. Und ich kann im Augenblick sowieso nicht bestimmen, was passiert mit landwirtschaftlichen Anbauformen. Wir haben sicherlich einen Wandel zu erwarten: "sind die landwirtschaftliche Fläche in der Größenordnung, wie wir sie brauchen? Wir brauchen jetzt alle landwirtschaftlichen Nutzflächen für die Nahrungsmittelproduktion aber auch für die Energieproduktion. Können wir diese noch benutzen in 2-3-5 Jahren? **Klimawandel** - ganz spannendes Thema. Ich wüsste keine Energiepflanze, die letztendlich (..) die brauchen das ausgewogene Mitteleuropäische Klima. Ich weiß nicht ob ich irgendwelches Zeug anbauen kann, was fünf Grad mehr überlebt, was mit der Dauerhitzeperioden des Sommer und mit dem feuchten Winter zurechtkommt? Wir sind also bei den klassischen Anbauprodukten, die wir nutzen. Es gibt zu wenig Entwicklung Richtung moderne Energiepflanze, die schnell wächst, die mit kargen Böden, mit den ganzen Wetterbedingungen zurechtkommt**. Das fehlt eben. Das wäre wichtig der Forschung zu sagen**" wenn wir die Biomasse brauchen, brauchen wir diese auch in fünf Jahren oder in zehn Jahren". In zehn Jahren haben wir eine andere Landwirtschaft. Ich weiß es nicht ob die Flächenvernässung, steigendes Grundwasser - ich komme auf die Flächen nicht mehr drauf; Witterungsereignisse, die mir die (..) ich brauche das Angebot ständig- die Biogasanlage muss ja ständig, das theoretisch ganze Jahr laufen, so gut wie es geht. Kriege ich das überhaupt noch hin? Wie anfällig bin ich auf Ausfallerscheinungen, die es in der Landwirtschaft in den nächsten Jahren in Größenordnung geben wird? Wir werden Dürre erleben, wir werden Wasser erleben, wir werden alles machen und wir können durchaus mit 25 Prozent mit Ernteausfall rechnen. Wir haben immer noch hingekriegt dieses Jahr. Bei Einzelprodukten: wir haben ja Kartoffelschwierigkeiten, weil die Landwirte diese nicht mal von den Feldern bekommen haben in der Zeit wo sie sie ernten mussten. Man muss einfach gucken - **der Anbau wird schon eine Herausforderung sein.** Landwirtschaft wird nicht mehr das gleiche sein in fünf, in zehn Jahren wie die heute ist. Also ganz neue Herausforderungen. #00:04:56-6#

I: Und haben Sie das Gefühl, das Landwirte und Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, aufgrund dessen dass die Flächen auf der Grenze liegen oder ist das vor Vorteil? #00:05:19-0#

R 05: Ich glaube, dadurch dass wir viele große Einheiten haben, wissen die Landwirte was die Nachbarn auf der anderen Seite der Grenze anbauen. Machen wir ein Beispiel, Kartoffeln. Keiner kann sich leisten so ein Kartoffel -Produkt aufzubauen, der muss analysieren. Was ist im Grenzraum, weil Reichenbach als Kartoffel-große-Lagerhalle verkauft zweidrittel osteuropäisch. Da müssen sie doch wissen, "ist der Markt dafür überhaupt da? oder kann ich günstigere produzieren?". Es kann sein dass dort der Markt da ist, aber ich kann günstiger produzieren. Ich glaube unsere Landwirte sind ganz pffifig die wissen schon was hinter der Grenze passiert. #00:05:59-3#

I: Und wie schätzen sie das ein: wenn sie teurer Mais anbauen, als die polnischen Landwirte. Die Lage der Landwirte im Landkreis Görlitz wäre dann von Nachteil oder Vorteil für eine Biogasanlage? #00:06:24-2#

R 05: Ich glaube, dass der noch **gering vorhandener Lohnvorteil**- anderer Vorteil kann es nicht geben. Der Traktor kostet in Polen genauso viel - sie müssen ihre Traktoren genauso auf dem Weltmarkt kaufen, sie müssen genauso ihre Mähdrescher kaufen. Ich glaube nicht dass Du den Mähdrescher in Polen 50 Prozent günstiger bekommst - das glaube ich einfach nicht. Also es sind Lohnkosten, es ist vielleicht Treibstoff solche Sachen, aber so weit sind sie auch nicht von uns entfernt, d.h. die **Produktionskosten nähern sich an**. Und wir ha-

ben definitiv eine **höhere Qualität** und wir haben **definitiv höhere Ertragsleistung**, weil wir einfach eine andere (..) ausgerichtete Landwirtschaft haben. Da kommt die polnische und tschechische Landwirtschaft hin (..) einfach durch die großen Felder - das beginnt in Polen auch. In Tschechien habe ich auch schon gesehen. Aber wenn Du irgendwo auf einem Berg steht, da ist der Teppich der Landwirtschaft sehr bunt, durch diese vielfältigen Nutzungen. **Effektivität** der Großmaschinen ist immer gefragt, ich glaube schon dass große landwirtschaftliche Betriebe einfach effektiver sind. Sie können die technologischen Möglichkeiten besser einsetzen. Und ich glaube schon, dass sie das durchaus ausgleichen können, einfach durch **höhere Produktivität**. Nun kann ich die polnische Produktivität nicht einsetzen und die machen es genauso. Ansonsten sage ich "das sind alles Weltmarktpreise" das Getreide wird europäisch gehandelt, ich wüsste jetzt nicht (..) eben durch die EU (..) gut man kann nach Polen fahren und die Kartoffeln 20 Prozent günstiger als bio kaufen, ich als Privatperson. Aber in dem großen industriellen Maßstab was ich ja brauche für die Biomasse glaube ich nicht (dass es günstiger ist). Das sind ja alles aushandelbare Preisen. #00:08:33-7#

I: Was denken Sie, was hemmt und was fördert bei <u>Planung und Umsetzung</u> einer Biomasseanlage? #00:08:43-4#

R 05: Standortsuche, Restriktion der Umwelt. Also erst mal überhaupt den Standort zu finden. Wo kann ich überhaupt noch machen, unabhängig davon erst mal wie ich das hinbekomme. Energieabhängig wo ist ein Einspeisepunkt- ich will ja viel Energie erzeugen, da brauche ich einen gesicherten Einspeisungspunkt- das müssen die Netze hergeben. da habe ich noch nicht geplant. **Die Standortsuche ist ja ziemlich schwierig**. Es ist so gut wie ausgereizt. Wenn ich noch die Wärmekopplung noch dazu nehme -wird es ganz ganz wenige Standorte geben, die in der Lage sind. Entweder von vorne an mit den Restriktionen der Umwelt zu rechnen; ich habe keine gesicherte Logistik, ich habe keine Transportwege und der Einspeisepunkt fehlt mir. Ich rede ja nicht über eine Steckdose- es muss ja was richtiges sein und das Netz muss ja aushalten. Und es wird ja nicht besser mit jeder Anlage, die ans Netz geht ist ja die Netzlast im Gesamtnetz größer und ich da den Strom irgendwie wegkriegen. Wenn ich den nicht wegkriege, dann muss ich zu irgendeinem Einspeisepunkt hin, da habe ich immense Investitionskosten. Hmm. Das wäre das erste, das man einen geeigneten Standort findet. Es gibt keine Standortnotwendigkeit weil ich denke das was an landwirtschaftlicher Produktion Biomasse erzeugt, ist ganz gut aufgehoben und ich kann mir nicht vorstellen, dass die Landwirte sagen „hey, ich brauche ja 20 neue Biogasanlagen, damit wir unsere Sachen loskriegen“. Sie kriegen Ihr Zeug so los. Die bekommen ihre Produkte durchaus auch zum relativ guten Marktwert. bei Biomasse versprechen sie sich mehr, vielleicht höhere Rendite aber die bekommen ihr Zeug los, es wird irgendwie alles verarbeitet.
Und wenn dann an die Planung geht, (..) ich denke schon wenn das ein professioneller Biomasseanlagenbauer macht, der weiß was er macht, da ist es in Ordnung. Machen es welche, die es machen weil sie eben aus wirtschaftlichen Gründen machen müssen "wir können das, es wird schon irgendwie" - das geht schief. Man braucht ein hohes technologisches Verständnis. Wenn man das als Planer nicht hat, weil man denkt "es ist wie ein Eigenheim oder eine Fabrikhalle zu planen" Das kann ich der Bevölkerung, der Gemeinde irgendwie nicht vermitteln. **Man muss immer auf der kommunalen Ebene vermitteln**. Das sind jetzt die planerischen Sachen. Bei der Umsetzung genauso. **Es fehlt oft an Transparenz von Anfang an.** Wenn ihr das schon wollt, dann müsst ihr das frühzeitig sagen. Nichts ist "hast Du gehört, da soll eine Biogasanlage gebaut werden. Oh Gott oh Gott, was machen die denn jetzt?" Ganz schlimm- das hast Du immer wieder. Mindestens einmal in der Woche "wird es was gebaut bei uns?" ich sage " ich habe da nichts gehört, dass da was gebaut wird, aber sie müssen die Gemeinde fragen". Ich kann ja der Gemeinde nicht vorgreifen, wo ich genau weiß wo was gebaut wird, kann ich nicht sagen "ja, natürlich es wird 500 Meter von dem Grundstück eine Biogasanlage gebaut oder ein Solarpark oder keine Ahnung was. #00:11:37-7#

I: also es wird nicht an die Bürger herangetragen? #00:11:37-7#

R 05: **Es wird NICHT FRÜHZEITIG genug an die Bürger transportiert**. Das ist eine gewisse Transparenz und man macht zu wenig die Vorteile der Region klar. Wenn ich Biogasanlagen baue, wenn ich Biomasse verarbeite, welchen Vorteil hast Du davon. Meine Landwirtschaft lebt davon. Der Bauer fährt den Traktor, der hat Arbeit damit. Einfach so was, solche ganz einfachen Vorteile ernennen. Und wenn es natürlich von der Wärmeerzeugung ausgehe und sage ich gehe ein bisschen von meiner Rendite runter und sage "ich gebe die Wärme fast zum Nullfaktor ab und ihr braucht nur in das Netz zu investieren, ihr habt bloß die Netzabschreibung, aber ich gebe Euch die Wärme für fünf Jahre- das erste Jahr für so, das zweite Jahr für so und das dritte Jahr für so", dann kann ich ein WILLE in der Bevölkerung Erzeugung, der ist immens. Damit kriegt man die Leute, weil ich sage das wird unbeherrschbar sein für die Zukunft. #00:12:40-0#

I: Wenn so ein Planungsbüro oder ein landwirtschaftlicher Betrieb so eine Anlage plant, muss er die Tatsache berücksichtigen, dass der Betrieb / die Anlage in <u>Grenzregion</u> ist? #00:12:59-2#

R 05: Das Gesetz sagt schon: wenn es grenzüberschreitende Auswirkungen hat, muss das Nachbarland in geeigneter Form -so steht im Gesetz- informiert werden darüber. Wenn man direkt an der Grenz macht, ich wüsste keine Anlage, die direkt ist (..). Man kann sicherlich über die kommunale Ebene machen, weil die Kommunen miteinander arbeiten, das relativ gut abstimmen. #00:13:20-2#

I: heißt es dass die direkt an der Grenze liegende Gemeinden die benachbarten im Nachbarland darüber informieren müssen, die anderen nicht? #00:13:27-7#

R 05: Ja, die anderen nicht. Es muss einen direkten Einfluss haben. Was das andere ist: warum auch? Bautzen sagt mir auch nicht, wenn sie eine Biogasanlage bauen. Wenn ich nicht zufälligerweise auf der Arbeitsebene erfahre "gucke mal hier, ich baue eine Biogasanlage, interessiert Dich das?". Was in Brandenburg an der Grenze zu Sachsen gebaut wird, interessiert das auch keinen. Warum sollten die Polen oder Tschechien das als notwendig sehen, wenn die Deutschen unter sich nicht notwendig ansehen, warum soll ich den Polen oder Tschechien sagen: "eh ihr müsst das mit uns abstimmen, weil wir vielleicht Vor-oder Nachteile davon haben". Da muss der Gesetzgeber sagen "weise mir nach, dass es an dem Standort ökonomisch, ökologisch sinnvoll funktioniert". Das die ökonomischen Aufwendungen für die ökonomische Aufforderungen passend sind wie Einspeisevergütung, Einspeisepunkt in der Nähe, Einfluss auf die Umwelt vertretbar, Transportketten beherrschbar und dann muss "der Anlagebetreiber mir nachweisen woher Du das Zeug kriegst". "Das kriege ich aus Polen" dann "bringe mir den Nachweis". Es gibt kein Steuerungsgremium #00:14:55-6#

I: Der Gemeinde gegenüber muss man nachweisen, dass es ökonomisch, ökologisch und sozial sinnvoll ist? #00:15:02-1#

R 05: Sollte man. Muss man nicht, man muss nicht mal abstimmen. Ich sage Bautzen und Brandenburg stimmen sich auch nicht mit uns ab. Ich glaube es gibt auch keine Notwendigkeit. Wenn man die großen Anlagen bestimmen will, wie große Windanlagen, dann kann man vom Gesetzgeber sagen "Ok, wir mache eine grenzüberschreitende Regionalplanung" und wir sagen ihm "der Landschaftsraum verkraftet, wenn er das und das erfüllt und landwirtschaftlich geprägt ist, eben keine Ahnung maximal so und so viel Megawatt Leistung Biomasse". Kann man ja sagen. Und dann muss man schauen, wen man erreichen kann. 20 Anlagen gibt es, rechnen die? Ist das irgendwo gut? #00:15:46-4#

I: Bei der Planung wäre es vorteilhaft wenn die Anlagebauer oder Investor sich informiert zum Beispiel welche Biomasse es hinter der Grenze gibt. #00:15:58-0#

R 05: Ansonsten würden wir in das Wirtschaftsgefüge eingreifen. Keiner sagt "Wenn ich in

der Region ein großes Fitnessstudio baue, es ist auch egal. Da fahren Leute hin, die machen Krach die haben einen Parkplatz die fahren dorthin alles schwierig. Und da kann ein Pole genaue auf dem polnischen Gebiet eins machen. Das interessiert den Deutschen auch nicht. Nur mit diese Thematik "da könnt ihr ja Umwelt haben und zeug" #00:16:30-0#

I: Aus Ihrer Erfahrung heraus, in dem Genehmigungsprozess für eine Biogasanlage - gibt es dort Schwierigkeiten und was ist fördernd? #00:16:49-5#

R 05: Die Investoren unterschätzen schon den bürokratischen Aufwand. Die Bürokratie und Planungsaufwand ist immens. Und der hat jedes Jahr zugenommen - wir prüfen Sachen welche wir vielleicht nicht so in Detail prüfen müssten als Staat und vernachlässigen Sachen die vielleicht wichtig wären um den Standort zu sichern: eben solche Transportwege. Es prüft ja keiner nach. Wer der sagt "Ich komme mit 20 LKWs und fahre die Straße lang“, dann schreibt es dort rein und alle sagen "Ja, genauso macht der das". Wenn ich dann aber sage "Woher kriegst Du das aller her" dann sagt er "Ich kriege das von hier, hinten" da sage ich "Da kommst DU dann aber ganz andere Straße lang". Das prüft man ja zu wenig. Man prüft das da nichts rauskommt aus der Anlage, dass es technisch funktioniert alles. #00:18:04-6#

I: Gib es aus Ihrer Sicht besondere Vor- oder Nachteile für Anlagen die an der <u>Grenze</u> liegen, wie z.B. Anlage in Zittau? #00:18:08-8#

R 05: Ich glaube nicht. Ich glaube, dass Grenzlagen viel weniger Probleme haben als wir immer denken. Das war von sieben Jahren noch anders. Ich glaube dass die Grenzen mittlerweile so transparent sind, dass man so viele Beziehungen zu dem Nachbar hinter der Grenze hat. Wir haben manchmal mehr Beziehung zu den Polen und den Tschechien, wir haben mehr mit den zu tun als zu den Bautzener als zu den Brandenburger. Bei bestimmten Sachen. Also nicht im gesamten Landkreis. Wenn ich z.B. Löbau sehen, die haben natürlich mehr Beziehungen zu Bautzen aber ich denke es gibt Orte im Landkreis, wo ich sage die haben mehr Beziehung zu den polnischen Nachbarn als hier in eigenen Umlandgemeinden bei bestimmten Themen. Es ist ja auch gefördert worden- die kriegen Geld dafür. Das passt schon, das ist auch gut so. Ich denke gar nicht darüber nach weil ich sage "ich muss wissen wie der Nachbar tickt, was der Nachbar ein wirtschaftliches Potenzial hat, ich muss ihn einschätzen können, damit er für mich ein Stückchen berechenbar für mich wird, weil man in einer gewissen Konkurrenzsituation lebt“. Aus zu unseren befreundeten polnischen und tschechischen Kollegen, weil ich sehe das überhaupt nicht ein, dass das Zgorzelec die große Investition nur macht und Sonderwirtschaftszone und steuerlich begünstig. Bogatynia und Jelenia Gora sowieso, Zary genau das gleiche. Die hauen ein Ding nach dem anderen und kriegen steuerliche Begünstigung. Da sage ich "das muss ja nicht sein", die können ja zu uns kommen, da ist ja schon ein gewisser Neid auch da. Berechtigt, weil ich sage die ich freue mich zwar für die, aber (uv.) weil das soziale Gefälle dann steigt und die haben höhere Einkünfte aber ab und zu könnten wir auch was abkriegen. Das ist der Boom der dahin schwappt. Das kommt bei den Energieanlagen genau das gleiche. Weil die der Meinung sind, die können mit Photovoltaik mit Windenergie Geld verdienen. Dann fragen sie uns nicht, da wird es gemacht. Biomasse ist schon bisschen schwieriger da müsstest Du schon Verträge habe um das zu machen. Zittau ist top, gut gelöstes Grenzmodell, Standort schwierig, Zukunft wird zeigen aber ich sehe keine Probleme. #00:20:15-3#

I: Und wie sehen Sie das beim Stromverbraucher, gibt es Befindlichkeiten oder nutzen sie gerne den Biostrom auf Biomassebasis? #00:20:29-0#

R 05: Das ist die **falsche Imagedarstellung**. Wenn ich ständig dem Verbraucher erzähle "Du armer Verbraucher musst die Energiewende bezahlen". Das ist die halbe Wahrheit. Die gesamte **Energiepolitik ist nicht verbraucherfreundlich**. Wir können uns noch 5 Jahre einreden, dass EC eine tolle Sache ist. Das funktioniert nicht- der Verbraucher will es nicht. Jeder Unternehmer würde dann sagen: ich habe versucht, dann habe ich noch mal versucht

und vielleicht noch mal das dritte Mal aber jetzt ist schon mal gut, ich kann mir das nicht mehr leisten. Der Staat sagt "eh cool, ich mache es weiter. Es ist meine Linie, ich will es unbedingt haben und dann mache ich es weiter". Das ist ein gewisser **Größenwahn** und das merkt natürlich die Bevölkerung. Die Bevölkerung merkt ganz sensibel und es wird übertrieben. Ich denke, dass die Einspeisevergütungen auch die verhandelbare ist zu zwei Drittel durch **Lobbyismus** bestimmt. Ich gebe bestimmte Vorteilsrollen ab, die eigentlich das Gesamtziel gar nicht mehr verfolgen. Ich sage "jetzt ist die Solar". Solange ich die Speicherproblematik nicht geklärt habe, ist Solar in gewisser Prozentsatz ok, aber dann ist mal gut. Egal was ist, es ist schon die **Scheinwelt** und da aufgebaut wird. **Und dann muss der Verbraucher die noch finanzieren.** Und dann macht die Politik nicht ihre Hausaufgaben wie vernünftig **Energienetze** bereitstellen. Wenn ich das will, muss ich das durchsetzen als Staat. #00:22:27-5#

I: Die Rahmenbedingungen? #00:22:27-5#

R 05: Die Rahmenbedingungen. Da muss ich die Trasse bauen gegen alles. Und solange wir uns durch sonst welche Instanzen klagen, hat das Verfassungsgericht kein Freiraum um die wichtigen Sachen nach Vorne zu bringen. Und es gibt keine Energiewende ohne Netze, da muss ich die Netze nach vorne bringen, da muss ich es machen. Mit allen Konsequenzen, dass auch ein Teil der Bevölkerung das eben nicht versteht. Aber ich meine wir hätten keine einzige Autobahn in Deutschland, wenn wir so planen würden wie in den letzten 20 Jahren. Keine einzige Autobahn, weil Du wahnsinnig wirst mit den Planungsprozessen. #00:23:01-1#

I: Wenn man aber an die Netze denkt, sollte man grenzüberschreitend denken? #00:23:07-1#

R 05: Ja, ganz wichtiges Thema. Das Energieverbundnetz auf der europäischen Standards funktioniert, sonst würde das nicht funktionieren. **Aber dem Verbraucher ist im Augenblick nicht zu vermitteln, es gibt mehr negativen Informationen als positiven Informationen**. Und Biomasse ist nicht "Du tust für Deine Landwirtschaft, Du tust nicht etwas damit Deine Agrarwirtschaft funktioniert, sondern es wird gesagt "Ja, die produzieren keine Lebensmittel, das stinkt und ist ganz schlimm. Und keine Ahnung was da noch passiert. Das ist das vollkommen **falsche Bild**. Da sage ich: ich bin sehr **für lokale Modelle**- das kann ja bloß lokal, regionale Wertschöpfungsketten. Das ist dem Verbraucher nicht zu vermitteln. Das wird ja das größte Problem dem Verbraucher zu vermitteln. Wenn es ihm aufgezwungen wird, würde sich irgendwann ins Negative umkehren, weil ich sage: "für den Lebensabschnitt den ich habe, mit welchen Aufwendungen ich Energie sparen muss, dann sage ich mir: warum? ich bin nur die Summe X hier, auch die älteren Menschen sagen: soll ich die 20 Jahren Energie sparen, das teuer subventionieren, warum? Wo keiner weiß ob der Klimawandel überhaupt kommt, ob er in der Größenordnung kommt, ob ich CO_2 spare und die anderen machen sonst was sie wollen. Ich kann in der Region nicht sagen "eh cool, wir machen jetzt EEA, wir machen jetzt ganz streng erneuerbare Energien und ich muss mich sechs Mal im Jahr auseinandersetzten, dass die Polen hoffentlich kein Kernkraftwerk im Dreiländereck bauen. Das sage ich super, grenzüberschreitende Zusammenarbeit. Und dann sagen die Polen: es tut uns Leid, wir sind ja auch ganz traurig, wollen es auch nicht, aber das sind die ja aus Warschau. Und in Warschau fragst Du jemanden und die sagen: das sind eigentlich nicht wir, das sind ja die großen Konzerne und das ja alles ganz groß abgesprochen und es muss ja eine Energieversorgung geben und es ist eben so. Und wir bauen eben zwei Kernkraftwerke, wir wollen die bauen. Und dann sage ich: na prima. Und dann rennst Du als Deutschland rum, sagst Du dem Verbraucher: ihr musst noch das bezahlen- das ist nicht vermittelbar. **Große europäische Politik ist in dem Fall auf den kleinen Verbraucher nicht transportierbar.** Man merkt ja das in eigenem Umfeld. Wir bemühen uns sehr in der Energiebildung und mit allen. Biomasse ist genauso wie Solar war da super- jeder wollte Solar auf eigenem Dach haben. Und seit dem es überall ein Stückchen die Landschaft negativ beeinflusst (..). Ok, dann sage ich es liegt auch an euch. Hättet ihr ordnungsgemäß **geplant**,

ich lasse jede Solaranlage planen. #00:26:34-3#

I: Wenn man von dem Verbraucher zu einem Unternehmen kommt, z.B. das Zittauer Werk. Wie beeinflusst die Grenzlage die Kosten und das Ergebnis der Bioenergieproduktion? #00:26:49-0#

R 05: Ich glaube, dass dadurch das die Landwirtschaften sich relativ annähern -das ist nur Gefühl, aber lassen sie vielleicht 20 Prozent Unterschiede in Produktionskosten sein oder ein Drittel. 30 Prozent ist vielleicht in Polen günstiger zu produzieren. Vielleicht aber mit einer geringeren Rentabilität, mit einem geringeren Ertrag- es wird sich aber in der Produktion, in der Beschaffung aufheben. Ich halte den Standort Zittau für teurer als für günstigeren. #00:27:44-7#

I: Ist der Standort in Zittau benachteiligt oder hat Vorteile im Vergleich zu einem Standort z.B. in der Nähe von Berlin? #00:28:00-8#

R 05: Eher Nachteile, aber das hängt ja mit Zittau zusammen, da dort einen hohen Planungsaufwand für den Standort hatte. Ich hatte keine freie Standortsuche - ich wollte den Standort, also musst so lange dran basteln, bis er irgendwann gepasst hat. Mit Hochwasserschutz, mit Transportwegen, mit Lagerkapazitäten, ganz schwierig- sie konnten sich nicht frei entfalten. #00:28:18-1#

I: Aber irgendwo in Landkreis Zittau- ist ein Standort benachteiligt oder hat mehr Vorteile als irgendwo in Sachsen, nicht in einer Grenzlage? #00:28:42-2#

R 05: Ich glaube schon, wir haben einen Nachteil, dass wir eben **eine geringere Abnahmequelle** an Strom von Kunden hätten. Das ist wie der Bioladen- ich kann mich mit einem Bioladen in Görlitz irgendwo hinstellen, ich werde nie das Ergebnis wie in Dresden erzielen, weil ich kann bloß von der Bevölkerung k.A. 20 Prozent zu dem grünen Gas oder weiß ich was überzeugen und ich habe bloß die 20 Prozent. Und wenn in der Stadt 500.000 Leute Wohnen, bin ich mit den 20 Prozent bin ich gut dabei. Wenn ich aber Zittau 40.000 im Einzugsgebiet, 30.000 um die Drehe- dann fehlt mir natürlich auch das Potenzial - das ist schon **ein Nachteil.** Das überlegen sich die Standortbetreiber schon, ob ich überhaupt die Zielgruppe erreichen kann oder ich muss höhere Aufwendungen betreiben. Das halte ich eher für einen Nachteil. Der **Vorteil** könnte vielleicht in gewisser Weise in ein **geringeren Kosten** liegen - das ich sage: vielleicht noch geringere Lohnkosten immer noch, aber in der Gesamtinvestition ist das egal wo sie die Investition treffen. Ich glaube eher das es spezifisch bessere Standorte gegeben hätte, wo ich geringere technologische Aufwendungen hätte betreiben müssen: für bestimmte Schutzmaßnahmen das ist schon groß: diese Wohnnähe, mit dem Lagern am Stadtgebiet, das ist schon schwierig. #00:30:14-1#

I: Aus Ihrer Erfahrung heraus fällt Ihnen noch andere Faktoren die schwierig oder fördernd für den Bioenergieausbau waren/ sind? #00:30:25-3#

R 05: Regionale Konkurrenz. Ich weiß nicht ob jedem regionalen Anbieter so gefällt, wenn einer kommt: ich hab ja die Fläche, ich mache etwas ganz anderes, ich hab z.B. Kieswerk, hab da Platz, mache da eine Biogasanlage hin und versorge mit der Wärme eine Gärtnerei. Wo der regionale Gasanbieter sagt: bisher hat er ja dieses Gas von mir gekauft und jetzt Du gibst ihm das Gas, kostengünstiger weil es subventioniert ist die Anlage oder Du gibst Du ihm die Wärme günstiger als er sein Gas bei mir kauft, da verliere ich natürlich den Kunden. Das ist schon eine Schwierigkeit. Wenn man regionale Anbieter hat, die sich dem Thema öffnen, es gibt trotzdem eine Konkurrenzsituation, wenn Private auftauchen. #00:31:30-5#

I: Inwieweit sehen Sie sich in der Position Maßnahmen zu unternehmen, welche Ausbau der Bioenergie fördern? #00:31:55-3#

R 05: Wir können als Kreis, ein großer Kreis schon einiges bewegen. Wir haben ja eine regionale Verantwortung und Kompetenz auch wo ich sage: wir sind immer noch relativ nah dran an die Menschen, relativ gut vor Ort und sind trotzdem wiederum so groß, dass wir einen gewissen Einfluss auf eine übergeordnete Einrichtungen haben. Ich glaube schon dass wir in Sachsen ein gehöriges Wort mitreden können. Wir sagen: das ist ein totaler Blödsinn in einer übergeordneter Einheit, dann nimmt das schon mal ernst. So wie es noch vielleicht vor fünf Jahren war "ach ja, die dort hinten", das ist nicht mehr. Durch die Größe können wir schon was machen. Wir haben auch natürlich durch die Größe eine andere Entfernung zu den Gemeinden- es ist nicht mehr so vertraut. Wenn ich mit 20 Gemeinden hantiere könnte ich vielleicht dauerhafter in den Prozess in Verbindung setzen als mit 75. Aber wir müssen auch sagen, der Landkreis hält die Position. **Wir dürfen aber nicht vergessen: wenn wir wirklich handeln wollen, kostet das Geld und wir brauchen Leute die das tun**. (..) Ganz klar, ich kann immer sagen ich als Landkreis: he? ziele? politisch irgendwas? EEA (..) wenn ich niemanden habe, der das umsetzt, wer das transportiert und was auch mal Geld kostet da funktioniert das nicht. Da kann ich also keine Betreuung machen. Aber ich denke schon wir halten da dagegen. Wir sagen auch selbstbewusst was Blödsinn ist, muss man auch als Blödsinn bezeichnen. Und wir haben ja Erfahrungen. Also wir haben ja lokale Erfahrungen: wir wissen was wo schief gegangen ist, wo es Bürgerproteste gab, wir haben den Planungsüberblick noch. Grade wir explizit als Amt für Kreisentwicklung. Das hat vielleicht das Umweltamt nur seine Immissionschutzrichtung und der Landwirt hat nur das. Ich denke schon wir sind schon **Globaldenker**. Das ist der Vorteil - wir können diese Prozesse relativ gut vergleichen und abwägen. Das braucht Geld aber auch einen klaren politischen Willen. Und der ist manchmal nicht da. Und da steht sich die Politik manchmal ein kleines Stück selbst im Wege (..) **weil ich glaube, die Zukunftsaufgaben müssen jenseits von unterschiedlichen parteipolitischen Positionen geklärt werden**, mit allen Kräften die das zumindest wollen. Ich darf den Begriff "demokratische Parteien" verwenden aber ich sage es trotzdem. Ich denke die großen Parteien im Land werden das schon mal richten, müssen einheitlich handeln. Das wäre so eine grundsätzliche Sache, dann schafft man. Ich brauche ein klares politisches Bekenntnis, was auch wirklich **DAUERHAFT** ist. Das ist nicht das was ich heute "hops" und morgen wieder "hü" und dann wieder hopp sage - dauerhafte Entscheidung. Freistaat ist da nicht so instabil, aber wir werden darauf hinweisen. Es darf ja kein Programm geben, welches eine gewisse kommunale Begleitung erfährt. Und das was es uns nicht passt, das sagen wir klipp und klar. #00:35:17-6#

I: Was die dauerhafte Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der Umfeld investitionsfreundlich ist? #00:35:31-9#

R 05: Wir müssen wirklich ehrlich über die **Ressourcen** reden. Ganz wichtiges Thema. Wenn das der Staat nicht hinkriegt, gibt es eine Konkurrenzsituation, die ist nicht mehr beherrschbar. Ressourcen in den was ich hineingebe und was ich aus dem System herausnehmen kann. Eine Zielgröße - pass auf, dieser landwirtschaftliche Raum nach wissenschaftlichen Rahmen verträgt das und das. Nicht jetzt sagen: ihr dürft das nicht. Das steht dem Staat auch nicht zu. Er sagt, ok in der regionalen Verantwortung, Kommune, Planungshoheit: wir können sagen: das verträgt der Raum an Biomasse. Wenn du diesen Erzeugungswert überschreitest, bist Du gar nicht in der Lage die Rohstoffe dafür grenzüberschreitend, immer im Kreis, nicht im Halbkreis, zu erzeugen. Das müssen rechtliche Rahmenbedingungen werden, ohne dass es ein rechtliches Dogma wieder wird. Es ist so, fertig. Wir schauen was die Landwirtschaft so treibt, wir können Landwirtschaften gewisse Sachen auch politisch steuern auch das geht über eine gewisse Grenze über **Fördermittelpolitik**. Es ist schwierig, aber man kann versuchen über eine gewisse Zielrichtung zu lenken. Und das geht nur grenzüberschreitend, weil ich kann ja nicht sagen: im Halbkreis oder im Viertel Kreis von Zittau unten. Und das einfach die europäische Politik erfordert. Ganz klar, **Rahmenbedingungen und regionalplanerische Ansätze** - ich finde das immer so putzig: wir reden über jedes Gebiet, wo ein Vogel rumfliegt, da machen wir eine Karte, die schützen wir. Dann sage ich auch: mach doch das auch für Biogas, oder für irgendwas anders und sag: wieviel erneuerbare Energien verträgt eine Region? Und das ist ja vermittelbar. Ich sage, pass mal

auf es ist eben so: Du hast ja günstige Bedingungen, Du lebst Du ja in der Region und hier weht nun der Wind. Wir wollen nicht dass die ja nach Dresden hinfahren und dort die Biogasanlage hinstellen. **Mehr lokale Verantwortung, auch grenzüberschreitend** aber wir sehen wie schwer wir uns in euroregionalen Kontext tun. Es muss viel weniger Fördermittel bestimmt sein, viel mehr sachbestimmt sein. Ich könnte mir vorstellen eine **regionalen Fond** für sowas einzurichten, außerhalb der Fördermittellandschaft, dass man Nachhaltigkeit fördert. **Regionale Verbundsysteme** machen: also wirklich sagen: weg von dem Profit Gedanken und sagen wir steuern über weitere, größere kommunale Genossenschaften, das ich sage: irgendwelche Modelle machen. #00:38:57-2#

I: Und was meinen Sie unter **Verbundsysteme**? #00:38:57-2#

R 05: Es finden sich Organisationsformen, die das gemeinsam betreiben, wo die Kommune, der Staat besser davon profitiert. Jetzt ist ein reiner **Wirtschaftslobbyismus**, den wir machen- wir geben eine höhere Einspeisevergütung wo wir die Menschen damit belasten. Ok, wenn ich sage wir belasten die Menschen, dann muss da irgendetwas zurückkommen- da kommt ja nichts zurück. Es werden einzelne Sachen gefördert werden. Das ist ja bei Braunkohle ganz signifikant. Ich glaube schon dass sich Vattenfall redlich bemüht, aber wir verspüren ja immer eine erhöhte Kompliziertheit in dem Einbringen in der Region. Da gibt es Tausend Gründe dafür, da finde ich auch 500 Gründe. Deswegen sagen: da verpflichten wir ihn, der muss die Wärme kostenneutral zur Verfügung stellen. Man kann ja alles machen, festlegen kann man im Gesetz alles. Mal sehen ob sie das bauen. Es rechnet sich ja trotzdem, weil sie ja Strom verkaufen. Man sagt: die Wärme musst Du hier geben und ich kümmere mich in dem kommunalem Wärmenetz. Und Du kannst den Strom verkaufen. Ich bin froh dass Schengen gekommen ist, ich bin froh über den Euro ich bin dankbar in der Grenzregion leben zu dürfen. Wissen welche Stabilität in dem europäischen Kontext- das wissen wir beide nicht. Ich glaube dass die Ressourcenversorgung der Region eines der wesentlichen Bestände ist. **Politische Steuerung** notwendig. Wir sind ja ein Land des Wissens, aber kein Land des Handels. #00:42:53-8#

I: Sie meinten in Bezug auf Information, dass man die Energiewende nicht der Bevölkerung vermitteln kann. **Wie wichtig ist die <u>Informationspolitik</u> um Fortschritt in Bioenergieausbau zu erzielen?** #00:43:11-7#

R 05: Wir brauchen erst mal andere nationalen und europäischen Vorgaben. Es ist immer mühsam regional und lokal etwas zu vermitteln. Man baut Steinchen auf Steinchen und dann kommt der böse Wind vom Bund, von der EU und macht pups und alles fällt wieder ein. Und dann sage ich kann ja nicht dafür, ich habe mich bemüht das allen zu erklären und jetzt kommt die EU mit ganz putzigen Vorstellungen und macht alles zunichte. Und es genügt es informell an die Mediengesellschaft einfach zu sagen: ja wir bezahlen die Energiewende alles. Dann können sie aufhören, brauchen sie mit niemanden über die Energie zu reden. Jetzt müssen wir uns ständig begründen, warum wir etwas tun. Beispiel: Elektroauto, wir testen seit Wochen Elektroauto. Alles wunderbar, aber da sagt Dir keiner das Elektroauto bestimmte Sachen braucht: ne Stecksdose, eine Starkstromsteckdose (...). Es müssen erst die nationalen, europäischen Sachen stabil stimmen und nicht diese hops, dann was anderes. **Das Vertrauen in die europäische Politik ist bei den Menschen nicht mehr vorhanden.** Ganz nüchtern, ganz einfach. Ich kann keinem vernünftig die europäische Politik im Energiesektor erklären. **Du kannst mit Informationen viel machen, aber wenn es keine nationale, europäische Stabilität gibt, versagen wir mit unserer lokalen und regionalen Energieinformationspolitik komplett**. Es ist dann wieder sehr mühselig das wieder aufzubauen. Ich sage was Böses: seit der Kreisreform kämpfen wir um den EEA. Wir würden heute noch ganz anders kämpfen, wenn in Japan nicht die schlimme Ereignisse passiert wären. Durch die japanischen Ereignisse hatte ich über Nacht, da konnte ich nichts dafür, es war ja ganz schlimm. Und trotzdem sage ich im Nachgang: es ist für mich zum Vorteil gewesen, weil die Menschen vor Ort ganz anders geworden sind. Mensch Du machst ja EEA, was ist das? Es waren ein paar Wochen absolute Euphorie zu verspüren, die Leute denken drüber. Bloß wir

können nicht nur durch Katastrophen die Leute dazu zu bringen, über ihr Leben nachzudenken. Das wäre etwas schlimm. Das kann man nachhaltig fördern: **lokale und regionale Informationspolitik kostet Geld, das darf man nicht vergessen. Und das muss auch jemand machen.** Und dann kommt es an. Und es ist die **falsche und unvollständige Informationsentwicklung**. Es fehlt die Begeisterung der Bevölkerung durch Informationspolitik. Es müssen **Funktionsmodelle** her. Ich glaube nicht dass wir mit 20 Flyern und 10 Informationsveranstaltungen die Menschen erreichen. Die Leute müssen neugierig gemacht werden. Und natürlich **altersgerechte Informationsvermittlung**. Wenn ich eine Biogasanalge im Dorf baue, muss ich damit rechnen, dass die ältere Menschen Zeit haben sich damit zu beschäftigen. Kleine Informationspolitik- ganz wichtig. Die Vorteile für die Region aufzuzeigen ist wichtig. Es muss auch plausibel bleiben. **Ehrlichkeit**. Es gibt gewisse negative Einstellung. **Kontinuität** - ganz wichtig. Dazu braucht man einen langen Atem. **Zielgruppenorientierte Ansprache.** Wir haben den Gemeinden schon empfohlen z.B. Biogasbesichtigung und Erklärung. Der Staat muss das machen - Informationspolitik. **Global und grenzüberschreitend** sowieso - Informationspolitik muss so passieren. #00:54:31-0#

I: Sehen Sie andere <u>Maßnahmen</u>, welche man unternehmen kann um die Situation zu verbessern? #00:54:38-0#

R 05: Es gibt diese , welche auch realistisch sind und diese auch konsequent verfolgen. Auch in allen politischen Umstellungen. Es müssen auch realistische Ziele sein. Wenn man so sagt, irgendein Wert bestimmt, ist es das eine. Ich muss aber wissen was ich will. Ist es weniger der Wert der sich gut verkaufen lässt. Ich muss Ziel haben, es muss begründbar sein, dass nicht wieder umfallen. Das ist ganz wichtig. Strategische Maßnahmen: man sollte mehr auf die Fachleute hören, ohne jetzt zu sehr fachlich zu sein. Es muss **GREIFBAR sein, KLAR sein und DAUERHAFT sein**. Das sind so strategische Maßnahmen. Wenn ich etwas tue muss ich auch langfristig Möglichkeiten dafür bereitstellen. Die können ideell sein, nämlich sagen: ich unterstütze diese Sache als Partei, ich bleibe dabei und ich versuche nicht gegenüber dem politischen Gegner das aufzugeben. Ich bleibe bei der Linie. Und uns muss man in die Lage versetzen strategische Sachen langfristig begleiten zu können. Weil ich sage: man braucht schon **einen langen Atem**. Was NACHHALTIGE Strategie ist wichtig. Wenn ich nachhaltig was machen will, muss ich dabei bleiben. #00:58:32-8#

I:Vielen Dank. Bitte noch ein paar demografische Angaben zu machen und bitte um Ihre Unterschrift zur Verarbeitung der Daten.
END

APPENDIX 3.6 Exploratory Interview No. 6

Name of R 06: Pavel Grmela
Place: Liberec, Energie Agentur Dreiländereck, Tř. 1. máje 858/26 46001 Liberec III
Duration: 50 min
Date: 18.09.2012
Interviewer: Maria Meyer

START
I: Als erstes möchte ich gerne befragen wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung im Kraj Liberec? #00:00:19-4#

R 06**:** Die Frage ist, ob man überhaupt von einer Entwicklung reden kann. Wir haben keine richtigen Biogasanlagen, nur eine in Kryzany hier, die ich kenne. Die Entwicklung der Bioenergieerzeugung ist von der Staatsebene nicht so viel gefördert. Und die andere Sache, das werde ich heute mehrmals wiederholen: die RECHTLICHE LAGE: die up and downs hat ist nicht so optimal für weitere Investoren, die hier etwas machen wollen. Die Bioenergieerzeugung ist nicht so optimal. #00:01:04-2#

I: Gut, danke. Und welche Erfahrung haben Sie mit den Nachbarlandkreisen in Bezug auf die Bioenergieerzeugung gemacht? #00:01:12-7#

R 06: Mit Nachbarlandkreisen: in Usti ist die Lage besser. In Deutschland ist die Lage auch besser. Die Technologie die wir auch hier benutzen kommt aus Deutschland. Über Polen weiß ich nichts, es sind keine Kontakte da. #00:02:17-8#

I: In Deutschland und in Sachsen sind sehr ambitionierte Ziele, was den Ausbau der erneuerbaren Energien angeht. In Tschechien ist geplant für 2020 13 Prozent Strom aus EE. **Wie beurteilen Sie die Klima und Energiepolitik in Tschechien in Bezug auf Bioenergie?** #00:03:01-0#

R 06: Die Klima- und Energiepolitik ist hier ein riesiges Thema in Tschechien, weil wir warten auf die neuen Energiekonzeption von Tschechien- die ist in Planung. Jetzt wird viel darüber geredet, dass erneuerbare Energien gar nicht unterstützt werden sollten. Und eher wieder Richtung Atom und Kohle Tschechien geht. Aber es ist noch in Absprache. #00:03:44-1#

I: Und was denken Sie, ist es gut oder schlecht für die Region Liberec? #00:03:43-2#

R 06: Ich denke es ist schlecht für die Region. Wenn man was machen will (im Bereich EE), gibt es nicht so viele Möglichkeiten das zu machen. z.B. die Netzbetreibende erlauben keinen neuen Zugang mehr. Es war gestoppt, es läuft jetzt, aber das Netz konnte keinen neuen Strom aufnehmen. Und es gibt immer noch Befürchtungen dass das Netz keine Neue Energie aufnehmen kann. Bei Biomasse haben die Experten Angst, dass es so ähnlich wird wie bei Solar. Wenn sie Bioenergie Unterstützung erfährt, wird es wie analog bei Photovoltaik enden. Es gibt politische Satzungen, dass der Ausbau durch Bevölkerung unterstützt werden muss. Der Endkunde muss dann die Kosten des Ausbaus bezahlen. #00:05:08-2#

I: Haben Sie das Gefühl dass die rechtliche Rahmenbedingungen für den Bioenergieausbau den Ausbau fördern oder hemmen? Und warum ist es so? #00:05:31-6#

R 06: Hemmen (...) Es wurde eine Strategie für erneuerbare Energien herausgegeben und das rechnet auch mit Unterstützung von Biogasausbau. Dann gibt es Regulationsamt und der stellt die Unterstützungspreise fest. Und wenn die sagen wir unterstützen die Bioenergie nicht, dann hat kein Investor Lust, zu investieren. Weil die Parität einer Kilowattsstunden Strom aus Atom oder Solar ist immer noch nicht da. #00:06:29-3#

I: Die Regionen Liberec und Usti befinden sich in Grenzlage. Wie beeinflusst das den Ausbau der Bioenergie?#00:06:49-8#

R 06: Ich denke es hat nichts zu tun mit der Lage, eher mit der Landwirtschaft. Es gibt z.B. in Mähren mehr landwirtschaftliche Flächen und passiert mehr Anbau von Biomasse. #00:07:31-9#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie im Kraj Liberec? #00:07:51-9#

R 07: Es wurde besprochen, dass sich die Förderpolitik ändern muss. Damals wurden gefördert: Strom der ausverkauft wurde. Jetzt will die Regierung die Investitionen fördern, das heißt wirklich die Anlagen fördern, die Strom am billigsten produzieren. Also nicht den Strom sondern die Anlagen, die Strom billig produzieren. Investitionsförderung ist geplant in der neuen Konzeption. Ich weiß nicht ob das gut oder schlecht ist. Früher war nicht flexibel. Wichtig ist die Flexibilität: wenn die Technologie günstiger wird, soll sich die Förderung verringern. Ich fürchte dass die neue Förderung nicht das gewährleistet. #00:10:29-7#

I: Welche Konsequenzen sehen Sie für die Region Liberec aufgrund der Grenzlage im Bezug auf die Möglichkeit Fördermittel zu bekommen? #00:10:45-8#

R 06: Solche Aktivitäten wie PR oder Information oder Studien kann man über Ziel 3 Förderung für grenzüberschreitende Zusammenarbeit finanzieren. Das ist ein Vorteil. Es ist gut wenn man solche Projekte wie BEN 3 macht, bekommt man viele Kontakte und viele Informationen über Technologien auf dem deutschen Markt vorhanden sind. Diese Informationen kann man dazu nutzen, in Tschechien etwas zu machen. #00:12:05-5#

I: Welche Rolle spielen aus Ihrer Sicht die Umweltauswirkungen der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse in Region Liberec? #00:12:25-8#

R 06: Bei Biomasse gibt es einen bestimmten Bereich bis 50 km wo es sich lohnt, wenn man über CO_2 spricht, wo es sich lohnt die Biomasse zu transportieren. Ein weiteres riesiges Problem ist die Mitverbrennung von Biomasse in Kohlekraftwerken. Es ist die Frage ob es nicht besser ist kleine dezentrale Anlagen, wo man die Bioenergie produziert. Leider die größte Energiefirma in Tschechien CEZ hat andere Meinung dazu. Sie baut die Kohlenkraftwerke um, für die Biomassemitverbrennung. Man bekommt Förderung für die Mitverbrennung. CEZ ist eine staatliche Firma. #00:14:46-9#

I: Zum Thema aktueller Stand der Technologie. Haben sie das Gefühl, dass die Technologien für Bioenergieproduktion welche auf dem Markt verfügbar sind, gut bekannt sind? #00:15:02-6#

R 06: Ja, ich denke das know-how ist vorhanden. Es ist nur die Frage, ob die Investitionen lohnen sich. Die Technologien kann man beschaffen. Es ist 100 km bis nach Prag und es kein Problem um Informationen zu beschaffen. Dort ist Biom.cz. Es ist ein öffentlich-privater Verein. #00:15:55-8#

I: Haben Sie das Gefühl dass es genug Informationen zu dem Thema Bioenergieproduktion im Kraj Liberec gibt ? #00:16:09-1#

R 06: Wenn man die Informationen sucht, dann findet man diese. Wenn man diese nicht sucht, ist es schwer diese zu sehen. Es gibt schon Informationen und dank Internet ist es unproblematisch. Die sind ein wenig und schwierig zu verstehen, nicht so gut strukturiert. Nicht so gut für Normal-Bürger zu verstehen. #00:17:26-0#

I: Jetzt kommen speziell Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion betrifft. **Was wirkt hemmend und was unterstützend beim <u>Anbau</u> und bei der Bereitstellung der Biomasse für Energiezwecke?** #00:18:06-1#

R 06: Bei Anbau das ist die Sache der Förderung. Wenn die Förderung vom Staat schlecht eingestellt ist, dann bauen die Leute das was ist gefördert an. Also man muss einen Mix für Anbau machen, damit es kommt keiner Konkurrenz mit Lebensmittelproduktion. Bei Bereitstellung habe ich keine Informationen wie es dort läuft. #00:19:03-6#

I: Und haben Sie das Gefühl, das Landwirte und Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, aufgrund dessen dass die Flächen auf der Grenze liegen oder ist das vor Vorteil? #00:19:08-9#

R 06: Die Preise in Deutschland bewegen sich anders als in Tschechien. In Deutschland ist alles irgendwie teurer. Die Dienstleistungen sind teurer. Die Arbeit kostet mehr. Im Vergleich zu einer anderen Region in Tschechien jetzt nicht so. Bioenergieerzeugung ist noch nicht verbreitet. Wenn die Entwicklung weiter geht, werden die Nachteile der Lage mehr sich zeigen. Ich denke eine Sache ist: Transport über die Grenze. Die Düngemittel (Reste von einer Biogasanalge - I) werden über die Grenze transportiert, dann gibt es Schwierigkeiten. #00:20:36-2#

I: Was denken Sie, was hemmt und was fördert bei Planung und Umsetzung einer Biomasseanalage? #00:20:42-5#

R 06: Bei der Planung: die Wärme von einer Anlage muss genutzt werden - das ist geplant dass es zur Pflicht wird. Wenn man eine kleine Biomasseanlage hat, es ist manchmal ein wenig schwierig die Wärme zu nutzen. Bei der Umsetzung: wenn man Strom produziert, muss man ins Stromnetz speisen. In Gasnetz wird noch nicht eingespeist. z.B. in Krizany geht die Wärme in die Luft. #00:24:01-6#

I: Wenn so ein Planungsbüro oder ein landwirtschaftlicher Betrieb so eine Anlage plant, muss er die Tatsache berücksichtigen, dass der Betrieb / die Anlage in Grenzregion ist? #00:24:09-2#

R 06: Ich denke nicht. Wir haben den Vorteil, dass sind ein wenig näher der deutschen Technologie sind. Also wenn man will, kann man ein deutsches Unternehmen rausfinden und es ist einfacher als in Mähren. Es läuft gleich wie bei anderen Anlagen. Aus meiner Sicht ich habe Kontakte mit Leuten die über neue Technologien verfügen, also wenn ich etwas aus dem Energiebereich haben will, habe ich einen Ansprechpartner. #00:25:23-5#

I: Aus Ihrer Erfahrung heraus, in dem Genehmigungsprozess für eine Biogasanlage - gibt es dort Schwierigkeiten und was ist fördernd? #00:25:37-9#

R 06: Ich habe leider keine Erfahrung. #00:26:34-7#

I: Und wie sehen Sie das beim Stromverbraucher, gibt es Befindlichkeiten oder nutzen sie gerne den Biostrom auf Biomassebasis? #00:27:14-2#

R 06: Das ist schwierig zu sagen, aber zurzeit das hauptsächliche Argument: Bioenergie und andere erneuerbare Energien machen Strom teurer. Über Preisverteilung. Es gibt immer ein Anteil an erneuerbaren Energien. Also je mehr erneuerbare Energien, desto mehr müssen wir bezahlen. Weil der Staat muss mehr Förderung bezahlen und das bezahlt der Mensch. Jetzt waren erneuerbare Energien total negativ gesehen in Tschechien. #00:29:49-5#

I: beeinflusst die Grenzlage das Denk- und Verhaltensweise der Stromerbraucher? #00:30:06-7#

R 06: Ich habe selber anderen Zugang zu Informationen. Andere Menschen haben nicht so viele Möglichkeiten, was hinter der Grenze passiert, haben nicht so viele Informationen. Und das schlimme dabei ist, die meisten Leute wollen es nicht wissen. Ohne Interesse. Was passiert in Deutschland, ist es egal. In Nachrichten kommen nicht viele Informationen über das Nachbarland. #00:32:30-7#

I: Aus Ihrer Erfahrung heraus fällt Ihnen noch andere Faktoren die schwierig oder fördernd für den Bioenergieausbau sind? #00:32:46-6#

R 06: Hauptproblem in Tschechien ist die gesamte Konzeption - wir machen die Konzeption immer so für 5 Jahre. Die Politik ist zu kurzfristig und ändert sich. Deswegen sind die Bedingungen für erneuerbare Energien INSTABIL. Man kann ja nicht so richtig investieren, weil man nicht so richtig weiß, wann andere Steuerzahlung eingeführt wird oder so. #00:33:28-8#

I: **Wenn man an Liberec denkt im Vergleich zu anderen Krajen: hat die Grenzlage einen Einfluss auf die Ausbaumöglichkeiten der Bioenergie?** #00:33:59-7#

R 06: Ich denke der Landkreis hat nicht schwieriger. Die Tschechische Republik ist nicht so groß, im Unterschied zu Polen oder Deutschland. Deswegen sind die Bedingungen in Tschechien fast gleich, was die Gesetzgebung angeht. Die natürlichen Bedingungen sind anders. Deswegen werden z.B. in Mähren mehrere Anlagen gebaut. Ich sehe die Grenze zwischen Deutschland und Tschechien als nicht problematisch. Es ist eher so, dass die Einstellung der Leute sich ändern muss: wir brauchen mehr PR (Public relations) damit die Bioenergie mehr Unterstützung bekommt. Ohne Unterstützung der Leute kann man nichts machen. #00:36:55-8#

I: **Inwieweit sehen Sie sich in der Position Maßnahmen zu unternehmen, welche Ausbau der Bioenergie fördern?** #00:37:20-9#

R 06: Meine Position: ich kann nichts machen um die Barrieren abzubauen. Ich bin nur Angestellter bei der Energieagentur bin zu klein dafür. Wir können PR Veranstaltungen machen, aber es ist schwierig. Die Agentur als Ganzes kann schon mehr unternehmen. Aber leider sind wir nur eine Regionale Agentur und haben keine richtigen Kontakte bei der Regierung. Und das muss man haben, um was bewegen zu können. Die Entscheidungsträger sitzen schon in Prag. Wir machen mehr regionale Sachen. Und es gibt kein staatliches Konzept in Richtung: Entwicklung der Energieagenturen. Das würde helfen. #00:39:26-5#

I: Was die dauerhafte Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der Umfeld investitionsfreundlich ist? #00:39:43-8#

R 06: Es wäre gut, wenn die Rahmenbedingungen kompakt zu haben, d.h. dass sich die Bedingungen ändern. Wenn man was anfängt und sich in 2 Jahren alles ändert, das ja kein Sinn. #00:41:27-1#

I: Wenn man an die Land- und Forstwirte denkt: welche Auswirkungen sind für diese Gruppen wenn man an die Grenzlage denkt? #00:41:50-8#

R 06: Ich denke es könnte ein Vorteil für die Landwirte und Forstwirte sein. Aber ich weiß nicht ob die Leute so denken, dass sie die Produkte in Deutschland verkaufen. Es gibt kein strukturierter Markt. Es ist wichtig langfristige Verträge zu machen, um zu sichern, dass Landwirte Ihre Biomasse nicht woanders verkaufen. Die Preise müssten ausgeglichen werden. #00:43:40-0#

I: Wie wichtig ist die Informationspolitik um Fortschritt in Bioenergieausbau zu erzielen? #00:44:01-4#

R 06: Ich denke auf der lokalen, regionalen Ebene ist es ganz einfach: die Entstehung und die Unterstützung der regionalen Energieagentur, die sich für Informationspolitik und Informationsvermittlung kümmert. Ein Partner der die Verhältnisse in der Region kennt. Und alle kennen die Energieagentur, was in der Region sie gemacht hat. Ich denke Biomasse sollte hauptsächlich in dezentralen Anlagen sein. Die Informationen sollten über regionale Agenturen verteilt werden. Es wäre gut einen Netzwerk haben: eine zentrale Agentur welche mit regionalen Agenturen zusammenarbeitet. #00:46:20-4#

I: Und soll es grenzüberschreitend sein? #00:46:25-3#

R 06: Ja, grenzüberschreitend. Meistens die Regionen sind mit der Grenze nicht stark abgegrenzt, was die sozio-kulturellen Bedingungen angeht. Damals waren Tschechien und Deutschland ein Land. Es gab eine Via Regia, die durch beide Länder führte. #00:47:12-9#

I: Sehen Sie andere Maßnahmen, welche man unternehmen kann um die Situation zu verbessern? #00:47:22-8#

R 06: Es wäre gut, die Regierung zu überzeugen, dass die Planung langfristig erfolgen soll. z.B. in Dänemark haben sie entschieden bis 2050 ich will energieautark sein. Und egal ob ich bei SPD oder bei den Grünen ich will bis 2050 autark sein. Das ist die Richtungssetzung. Die Gefahr in Tschechien ist, dass nach der Wahl gibt es keine Kontinuität. #00:48:38-6#

I: Vielen Dank. Bitte noch ein paar demografische Angaben zu machen und bitte um Ihre Unterschrift zur Verarbeitung der Daten. #00:48:57-2#

END

APPENDIX 3.7 Exploratory Interview No. 7

Name of R 07: Dr. Mieczyslaw Ciurla
Place: Marshall Wroclaw
Duration: 55 min
Date: 28.09.2012
Interviewer: Maria Meyer

START
I: W jakiej mierze jest Pan zadowolony z rozwoju wytwarzania bioenergii w województwie dolnośląskim? #00:00:19-4#

R 07: W ogole nie ma tego rozwoju na razie. Mysle oczywiscie o terenach przygranicznych. W wojewodztwie Dolnoslaskim bardzo niewiele powstalo- dwie czy trzy biogazownie. I to maja bardziej charakter pilotazowy. Mozna powiedziec ze Pan minister Gospodarki oglosil, ze w kazdej gminie ma byc zbudowana jedna biogazowania, ale to jest bzdura, na razie nie ma. Dla mnie trzeba najpierw zbilansowac zasoby biomasy. To co mowi sie w Polsce o energetyce rozproszonej, to wymaga to NADZORU i KOORDYNACJI, cos takiego. Trzeba to zbilansowac. To musi byc sprzezone z polityka agrarna. Powstaje pytanie: mamy roznego rodzaju ziemie. Prowadzi to do jednorodzajowej produkcji, np. sloma, czy myskanty. Trzeba patrzec jak sie rozwinie cala polityka certyfikatow, jesli chodzi o CO2. Trzeba powiedziec jasno. Ci wieksi beda monopolistami w zakresie pozyskiwania certyfikatow i maly nie bedzie mila nic do gadania. Co bedzie z ustawa o OZE (I: Odnawialne Zrodla Energii) i jak bedzie finansowane. Bo niestety energia z tego typu wytwarzania jest 2-3 krotnie drozsza od energii zawodowej. Takze to jest sprawa ktora nie moze byc na "hura". Jesli ja czytam ze w Niemczech, ze Pani Merkel chce najpierw zmniejszyc a potem zlikwidowac doplaty, to spowoduje ze wiele tych elektrowni zbankrutuje. #00:03:58-2#

I: Jakie doświadczenia miał Pan z sąsienimi podregionami do jeleniogorskiego jeśli chodzi o wytwarzanie bioenergii? #00:04:01-0#

R 07: W tej chwili malo kto sie zajmuje tego typu rzeczami. Np. kogeneracja wroclawska wykorzystuje wspolspalanie biomasy, ale wykorzystuje do tego firme, ktora dostarcza jej biomase. Firma ta skupuje jej z okolicznych miejscowowsci odpady rolnicze, slome, odpady drzewne bo produkuja tzw. pelety, wykorzystywane do wspolspalana. Jak to bedzie jak wspolspalanie bedzie nieoplacalne lub zabronione, to zobaczymy w tym miejscu. Druga sprawa jes problem inwestycji w biogazownie. Bo to sa drogie rzeczy. Okres splaty tej inwestycji to jest kilkanascie lat- nikt nie chce sie w to za bardzo bawic bo nie wie czy mu sie to splaci czy tez nie. Ostatnia kategoria to jest to, ze w Polsce nikt nie chce doplacac do tej energii. To sa podsawowe rzeczy dlaczego te biogazownie nie powstaja. #00:05:28-1#

I: Udział odnawialnych źródeł energii elektrycznej bruttow produkcji prądu w 2020 r. ma wynieść w Polsce 15 Prozent (w europie 20 procent) **Jak ocenia Pan ta politykę rozbudowy energii z odnawialnych źródeł i w szczególności biomasy? #00:05:55-3#**

R 07: Marnie. my mamy na razie 3 procent i to przewaga elektrowni wiatrowej, do tego wodna i na koncu biogazownie. i troche fotowoltaki, ale tego jest niewiele. Dopoki nie ukaze sie ustawa o OZE to bedzie 0. Ustaw jest w trakcie przygotowania, ale to trwa juz od pol roku. Ostatnia wersja zostala oprotestowana i powiedziano byc moze z koncem tego roku albo poczatkiem przyszlego ta ustawa se ukaze, w co nie wierze. #00:06:46-8#

I: Brak ustawy OZNE. Co Pan sadzi jak uwarunkowania prawne dla rozbudowy bioenergii dwplywaja na jej rozbudowę? #00:07:04-3#

R 07: Do momentu dopoki nie bedzie jasne, co jest traktowane jako odnawialne zrodlo, jakie beda warunki przylaczenia i odbioru, jakie beda warunki pokrywania kosztow wytwarzania, w

jaki sposob, z jakim przelicznikiem, w sensie stalym nie tylko incendentalnie- nie talko raz w roku; to bedziemy mieli zero. Na razie bedzie tak jak dzisiaj. Swego czasu w Polsce powstalo wiele elektrowni wiatrowych, nowych inwestycji ktore teraz stoja i czekaja na ta ustawe. Z biomasa jest trudniej: trzeba ja zebrac, przerobic. Jesli che sie wybudowac biogazownie sa tez (I:jak przy energi wiatrowej) protesty. Bo ludzie boja sie tego smogu Czasem ten strach jest przesadny, bo te biogazownie sa budowane ze tam nie ma zadnego ale, mimo tego nie chca ludzie. #00:09:43-4#

I: Jak Pana zdaniem położenie przygraniczne wojewodztwa dolnoslaskiego wplywa na szanse na rozwóju bioenergii? #00:09:59-8#

R 07: Nie laczyl bym fakt polozenie na granicy z rozbudowa bioenergii. Mysle ze u nas nie ma czegos takiego jak tendencji, kultury w tym zakresie. W ramach programu operacyjnego namawialismy gminy, zeby postawily lokalna kogeneracje, ale nikt sie na to nie zdecydowal ze wzgledu na te koszty, na brak pewnosci zasilania, ze trzeba to bedzie wozic daleko, bo ci wieksi beda wykupywac material- juz to robia. Ta ustawa musi sie ukazac, bo kazdy z tych producentow musi zrozumiec ze to dla niego jest interes. Jesli na razie poki co go nie ma, to nie bardzo chce sie do tego angazowac. #00:11:24-9#

I: Jak oddzialuje polityka wsparcia na rozbudowę bioenergii w regionie województwie dolnośląskim? #00:11:42-7#

R 07: W funduszach strukturalnych mamy srodki na te rzeczy dla przedsiebiorstw ktore chca budowac, ale jak juz powiedzialem zainteresowanie tymi inwestycjami jest bardzo niewielkie, marne prawie zerowe. Z czego to wynika? Firma ktora bedzie angazowala srodki musi miec zysk. Dzisiaj maja problemy z przylaczeniammi odbioru tej energii. Nikt nie chce kupowac tej energii po takiej cenie jaka proponuje wytworca. Poziom doplat jest nieuregulowany, dlatego na razie jest spokoj. Byc moze jak sie ukaze ta ustawa, byc moze to sie wszystko zmieni, ale to sie dopiero okaze. Disiaj z tego korzystaja tylko ci, ktorzy juz sa producentami ciepla przede wszystkim chodzi o cieplownie po to zeby wykazac sie wspolspalanie ale nic wiecej. ale tez w niewielkim stopniu bo to jest coraz drozsze. Tylko zeby sie wykazac, ze probuje i stosuje. Jesli wspolspalanie okaze sie nieefektywnie, bo ustawa moze nie "zabroni" ale nie uzna za certyfikaty, to wowczas przy tych kosztach nie bedzie sie oplacalo. Teraz zawieszono- wpolspalanie nie uzawane jest jako odnawialne zrodla energii. Kiedys drewno uznawano jako OZE, teraz nie, tylko scisnki. #00:14:02-9#

I: Jaką rolę odgrywa oddziaływanie na środowisko np. częsty transport biomasy przy wytwarzaniu energii z biomasy ? #00:14:11-4#

R 07: Jesli mowimy o biogazowniach, ktore bazuja na swoich produktach (np. takie jak w Niemczech), gdzie jest chodowla krow, swin i jest chodowla rolnicza, kukurydza: jaki tam transport jest- przy rolniczych. Przy przemyslowych, przy wspolspalaniu, to trzeba wozic biomase. Dlatego ci przetwarzajacy maja jednego dostawce, ktory przywozi, zeby nie wszyscy wozili i on wstepnie przygotowuje biomase. Czli ona jest wysuszona, speletowana albo zweglowa, zeby nie wozic z daleka. Wyliczono, ze z dalej niz 50 km to sie nie oplaca, chyba ze juz jest tak przygotowana, ze mozna wrzucic do paleniska. #00:15:59-8#

I: Oprocz spalania biomasy, sa jeszcze inne technologie, jak np. produkcja biogazu przez fermentacje. **Jak ocenia Pan dostepnosc technologii do wytwarzania bioenegii w woj. dolnośląskim?** #00:16:10-0#

R 07: Pani mowila o takich biogazowniach gdzie jest kogenerator i produkcji pradu z biogazu. My na razie nie mamy takich biogazowni. Technologie mozna kupic gdzie sie chce. Propozycji jest duzo. Jest tego wbrod. Wspolspalanie jest koncentracja tych duzych wytworcow. Oni chca wspolpalac, bo otrzymuja certyfikat. To jest najlatwiejsza droga. Musi to zrobic, to moze sie wykazac. Na obszarach wiejskich musi byc inwestor, musi mu sie

oplacac. Jesli on ma problemy z odbiorem tej energii, nie ma doplat, to po co on ma sie w to bawic. A jeszcze sie potem okaze ze bedzie mial problem z dostarczaniem biomasy. Niech Pani zobaczy tu jest "Czysta Energia" (I: gazeta). To wszystko jest dostepne na rynku. #00:18:44-7#

I: Skupmy si teraz na lancuchu dostaw. **Co hamuje a co wspiera według Pana przy produkcje biomasy na cele energetyczne?** #00:19:19-6#

R 07: Na razie nie ma zapotrzebowania, nikt tego nie chce. Co mozna dostarczac: trzeba by bylo siac kukurydze dla kogos kto bedzie odbieral i fermentowac. Producent by sie znalazl. W Niemczech sa te biogazownie rolnicze. Rolnik ma 300 ha i hoduje kukurydze. W Niemczech jest to jasno postawiona sprawa ile sie doplaca do 1 kilowata. To co ja czytam, ze jesli Niemcy zlikwiduja doplaty, bo beda musieli zlikwidowac, to to wszysto padnie. #00:20:48-5#

I: Jak położenie przygraniczne wpływa na produkcje biomasy na cele energetyczne? #00:21:08-8#

R 07: Czy producentowi pradu na bazie importowanej biomasy oplaca sie produkowac? wlasciciel produkuje biomase. Dlatego w Niemczech rozwijaly sie biogazownie na gospodarstwach. Ma gnojowke, z ktora nie ma co zrobic. I to tez nie jest oplacalne. Dopoki sa oplaty jest oplacalne. Powiedzmy ze ta technologia jest mimo wszystko jak policzyc koszty to i tak mu sie nie oplaca. bez doplat. Jesli zalozymy, ze cena energi pojdzie 30 procent to ta energia bedzie tez zuzywna zeby wytworzyc biomase i zeby tez przetworzyc biomase. Teraz jest pytanie: ile musilaby sie zwiekszyc cena bioenergii zawodowej w elektrowni, zeby zbilansowac, zeby bylo oplacalne. Bedzie trudno. To jest tak jak z wiatrakami. To jest wcale nieoplacalny interes. To sie nie oplaci. Przyjelismy inna filozofie, ze zgadzamy sie na koszy i nie chcemy truc powietrza, nie chcemy emitowac teog CO2. ale tez jest z drugiej strony konsument. Jesli bedzie Pani duzo placila za prad, to bedzie Pani robila wszystko, zeby go nie zuzywac. Czyli nie bedzie go potrzeba tego pradu. Nie ma go gdzie zmagazynowac. Nie bedzie potrzeba takij mocy zainstalowanej. Bedzie smieszny uklad: jesli nie bedzie Pani potrzebowala tyle energii, nie bedzie sie oplacalo zyc z energetyki odnawialnej. musi byc klasyczna. Ta klasyczna bedzie coraz badziej droga. Coraz bardziej droga. Bo on musi swoje koszta zbilansowac. Jesli elektrownia nie uzyskuje dochodow, po co ma produkowac. Wzrost cen bedzie coraz wiekszy. rowniez niebezpiecznie. Jesli do 60 procent z wegla dojdziemy to bedzie wielki sukces. gospodarka jest bardzo czula energetycznie. #00:30:13-7#

I: Wspomnial Pan o szkole, ktora wykorzystuje biomase na produkcje bioenergii. **Jakie czynniki hamuja a jakie przyspieszaja planowanie i realizacje inwestycji wytwarzania bioenergii?** #00:30:59-2#

R 07: Problemy sa zawsze o charakterze finansowym. celem takich inwestycji np. przy szkole maja charakter demonstracyjny, zeby pokazac ze to dziala. Na razie nie znajduje to wielkiego odbicia. W tej chwili to co sie stanie, to stanieja fotowoltaika**. Nasze prawo**, element ktory hamuje, u nas trzeba miec 30 pozwolen (w Niemczech 5 czy 6) na biogazownie. Procedura prawna jest bardzo skomplikowana. Juz nie mowie o uzgodnieniu ze spoleczenstwem. To jest tez bardzo wazna sprawa. #00:32:51-8#

I: Jak wplywa położenie przygraniczne na proces planowania i realizacji inwestycji wytwarzania bioenergii? #00:33:12-4#

R 07: Przy dzisiejszym swobodnym przeplywie pracy, ziemi i kapitalu to nie ma problemu kupic- trzeba sie tylko dogadac z rolnikami. Pytanie jest tylko ile starczy tej biomasy. Granica nie przeszkadza w zadnym wypadku. #00:34:37-7#

I: Jakie czynniki hamuja a jakie przyspieszaja wnioskowanie o dofinansowanie oraz pozwolenie na budowę instalacji do produkcji bioenergii? #00:34:54-9#

R 07: My mamy srodki na budowe RPO (Regionalny Program Operacyjny) instalacji biogazowych czy wodnych. To zalezy od przedsiebiortwa i lokalizacji. ale chetnych nie ma bo co z tym zrobic. Kto doplaci? Ostatnio byla taka duza biogazownia demonstracyjna w Swidnicy, to trzeba by bylo zapytac. Ja nie chcialbym sie wypowiadac. Tam powstala taka fundacja. Prezesem jest Pan Brzozowski. #00:36:49-0#

I: Co motywuje a co hamuje konsumenta do korzystania z bioenegii? #00:37:05-7#

R 07: W Polsce sa tak zwane dwa taryfikatory: jeden jest dla przedsiebiorcow i gmin i ci moga wybierac sobie. Indywidualni maja taryfe panstwowa i nikt nie moze im sprzedac drozej ta energie. Dzisiaj sie mowi ze mozna wybrac roznego dostawce. Wcale to nie oznacza ze on sprezdaje czysta energie. On jest posrednikeim. i nie ma Pani pewnosci ze nie podniesie on Pani ceny za rok lub pol roku. Jako firma mozna sie zdecydowac, ale pozniej trzeba szukac znowu innego dostawce. To wcale nie jest praktykowane w Polsce, bo to jest bardzo niewygodne. Najczesciej sprezdawca energii elektrycznej jest mniej wiecej ten kto ja produkuje. Wtedy ma Pani z nim podpisana umowe i Pani wie: on produkuje i sprzedaje Pani. Przychodzi firma, ktora jest posredenikiem: zyli sprzedaje Pani czysta energie, na papierze, ale bierze ja z energi PRO, bo nie ma innego wytworcy. To jest taka mozliosc, ale nikt z niej nie chce korzystac. #00:39:39-7#

I: W Niemczech sa przypadki korzysania wirtualnego z bioenegii dla celow prestizowych. Jesto cos takiego, ze wzgledow demostracyjnych? #00:40:08-6#

R 07: Moze ak jest w Niemczech, ale cos nie bardzo w to wierze.Nie ma rynku konsumenta ktory korzysta z bioenergii, bo tez nie ma bioenergii. #00:44:10-2#

I: Zna Pan/Pani inne trudności i czynniki pobudzajace jakie występują przy produkcji bioenergii? #00:44:22-1#

R 07: To co mowilem: prawne rzeczy, ktore sa uciazliwe. Spoleczne: potrzebna akceptacja. Ludzie uslysza o inwestycji, to zaraz bedzie proces: dlaczego tu a nie tam. My staramy sie wojtow namawiac do wybudowania jednej biogazowni na terenie 3-4 gmin. Produkcja ciepla i pradu, ale niestety to bedzie wymagalo lat swietlnych, zeby ich przekonac. Jak przyjdzie do wylozenia pieniedzy, to zaczynaja sie problemy. #00:46:19-7#

I: W jaki sposób jest Pan/Pani sama w stanie podjąć działania zeby poprawic sytuacje? #00:46:20-7#

R 07: Musi byc unormowanie prawne. Formuly prostszego latwiejszego instalowania tych inwestycji. Musza byc preferencyjne kredyty na budowe, latwosc dostepu do tych kredytow. Zeby powstal taki ruch prosumencki, czyli wspolne biogazownie. #00:48:02-7#

I: Jaką rolę odgrywa według Pana polityka informacyjna w rozwoju bioenergii w obszarze przygranicznym? #00:48:27-3#

R 07: Jesli chcemy nadac temu wymiar znaczacy, to Panstwo musi zainwestowac, nie ma inngeo wyjscia. Czyli trzeba wesprzec przynajmniej na poczatek, zrobic kilka pokazowych biogazowni na koszt panstwa, po to zeby inni zobaczyli. Kiedys z ta doplata trzeba bedzie skonczycc. ale trzeba pokazac ze to sie da zrobic. i nie ma problemu z podlaczeniem. Technicznie nie jest skomplikowane. mozna pokazac ze na nieuzytkach urosna miskanty i inne- mozna je spalac, czy do czegos innego. zagospodarowac nieuzytki. ale to trzeba pokzac wszystko. my jestesmy na etapie tych wszystkich roslin uprawy laboratoryjnej.

#00:50:33-7#
I: Jak wplywa położenie przygraniczne na rozwoj produkcji bioenergii regionu jeleniogorskiego? #00:50:56-0#

R 07: Mysle ze to dobrze- do rolnik, ktory sprzedaje biomase do Niemiec, moze sie zastanowi sie i zrobi u siebie. Mysle ze to polozenie przygraniczne pomaga, rozszerze horyzonty. #00:51:55-4#

I: Jakie inne działania według Pana/Pani należy podjąć aby przyspieszyć rozbudowe bioenrgii? #00:51:57-6#

R 07: To jest nie pomysl ale niebezpieczenstwo. My mozemy doprowadzic do jakiejs monokultury. jak bedziemy produkowac byle jakie zboze, zeby sie spalilo, to zapomnimy o produkcji zboza dla nas. takie zboze ma sie tylko spalic. przeciez juz dzisiaj rozwazano spalanie owsa. bo nagle owies byl porownywalny z tona wegla. Co sie stalo: owies poszedl w gore i juz nikt nie pali owsa.

Dziekuje za wywiad.

END

APPENDIX 3.8 Exploratory Interview No. 8

Name of R 08: Tobias Steiner
Place: Wohnbau- und Wärmeversorgung Großschönau GmbH (WWG), Großschönau
Duration: 60 min
Date: 23.11.2012
Interviewer: Maria Meyer

START
I: Herr Steiner, wie zufrieden sind Sie mit der Entwicklung der Bioenergieerzeugung im Landkreis Görlitz? #00:22:57-8#

R 08: Potenziale sind ja da und man sieht dass viele sich mit dem Thema auseinandersetzen. Auch die Landwirte und sie bauen ja auch. Wenn ich mir alleine anschaue, Olbersdorf hat eine Biogasanlage, Zittau hat eine Biogasanlage, Grossschönau hat jetzt auch eine. Aber jede Gasanlage hat unterschiedliche Probleme z.B. Zittau hat das Problem, dass die Preise der Eingangsstoffe nach oben gehen und das nicht so unbedingt kalkuliert haben. Unser Biobauer hat eigene Kapazitäten kann sein Bedarf aus eigenen Flächen decken, hat aber kein Wärmekonzept. Das sind so die Probleme, die sich so auftun. Aber Ansonsten denke ich das ist eine gute Sache, die weiter ausgebaut werden muss, aber KOORDINIERT. Bis jetzt ist es eben so: "wie kann ich Geld verdienen". Das ist ja immer so, die ganzen Investoren reisen durch das Land uns sagen: Bauer, Du hast Gülle, nutze sie, vergolde sie Du hast noch so viel Getreide auf dem Feld stehen nach dem Mähen, das kannst Du auch mit mähen und mit vergasen. Im Vordergrund immer das Geld steht und weniger Nutzen für Alle. Das ist natürlich immer sehr schwierig. Ich denke wir sind auf einem guten Weg. #00:24:44-8#

I: Und welche Erfahrung haben Sie mit den Nachbarlandkreisen in Bezug auf die Bioenergieerzeugung gemacht? #00:24:55-3#

R 08: Da muss ich gestehen, da habe ich eigentlich wenig Erfahrung gemacht. Wir haben mit unseren Problemen, Gemarkung Gemeinde uns beschäftigen. Ich habe nur so beiläufig mitbekommen, wer Verträge mit Polen oder Tschechien hat, da sind auf einmal die Preise höher geworden sind. Wir haben uns in Gemeinde Grossschönau damit beschäftigt, wie könnte man bestehende Systeme zusammenführen. Wir haben gesagt, dass wir einen möglichen Produzenten haben. Wir haben überlegt, wie können wir den einbinden. Dass der Produzent eigene Strategie verfolgt "ich will nur die Wärme verkaufen den Rest ist es egal, damit verdiene ich Geld" passte nicht in die Strategie des Trixibades, der nun in der Mitte lag. Mir war es auch nicht möglich zu sagen, gut ihr verzichtet auf eures eigene und sieht das große ganze, weil immer muss ich denken "wie kann ich Kosten senken, wie kann ich zusätzlich Potenziale finden und das ist immer Energiekosten senken" und das ist kontraproduktiv. Und für uns ist der Bauer ziemlich weit weg. Wenn er seine Leitung zu uns führt, lohnt es sich nicht. Wir haben nicht nach Polen oder Tschechien geschaut, Kapazitäten liegen dort, um das selber zu machen. Es wäre auch mal Ansatz zu sagen " wenn es eine Möglichkeit kommt, mit nachwachsenden Rohstoffen, selber so eine Anlage aufzubauen". Dann müssen wir natürlich schauen, wo kommen unsere Rohstoffe her. #00:27:50-7#

I: In Sachsen gibt es sehr ambitioniertes Ziel 30 Prozent Strom aus erneuerbaren Energien in 2020. Das ist sogar höher als in Deutschland und Europa. Wie beurteilen Sie die sächsische Klima- und Energiepolitik in Bezug auf den Ausbau der Erneuerbarer und speziell der Bioenergie? #00:28:20-4#

R 08: Die Entwicklung ist schon gut. Wir müssen ja sehen, dass allen fossilen Energieträger endlich sind. Und wenn wir wirklich zukunftsorientiert arbeiten wollen, dann müssen wir Möglichkeiten betrachten, wie wir anders machen können. Ich denke da haben wir alle den Anspruch das umzusetzen. Wir haben für uns erst mal festgelegt, dass unsere Grundlast auf erneuerbaren Rohstoffen abgedeckt wird. Wie man das macht, ist ja zweitens. Ich denk über

die Verteilernetze die bestehen, habe ich große Möglichkeiten Biogas mit einzusetzen. Das müsste eben noch weiter unterstützt werden, dass große Anlagen entstehen und in die Netze ihre Potenziale einspeisen, dass immer mehr das nutzen können. Es gibt ja in Deutschland die Fan-Gemeinde von Ökostrom. Die sagen: wir wollen nur Ökostrom und beziehen das als Zertifikat. Im Osten eher weniger, aber so in Baden-Würtemberg. Die sagen "Wir wollen es aus Prinzip, wir wollen es unterstützen" und zahlen natürlich auch etwas mehr. Aber man sieht selbst, wenn es eben politisch oder der Ansatz entgleitet- mit dieser EEG Umlage, wird der Strom eben verteuert, obwohl der Strompreis sinkt ja eigentlich, weil ja immer mehr Strom zur Verfügung bleibt. Es gibt immer mehr Windstrom zur Verfügung. Windstrom macht den Strom billiger, aber durch die ganzen Umlagen und weil ja viele verdienen wollen wird er immer teurer. Die Nutzen das um ein gewisses Risiko auszugleichen. Die Probleme sind eben: die Entlastung von Großunternehmen, die diese Belastung nicht zahlen. Warum ist es so? Da können gute Ansätze schnell wieder zerredet werden. Die großen werden entlastet und die kleinen müssen das zahlen. Und schon ist so ein negativer Touch mit dran wo gute Konzepte dann kaputt gemacht werden. Und die Konzepte sind gut. Im Moment ist es so, die sollen jetzt gefördert werden und eines Tages sollen die sich selber tragen. #00:31:56-2#

I: Haben Sie das Gefühl dass die rechtlichen Rahmenbedingungen für den Bioenergieausbau den Ausbau fördern oder hemmen? #00:32:12-5#

R 08: Ich finde das EEG prinzipiell gut und es fördert auch. Aber diese vielen kleinen Ausnahmegenehmigungen machen das System kaputt, z.B. die Entlastung von Großversorger von der EEG Umlage. #00:32:36-0#

I: Die Region Görlitz befindet sich in Grenzlage. Wie beeinflusst das den Ausbau der Bioenergie? #00:32:52-7#

R 08: ich denke es hat Vorteile. Die Vorteile resultieren vielleicht daraus, dass die Grenzregion dadurch Stück für Stück ihre Barrieren abbaut. Dass wir in der Lage sind eben auch über unseren Tellerrand hinauszuschauen. Ein gewisser Markt entsteht in der Region für diese Rohstoffe und wir können einen gewissen Know-How Transfer mit erzeugen. Diese Grenzregionen sind ja spannend. Ich fahre gerne zum Bodensee- dort sieht man eine gewisse Wirtschaftszone- jeder hat eigene Kompetenzen. Wir haben diese auch, wir müssen nur diese entwickeln. Den Wirtschaftsraum Liberec darf man nicht unterschätzen und wenn wir vergessen den Anschluss zu finden, dann ist es schwierig, dann bleiben wir immer eine ländliche Region zwischen Liberec und Prag und Dresden. Ich sehe große Chancen, dass grenzüberschreitende Aktivitäten auch stattfinden. Beispielweise habe ich den Bauer Sell zu fragen, ob er seine Kapazitäten auszubauen und das sah er als möglich an. Aber man müsste die Rohstoffe aus der Region dazu kaufen. Hier ist Varnsdorf in der Nähe sehe ich Potenziale. #00:37:47-2#

I: Welche Bereiche der Förderpolitik sehen Sie als fördernd und welche hemmend für den Ausbau der Bioenergie im Landkreis Görlitz? #00:37:51-2#

R 08: Die Programme sind ja alle förderlich. Man merkt aber dass die Programme einen gewissen finanziellen Grundstock haben und diese ganzen Rahmenbedingungen und Nachweise, die man führen muss um überhaupt aktiv zu werden schrecken häufig ab. Wenn ich nur die Richtlinie der Sächsischen Aufbaubank anschaue: dann sage ich mir dann lasse ich eben. Die Nachweispflichten sind zu aufwendig eben. Es wird praktisch dort noch mal wie ein zweiter Ingenieur eingesetzt um zu prüfen ob man die Förderung überhaupt bekommen kann. Es ist sehr an Zahlen festgemacht. Wenn man Biogas verbraucht, muss man nachweisen, wie ist der Wärmeverbrauch im Prozess. Ist der Wärmeverlust größer als 25 Prozent, gibt es diese ganze Bonis nicht mehr. Es gibt sehr viel an Zahlen festgemacht. Wir haben unseren Wärmeverlust um 20 Prozent, es ist normal, aber wir grenzen an 25 Prozent. Das sind solche Rahmenbedingungen wo man an Zahlen festlegt und weniger am Einsatz von

nachwachsender Rohstoffe. #00:40:25-4#

I: Welche Rolle spielen aus Ihrer Sicht die Umweltauswirkungen der Biomasseanlagen wie z.B. erhöhtes Transportaufkommen der Biomasse in Region Görlitz? #00:40:37-2#

R 08: Wenn ich mit beispielweise mit Biogasanlagen arbeite, fände ich es gut, wenn ich nur Material aus der Region eingesetzt wird. Wenn ich natürlich Maissilage von sonst woher um dort einzuspeisen und dort Geld über den Strom zu realisieren fänd ich sehr schlecht. Wenn es lokale Anlagen sind Landkreis beispielweise. Wenn aber Überkapazitäten erzeugt werden nur aus reiner Profitgier, dann geht es auch von Baum des Systems. Wenn die Möglichkeit besteht, wird es immer Ausreisser geben, die sagen gut, die Anlage baue ich hinten, hier rechnet sich, speise ein, verdiene mein Geld, Ruhe ist. Diese konzeptionelle Planung mehr nachwachsende Rohstoffe mehr nach dem Bedarf einzusetzen, ist eben nicht. Sachsen produziert eigentlich mehr Strom als es verbraucht. Jetzt müsste geschaut werden, wo der meiste Strom verbraucht wird- in den Ballungsräumen, wie wird er verbraucht. #00:43:11-5#

I: Zum Thema aktueller Stand der Technologie. Haben sie das Gefühl, dass die Technologien für Bioenergieproduktion welche auf dem Markt verfügbar sind, gut bekannt sind? #00:43:23-9#

R 08: Wir haben ja nun viele Träger des Wissens. Wir haben ja Hochschule, es gibt viele Vereine die das natürlich kommunizieren, es gibt regionale Energieversorger, die auch dieses Wissen mit bündeln- wenn ich mir die Stadtwerke anschaue, die sind immer mehr interessiert immer mehr nachwachsende Rohstoffe in ihren Mix einfließen zu lassen bis hin zu einem kleinen Wärmeversorger wie wir es sind. Wir sind natürlich auch daran interessiert diesen Anteil zu erhöhen und haben es auch gemacht. Stadtwerke Zittau haben es gemacht. Stadtwerke Görlitz sind auch dabei, die wollen unbedingt mehr Windenergie in ihr System mit einspeisen. Da es ist schon Bewegung. Wer sich mit dem Thema auseinandersetzen will, bekommt er die Informationen, die er braucht. #00:44:32-3#

I: Jetzt kommen speziell Fragen z.T. Wahrnehmung der Barrieren und fördernden Faktoren in den einzelnen Wertschöpfungsstufen, d.h. die Schwierigkeiten und unterstützende Faktoren sind unterschiedlich bei Projektumsetzung, je nachdem ob die Planung, Konstruktion und so weiter betrifft. **Was wirkt hemmend und was unterstützend beim Anbau und bei der Bereitstellung der Biomasse für Energiezwecke?** #00:45:09-1#

R 08: Ich denke, dort gibt es nicht so viele Barrieren. Die Biomasse ist da, muss nur zielgerichtet eingesetzt werden. Auch Kommunen haben ja gewisse Flächen, wo Biomasse anfällt ob das Felder, Wiesen oder Bergwiesen wo Biomasse anfällt, die genutzt werden kann. Material ist aus meiner Sicht da, die Barrieren sind für die Landwirte im Vorfeld genau informiert zu sein, wie die ganze Kette funktioniert, um partizipieren zu können. Wenn ich eine Biogasanlage habe, muss ich mir einfallen lassen, wie bekomme ich meine Wärme weg, ich kann die nutzen. Die Landwirte haben praktisch ein zusätzliches Geschäftsfeld. Aus normalen Bauern werden sogenannte Energiebauern die nicht genutzten Potenziale besser nutzen können. Bisher war Gülle ein Dünger und in die Wertschöpfungskette eingeführt. Jetzt wird die Gülle noch verfeinert und wird noch einem Prozess zugeführt um dann als Dünger zu dienen. Es ist eine Steigerung in der Landwirtschaft. Die abgemähten Halme bleiben über die Erde stehen. Bisher war es so. Mittlerweile wird so tief abgeschnitten dass die Reste in die Biogasanlage mit einzuführen. Natürlich da muss man das berechnen, die zusätzliche Energie die man einsetzen muss, um es zusätzlich zu machen. Dort wird das Produkt veredelt. #00:48:06-4#

I: Und haben Sie das Gefühl, das Landwirte und Forstwirte, die Biomasse anbauen und aufbereiten schwierig haben, aufgrund dessen dass die Flächen auf der Grenze liegen oder ist das vor Vorteil? #00:48:13-7#
R 08: Wenn sie sich Raps angeschaut haben, als der Raps an der vorderen Stelle war, dann

war in Polen und in Tschechien das Raps A und O. Es richtet sich schon danach, wo ist mein nächster Markt. Das ist jenseits der Grenze und bei uns ist es auch so. Die Regionen können davon profitieren. Es ist ja nicht schlecht. #00:49:14-0#

I: Was denken Sie, was hemmt und was fördert bei Planung und Umsetzung einer Biomasseanalage? #00:49:20-9#

R 08: Da gibt es ja verschiedene Rahmenbedingungen welche man beachten muss. So eine Biogasanlage ist zwar nach außen geruchsneutral, aber wenn sie gebaut wird, sagen viele "ach es ist Geruchsbelästigung". Also es muss Einhaltung zu Wohngebieten. Es gibt viele Bedenkenträger, die können so eine Anlage schnell zerstören, wo es darum geht, dass es nicht genehmigungsfähig an dieser Stelle. Es ist ja ein geschlossenes System. Im Vorfeld das richtige Konzept zu entwickeln, um so eine Anlage ordentlich nutzen zu können. Die Bauanträge- die Verfahren sind sehr langwierig. Wenn ich so eine Anlage bauen will, müsste ich jetzt planen und in vielleicht zwei Jahren würde sie dann stehen. Wenn ich auch mit Fördermittel arbeite, es dauert ja sehr lange bis ich die Fördermittel habe. Wenn ich auf klassische Art und Weise greife, sind die Planungsprozesse sehr sehr langwierig. #00:51:06-7#

I: Wenn so ein Planungsbüro oder ein landwirtschaftlicher Betrieb so eine Anlage plant, muss er die Tatsache berücksichtigen, dass der Betrieb / die Anlage in Grenzregion ist? #00:51:15-3#

R 08: Durch die EU wird es sich alles angleichen. Da werden die Baugenehmigungsverfahren, die Abgaswerte und weiß ich nicht was wird sich über die Jahre angleichen, da wird es kaum Unterschiede noch geben. #00:51:34-7#

I: Aus Ihrer Erfahrung heraus, in dem Genehmigungsprozess für eine Biogasanlage - gibt es dort Schwierigkeiten und was ist fördernd? #00:51:43-6#

R 08: **I**ch bin der Auffassung: so eine Anlage kann ich schon bauen, aber ich habe immer noch das Problem die Wärme zu verkaufen. Sinnvolle Konzepte zu finden, um die Energie einzusetzen. Jeder Bauer ist gestrebt so eine Anlage zu bauen, weil es zusätzliches Geschäftsfeld ist. Aber es ist nicht immer sinnvolle Nutzung des Stroms und der Wärme erkennbar. Und das ist immer noch ein Mangel. Für den Bauern gibt es relativ wenige Barrieren. Nachwachsende Rohstoffe sind im Vorrang und damit ist das Genehmigungsprozess so ausgelegt, dass es genehmigt wird. Barrieren ist eher wenig. Eher dort wie kriege ich die Wärme los. Es wird viel gebaut, wo es nicht sinnhaft ist. #00:53:57-6#

I: Gibt es was spezielles was typisch für die Grenzregion ist? #00:54:08-5#

R 08: Ich denke nicht. Wir haben ja Binnenmarkt. In dem Binnenarkt kann ich agieren. Die einzige Barriere ist häufig noch die Sprache. Wenn ich nach Polen komme, da ist die Barriere, wer ist für was zuständig, an wen soll ich mich wenden. #00:55:05-8#

I: Wie sehen Sie das beim Stromverbraucher, gibt es Befindlichkeiten oder nutzen sie gerne den Biostrom auf Biomassebasis? #00:55:21-5#

R 08: Die steigenden Preise- Strom und Wärmepreise. Wenn steigende Preise vorherrschen, führt das dazu, dass die Verbräuche einzelner Nutzer sehr stark zurückgehen. Wir haben das bei uns im Wärmemarkt - die Preise steigen, damit versuchen die Nutzer dem entgegenzukommen und verbrauchen weniger. Es wird auch so im Strombereich so sich gestalten. Man merkt die Leute sparen mehr. Dadurch kommt mehr zu Schimmelschäden an den Bauwerken. Die Leute heizen nicht mehr, lüften weniger. Es ist immer noch so bissel Gefahr, dass man so eine Anlage berechnet, damit sie optimal läuft. Unser Beweggrund war die Perspektive, unter welchen Bedingungen kann ich investieren. Nur wenn Anteile regenerativer Energien in unserem Mix sind, bekommen wir in Zukunft auch Fördergelder um weiter bauen

zu können. Wer versucht herkömmlich zu heizen, es wird unter dem Förderaspekt Geld zu bekommen. Wir haben gesagt: wir richten uns strategisch so aus, dass wir die Möglichkeiten haben, unser Wärmenetz zu erweitern, um Fördergelder zu bekommen. Und in unserem Energie-Mix ist eben 25 Prozent Bio. #00:59:04-8#

I: Und was ist der Beweggrund des Otto-normal-Verbraucher? #00:59:02-4#

R 08: Der Otto-normal-Verbraucher, dem geht es immer um Preis. Es gibt natürlich Idealisten, die sagen wir haben die Welt nur einmal und die will ich bewahren und dafür bin ich bereit mehr zu zahlen. Aber das ist nur ein ganz kleiner Teil. Letztendlich muss es in der Zukunft so sein, dass Biostrom günstiger ist, aber wie wird man das erreicht? #00:59:48-0#

I: Aus Ihrer Erfahrung heraus fällt Ihnen noch andere Faktoren die schwierig oder fördernd für den Bioenergieausbau sind? #01:00:03-8#

R 08: Das einzige was wirklich immer problematisch ist, muss immer dargestellt werden: die Dokumentation über tatsächlich verbraucht werden- es ist sehr aufwendig. die Nachweisführung um die Boni zu bekommen, ist sehr bürokratisch. #01:01:44-4#

I: Inwieweit sehen Sie sich in der Position, Maßnahmen zu unternehmen, welche Ausbau der Bioenergie fördern? #01:02:04-0#

R 08: Wir sind ja ein kommunaler Energieversorger. Für uns besteht der Anreiz unser Versorgungsgebiet auszuweiten und dann eine Alternative anzubieten. Viele haben ihre eigene Heizung, ihre Erdgaskessel oder Ölkessel. Man könnte eben über Vernetzung auch viele Vorteile bringen. Wenn man über unser Wärmenetz das bezieht, hätte man viele Vorteile- man hätte keine Schornsteinfegergebühren, keine Wartungskosten mehr, man hätte den einheitlichen Wärmepreis. Man macht sich natürlich ein wenig abhängig von einem Energieversorger, aber man hätte die Möglichkeit saubere Energie im großen Rahmen zu nutzen. Wenn ich so schaue, wie viele wieder Holz verheizen. Und wie schlecht kommen wir wieder in die schlechte Luft. #01:06:23-4#

I: Was die rechtlichen Rahmenbedingungen angeht, was würden Sie vorschlagen, was man ändern kann damit der Umfeld investitionsfreundlich ist? #01:06:34-2#

R 08: Im Moment wird es kein richtiger Weg vorgegeben. Die Bundesregierung hat eine Vollbremsung auf der Autobahn gemacht und fährt in andere Richtung. Ein Konzept ist im Moment nicht zu erkennen. Es wird Lobbyismus zu erkennen. Die Lobbyarbeit müsste zurückgefahren werden. Durch die föderale Politik blockiert man ordentliche Konzepte. Im Moment ist das eher so punktuelle Förderung - jeder macht seins und die Bundesregierung kriegt es nicht hin die Netze ordentlich auszubauen. Das ist so in ganz Sachsen, das würde ich nicht an der Grenze festmachen. Verlässliche Perspektiven für die Zukunft fehlen. Viele Investoren werden abgehalten, weil die nicht wissen, wie entwickelt sich das. Das sieht man schon bei großem Energieversorgen, die sehen der Bedarf ist da, aber Gaskraftwerke nicht bauen, weil sie nicht wissen wie die Rahmenbedingungen sich in dem Bereich entwickeln. Also die lassen das erst mal. Kein Konzept da. Das müsste man europaweit betrachten, wie wollen wir tatsächlich CO_2 Einsparung umsetzen, mit welchen Mitteln, das einheitlich für alle Länder und das ist im Moment nicht da. Wenn man versucht dort (Bogatynia, Liberec) Veränderung durchzuführen, wird erst mal zu Problemen führen. Deswegen wäre es gut insgesamt für Europa, diese Ziele die sie festgelegt haben auch ein Konzept, wie erreiche ich das. Und das wird im Moment auch sichtbar: Polen haben andere Ansätze: Polen versucht z.B. Atomkraftwerk bauen. #01:13:02-0#

I: Wie wichtig ist die Informationspolitik um Fortschritt in Bioenergieausbau zu erzielen? #01:13:11-6#

R 08: Eine große Rolle. Wir wissen wenig was in unseren Nachbarländern stattfindet, aus welchem Antrieb heraus. Ich sehe mich auch nicht in der Lage zu sagen, welche Rahmenbedingungen es gibt in Polen. Es gibt in Polen gewisse Informationszentren, aber es müsste aus Europaebene das verstärkt werden. #01:14:01-2#

I: Sehen Sie andere Maßnahmen, welche man unternehmen kann um die Situation zu verbessern? #01:14:10-5#

R 08: Das Bewusstsein muss geweckt werden. das Verständnis muss geweckt werden, dass man für die Umwelt was tun muss. Und das von kleinen Kindern an. Mein Sohn hat in der Schule erzählt: mein Papa hat eine Photovoltaikanlage. Das sind solche Sachen, die schwer vermittelbar sind. #01:17:44-9#

I: Vielen Dank. Bitte noch ein paar demografische Angaben zu machen und bitte um Ihre Unterschrift zur Verarbeitung der Daten. #00:48:57-2#

END

APPENDIX 4 Category System for Interview Analysis

APPENDIX 4.1 Formal Categories:

- Serial number
- Kind of Stakeholder
- Country

APPENDIX 4.2 Content Categories

Barriers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Feedstock Supplier	Competition vs. other investment	Lack of feedstock experience	Perceptual challenges of feedstock supply
	Limited/uncertain return on investment	Physical resource limitations (land availability)	Uncertain european energy strategy
	Negative global environmental impacts	Other availability barriers	Uncertainties of financial support for agriculture
	Negative local environmental impacts		Unsettled bioenergy market (unreliable energy buyer)
	Possible negative impacts on food production		Unclear and complex legislative concerning cross-border trasport of residual materials
	Resource intensive feedstock		Other behavioral barriers
	Other structural barriers		
Barriers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Plant Developers / Owners	Competition vs. other investment	Lack of feedstock supply (resource availability)	Perceptual challenges of bioenergy plant
	Low primary-end-user demand	Other availability barriers	Unclear and complex legislative process of plant permission
	Possible negative environmental impacts		Unclear and complex legislative concerning cross-border trasport of residual materials
	Possible negative impacts on food production		Uncertain development and operational costs
	The conversion technology is too expensive		Uncertainty of conversion technology/equipment
	Other structural barriers		Uncertainties of financial support
			Other behavioral barriers

Table 31: Content categories for biomass supplier and energy poducer on the level: barriers

Barriers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Government / Policy Advisor	Competition vs. other investment	Lack of feedstock supply (resource availability)	Unclear and complex legislative process of plant permission
	Possible negative impacts on food production	Physical resource limitations (land availability)	Perceptual challenges of bioenergy plant
	Possible negative impacts on environment	Other availability barriers	Other behavioral barriers
	The conversion technology is too expensive		
	Other structural barriers		
Barriers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Primary End-users of Bioenergy	Bioenergy costs vs. fossil-fuel	Low supply of bioenergy	Perceptual challenges of bioenergy use
	Possible negative impacts on food production	Seasonal effects of bioenergy supply	Preferential over other renewable energy options
	Possible negative impacts onenvironment	Other availability barriers	Uncertainty of adaptability
	Infrastructure and other costs		Unsettled/changing bioenergy market
	Other structural barriers		Unclear and complex legislative conerning bioenergy use
			Other behavioral barriers

Table 32: Content categories for policy advisors and energy user on the level: barriers

Drivers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Feedstock Supplier	Market diversification/opportunity	Good technique for waste / residual materials utilization	Attractiveness of a growing bioenergy market
	Profitable return on investment	Other availability drivers	Other behavioral drivers
	Meeting governmental energy/carbon/waste targets		
	Other environmental benefits (other than CO_2 reduction)		
	Other structural drivers		

Table 33: Content categories for feedstock supplier on the level: drivers

Drivers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Plant Developers / Owners	Market diversification/ opportunity	Availability of financial reward/support mechanisms	Bioenergy supply consistency vs. other intermittent energy options
	Meeting governmental energy/carbon/waste targets	Variety of feedstock use for bioenergy (resource diversification	Bioenergy use versatility
	Other environmental benefits (other than CO_2 reduction)	Other availability drivers	Increased bioenergy interest from end-user
	Other structural drivers		Other behavioral drivers
Drivers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Government / Policy Advisor	Decentralisation of energy capability	Good technique for waste / residual materials utilization	Bioenergy supply consistency vs. other intermittent energy options
	Increase rural development and economy	Variety of feedstock use for bioenergy (resource diversification	Ability to penetrate most energy markets (versatile)
	Increased fuel security	Other availability drivers	Other behavioral drivers
	Meeting governmental energy/carbon/waste targets		
	Other environmental benefits (other than CO2 reduction)		
	Other structural drivers		
Drivers / Stakeholders	**Structural**	**Availability**	**Behavioral**
Primary End-users of Bioenergy	Cost reduction via direct substitute of fossil-based fuels	Good technique for waste / residual materials utilization	Bioenergy supply consistency vs. other intermittent energy options
	Investment opportunity into renewable energy	Contribution to achieving governmental schemes	Ability to penetrate most energy markets (versatile)
	Meeting governmental energy/carbon/waste targets	Other availability drivers	Positive effects on image
	Other environmental benefits (other than CO_2 reduction)		Other behavioral drivers
	Other structural drivers		

Table 34: Content categories for policy advisor, energy producer and user on the level: drivers

Feedstock Supplier	Plant Developers / Owners	Government / Policy Advisor	Primary End-users of Bioenergy
No impact	no impact	no impact	no impact
Market transparency	market transparency	market transparency	market transparency
Transaction costs	unclear legal legislative: cross-border residual materials transport	impact of neigbour energy policy (green energy vs nuclear power)	other impacts of border location
Additional markets	transaction costs	unclear legal legislative: cross-border residual materials transport	
Market distortion caused different subsidies for agriculture	low population caused border location	other impacts of border location	
Not sufficient cross-border infrastructure	market distortion caused different subsidies for bioenergy production		
Other impacts of border location	higher costs caused cross-border infrastructure		
	other impacts of border location		

Table 35: Content categories on the level: impact of border location on bioenergy production for all stakeholders

Feedstock Supplier	Plant Developers / Owners	Government / Policy Advisor	Primary End-users of Bioenergy
Continuous integrated European long term energy strategy	Continuous integrated European long term energy strategy	Continuous integrated European long term energy strategy	Continuous integrated European long term energy strategy
Clearer legislative concerning cross-border residual meterials transport	Clearer legislative concerning cross-border residual materials transport	Dissemination of best practice examples	Dissemination of best practice examples
Equal subsidies in different cross border area for agriculture	Clearer legislative concerning plant permission	Information strategy	Information strategy
Cross-border infrastructure development	Equal cross-border subsidies for bioenergy production	Other opportunity-specific strategies	Other opportunity-specific strategies
Dissemination of best practice examples	Cross-border infrastructure development		
Information strategy	Dissemination of best practice examples		
Other opportunity-specific strategies	Information strategy		
	Information strategy concerning bioenergy production		
	Other opportunity-specific strategies		

Table 36: Content categories on the level: opportunity-specific strategies to overcome barriers and strengthen drivers

APPENDIX 5 Interview Reports

APPENDIX 5.1 Interview Report No.1

R 01 Jirka Zahradnik, biomass supplier

START
Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

Q 1: How do you assess the bioenergy development in the region Liberec?

- There is any bioenergy development in the region Liberec;
- I am unsatisfied.

Q 2: What experience do you have with neighbors' border regions?

- In comparison to the region Liberec, they are better situated – more agriculture;
- The farmers are looking for new possibilities on the market;
- Because of new coming (2013: at least 60percent of the heat has to be used) law farmers are searching for new possibilities to use the heat produced by the biomass installation.

Q 3: How do you assess the Czech renewable energy policy?

- Renewable energies make the energy more expensive;
- In Czech Republic there are two nuclear reactors. There are some plans to extend renewable energies, but most plans based on wind and sun energy;
- I don´t know how it goes further, but there are two main streams: biomass yes, another: why should we grown biomass on the fields where food production can take place?

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- It´s disturbed. An example of cooperation biomass plant in Varnsdorf (DE) and heat installation in Varnsdorf → there are problems with the output of biomass plant;
- "It is continues there and here with the institutions"

Q 5: What is in your opinion the cross-border impact on legal framework?

- "I think the cross-border location doesn´t impact negatively on the chances for success" → of bioenergy dissemination.

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- I cannot say anything specific to this topic.

Q 7: What is in your opinion the role of funding in cross-border context?

- I cannot say anything specific to this topic.

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- It plays some role, especially in case of longer transport distance;
- "I have already experienced, that biomass was transported over 200 km" → it can results with problems.

Q 9: How do you assess the bioenergy technology and information availability?

- For the farmers is economically not interesting to buy biomass (and run a biomass installation);
- Information is available;
- The problem is: the technology can be used specific for maize harvest and nothing else.

Q 10: What do you think about biomass as feedstock for energy production?

- Biomass is a trade product → it is not a problem
- Moreover to produce high quality maize, special technological machines are needed

Q 11: How would you describe the feedstock supply in a cross-border area?

- Problems are with the border crossing: there are relative few crossing points at the border→ "transport distances are longer";
- The biomass from Liberec (CZ) is Input in Zittau (DE) because of the feeds for electricity and heat production.

Q 12: What is your experience with biomass installations development in the area you live in?

- "The farmers are motivated just by the price" of biomass → young farmers;
- Older farmers, over 55 years old which already since 20 years grow the same things, say "why should I grow something else";
- The younger "don´t think about the future" ;
- It is not more difficult for the farmers in the border areas to grow and prepare biomass for energy production;
- "There were some plans for an agriculture biomass plant" → advantage: use of heat by two houses, but it was not sufficient enough;
- "Also use of the output products from a biogas production is not economically efficient";
- There are some plans to "not create new waste dump" -> "for the waste new line of use should be found".

Q 13: What do you know about the bioenergy use in the region you live in?

- I cannot say anything specific to this topic.

Q 14: What other impacts on bioenergy dissemination do you recognize?

- I cannot say anything specific to this topic.

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- "In the Czech Republic there are already about 13 percent of renewable energies, I don´t know";
- "There are people pro nuclear power, who say that Czech Republic is energy autonomy and can even export energy" → why should it do something with biomass;
- "Natural condition in the Liberec region are not suitable for the agriculture" → "it is connected with the situation";
- "There are new 250 biogas plants planned and not one in the region Liberec";
- Situation in Usti→ don´t know;
- Reason for lack of biomass installation in the Region Liberec is "probably the lack of feedstock due to supply a biogas plant".

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- There are a lot of places where the information about renewable energies can be found;
- In Liberec I know already four.

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- "I would change the funding for farmers" ;
- Different use of waste: more for second use → more support needed.

END

APPENDIX 5.2 Interview Report No. 2

R 02: Mochalski, biomass supplier

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START

Q 1: How do you assess the bioenergy development in the region Jeleniogorski?

- "In the region of Dolny Slask, there is just one biogas plant";
- "We produce for the Germans, here there is any biogas plant";
- "We don´t have possibilities to use it in Poland";
- "The nearest is near Wroclaw" (biogas installation);
- Investors invested more in wind energy, there is easier;
- Investors are not interested in biomass plants because "it is a lot of work (...) organizational problems, problems with the work" "the technological process makes some organizational problems".

Q 2: What experience do you have with neighbors' border regions?

- Next to Wroclaw is one biomass installation – the only one for the region of Dolny Slask;
- "For us max 50 km is economically meaningful to transport biomass";
- "Alone we are a poor company, not able to build biogas installation";
- "I talked to the mayors, due to build a biogas plant", but "why should I build, in the situation when I have one near";
- "Nowadays there is any border";
- In case of good conditions for investment, there would be some installation;
- Agriculture doesn´t have such money to invest for 15-20 years→ some guarantees are needed;
- "Why should we try to build a biogas plant, we already have one in Zittau"

Q 3: How do you assess the Polish renewable energy policy?

- There are some financial supports for agriculture;
- In EU should be the same financial support.

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- Agriculture doesn´t have such money to invest for 15-20 years→ some guarantees are needed;
- Without nuclear energy we do not ensure the energy supply.

Q 5: What is in your opinion the cross-border impact on legal framework?

- "Nowadays there is any border".

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- In case of the same financial support for farmers, there will be more biogas plants, because farmers would grow plants and do not look where they can get funding.

Q 7: What is in your opinion the role of in cross-border context?

- For every country and region should be the same support condition;
- The market is common, there are any borders;
- There are any reasons, why trade should not take place.

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- We don´t manage transport – there are firms, which take care about the transport;
- For us is important the price from the storage.

Q 9: How do you assess the bioenergy technology availability and information?

- I think the biogas production technology is easy; more difficult is the biogas conversion the natural gas;
- For us it is equal – we sell where we get higher price;
- The most important for us, the high price and reliability.

Q 10: What do you think about biomass as feedstock for energy production?

- "It works well – I don´t know the language, but if we do not understand each other, we can draw";
- We have translators;
- We had problems with the laboratory.

Q 11: How would you describe the feedstock supply in a cross-border area?

- There are any differences;
- Price and reliability are most important;
- Germans had better economically conditions and more time.

Q 12: What is your experience with biomass installations development in the area you live in?

Didn´t ask because not able to answer the question (see below).

Q 13: What do you know about the bioenergy use in the region you live in?

- I´m not able to answer the question.

Q 14: What other impacts on bioenergy dissemination do you recognize?

- I cannot answer the question. I don´t know;
- I don´t have problems to sell the biomass the Germans;
- If we have had a biomass installation here I could sell it also here.

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- Farmers can't afford to build biomass installations on their own.

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- Didn´t ask because not able to answer the question (see below).

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- An investor is needed – equal from Poland or foreign;
- Biogas installation is one of the best solutions because it generates work places.

END.

APPENDIX 5.3 Interview Report No. 3

R 03 Hänsch, Biomethan GmbH, plant manager

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START

Q 1: How do you assess the bioenergy development in the region Goerlitz?

- There are a lot of bioenergy installations in the region;
- At the beginning there were agriculture plants on the spots;
- Meanwhile there are other installations, industrial, as ours;
- There is not very much biomass left.

Q 2: What experience do you have with neighbors' border regions?

- "We didn´t went to the next region (in Germany) – it depends on the economic efficient transport distances";
- "We went towards Poland and there were the condition surprisingly even better";
- It was better not because of the price, but the polish farmers were willing to contract in the long term;
- In Germany there are already a lot of big agriculture installation, which need biomass for their energy production – they don´t want to close agreements for long terms.

Q 3: How do you assess the Saxon renewable energy policy?

- It is difficult to say for me;
- If I consider just Zittau, we almost achieved the goals – there are two plants producing electricity based on biomass.

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- The EEG was for us the most important regulatory frame, because biogas is more expensive than natural gas;
- I think it won´t change in the next few years;
- After EEG: our hope is that the gas price level will change; otherwise we will have a problem with the installation;
- The question is: what direction does the change go: the more renewable energies on the market, the longer natural gas can be used.

Q 5: What is in your opinion the cross-border impact on legal framework?

- For us it was an advantage; I think for other also;
- The most important for us: natural resources and services: harvesting, transport, storage.

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- There are problems with the new EEG;
- We know from the installation producer, that since the restriction: max. 60 percent maize the request for new installations sank;
- We think also about new resources like sugar beets or grass silage;

- We got the funding because we were the first installation in Saxony, which produced biogas, which was prepared and injected into the natural gas pipelines.

Q 7: What is in your opinion the role of funding in cross-border context?

- I cannot say anything specific to this topic.

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- It has to be distinguished: in case of whole ecological balance, the advantages of a biogas plants are non-controversial;
- Under local aspects there are some additional emissions, because the grow fields are situated local;
- The transport part is just marginal (according to newest study conducted by bachelor student);
- The part of the emission is not so large in relationship to the grow and harvest of biomass.

Q 9: How do you assess the bioenergy technology and information availability?

- There is lots of information available;
- We conduct also site visits for the university;
- It makes knowledge-transfer possible.

Q 10: What do you think about biomass as feedstock for energy production?

- We are not feedstock supplier, but lots of contacts to supplier;
- The advantage is that the farmers have a stable part of the value added chain and the contracts are over a longer period of time;
- This is a base for the basic financial security → normally the agriculture has to deal with the market fluctuations and weather fluctuation;
- High stability for the farmers against price fluctuations.

Q 11: How would you describe the feedstock supply in a cross-border area?

- I think the effects are the same as on the German part;
- The cost structure is almost the same, against expectation → because they buy also theirs tractors and machines from the same producers as German farmers.

Q 12: What is your experience with biomass installations development in the area you live in?

- There are subjective and objective purposes. Subjective: reservations from farmers against growth of energy crops, because the agriculture was always the food producer→ competition to the food production;
- Objective: there was just marginal request for energy crops in Poland → for us it was an advantage;
- When we deal cross-border we have to play with the rules→ this is connected with more effort (10 letters instead of one, one additional tax adviser; additional bank account);
- There are some problems: e.g. return delivery of the rests from the fermentation process: our goal was to create a material circle. The rests are according to the Polish law a waste and cannot be transported via borders → we needed a complex certification process. We spent a half year to receive the certificate for this. It was impossible:

we didn´t have any rests for the analysis and had to analyze rests from other installation.

Q 13: What do you know about the bioenergy use in the region you live in?

- Any knowledge.

Q 14: What other impacts on bioenergy dissemination do you recognize?

- In case of permission procedure I think there are any differences, whether the installation is in a border region or somewhere else in Saxony;
- Our permission procedure was very complex, but it had nothing to do with the border location;
- Because of the change in the regulation to the new EEG we had higher requirements to full fill→ we had to change plans in a short time and had additional costs;
- We have two colleagues speaking polish, it is although not easy: we have an additional effort because of the two languages and communication;
- In the accounting is not easy, because there are some differences there;
- We have perhaps a small advantage because of the input, but it compensated by such things;
- For us it was a strategic decision;
- We are happy that we own almost whole value added.
- For us the cross-border location gave us the possibilities to gain enough input to build an installation

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- Reliable law framework is essential;
- The continuity is critical;
- It is not helpful that the EEG is changing – we experience now the 4th version and we will experience the 5th and the 6th at sure;
- We hope that we have some protection of current status;
- It (permission) is a complex procedure and if we are in the middle of planning, than we have to start from the beginning and make new calculation – it is difficult;
- The continuity is critical.

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- That what we notice as an information policy at the state level is counterproductive;
- At the local level the cooperation is quite good – the impact possibilities of the rural district on the policy are limited
- We received support from the city Zittau and from the district (Landkreis) – the proximity is an advantage
- On the federal level → they cause us problems: the price discussion is not to the purpose;
- We experience that opinion: we invest and to suck the money;
- We have to pay attention where lead such discussion→ the renewable energies can lose their good opinion.

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- It is not necessary to regulate everything by the EU→ it is reasonable that the EU do not regulate everything;
- It is important to keep the contacts between border regions;
- There are some barriers under banks;
- It is essential to create examples, where it works→ this becomes more known and the farmers can see them;
- We try to avoid problems, especially if we have to solve them on the legal way with law → it is difficult, so we try to avoid such problems. END

APPENDIX 5.4 Interview Report No. 4

R04 Andre Birner, biomass supplier & plant owner

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START
Q 1: How do you assess the bioenergy development in the region Goerlitz?

- "It goes slow";
- There was a lot of action, but now it goes relatively rough-running;
- There are lots of problems, although there is some rethinking;
- On long distance the resources can be not sufficient, especially for the small companies because in the three country region there are big actors.

Q 2: What experience do you have with neighbors' border regions?

- A lot of resources go to the Czech Republic;
- Also a lot of resources come via Hamburg;
- "There is also demand from the Leipzig region, but the distance is too long and therefore too expensive".

Q 3: How do you assess the Saxon renewable energy policy?

- "Yes, we should go for it → we have to look which areas we should expand";
- "We need to collect experience; in biogas installation we have gathered already experience";
- "Important is to expand the energy grids and networks between actors → I don´t know in what kind of form".

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- In the field of fast growing forest there are a lot of legal barriers, there are laws, which constrain dissemination of the fast growing woods;
- "EEG was eerily supportive. Everything what was built here, is thanks to the EEG";
- "Now it is important to find some good change over".

Q 5: What is in your opinion the cross-border impact on legal framework?

- "Good question. Pure price – the big [companies] can buy other volumes; against them we have any chance";
- "This is the three corner region";
- "Last year we couldn´t offer good enough price for the polish buyer→ we had big problems to buy the materials";
- "In Dresden would be easier to buy the materials";
- "But it is not always this- there is no logic now. Since two years we can see some panic on the market";
- "On the other hand I can´t say why is it so in Poland and Czech Republic – why so much wood goes there and exactly where. We are in the dark".

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- "I can say something just about EEG – it was eerily supportive. It had a very strong impact, I think even too strong";
- "The model has worked and brought some good examples";
- "Now there are some energy plants, we have to think about the fact, how can they work cost efficient";
- "In the field of bioenergy there won´t be any strong development any more, perhaps only in the field of fast growing trees".

Q 7: What is in your opinion the role of funding in cross-border context?

- Any knowledge.

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- "Our work area reaches 100 km. Because of the costs and of course of philosophy of renewable energies. This is still ok";
- "But we are asking ourselves whether the wood from the Ukraine still makes sense";
- "One we were forced (because of the lack of materials) to buy and transport the wood over more than 100 km. Does it make sense?"

Q 9: How do you assess the bioenergy technology and information availability?

- "Municipalities and investors, which are interested [in the bioenergy production], yes they are informed";
- "Some rethinking take place";
- "If somebody tries to find information, it is not a problem. Such situation that there is a lot of information – no it is not that".

Q 10: What do you think about biomass as feedstock for energy production?

- "At the beginning the fast growing trees were strong financial supported by the Saxony, Germany and EU and the farmers were convinced";
- "It was a best practice project";
- "Then there was a company, which made agreements with farmers and it didn´t work – with the first installation the company didn´t have any experience; a lot of things went wrong, the farmers were skeptical and for the farmers it was too high risk";
- "In this installation the experience was insufficient. Now are the farmers skeptical";
- "Then the company became insolvent – it was the end".

Q 11: How would you describe the feedstock supply in a cross-border area?

- "It has nothing to do with the border region. It depends on the forest ownership. Here there are a lot of private forest owner and it makes the thing easier. In other parts of Saxony, the owner is Saxon Forest and it makes the whole thing more difficult";
- "And at the same time resources from Poland – I´m not good informed, but I know that a big part of the forest in the border region belongs to the state and they give the resources with high price";
- "It is easier to buy from the Polish state forest owner than from the small private owner here";
- "There are some seasonal fluctuations and we don´t know why";
- "We are not a producer, we just buy".

Q 12: What is your experience with biomass installations development in the area you live in?

- "Our installation is run with maize silage, but I don´t know where does it come from".

Q 13: What do you know about the bioenergy use in the region you live in?

- Heat; good price and EEG.

Q 14: What other impacts on bioenergy dissemination do you recognize? What other impacts on bioenergy dissemination do you recognize?

- Can´t reply to this question.

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- The EEG it is a good instrument, because it is possible to feed in electricity and receive payment. Mr. Diele is the contact person;
- The funding should be adapted to the development stadium of a region – infrastructure in Czech Republic and Poland should be developed;
- For the bioenergy production – the condition should be the same.

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- The main problems are the language barriers;
- "We would like to have contact with the small companies – it is damn difficult";
- "I think the beginning should be made in the school to solve the problem".

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- There is a lot of action, but I have this feeling, that the most is not well coordinated;
- 1000 studies, networks, nothing reasonable came as output;
- The actors have to find themselves from bottom to up;
- The languages and infrastructure have to be supported;
- It is difficult to achieve something via networks. Actors have to find themselves by their own. Companies, which already have experience cross border- they are helpful.

END

APPENDIX 5.5 Interview Report No. 5

R 05 Holger Freymann, policy advisor

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START
Q 1: How do you assess the bioenergy development in the region Goerlitz

- "I am very satisfied of the bioenergy development";
  - **Growth** in the last years: "this show the results and growth";
  - Enough biomass potentials, enough biomass installations "there is enough biomass, enough biomass installations according to the existing potentials of biomass";
  - "I am satisfied of the use of existing resources in the local cycles";
- **Problem**: big installations with broad sphere of influence → result: **long transport distances;**
- Many communities recognized the **trends** at the right time → strategic planning;
- The region Goerlitz is **predestinated** because of the landscape for the biomass growth and bioenergy production → local conditions;
- Growth of biomass not only on the high active soils, but also on these of low quality→ it makes sense;
- Open question left: future path: "Can we achieve even higher goals? Is the region able to absorb this?"
- In the field of renewable **energy mix**, the region Goerlitz goes ahead of the the Saxony and Germany and bioenergy plays a key role "the bioenergy play a key role (…)" → importance.

Q 2: What experience do you have with neighbors' border regions?

- **Efforts** to site an investment in own responsible area of work;
- Neighboring investment are noticed, but are not disturbed → notification;
- Just a little coordination, especially in case of regional development concept e.g. energy
  - Some coordination, **lack of coordination in the area of renewable energy sources "where I find my resources?"**
- More cooperation with Polish and Czech colleagues on the project basis because of higher interest - for PL and CZ people it is still "new land";
- In the region has renewable energy different weigh that in other region → brown coal;
  - "We can both": renewable energies and brown coal without damage for the landscape.
- In case of common concept, coordination will take place, currently not the case;
- Important the support of the higher technical university, high support → a lot of experts in the region;
- Region Goerlitz is because of the landscape well eligible for bioenergy production→ **preconditions, requirements.**

Q 3: How do you assess the Saxon renewable energy policy?

- Saxon policy has recognized the energy problem at an early stage → **strategic planning**;
- The problem is: perception: **misjudged role of the region in the goal implementation**: "I can set good goals, but the reality takes place on the regional and municipal level, because there are the factors responsible for the goals implementation"
  - **A gap between what man want on the political area and what is possible to implement in the Land Saxony**;
- The region Goerlitz has already full filled the goals of 30 percent and even exceeded;
- **No reason, why the Saxony should force the region to implement more renewable energies to reach the whole goal**
  - If the region Goerlitz should work for other regions, the arguments should be stronger, otherwise it is account of future generation;
- The regional development plan set goals for renewable energies, according to the available areas;
- The problem is: **we try to exceed the renewable energies and not focus on growing energy use**
  - "I don´t know any concept which take notice of this problem"
- In case if bioenergy is the way wrong: **biomass installation are big and have greater impact (not only visible) on the regional population**;
  - "I´m for **special zones** for the bioenergy production facilities";
  - Current promotion instrument EEG does not support it;
- There are **discrepancies** between the responsible ministries.

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- Complex: federation and land level;
- Current legislation process on the federation level has been exploited: bioenergy installation became privilege form of energy production facilities in the extern areas → this does not solve the problems→ **better to set a legal framework for building of energy installations**. Currently I can set an installation without a build plan→ after building there are problems e.g. inhabitants say: it smells not good etc. → **the privilege principle was not a helpful step**, it is now in the federal legislation;
- On the land level legislation: there are different regulation concerning emissions → it is difficult;
- There was **any legal regulation, anything what would reduce the bureaucracy, anything what would make the procedure easier** → everything has became more complex;
- Another difficulty: the question concerning the **impact of the installation on the environment**→ there are a lot of EU regulation in the field of nature, human protection. The plans were good, but the Federal Republic and the Federal States made it more complex, **overregulated it** → now: complex procedures,**"no more controllable" the complexity is higher**→ no one understands the procedure any more;
- "**Risk management takes place just marginally"**;
- A lot of regulation without consideration wheatear it is needed;
- The decision process takes **more time**;
- Responsibilities were transferred to the federal lands, but there are "**lacks of professionals in the field**",→ difficult to understand and "assess the difficult aspects of permission procedure";
- "The legal framework is a barrier for the bioenergy dissemination"; nobody has a courage to say: "we have to rethink the situation";
- The permission procedure take more time that in the past and is **more expensive**;
- Everything is very detailed checked→ more complex.

Q 5: What is in your opinion the cross-border impact on legal framework?

- According to the law: when there are some cross-border impacts of the installation foreseeable, the neighbor land has to be informed about them (is not necessary);
- No information from neighbor regions required: would be good, but according to the law not needed;
- **Missing: leading body**: check: enough biomass input? Transport distances are controllable?
- Borders are very **transparent**: a lot of projects with Poland and Czech Republic;
- **Cooperation**, but also information about the neighbor region which are a competitors;
- There are a lot of funding for cooperation: it was good, but **tax subventions** (e.g. special economic zones in Poland) for investment: not necessary and **distorts the competition**;
- **Zittau a good example** for cross-border cooperation although difficult location.

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- It is a difficult topic: **intervention** in the market is always not so good. Important: if there are grants, the politic should be **consequent**;
- There are things, which are granted in a **right way**;
- It makes sense, when **the farmers receive an additional source of their income** generation. Important in this case is the fact, that it **should not to be a burden to the agriculture**;
- A facility, where the rests are used should be rentable. Such installation should not receive a funding;
- Funded should be the **preparation process and consulting**: "do you have sufficient resources for an installation?" → a region cannot afford it on its self. → region can take care of the consulting, but it requires the **legal regulation** on the country level;
- **"Financial support for the planning, preparation and monitoring, supervision of the implementation process is important"**;
- **The funding of energy prices is a barrier**, because "it leads to a development, which is no more in the real market";
- There are **good examples** of bioenergy production and use, e.g. in **public institutions**, schools, kindergarden, which are heated by the heat from the bioenergy facilities → this is the right way and should be financial supported;
- Very negative impact has **changes in the regulation** concerning funding: after announcement there is a lot of action. There is still the question not answered: "where you will find the resources for the facility and what do you intend to do with the production rests?" → **material cycles should get more attention**; meaningful the financial support of the consideration of material cycles → should be supported;
- Better way to support the bioenergy dissemination: **via taxes privileges:** it does not put a strain on the society it results immediately
- **Sustainable and long term** investment models are required.

Q 7: What is in your opinion the role of funding in cross-border context?

- In case of any funding, the investment would be placed where are better economical conditions, without consideration the borders;
- Fundings are a kind of intervention in the market;
- It is a disadvantage: e.g. the investment in Zittau (DE) → perhaps the investment would have been placed in Bogatynia (PL) in case of any financial support;
- **It is a barrier → investor do not consider the local and regional conditions, just the financial support.**

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- We found the compromise – "even the big installations have transport distances, which are **controllable**";
- Environmental impact of the installations is a **subjective perception** and it can be **guided**;
- Transport is not a problem; it is possible to set the transport ways in appropriate way → important is the reduction of smell and noise → technological possible;
- Better to place the installation, where the **population** has nothing against it instead of where it is on the tolerant limits;
- The big installation with high (unused) heat production should not be supported financial any more→ important to **use the produced heat**;
- Smell caused by the transport should be minimized;
- It is possible, to influence the subjective perception;
- Important: **sensibility**: create win-win situation, where the community, municipality have also profits from the installation (e.g. cheap heat);
- "There is **any sustainable risk management**" → the installations are at newest standard, but what happens in case of a nature catastrophe or strong rainfall? → in case of broken installation we have an environmental catastrophe
- **Risk management is not efficient**;

Q 9: How do you assess the bioenergy technology and information availability?

- The investors of bioenergy installations are professionals - they have knowledge at the high level;
- There are a lot of possibilities to gain technological knowledge: a lot of symposiums and conferences;
- Missing: **investors not always take advantages from the regional knowledge experts** e.g. technical university → should more use the existing potentials;
- The investors and planners mostly do not have sufficient information about the input, the resources→ farmers know what they cultivate and what they can use for the bioenergy production; **industrial investor mostly do not pay enough attention to the feedstock supply in advance**→ here is national steering mechanism necessary.

Q 10: What do you think about biomass as feedstock for energy production?

- It is depending from the kind of biomass;
- In case of use of biomass grow on the areas which are appropriate for the biomass cultivation → it is ok, but when biomass will be grown on better fields to achieve higher harvest and in this way these good areas are blocked for food production → it is wrong;
- **Over-subscription**: farmers are forced to grow the crops which they are delivering to the installation → long term contracts for crop growing is not so good for the farmers, for the installation operators are good;
- "I do not know what will happen in the next 5 years?" What happen with the European Union, with the funding policy of EU;
- "We think: we have too many fields with the energy maize, it is wrong. But it is not so bad";
- **Long term obligation of farmers is a problem** → we do not know what happens in the future?
- **Climate change** → what happens with the crops under higher temperature? And under higher rainfalls? → Need for more research in this field
- Important question: how sensible is my installation in case of deficits in the agriculture caused by the climate change?
- Feedstock supply is a **challenge.**

Q 11: How would you describe the feedstock supply in a cross-border area?

- The farmers are well informed about the situation on the other site of the border and react on the current market development;
- German farmers have **higher costs of labor**, perhaps more expensive fuel, but general the **product cost approach to each other**;
- German farmers have **higher agriculture productivity and higher quality** → caused by bigger fields and efficiency of the big machines and big field areas of agriculture farms;
- The industrial prices are world prices.

Q 12: What is your experience with biomass installations development in the area you live in?

- Border situation does not impact negative the dissemination of bioenergy. The will and the philosophy are an important factor;
- The region is affected by energy ideas because of the past development: brown coal → from this development "try to achieve a change" → "Yes we can make something else than brow coal. I think it is a historical roots";
- We have good resources, good local conditions and experience with the energy production and support from the university → positive factor. "other (regions) are disadvantaged";
- Search for the appropriate location is very difficult: the operator needs a point for the energy injection, the **energy grids** should be able to induct the energy;
- **In case of lack of appropriate injection point→ high investment costs needed to build the connection**;
- In the agriculture: farmers do not have problems with feedstock supply and use for energy production: they use their crops;
- Professional planners are experts – they have sufficient knowledge and technological understanding;
- **Missing**: at the municipal level information and **transparency** for the society;
- Not sufficient information about the plan to the citizens, not at the early stage, what would be important;
- **Better communication of local advantages needed**: of a biomass installation to the citizens: what are the advantages for the farmers, for the local society? Impact on the environment acceptable?
- **Permission** high and each eary increasing **bureaucracy**: some aspects are checked which are perhaps not so important and others are not required, which are important, e.g. the **transport distance**: nobody controls the distances of transported biomass and what are the **output materials** and their impact.

Q 13: What do you know about the bioenergy use in the region you live in?

- **False image** presentation: "you poor consumer, you have to pay the costs of the energy turn out" → just half a truth;
- The energy policy is not customer friendly;
- Each company would say after couple time of trials: it is enough, the state not→ **megalomania**;
- Too much **lobby**: 2/3 of the prices set in the legal frame for the energy (EEG) have been influenced by lobby work → energy user has to pay for that;
- The government does not make its homework: the grid building. → state has to **enforce** it with all consequences, even if some part of the society does not understand it → without sufficient grids there is no energy turn out;
- There are more negative than positive information sent to the customer → false image of the changes;
- **Local models of energy production and supply required**.

Bioenergy use in cross-border context:

- **To much lobby**: in Germany we plan energy turn out and Poland plan to build nuclear power stations;
- European energy policy is currently **difficult to explain** to the energy user → failure of plan e.g. if the solar / biomass installation would be appropriate planed, it would be easier;
- **Disadvantage of border location** of investment: lower energy purchase than in other regions with higher number of citizens e.g. Dresden → operation consider whether to run an installation better in/ near bigger cities;
- **Advantage**: perhaps marginally lower production costs (lower costs of labor).

Q 14: What other impacts on bioenergy dissemination do you recognize?

- Regional competition of private operator.

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- Administrative Office For Regional Development - regional responsibilities and competence;
- Thanks to the size it is possible to transport requirements to the center/ region, but more difficult to lead the municipalities (75);
- Not only **political will** is important: necessary **money and people who implement it**;
- The global future tasks should be set by political parties together in a dialog;
- "We need a clear and stable political commitment", not nonpermanent;
- "We have to talk honest about the **resources**" → it would be good to regulate: so much biomass can be grown in the region. In case of higher production, it can be difficult to find enough biomass to supply the installation: in cross-border region: resources not to the border, but in circle;
- By means of funding agriculture can be regulated to a certain degree→ it should be cross-border → need to be managed by European policy : **the framework, but regional approaches**;
- **More regional responsibilities** required, but cross-border: we have to see us in the European context → e.g. regional fund, besides European funding with the aim to support sustainable energy production;
- **Regional network system**, without the profit as leading thought, e.g. by means of bigger, municipal association steering the development → **currently too much lobbying** → political management required "we are the country of knowledge, not of action".

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- National and European information policy requested;
- "It is not enough to say: you have to pay the costs of energy turn out";
- "Important: European and national framework stable, not changing often, **continuity** required" → people do not trust the European policy any more;
- "In case of lack of global and national information strategies, we have to fail on the regional level";
- "Local and regional information policy is necessary, but it costs **money** and requires **human resources** → currently false and incomplete information";
- "**Functional models** required, which can be seen, touches etc."
- "Information policy on the **regional** level very important";
- "True information, **continuity, long term information policy, target group orientated; age-based information**"**;**
- "**Global and cross-border information policy**".

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- "Set sustainable, but **realistic** goals → can explain and give reasons for these goals";
- "Base on experts, but determine the **goals concrete, clear and long-lasting**";
- "For the sustainable strategy **endurance** required".

END

APPENDIX 5.6 Interview Report No. 6

R 06 Grmela, policy advisor

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START

Q 1: How do you assess the bioenergy development in the region Liberec?

- "The question is, whether we can talk about bioenergy development at all";
- "We don´t have any bioenergy installation except one in Krizany";
- "The bioenergy dissemination doesn´t have been supported by the government";
- "And the legal situation is not supportive for investors, who want to do something: this up and downs: it is not so optimal";

Q 2: What experience do you have with neighbors' border regions?

- "In Usti is better";
- "In Germany also. All technology we use comes from Germany";
- "In Poland I don´t know - there are any contacts".

Q 3: How do you assess the Czech renewable energy policy?

- Energy and climate policy is a huge topic in Czech Republic;
- "We are waiting for the new energy plan – it is in planning. There is a lot of talk, that renewable energies won´t be supported any more in the future and the trend will go in direction nuclear and coal";
- "I think it is bad for the Liberec region";
- "If we want to do something direction renewable energies, it is difficult, e.g. network operators don´t allow to feed new electricity based on solar energy. And the experts are afraid that it will be the same with the bioenergy in case of any support";
- "Political there is some regulations, which the end users have to pay for the renewable energy dissemination".

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- "It constrains";
- "There are some regulations for support on renewable energies and regulation agency set prices but if they say we don´t support bioenergy, any investor will do something";
- "Because the equality of nuclear energy is not yet available".

Q 5: What is in your opinion the cross-border impact on legal framework?

- "It doesn´t have any impact. Bioenergy dissemination is connected with the agriculture. In Maren there are more agriculture areas and more bioenergy".

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- It is planned to change the funding – there will be any energy direct feeds, just investment support it means that investors, which produce the cheapest energy will receive fundings;

- "I don´t know whether it is good or bad";
- "I think the flexibility is important: when the technology costs become lower, the funding should be reduced as well. I´m afraid it won´t be this way".

Q 7: What is in your opinion the role of funding in cross-border context?

- "For such activities like PR or studies European funding for cross-border cooperation can be used. It is good";
- "Such outputs like information about technologies in Germany and contacts can be used to make something in Czech Republic".

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- "If we talk about CO_2 emission in the circle of 50 km it is worth to transport biomass";
- "Unfortunately there is a co-combustion of biomass with coal. There is some funding for this";
- "This is a question whether it makes more sense to produce and use biomass local in smaller installation";
- "The Czech national company CEZ has other opinion and build coal power stations and combust there coal with biomass".

Q 9: How do you assess the bioenergy technology and information availability?

- "Yes, I think the know-how is available";
- "The only question is whether the investment is cost efficient. Technology can be bought"
- Information is not well structured for the "normal citizen".

Q 10: What do you think about biomass as feedstock for energy production?

- In case of feedstock grow – the people grow what the funding is for;
- Mix of different plants is important, otherwise there is a competition to the food production;

Q 11: How would you describe the feedstock supply in a cross-border area?

- "I think in Germany everything is a little bit more expensive. Work labor is more expensive";
- "We don´t have any bioenergy installation yet, but in the future the disadvantages of the location will be more visible";
- "Cross-border transport is a problem: with the rests from bioenergy installation [in Germany to Czech Republic] – legal problem".

Q 12: What is your experience with biomass installations development in the area you live in?

- The heat has to be used and in case of small installation it is sometime difficult;
- Electricity has to be feed in into the grids. In the gas grid there is any feed in yet;
- e.g. in Kryzany [biogas installation] the heat goes in the air.

Cross-border impact:

- "I don´t think there is an impact. It is the same in case of other installations";
- "We are lucky to be near the German technology".

Q 13: What do you know about the bioenergy use in the region you live in?

- "It is difficult to say, but currently the main argument is that the renewable energies make the energy more expensive. Via distribution of prices. The more renewable energies we have, the more we have to pay";
- "Currently have renewable energies in the Czech Republic very negative image";
- "People don´t know what happens over the border";
- "They are not interested and there is not much information in the news about neighbor countries".

Q 14: What other impacts on bioenergy dissemination do you recognize?

- "The main problem is the whole conception. The political conception is made for five years. It is too short period of time";
- The conditions for renewable energies are not STABLE
- It is not possible to invest, because we don´t know when the next taxes will be implemented

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- "It is important to have compact framework. The legal framework changes after two years – it doesn´t make any sense";
- "It is important to make long term agreements. Otherwise sell the farmers their biomass somewhere alse".

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- "It is very easy: local energy agency which take care about information policy and information brokering which cooperate with central energy agency";
- "Regional agency – partner who knows well the region and condition";
- "It should take place cross-border. There are a lot of in common socio-culturally with the border regions- in the past it was one region".

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- "We have to convince our government to make long term plans";
- "The risk in Czech Republic is that after elections we don´t have any continuity".

END

APPENDIX 5.7 Interview Report No. 7

R 07: Dr. Ciurla, policy advisor

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START

Q 1: How do you assess the bioenergy development in the region Lower Silesia?

- "There isn´t any development of bioenergy in the border region yet. There are just few – two or three biogas installations in the Dolny Slask, but they have pilot character";
- "Our economy minister said that in each municipality should be build one biogas installation. It is rubbish"
- "We have to balance our resources first";
- "Local energy requires coordination and supervision";
- "There should be some feedback with the agriculture policy"
- "Certificate CO_2 – we have to be honest: the big [players] buy everything and the small won´t have anything to say";
- "We have to see what will happen with the regulation OZE [for renewable energies] – unfortunately the renewable energy is two or three times more expensive than the traditional";
- "This can´t be like *hurra* ".

Q 2: What experience do you have with neighbors' border regions?

- "Currently almost anyone cares about such things";
- "There is a co-combustion of biomass in a power station - this company buys the biomass from other company, responsible for feedstock supply. When this combustion won´t be cost efficient any more, we will see how it goes further";
- "The next problem is investment in biogas installation: they are expensive and the return of investment is a long time – nobody wants to do it, because nobody knows whether it will be cost efficient or not";
- "The last problem: in Poland nobody wants to pay extra money for such energy".

Q 3: How do you assess the Polish renewable energy policy?

- "It is poorly. As far as the new regulation OZE doesn´t appear it will be zero [bionenergy]";
- There is regulation OZE, but last version was changed – it was half year ago. There were some protests. New version should appear at the end of this year or beginning of 2013 but I don´t believe in it".

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- "As far as the condition will be clear, e.g. what can be classified to the renewable energies, what would be the feed in tariffs – not just for one year, but stable- we will have zero";
- "With biomass is more difficult – it has to be grown and prepare";
- "In case of bioenergy installation there are some protests – their fear is exorbitant, but they don´t want new installations".

Q 5: What is in your opinion the cross-border impact on legal framework?

- "I wouldn´t combine the border position with the bioenergy dissemination";
- "We tried to convinced municipalities to invest in biogas installations, but they are afraid that the biomass will be bought by the bigger companies and they will have problems with energy feeding in the grids";
- "As far as the regulation concerning renewable energies doesn´t appear, nobody wants to involve".

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- "We have some means in the structural funds for building of installations but the interest is minimal, poorly, almost zero. Why? Companies have problems with feed in the energy into the grids. Nobody wants to buy this energy because the prices which are offered by the producer are too high. There are any subsidies for energy. When the regulation occurs, perhaps everything changes";
- "Currently just these energy producers take advantages, which have co-combustion of biomass. But they do just to proof, that they use renewable energies";
- "In the past wood was a renewable energy source, now just pieces of wood".

Q 7: What is in your opinion the role of funding in cross-border context?

- See Q 5: "I wouldn´t combine the border position with the bioenergy dissemination".

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- "In case of agriculture biomass installation – what kind of transport is there? We have nothing to talk about";
- "In case of industrial installation they use support from a company, which gather and supply them biomass from different sources".

Q 9: How do you assess the bioenergy technology and information availability?

- "We don´t have biogas installations here, but the technology is available. It is a lot of technologies on the market";
- "There is co-combustion, but the operators want just to get certificates";
- "In the rural regions – there has to be investor. But why should one investor build such biomass installation and than have problems with energy feeding into the grids? There are any subsidies. And the next problem can be, that the investor will have problems with biomass availability".

Q 10: What do you think about biomass as feedstock for energy production?

- "Currently there is any demand, nobody wants the biomass".

Q 11: How would you describe the feedstock supply in a cross-border area?

- "As far as there are in Germany subsidies for bioenergy production, it is cost-effective";
- "Polish farmers are suppliers of biomass to Germany – I think it is good, because the expand they horizons and perhaps someday they want to produce bioenergy on their own".

Q 12: What is your experience with biomass installations development in the area you live in?

- "There are some pilot (demonstration) projects- e.g. investment at one school. But it doesn´t give a lot"
- "Problems are with the legal regulation: our regulation is very complicated";
- "Next thing is agreement with the society – it is very important";
- "In the current situation (free flow of human capital, work and land) it [border location] is no problem. The question is whether the biomass is sufficient";
- "Border doesn´t disturb at all. Necessary is just to agree with the farmers"
- "There is some money for investments, but any willing investors".

Q 13: What do you know about the bioenergy use in the region you live in?

- "There is some possibility to buy "clean energy" from the companies, which sell it. But nobody wants to do this, because the individual customers, they still have subsidies for prices from the government";
- "Companies don´t want to change often the energy supplier, because they are afraid that in one year the prices will rise – it is not practicable";
- "In Poland there is any "bioenergy consumer" because there is any bioenergy".

Q 14: What other impacts on bioenergy dissemination do you recognize?

- "As I said: legal problems";
- "And society: acceptance is required".

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- "I don´t know more about this topic".

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- "I think some demonstration installations are necessary. In this way people can see that it works";
- "Technically it is not complicated";
- "Show that the wastelands can be used to produce biomass".

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- "It is not an idea, but a risk that we will produce just one kind of crop and it leads to monoculture";
- "Next risk is burning of cereals".

END

APPENDIX 5.8 Interview Report No. 8

R 08 Tobias Steiner, bioenergy consumer

Central Question

What are the main barriers, drivers and strategies for bioenergy dissemination in border regions?

START

Q 1: How do you assess the bioenergy development in the region Görlitz?

- There are some potentials and people dealing with them;
- "We have already many biogas installations, although they have different problem";
- "I think it is a good thing, but it has to be disseminated, in a coordinated way";
- "Now it is: how can I make some money"
- "I think we are on the right way".

Q 2: What experience do you have with neighbors' border regions?

- "I have to admit, that I have just a little experience";
- "We didn´t have a look how is the situation in Poland and Czech Republic. The potentials are there that they can do it on their selves".

Q 3: How do you assess the Saxon renewable energy policy?

- "The development is good. We have to realize, that the fossil resources are endless";
- "With the EEG allocation is the electricity more expensive, although the electricity price sinks";
- "The problem is that the big companies are not financially burdened. Why is it so? Thus good ideas can be destroyed. The small companies have to pay and the big ones are unburdened".

Q 4: What is in your opinion the role of legal framework for bioenergy dissemination?

- "I think that principally the EEG is a good instrument and support it. But all the small exceptional permissions make the system not working".

Q 5: What is in your opinion the cross-border impact on legal framework?

- "I think the border location has advantages. We remove barriers step by step";
- "Specific resources market arises and we can be part of the know-how transfer";
- "Border regions are very interesting: each of or regions has own competences – we just have to develop them";
- "In the cross-border activities I see a big chance for us".

Q 6: What is in your opinion the role of grants and funding for bioenergy dissemination?

- "The programs are all supportive";
- "The verification documents are often disincentive";
- "The obligation for verification documents are too complex";
- "A lot of criteria are connected with numbers, less with the implementation of renewable resources".

Q 7: What is in your opinion the role of funding in cross-border context?

- I cannot say anything specific to this topic.

Q 8: What are in your opinion the environmental impacts of bioenergy production and use?

- "If I work for biogas installation, it would be good to use the regional biomass";
- "In cases where maize silage from elsewhere is used to produce energy and just to earn money, I think it is very bad";
- "In case of many possibilities there are always some people who exploit it";
- "Conceptual planning according to the resources - it is unfortunately not the case";
- "Saxony produces more electricity than it needs; we have to think about how the electricity is used".

Q 9: How do you assess the bioenergy technology and information availability?

- "We have many knowledge institutions: we have the technical university, we have regional associations and also municipal energy supplier";
- "Municipal energy supplier: Stadtwerke they try to incorporate more renewable energies into their mix";
- "There is some action";
- "Who is interested in the topic, will find the needed information".

Q 10: What do you think about biomass as feedstock for energy production?

- "There are not so many barriers";
- "Biomass is available, it has to be applied goal-orientated";
- "The barriers are: farmers have to be informed how the supply chain works to participate in it";
- "The farmers have an additional business area";
- "It is an increase in the agriculture";
- "The agriculture products are refined".

Q 11: How would you describe the feedstock supply in a cross-border area?

- "It orientates on the nearest market";
- "It is on the both sites of the border";
- "The regions can profit from this. It is not bad".

Q 12: What is your experience with biomass installations development in the area you live in?

- "There are a lot of framework regulations";
- "There are also a lot of people who have concerns and doubts. They can ruin fast a biomass installation";
- "It is important to develop a right concept for such installation";
- "The applications for build permission are very interminable";
- "I think everything will approximate to each other because of the EU";
- "As a farmer I have the problem to sell the heat";
- "I think the problem is in the meaningful concepts for energy use";
- "The farmers have relatively little problems";
- "A lot of plants are build, where it doesn't make sense";
- "We have single European market".

Q 13: What do you know about the bioenergy use in the region you live in?

- "The barriers are the increasing prices of electricity and heat";
- "Because of this users consume less energy, they save";
- "This causes mildews in the buildings – because people heat less to save";
- "It is a bit of risk because the installation are planned to produce some amount of energy and the consumption is less";
- "The end user is interested only in the price. There are some idealists willing to pay more, but not many. It is important to offer not expensive bioenery in the future - but how to do it?"

Q 14: What other impacts on bioenergy dissemination do you recognize?

- "Documentation due to receive financial support is very time-consuming".

Q 15: What are in your opinion strategies due to disseminate bioenergy?

- "Currently there is any way to follow. The government made full-braking on the high way and drives opposite direction";
- "There are any concepts but lobbyism. It should be changed";
- "Just selective financial support";
- "The government failed to build the energy grids";
- "The perspectives for investment are not known - a lot of investors wait because they don´t know how goes further";
- "We have to think in the European dimension: if we want to cut down CO_2 emission, we have to act on the European level. Currently it is not visible";
- "We need not only goals, but also get to know the concepts how to achieve the goals"
- "Poland e.g. has other approaches: they think about nuclear energy".

Q 16: What is in your opinion the role of information in bioenergy dissemination?

- "Very important role";
- "We don´t know what happens over the border";
- "In Poland there are also information centers, but we should extend the information on the European level".

Q 17: What other strategies and measures for bioenergy growth would you suggest?

- "People awareness should be extended";
- "Understanding has to be raised, that we have to do something for the environment";
- "From beginning on, already at school";
- "These aspects are difficult to explain".

END

APPENDIX 6 Interview Coding

APPENDIX 6.1 Coding plans

Coding plan 1:

Code	Stakeholder: feedstock supplier
1	agriculture
2	forest
3	biological waste
4	any (no suplier)

Coding plan 2:

Code	Stakeholder: energy plant
1	investor
2	developer
3	operator

Coding plan 3:

Code	Stakeholder: policy advisor
1	research institutution
2	business consulting
3	bank
2	administration

Coding plan 4

Code	Country
1	Germany
2	Poland
3	Czech Republic

Coding plan 5:

Code	Diverse category
0	not mentioned
1	mentioned

Coding plan 6:

Code	Return on investment
0	Not mentioned
1	Limited return on investment from feedstock supply
2	Uncertain return on investment from feedstock supply
3	Limited return on investment from energy production
4	Uncertain return on investment from energy production

Coding plan 7:

Code	Possible negative environmental impacts
0	Not mentioned
1	Negative global environmental impacts of energy production
2	Negative local environmental impacts of energy production

Coding plan 8:

Code	Meeting governmental energy/carbon/waste targets
0	Not mentioned
1	Meeting governmental energy
2	Meeting governmental carbon targets
3	Meeting governmental waste targets

Coding plan 9:

Code	Market transparency
0	not mentioned
1	Transparent market of feedstock supply
2	non-transparent market of feedstock supply
3	Transparent market of bioenergy production
4	non-transparent market of bioenergy production

Coding plan 10:

Code	Cross-border infrastructure
0	Not mentioned
1	Cross-border transport roads
2	Cross-border energy grids

Coding plan 11:

Code	Information strategy
0	not mentioned
1	More information on opportunities and risks
2	Regional information strategies
3	Target group orientated information policy

Table 37: Coding plans for all four stakeholder groups (own design)

APPENDIX 6.2 System Categories and Coding

APPENDIX 6.2.1 System Categories and Coding of Feedstock Suppliers` Answers

Category	Name	Code
Serial number	No.	1 - 8
Stakeholder: feedstock supplier	s_supplier	Coding plan 1
Country	country	Coding plan 4

Table 38: Formal categories feedstock suppliers

No.	Category	Name	Code
1.1	Serial number	No.	
		R 1	1
		R 2	2
		R 4	4
1.2	Stakeholder: feedstock supplier	s_supplier	
		R 1	1
		R 2	1
		R 4	2
1.3	Country	country	
		R 1	3
		R 2	2
		R 4	1

Table 39: Coding answers of formal categories feedstock suppliers

Category	Name	Code
Structural Barriers		
Competition vs. other investment	invest_comp	Coding plan 5
Limited/uncertain return on investment	ROI_uncertain	Coding plan 6
Possible negative environmental impacts	negative_env_impact	Coding plan 7
Possible negative impacts on food production	negativ_food_impact	Coding plan 5
Resource intensive feedstock	r_intensive	Coding plan 5
Other structural barriers	other_struct_barriers	Coding plan 5
Availability Barriers		
Lack of feedstock experience	no_fs_experience	Coding plan 5
Physical resource limitations (land availability)	land_availability	Coding plan 5
Other availability barriers	other_avail_barriers	Coding plan 5
Behavioral Barriers		
Perceptual challenges of feedstock supply	fs_perceptual	Coding plan 5
Uncertain european energy strategy	uncertain_e_strategy	Coding plan 5
Uncertainties of financial support for agriculture	uncertain_ support_ agric	Coding plan 5
Unsettled bioenergy market (unreliable energy buyer)	market_change	Coding plan 5
Unclear and complex legislative concerning cross-border transport of residual materials	unclear_cb_transport	Coding plan 5
Other behavioral barriers	other_behav_barriers	Coding plan 5

Table 40: Content categories feedstock suppliers on the level barriers

Category	Structural Barriers					
Name / Respon-dent	**invest_comp**	**ROI_uncertain**	**negative_ env_ im-pact**	**nega-tiv_food_ impact**	**r_intensive**	**other_struct _barriers**
R 1	“economically not interesting to[…] run a biomass in-stallation”; "use of the output products from a biogas pro-duction is not eco-nomically efficient”	“there were some plans for an agricul-ture biomass plant […] but it was not sufficient enough"	not mentioned	"why should we grown biomass on the fields where food production can take place?"	"special technological machines are needed"	not mentioned
R 2	“farmers can’t af-ford to build bio-mass installations in their own”	"max 50 km is economically meaningful to transport bi-omass";	not mentioned	not mentioned	not mentioned	lack of finan-cial support "some guar-antees are needed"(for energy pro-duction)
R 4	not mentioned	"the big [com-panies] can buy other volumes; against them we have any chance"	"once we were forced (because of the lack of materials) to buy and transport the wood over more than 100 km. Does it make sense?"	not mentioned	not mentioned	legal barriers "there are laws, which constrain dissemination of the fast growing woods"

Table 41: Summary of answers for structural barriers feedstock suppliers

Category	Structural Barriers					
Name / Respondent	**invest_comp**	**ROI_uncertain**	**negative_env_ impact**	**nega-tiv_food_ impact**	**r_intensive**	**other_struct _barriers**
R 1	1	4	0	1	1	1
R 2	1	3	0	0	0	0
R 4	0	2	2	0	0	1

Table 42: Coding of answers for structural barriers feedstock suppliers

Category	Availability Barriers		
Name / Respondent	**no_fs_experience**	**land_availability**	**other_avail_barriers**
R 1	not mentioned	not mentioned	not mentioned
R 2	not mentioned	not mentioned	not mentioned
R 4	not mentioned	not mentioned	not mentioned

Table 43: Summary of answers for availability barriers feedstock suppliers

Category	Availability Barriers		
Name / Respondent	no_fs_experience	land_availability	other_avail_barriers
R 1	0	0	0
R 2	0	0	0
R 4	0	0	0

Table 44: Coding of answers for structural barriers feedstock suppliers

Category	Behavioral Barriers					
Name / Respon-dent	**fs_perceptual**	**uncertain_e_ strategy**	**uncertain _support _agric**	**market_change**	**unclear_cb_transp ort**	**other_behav_ba rriers**
R 1	higher effort than conven-tional crops "special techno-logical ma-chines are needed"	"there are some plans to extend re-newable energies […] I don´t know how it goes further"	not men-tioned	market insufficient developed "there is any bioenergy development in the region Liberec. I am unsatisfied"	legal framework "It disturbs […] cooper-ation biomass plant in Varnsdorf (DE) and heat installation in Rumburk (CZ) - there are problems with the output of biomass plant "	**preconceptions**: "renewable ener-gies make the energy more expensive"; tradition: "older farmers, already since 20 years grow the same things, say why should I grow something else"
R 2	not mentioned	not mentioned	"some guarantee s are needed"	market insufficient developed "we produce for the Germans, here there is any biogas plant" " We don´t have possibilities to use it in Poland. […] An investor is needed – equal from Poland or foreign"	not mentioned	"the technologi-cal process makes some organizational problems" **aver-sion to chal-lenges** "the mayors […] why should I build, in the situation when I have one near"
R 4	with the first installation the company didn´t have any expe-rience; […], the farmers were skeptical and for the farmers it was too high risk"	not mentioned	not men-tioned	unsufficient experi-ence of investors "in this installation the experience was insufficient. Now are the farmers skeptical"	not mentioned	not mentioned

Table 45: Summary of answers for behavioral barriers feedstock suppliers

Category	Behavioral Barriers					
Name / Respondent	fs_ perce ptual	uncertain_e_ strategy	uncertain_ support_ agric	market_ chan- ge	unclear_cb _transport	other_behav_ barriers
R 1	1	1	0	1	1	1
R 2	0	0	1	1	0	1
R 4	1	0	0	1	0	0

Table 46: Coding of answers behavioral barriers feedstock suppliers

Category	Name	Code
Structural Drivers		
Market diversification/opportunity	market_divers	Coding plan 5
Profitable return on investment	ROI_profit	Coding plan 5
Meeting governmental energy/carbon/waste targets	meeting_targets	Coding plan 8
Other environmental benefits (other than CO_2 reduction)	other_env_benefits	Coding plan 5
Other structural drivers	other_struct_drivers	Coding plan 5
Availability Drivers		
Good technique for waste / residual materials utilization	waste_utilization	Coding plan 5
Other availability drivers	other_avail_drivers	Coding plan 5
Behavioral Drivers		
Attractiveness of a growing bioenergy market	bioenergy_market_atract	Coding plan 5
Other behavioral drivers	other_beh_drivers	Coding plan 5

Table 47: Content categories on the level: drivers feedstock suppliers

Category	Structural Drivers				
Name / Respondent	market_divers	ROI_profit	meeting_ targets	other_env_ benefits	other_struct_ drivers
R 1	not mentioned	not mentioned	“for the waste new line of use should be found”	not mentioned	not mentioned
R 2	“we sell where we get higher price”	Important "the high price and reliability"	not mentioned	not mentioned	"Biogas instal- lation […] generates work places"
R 4	not mentioned	thanks to EEG "it is possible to feed in electricity and re- ceive payment"	not mentioned	not mentioned	"EEG was eerily supportive"

Table 48: Summary answers structural drivers feedstock suppliers

Category	Structural Drivers				
Name / Respondent	market_divers	ROI_profit	meeting_ targets	other_env_ benefits	other_struct_ drivers
R 1	0	0	3	0	0
R 2	1	1	0	0	1
R 4	0	1	0	0	1

Table 49: Coding answers structural drivers feedstock suppliers

Category	Availability Drivers	
Name / Respondent	**waste_utilization**	**other_avail_drivers**
R 1	“for the waste new line of use should be found”	"Biomass is a trade product - it is not a problem"
R 2	not mentioned	not mentioned
R 4	not mentioned	not mentioned

Table 50: Summary answers availability drivers feedstock suppliers

Category	Availability Drivers	
Name / Respondent	**waste_utilization**	**other_avail_drivers**
R 1	1	1
R 2	0	0
R 4	0	0

Table 51: Coding answers availability drivers feedstock suppliers

Category	Behavioral Drivers	
Name / Respondent	**bioenergy_market_atract**	**other_beh_drivers**
R 1	young farmers "are motivated just by the price” of biomass	"biogas production technology is easy" Information is available
R 2	not mentioned	not mentioned
R 4	"Some rethinking […] takes place"	"Municipalities and investors […] yes they are informed"

Table 52: Summary answers behavioral drivers feedstock suppliers

Category	Behavioral Drivers	
Name / Respondent	**bioenergy_market_atract**	**other_beh_drivers**
R 1	1	1
R 2	0	1
R 4	1	1

Table 53: Coding answers behavioral drivers feedstock suppliers

Category	Name	Code
No impact	no_impact	Coding plan 5
Market transparency	market_transparency	Coding plan 9
Transaction costs	trans_costs	Coding plan 5
Additional markets	add_markets	Coding plan 5
Market distortion caused different subsidies for agriculture	market_distortion_agric	Coding plan 5
Not sufficient cross-border infrastructure	lack_infrastructure	Coding plan 5
Other impacts of border location	other_cb_impacts	Coding plan 5

Table 54: Content categories on the level: impact of border location feedstock suppliers

Category	Impact of Border Location						
Name / Respon-dent	**no_impact**	**market_ transparency**	**trans_ costs**	**add_market s**	**market_ distortion _agric**	**lack_infra structure**	**other_cb_ impacts**
R 1	"The cross-border loca-tion doesn´t impact neg-atively on the chances for success"	"It is not more difficult for the farmers in the border areas to grow and prepare bio-mass for en-ergy produc-tion"	"Problems are with the border crossing: "distances are longer"	The farmers are looking for new possibilities on the mar-ket	"The bio-mass from Liberec (CZ) is Input in Zittau (DE) because of the feeds for electricity and heat production"	"Problems are with the border crossing: there are relative few crossing points at the border"	"[…] region Liberec, they are better situated with more agri-culture"
R 2	"Nowadays there is any border"	"The market is common. […] There are any reasons, why trade should not take place"	"It works well – I don´t know the language, but […] we have trans-lators"	"Price and reliability are most im-portant, Germans had better economical-ly condi-tions"			"We had problems with the laboratory"
R 4	"It has noth-ing to do with the border re-gion. [...] It depends on the forest ownership.	"A lot of re-sources go to the Czech Republic. And at the same time resources from Poland – I´m not good informed"	"I´m not good in-formed"	[…] it is easier to buy from the polish state forest owner than from the small private own-er here"		"Infrastruc-ture in Czech Re-public and Poland should be developed"	"[…] there are some language barriers"

Table 55: Summary answers impact of border location feedstock suppliers

Category	Impact of Border Location						
Name / Re-spondent	**no_ im-pact**	**market_trans-parency**	**trans_ costs**	**add_ mar-kets**	**market_ distortion_ agric**	**lack_infra -structure**	**other_cb_ impacts**
R 1	1	1	1	1	1	1	1
R 2	1	1	1	1	1	1	1
R 4	1	1	1	1	1	1	1

Table 56: Coding answers of border location feedstock suppliers

Category	Name	Code
Continuous integrated European long term energy strategy	continuous_EU_strategy	Coding plan 5
Clearer legislative concerning cross-border residual materials transport	clearer_leg_residual	Coding plan 5
Equal subsidies in different cross border area for agriculture	equal_subsidies	Coding plan 5
Cross-border infrastructure development	infra_develop	Coding plan 10
Dissemination of best practice examples	best_practice	Coding plan 5
Information strategy concerning bioen-ergy production	chances_risks_info	Coding plan 11
Other opportunity-specific strategies	other_strategies	Coding plan 5

Table 57: Content categories on the level: opportunity-specific strategies to overcome barriers and strengthen drivers feedstock suppliers

Category	**Opportunity-specific Strategies**						
Name / Respon-dent	**continuo us_ EU_ strategy**	**clearer _ leg_ resi-dual**	**equal_ subsidie s**	**infra_ develop**	**best_ practice**	**chances_ risks_ fs_ info**	**other_ strategies**
R 1	not mentione d	not men-tioned	not men-tioned	not mentioned	not mentioned	not mentioned	"[...] change the funding for farm-ers […] **Different use of waste:** more for second use - more sup-port needed"
R 2	not mentione d	not men-tioned	"In EU should be the same financial support".	not mentioned	not mentioned	not mentioned	not mentioned "
R 4	“EEG was eeri-ly sup-portive. […] Now it is im-portant to find some good change over”	not mentio ned	"[…] the condition should be the same"	“Important is to expand the energy grids and networks between ac-tors. [...]Infrastructu re in Czech Republic and Poland should be developed"	"Compa-nies, which already have expe-rience cross bor-der- they are helpful"	not mentioned	"The main prob-lems are the lan-guage barriers [...] I think the beginning should be made in the school to solve the problem. […] The **languages and infrastruc-ture have to be supported**"

Table 58: Summary answers opportunity-specific strategies feedstock suppliers

Category	Opportunity-specific Strategies						
Name / Respondent	**continuous_ EU_strategy**	**clearer_leg _ residual**	**equal_ subsidies**	**infra_ develop**	**best_ practice**	**chances_ risks_fs_info**	**other_ strategies**
R 1	0	0	0	0	0	0	1
R 2	0	0	1	0	0	0	0
R 4	1	0	1	1;2	1	0	1

Table 59: Coding answers of opportunity-specific strategies feedstock suppliers

APPENDIX 6.2.2 System Categories and Coding of Policy Advisor` Answers

Category	Name	Code
Serial number	No.	1 - 8
Stakeholder: policy advisor	s_advisor	Coding plan 3
Country	country	Coding plan 4

Table 60: Formal categories policy advisors

Category	Name	Code
Serial number	No.	
	R 5	5
	R 6	6
	R 7	7
Stakeholder: policy advisor	s_advisor	
	R 5	4
	R 6	2
	R 7	4
Country	country	
	R 5	1
	R 6	3
	R 7	2

Table 61: Coding answers formal categories policy advisors

Category	Name	Code
Structural Barriers		
Competition vs. other investment	invest_comp	coding plan 5
Possible negative environmental impacts	enironment_imp	coding plan 7
Possible negative impacts on food production	negativ_food_impact	coding plan 5
The conversion technology is too expensive	expensive_techn	coding plan 5
Other structural barriers	other_struct_barriers	coding plan 5
Availability Barriers		
Lack of feedstock supply (resource availability)	lack_fs	coding plan 5
Physical resource limitations (land availability)	land_availability	coding plan 5
Other availability barriers	other_avail_barriers	coding plan 5
Behavioral Barriers		
Unclear and complex legislative process of plant permission	unclear_legislative	coding plan 5
Perceptual challenges of bioenergy plant	advisor_perceptual	coding plan 5
Other behavioral barriers	other_behav_barriers	coding plan 5

Table 62: Content categories policy advisor on the level: barriers

Category	Structural Barriers				
	Competition vs. other investment	**Possible negative impacts on food production**	**Possible negative environmental impacts**	**The conversion technology is too expensive**	**Other structural barriers**
Name / Respondent	invest_comp	negativ_food_impact	negative_env	expensive_ techn	other_struct_ barriers
R 5		"When biomass will be grown on better fields to achieve higher harvest and in this way these **good areas are blocked for food production - it is wrong**"	Problem: big installations with broad sphere of influence - result: **long transport distances**. **"Risk management takes place just marginally.** [...] The big installations with high (unused) heat production should not be supported financial any more".	not mentioned	"A gap between what is want on the political area and what is possible to implement in the Land Saxony. The problem is: we try to exceed the renewable energies and not focus on growing energy use. [...] Important: if there are grants, the **politic should be consequent**". The **funding of energy prices is a barrier,** because "it leads to a development, which is no more in the real market"
R 6		In case of feedstock grow – the people grow what the funding is for. […] **Mix of different plants is important**, otherwise there is a competition to the food production."	"Unfortunately there is a co-combustion of **biomass with coal.** There is some funding for this."	It is planned to change the funding [...] the cheapest energy will receive fundings."	"The legal situation is not supportive for investors, who want to do something: **this ups and downs: it is not so optimal.** [...] The political conception is made for 5 years. It is too short period of time. [...] The **conditions for renewable energies are not STABLE. [...]** It is important to make long term agreements."
R 7	There is some money for investments, but any willing investors.	not mentioned	"Next risk is burning of cereals"	"[...] **investment in biogas installation**: they are **expensive** and the return of investment is a long time [...]. Companies have problems with feed in the energy into the grids. […]**There are any subsidies for energy.**"	"As far as the new regulation of renewable energies doesn´t appear it will be zero [bionenergy]. [...] In the rural regions – there has to be investor. But why should one investor build such biomass installation and than **have problems with energy feeding into the grids**? **There are any subsidies**. **Problems are with the legal regulation**: our regulation is very complicated"

Table 63: Summary answers structural barriers policy advisors

Category	Structural Barriers				
Name / Respondent	**invest_comp**	**negativ_food_ impact**	**negative_env**	**expensive_ techn**	**other_struct_ barriers**
R 5	0	1	2	0	1
R 6	0	1	1	1	1
R 7	1	1	0	1	1

Table 64: Coding answers structural barriers policy advisors

Category	Availability Barriers		
	Lack of feedstock supply (resource availability)	**Physical resource limitations (land availability)**	**Other availability barriers**
Name / Respondent	lack_fs	land_availability	other_avail_barriers
R 5	"The investors and planners mostly do not have sufficient information about the input, the resources. Farmers know what they cultivate and what they can use for the bioenergy production; industrial investor mostly **do not pay enough attention to the feedstock supply in advance**"	"**Long term obligation of farmers is a problem** - we do not know what happens in the future?"	"The region is affected by energy ideas because of the past development: brown coal. [...] In case of **lack of appropriate injection point** [...] high investment cost are needed to build the connection. [...] **Missing: at the municipal level information and transparency for the society**"
R 6	not mentioned	not mentioned	"The bioenergy dissemination was not supported by the government"
R 7	"Investor will have problems with biomass availability. Currently there is any demand, nobody wants the biomass. "	not mentioned	"There is some possibility to buy "clean energy" from the companies, which sell it. But nobody wants to do this, because the **individual customers, they still have subsidies for prices from the government.** [...] Companies don´t want to change often the energy supplier, because they are afraid that in one year the prices will rise".

Table 65: Summary answers availability barriers policy advisors

Category	Availability Barriers		
Name / Respondent	**lack_fs**	**land_availability**	**other_avail_barriers**
R 5	1	1	1
R 6	0	0	1
R 7	1	0	1

Table 66: Coding answers availability barriers policy advisors

Category	Behavioral Barriers		
	Unclear and complex legislative process of plant permission	**Perceptual challenges of bio-energy plant**	**Other behavioral barriers**
Name / Respondent	unclear_legislative	advisor_perceptual	other_behav_barriers
R 5	**“Everything became more complex. [...]** Responsibilities were transferred to the federal lands, but there are lacks of professionals in the field […]”	"Biomass installations are big and have **greater impact (not only visible) on the regional population.** [...] There are **discrepancies between the responsible ministries. [...]** How sensible is my installation in case of deficits in the agriculture caused by the **climate change**?"	“Regulation in the field of nature, human protection - the plans were good, but the Federal Republic and the Federal States made it more complex, **overregulated** it [...] **Long term obligation of farmers is a problem** - we do not know what happens in the future? **Missing: leading body**: enough biomass input? Transport distances are controllable?"
R 6	not mentioned	"The heat has to be used and in case of small installation - it is sometime difficult. […] Electricity has to be feed in into the grids. In the gas grid **there is any feed in yet** e.g. in Kryzany [biogas installation] the **heat goes in the air."**	"Currently the main argument is that the **renewable energies make the energy more expensive**. […] Currently have renewable energies in the Czech Republic very **negative image."**
R 7	"Our regulation is very **complicated"**	**"Municipalities** t[…] **are afraid** that the biomass will be bought by the bigger companies and they will have problems with energy feeding in the grids. As far as the **regulation** concerning renewable energies **doesn´t appear**, nobody wants to involve"	"In Poland nobody wants to pay extra money for such energy. […] It is not an idea, but a risk that we will produce just one kind of crop and it leads to monoculture. "

Table 67: Summary answers behavioral barriers policy advisors

Category	Behavioral Barriers		
Name / Respondent	**unclear_legislative**	**perceptual**	**other_behav_barriers**
R 5	1	1	1
R 6	0	1	1
R 7	1	1	1

Table 68: Coding answers behavioral barriers policy advisors

Category	Name	Code
Structural Drivers		
Decentralisation of energy capability	decentral_energy	coding plan 5
Increase rural development and economy	rural_develop	coding plan 5
Increased fuel security	fuel_security	coding plan 5
Meeting governmental energy/carbon/waste targets	meeting_targets	coding plan 8
Other environmental benefits (other than CO_2 reduction)	other_env_benefits	coding plan 5
Other structural drivers	other_struct_drivers	coding plan 5
Availability Drivers		
Good technique for waste / residual materials utilization	waste_utilization	coding plan 5
Variety of feedstock use for bioenergy (resource diversification	ressource_divers	coding plan 5
Other availability drivers	other_avail_drivers	coding plan 5
Behavioral Drivers		
Bioenergy supply consistency vs. other intermittent energy options	supply_consistency	coding plan 5
Ability to penetrate most energy markets (versatile)	use_versatility	coding plan 5
Other behavioral drivers	other_beh_drivers	coding plan 5

Table 69: Content categories policy advisors on the level drivers

Category	Structural Drivers					
	Decentra-lisation of energy capability	**Increase rural development and economy**	**Increased fuel securi-ty**	**Meeting gov-ernmental en-ergy/carbon/waste targets**	**Other envi-ron-mental benefits (other than CO_2 reduc-tion)**	**Other structural dri-vers**
Name / Respondent	decentral_ energy	rural_develop	fuel_ secu-rity	meeting_targets	other_env_ benefits	other_struct_drivers
R 5	not mentioned	"The region Goerlitz is predes-tinated because of the landscape for the biomass growth and bioenergy pro-duction [..]. It makes sense, when the farmers receive **an addi-tional source of their income gen-eration.**"	not mentioned	"Saxon policy has recognized the energy prob-lem at an early stage"	not mentioned	not mentioned
R 6	not mentioned	not mentioned	not mentioned	not mentioned	not mentioned	"In Germany […] work labor is **more expen-sive.** We don´t have any bioen-ergy installation yet [in Poland], but in the future the disad-vantages of the location will be more visible"
R 7	not men-tioned	not mentioned	not men-tioned	not mentioned	not mentioned	not mentioned

Table 70: Summary answers structural drivers policy advisors

Category	Structural Drivers					
Name / Respondent	**decentral_ energy**	**rural_ develop**	**fuel_ security**	**meeting_ targets**	**other_env_ benefits**	**other_struct_drivers**
R 5	0	1	0	1	0	0
R 6	0	0	0	0	0	1
R 7	0	0	0	0	0	0

Table 71: Coding answers structural drivers policy advisors

Category	Availability Drivers		
	Good technique for waste / residual materials utilization	**Variety of feedstock use for bioenergy (resource diversification)**	**Other availability drivers**
Name / Respondent	waste_ utilization	ressource_divers	other_avail_drivers
R 5	not mentioned	**"Region** Goerlitz is because of the landscape well **eligible for bioenergy production**. […] Farmers do not have problems with feedstock supply and use for energy production: they use their crops"	"Important the **support of the higher technical university [...] a lot of experts in the region**. [...] The **investors** of bioenergy installations are **professionals**".
R 6	not mentioned	not mentioned	"**Know-how is available**. [...] The only question is whether the investment is cost efficient. Technology can be bought. […] **There are a lot of in common socio-culturally** with the border regions- in the past it was one region."
R 7	not mentioned	not mentioned	"We don´t have biogas installations here, but the **technology is available**. It is a lot of technologies on the market."

Table 72: Summary answers availability drivers policy advisors

Category	Availability Drivers		
Name / Respondent	**waste_ utilization**	**ressource_ divers**	**other_avail_ drivers**
R 5	0	1	1
R 6	0	0	1
R 7	0	0	1

Table 73: Coding answers availability drivers policy advisors

Category	Behavioral Drivers		
	Bioenergy supply consistency vs. other intermittent energy options	**Ability to penetrate most energy markets (versatile)**	**Other behavioral drivers**
Name / Respondent	bioenergy_market_atract	use_versatility	other_beh_drivers
R 5	"False image presentation: you poor consumer, you have to pay the costs of the energy turn out **it is just half a truth."**	"There are **good examples of** bioenergy **production and use,** e.g. in public institutions, schools, kindergarden, which are heated by the heat from the bioenergy facilities"	"The region is affected by energy ideas because of the past development: brown coal. From this development '**try to achieve a change'** - 'yea we can make something else than brow coal'. I think it is a **historical roots**
R 6	not mentioned	"The **heat** has to be used and in case of small installation […] **Electricity** has to be feed in into the grids"	"In case of feedstock grow – the people grow what the funding is for. […] We are **lucky to be near the German technology"**
R 7	not mentioned	"There is a co-combustion of biomass in a power station. […] wastelands can be used to produce biomass"	"Polish farmers are suppliers of biomass to Germany – I think it is good, because thy expand their horizons and perhaps someday they want to produce bioenergy on their own"

Table 74: Summary answers behavioral drivers policy advisors

Category	Behavioral Drivers		
Name / Respondent	**bioenergy_ market_atract**	**use_ versatility**	**other_beh_ drivers**
R 5	1	1	1
R 6	0	1	1
R 7	0	1	1

Table 75: Coding answers behavioral drivers policy advisors

Category	Name	Code
No impact	no_impact	coding plan 5
Market transparency	market_ transp	coding plan 9
Impact of neighbor energy policy (green energy vs. nuclear power)	impact_energy_ policy	coding plan 5
Unclear legal legislative: cross-border residual materials transport	legal_cb_ transport	coding plan 5
Other impacts of border location	other_cb_ impacts	coding plan 5

Table 76: Content categories on the level: impact of border location policy advisors

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Category	Impact of Border Location				
	no impact	**market transparency**	**impact of neigbour energy policy**	**cross-border residual materials transport**	**other impacts of border location**
Name / Respondent	no_impact	market_transp	impact_energy_policy	legal_cb_transport	other_cb_impacts
R 5	**"Border situation does not impact negative** the dissemination of bioenergy. […] No information from neighbor regions required: would be good, but according to the law not needed."	**"Neighboring investments are noticed, but are not disturbed.** [...] **The farmers are well informed** about the situation on the other site of the border and react on the current market development. […] a lot of projects with Poland and Czech Republic."	"In the region has renewable energy different weight than in other region […] **in Germany we plan energy turn out and Poland plans to build nuclear power stations"**	not mentioned	**"Investors do not consider the local and regional conditions, just the financial support.** [...] **lower energy purchase** than in other regions with higher number of citizens e.g. Dresden. Advantage: perhaps marginally **lower production costs**."
R 6	"It doesn´t have **any impact**. Bioenergy dissemination is connected with the agriculture. In Maren there are more agriculture areas and more bioenergy"	"All technology we use comes from Germany. […] In Poland I don´t know- there are any contacts"	not mentioned	**"Cross-border transport is a problem**: with the rests from bioenergy installation [in Germany to Czech Republic] – legal problem"	"For such activities like PR or studies European **funding for cross-border cooperation** can be used. […] We are lucky to be near the German technology."
R 7	"I wouldn´t combine the border position with the bioenergy dissemination"	"Polish farmers are suppliers of biomass to Germany [...] In the current situation, **free flow of human capital, work and land**, it is no problem."	not mentioned	not mentioned	not mentioned

Table 77: Summary answers impact of border location policy advisors

Category	Impact of Border Location				
Name / Respondent	**no_impact**	**market_ transp**	**impact_ energy_policy**	**legal_cb_ transport**	**other_cb_ impacts**
R 5	1	1	1	0	1
R 6	1	1	0	1	1
R 7	1	1	0	0	0

Table 78: Coding answers of impact of border location policy advisors

Category	Name	Code
Continuous integrated European long term energy strategy	continuous_EU _strategy	coding plan 5
Dissemination of best practice examples	best_ practice	coding plan 5
More information on chances and risks of bioenergy production	chances_risks_ info	coding plan 11
Other opportunity-specific strategies	other_ strategies	coding plan 5

Table 79: Content categories on the level opportunity-specific strategies to overcome barriers and strengthen drivers policy advisors

Category	Opportunity-specific Strategies			
	Continuous integrated European long term energy strategy	**Dissemination of best practice examples**	**More information on chances and risks of bioenergy production**	**other opportunity-specific strategies**
Name / Respondent	continuous_EU_strategy	best_practice	chances_risks_info	other_strategies
R 5	"We need a **clear and stable political commitment**, not nonpermanent [...] it should be cross-border [...] needs to be managed by European policy: the framework, but regional approaches. [...] **we have to see us in the European context**"	"There are good examples of bioenergy production and use […] local models of energy production and supply required. **Functional models** are required, which can be seen, touches etc. "	"**Better communication of local advantages needed** [...] Information policy **on the regional level very important** [...] **target group orientated; age-based information;** global and **cross-border** information policy"	"**Material cycles** should get more attention. [...] Better way to support the bioenergy dissemination: via **taxes privileges**: it does not put a train on the society it results immediately. [...] We have to talk honest about the resources. [...] In cross-border region: **resources not to the border, but in circle**. [...] The government does not make its homework: the **grid building**."
R 6	"We have to convince our government to make **long term plans.** The risk in Czech Republic it is that after elections we don´t have any continuity"	not mentioned	**"Regional** agency – partner who knows well the region and condition. It should take place **cross-border**. There are a lot of in common socio-culturally with the border regions- in the past it was one region"	It is very easy: **local energy agency** which takes care about information policy and information brokering which cooperate with central energy agency."
R 7	"Financial support for the planning, preparation and monitoring, supervision of the implementation process is important."	"I think some demonstration installations are **necessary.** In this way people can see that it works"	"Important: **sensibility:** create **win win** situation, where the community, municipality have also profits from the installation (e.g. cheap heat)"	"Better to place the installation, where the population has nothing against it instead of where it is on the tolerant limits"

Table 80: Summary answers opportunity-specific strategies policy advisors

sCategory	Opportunity-specific Strategies			
Name / Respondent	continuous_EU_strategy	best_practice	chances_risks_info	other_strategies
R 5	1	1	3	1
R 6	1	0	2	1
R 7	1	1	1	1

Table 81: Coding answers of opportunity-specific strategies policy advisors

APPENDIX 6.2.3 System Categories and Coding of Energy Plant Developers and Owners` Answers

Category	Name	Code
Serial number	No.	1 - 8
Stakeholder: plant developer & owner	s_plant	Coding plan 2
Country	country	Coding plan 4

Table 82: Formal categories plant developers and owners

Category	Name	Code
Serial number	No.	
	R 3	3
	R 4	4
Stakeholder: plant developer & owner	s_developer	
	R 3	3
	R 4	3
Country	country	
	R 3	1
	R 4	1

Table 83: Coding answers formal categories plant developers and owners

Category	Name	Code
Structural Barriers		
Competition vs. other investment	invest_comp	coding plan 5
Limited/uncertain return on investment	ROI_uncertain	coding plan 6
Low primary-end-user demand	low_e_demand	coding plan 5
Possible negative environmental impacts	enironment_imp	coding plan 7
Possible negative impacts on food production	negativ_food_impact	coding plan 5
The conversion technology is too expensive	expensive_techn	coding plan 5
Other structural barriers	other_struct_barriers	coding plan 5
Availability Barriers		
Lack of feedstock supply (resource availability)	lack_fs	coding plan 5
Other availability barriers	other_avail_barriers	coding plan 5
Behavioral Barriers		
Perceptual challenges of bioenergy plant	plant_perceptual	coding plan 5
Unclear and complex legislative process of plant permission	unclear_legislative_plant	coding plan 5
Uncertain development and operational costs	uncertain_costs	coding plan 5
Uncertainty of conversion technology/equipment	uncertain_techn	coding plan 5
Uncertainties of financial support	fin_support	coding plan 5
Other behavioral barriers	other_behav_barriers	coding plan 5

Table 84: Content categories on the level barriers plant developers and owners

Category	Structural Barriers						
	Competition vs. other investment	**Limited/ uncertain return on investment**	**Low primary-end-user demand**	**Possible negative environmental impacts**	**Possible negative impacts on food production**	**The conversion technology is too expensive**	**Other structural barriers**
Name / Respondent	invest_ comp	ROI_ uncertain	low_e_ demand	environment_imp	negativ_food_ impact	expensive_ techn	other_ struct_ barriers
R 3	not mentioned	**"After EEG**: our hope is that the gas price level will change; otherwise we will have a problem with the installation"	not mentioned	"Under local aspects there are some **additional emissions**, because the grow fields are situated local. The part of the emission is not so large in relationship to the grow and harvest of biomass"	**Competition to the food production** "reservations from farmers against growth of energy crops, because the agriculture was always the food producer"	not mentioned	not mentioned
R 4	not mentioned	not mentioned	not mentioned	**"But we are asking ourselves whether the wood from the Ukraine still makes sense.** Once we were forced (because of the lack of materials) to buy and transport the wood over more than 100 km. Does it make sense? „	not mentioned	not mentioned	not mentioned

Table 85: Summary answers structural barriers plant developers and owners

Category	Structural Barriers						
Name / Respondent	**invest_ comp**	**ROI_ uncertain**	**low_e_ demand**	**environ-ment_imp**	**negativ_ food_impact**	**expensive_ techn**	**other_ struct_ barriers**
R 3	0	4	0	2	1	0	0
R 4	0	0	0	2	0	0	0

Table 86: Coding answers structural barriers plant developers and owners

Category	Availability Barriers	
Name / Respondent	lack_fs	other_avail_barriers
R 3	"There are a lot of bioenergy installations in the region. […] **There is not very much biomass left"**	not mentioned
R 4	"On long distance the **resources cannot be sufficient,** especially for the small companies because in the three country region there are **big actors"**	not mentioned

Table 87: Summary answers availability barriers plant developers and owners

Category	Availability Barriers	
Name / Respondent	**lack_fs**	**other_avail_barriers**
R 3	1	0
R 4	1	0

Table 88: Coding answers availability barriers plant developers and owners

Category	Behavioral Barriers					
	Perceptual challenges of bioenergy plant	**Unclear and complex legislative process of plant permission**	**Uncertain development and operational costs**	**Uncertainty of conversion technology**	**Uncertainties of financial support**	**Other behavioral barriers**
Name / Respondent	plant_ perceptual	unclear_legislative_ plant	uncertain_ costs	uncertain _ techn	fin_support	other_behav_ barriers
R 3	"On the federal level - they make us problems [...] we experience that **opinion: we invest to suck the money**. […] the **renewable energies can lose their good opinion"**	"Our **permission procedure was very complex**. Because of the change in the regulation to the **new EEG** we had higher requirements to fullfill […] we had to change plans in a short time and **had additional costs**	"German and Saxonian energy policy development: "the question is: **what direction does the change go?"**	not mentioned	**"There are problems with the new EEG** [...] we know from the installation producer, that since the restriction: max. 60 percent maize the request for new installations is sank"	**"Reservations from farmers** against growth of energy crops, because the agriculture was always the food producer and competition to the food production"
R 4	"On long distance the **resources can be not sufficient**, especially for the small companies because in the three country region there are big actors "	"In the field of fast growing forest t**here are a lot of legal barriers**, there are laws, which constrain dissemination of the fast growing woods"	"**The big** [companies] **can buy other volume**s; against them we have any chance"	not mentioned	not mentioned	"With the first installation the company didn´t have any experience; a lot of things went wrong, the farmers […] Now are the **farmers skeptical**"

Table 89: Summary answers behavioral barriers plant developers and owners

Category	Behavioral Barriers					
Name / Respondent	**plant_ perceptual**	**unclear_ legislati-ve_ plant**	**uncertain _ costs**	**uncertain_ techn**	**fin_sup port**	**other_behav_ barriers**
R 3	1	1	1	0	1	1
R 4	1	1	1	0	0	1

Table 90: Coding answers behavioral barriers plant developers and owners

Category	Name	Code
Structural Drivers		
Market diversification/opportunity	market_divers	coding plan 5
Meeting governmental energy/carbon/waste targets	meeting_targets	coding plan 8
Other environmental benefits (other than CO_2 reduction)	other_env_benefits	coding plan 5
Other structural drivers	other_struct_drivers	coding plan 5
Availability Drivers		
Availability of financial reward/support mechanisms	financial_support	coding plan 5
Variety of feedstock use for bioenergy (resource diversifi-cation	ressource_divers	coding plan 5
Other availability drivers	other_avail_drivers	coding plan 5
Behavioral Drivers		
Bioenergy supply consistency vs. other intermittent ener-gy options	supply_consistency	coding plan 5
Bioenergy use versatility	use_versatility	coding plan 5
Increased bioenergy interest from end-user	end_user_interest	coding plan 5
Other behavioral drivers	other_beh_drivers	coding plan 5

Table 91: Content categories on the level drivers plant developers and owners

Category	Structural Drivers			
	Market diversi-fication/ oppor-tunity	**Meeting governmen-tal energy/carbon/ waste targets**	**Other envi-ronmental benefits (other than CO_2 reduc-tion)**	**Other structural dri-vers**
Name / Respondent	market_divers	meeting_targets	other_env_be nefits	other_struct_drivers
R 3	"The EEG was for us the most important regula-tory frame, be-cause **biogas is more expensive than natural gas"**	"It has to be distin-guished: in case of **whole ecological balance, the ad-vantages of a bio-gas** plant are non-controversial. […] **If I consider just Zittau, we almost achieved the goals** – there are two plants producing electricity based on biomass"	not mentioned	"At the local level the cooperation is quite good – the impact pos-sibilities of the rural district on the policy are limited […] We received **support from the city** Zittau and from the district (Landkreis) – **the proximity is an ad-vantage"**
R 4	not mentioned	not mentioned	not mentioned	not mentioned

Table 92: Summary answers structural drivers plant developers and owners

Category	Structural Drivers			
Name / Respondent	**market_ divers**	**meeting_ targets**	**other_env_ benefits**	**other_ struct_drivers**
R 3	1	1	0	1
R 4	0	0	0	0

Table 93: Coding answers structural drivers plant developers and owners

Category	Availability Drivers		
	Availability of financial reward/support mechanisms	**Variety of feedstock use for bioenergy (resource diversification)**	**Other availability drivers**
Name / Respondent	financial_support	ressource_ divers	other_avail_drivers
R 3	"The **EEG was for us the most important regulatory frame**, because biogas is more expensive than natural gas. […] **We received support from the city Zittau and from the district (Landkreis) – the proximity is an advantage"**	"We think also about new resources like **sugar beets or grass silage"**	"We didn´t went to the next region (in Germany) – it depends on the economic efficient transport distances. [...] **We went towards Poland and there were the condition surprisingly even better.** It was better not because of the price, but the polish farmers were willing to **contract in the long term.** [...] The advantage is that the farmers have a stable part of the value added chain and the contracts are over a longer period of time. This is a base for the basic financial security. Normally the agriculture has to deal with the market fluctuations and weather fluctuation". **High stability for the farmers against price fluctuations"**
R 4	"EEG was eerily **supportive.** Everything what was built here, is thanks to the **EEG.** Now it is important to find some good change over. [...] The model has worked and brought some good examples. [...] The **EEG it is a good instrument,** because it is possible to feed in electricity and receive payment. [...] At the beginning the fast growing trees were **strong financial supported by the Saxony, Germany and EU**"	" […] at the same time **resources from Poland**"	"We need to collect experience; in biogas installation we have **gathered already experience.** [...] Municipalities and investors, which are interested [in the bioenergy production], yes they are **informed.** [...] If somebody tries to find information, it is not a problem."

Table 94: Summary answers availability drivers plant developers and owners

Category	Availability Drivers		
Name / Respondent	financial_ support	ressource_divers	other_ avail_drivers
R 3	1	1	1
R 4	1	1	1

Table 95: Coding answers availability drivers plant developers and owners

Category	Behavioral Drivers			
	Bioenergy supply consistency vs. other intermittent energy options	Bioenergy use versatility	Increased bioenergy interest from end-user	Other behavioral drivers
Name / Respondent	supply_consistency	use_versatility	end_user_ interest	other_beh_drivers
R 3	"For us it was a strategic decision. **We are happy that we own almost whole value added.**"	"We were the first installation in Saxony, which **produced biogas**, which was **prepared and injected into the natural gas pipelines."**	not mentioned	"I think the biogas production technology is easy. There are lots of information available. […] We conduct also site visits for the university. It makes **knowledge-transfer possible**."
R 4	not mentioned	"**heat** and good price for **electricity"**	not mentioned	not mentioned

Table 96: Summary answers behavioral drivers plant developers and owners

Category	Behavioral Drivers			
Name / Respondent	supply_ consistency	use_ versatility	end_user_ interest	other_beh_drivers
R 3	1	1	0	1
R 4	0	1	0	0

Table 97: Coding answers behavioral drivers plant developers and owners

Category	Name	Code
No impact	no_impact	coding plan 5
Market transparency	market_transp	coding plan 9
Unclear legal legislative: cross-border residual materials transport	legal_cb_transport	coding plan 5
Transaction costs	trans_costs	coding plan 5
Low population caused border location	low_population	coding plan 5
Market distortion caused different subsidies for bioenergy production	market_distortion	coding plan 5
Higher costs caused cross-border infrastructure	lack_infrastructure	coding plan 5
other impacts of border location	other_cb_impacts	coding plan 5

Table 98: Content categories on the level impact of border location plant developers and owners

Category	Impact of Border Location							
Name / Respondent	no_impact	market_transp	legal_cb_transport	trans_costs	low_ population	market_ distortion	lack_ infrastructure	other_cb_impacts
R3	"In case of **permission procedure** I think **there are any differences**, whether the installation is in a border region or somewhere else in Saxony"	"I think the effects are the same as on the German part. The **cost structure is almost the same**, against expectation […] because they buy also their tractors and machines from the same producers as German farmers"	"There are some **problems: e.g. return delivery of the rests from the fermentation process […] we needed a complex certification process**."	"When we deal cross-border we have to play with the rules [...] we have an **additional effort** [...]. We have perhaps **a small advantage because of the input, but it is compensated by such things.** "	not mentioned	not mentioned	not mentioned	"For us the cross-**border location gave us the possibilities to gain enough input** to build an installation"
R 4	"It has nothing to do with the border region"	"**I´m not good informed** […] On the other hand I can´t say why is it so in Poland and Czech Republic – why so much wood goes there and exactly where. **We are in the dark**"	not mentioned	"The main problems are the language barriers. […] We would like to have contact with the small companies – it is damn difficult. […]"	not mentioned	"For the bioenergy production – the condition should be the same "	"Infrastructure in Czech Republic and Poland should be developed "	"In Dresden would be easier to buy the materials.. [...] **It is easier to buy from the polish state forest owner** than from the small private owner here."

Table 99: Summary answers impact of border location plant developers and owners

Category	Impact of Border Location							
Name / Respondent	no_ impact	market_ transp	legal_cb_ transport	trans_ costs	low_ population	market_ distortion	lack_ infrastructure	other_cb_ impacts
R3	1	3	1	1	0	0	0	1
R 4	1	2	0	1	0	1	1	1

Table 100: Coding answers impact of border location plant developers and owners

Category	Name	Code
Continuous integrated European long term energy strategy	continuous_EU_strategy	coding plan 5
Clearer legislative concerning cross-border residual materials transport	clearer_leg_residual	coding plan 5
Clearer legislative concerning plant permission	clearer_leg_plant	coding plan 5
Equal cross-border subsidies for bioenergy production	common_cb_subsidies	coding plan 5
Cross-border infrastructure development	infra_develop	coding plan 10
Dissemination of best practice examples	best_practice	coding plan 5
Information strategy concerning bioenergy production	bioenergy_info	coding plan 11
Other opportunity-specific strategies	other_strategies	coding plan 5

Table 101: Content categories on the level opportunity-specific strategies to overcome barriers and strengthen drivers plant developers and owners

Category	Opportunity-specific strategies								
Name / Respondent	continuous_EU_ strategy	clearer_leg_ residual	clearer_leg_ plant	common_cb_ subsidies	infra_ develop	best_ practice	chances_ risks_info	bioenergy_ info	other_ strategies
R 3	"Reliable law framework is essential […]. The continuity is critical"	"there are some problems: e.g. return delivery of the rests from the fermentation process"	"it is reasonable that the EU does not regulate everything"	not mentioned	not mentioned	"It is essential to create examples, where it works"	not mentioned	"We received support from the city Zittau and from the district [...] On the federal level, they make us problems"	"It is important to keep the contacts between border regions. There are some barriers under banks
R 4	not mentioned	not mentioned	not mentioned	„For the bioenergy production – the condition should be the same "	"Important is to expand the **energy grids and networks** between actors."	"Companies, which already have experience cross border- they are helpful"	not mentioned	not mentioned	"The main problems are the language barriers. **The actors have to find themselves from bottom to up"**

Table 102: Summary answers opportunity-specific strategies plant developers and owners

Category	Opportunity-specific strategies								
Name / Respondent	**continuous_ EU_ strategy**	**clearer _leg_ residual**	**clearer_ leg_ plant**	**common_ cb_ subsidies**	**infra_ develop**	**best_ practice**	**chances_ risks_info**	**bioenergy_ info**	**other_ strategies**
R 3	1	1	1	0	0	1	0	1	1
R 4	0	0	0	1	2	1	0	0	1

Table 103: Coding answers opportunity-specific strategies plant developers and owners

APPENDIX 6.2.4 System Categories and Coding of End Users` Answers

Category	Name	Code
Serial number	No.	1 - 8
Country	country	Coding plan 4

Table 104: Formal categories end user

No.	Category	Name	Code
1.1	Serial number	R 8	8
1.2	Country	country	1

Table 105: Coding answers formal categories end user

Category	Name
Structural Barriers	
Bioenergy costs vs. fossil-fuel	invest_comp
Possible negative environmental impacts	enironment_imp
Possible negative impacts on food production	negativ_food_impact
Infrastructure and other costs	infra_costs
Other structural barriers	other_struct_barriers
Availability Barriers	
Low supply of bioenergy	low_supply
Seasonal effects of bioenergy supply	other_availability_barr
Other availability barriers	other_avail_barriers
Behavioral Barriers	
Perceptual challenges of bioenergy use	perceptual_use
Preferential over other renewable energy options	other_renewables
Uncertainty of adaptability	adaptability
Unsettled/changing bioenergy market	changing_market
Unclear and complex legislative concerning bioenergy use	unclear_legislative
Other behavioral barriers	other_behav_barriers

Table 106: Content categories on the level barriers end user

Barrier	Category	Expert description
Structural	invest_comp	"The barriers are the **increasing prices of electricity and heat.** Because of this users **consume less energy, they save.** [...] **The end user is interested only in the price**. There are some idealists willing to pay more, but not many."
	environment_imp	"If I work for biogas installation, it would be **good to use the regional biomass.** In cases where maize silage from elsewhere is used to produce energy and just earn money, I think it is very bad. [...] Conceptual **planning according to the resources** - it is unfortunately not the case."
	negativ_food_impact	not mentioned
	infra_costs	not mentioned
	other_struct_barriers	"I think that principally the EEG is a good instrument and support it. But **all the small exceptional permissions make the system not working**. Currently there is any way to follow. **The government made full-braking on the high way and drives opposite direction.** There **are any concepts but lobbyism**. It should be changed. [...] Just selective financial support. **The perspectives for investment are not known** - a lot of investors wait because they don´t know how it goes further. [...] The small companies have to pay and the big ones are unburdened."
Availability	low_supply	not mentioned
	other_availability_barr	not mentioned
	other_avail_barriers	"The government failed to build the **energy grids**"
Behavioral	perceptual_use	not mentioned
	other_renewables	not mentioned
	adaptability	not mentioned
	changing_market	not mentioned
	unclear_legislative	"The applications for build permission are very **interminable.** The verification documents are often **disincentive**"
	other_behav_barriers	"There are also a lot of people who have concerns and doubts. [...] I think the problem is in the **meaningful concepts for energy use.** […] **Farmers have to be informed** how the supply chain works to participate in it"

Table 107: Summary answers barriers end user

Category	Name
Structural Drivers	
Cost reduction via direct substitute of fossil-based fuels	cost_reduction
Investment opportunity into renewable energy	investment
Meeting governmental energy/carbon/waste targets	meeting_targets
Other environmental benefits (other than CO_2 reduction)	other_env_benefits
Other structural drivers	other_struct_drivers
Availability Drivers	
Good technique for waste / residual materials utilization	waste_utilization
Other availability drivers	other_avail_drivers
Behavioral Drivers	
Bioenergy supply consistency vs. other intermittent energy options	supply_consistency
Ability to penetrate most energy markets (versatile)	use_versatility
Positive effects on image	image
Other behavioral drivers	other_beh_drivers

Table 108: Content categories on the level drivers end user

Driver	Category	Expert description
Structural	**cost_reduction**	not mentioned
	investment	"I think that principally the **EEG is a good instrument and support it**."
	meeting_targets	not mentioned
	other_env_benefits	not mentioned
	other_struct_drivers	"I think it is a good thing, but it has to be disseminated, in a **coordinated** way. [...] **I think we are on the right way. The development is good.** [...] With the EEG allocation is the electricity more expensive, although the electricity price sinks. [...] **The farmers have an additional business area.** It is an increase in the agriculture."
Availability	**waste_utilization**	not mentioned
	contribute_gov_ schemes	not mentioned
	other_avail_drivers	"We have **many knowledge institutions:** we have the technical university; we have regional associations and also municipal energy supplier e.g. municipal energy supplier (Stadtwerke). [...] Who is interested in the topic, will find the needed information. [...] **Biomass is available,** it has to be applied goal-orientated."
Behavioral	**supply_consistency**	not mentioned
	use_versatility	not mentioned
	image	not mentioned
	other_behav_barriers	"I think the **biogas production technology is easy**."

Table 109: Summary answers drivers end user

Category	Name
No impact	no_impact
Market transparency	market_ransparency
Other impacts of border location	other_cb_impacts

Table 110: Content categories on the level: impact of border location end user

Impact Category	Expert description
no_impact	"I don´t think so [impact of cross-border location on planning of installation]. **We have a single European market"**
market_transparency	**"I think the border location has advantages.** We remove barriers step by step. Specific resources market arises and **we can be part of the know-how transfer.** Border regions are very interesting: **each of our regions has own competences** – we just have to develop them. [...] In the cross-border activities I see a **big chance for us.** I think everything will approximate to each other because of the EU"
other_cb_impacts	"**I have just a little experience** [...]. We didn´t have a look how is the situation in Poland and Czech Republic. The potentials are there that they can do it on their selves. […] **The regions can profit from this**. It is not bad."

Table 111: Summary answers impact of border location end user

Category	Name
Continuous integrated European long term energy strategy	continuous_EU_strategy
Dissemination of best practice examples	best_practice
Information strategy	chances_risks_info
Other opportunity-specific strategies	other_strategies

Table 112: Content categories on the level opportunity-specific strategies to overcome barriers and strengthen drivers end user

Strategy Category	Expert description
continuous_EU_ strategy	**"The perspectives for investment are not known** - a lot of investors wait because they don´t know how it goes further. **We have to think in the European dimension**: if we want to cut down CO_2 emission, we have to act on the European level. Currently it is not visible. We need not only goals, but also get to know the concepts how to achieve the goals. Poland e.g. has other approaches: they think about nuclear energy"
best_practice	not mentioned
chances_risks_info	"**We don´t know what happens over the border.** In Poland there are also information centers, but **we should extend the information on the European level**. People awareness should be extended. **Understanding has to be raised,** that we have to do something for the environment. [...] From beginning on already at school. These aspects are difficult to explain."
other_strategies	I think it is a good thing, but it has to be **disseminated, in a coordinated way.**

Table 113: Summary answers strategies end user

APPENDIX 7 Likert Scale Questionnaires

APPENDIX 7.1 Survey for Feedstock Suppliers (agriculture, forestry and waste management)

1. What kind of biomass do you sell for the energy purpose (please mark up one or more answers)?

   □ yes, from agriculture
   □ yes, from forestry
   □ yes, from waste management
   □ yes, from other sources (please specify)_____ □
   □ no, I don´t supply biomass

2. How, in your opinion, does the bioenergy have impact on…?

	very negativ	negativ	no impact	positiv	very positiv
Global environment	□	□	□	□	□
Local environment	□	□	□	□	□
Food production	□	□	□	□	□

3. How important is the impact of bioenergy for you on following environmental aspects….?

	not at all important	low importance	moderately important	very important	neutral (doesn´t apply)
Way to achieve energy goals	□	□	□	□	□
Way to reduce CO_2	□	□	□	□	□
Reduction of traditional fossil fuel use (e.g. coal)	□	□	□	□	□

4. What does it make in your opinion the crop growing and biomass sale more attractive…?

	strongly disagree	somewhat disagree	somewhat agree	strongly agree
It is an additional income source	□	□	□	□
It makes possible to produce different products	□	□	□	□
It makes possible to use soils of not good quality	□	□	□	□
Biomass sale is a meaningful option for waste management	□	□	□	□
It makes possible to open up new market sales (market extension)	□	□	□	□

5. What does it make in your opinion the crop growing and biomass sale less attractive…?

	strongly disagree	somewhat disagree	somewhat agree	strongly agree
I prefere to derive income from other sources	□	□	□	□
Crop growing and biomass sale are not sufficient profitable	□	□	□	□
Crop growing and biomass sale require higher efforts (e.g. special machines) in comparison to the traditional cropping	□	□	□	□
I don´t have enough area for biomass growing	□	□	□	□
Reliable buyers of biomass for energy purpose are missing.	□	□	□	□
I don´t have enough experience with biomass crop growing	□	□	□	□

6. To what extend do you agree with the statements concerning bioenergy production…?

	strongly disagree	somewhat disagree	somewhat agree	strongly agree
Access to the funding is easy	☐	☐	☐	☐
Current legal environment is stable	☐	☐	☐	☐
Financial support is sufficient	☐	☐	☐	☐
Social awareness is high	☐	☐	☐	☐
Without financial support from state, it is not possible to use biomass for energy production	☐	☐	☐	☐

7. How does the cross-border situation of your farm influence your activities? *(Please match one or more answers)*

   ☐ It doesn´t have any impact
   ☐ I don´t know anything about the biomass market over the nearest borders
   ☐ I have sufficient information about the biomass market over the nearest borders
   ☐ It is possible for me to sell biomass over the nearest border
   ☐ Farmers in my neighbor countries have other subsidies what causes market distortion
   ☐ It is possible for me to look at best practice example of bioenergy production over the nearest borders
   ☐ Other reason *(please specify)*_____

8. What do you think about the following possibilities to increase the attractiveness of biomass growing for the purpose of energy production?

	not probable	somewhat improbable	somewhat probable	very probable
European energy strategy should be longterm and integrated	☐	☐	☐	☐
Decentralisation of biomass use for energy purposes (= transport reduction)	☐	☐	☐	☐
Implementation of a financial support system for biomass growing for energy production in form of tax reductions	☐	☐	☐	☐
More information about best practice examples of bioenergy production	☐	☐	☐	☐
More information about chances and risks of biomass growing for energy purpose	☐	☐	☐	☐

9. How significant are the following strategies for assuring the same chances of biomass producer and supplier in the border regions, you live in?

	not at all important	low impor-tance	moderately important	very important
More comprehensive law about cross-border transport of residual materials from bioenergy production	□	□	□	□
Equal financial support for all EU Member States	□	□	□	□
Cross-border infrastructure development	□	□	□	□

10. Demographic questions

Age _____

Gender (w / m) _____

Professional experience (in years) _____

Region *(please match the box):*

□ Görlitz

□ Bautzen

If you are interested in the results of this survey, please put your e-mail address below:

_____

Thank you very much!

APPENDIX 7.2 Survey for Policy Advisors

1. What kind of biomass do you have contact in jour job with…?((please mark up one or more answers)

   □ from agriculture
   □ from forestry
   □ from waste management
   □ from other sources (please specify)_____
   □ with non

2. How, in your opinion, does the bioenergy have impact on…?

	very negativ	negativ	no impact	positiv	very positiv
Global environment	□	□	□	□	□
Local environment	□	□	□	□	□
Food production	□	□	□	□	□

3. How important is the impact of bioenergy for you on following environmental aspects….?

	not at all important	low importance	moderately important	very important	neutral (doesn´t apply)
Way to achieve energy goals	□	□	□	□	□
Way to reduce CO_2	□	□	□	□	□
Reduction of traditional fossil fuel use (e.g. coal)	□	□	□	□	□

4. What does it make in your opinion the bioenergy production more attractive…?

	strongly disagree	some-what disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Continuity of bioenergy in comparison with other fluctuant renewable energies	□	□	□	□	□
Flexibility of bioenergy application (electricity, heat, fuel)	□	□	□	□	□
High interest of electricity, heat customers on renewable energies	□	□	□	□	□
Support systems electricity and heat based on biomass	□	□	□	□	□
Diversity of input materials for energy production (input diversification)	□	□	□	□	□

5. What does it make in your opinion the bioenergy production less attractive…?

	strongly disagree	some-what disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Investors prefer to invest in other business areas	□	□	□	□	□
End user demand for bioenergy is too low	□	□	□	□	□
There is not enough biomass to establish a bioenergy plant	□	□	□	□	□
There is not enough agricultue area for biomass growing in the radius of 30 km	□	□	□	□	□
Development and operation costs of a bioenergy plant are uncertain	□	□	□	□	□
Technology of bioenergy production is too expensive	□	□	□	□	□

6. To what extend do you agree with the statements concerning bioenergy production…?

	strongly disagree	somewhat disagree	somewhat agree	strongly agree
Access to the funding is easy	□	□	□	□
Current legal environment is stable	□	□	□	□
Financial support is sufficient	□	□	□	□
Social awareness is high	□	□	□	□
Without financial support from state, it is not possible to use biomass for energy production	□	□	□	□

7. How does the cross-border situation of a farm influence its activities? (Please match one or more answers)

□ It doesn´t have any impact
□ I don´t know anything about the bioenergy market over the nearest borders□
□ I have sufficient information about the bionergy market over the nearest borders
□ It is possible for biomass supplier to sell biomass over the nearest border
□ Biomass suppliers in neighbor countries have other subsidies what causes market distortion
□ It is possible for me to look at best practice example of bioenergy production over the nearest borders
□ Other reason *(please specify)*_____

8. To what extend do you agree with the statements concerning cross-border activities?

	strongly disagree	somewhat disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing	□	□	□	□	□
Use of existing cross-border infrastructure causes higher costs	□	□	□	□	□
Cooperation with partners from foreign border regions requires higher expenditure of time	□	□	□	□	□

9. What do you think about the following possibilities to increase the attractiveness of bioenergy production?

	not probable	somewhat improbable	somewhat probable	very probable
European energy strategy should be long-term and integrated	□	□	□	□
Decentralization of biomass use for energy purposes (= transport reduction)	□	□	□	□
Implementation of a financial support system for biomass growing for energy production in form of tax reductions	□	□	□	□
More information about best practice examples of bioenergy production	□	□	□	□
More information about chances and risks of biomass growing for energy purpose	□	□	□	□

10. How significant are the following strategies for assuring the same chances of bioenergy producer in the border regions, you live in?

	not at all important	low importance	moderately important	very important
More comprehensive law about cross-border transport of residual materials from bioenergy production	□	□	□	□
Equal financial support for all EU Member States	□	□	□	□
Cross-border infrastructure development	□	□	□	□

11. Demographic questions

Age _____

Gender (w / m) _____

Professional experience (in years) _____

Region *(please match the box):*

□ Görlitz

□ Bautzen

If you are interested in the results of this survey, please put your e-mail address below:

_____

Thank you very much!

APPENDIX 7.3 Survery for Energy Producers

1. What kind of biomass do you use in your installation for energy production (please mark up one or more answers)?

   □ from agriculture
   □ from forestry
   □ from waste management
   □ from other sources (please specify)_____
   □ no, I don´t produce bioenergy

2. How, in your opinion, does the bioenergy have impact on…?

	very negativ	negativ	no impact	positiv	very positiv
Global environment	□	□	□	□	□
Local environment	□	□	□	□	□
Food production	□	□	□	□	□

3. How important is the impact of bioenergy for you on following environmental aspects….?

	not at all important	low importance	modera-tely important	very import ant	neutral (doesn´t apply)
Way to achieve energy goals	□	□	□	□	□
Way to reduce CO_2	□	□	□	□	□
Reduction of traditional fossil fuel use (e.g. coal)	□	□	□	□	□

4. What does it make in your opinion the bioenergy production more attractive…?

	strongly disagree	some-what disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Continuity of bioenergy in comparison with other fluctuant renewable energies	□	□	□	□	□
Flexibility of bioenergy application (electricity, heat, fuel)	□	□	□	□	□
High interest of electricity, heat customers on renewable energies	□	□	□	□	□
Support systems electricity and heat based on biomass	□	□	□	□	□
Diversity of input materials for energy pro-duction (input diversification)	□	□	□	□	□

5. What does it make in your opinion the bioenergy production less attractive…?

	strongly disagree	some-what disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Investors prefer to invest in other business areas	□	□	□	□	□
End user demand for bioenergy is too low	□	□	□	□	□
There is not enough biomass to establish a bioenergy plant	□	□	□	□	□
There is not enough agricultue area for biomass growing in the radius of 30 km	□	□	□	□	□
Development and operation costs of a bioenergy plant are uncertain	□	□	□	□	□
Technology of bioenergy production ist too expensive	□	□	□	□	□

6. To what extend do you agree with the statements concerning bioenergy production…?

	strongly disagree	somewhat disagree	somewhat agree	strongly agree	neutral (doesn´t apply)
Access to the funding is easy	☐	☐	☐	☐	☐
Current legal environment is stable	☐	☐	☐	☐	☐
Financial support is sufficient	☐	☐	☐	☐	☐
Social awareness is high	☐	☐	☐	☐	☐
Without financial support from state, it is not possible to use biomass for energy production	☐	☐	☐	☐	☐

7. How does the cross-border situation of your plant influence your activities? (Please match one or more answers)?

☐ It doesn´t have any impact

☐ I don´t know anything about the bioenergy market over the nearest borders

☐ I have sufficient information about the bioenergy market over the nearest borders

☐ It is possible for me to buy biomass over the nearest border

☐ Farmers in my neighbor countries have other subsidies what causes market distortion

☐ It is possible for me to look at best practice example of bioenergy production over the nearest borders

☐ Other reason *(please specify)*_____

8. To what extend do you agree with the statements concerning cross-border activities?

	strongly disagree	some-what disagree	some-what agree	strongly agree	neutral (doesn´t apply)
Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing	☐	☐	☐	☐	☐
Use of existing cross-border infrastructure causes higher costs	☐	☐	☐	☐	☐
Cooperation with partners from foreign border regions requires higher expenditure of time	☐	☐	☐	☐	☐

9. What do you think about the following possibilities to increase the attractiveness of bioenergy production?

	not probable	somewhat improbable	somewhat probable	very probable	neutral (doesn´t apply)
European energy strategy should be long-term and integrated	□	□	□	□	□
Decentralization of biomass use for energy purposes (= transport reduction)	□	□	□	□	□
Implementation of a financial support system for biomass growing for energy production in form of tax reductions	□	□	□	□	□
More information about best practice examples of bioenergy production	□	□	□	□	□
More information about chances and risks of biomass growing for energy purpose	□	□	□	□	□

10. How significant are the following strategies for assuring the same chances of bioenergy producer in the border regions, you live in?

	not at all important	low importance	moderately important	very important	very important
More comprehensive law about cross-border transport of residual materials from bioenergy production	□	□	□	□	□
Equal financial support for all EU Member States	□	□	□	□	□
Cross-border infrastructure development	□	□	□	□	□

11. Demographic questions

Age _____

Gender (w / m) _____

Professional experience (in years) _____

Region *(please match the box):*

□ Görlitz

□ Bautzen

If you are interested in the results of this survey, please put your e-mail address below:

_____

Thank you very much!

APPENDIX 8 Coding Plans for Survey Analysis

APPENDIX 8.1 Coding Plans for Survey Analysis Feedstock Suppliers

Question 1

What kind of biomass do you sell for the energy purpose?

Question	Answers	Code	
		mentioned	not mentioned
Question 1a	from agriculture	1	0
Question 1b	from forestry	1	0
Question 1c	from waste management	1	0
Question 1d	from other sources (please specify)	1	0
Question 1e	no, I don´t supply biomass	1	0

Question 2

How, in your opinion, does the bioenergy have impact on…?

Question 2a	Global environment
Question 2b	Local environment
Question 2c	Food production

Answers	Code
very negativ	1
negativ	2
no impact	3
positiv	4
very positiv	5

Question 3

How important is the impact of bioenergy for you on following environmental aspects….?

Question 3a	Way to achieve energy goals
Question 3b	Way to reduce CO_2
Question 3c	Reduction of traditional fossil fuel use (e.g. coal)

Answers	Code
not at all important	1
low importance	2
neutral (doesn´t apply)	3
moderately important	4
very important	5

Question 4

What does it make in your opinion the crop growing and biomass sale more attractive…?

Question 4a	It is an additional income source
Question 4b	It makes possible to product different products
Question 4c	It makes possible to use soils of not good quality
Question 4d	Biomass sale is a meaningful option for waste management
Question 4e	It makes possible to open up new market sales (market extension)

Answers	Code
strongly disagree	1
somewhat disagree	2
somewhat agree	3
strongly agree	4

Question 5

What does it make in your opinion the crop growing and biomass sale less attractive…?

Question 5a	I prefere to derive income from other sources
Question 5b	Crop growing and biomass sale are not sufficient profitable
Question 5c	Crop growing and biomass sale require higher efforts (e.g. special machines) in comparison to the traditional cropping
Question 5d	I don´t have enough area for biomass growing
Question 5e	Reliable buyers of biomass for energy purpose are missing
Question 5f	I don´t have enough experience with biomass crop growing

Answers	Code
strongly disagree	1
somewhat disagree	2
somewhat agree	3
strongly agree	4

Question 6

To what extend do you agree with the statements concerning bioenergy production…?

Question 6a	Access to the funding is easy
Question 6b	Current legal environment is stable
Question 6c	Financial support is sufficient
Question 6d	Social awareness is high
Question 6e	Without financial support from state, it is not possible to use biomass for energy production

Answers	Code
strongly disagree	1
somewhat disagree	2
somewhat agree	3
strongly agree	4

Question 7

How does the cross-border situation of your farm influence your activities?

Question	Answers	Code	
		mentioned	not mentioned
Question 7a	It doesn´t have any impact	1	0
Question 7b	I don´t know anything about the biomass market over the nearest borders	1	0
Question 7c	I have sufficient information about the bionergy market over the nearest borders	1	0
Question 7d	It is possible for me to sell biomass over the nearest border	1	0
Question 7e	Farmers in my neighbor countries have other subsidies what causes market distortion	1	0
Question 7f	It is possible for me to look at best practice example of bioenergy production over the nearest borders	1	0
Question 7g	Other reason (please specify)	1	0

Question 8

What do you think about the following possibilities to increase the attractiveness of biomass growing for the purpose of energy production?

Question 8a	European energy strategy should be longterm and integrated
Question 8b	Decentralisation of biomass use for energy purposes (= transport reduction)
Question 8c	Implementation of a financial support system for biomass growing for energy production in form of tax reductions
Question 8d	More infomation about best practice examples of bioenergy production
Question 8e	More information about chances and risks of biomass growing for energy purpose

Answers	Code
not probable	1
somewhat improbable	2
somewhat probable	3
very probable	4

Question 9

How significant are the following strategies for assuring the same chances of biomass producer and supplier in the border regions, you live in?

Question 9a	More comprehensive law about cross-border transport of residual materials from bioenergy production
Question 9b	Equal financial support for all EU Member States
Question 9c	Cross-border infrastructure development

Answers	**Code**
not at all important	1
low importance	2
moderately important	3
very important	4

Question 10

Demographic questions

Question 10a

Age

Answers (in years)	**Code**
< = 18	1
>18 and <= 30	2
> 30 and <= 40	3
>40 and <= 50	4
> 50	5

Question 10b

Gender (w / m)

Answers	**Code**
woman	1
man	2

Question 10c

Professional experience (in years)

Answers	**Code**
< = 5	1
>5 and <= 10	2
> 10	3

Question 10d

Region

Answers	**Code**
German Border region	1
Polish Border region	2
Czech Border region	3

APPENDIX 8.2 Coding Plans for Survey Analysis Policy Advisors

Question 1

What kind of biomass do you have contact in your job with…?

Question	Answers	Code	
		mentioned	not mentioned
Question 1a	from agriculture	1	0
Question 1b	from forestry	1	0
Question 1c	from waste management	1	0
Question 1d	from other sources (please specify)	1	0
Question 1e	no, I don´t produce bioenergy	1	0

Question 2

How, in your opinion, does the bioenergy have impact on…?

Question 2a	Global environment
Question 2b	Local environment
Question 2c	Food production

Answers	Code
very negativ	1
negativ	2
no impact	3
positiv	4
very positiv	5

Question 3

How important is the impact of bioenergy for you on following environmental aspects….?

Question 3a	Way to achieve energy goals
Question 3b	Way to reduce CO_2
Question 3c	Reduction of traditional fossil fuel use (e.g. coal)

Answers	Code
not at all important	1
low importance	2
neutral (doesn´t apply)	3
moderately important	4
very important	5

Question 4

What does it make in your opinion the bioenergy production more attractive…?

Question 4a	Continuity of bioenergy in comparison with other fluctuant renewable energies
Question 4b	Flexibility of bioenergy application (electricity, heat, fuel)
Question 4c	High interest of electricity, heat customers on renewable energies
Question 4d	Support systems electricity and heat based on biomass
Question 4e	Diversity of input materials for energy production (input diversification)

Answers	**Code**
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 5

What does it make in your opinion the bioenergy production less attractive…?

Question 5a	Investors prefer to invest in other business areas
Question 5b	End user demand for bioenergy is too low
Question 5c	There is not enough biomass to establish a bioenergy plant
Question 5d	There is not enough agricultue area for biomass growing in the radius of 30 km
Question 5e	Development and operation costs of a bioenergy plant are uncertain
Question 5f	Technology of bioenergy production is too expensive

Answers	**Code**
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 6

To what extend do you agree with the statements concerning bioenergy production…?

Question 6a	Access to the funding is easy
Question 6b	Current legal environment is stable
Question 6c	Financial support is sufficient
Question 6d	Social awareness is high
Question 6e	Without financial support from state, it is not possible to use biomass for energy production

Answers	Code
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 7

How does the cross-border situation of a farm influence its activities?

Question	Answers	Code	
		mentioned	not mentioned
Question 7a	It doesn´t have any impact	1	0
Question 7b	I don´t know anything about the bioenergy market over the nearest borders	1	0
Question 7c	I have sufficient information about the bionergy market over the nearest borders	1	0
Question 7d	It is possible for biomass supplier to sell biomass over the nearest border	1	0
Question 7e	Biomass suppliers in neighbor countries have other subsidies what causes market distortion	1	0
Question 7f	It is possible for me to look at best practice example of bioenergy production over the nearest borders	1	0

Question 8

To what extend do you agree with the statements concerning cross-border activities?

Question 8a	Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing
Question 8b	Use of existing cross-border infrastructure causes higher costs
Question 8c	Cooperation with partners from foreign border regions requires higher expenditure of time

Answers	Code
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 9

What do you think about the following possibilities to increase the attractiveness of bioenergy production?

Question 9a	European energy strategy should be longterm and integrated
Question 9b	Decentralisation of biomass use for energy purposes (= transport reduction)
Question 9c	Implementation of a financial support system for biomass growing for energy production in form of tax reductions
Question 9d	More information about best practice examples of bioenergy production
Question 9e	More information about chances and risks of biomass growing for energy purpose

Answers	Code
not probable	1
somewhat improbable	2
neutral (doesn´t apply)	3
somewhat probable	4
very probable	5

Question 10

How significant are the following strategies for assuring the same chances of bioenergy producer in the border regions, you live in?

Question 10a	More comprehensive law about cross-border transport of residual materials from bioenergy production
Question 10b	Equal financial support for all EU Member States
Question 10c	Cross-border infrastructure development
Question 10d	Other strategy *(please specify)*

Answers	Code
not at all important	1
low importance	2
neutral (doesn´t apply)	3
moderately important	4
very important	5

Question 11

Demographic questions

Question 11a
Age

Answers (in years)	Code
< = 18	1
>18 and <= 30	2
> 30 and <= 40	3
>40 and <= 50	4
> 50	5

Question 11b
Gender (w / m)

Answers	Code
woman	1
man	2

Question 11c
Professional experience (in years)

Answers	Code
< = 5	1
>5 and <= 10	2
> 10	3

Question 11d
Region

Answers	Code
German Border region	1
Polish Border region	2
Czech Border region	3

APPENDIX 8.3 Coding Plans for Survey Analysis Energy Producers

Question 1

What kind of biomass do you use in your installation for energy production?

Question	Answers	Code	
		mentioned	not mentioned
Question 1a	from agriculture	1	0
Question 1b	from forestry	1	0
Question 1c	from waste management	1	0
Question 1d	from other sources (please specify)	1	0
Question 1e	no, I don´t produce bioenergy	1	0

Question 2

How, in your opinion, does the bioenergy have impact on…?

Question 2a	Global environment
Question 2b	Local environment
Question 2c	Food production

Answers	Code
very negativ	1
negativ	2
no impact	3
positiv	4
very positiv	5

Question 3

How important is the impact of bioenergy for you on following environmental aspects?

Question 3a	Way to achieve energy goals
Question 3b	Way to reduce CO_2
Question 3c	Reduction of traditional fossil fuel use (e.g. coal)

Answers	Code
not at all important	1
low importance	2
neutral (doesn´t apply)	3
moderately important	4
very important	5

Question 4

What does it make in your opinion the bioenergy production more attractive…?

Question 4a	Continuity of bioenergy in comparison with other fluctuant renewable energies
Question 4b	Flexibility of bioenergy application (electricity, heat, fuel)
Question 4c	High interest of electricity, heat customers on renewable energies
Question 4d	Support systems electricity and heat based on biomass
Question 4e	Diversity of input materials for energy production (input diversification)

Answers	**Code**
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 5

What does it make in your opinion the bioenergy production less attractive…?

Question 5a	Investors prefer to invest in other business areas
Question 5b	End user demand for bioenergy is too low
Question 5c	There is not enough biomass to establish a bioenergy plant
Question 5d	There is not enough agricultue area for biomass growing in the radius of 30 km
Question 5e	Development and operation costs of a bioenergy plant are uncertain
Question 5f	Technology of bioenergy production ist too expensive

Answers	**Code**
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 6

To what extend do you agree with the statements concerning bioenergy production…?

Question 6a	Access to the funding is easy
Question 6b	Current legal environment is stable
Question 6c	Financial support is sufficient
Question 6d	Social awareness is high
Question 6e	Without financial support from state, it is not possible to use biomass for energy production

Answers	Code
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 7

How does the cross-border situation of your plant influence your activities?

Question	Answers	Code	
		mentioned	not mentioned
Question 7a	It doesn´t have any impact	1	0
Question 7b	I don´t know anything about the biomass market over the nearest borders	1	0
Question 7c	I have sufficient information about the bionergy market over the nearest borders	1	0
Question 7d	It is possible for me to buy biomass over the nearest border	1	0
Question 7e	Farmers in my neighbor countries have other subsidies what causes market distortion	1	0
Question 7f	It is possible for me to look at best practice example of bioenergy production over the nearest borders	1	0

Question 8

To what extend do you agree with the statements concerning cross-border activities?

Question 8a	Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing
Question 8b	Use of existing cross-border infrastructure causes higher costs
Question 8c	Cooperation with partners from foreign border regions requires higher expenditure of time

Answers	Code
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 9

What do you think about the following possibilities to increase the attractiveness of bio-energy production?

Question 9a	European energy strategy should be longterm and integrated
Question 9b	Decentralisation of biomass use for energy purposes (= transport reduction)
Question 9c	Implementation of a financial support system for biomass growing for energy production in form of tax reductions
Question 9d	More information about best practice examples of bioenergy production
Question 9e	More information about chances and risks of biomass growing for energy pur-pose

Answers	Code
strongly disagree	1
somewhat disagree	2
neutral (doesn´t apply)	3
somewhat agree	4
strongly agree	5

Question 10

How significant are the following strategies for assuring the same chances of bioenergy producer in the border regions, you live in?

Question 10a	More comprehensive law about cross-border transport of residual materi-als from bioenergy production
Question 10b	Equal financial support for all EU Member States
Question 10c	Cross-border infrastructure development

Answers	Code
not at all important	1
low importance	2
neutral (doesn´t apply)	3
moderately important	3
very important	4

Demographic questions

Question 11a
Age

Answers (in years)	**Code**
< = 18	1
>18 and <= 30	2
> 30 and <= 40	3
>40 and <= 50	4
> 50	5

Question 11b
Gender (w / m)

Answers	**Code**
woman	1
man	2

Question 11c
Professional experience (in years)

Answers	**Code**
< = 5	1
>5 and <= 10	2
> 10	3

Question 11d
Region

Answers	**Code**
German Border region	1
Polish Border region	2
Czech Border region	3

APPENDIX 9 Stakeholders Perceptions

APPENDIX 9.1 Perceptions of Feedstock Suppliers

Question 3. Contribution of bioenergy to goals achievement							
Contribution	**n**	**not at all important**	**low importance**	**neutral**	**moderately important**	**very important**	**Total**
Way to achieve energy goals							
Polish border region	30	7%	17%	7%	63%	7%	100%
German border region	24	4%	33%	13%	46%	4%	100%
Czech border region	8	25%	13%	0%	50%	13%	100%
Way to reduce CO_2							
Polish border region	30	7%	17%	3%	47%	27%	100%
German border region	24	0%	29%	13%	50%	8%	100%
Czech border region	8	13%	50%	0%	38%	0%	100%
Reduction of traditional fossil fuel use (e.g. coal)							
Polish border region	29	7%	34%	3%	38%	17%	100%
German border region	26	0%	15%	12%	50%	23%	100%
Czech border region	8	13%	0%	0%	88%	0%	100%

Table 114: Attitudes of feedstock suppliers towards impact bioenergy goals achievement in different border regions (own design based on survey 2013)

Question 4. Drivers for crop growing and biomass sale						
Driver	**n**	**strongly disagree**	**somewhat disagree**	**somewhat agree**	**strongly agree**	**Total**
It is an additional income source						
Polish border region	28	14%	0%	61%	25%	100%
German border region	23	0%	9%	78%	13%	100%
Czech border region	7	14%	0%	57%	29%	100%
It makes possible to produce different products						
Polish border region	24	17%	25%	38%	21%	100%
German border region	23	9%	35%	48%	9%	100%
Czech border region	6	17%	0%	67%	17%	100%
It makes possible to use soils of not good quality						
Polish border region	26	15%	15%	54%	15%	100%
German border region	22	14%	50%	32%	5%	100%
Czech border region	6	17%	0%	67%	17%	100%
Biomass sale is a meaningful option for waste management						
Polish border region	26	15%	31%	31%	23%	100%
German border region	22	32%	27%	27%	14%	100%
Czech border region	8	0%	0%	50%	50%	100%
It makes possible to open up new market sales (market extension)						
Polish border region	28	14%	21%	39%	25%	100%
German border region	23	0%	22%	61%	17%	100%
Czech border region	6	17%	17%	50%	17%	100%

Table 115: Drivers for crop growing and biomass sale according to biomass suppliers in different border regions (own design based on survey 2013)

Question 3: Attitude towards impact on environment and food production							
Impact on	**n**	**Very Negative**	**Negative**	**No Impact**	**Positive**	**Very Positive**	**Total**
Global environment							
Polish border region	31	3%	3%	26%	65%	3%	100%
German border region	25	8%	12%	32%	40%	8%	100%
Czech border region	8	0%	25%	25%	50%	0%	100%
Local environment							
Polish border region	24	0%	4%	42%	50%	4%	100%
German border region	24	4%	17%	38%	29%	13%	100%
Czech border region	8	0%	25%	0%	63%	13%	100%
Food production							
Polish border region	23	4%	22%	48%	26%	0%	100%
German border region	24	0%	38%	50%	8%	4%	100%
Czech border region	8	0%	38%	38%	25%	0%	100%

Table 116: Attitudes of feedstock suppliers towards impact on environment and food production in different border regions (own design based on survey 2013)

Question 5. Barriers for crop growing and biomass sale						
Barrier	**n**	**strongly disagree**	**somewhat disagree**	**somewhat agree**	**strongly agree**	**Total**
I prefere to derive income from other sources						
Polish border region	18	0%	78%	0%	22%	100%
German border region	20	10%	50%	30%	10%	100%
Czech border region	7	14%	14%	14%	57%	100%
Crop growing and biomass sale are not sufficient profitable						
Polish border region	18	17%	56%	0%	28%	100%
German border region	20	25%	40%	25%	10%	100%
Czech border region	6	33%	33%	17%	17%	100%
Crop growing and biomass sale require higher efforts (e.g. special machines) in comparison to the traditional cropping						
Polish border region	17	12%	76%	0%	12%	100%
German border region	19	32%	47%	16%	5%	100%
Czech border region	6	17%	33%	50%	0%	100%
I don´t have enough area for biomass growing						
Polish border region	24	8%	75%	0%	17%	100%
German border region	20	5%	40%	40%	15%	100%
Czech border region	6	33%	50%	0%	17%	100%
Reliable buyers of biomass for energy purpose are missing						
Polish border region	18	28%	44%	0%	28%	100%
German border region	20	10%	55%	25%	10%	100%
Czech border region	6	17%	33%	33%	17%	100%
I don´t have enough experience with biomass crop growing						
Polish border region	22	23%	64%	0%	14%	100%
German border region	18	28%	67%	6%	0%	100%
Czech border region	6	17%	50%	0%	33%	100%

Table 117: Attitudes of feedstock supplier towards potential barriers for biomass growing and sale in different Border regions (own design based on survey 2013)

Question 6. Assessment of factors impacting bio-energy generation	n	strongly disagree	somewhat disagree	somewhat agree	strongly agree	Total
Access to the funding is easy						
Polish border region	25	40%	40%	8%	12%	100%
German border region	19	5%	42%	53%	0%	100%
Czech border region	6	33%	17%	50%	0%	100%
Current legal environment is stable						
Polish border region	26	31%	38%	19%	12%	100%
German border region	19	26%	53%	16%	5%	100%
Czech border region	6	33%	50%	17%	0%	100%
Financial support is sufficient						
Polish border region	20	45%	40%	0%	15%	100%
German border region	21	19%	33%	38%	10%	100%
Czech border region	6	17%	50%	17%	17%	100%
Social awareness is high						
Polish border region	23	22%	52%	13%	13%	100%
German border region	21	10%	52%	33%	5%	100%
Czech border region	6	50%	17%	33%	0%	100%
Without financial support from state, it is not possible to use biomass for energy production						
Polish border region	19	32%	11%	11%	47%	100%
German border region	22	5%	14%	45%	36%	100%
Czech border region	6	0%	17%	67%	17%	100%

Table 118: Assessment of other factors impacting bioenergy generation in German, Polish and Czech Border regions by feedstock suppliers (own design based on survey 2013)

Question 7. Impact of cross-border location on farm activities				
Impact	**n**	**mentioned**	**not mentioned**	**Total**
It doesn´t have any impact				
Polish border region	22	14%	86%	100%
German border region	24	63%	38%	100%
Czech border region	7	57%	43%	100%
I don´t know anything about the biomass market over the nearest borders				
Polish border region	22	41%	59%	100%
German border region	24	50%	50%	100%
Czech border region	7	43%	57%	100%
I have sufficient information about the bionergy market over the nearest borders				
Polish border region	22	9%	91%	100%
German border region	24	0%	100%	100%
Czech border region	7	0%	100%	100%
It is possible for me to sell biomass over the nearest border				
Polish border region	22	32%	68%	100%
German border region	24	0%	100%	100%
Czech border region	7	0%	100%	100%
Farmers in my neighbor countries have other subsidies what causes market distortion				
Polish border region	22	18%	82%	100%
German border region	24	0%	100%	100%
Czech border region	7	0%	100%	100%
It is possible for me to look at best practice example of bioenergy production over the nearest borders				
Polish border region	22	9%	91%	100%
German border region	24	4%	96%	100%
Czech border region	7	0%	100%	100%
Other reason (please specify)				
Polish border region	22	0%	100%	100%
German border region	24	4%	96%	100%
Czech border region	7	0%	100%	100%

Table 119: Assessment of impact of cross-border location by feedstock suppliers in different border regions (own design based on survey 2013)

Question 8. Assessment of strategies for increasing the attractiveness of biomass growing for the purpose of energy production						
Strategy	**n**	**not probable**	**somewhat improbable**	**somewhat probable**	**very probable**	**Total**
European energy strategy should be longterm and integrated						
Polish border region	26	4%	15%	23%	58%	100%
German border region	21	5%	10%	33%	52%	100%
Czech border region	7	0%	14%	14%	71%	100%
Decentralisation of biomass use for energy purposes (= transport reduction)						
Polish border region	20	0%	0%	30%	70%	100%
German border region	22	0%	5%	23%	73%	100%
Czech border region	7	0%	0%	71%	29%	100%
Implementation of a financial support system for biomass growing for energy production in form of tax reductions						
Polish border region	23	9%	9%	22%	61%	100%
German border region	21	19%	10%	52%	19%	100%
Czech border region	7	29%	14%	29%	29%	100%
More information about best practice examples of bioenergy production						
Polish border region	21	5%	5%	19%	71%	100%
German border region	22	5%	27%	41%	27%	100%
Czech border region	7	14%	0%	43%	43%	100%
More information about chances and risks of biomass growing for energy purpose						
Polish border region	22	9%	9%	18%	64%	100%
German border region	21	5%	19%	52%	24%	100%
Czech border region	7	14%	0%	57%	29%	100%

Table 120: Assessment of strategies for increasing the attractiveness of biomass growing for the purpose of energy production by feedstock suppliers in different border regions (own design based on survey 2013)

Question 9: Assessment of other aspects of biomass supply in different border regions by feedstock suppliers in different border regions						
Strategy	**n**	**not at all important**	**low importance**	**moderately important**	**very important**	**Total**
More comprehensive law about cross-border transport of residual materials from bioenergy production						
Polish border region	27	7%	22%	44%	26%	100%
German border region	19	16%	11%	63%	11%	100%
Czech border region	7	0%	29%	43%	29%	100%
Equal financial support for all EU Member States						
Polish border region	27	0%	15%	33%	52%	100%
German border region	19	5%	21%	53%	21%	100%
Czech border region	7	0%	0%	71%	29%	100%
Cross-border infrastructure development						
Polish border region	27	15%	11%	48%	26%	100%
German border region	19	5%	26%	58%	11%	100%
Czech border region	7	0%	29%	57%	14%	100%

Table 121: Assessment of other aspects of biomass supply in different border regions by feedstock suppliers in different border regions (own design based on survey 2013)

APPENDIX 9.2 Perceptions of Policy Advisors

Question 3. Contribution of bioenergy to goals achievement							
Contribution	**n**	**not at all important**	**low importance**	**moderately important**	**very important**	**not at all important**	**Total**
Way to achieve energy goals							
Polish border region	19	0%	32%	0%	37%	32%	100%
German border region	17	0%	12%	0%	53%	35%	100%
Czech border region	30	3%	13%	3%	57%	23%	100%
Way to reduce CO_2							
Polish border region	19	0%	16%	0%	21%	63%	100%
German border region	16	0%	25%	0%	44%	31%	100%
Czech border region	30	0%	23%	3%	47%	27%	100%
Reduction of traditional fossil fuel use (e.g. coal)							
Polish border region	19	0%	37%	0%	21%	42%	100%
German border region	16	0%	19%	0%	50%	31%	100%
Czech border region	30	3%	20%	0%	37%	40%	100%

Table 122: Attitudes of policy advisors towards impact bioenergy goals achievement in different border regions (own design based on survey 2013)

Question 4. Drivers for bioenergy generation							
Drivers	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Continuity of bioenergy in comparison with other fluctuant renewable energies							
Polish border region	19	0%	16%	0%	47%	37%	100%
German border region	17	0%	0%	0%	41%	59%	100%
Czech border region	30	10%	7%	3%	57%	23%	100%
Flexibility of bioenergy application (electricity, heat, fuel)							
Polish border region	19	0%	5%	0%	42%	53%	100%
German border region	16	0%	6%	0%	44%	50%	100%
Czech border region	18	0%	17%	11%	72%	0%	100%
High interest of electricity, heat customers on renewable energies							
Polish border region	19	0%	32%	0%	47%	21%	100%
German border region	16	0%	13%	0%	69%	19%	100%
Czech border region	23	9%	39%	0%	52%	0%	100%
Support systems electricity and heat based on biomass							
Polish border region	19	0%	5%	5%	74%	16%	100%
German border region	16	0%	19%	6%	50%	25%	100%
Czech border region	23	22%	9%	9%	61%	0%	100%
Diversity of input materials for energy production (input diversification)							
Polish border region	19	0%	32%	5%	26%	37%	100%
German border region	16	0%	6%	6%	38%	50%	100%
Czech border region	22	5%	27%	5%	64%	0%	100%

Table 123: Drivers for bioenergy generation according to policy advisors in different border regions (own design based on survey 2013)

Question 2: Attitude towards impact on environment and food production							
Impact on	**n**	**very negative**	**negative**	**bo impact**	**positive**	**very positive**	**Total**
Global environment							
Polish border region	18	0%	6%	17%	61%	17%	100%
German border region	16	0%	13%	13%	56%	19%	100%
Czech border region	30	3%	3%	17%	67%	10%	100%
Local environment							
Polish border region	18	0%	6%	17%	61%	17%	100%
German border region	17	0%	12%	24%	47%	18%	100%
Czech border region	30	3%	17%	10%	50%	20%	100%
Food production							
Polish border region	19	0%	16%	47%	26%	11%	100%
German border region	16	0%	50%	44%	6%	0%	100%
Czech border region	30	10%	13%	63%	10%	3%	100%

Table 124: Attitudes of policy advisors towards impact on environment and food production in different border regions (own design based on survey 2013)

Question 5. Barriers for bioenergy generation							
Barrier	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Investors prefer to invest in other business areas							
Polish border region	19	0%	32%	5%	42%	21%	100%
German border region	15	7%	27%	0%	67%	0%	100%
Czech border region	22	9%	32%	5%	55%	0%	100%
End user demand for bioenergy is too low							
Polish border region	19	0%	26%	5%	53%	16%	100%
German border region	16	19%	38%	0%	38%	6%	100%
Czech border region	24	4%	21%	4%	71%	0%	100%
There is not enough biomass to establish a bioenergy plant							
Polish border region	19	0%	32%	5%	42%	21%	100%
German border region	16	13%	38%	0%	38%	13%	100%
Czech border region	22	9%	27%	9%	55%	0%	100%
There is not enough agriculture area for biomass growing in the radius of 30 km							
Polish border region	19	0%	42%	5%	37%	16%	100%
German border region	17	12%	18%	0%	65%	6%	100%
Czech border region	24	21%	29%	13%	38%	0%	100%
Development and operation costs of a bioenergy plant are uncertain							
Polish border region	19	0%	5%	5%	58%	32%	100%
German border region	15	0%	20%	0%	53%	27%	100%
Czech border region	19	5%	58%	5%	32%	0%	100%
Technology of bioenergy production is too expensive							
Polish border region	18	0%	11%	6%	67%	17%	100%
German border region	17	6%	29%	12%	41%	12%	100%
Czech border region	21	10%	43%	10%	38%	0%	100%

Table 125: Attitudes of policy advisors towards potential barriers for bioenergy generation in different border regions (own design based on survey 2013)

Question 6. Assessment of other factors impacting bioenergy generation							
Factor	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Access to the funding is easy							
Polish border region	18	17%	56%	0%	28%	0%	100%
German border region	16	19%	38%	0%	44%	0%	100%
Czech border region	28	18%	57%	0%	25%	0%	100%
Current legal environment is stable							
Polish border region	18	11%	67%	0%	22%	0%	100%
German border region	17	35%	53%	0%	12%	0%	100%
Czech border region	29	34%	41%	0%	24%	0%	100%
Financial support is sufficient							
Polish border region	18	11%	50%	0%	39%	0%	100%
German border region	16	0%	31%	0%	50%	19%	100%
Czech border region	24	8%	67%	0%	25%	0%	100%
Social awareness is high							
Polish border region	18	28%	72%	0%	0%	0%	100%
German border region	16	13%	56%	0%	25%	6%	100%
Czech border region	29	31%	52%	0%	17%	0%	100%
Without financial support from state, it is not possible to use biomass for energy production							
Polish border region	18	17%	22%	0%	56%	6%	100%
German border region	17	12%	24%	0%	35%	29%	100%
Czech border region	25	4%	32%	0%	64%	0%	100%

Table 126: Assessment of other factors impacting bioenergy by policy advisors in different border regions (own design based on survey 2013)

Question 7. Impact of cross-border location of farm activities				
Impact	**n**	**mentioned**	**not mentioned**	**Total**
It doesn´t have any impact				
Polish border region	18	0%	100%	100%
German border region	17	24%	76%	100%
Czech border region	30	37%	63%	100%
I don´t know anything about the bioenergy market over the nearest borders				
Polish border region	18	89%	11%	100%
German border region	17	35%	65%	100%
Czech border region	30	43%	57%	100%
I have sufficient information about the bioenergy market over the nearest borders				
Polish border region	18	0%	100%	100%
German border region	17	18%	82%	100%
Czech border region	30	3%	97%	100%
It is possible for biomass supplier to sell biomass over the nearest border				
Polish Border region	18	11%	89%	100%
German Border region	17	41%	59%	100%
Czech Border region	30	3%	97%	100%
Biomass suppliers in neighbor countries have other subsidies what causes market distortion				
Polish border region	18	0%	100%	100%
German border region	17	18%	82%	100%
Czech border region	30	3%	97%	100%
It is possible for me to look at best practice example of bioenergy production over the nearest borders				
Polish border region	18	6%	94%	100%
German border region	17	29%	71%	100%
Czech border region	30	7%	93%	100%
Other reason				
Polish border region	18	0%	100%	100%
German border region	17	6%	94%	100%
Czech border region	30	7%	93%	100%

Table 127: Assessment of impact of cross-border location of farm activities by policy advisors in different border regions (own design based on survey 2013)

Question 8. Assessment of cross-border activities							
Impact	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing							
Polish border region	18	6%	11%	17%	50%	17%	100%
German border region	16	0%	13%	0%	88%	0%	100%
Czech border region	23	4%	26%	13%	57%	0%	100%
Use of existing cross-border infrastructure causes higher costs							
Polish border region	18	0%	28%	11%	44%	17%	100%
German border region	15	20%	33%	0%	47%	0%	100%
Czech border region	24	4%	29%	13%	54%	0%	100%
Cooperation with partners from foreign border regions requires higher expenditure of time							
Polish border region	18	11%	17%	11%	33%	28%	100%
German border region	16	6%	13%	0%	63%	19%	100%
Czech border region	22	9%	27%	14%	50%	0%	100%

Table 128: Assessment of cross-border activities by policy advisors in different border regions (own design based on survey 2013)

Question 9. Assessment of strategies for increasing the attractiveness of bioenergy generation							
Strategy	**n**	**not pro-bable**	**somewhat improbable**	**neutral**	**somewhat probable**	**very probable**	**Total**
European energy strategy should be longterm and integrated							
Polish border region	18	0%	6%	0%	50%	44%	100%
German border region	16	6%	13%	0%	44%	38%	100%
Czech border region	30	3%	13%	0%	27%	57%	100%
Decentralisation of biomass use for energy purposes (=transport reduction)							
Polish border region	18	0%	6%	0%	50%	44%	100%
German border region	17	0%	12%	0%	35%	53%	100%
Czech border region	29	7%	17%	0%	21%	55%	100%
Implementation of a financial support system for biomass growing for energy production in form of tax reductions							
Polish border region	18	0%	11%	6%	28%	56%	100%
German border region	17	24%	24%	0%	35%	18%	100%
Czech border region	30	17%	17%	0%	47%	20%	100%
More infomation about best practice examples of bioenergy production							
Polish border region	18	0%	6%	0%	39%	56%	100%
German border region	16	0%	13%	0%	38%	50%	100%
Czech border region	30	3%	10%	3%	40%	43%	100%
More information about chances and risks of biomass growing for energy purpose							
Polish border region	18	0%	6%	0%	39%	56%	100%
German border region	16	0%	19%	0%	44%	38%	100%
Czech border region	29	3%	7%	0%	41%	48%	100%

Table 129: Assessment of strategies for increasing the attractiveness of biomass growing for the purpose of energy production by policy advisors in different border regions (own design based on survey 2013)

Question 10. Assessment of strategies for assuring the same chances of bioenergy producers in different border regions							
Strategy	**n**	**not at all important**	**low importance**	**moderately important**	**very important**	**not at all important**	**Total**
More comprehensive law about cross-border transport of residual materials from bioenergy production							
Polish border region	16	0%	0%	0%	50%	50%	100%
German border region	16	0%	0%	0%	63%	38%	100%
Czech border region	30	10%	13%	0%	57%	20%	100%
Equal financial support for all EU Member States							
Polish border region	16	0%	0%	0%	50%	50%	100%
German border region	15	13%	33%	7%	40%	7%	100%
Czech border region	30	7%	10%	0%	50%	33%	100%
Cross-border infrastructure development							
Polish border region	15	0%	7%	0%	60%	33%	100%
German border region	16	0%	6%	0%	63%	31%	100%
Czech border region	30	17%	37%	0%	30%	17%	100%

Table 130: Assessment of other aspects of biomass supply in different border regions by policy advisors in different border regions (own design based on survey 2013)

APPENDIX 9.3 Perceptions of Energy Producers

Question 3. Contribution of bioenergy to goals achievement							
Contribution	**n**	**not at all important**	**low importance**	**neutral**	**moderately important**	**very important**	**Total**
Way to achieve energy goals							
Polish border region	2	0%	50%	0%	50%	0%	100%
German border region	19	0%	11%	0%	47%	42%	100%
Czech border region	5	0%	60%	0%	40%	0%	100%
Way to reduce CO_2							
Polish border region	2	0%	50%	0%	50%	0%	100%
German border region	19	0%	16%	0%	63%	21%	100%
Czech border region	5	0%	20%	0%	60%	20%	100%
Reduction of traditional fossil fuel use (e.g. coal)							
Polish border region	2	0%	100%	0%	0%	0%	100%
German border region	17	0%	18%	0%	59%	24%	100%
Czech border region	5	0%	20%	0%	60%	20%	100%

Table 131: Assessment of contribution of bioenergy to goals achievement by energy producer in different border regions (own design based on survey 2013)

Question 4. Drivers for bioenergy generation							
Drivers	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Continuity of bioenergy in comparison with other fluctuant renewable energies							
Polish border region	2	50%	0%	0%	50%	0%	100%
German border region	19	0%	5%	0%	26%	68%	100%
Czech border region	5	0%	40%	0%	20%	40%	100%
Flexibility of bioenergy application (electricity, heat, fuel)							
Polish border region	2	50%	0%	0%	50%	0%	100%
German border region	19	0%	5%	0%	53%	42%	100%
Czech border region	5	0%	0%	0%	80%	20%	100%
High interest of electricity, heat customers on renewable energies							
Polish border region	2	50%	50%	0%	0%	0%	100%
German border region	19	0%	11%	0%	53%	37%	100%
Czech border region	5	0%	20%	20%	40%	20%	100%
Support systems electricity and heat based on biomass							
Polish border region	2	50%	0%	0%	0%	50%	100%
German border region	18	6%	11%	0%	56%	28%	100%
Czech border region	5	0%	20%	0%	0%	80%	100%
Diversity of input materials for energy production (input diversification)							
Polish border region	2	50%	50%	0%	0%	0%	100%
German border region	19	0%	5%	0%	58%	37%	100%
Czech border region	5	0%	0%	0%	80%	20%	100%

Table 132: Drivers for bioenergy generation according to energy producers in different border regions (own design based on survey 2013)

Question 2: Attitude towards impact on environment and food production							
Impact on	**n**	**very negative**	**negative**	**no impact**	**positive**	**very positive**	**Total**
Global environment							
Polish border region	2	0%	50%	50%	0%	0%	100%
German border region	18	0%	11%	17%	50%	22%	100%
Czech border region	5	0%	0%	60%	20%	20%	100%
Local environment							
Polish border region	2	0%	50%	50%	0%	0%	100%
German border region	18	0%	6%	39%	22%	33%	100%
Czech border region	5	0%	20%	0%	60%	20%	100%
Food production							
Polish border region	2	0%	50%	50%	0%	0%	100%
German border region	19	5%	32%	53%	11%	0%	100%
Czech border region	5	0%	60%	20%	20%	0%	100%

Table 133: Attitudes of policy energy producers advisors towards impact on environment and food production in different border regions (own design based on survey 2013)

Question 5. Barriers for bioenergy generation							
Barrier	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Investors prefer to invest in other business areas							
Polish border region	2	0%	50%	50%	0%	0%	100%
German border region	19	16%	21%	11%	47%	5%	100%
Czech border region	5	20%	20%	0%	20%	40%	100%
End user demand for bioenergy is too low							
Polish border region	1	0%	0%	100%	0%	0%	100%
German border region	19	16%	37%	5%	37%	5%	100%
Czech border region	5	0%	60%	20%	0%	20%	100%
There is not enough biomass to establish a bioenergy plant							
Polish border region	2	0%	50%	0%	0%	50%	100%
German border region	19	11%	47%	11%	26%	5%	100%
Czech border region	5	20%	20%	0%	20%	40%	100%
There is not enough agriculture area for biomass growing in the radius of 30 km							
Polish border region	2	0%	0%	0%	0%	100%	100%
German border region	19	11%	53%	5%	21%	11%	100%
Czech border region	5	0%	0%	0%	40%	60%	100%
Development and operation costs of a bioenergy plant are uncertain							
Polish border region	2	0%	0%	0%	0%	100%	100%
German border region	19	5%	21%	5%	63%	5%	100%
Czech border region	5	0%	20%	0%	20%	60%	100%
Technology of bioenergy production ist too expensive							
Polish border region	2	0%	50%	0%	0%	50%	100%
German border region	19	0%	42%	5%	53%	0%	100%
Czech border region	5	0%	20%	0%	20%	60%	100%

Table 134: Attitudes of energy producers towards potential barriers for bioenergy generation in different border regions (own design based on survey 2013)

Question 6. Assessment of factors impacting bioenergy generation							
Factor	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Access to the funding is easy							
Polish border region	2	50%	50%	0%	0%	0%	100%
German border region	18	0%	39%	0%	61%	0%	100%
Czech border region	5	40%	40%	0%	20%	0%	100%
Current legal environment is stable							
Polish border region	2	100%	0%	0%	0%	0%	100%
German border region	17	35%	29%	0%	29%	6%	100%
Czech border region	5	60%	40%	0%	0%	0%	100%
Financial support is sufficient							
Polish border region	2	0%	100%	0%	0%	0%	100%
German border region	17	18%	41%	0%	41%	0%	100%
Czech border region	5	20%	0%	0%	40%	40%	100%
Social awareness is high							
Polish border region	2	50%	50%	0%	0%	0%	100%
German border region	18	0%	67%	0%	33%	0%	100%
Czech border region	5	0%	60%	0%	20%	20%	100%
Without financial support from state, it is not possible to use biomass for energy production							
Polish border region	2	0%	50%	0%	0%	50%	100%
German border region	18	11%	11%	0%	44%	33%	100%
Czech border region	5	0%	0%	0%	0%	100%	100%

Table 135: Assessment of other factors impacting bioenergy generation in different border regions by energy producers (own design based on survey 2013)

Question 7. Impact of cross-border location of plant activities				
Impact	**n**	**mentioned**	**not mentioned**	**Total**
It doesn´t have any impact				
Polish border region	2	50%	50%	100%
German border region	19	68%	32%	100%
Czech border region	5	60%	40%	100%
I don´t know anything about the bioenergy market over the nearest borders				
Polish border region	2	50%	50%	100%
German border region	19	53%	47%	100%
Czech border region	5	80%	20%	100%
I have sufficient information about the bioenergy market over the nearest borders				
Polish border region	2	0%	100%	100%
German border region	19	16%	84%	100%
Czech border region	5	0%	100%	100%
It is possible for me to buy biomass over the nearest border				
Polish border region	2	0%	100%	100%
German border region	19	21%	79%	100%
Czech border region	5	0%	100%	100%
Biomass suppliers in neighbor countries have other subsidies what causes market distortion				
Polish border region	2	0%	100%	100%
German border region	19	0%	100%	100%
Czech border region	5	20%	80%	100%
It is possible for me to look at best practice example of bioenergy production over the nearest borders				
Polish border region	2	0%	100%	100%
German border region	19	5%	95%	100%
Czech border region	5	20%	80%	100%
Other reason				
Polish border region	2	50%	50%	100%
German border region	19	11%	89%	100%
Czech border region	5	0%	100%	100%

Table 136: Assessment of impact of cross-border location of plant activities by energy producers in different border regions (own design based on survey 2013)

Question 8. Assessment of cross-border activities							
Impact	**n**	**strongly disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**strongly agree**	**Total**
Legal regulation concerning cross-border transport of residual materials from bioenergy production is confusing							
Polish border region	2	0%	0%	50%	0%	50%	100%
German border region	14	0%	43%	7%	36%	14%	100%
Czech border region	5	0%	20%	0%	80%	0%	100%
Use of existing cross-border infrastructure causes higher costs							
Polish border region	1	0%	0%	0%	100%	0%	100%
German border region	13	8%	54%	15%	23%	0%	100%
Czech border region	5	0%	60%	0%	20%	20%	100%
Cooperation with partners from foreign border regions requires higher expenditure of time							
Polish border region	2	0%	0%	50%	50%	0%	100%
German border region	13	0%	23%	23%	46%	8%	100%
Czech border region	5	0%	20%	0%	40%	40%	100%

Table 137: Assessment of cross-border activities by energy producers in different border regions (own design based on survey 2013)

Question 9. Assessment of strategies for increasing the attractiveness of bioenergy generation							
Strategy	**n**	**not probable**	**somewhat improbable**	**neutral**	**somewhat probable**	**very probable**	**Total**
European energy strategy should be long term and integrated							
Polish border region	2	0%	0%	0%	50%	50%	100%
German border region	19	5%	5%	0%	26%	63%	100%
Czech border region	5	0%	0%	0%	20%	80%	100%
Decentralisation of biomass use for energy purposes (= transport reduction)							
Polish border region	2	0%	0%	0%	0%	100%	100%
German border region	19	0%	0%	0%	37%	63%	100%
Czech border region	5	0%	20%	0%	40%	40%	100%
Implementation of a financial support system for biomass growing for energy production in form of tax reductions							
Polish border region	2	0%	0%	0%	0%	100%	100%
German border region	19	16%	16%	5%	21%	42%	100%
Czech border region	5	20%	40%	0%	20%	20%	100%
More information about best practice examples of bioenergy production							
Polish border region	2	50%	0%	0%	0%	50%	100%
German border region	19	0%	5%	0%	32%	63%	100%
Czech border region	5	0%	0%	0%	60%	40%	100%
More information about chances and risks of biomass growing for energy purpose							
Polish border region	2	50%	0%	0%	0%	50%	100%
German border region	19	0%	0%	0%	68%	32%	100%
Czech border region	5	0%	0%	0%	60%	40%	100%

Table 138: Assessment of strategies for increasing the attractiveness of biomass growing for the purpose of energy production in different border regions by energy producers (own design based on survey 2013)

Question 10. Assessment of strategies for assuring the same chances of bioenergy producers in different border regions							
Strategy	**n**	**not at all important**	**low importance**	**neutral**	**moderately Important**	**very important**	**Total**
More comprehensive law about cross-border transport of residual materials from bioenergy production							
Polish border region	2	0%	0%	0%	100%	0%	100%
German border region	18	0%	17%	0%	56%	28%	100%
Czech border region	5	0%	0%	0%	60%	40%	100%
Equal financial support for all EU Member States							
Polish border region	2	0%	0%	0%	100%	0%	100%
German border region	18	0%	28%	0%	61%	11%	100%
Czech border region	5	0%	20%	0%	40%	40%	100%
Cross-border infrastructure development							
Polish border region	2	0%	0%	0%	100%	0%	100%
German border region	18	0%	6%	0%	89%	6%	100%
Czech border region	5	0%	20%	0%	80%	0%	100%

Table 139: Assessment of other aspects of biomass supply in different border regions by energy producers in different border regions (own design based on survey 2013)