

University of Twente.
Faculty of Management and Governance
Master in Public Administration

Renewable electricity in Latvia

Institutional challenges to increase the share of renewables in Latvian electricity supply

Master Assignment
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December 2010
Enschede, the Netherlands

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Abstract

This research seeks for institutional conditions within which electricity production using renewable sources in Latvia can develop in order to reduce energy dependency from foreign suppliers and meet the renewable energy production targets. The focus is on the effective market organization principles. The institutional economic theory frame is used to analyse the Latvian electricity market organisation. In addition, this research seeks to provide suggestions for institutional condition changes in the market to increase renewable electricity production.

1. Introduction

1.1. Background

This thesis is about the electricity supply in Latvia. Latvia, as part of the former Soviet Union, pretty much depends on electricity imports from Russia. Latvia should increase domestic production because availability of resources and materials at competitive prices is important precondition to reach economical development. Energy in general and electricity in particular is a vital resource. Many actors are involved in the electricity market such as electricity distribution company, the government, national and international organizations, energy suppliers, and private and industrial energy consumers. One of the main goals for the government is to ensure the country with safe and effective energy supply and to meet targets set by international organizations that Latvia has undertaken. The European Commission has set the targets for energy production using renewable energy sources - Latvia has to produce 42% of consumed energy using renewable energy sources by 2020 instead of the 36% the country is currently producing (Europe's Energy Portal; 2010). It is large step and to meet this goal, Latvia needs to make changes in the energy policy in general and in electricity policy in particular to ensure goal attainment in 2020. It is assumed that many aspects of the Latvian electricity supply need to be changed. The government is the main actor in the electricity system and it needs to find balance among expectations of all the involved actors; energy suppliers are using their impact in energy market by dictating rules in other policy fields; consumers are demanding predictable policy and electricity prices. In my research I will concentrate on institutional changes in electricity supply, in particular changes that might increase energy production from renewable energy sources.

The application of renewable energy resources is still too restricted in Latvia. Part of the problem is the costs of renewables which still exceed those of conventional energy resources like coal, gas and oil. In the context of the EU several support instruments for renewable resources are in use, such as a feed in support and a quota system. These systems are created as support mechanisms for renewable energy production in order to increase the share of renewable energy. Feed in tariff is used to encourage energy producers by assuring special prices for energy production using renewable resources. Quota system is created to promote renewable energy production by setting energy volume that must be produced using renewable energy sources. Below in chapter I will explain these instruments in more detail. In my research I will analyse if these kinds of support instruments could also be effective in Latvia. For that reason I will analyse the Latvian electricity market from an institutional perspective to find out if the current electricity market is well suited for supporting an increase in domestic electricity production from renewable energy resources. In this thesis renewable energy resources are wind, sun, biomass and hydro (European Commission; 1996).

The main purpose to my research is to show possibilities to increase renewable energy sources (RES) application by better management of available support mechanisms and by increasing institutional efficiency. Particularly interesting for me will be to analyze why the current system in Latvia is not effective and what are the possibilities to create it more efficient and how the government can cooperate with market actors to create fair rules for support instrument distribution.

1.2. Aim and research questions

In Latvia a couple of supporting instruments are employed, but there are many uncertainties about their effective application and impact. The government is the main actor in this “game” and currently is situated between mile-stones; it needs to ensure competitive electricity prices but at the same time it is committed to the international EU obligations for increasing renewable energy share. Electricity imports from Russia are still substantive and the relative low prices are hard to beat by renewable based electricity. Latvia is in a way burdened by its heritage of being a former Soviet satellite. Despite the formal reforms in electricity supply, initiated by the EU membership of the country, the actual electricity market appears to be inadequately equipped for increasing the share of renewables. In order to find out more systematically what the problems in Latvian electricity supply are, I have formulated the following research questions.

The overall research question is:

What institutional changes are needed for increasing the share of renewable electricity production in Latvia?

As indicated above, in this thesis I will develop an institutional perspective on the Latvian electricity market to analyse the challenges of increasing the share of renewables. To elaborate my institutional perspective in a more systematic way, I have formulated the following set of subquestions.

- What is the current state of electricity production in Latvia?

To answer this question I will write an overview of the electricity system starting with the historical development and description of the current electricity market. My focus will be on the organization and functioning of the Latvian electricity market. The description of the Latvian electricity market will also identify the major actors and their role in the market.

- What are effective institutional conditions to support renewable electricity production in electricity markets?

To answer this question I will draw a theoretical framework based on institutional economic theory. I will review the literature to find out what the success conditions for electricity production are, as well as how the system should be organized to work effectively according to theory. I will focus on the openness of the electricity market

for new investors, access to the grid, and adequate financial support mechanisms for renewable energy sources.

- To what degree does the Latvian electricity market reflect the institutional conditions for support of renewable electricity production?

The previous question dealt with the theory of effective market organisation. The third subquestion is focused on an empirical assessment of the institutional outlook of the Latvian electricity market, in particular in how far the market reflects the conditions for increasing the share of renewable electricity.

- What institutional changes are needed in the Latvian electricity market to increase the share of renewable electricity production?

The last subquestion actually covers the main question of the thesis. Based on the conclusion of my analysis I will answer the question.

1.3. Research approach and methods

Considering the frame for my research questions, it clarifies the fact that in my research I will deal with qualitative data that consist of words (Babbie; 2007; p. 383). It means the methods of data collection will be qualitative as well and I will gather the data by reading documents and other relevant information about the issue. In order to answer my research question I will review theoretical literature and analyse available policy documents.

I will obtain data from documents published by the European Commission, the Cabinet of Ministers of the Republic of Latvia and other official institutions. Scientific articles I will use to find out advantages and disadvantages for existing policy-making approaches. The Cabinet of Ministers of the Republic of Latvia regulations provides legislation for the Latvian electricity market. To analyze the current legislative situation in Latvia, I will review the Cabinet of Ministers of the Republic of Latvia regulations. The data about the EU position in electricity production from renewable energy sources I will gather from the European Commission documents and directives. This information will be the basis for my case studies.

1.4. Overview of the thesis

In chapter 1 I have explained the background, research goal and questions and research methodology. In chapter 2 I will introduce and explain the theoretical concepts I will use in this thesis. As explained above, I will develop an institutional perspective in this thesis. Therefore, guided by the second subquestion, I will go into institutional literature in chapter 2. Chapter 3 will be methodological. Chapter 4 will answer the first subquestion on the state of the art of the Latvian electricity market. This will provide me with the actual overview of the current organisation of the Latvian electricity market. As well in chapter 4 I will analyse the institutional conditions for increasing the share of renewable electricity in Latvia with the help of the theoretical notions developed in chapter 2. Finally, chapter 5 will draw

conclusions and will formulate recommendations on the institutional outlook for renewables in Latvia.

2. Theoretical background

2.1. Introduction

In this chapter, I will develop my theoretical framework that will help me to answer the research question. As indicated in the introductory chapter, I will analyse the conditions for increasing renewable electricity in Latvia from an institutional perspective. This means that I will draw on the economically oriented institutional literature in this chapter. I will start with a brief outline of the basic assumptions of institutional economics, then I will continue with a section explaining the major concepts and approaches in institutional economics. Finally, I will discuss an institutionally based market framework suggested by Arentsen and Künneke (2003), originally developed for gas markets, but equally relevant for electricity markets. I will end the chapter with a summary of the major findings.

To be able to answer my research questions I have to study the literature that already exist on this topic. The literature will include institutional economic theory, concepts and main characteristics of institutional economics. Institutional economic theory offers the picture to which any government and market cooperation has to mould to reach effective results. The purpose is to uncover the main qualities for going towards process in developing effective institutional conditions.

I will summarize the essential characteristics of the institutional economic theory that will be used to make an analytical framework. The analytical framework I will use to analyse the institutional conditions for supporting renewable electricity production in Latvia.

2.2. Institutional economics: basic premises

The main idea of the Institutional Economics is that institutions signify for economic performance. The institutional economics is a trial to include a theory of institutions into economics. The institutional economic theory is based on neo-classical theory, but goes beyond it by amending its pure rationality assumptions. In contrast to the many earlier attempts to overturn or replace neo-classical theory, the new institutional economics builds on, modifies, and extends neo-classical theory to permit it to come to grips and deal with an entire range of issues heretofore beyond its horizon (North; 2000).

Simon (1986) has summarized the implications of neo-classical assumption, as follows. If we accept values as given and constant, if we postulate an objective description of the world as it really is, and if we assume that the decision maker's computational powers are unlimited then two important consequences arise. First, we do not need to distinguish between the real world and the decision maker's perception of it: he or she perceives the world as it really is. Second, we can predict the choices that will be made by a rational decision maker entirely from our knowledge of the real

world and without knowledge of the decision maker's perceptions or modes of calculation. North (2000) is saying that in a world of instrumental rationality institutions are unnecessary, ideas and ideologies do not matter, effective economical and political markets characterize economies. These are the roots for new institutional economics.

Institutions in institutional economics are the rules of the game in a society. Institutions set frame conditions in which actors decide and act. Institutions by different authors in different periods are defined differently. Schomoller (1900) defines institution as a set of formal and informal rules, including their enforcement arrangements. Institution is a partial order for community life which serves specific purposes and which has the capacity to undergo further evolution independently. It offers a firm basis for shaping social actions over long periods, e.g. property, slavery, serfhood, marriage, market system, coinage system and freedom of trade.

Almost century later, North (1994) again claims that institutions are the rules of the game. He defines institutions as the humanly devised constraints that structure political, economic and social interactions. They consist on both informal constraints as sanctions, customs, taboos, traditions and codes of conduct, and formal rules such as constitutions, laws and property rights. North describes that the purpose of an institution is to steer individual behaviour in a particular direction. An institution provides structure to everyday activity and reduces uncertainty. Institutions define the incentive structure of societies and specially economies. Institutions are crucial to economic development, because they regulate, even if imperfectly, the social behaviour of individual citizens. The creation of institutions is driven by the search for organizational structure that will optimize the social behaviour of people.

Ostom (1990) understands institutions as the set of working rules that are used to determine who is eligible to make decisions in some arena; what actions are allowed or constrained; what aggregation rules will be used; what procedures must be followed; what information must or must not be provided; and what payoffs will be assigned to individuals dependent on their actions. All rules contain prescription that forbid, permit, or require some action or outcome. Working rules are those actually used, monitored, and enforced when individuals make choices about the actions they will take.

Williamson (1996) associates the concept of institutions with that of governance for microanalyses of the individual transaction. The institutional environment (rules of the game) is taken as granted, and the economic players wilfully align transactions with governance structures to optimize revenues. Transaction costs are viewed as costs of running the economic system. Thus, institutions are governance mechanisms and their study is directly related with the optimum decision regarding lower transaction costs.

Another question is how and in what circumstances institutions are established. There are two basic explanations. One is that institutions arise "spontaneously" based on individuals self interests. Menger (1963) says that in such

case, they may organize themselves without any agreement, without any legislative compulsion, even without any consideration of public interest. Hayek (1973) uses the term evolutionary rationalism to describe the situation. At the other extreme institutions may be the product of deliberative design. Some authorities like parliament, a dictator, a team, etc, acting with complete rationality, may be able to introduce a particular institutional structure that it deems appropriate. This is the case of a made order as opposed to a spontaneous or grown order.

Bounded rationality is limitation that raises transaction costs. Bounded rationality can hamper the effective operation of transactions, because of limited time, resources and control (North;1994). Simon (1958) defines bounded rationality as the notification that in decision-making, rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the limited time that they have to make decisions, the structure within which the mind operates is limited.

Kreps (1990) has noted: A bounded rational individual attempts to maximize, but finds it costly to do so and unable to anticipate all contingencies. Because of this inability contingency will arise. In situation under bounded rationality and non-zero transaction costs is impossible to deal with complexity in all contractually relevant respects.

Methodological Individualism is an entirely new interpretation is given to the role of individual decision makers. Methodological individualism emphasizes that people are different and have different tastes, goals, purposes and ideas (Furubotn & Richter; 2007).

The maximand means that individuals are assumed to seek their own interests as they perceive them and to maximize utility subject to the barriers established by the existing institutional structure. It shows that a decision maker, whether he will be a state bureaucrat, a politician, the manager of a capitalist firm is presumed to make his own choices and pursue his own goals within the limits allowed by the organizational structure in which he is operating (Furubotn & Richter; 2007).

For **individual rationality** are two approaches - perfect and imperfect individual rationality. Perfect individual rationality poses that all decision makers have consistent and stable preferences- whether they are consumers, entrepreneurs, or bureaucrats. Kreps (1990) describe completely rational individual as one who has the ability to foresee everything that might happen. He can evaluate and optimally choose among available courses of action, all in the blink of an eye and at no cost.

North (1978) explains imperfect individual rationality like the preferences of decision makers are recognized as incomplete and subject to change over time. The assumption of imperfect individual rationality is dominant in the new institutional approach to economy history. Williamson (1985) has emphasized that limited rationality means that not all economic exchange can be organized by market contracting.

2.3. Basic concepts and approaches

The following section of description is about basic concepts and approaches for institutional economic theory.

Property rights, in the economist's widest sense of term, embrace the right to demand certain behaviour from other individuals. Neoclassical economics considers that no attention is given to those coalitions whose purpose is to improve the welfare of their memberships at the expense of other individuals in the system through the use of governmental authority. In the economics of institutions, the term property rights refers to an actor's rights, which are recognized and enforced by other members of society, to use and control valuable resources. The system of property rights in an economic system defines the position of individuals with respect to the utilization of scarce resources (Furubotn and Ritzcher; 2007; p. 31). The control over resources also has an internal component. Various rules, and their enforcement by political organizations and by custom and social norms, provide external control, but usually actors also invest privately in control, depending on how much external enforcement the community provides.

The economic implications of the institutional structure of society are manifested in the system of property rights. Property rights in institutional economic theory case means the distribution of effective control, by individuals and groups, of valuable assets, including human capital. In other words, the system of property rights describes the distribution of power in society. In the economics of institutions, trade is defined as the exchange of property rights to various attributes of valuable assets – rather than as an exchange of the assets themselves. The value of an asset to an actor varies with the number of attributes he controls. A formal ownership but without the control of any valuable attribute has no value. (Alston, Eggertsson, North; 1996; p. 14)

Many factors influence efficiency of market and political interaction. One of the most important factors is **transaction costs**. These expenses arise from economic exchange. According to Williamson (1976), specificity, frequency, limited rationality, uncertainty and opportunistic behaviour are the determinants of transaction costs. Before analyzing transaction cost importance in the Latvian electricity market, I will give an insight into the transaction cost theory.

To be able to make an exchange between two parties, at the beginning is necessary that they find each other and make sure it will be gainfully to cooperate. If the search is successful and the parties make contact they must inform each other of the exchange opportunity that may be present, and the conveying of such information will again require resources. The assets of the transaction specific values depend on the buyer and seller relationship. It means that both parties should invest in relationship building, because trustful relationships are reducing transaction costs. If there are several economic agents on either side of the potential bargain to be struck, some costs of decision-making will be incurred before the terms of trade can be decided on. Often such agreeable terms can only be determined after costly

bargaining between the parties involved. After the decision to cooperate, there will be the costs of policing and monitoring the other party to see that his obligations are carried out as determined by the terms of the contract and of enforcing the agreements reached. All these issues represent transaction costs: search and information costs, bargaining and decision costs, policing and enforcement costs. (Dahlman; 1979)

Transaction costs depend on organization of the institutional framework, including property rights. In any case, the costs of organizational knowledge and production, the self-interests of individuals are involved. Individuals searching their own welfare will tend to choose an organizational structure that minimizes their transaction costs. Searching the best available partner cost time and resources, but in case when organization wants to be effective, it should make decision in limited time, basing on information it has gathered (Furubotn and Ritcher; 2007). From this arise limitation that is called bounded rationality.

Governance structure is understood as a system of rules plus the instruments that serve to enforce the rules. In general, an order may be enforced by “purely subjective” mechanisms (value-rational, religious, etc.) or by “the expectations of specific external effects” (Weber; 1968). Institutional economics in most of the cases deals with the expectations of specific external effects-specifically, with a system that limits the possible behaviours of individuals by sanctions. The sanctions are established either by custom (including the social enforcement of ethical and moral codes of conduct) or by law (Furubotn and Ritcher; 2007).

Opportunistic behaviour is viewed as the qualities other than rationality, which have been attributed to decision makers. Opportunism relates with people possibility to act in self-interests (Furubotn and Ritcher; 2007). Brunner and Meckling (1977) use term “resourceful, evaluating, maximizing man” (REMM) to describe the model of man developed in economics. In reality, there are persons “self-seeking with guile” and it is very costly to distinguish opportunistic from nonopportunistic actors *ex ante*.

2.4. Institutional organisation of markets

The above shows that institutional theory points to the importance of institutions for the structuring of transactions in markets. In a similar way, several authors have suggested institutional models for the structuring of markets. In this section I will introduce and explain the institutional framework of Arentsen and Künneke (2003), which they have suggested for the comparative analysis of institutional change in European gas markets. Although this framework has been suggested for the analysis of gas markets, it should be equally applicable on electricity markets in general and the Latvian electricity market in particular. For that reason I will explain the framework in more detail in this section.

Dominant policy focus	Public property	Public utility	Commodity
	Resource policy	Market failure	Competition
Political-economical organization			
Ownership structure	Public dominance		Private dominance
Governmental control and regulation	Focus on resources	Sector specific regulation	Competition policy
Economic regulation	Producer oriented	Consumer oriented	Network related
Number of actors	Controlled access and limited number of actors	Controlled access and limited number of actors	Market driven
Barriers to entry			
Eligibility	Not relevant	Regulated monopoly	Competitive market
Performance			
Economic	Maximization of state revenues	Reasonable consumer tariffs and selective services	Static and dynamic efficiency
Public	National welfare	Public service obligations	Competitive economic structures and allocative efficiency

Table 1: Features of ideal type energy market models; adapted from: Arentsen & Kunneke; 2003

As can be seen from the table 1, the authors distinguish three different market models, based on three different dimensions: dominant policy focus, the politico-economic organisation and the performance of markets. In the public property model, policy is dominantly focused on the country's natural resources, in the case of Arentsen and Kunneke, natural gas. The politico-economic organisation and the performance of the public property model is featured in such a way as to benefit as a country as much as possible from the natural resources. In the public utility model, the politico-economic organisation and performance are tuned towards having good access to imported resources and effective consumer markets. In the commodity oriented market the politico-economic organisation and performance are featured to accommodate effective competition in the market. All three market models can be traced in the Europe, but probably not in the pure theoretical outlook of table 1.

The interesting thing of the market models for my research is that the three dimensions to define the market are also applicable to electricity markets. In particular the commodity market model is of relevance here, since EU member states are required to have liberalised their electricity markets at the beginning of the 21st century. Since Latvia is an EU member, it should have its electricity market liberalised and within this liberal market it should allow for renewable based electricity production in order to commit to EU requirements.

So the commodity model provides me with an adequate framework to analyse the institutional conditions for increasing the share of renewables in the Latvian electricity market. Let's have a closer look at the different aspects of the commodity model.

At the policy level, the commodity model is focused on competition. In a liberalised electricity market this requires from government an adequate policy to ascertain good competitive conditions in electricity supply and demand. Also it would require fair competition between conventionally produced and renewable produced electricity.

On politico economic organisation, the commodity model requires private property relations and also the guarantee of private property. Within this model the market competition and competition among the actors is improving the efficiency of the system. There are no entry regulations, licences or other political instruments involved in the system, harmonization between supply and demand is up to private actors. Private market actors and competition among them are driving the system, which is the main force for making the system efficient.

Political-economical organization of the commodity model is that state is no longer the owner of the energy supply companies. In some cases, it is still possible, but state is not the main player in this model. In the commodity model consumer plays important role. Consumers can choose energy supplier according to their preferences. The main characteristics for this model are transparency and accessibility. Commodity model focuses on economical performance. The state role in this model is to control and regulate the conditions of competition. Government is also responsible for the market organization that it meets the EU or other international organization standards for renewable energy production. Energy production from renewable energy sources is not economically competitive with fossil energy sources, but to meet sustainable development requirements countries must increase renewable energy share in consumption. To stimulate RE exploitation couple of support instruments are available. Currently in the EU is a range of different support systems operational that can be broadly classified into four groups: feed-in tariffs, green certificates, tendering systems and tax incentives (Bruton; 2007). Below are described each of them basing on the European Commission (2005) distinction.

Feed-in tariff systems are characterised by a specific price normally set for a period of around several years, which must be paid by electricity companies, usually distributors, to domestic producers of green electricity. The additional costs of these schemes are paid by suppliers in proportion to their sales volume and are passed

through to the power consumers by way of a premium on the kWh end-user price. These schemes have the advantages of investment security, the possibility of fine tuning and the promotion of mid- and long-term technologies. On the other hand, they are difficult to harmonise at EU level, may be challenged under internal market principles and involve a risk of overfunding, if the learning-curve for each RES-E technology is not build in as a form of degression over time. Under this system, the government sets a fixed premium or an environmental bonus, paid above the normal or spot electricity price to RES-E generators.

Under the *green certificate system*, RES-E is sold at conventional power-market prices. In order to finance the additional cost of producing green electricity, and to ensure that the desired green electricity is generated, all consumers (or in some countries producers) are obliged to purchase a certain number of green certificates from RES-E producers according to a fixed percentage, or quota, of their total electricity consumption/production. Penalty payments for non-compliance are transferred either to a renewables research, development and demonstration (RD&D) fund or to the general government budget. Since producers/consumers wish to buy these certificates as cheaply as possible, a secondary market of certificates develops where RES-E producers compete with one another to sell green certificates. Therefore, green certificates are market-based instruments, which have the theoretical potential, if functioning well, of ensuring best value for investment. These systems could work well in a single European market and have in theory a lower risk of overfunding. However, green certificates may pose a higher risk for investors and long-term, currently high cost technologies are not easily developed under such schemes. These systems present higher administrative costs.

Under a *tendering procedure*, the state places a series of tenders for the supply of RES-E, which is then supplied on a contract basis at the price resulting from the tender. The additional costs generated by the purchase of RES-E are passed on to the end consumer of electricity through a specific levy. While tendering systems theoretically make optimum use of market forces, they have a stop-and-go nature not conducive to stable conditions. This type of scheme also involves the risk that low bids may result in projects not being implemented.

Systems based only on *tax incentives* are used as an additional policy tool. (Commission of the European Communities;2005)

On performance the commodity model is oriented towards static and dynamic efficiency, which refers to cost effective prices in combination with openness towards innovation. The main benefit from liberalization is that the business activities by private actors will lead to cost savings and efficiency improvement. Within commodity model internal and cross border competition will lead to price interflow. The commodity model excludes governmental influence in electricity market process, there are no system entry regulations and the market is driven by competition. In commodity model is legal concurrence about renewable electricity production support instruments and government has insignificant possibilities to influence the process.

The problem of renewable energy resource wider exploitation is its high production costs. Currently production costs for renewable energy is still much higher than for fossil energy sources, that is why renewable electricity production needs some financial support to get competitive. In commodity model RE production is governmental competence, because the government is responsible for meeting the RE production targets.

The other two models that Arentsen and Kunneke (2003) have distinguished are public property model and public utility model. Public property model refers to the countries that have natural energy resources and public utility model exists in the countries where energy resources are imported. To distinguish the differences between these models I will describe them more in details basing on Arentsen and Kunneke model description.

Public property model refers to the countries that are gifted with fossil energy resources. The establishment of this model was on 1960's when countries discovered their resources. In that moment, the governments had no experience how to organize the exploitation, who can be empowered to supply the resources, and other questions about the organization of the system. At that time, the government considered these natural resources as public property. The idea was that the resources would bring prosperity to the country.

The focus of this policy was to ensure effective governance over the resources. Countries made special policies to ensure cost-effective exploitation, long-term security of supply, and public devices for distribution of the financial and economic values involved. By creating effective long-term policy for natural resource exploitation, the countries are ensuring economical benefits also for the future generations.

Politically the natural resources are considered as public property, but economically the resources are exploited in close co-operation with private industry. For that reason, the institutional organization is developed as complex public and private cooperation, where governance structures are controlling private actor performance in national energy system. This includes public private partnership and state regulations for effective management of public property. Usually the government is giving licences for the companies that can operate with natural resources. Government can keep the system under control in this way.

The main idea for this model is to increase public welfare by using natural resources. To ensure effective management over the resources, government should participate in policy-making and keep control private companies performance in energy distribution.

In *public utility model*, electricity is seen as an essential resource to ensure safe environment for economical performance and it develops in the countries not gifted with its own energy resources. Public dominance, orientation on electricity consumption and demand, electricity company's monopoly status, and specific

regulation by government are the main things that characterize electricity system as public utility model.

State policy in the public utility model sets electricity as important resource that should be provided effectively for every inhabitant. In this model, the state is actively involved in electricity policy processes. Due to the complexity of the electricity system, development as a market model is impossible in this situation. That is the reason government is taking an active role in leading and controlling the electricity market. Situation when electricity provider has monopoly status, ensure governmental control over the energy system. As North (1993; p. 6) mentions the growth of economies historically has occurred within the institutional framework with the well developed coercive policies.

Political actors are having control over the electricity system, because government owns the system and electricity company in public utility model. The economic regulation is consumer-oriented and new actors cannot enter the market without governmental permission.

The public utility model focuses on consumer satisfaction, safe energy distribution and balance on price and quality. The bedrock of this model is effective political and economical interaction to achieve consumer satisfaction with electricity supply.

2.5. Conclusions

The purpose of this chapter was to provide the theoretical background, which is relevant for my study. The theory will help me to answer the research questions and it will represent the basic information for my analysis.

The main concept for my research is the institutional economic theory, in the context of effective institutional conditions to ensure appropriate environment for renewable electricity production. The theoretical basis will help me to understand and better explain the situation for my case studies to which I am focusing on. In the case of the Latvian electricity market is problem with effective instrument application to meet market expectations and electricity provider possibilities for effective cooperation. However, to be able to draw this conclusion, I need to connect the theory with the data I will gather in my research. In Latvia, the free market system is developing only in last 20 years and there is not enough experience how to organize the process. It is relevant for my analysis to see what the characteristics are to run the system effectively to see what institutional improvements Latvia should make.

The literature reviewed will help me better understand how things stand in practice. For the research I choose Latvian electricity institutional system, where many improvements can be made. The literature can describe at the theoretical level how the phenomenon of effective institutional and liberalised market conditions can be reached and why it is important to invest resources and time to organize the system. In this context, I need to have a clear picture of the concept of institutional conditions to ensure safe environment where companies can work effectively. For that

reason I will use ideal market type model. Knowing what the conditions for effective renewable electricity development are makes easier to understand the case in Latvia and see the gaps, which should be improved.

I started this section with institutional economic theory overview that provides me with general picture about the market organization and essential aspects that influence the market performance. I will use it to describe important aspects in Latvian electricity system.

For my analysis I will use commodity model as a framework to analyse empirically the institutional frame conditions for increasing the share of renewable electricity production in Latvia. In commodity model the market is open, driven by competition and government has insignificant role. The main idea for government in commodity model is to ensure that the country meets the targets for renewable energy share in consumption set by different organizations. As the energy production using renewable sources is not yet economically profitable couple of support instruments as feed-in tariffs, green certificates, tendering systems and tax incentives are created. The government is responsible for their legal and fair division. Commodity model is the most appropriate for renewable energy development, because energy producers can easily enter the market and support is available for energy production by renewable energy sources.

3. Methodology

3.1. Introduction

This chapter deals with methodology. I will explain my research design and the data I will use in my analysis. In section 2 I will explain my research approach and design and in section 3 the data collection and analysis. At the end of the chapter I will summarize the major findings.

3.2. Research approach and design

Given my research questions, I will use *applied research*. According to Miller and Salkind (2002), applied research shows how the theoretical knowledge can be used to address a practical problem.

The research strategy will be *case study*. Case study is the study of the particularity and complexity of a single case to understand its activity within important circumstances (Stake; 1995). Case study research is bringing into light a complex issue and expands knowledge to what is already known from previous researches. Case study stress detailed contextual analysis of specified conditions or events and their relationships. More precisely in the research, I will focus on electricity market in Latvia. In my research I will apply an institutionally based framework to analyse and assess the frame conditions for increase of renewable electricity in Latvia. This allows me to test to what extent Latvian electricity market reflects to effective market conditions.

Stake (1995) has mentioned six important steps for organizing case study research. The steps are:

- Determine and define the research questions;
- Select the case and determine data gathering and analysis techniques;
- Prepare to collect the data;
- Collect the data in the field;
- Evaluate and analyse the data;
- Prepare the report.

To do my analysis in a structured way I will follow these steps. The first step I have already done and now I will continue with the next ones.

3.2.1. Data collection

To be able to evaluate the electricity system in Latvia I need to gather information from academic literature, policy documents and interview. Primarily I will collect data from written documents, reports and previous researches, but some

information from the actors involved in the system. This implies that I will have interview with person working in this field.

According to interview I am planning to have face to face, semi-structured interview, since the information the interviewer give to me during the discussion could be relevant enough to induce me to ask some additional questions in that way to receive more information, also to ask for clarification. Semi-structured interviews are recommended especially for gathering qualitative data. I am planning to make one-on-one conversation and as I will make it with the expert in Latvian electricity system, the interview will be held in Latvian. The interview will take place at the office of the interviewer, during the working hours and will last approximately one hour. During the interview I will take notes.

Regarding the written documents I will use the information from policy documents, researches and reports. As an information resource I will use the electricity company homepage www.latvenergo.lv, to describe the dependence from energy suppliers I will use the book “Baltic Independence and Russian Foreign Energy Policy” written by Elletson (2006). Latvian Electricity Law provides information about the core organizational issues of the electricity system. I will use it to gather information for the market description. To analyse the market, the theoretical background will be relevant for my case studies, because I will structure the description basing on theoretical aspects that I have pointed as important for the future analysis. For this step, my interest is in the concept of market models and I will analyse the market from the ideal market model perspective form Arentsen and Kunneke (2003) that I have described in the previous chapter to find out which type of market model exists in Latvia.

To make the answer for the second question, I will describe existing support instruments in Europe. Commission of the European Communities (2005) have made distinction and description about each of the instruments. It will be the main information source for the answer of this question.

To answer the third sub question *to what degree does the Latvian electricity market reflect the institutional conditions for support of renewable electricity production* I will use available information from the European Renewable Energy Council homepage. There is official renewable energy policy review for each of the European country, including Latvia. Ministry of Economics of Republic of Latvia is the Ministry that is responsible for energy issues. I will use available documents to analyse roles of involved actors and their capabilities to influence the process.

3.2.2. Data analysis

For my study I will make a *qualitative data analysis* which according to Babbie (2007, p.393) is a non-numerical assessment of observations. For the research I will apply a framework of ideal market type models I have described in the chapter 2. The theoretical base of the framework will help me to evaluate the organization and

performance of Latvian electricity market. In the research I will analyse to what degree Latvian electricity market reflects to conditions where renewable electricity production can develop and what changes are needed to increase the share of renewables.

For my qualitative study, the database will consist of texts, scientific articles and documents. The core idea for my research is to transform the gathered data into meaningful conclusions. I will use *evaluation method* for describing the electricity market in Latvia. Evaluation is the systematic acquisition and assessment of information to provide useful feedback about some object.¹ The definition explains that evaluation involves data collection, judging the information and is assessment worth for making results. The aim of evaluation is to give background about some issue and it help in decision-making. The evaluation can influence the policy process through the perspective of empirically made feedback.

In theory are couple of evaluation strategies, but for my research I will use *scientific-experimental model*. I will apply scientific method for the case in Latvia and try to model theory driven evaluation. The scientific model I will use in my research is ideal-type energy market models by Arentsen and Kunneke (2003).

The first step in the data analysis process will be to read the description of the existing electricity markets in Latvia and other countries to get an overview about the market organization. I will read scientific articles to understand the process of institutional changes in other cases to be able to make a plan for institutional changes in the Latvian electricity market.

3.3. Conclusions

The aim for this chapter is to describe in details how I am going to answer my research questions systematically, which methods I will use and what sources will provide relevant information for my research. The first step for my study will be to collect appropriate information to acquaint with the topic also in other cases. The next step will be more specific, because I will concentrate on the Latvian case and gather specific information that is relevant for my case study. After noticing the imperfections in the case of Latvian electricity system, I will be able to give suggestions what institutional changes are needed to make the electricity market in Latvia more efficient and trustful for potential renewable electricity producers.

¹ Web Center for Social Research Methods, Introduction to evaluation, Retrieved from <http://www.socialresearchmethods.net/kb/intreval.php>

4. Data analysis

4.1. Introduction

The following chapter of the thesis will start with the description of the Latvian electricity market organization and continue with analysis of the market. I will start with the historical development overview of the Latvian electricity system and move to the current market description. The next subchapter will be analysis of institutional conditions in Latvian electricity market, which will consist of political orientation, politico-economic organization and market performance analysis. I will conclude this chapter with conclusions.

4.2. Historical development

I will begin this chapter with description of the Latvian electricity system development. Representing the development and the background of the system makes it easier to understand the current organization of the market.

Latvia is one of the three Baltic States, which was formerly part of the Soviet Union. Latvia regained its independence in 1991, after having been occupied for 40 years. The main evolution of the energy market in Latvia was during the time when the country was part of the USSR. Chronology of the electricity development is providing the main happenings in the energetic evolution in Latvia.

1939, December 22 - Adoption of the law “On the Establishment of the State Electricity Company Ķegums”. The date marks the starting point in the development of the power system in Latvia.

1940, summer-autumn - Activities of the Soviet power - expropriation of the power stations, hydropower plants and electric networks owned by private and stock companies. Incorporation of the state electricity company Ķegums into the Energy Entity (Energotrests) of the Local Industry Public Commissariat of the Latvian Soviet Socialist Republic (Latvian SSR). Drafting of the energy sector development plan.

1941 - Establishment of Latvian General Regional Energy supply districts by the authorities of German occupation. During the war period more than 90% of all electrical facilities – power stations, transformer substations, lines and equipment were destroyed.

1960 - Construction of the main electric transmission line of 330kV from the State Electric Power Station Andrejsala to Riga and Šiauliai in Lithuania with a distribution substation at Salaspils. Integration of the Latvian power system into the North-West power system of the USSR. One by one, small electric stations closed down as their operation considered to be non-profitable.

1965 - Putting into operation of the first five hydro aggregates of Pļaviņas HPP. Launching of all ten aggregates on December 21, 1966.

1972 - Starting the construction of the thermal power plant Riga TPP-2. In 1973, the first water heating boilers put into operation. On 22 December 1975 TPP-2 with electric capacity of 63 MW put into operation. Since 1979, the total electric capacity of TPP-2 is 390 MW and heat capacity is 1100 Gkal/h. In 1984 gasification of TPP-2 and since then heavy fuel oil used as reserve fuel.

1991, January - In the barricade days the order of the Central Committee of the Latvian Communist party for “Latvenergo” to stop the operation of TEC-2 so that to create chaos and the emergency situation. Refusal of the “Latvenergo” management and the Power Sector Trade Union to execute the order and the Latvian Radio informed to the effect, thus thwarting the plans about a provocation with unpredictable consequences.(Latvenergo;2010)

After 1991, Latvia was independent country and needed to create its legislation and policy system from the beginning, involving energy system. That time the country had no specialists that had experience and education in free market principles. For that reason, all plans and policies were made basing on the Soviet experience and existing connections. The electricity system developed in the time the country was part of the USSR that is why now Russia is important actor in Latvian electricity market and cannot be excluded from the energy policy processes in Latvia that is why a little bit I will describe the Russian role in Latvian energy policy processes.

The Baltic States are historically linked to the Russian market and currently they are the bridge between East and West. The West’s bench-mark to the East and Russia’s window on Europe (Elletson; 2006). The problem Latvia face is the fact that Russian companies supply almost 60 % of total energy consumption in Latvia, in that way having great influence in Latvian energy system. The main supply companies are completely or partly owned by the Russian state that is why their policy reflects the Moscow’s foreign and security policy targets. The Latvian government realize the situation, but, first, the current supply system is well developed and it is too expensive to make fundamental changes, secondly, Russia is supplying much cheaper energy than any alternative supplier is.

Russia wants to keep also Europe under the control with the energy supply. The former president of Russia Vladimir Putin (2006) emphasised the countries importance for Europe in the G8 meeting. He illustrated the power of Russia. Ronald Nash (2006) commented the position of Putin in G8 meeting, “Just as Russia focuses the G8 on energy security, Putin has illustrated why its position is at least as powerful as any other around the table. The argument has been made that there is a symbiotic relationships between energy producer and energy supplier-Russia needs the consumer just as much as Europe needs the producer. It is difficult to imagine a

scenario when Europe will unilaterally stop buying gas from Russia. Russia, on the other hand, has shown it can turn off gas supplies simply because of an unpaid gas bill. As the G8 focus on energy security, Russia has shown where the balance of power lies.” Gas and oil are the major instruments how Russia can express its power over Latvia or Baltic States and also over Europe. It is impossible to exclude Russia from the debate about Europe’s security of energy supply.

Russian energy specialist E.A. Telegina, the Director of the Russian Institute of Energy and Geopolitics, has emphasised Russia as a reliable long-term energy partner. In International Conference on Energy Security: Role of Russian Gas Companies she gave a speech and pose organization’s position “Russia has been a traditional, reliable and important exporter of energy ... to the European Union. The EU has a serious interest in preserving and increasing the role of Russia as an oil and gas supplier. An important trend is world development and, in particular, in the development of advanced countries (North America, Europe, Japan) is an increase in natural gas consumption, which requires material investments in world energy...

As an important factor for world energy development is the gas and electric power sectors ’liberalization process’, which is going on today. The basic consequences would be the development of competition among producers, a possibility to choose a supplier and reduction of prices for end users. One of the key strategic task of the Russian Fuel and Energy Complex is to “preserve and to maintain the competitiveness of Russian fuel and energy resources in world energy markets” (Telegina; 2005).

With these expressions from Russia, it is visible that Baltic States are very important for its foreign policy and critical for keeping the Europe under the energy control. Latvia is very dependent on energy supply from Russia and the Baltic market is comparatively small. Russia is supplying cheap energy not because it is economically gainful for them, but because it is important to ensure its positions in Europe. For those reasons, Russia cannot be excluded from electricity market analysis.

4.3. Current situation

Since 1991, the country is independent, and it became the EU member state in May 2004. The energy system is closely connected not only with Russia, but also with the other Baltic States. The Baltic States have relatively well-developed natural gas, district heating and electricity grid systems. The natural gas and electricity systems in Latvia are good interconnected with Lithuania and Estonia, but there are no good connections with other countries. Due to the historical development, it is oriented towards Belarus and Russia.

Now there are considerable differences between the three Baltic countries. Each country has to consider its own energy supply. Estonia is supplied with electricity mainly by the utilization of oil shale (Ekmanis; 2000) and has excess

electricity production capacity. Lithuania experience electricity shortage. From producer the country became electricity importer, because in the end of 2009 Lithuania closed its nuclear power plant. During the Soviet Union period, the hydro power plants in Latvia were used to regulate the electricity in the whole Baltic region (Lund; 1999). At this moment, Latvia has insufficient capacity to meet its own demand. This makes Latvia an interesting example because the country has the opportunity to build a sustainable energy-system when coping with the capacity shortage. (Rasmussen;2009) Although, the energy system is united and easier accessible from Russia, by supporting local energy producers, is possible to decrease the dependence from foreign suppliers, but currently the Latvian government is supporting the gas power station building and that will only increase the country's dependence.

Currently, Latvia is one of the most dependent countries on imported energy resources among the European Union. Domestic production of primary energy in Latvia is 35 % of total production and 65 % are imported (REEEP; 2010). In Latvia 1543 MW electricity by hydro power stations, 908 MW by combined heat and power stations and 25 MW by wind is generated in 2008. Oil and gas-fired power stations, at more than 60 % of total domestic production, present the main source of primary energy in Latvia and the oil and gas are imported (BALTSO; 2008). A dependence on imported electricity is becoming a more serious problem. The energy production from renewable resources is mainly an issue of energy security and only secondly a matter of environmental policy (Indriksone; 2008). There is the question of security of supply. Even though Estonia is still supplying electricity, Lithuania close Ignalina's nuclear power station in the end of December 2009 and is not any more supplying electricity for Latvia. It means that Latvia should cover the electricity shortage caused by discontinued electricity supply from Lithuania. There is an economic question linked to the supply security. Latvia's priority is to ensure the need for base energy capacity and meet the energy security requirements with respect to minimize dependence on foreign suppliers (particularly from Russia) (Elletson; 2006). The electricity production and consumption in Latvia in 2008 is represented in the figure 1. Only in April and March, Latvia can ensure the electricity demand because of its hydro power plants. All the other months Latvia must ensure its demand by importing electricity from the other countries.

Net Consumption and Production by Month in Latvia, GWh

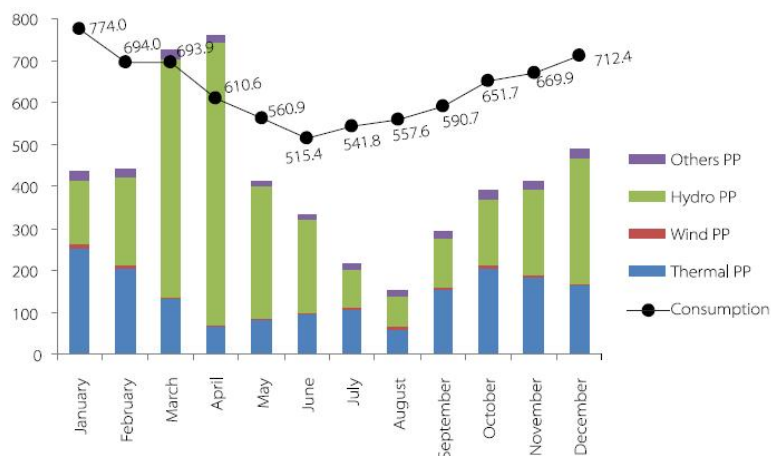


Figure 1; Net Consumption and Production by Month in Latvia; source: BALTSO; 2009

The import ensures large part of consumed electricity that is why the central challenge for Latvia is to diversify supply and ensure effective energy system.

4.4. Institutional conditions in Latvia

The institutional economic theory provides the concepts that are relevant to the Latvian electricity market case. The theory is summarized in chapter 2, and now I will describe Latvian electricity market characteristics basing on that theory. I will use ideal type market model as a frame for analysing to what extent Latvian electricity system meets the institutional conditions for the increase of renewable electricity production. I take the dimensions of the commodity market model as explained in chapter 2 for structuring my argument. This means that I first analyse the policy focus in Latvian electricity market, next the political economic conditions and finally the performance of the electricity market. I will finalize the chapter with conclusions.

4.4.1. Policy orientation

The commodity model focuses on competition, which requires governmental policies to ascertain competition in electricity production, supply and trade. However, in Latvia this kind of competition policy is missing for the electricity market. Moreover, Latvia is facing the problem of an instable and fast changing policy. A frequent policy and legislation change is the main policy barrier in Latvian electricity policy. There is no stability for a potential investor caused by policy uncertainties. This situation prohibits innovation development and renewable energy evolution. Opinion of the experts² is that in Latvia are too many regulations and sometimes not all the involved institutions are having common opinion about their implementation.

² Source: interview Ainārs Feldmanis and Valdis Petris

Complicated bureaucratic procedures take long time to be realized. Sometimes during the project development time, the legislation is changed, which does not raise certainty for project developers. In some situations the changes cause the project determinable and investor stop further project development.

To ensure fair competition among the market actors, the rules of game must be established. In Latvian electricity policy the rules of competition are established, but they change constantly. The rules of competition also imply price establishment. In reality couple of price establishment principles exist. In terms of electricity price establishment in Latvian electricity market, the situation is following. The state owned company “Latvenergo” is a public electricity trader that has monopoly status in the country and is also responsible for the electricity price establishment. The public trading function is defined in the electricity trading licence of “Latvenergo”, which prescribes both trading of electricity to the associated users for tariffs approved by Public Utilities Commission and mandatory procurement of electricity from different generators. Currently, the energy from renewable sources is purchased for tariff that is attached to natural gas tariff. As natural gas is purchased from Russia it means that the electricity price and also partly policy in Latvia is depending on Russia’s energy policy in that way ensuring important role for Russia in the electricity policy. One more important aspect is that the natural gas tariff is changing constantly, so the purchase prices are unpredictable and it does not guarantee stability for potential RES project development. In several respects, government does not guarantee competitive conditions in the market: a clear support policy for renewable electricity production is missing. Latvia did not formulate any ambitions or goals for increasing the share of renewable electricity.

According to unstable situation in governmental policies and frequent changes in legislation, the government ensures its strong position in the market, because it takes active role in market processes. The government is not only establishing rules of competition, but also organizing the market. The main institution in the Latvian electricity market is the Ministry of Economy (ME). It is the central government executive power office, which develops and implements the national policy in the national economy. One of the main functions of the ministry is to prepare and implement the energy policy that is why its role in the electricity market is so important. The Energy department within the ME works out the energy sector development concepts, manages and analyses the energy resource balance development, prepares draft international agreements in energy, coordinates efficient use of energy resources, analyses investment projects in energy productions and participates in the regulatory activities of energy utilities.

The Cabinet of Ministers (CM) is the main institution of executive power, which defines the rules on how energy should be supplied to consumers according to the Energy Law. CM determines the common procedure, according to which electricity supply utilities purchase electricity.

Institutions mentioned above are responsible for establishment of market rules, but one of the most important issues in market organization is control function. This implies also designing the rules and afterwards controlling their application. In Latvia this function is realized by the Public Utilities Commission (PUC), which is public utilities regulation institution. The PUC is an independent state institution, and one of its main activities is to develop methodologies for tariff calculations and to regulate energy (except for heat supply, if heat production is not combined with electricity production) sector on the state level. (PUC; 2010).

So with respect to policy focus, the Latvian electricity market does not reflect the pure commodity model. Actually, on the policy side a clear competition policy is missing and the supply and demand conditions in Latvia continue to be planned by the government instead of decided by supply and demand in the market. Moreover, it seems that in policy focus Latvia is more of a mixture of the three models: there is a focus on resources, on market failure and competition.

4.4.2. Politico-economic structure

In this section I will analyse Latvian electricity market structure in terms of politico-economic conditions. I will look more deeply in the ownership structure, control and regulation issues, access to market and eligibility.

The ownership structure of the electricity system in Latvia is organized in a way that the state is the only owner of the electricity system. The electricity distributor company “Latvenergo” has monopoly status and is publicly owned company, which ensures strong governmental influence also in electricity market organization. In Latvian electricity market also private actors can participate, but it demands some preconditions.

Private participation in market activities requires private property relations and also the guarantee of private property. In Latvia property rights are approved by the government and private persons have legal rights to own a property and to use and control valuable resources. Theoretically the system of property rights describes the distribution of power in society. From this follows that the government is giving power to private actors for economical performance, which means that private persons have legal rights to own also an electricity production company.

To make sure the property rights are used within legal frames and according to the purpose, government controls and sets regulations for competition. Competition policy also in means of meeting energy production from renewable energy sources targets. Renewable electricity production is not yet economically competitive with electricity production from fossil energy sources, according to renewable electricity production speciality as high-capital cost and low capacity factor in comparison to conventional power-producing options. That is the reason why the government must provide support instruments for RE production.

Renewable energy production requirements plays important role in electricity production policy. The government is responsible institution for meeting the EU requirements. In Latvia the Ministry of Environment is the central executive institution in the area of environmental protection and nature protection. Its main duties are to prepare and implement a national policy and draft legal acts within its jurisdiction and ensure their implementation.

The Ministry of Environment is the main institution in electricity system that is forcing to implement electricity production from renewable energy sources according the agreements Latvia has undertaken for increasing energy production from RES. To meet these targets couple of support mechanisms are available as feed-in tariff and quota system. Latvia assigned special tariffs for the feed-in of electricity from fixed technologies through tendering procedures. In this case of a tendering model, electricity suppliers or the state tenders energy volumes. The tendering procedure was an instrument to introduce a price or quota regulation. Now I will explain more in details exploitation of these support instruments in the Latvian electricity market.

Until January 2003, a feed-in tariff system was in force. It was double the average electricity price and electricity could be purchased for a period of 8 years after grid-connection. This tariff was very successful in promoting RES, especially in the small hydropower sector, where the production increased from 2.5 to 30 GWh in the period from 1996 until 2001. Currently Latvian legislation does not foresee promotion of the purchase of heat energy produced from RES. Although, Regulation the Cabinet of Ministers No. 9 of 2002 "Requirements for co-generation plants and the procedure of setting price for purchase of excess electricity" states that:

-If the electrical capacity installed is not more than 0.5 MW and a renewable resource or source has been utilised in its production process, the price for the purchase of surplus electricity shall be determined by applying the coefficient 1.12 to the average sales tariff in the operating area of the relevant system operator's licence.

-If the electrical capacity installed is more than 0.5 MW, but does not exceed 4 MW and a renewable resource has been utilized in its production process, the price for the purchase of the surplus electricity shall be determined by applying the coefficient 0.95 to the average sales tariff in the operating area of the relevant system operator's license.

-If the electrical capacity installed is not more than 0.5 MW and fossil fuel has been utilised in its production process, the price for the purchase of surplus electricity shall be determined by applying the coefficient 0.9 to the average sales tariff in the operating area of the relevant system operator's license. If the electrical capacity installed is more than 0.5 MW, but does not exceed 4 MW and fossil fuel has been utilized in its production process, the price for the purchase of surplus electricity shall be determined by applying the coefficient 0.75 to the average sales tariff in the operating area of the relevant system operator's license. (EREC;2004)

Since 2002 until 2007, feed in tariff system was replaced by the green certificate system. Every year during this period, the Cabinet of Ministers issues a regulation defined the total amount of allowed installed capacities for electricity from renewable energy. In the Regulation of Cabinet of Ministers No. 40 (2004) it is defined that total capacity for electricity production from renewable or local energy sources is 2 MW: 1 MW for electricity production from biomass, wood or peat and 1 MW for production of electricity using waste or biogas.

Comparing with total electricity consumption in the country, the quotas given for renewable electricity production were very small (from 30MW in 2002 to 2MW in 2004) and these were not fully used for couple of reasons, as too many bureaucratic barriers and prohibitive conditions for grid connections. For example, to begin a project the potential investor must receive a licence within an annual quota of renewable energy sources for electricity production by the Ministry of Economy, but the procedure is complicated and in many situations, different institutions are setting different requirements.

Quota system did not ensure the development of renewable energy production that is why in 2007, quota system was again replaced by feed in tariff system. As it can be seen in figure 2 the biggest development for electricity production using renewable energy sources was in the period feed in tariff system was in force.

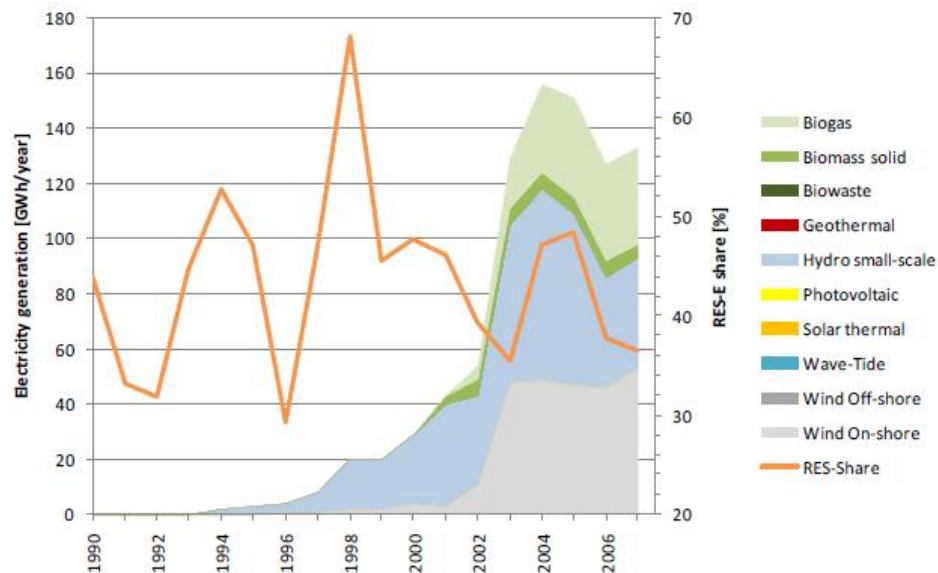


Figure 2: Development of RES-Electricity generation in Latvia 1990 – 2007 without large scale hydropower. Source: Eurostat; (2010)

In terms of economic regulation of the Latvian electricity system the electricity price in Latvia is based on covering all the electricity production and supply expenses. Figure 3 presents the influence factors for the electro energy price. Taking into account that Latvia has energy deficit and cannot produce enough electricity to ensure its demand, the rest of the energy is imported from foreign

countries and the government set the purchase rules, not the market actors as it is in liberalised electricity market. In the figure is notable the large dependence on energy suppliers, because 51% of electro energy price depends on imports. One of the import price factors in Latvia is the electro energy price in the Nord Pool market. The participation in electricity auction is important precondition for liberalised market.

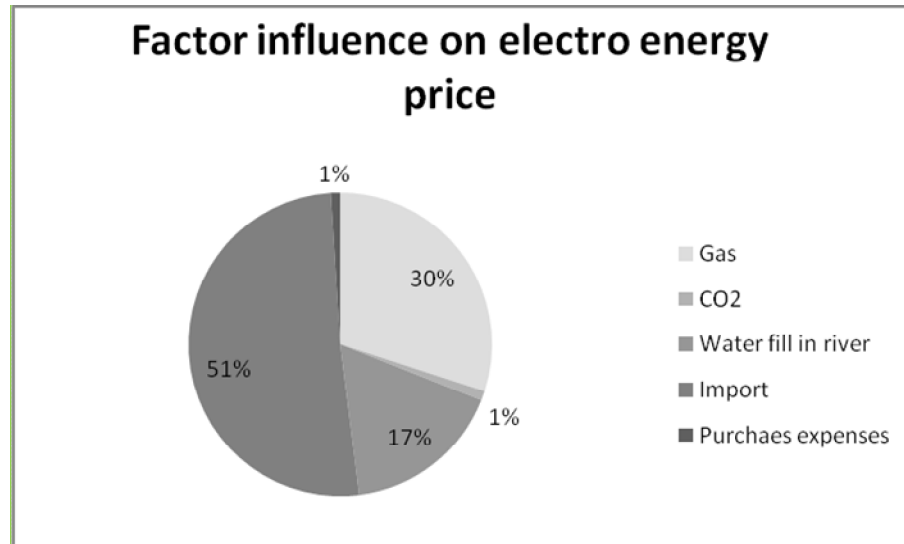


Figure 3: Factor influence on electro energy price; source: www.latvenergo.lv(2009)

The Nord Pool market is the power market for Estonia, Norway, Denmark, Finland and Sweden. Nord Pool Spot runs the largest physical power market in the world, offering both day-ahead and intra-day markets to its participants. 317 companies from 20 countries trade on the exchange. In 2009, the group had a turnover of 287 TWh representing a value of 10.8 billion euro and 72% of the total consumption of electricity in the Nordic countries (Nord Pool; 2010).

The primary role of a market price is to establish equilibrium between supply and demand. The Spot market at Nord Pool Spot is an auction based exchange for the trading of prompt physically delivered electricity. It is the central Marketplace for Nordic Electricity.

The Nord Pool power exchange is currently the nearest active power exchange where the Baltic States can have a limited participation (limited because the capacity of Estlink connection between the Baltic States and Finland is 350 MW, while the peak load of Latvia is only 1,200 MW) (Enefit; 2010). The Nord Pool auction makes Latvia less dependent from one supplier, but the small cable capacity is bottleneck for this option. This obstacle shows technical barriers for liberalised market.

The State Energy Inspection is a state administration institution that supervises and controls the technical state supervision and control of objects of energy suppliers

and equipments and devices of energy utilization, but they have no legal rights to demand new electricity network building that the system can be market driven.

In Latvia the electricity producer is responsible for electricity transportation to common network, which increase the necessary investments for RE power station building, because RE sources usually are available in certain places where demand is low. To deliver the energy to consumers raises the energy costs. Half of the Latvian population is living in the capital where the energy demand is the highest, but available RES are relatively far from it.

The rules of competition also imply price establishment. Currently, the energy from renewable sources is purchased for tariff that is attached to natural gas tariff. As natural gas is purchased from Russia it means that the electricity price and also partly policy in Latvia is depending on Russia's energy policy in that way ensuring important role for Russia in the electricity policy. One more important aspect is that the natural gas tariff is changing constantly, so the purchase prices are unpredictable and it does not guarantee stability for potential RES project development.

The situation when the electricity price is determined by one actor is also linked with the number of actors participating in the market. Electricity market in Latvia is ruled by one major actor, because there are important entry barriers for new electricity producers. The lack of private partnership is caused by too restrictive rules for entering the market and it leads to insufficient competition. To begin a project the potential investor must receive a licence within an annual quota of renewable energy sources for electricity production by the Ministry of Economy. Quota distribution system is complicated and there are no clear rules how the quota is shared. The main reason for that is clash of interests. The main energy supplier in Latvia is sub owned by Russian energy providers that cause the situation when there is no will to open the market for new energy producers.

The idea for large number of actors is to prevent strategic behaviour of market actors, because every new actor in the policy making process is trying to change the system accordingly to his preferences and rationalities. In competitive market actors have limited possibilities for opportunistic behaviour, because they must think how to become more effective to get the market share. If they work only in self interests, they will not be competitive. In Latvian electricity market are limited numbers of actors, which give them possibilities to have opportunistic behaviour, e.g. interests in getting bribes for definite decisions. This becomes apparent especially in governmental actor behaviour when their decisions made are not in consumer interests, nor they are economically gainful for the electricity company. In some cases, evidence shows corruption of political actors.

Is hard to reach innovation development if in market participate small number of actors, because there is no competition among them and they are not interested in increasing efficiency. It is market related barrier that is linked to RES technology research activity limitation, because in Latvia supply is stimulating research activities not consumer demand, which hamper the RES technology development. That is also

the reason why in Latvia is only few independent RE producers. The lack of governmental support and absence of long term program for the RE development rise a situation that there is lack of specialists in this field as well. However there are about 10 research institutes where the renewable energy field researches are implemented. According to universities there is no one that has special study programs for educating renewable energy specialists. Although some universities have programs in environmental sciences with courses in renewable energy, but it is not sufficient if the country wants to develop renewable energy production. It is also because there is limited amount of high level graduate specialists for teaching and training students in RE field. This means that the country must start with educating educators, which can be done together with foreign universities and research centres. The lack of well educated specialists hamper RE technology development and that is the reason why technologies for renewable energy production are purchased in foreign countries. Also the government is not active in promoting RE development. The regulation that states renewable energy usage is established by Cabinet of Ministers. The regulation "Principal statements of exploitation renewable energy resources for years 2006-2013" includes only general assumptions not clear plan how the country is going to develop RE exploitation.

Not only lack of appropriate technologies and knowledge precludes RE production, but also not sufficient financial resources. However, in Latvia do exist responsible institution for attaching investment. The Latvian Investment and Development Agency (LIDA) is a non-profit state Joint Stock Company. It is the executive arm of government responsible for attracting foreign direct investment to Latvia, and plays a prominent role in stimulating an expansion in exports. The role of this agency is to attach investment also for energy production company establishment. The problem for new investor attachment is not reliable policy for renewable energy production.

There is no stability for a potential investor caused by policy uncertainties. This situation prohibits innovation development and renewable energy evolution. Opinion of the experts³ is that in Latvia are too many regulations and sometimes not all the involved institutions having common opinion about their implementation. Complicated bureaucratic procedures take long time to be realized. Sometimes during the development of a new electricity production project development, the legislation is changed, which does not raise certainty for project developers. In some situations the changes cause the project determinable and investor stop further project development.

In conclusion, on the political institutional organisation, the Latvian electricity market turns out to be a mixed organisation, consisting of a mixture of the three market models. Actually, the market functions as a monopoly, both in production and distribution, which makes it very difficult for new investors to enter the market. Despite a glance of a support policy for renewables, new investors face huge

³ Source: interview Ainārs Feldmanis and Valdis Petris

difficulties to realise RES projects, with the ultimate result that renewable electricity production hardly develops in Latvia. Although, the property rights are established in a way private actors can participate in electricity market process, in the system exist important entry barriers that precludes private participation in market processes. From this we can see that the government is still the main actor in electricity policy. The government also is responsible for meeting renewable energy production targets. Due to the fact that renewable energy production is more expensive than from fossil energy sources, their production must be supported by using available instruments. Currently in Latvia feed-in tariff system is used to ensure renewable electricity production, but it is not working effectively and by current policies the country cannot meet the targets. The country is lacking with well educated specialist in RE field, which hamper also new technology development. There is not even one program in universities that is educating specialists in RE technologies.

4.4.3. Performance

The performance of the Latvian electricity system is focused on different targets than for ensuring effective market development. The arguments for this statement I will explain in this section. The idea for my research is to draw suggestions for necessary institutional changes in Latvian electricity system to increase renewable electricity production. That is why in analysing performance of commodity model I am concentrating on renewable energy issues.

The first issue I will analyse is allocative efficiency, which includes issues like access to market and optimal transmission and consumer prices. In Latvia access to the market is not transparent, because the government is still controlling and managing the electricity market. Besides, there are no clear long-term policies for entrance of new market actors. In the Latvian electricity system exists also fiscal and financial barriers that are linked with uncertainties in governmental policies. Renewable energy technologies demand high financial investments and usually it takes long time to get back the investment. In the situation of Latvian electricity market organization potential investors have many uncertainties about the legal organization of the market. This leads to the situation that potential investors not any more are interested in project development.

RE production has a lot of advantages and disadvantages as well as certain necessarily preconditions. The usage is linked with small amounts of produced energy, big volumes of necessary resources and a lot of space for installing the stations compared with fossil energy resources. For most of the countries, it is huge disadvantage, but in the case of Latvia, it is advantage, because the density of the population is 35 persons per square meter. The territory of Latvia covers 64 589 km² (45 % of the territory is covered with forests) and there are 2.3 million inhabitants. It means that cities in the countryside of Latvia are small and energy consumption is relatively low, which is good precondition to build small-scale power stations for local consumption. In addition, economical aspects play the main role when choice

lies among different opportunities. The most important factor is price. Compared with other European countries, the current electricity price in Latvia is one of the lowest.

Figure 4 shows the electricity prices for the household consumers in the European Union. Currently the electricity price for household in Latvia is 0.108 EUR/kWh that is the 6th lowest among the European countries, but the price increase is expected after integrating the Baltic States in the common European electricity network.

Electricity prices for household consumers (in € per 100 kWh)

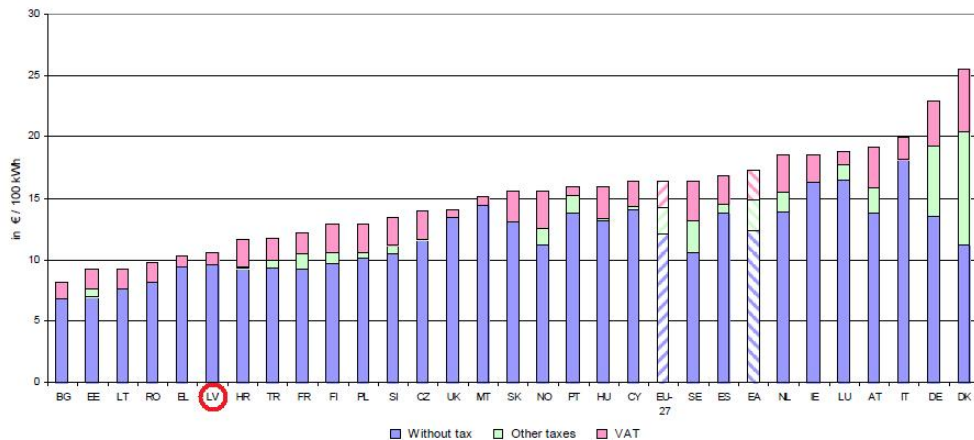


Figure 4: Electricity prices for household consumers in 2009 Source: Eurostat

According to the predictions of Latvian experts, the electricity price will triple by 2030, thus reaching 0.1466 EUR/kWh. A conservative scenario would use the prediction by European Commission experts of doubling of the price. In this scenario, wholesale electricity price would reach 0.0977 EUR/kWh in 2030, and would be rising at around 3.5% each year, reaching 0.0689 EUR/kWh in 2020. (Kālis; 2008) It means the electricity price using renewable resources will become competitive. In addition, only one third of the electricity price for households consists of electro energy price. Price establishment also is based on issues as social efficiency, political environmental effectiveness and policy coherence. I will briefly go into these issues.

In market performance one of the biggest challenges is to find balance between social and political environment efficiency and to create RE support system that is coherent with market principles. Social efficiency is linked with cost-effectiveness and the aim is to achieve the targets with less expenses. The questions related to the issue are - which are the most effective technologies to produce electricity from renewable energy sources; how different instruments differ in their effect on technology development and how to find solution that could be applied in other countries as well. In that way it would be possible to reduce research and learning costs. These aspects show that policies must be flexible; including the possible renewable electricity producing technology development and they become commercially competitive. In Latvian electricity system competition is limited that

leads to situation when social efficiency is not important aspect in electricity market performance.

The next aspect in market performance is political environmental effectiveness that is measurement of the additional renewable energy capacity installed according to the policy. For potential investors two factors are important: long-term predictability of the policy itself and the effectiveness of the trilateral relationship between the government, mandated purchasers, and producers/developers of renewable energy (Langniss and Wisser 2003; Finon and Perez 2006). Evidently, investors in and producers of renewable energy production need stable and predictable cash flow, which is heavily influenced by the indirect subsidy offered by alternative policies for future investments, the long term commitment of the government and the relationship between parties must remain intact for investments already made (Finon 2007). A couple of factors influence production and investment, as level of support and its credibility and predictability. If these are concerned, one very important aspect is the delicacy of an instrument to different external changes, like changes of power after elections. In Latvia this aspect is having important role, because the governmental actors are highly involved in electricity market organization, which means that the government not only controls the market, but also takes active role in electricity system. The higher the level of encouragement, the more reliable and anticipated investment revenues, the bigger the impact on production and investment will be.

The third criterion is alternative policy coherence to the existing market system. This means that selected support instruments should be appropriate for the market organization system. As there are no clear policies it is difficult to measure policy coherence.

The experts⁴ point the three major challenges for Latvian electricity market development- free market, investments and development. These issues are closely linked and improvements in every of this aim makes positive influence on others. The main problem for free market development is lack of network connections. To improve the situation big investments are necessary. Also Latvia cannot ensure its electricity demand and new power generation stations must be built, but developing new electricity generation technologies would be possible to use energy sources more effectively. To make the electricity system liberalized, the EU together with Latvian government has made possible suggestions and they are:

- Regulated tariff cancelation;
- Cancel cross border limitations;
- Distribution system operator function share;
- Market oriented management system;
- Joint balancing system for Baltic region;
- Retail market organization based on free market principles. (EU; 2009)

⁴ Interviewer: Valdis Petris and Ainārs Feldmanis

All these suggestions are approved in the EU and Latvian government and the country is working to meet these goals, but to be able to do that, the existing barriers must be reduced, market should be better organised and associated services and transmission capacity should be appropriate to ensure the market performance.

Market performance demands price establishment according to supply and demand. The primary role of a market price is to establish equilibrium between supply and demand. This situation is possible in an auction based exchange for the trading of prompt physically delivered electricity. Latvia has made step forward in terms of participating in auction based power exchange, but the main limitation according to cable capacity should be solved in order to benefit more.

By analysing Latvian electricity system performance I found some characteristics from each of the market models. The price is established in a way that it is reasonable for consumers, which more refers to the public utility model. In the same time there are some indicators that are more appropriate to market model, as participation in auction based electricity exchange. Due to insignificant cable capacity Latvia has limited possibility to buy electricity in auction. Analysing the potential for renewable energy production development I discovered that Latvia has huge potential for energy production by using renewable energy sources especially bio resources. The country is using renewable energy sources for electricity production, but the potential is much higher than currently is used. To be able to use this potential the country must make clear policies for their exploitation, also according to the EU requirements.

4.5. Conclusions

Liberalization by definition is the outcome of the policy process. That is why for my study is very important to distinguish political obstacles for possible institutional changes in Latvia. The institutional changes are not goal in themselves, but they create the introduction of more effective and competition driven electricity market. That is the reason I took institutional economic theory as a basis for my research. For the empirical part I used Arentsen & Kunneke (2003) ideal market type models for analysing to what extent Latvian electricity market reflects liberalised market standards in order to be able to give suggestions what institutional changes are necessary to increase RE production.

One of the major problems for Latvian electricity market liberalization is too few market actors and not enough electricity network connections. Majority of the electricity network connections are linked towards Russia, which ensures important role for Russia in Latvian energy policy in general and electricity policy in particular. Low capacity transmission grid connection with Finland is also the main reason why the country has limited access to the Nord Pool electricity auction.

Although the EU has set the targets for electricity market organization according to some circumstances Latvia has difficulties to reorganize the electricity system. By analysing available documents I noticed that important role in Latvian electricity system organization is playing Russia by its well developed energy supplies and low prices. Although the government has target to decrease energy dependence from foreign suppliers there is no plan how to realize this aim.

The target for increasing renewable energy share in consumption is set, but the appropriate policies are complicated. Theoretically in Latvia exist renewable energy production support mechanisms, but their availability is limited and assigned energy volumes are changing constantly as well as policies for their distribution.

By analysing the politico-economic structure of the Latvian electricity system I can conclude that there is no significant indicator, which shows the governmental will to support renewable energy production. The policies are oriented towards electricity production in thermo electro stations using gas in that way supporting fossil fuel exploitation and giving priority to single energy supplier. This situation is not beneficial for innovation development. Cost effectiveness is not playing important role in Latvian electricity system, although the purchased gas from Russia is in a way cheaper, it is in conflict with liberalised market principles.

Latvian electricity market performance is not promoted towards efficiency and wider RE production. The governmental institution sets electricity tariff, which imply all the expenses for electricity production and distribution. The country has limited access to electricity auction, because of small cable capacity, that is why the country must purchase electricity from current suppliers.

The legislation changes too often to ensure reliable environment for RE development. Although support instruments for renewable energy production are available, their distribution is unclear. During the period feed in tariff was in force the first time, mainly small scale hydro power plants, on-shore wind parks and electricity production using bio energy profited from this unique feed-in tariff, ensuring twice the electricity price for a period of 8 years after grid-connection. This tariff system was valid until 2003. In 2002, the feed-in tariff was replaced by a quota system, with previously defined capacity volumes that had to be installed. The capacity volumes were settled by the Cabinet of Ministers, but the new quota system could not achieve favourable outcomes, in result it again was replaced by a feed-in tariff system in 2007.

In Latvia, new energy producers can enter the electricity market only with governmental permission. The government is giving licences and the prices are equal for all individual electricity producers. The access is controlled and only limited number of actors can enter the system. For example, when the government is announcing quotas or feed-in tariff distribution, potential energy producers can apply in that way getting permission to sell produced electricity.

Lack of competition related to regulations prohibiting entry in energy sector is significant problem in Latvian electricity market. Governmental monopoly company

“Latvenergo” is the only electricity distributor. Government is giving permissions for electricity producers to sell the electricity for the common network.

Governmental monopoly “Latvenergo” is highly controlling energy sector, transmission and distribution. Bureaucratic system do not create safe and foreseeable environment for safe investments that cause lack of private partnership and do not stimulate renewable energy development.

5. Conclusions

The aim for my research was to find out what effective institutional conditions are to ensure renewable electricity production in Latvian electricity market. Latvia has potential for renewable energy production, but it is not used for several institutional reasons. In this thesis I have analysed the institutional barriers and explored ways of improvement. To systemise the research I posed the research question and four sub questions. The main question was *what institutional changes are needed for increasing the share of renewable electricity production in Latvia?* To be able to answer this question I posed subquestions which I will answer in this chapter.

The first sub question was *what is the current state of electricity production in Latvia?*

I made a market description to give an overview of the Latvian electricity system development and the main market characteristics. The core aspect I found out about Latvian electricity market organisation was following. The historical development of Latvia and the electricity system is the reason why the market is so closely linked to Russia, because the electricity system was created during the time Latvia was part of the USSR.

Analysing electricity demand and current electricity production volumes I discovered that only in March and April the country can ensure its consumption by domestic production. All the other months there is shortage of electricity and the country must import. One more way how the country can ensure its consumption throughout the year is to support electricity production from renewable energy sources.

Latvia has appropriate conditions to produce electricity from RES. The density of population is low and RES are available. The best option to produce energy is by using wood, because this kind of energy production does not depend on weather conditions and big amounts of wood are available in Latvia.

The second question I answered was *what are effective institutional conditions to support renewable electricity production in electricity markets?*

To answer this question I made a theoretical frame based on institutional economic theory. I reviewed the literature to find out what the success conditions for electricity production are, as well as how the system should be organized to work effectively. As a basis for my analysis I used ideal market type models suggested by Arentsen and Kunneke (2003). The distinct between three different types of market organisation: electricity as public property, electricity market organization as public utility and commodity market. The models were made for gas market, but it can be applied also for electricity market. In commodity model the market is open, driven by

competition and government place a regulatory role and also responsible for meeting renewable energy production targets. Commodity market type refers to liberalised market and within this market type the electricity production from renewable energy sources can develop.

The third question I posed is *to what degree does the Latvian electricity market reflect the institutional conditions for support of renewable electricity production?*

To answer this question I used the frame for effective institutional conditions to ensure reliable environment for renewable electricity production. I analysed to what degree Latvian electricity market reflects to these conditions, according to the structure. At the beginning I analysed policy focus then politico-economic structure and I concluded with performance analysis.

With respect to policy focus, the Latvian electricity market reflects to all three market model mixture. Supply and demand is planned by the government and market competition cannot influence the market price. In Latvia the policy focus is on resources and market failure. The rules of the game are established by the Cabinet of Ministers, the institution responsible for control is Public Utility Commission. So there are some conditions referring to open and reliable market, but in reality the government is the main actor in market organization.

By analysing politico-economic organisation I discovered that there is no market model functioning in Latvian electricity supply. The market functions as a monopoly, both in production and distribution. Market organization as monopoly do not create reliable environment for new investors to enter the market. Although the government supports energy production from renewable sources by establishing support instruments they are hardly available and new investors face huge difficulties to realise RES projects.

According to property rights the situation is appropriate for market development. Private actors have legal rights to own property and participate in market processes. Despite the property rights approval by the government, in reality there are serious entry barriers that preclude private business in the Latvian electricity supply. The government is responsible for meeting renewable energy production targets, but it does not ensure appropriate conditions for production development. Although support instruments as feed-in tariffs are established, their distribution policy is changing constantly, which do not ensure potential investor trust in the system.

The electricity system development is also influenced by market related barriers. The most important market barrier is linked to new technology development, because in Latvia it is stimulated by supply. This situation prohibits innovation development and renewable energy evolution. The country is lacking a serious research and development policy. There are 10 research centres that also research renewable energy production technologies, but there is no university that has special program for educating specialists in this field. That is the reason why renewable

energy production technologies are purchased in other countries. Experts⁵ admit that in Latvia are too many regulations and complicated bureaucratic procedures. The system is complicated, important barriers precludes market development and there is no indicators that show governmental will to support RE production, which lead to situation that renewable electricity production hardly develops in Latvia.

Next I analysed Latvian electricity system performance. By doing that I found some characteristics from each of the three market models. The price is established in a way that it is reasonable for consumers, which more refers to the public utility model. In the same time there are some indicators that are more appropriate to market model, as participation in auction based electricity exchange. Due to insignificant cable capacity Latvia has limited possibility to buy electricity in auction. Analysing the potential for renewable energy production development I discovered that Latvia has huge potential for energy production by using renewable energy sources especially bio resources. The country is using renewable energy sources for electricity production, but the potential is much higher than currently in use. To be able to use this potential the country must make clear policies for their exploitation.

All the findings mentioned above lead me to the answer of the main research question *what institutional changes are needed in the Latvian electricity market to increase the share of renewable electricity production?*

To be able to increase the share of renewable electricity production the country must ensure reliable environment for that. Currently the Latvian electricity system is working by monopoly principles where the main actor is the government. Supply and demand is organized by the monopoly electricity company, which also sets electricity prices. Supply is stimulating research activities in Latvia, not demand or the government. The property rights are appropriate for private partnership in electricity market activities, but there are important market entree barriers. The government is responsible for meeting renewable energy production targets in order to be able to meet them support mechanisms are created. Although the government has created support instruments, their distribution is unclear and policy is changing constantly.

The institutional organisation of the Latvian electricity market should change in order to increase the share of renewable energy production. The biggest institutional change must be towards a competitive market organisation, openness and no entry barriers for new investors. Under these conditions also new technologies will develop, because the market demands innovations, if supply and demand determinates prices. The government should control and regulate the adequate conditions for renewable energy production. At this moment the production of electricity from renewable sources is not competitive with fossil resources and therefore needs financial support of the government. Instruments must be easily available and clear

⁵ Source: interview Ainārs Feldmanis and Valdis Petris

long term policy should guide their distribution. If these conditions will be organised in a way that the market is reliable, also investors will be more interested in taking part in the market. But still the stimulation of investors is needed, also to attract foreign investors.

Currently electricity grid network is not developed well enough to be able to ensure effective market liberalization. The main connections are towards Russia, because of the country's historical connections with Latvia. The electricity grid network must be improved to be able to create effective market competition.

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