What barriers are standing in the way of implementation of renewable energy sources in the EU member states?

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Abstract

The European Union as a whole is dependent on the imports of primary energy sources, mostly due to politically or economically unstable regions, and their dependence is constantly increasing. Since a new millennium, the EU started to adopting strategies focusing mainly on energy efficiency and the usage of renewable energy sources as their potential is not negligible. There are a big differences in the usage of the renewable energy sources among the member states. The main purpose of this thesis is to discover barriers of renewable energy sources implementation. The relevant concepts of Path Dependence, Intergenerational Change and Multi-Level Perspective are tested with the data of chosen study case, Denmark and Slovakia, in order to analyze barriers which are standing in the way of implementation of renewable sources. As a result, six main barriers are illustrated.

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1. Introduction

The main reason for choosing the renewable energy sources as a topic of this thesis is that it became one of the key issues in energy discussions and dominant subject in the public discussions since the introduction of Europa 2020 strategy, which includes main goals of the European Union in the energy sector until the year 2020.

In the past, the human populations were demanding less energy due to the size and expansion possibilities than today. The usage of energy can be dated from the fire invention, what was a very simple energy source of our ancestors. Since that time, the humanity has discovered many other new energy sources and was able to adapt them according to actual needs. It started with wood burning and coal burning, then oil, natural gas, nuclear energy and the usage of renewable or alternative sources. All those energy sources gradually contributed to higher energy needs what ensured an overall development of civilization. The globalization of trade and the rise of population causing an enormous increase of world production what is closely connected to the energy demands of individual countries.

Currently, the energy supply is still provided mostly from primary energy sources, fossil or nuclear stocks, but their reserves are on the top of exhaustibility border. The growth of the population leads to higher consumer requirements and higher energy consumption what means that one day the energy sources will be exhausted. However, the human ingenuity and technological progress discovering new ways of energy sources and pushing the exhaustibility border further.

It is very hard to imagine our life without energy and therefore a continuing dependence on fossil and nuclear fuels and their gradual exhaustibility become one of the serious global problems of today's world. The other problem is that their burning has a negative impact on the environment. In the last three decades, many countries, in accordance with different international agreements, decided to increase the usage of renewable energy sources, but on the other hand, they are still planning to use a primary energy sources.

In most of the EU countries, a high percentage of energy consumption is covered by imports, while renewable energy sources cover very low percentage of energy consumption. What means that there is a big potential for the utilization of renewable energy sources, but they are not used properly what make us to think about why is it so?

1.2. Problem formulation

The above mention arguments lead to the following problem formulation of this paper:

What barriers are standing in the way of implementation of renewable energy sources in the EU member states?

According to the report of the International Energy Agency (IEA) organization, it will require a huge investment in order to ensure sufficient electricity in the first half of this century. It's the only one way how the world can avoid disruption of the electricity supply. According to analysts, the major part of investment funds will go into the development of energy production and smaller part will go into the availability of oil and gas in the next three decades.[1]

In order to ensure a long term economic growth, it's important to secure a reliable energy supply in optimum cost and adequate protection of the environment, as our planet is too much polluted. To achieve a sustainable economic development it's necessary to change technologies, practices and behaviour, not only in the production but also in demand.

It is important to point out that energy is one of the most important sector of the global economy and deserves deeper interest and analysis. The future generation will need to solve problems regarding energy supply because it's postponed by contemporaries. The global growth is associated with increasing consumption, but on the other hand, there are limited resources and energy production. In recent years, there is a big interest in energy sector on the local or global level among professional public, politicians, legislators and decision-makers.

The main aim of this thesis is to find out why some of the EU countries are using renewable energy sources more and some less, and if the theoretical explanation fits with the empirical reality. This work highlights the existing possibilities of renewable energy sources usage and analysing the current situation and barriers of renewable sources as a suitable alternative solution for the current problem of energy supply. The empirical data of this research are based on study case of two selected countries from the EU member states, which are Slovak Republic and Denmark. The examination of theories with the empirical data can explain barriers which are standing in the way of implementation of renewable energy sources in the EU member states.

[1] International Energy Agency "World Energy Outlook" *IEA homepage*, 2014 <http://www.worldenergyoutlook.org/media/weowebsite/2014/WEO2014_LondonNovember.pdf>

1.3. Definition of renewable and non-renewable energy sources

The energy industry deals with non-renewable and renewable energy sources.

1.3.1. Non - renewable energy sources

The non-renewable energy sources, also called primary sources or fossil fuels, might be exhausted within a few decades. They are: coal, petroleum, natural gas and nuclear energy.[2] They are polluting our environment, waters, atmosphere, contributing to the greenhouse effect, but on the other hand, are very important for the industry.

Coal is a flammable rock containing mainly carbon and in small amount also hydrogen, oxygen, sulphur and nitrogen. The black coal contains about 75-92% of carbon and brown coal around 60-75%, its quality depends on the content of carbon. The formation of coal went through the complex processes over several hundred years and its disadvantages are a transportation, unsafe mining, destruction of landscapes, the creation of acid rain and the greenhouse effect.

Petroleum, also known as a black gold, is dark brown or black flammable liquid with a characteristic smell, insoluble in water, floats on the water and it is a mixture of carbon and hydrogen. The formation of petroleum went through complex processes from mud, residues of animals and algae with the absence of air under pressure of layers together with the natural gas. The petroleum is mined by drilling from which is automatically or by pumps extruded on the surface. From petroleum is made gasoline, kerosene, gas oil, fuel oil, some drugs, fertilizers and pesticides. The biggest disadvantages are petroleum accidents and air pollution.

Natural gas is flammable in the pure form, without smell or colour, and contains around 70-90% of hydrocarbon. It was formed together with the petroleum and coal, and can be mined from land and also from undersea. It's transported by pipelines or liquefied tankers and used for heating, lighting, and as a fuel for cars. The natural gas is cheap, meets the emission limits, is ecological and the transportation is easy also for long distance. On the other hand, there is the danger of explosions and pipeline accidents.

Nuclear energy is based on obtaining energy from the core of atom and the nuclear reactions are accompanied by radioactivity. Nuclear energy is converting thermal energy into kinetic energy by combustion of fossil fuels and then the generators producing from kinetic energy the electric energy. The disadvantage is the creation of radioactive waste.

[2] Encyclopedic Entry "Non-renewable energy" *National Geographic*, 2016 <http://education.nationalgeographic.org/encyclopedia/non-renewable-energy/>

1.3.2. Renewable energy sources

The renewable energy sources are environmentally friendly and are partially or fully renewing by themselves or by someone when they need. Those sources are: sun, wind, water and biomass and geothermal energy.[3]

Sun is a star formed from hot plasma and its surface temperature is about 6000 °C. It is the largest and most accessible energy supplier, and the source of solar energy is nuclear reaction. The solar panels are used in order to create the energy from the sun. When sunlight falls on photovoltaic plate of the solar panel, it releases electrons which are involved in the creation of electricity. The big advantage is that its operation is simple, but on the other hand, it's expensive to buy and the volatility of sunlight is a big disadvantage.

Wind is a movement formed due to different pressures and is affected by temperature. The wind formation is affecting the Earth's rotation, its surface, and the deployment of continents and seas. The windmills are used in order to create the energy from wind. The wind is turning a turbine placed on the flagpole and by this rotation the wind energy is converted into mechanical energy. Then the generator is converting mechanical energy into electricity, which is further distributed by the network. The most windmills are in Denmark, Germany and Spain. Their advantage is that wind turbines do not produce any emissions or waste, and disadvantage is variability of wind, noise and difficulties in their localization.

Water is a compound of hydrogen and oxygen and together with air is forming the basic conditions for life. It's without any taste, smell or colour and represents around 71% of the earth's surface. The hydropower plants are used in order to create the energy from water. The floating water spins the turbine and the generator is converting mechanical energy into electrical energy which is then transported to locations of need. The advantage is that it doesn't pollute the air, doesn't devastate the landscape and its safe. The disadvantage is that it depends on water flow, flooding a large area and its construction is time consuming.

Biomasses are organic materials such as wood, straw, agricultural residues, excrements of animals, municipal waste, or other waste from sewage treatment plants. The advantage is low emissions of CO2, utilization of waste, the availability of resources, and the usage of non-food lands. On the other hand, there is a higher creation of ash-waste.

[3] Encyclopedic Entry "Renewable energy" *National geographic*, 2016 <http://education.nationalgeographic.org/encyclopedia/renewable-energy/>

Geothermal energy produces electricity from the thermal energy of the earth (hot steam) and its build in volcanically active areas. Some of them are in Iceland, Italy and New Zealand.

2. Methodology

In the methodology part is discussed the structure of this paper, methods of data collection, and reasons for chosen study case.

2.1. Report outline

This paper work is divided into six main chapters.

The first chapter starts with an introduction, where are discussed main reasons for investigation into the renewable energy sources topic. It is followed by the problem formulation, where is stated the research question and main purpose of this work. In this part are also defined types of renewable and non-renewable energy sources.

The second chapter is a methodology part, where the general structure of this paper is presented, as well as methods of data collection and the explanation of chosen study case.

The third chapter is dedicated to a theoretical framework, which starts with the general definition of energy policy. This is followed by two core theories which might directly explain the problem formulation of this paper. The first one is Path Dependence concept saying that history matters and the future decisions are influenced by the past. The second one is Intergenerational Change theory explaining the transformation of human values from materialist to post-materialist over the time. The last mention concept is Multi-Level Perspective (MLP) on socio-technical transitions which provides insights into how new technology is transitioned to a radically new one in order to fulfil a social need. This concept is not directly explaining the problem of this paper but might help to discover barriers of renewable energy source implementation.

The fourth, empirical chapter is based on the comparison of two chosen countries, the Slovak Republic and Denmark. This chapter includes facts exploring whether used theories are usable for the topic of this paper. It contains information regarding the history of the EU, Slovak and Danish energy policy, economic situation and taxation system of Denmark and Slovak Republic, and their cultural differences.

The fifth chapter is dedicated to results of interviews made within this project and the examination of theories with empirical data. The main point here is to explore whether the data supports theories or not, what will help to answer the research question of this paper.
The last part will be conclusion, where all discovered barriers which are standing in the way of implementation of renewable energy sources in the EU member states will be concluded.

2.2. Data collection

This paper uses a qualitative data collection to gain deeper understanding of the topic in order to answer the research question. The reason for choosing the qualitative approach is that the information has a deeper insight into the phenomenon under study.[4] Three types of qualitative data collection were chosen: documentary, focus group interview and individual interview data collection.

The documentary data will be mostly gathered from published documents of the European Commission, Eurostat, OPEC, World Value Survey, published statistics and surveys of the International Energy Agency (IEA), Danish and Slovakian governmental websites, published online books, articles, newspapers and journals. The information from those sources will be used in first three chapters. In the introduction part, where are presented types of renewable and non-renewable energy sources, in the theoretical chapter, which is focused on general definition of the EU energy policy, on the concept of Path Dependence, Intergenerational Change theory and Multi-Level Perspective concept, what might be relevant theories in order to solve the research question of this paper. And also in empirical chapter, where is discussed the EU, Slovak and Danish energy policy, economic situation and taxation system of Denmark and Slovak Republic and their cultural differences.

In analytical part, the theories used in this paper will be examined with gathered information from the empirical chapter, so the author will be able to find out if the theories are supporting or diverting the empirical data, what will lead to answering the research question of this paper. In this part, the author will also present data gathered from the focus group interview and individual expert interview.[5] The main purpose of interviews is to gain the key information regarding barriers which are standing in the way of implementation of renewable energy sources in the

[4] Library "Methods of collecting qualitative data" *Libweb surrey*, 2016
<http://libweb.surrey.ac.uk/library/skills/Introduction%20to%20Research%20and%20Managing%20Information%20Leicester/page_54.htm>
[5] Helene Pristed Nielsen "Qualitative Research Interviews" AAU Theories of Social Science and Methodology, 7th semester

Slovak Republic and see if results from interviews are compatible with the findings. The focus group interview was executed personally with the employees from the finance and controlling department, the product and innovation department and the employee from corporate development department of the energy company which provides comprehensive services related to electricity off-take in Slovakia. The individual expert interview was done through Skype conversation with the scientist in the field of renewable energy sources, currently working on the project in Poland for European Technologic Platform Earth Energy. The main role of the author is to understand the topic from the different perspective of interviewees and to interpret the meanings about the research subject.

The focus group interview data collection allows the author to gain broader data from employees of the energy company about discussed topic. The individual expert interview method of data collection is the most useful in discussion about sensitive topics and it helps in detecting opinions of people who are experts in the study field. The main advantage of both interviews is that it provides much more detailed information than are obtained through other data collection methods, for example, surveys or observation.

2.3. Case Selection

There are two main reasons for selecting Slovak Republic and Denmark as the study case of this paper. First of all, the case selection is influenced by the share of energy from renewable sources in the EU countries, presented by Eurostat.

Share of energy from renewable sources
(in % of gross final energy consumption)

	2004	2011	2012	2013	2014	2020 target
EU	**8.5**	**13.1**	**14.3**	**15.0**	**16.0**	**20**
Belgium	1.9	6.2	7.2	7.5	8.0	13
Bulgaria	9.4	14.3	16.0	19.0	18.0	16
Czech Republic	5.9	9.5	11.4	12.4	13.4	13
Denmark	14.9	23.5	25.6	27.3	29.2	30
Germany	5.8	11.4	12.1	12.4	13.8	18
Estonia	18.4	25.5	25.8	25.6	26.5	25
Ireland	2.4	6.6	7.1	7.7	8.6	16
Greece	6.9	10.9	13.4	15.0	15.3	18
Spain	8.3	13.2	14.3	15.3	16.2	20
France	9.4	11.1	13.4	14.0	14.3	23
Croatia	23.5	25.4	26.8	28.1	27.9	20
Italy	6.3	12.9	15.4	16.7	17.1	17
Cyprus	3.1	6.0	6.8	8.1	9.0	13
Latvia	32.8	33.5	35.7	37.1	38.7	40
Lithuania	17.2	20.2	21.7	23.0	23.9	23
Luxembourg	0.9	2.9	3.1	3.6	4.5	11
Hungary	4.4	9.1	9.6	9.5	9.5	13
Malta	0.1	1.9	2.9	3.7	4.7	10
Netherlands	2.1	4.5	4.7	4.8	5.5	14
Austria	23.3	30.8	31.6	32.3	33.1	34
Poland	6.9	10.3	10.9	11.3	11.4	15
Portugal	19.2	24.7	25.0	25.7	27.0	31
Romania	17.0	21.4	22.8	23.9	24.9	24
Slovenia	16.1	20.2	20.9	22.5	21.9	25
Slovakia	6.4	10.3	10.4	10.1	11.6	14
Finland	29.2	32.8	34.4	36.7	38.7	38
Sweden	38.7	49.0	51.1	52.0	52.6	49
United Kingdom	1.2	4.2	4.6	5.6	7.0	15
Iceland	58.9	71.6	73.2	72.2	77.1	64
Norway	58.1	64.8	65.9	66.7	69.2	67.5

According to their survey, some of the EU member states, for example, Bulgaria, the Czech Republic, Estonia, Croatia, Italy, Lithuania, Romania, Finland and Sweden, already reached the level required to meet their national 2020 targets. There are also countries which are less than one percentage from their 2020 targets, for example, Denmark and Austria. The countries such as France, the Netherlands, UK, Ireland and Slovak Republic are the furthest from their 2020 targets. From the above picture we can see, that the Slovak Republic is the country where the percentage of energy from renewable energy sources was only 11.6% in 2014 and it's the country which is furthest from their 2020 national target, while Denmark had 29.2% energy from renewable energy sources in the same year and is the closest from their 2020 national target.[6]

Second of all, the case selection is influenced by data availability. The majority of deeper data regarding the energy policy, legislative framework, implication of renewable energy sources into the system and future plans are available in the language of the country. The author of this paper understands the Slovak and Danish language and there is much information available in those languages.

The author of this paper believes that the comparison of empirical data of those two countries will help to deeper identify barriers which are standing in the way of implementation of renewable energy sources in the EU member states.

[6] Eurostat "Renewable energy in the EU" *European commission home page*, 2016 <http://ec.europa.eu/eurostat/documents/2995521/7155577/8-10022016-AP-EN.pdf/38bf822f-8adf-4e54-b9c6-87b342ead339>

3. Theoretical chapter

This chapter starts with the theoretical framework and general definition of the EU energy policy, and continues with chosen concepts and theory: The Path Dependence concept, Intergenerational Change theory and Multi-Level Perspective concept (MLP).

3.1. Theoretical framework

First of all, it's important to define the general EU energy policy to understand how important is the energy sector. The research question of this paper cannot be well explained without the application of Path Dependence concept, what is concept which might directly explain the problem of this paper. It says that future choices are influenced by decisions made in the past. If some country is following one road, then any simple change will cost a lot. Paul David explains this theory as interaction of specific events, decision-making and behaviour of individuals, and saying that in order to predict the future it is necessary to know the history. In the past, the Slovak Republic went through the process of transformation from Communism to Capitalism and the issues regarding energy policy started to be important for the government after the country become the member of the EU in 2004, while Denmark has a long history in renewable energy policy. By the examination of Path Dependence theory with energy policies of Denmark and Slovakia, the author will be able to explain the energy strategies of Denmark and Slovak Republic, what might explain barriers of implementation of renewable energy sources.

The theory of Intergenerational Change, made by Ronald Inglehart, is the theory which also might directly explain the problem of this paper. It is based on scarcity and socialization hypothesis explaining the human values and preferences in the time of economic recession and in the time of economic growth, the transformation of human values over the time. The implementation of new technologies is closely connected with human preferences and values. In Denmark, the transition to post-material values has been progressed much further than in Slovakia. Therefore, the Danish people are more ecologically minded and are more likely to switch from traditional grid to renewable energy sources, while Slovakian people are more materialistic due to lower living standards. The examination of Intergenerational Change theory with cultural differences between Denmark and Slovakia, as well as Inglehart and Welzel findings of those two cultures, might help to explain the research question.

The last used concept is the MLP, which is not directly connected to the problem of this paper, but might indirectly help to explain barriers of renewable energy sources implementation. The MLP concept explaining, that energy regime is a complex system characterised by actors (firms, public bodies, economic interests) who are shaping current energy systems. According to the European Commission, the support of the R&D is very low in Slovakia, while Denmark is supporting their innovations the most from the EU. The Multi-Level Perspective concept explaining the interaction between actors (Regime), environments (Landscape) and innovations (Niche) in the system of the country. According to Geels, the niche can growth faster if it's supported by powerful groups what making changes at the landscape level and creating pressure on the regime. The examination of MLP concept with the Slovakian and Danish energy system, taxation system and economic situation might lead to discover barriers of implementation of renewable energy sources.

3.2. The definition of EU Energy policy

The main purpose of the European Union energy policy is to ensure safe and reliable supply of energy in required quantity, quality and optimum cost in order to keep the economic growth. The main mission of the energy legislators is to issue the relevant legal norms, to ensure their compliance, to plan the future development of energy, to promote and support development programs in order to propagate necessary information to the public. The important aim of the state leaders is to secure the energy supplies for a long term, to ensure energy efficiency and to protect the human environment.

''Without energy, however, our daily life would be very different as the factories would grind to a halt, aeroplanes could not take off, cars could not start, and we would have no heating, hot water, electricity or computers." (Loyola de Palacio, 2002)[7]

The importance of the energy sector is comparable to the importance of a food industry which is characterized by a great diversity and flexibility in the production. The power supply, in contrast to the food industry, is characterized by relatively low flexibility and diversification because on the market is few choices of fuel and its production is financial and time consuming.

In the 20th century, except the oil crisis, the primary energy was relatively cheap and in excess but this situation is gradually changing due to limited optimization of the energy usage and

[7] Loyola de Palacio ''Let us overcome our dependence'' *European Commission*, 2002 <file:///C:/Users/Martina/Downloads/KO3801835ENC_002%20(2).pdf>

energy efficiency of the end users. The relation between price and consumption of the energy is one of economic aspects of the energy system and prices affect consumer behaviour. High bills have a negative impact on trade, employment and lifestyle, but on the other hand, high bills can stimulate research of additional sources, innovation and improvement of efficiency.

3.3. Concept of Path Dependence

The theory of Path Dependency is a basic concept of historical institutionalism focusing on developing a sociological view of institutions. Can clarify how the European Commission become a major player in the energy field, when expanded its vague powers in the energy sector and developed informal rules which become more formal. It was created by economists in order to explain processes of new technology adoption and industry evolution. It is ideological concept which says that casual phenomena or events can have a long term cumulative effect on the organization of activities as well as on the success or failure of specific regions. According to Paul David, the concept of Path Dependence is the interaction of specific events, decision-making and behaviour of individuals. Due to this influence it is necessary to study the historical processes, so we can properly understand and predict what might happen next. According to Blazek and Uhlir, the Path Dependence is in the direction of new economic geography used very simply and differently from the concept of Paul David who represents the traditional neo-classical economics, where the gradual development is virtually ignored, as well as the role of local institutions or government spending.[8] The Path Dependence can also explain the energy strategies of individual Member States. F. Baumann and G. Simmer argue that those strategies are the results of past experiences such as oil shocks or communist legacy. In the case of Poland, was shown that its external energy preferences is the result of wider geopolitical objectives, which are manifested in deep-seated sense of strategic vulnerability in face to face with Russia and in high level of securitization of Polish energy discourse.[9]

According to the professor of political science at the University of California, Paul Pierson, the Path dependence means focusing on the dynamics of self-reinforcing processes or positive feedback processes in a political system, which can be influenced by relatively modest perturbations at early stage. There is broader and narrow definition. The broader definition of Path Dependence explains that what happened in earlier time may influence the results and

[8] E-study documents "Path Dependence Theory" *E-study documents*, 2016 <https://is.mendelu.cz/eknihovna/opory/index.pl?cast=62135>
[9] F. Baumann and G. Simmer "Between Conflict and Convergence" *CAP*, 2011 <http://www.cap.lmu.de/download/2011/CAP_Paper-Baumann-Simmerl.pdf>

trajectory in later time, but it's not inevitable that events from past will provoke movements in the same direction, because the future direction and trajectory may be different. This definition refers to the fact that the history matters. The narrow definition of Path Dependence means that the road or track which some country or region started to follow, the costs of it change or cancellation are very high. This definition points out, that certain institutional setting is standing in the way of simple change, in other words, the institutional arrangement in the past hampers any changes in the future and the operational removal is difficult. The Path dependence has specific characteristics. First one is unpredictability, what means that events which have a big impact on the future are partly random, therefore some results can be positive or negative and we are not able to predict which final state will be reached. The second one is inflexibility, what means that farther we are in the process, the harder it becomes to change from one path to other. The third one nonergodicity what means that the random or sequential events should not be cancelled, because they can serve as feedback for the future decisions. And the last one is potential path inefficiency what means that in the long-run, some results may pay-off less in contrast to the other path which we renounced.[10]

Paul Pierson in his work "The Path to European Integration" argues, that in the process of European integration appears so called "gaps" in the ability of member state to control subsequent institutions and policies due to four reasons.

1. The democratic governments are having a short time horizons of making decisions due to electoral considerations and long term effects are likely to be heavily discounted.[11] Therefore, the political decision makers are more focused on the short term decisions and it can happen that governments may support policies which can restrict own position. The politicians are paying attention to long term consequences only if it become politically salient or they don't have electoral fear, what also can affect the national sovereignty.

2. The unintended consequences of institutional choices may create gaps, even if policymakers are focusing on long-term effects. This means, that decision makers can make for example some policy, that governments will be able or will be not able to apply. The European Union is creating policies which have to be applied into national law, what limiting the ability of member states to control the development of policy. First of all, The EC decision making is overload what

[10]Paul Pierson "Increasing returns, Path Dependence, and the Study of Politics" *World Bank*, page 252, 2000 <http://siteresources.worldbank.org/INTAFRSUMESSD/Resources/1729402-1150389437293/Pierson_2000.pdf>

[11] Paul Pierson "The Path to European Integration: A Historical Institutionalist Perspective" Harvard University, page 13, 1994 <https://ces.fas.harvard.edu/files/working_papers/PSGE_WP5_2.pdf>

creating weaker ability of member states to control the process. Second of all, the spillover effect limiting control of member states over policies because tasks adopted in one area can have important consequences in other area. The effort to integrate in some field is changing other field what can cause problems because integrated part cannot be isolated. More policies increasing side effects which are likely to be more prevalent.[12] Ernest B. Haas, the representative of neo-institutionalism, distinguish three types of spillover: functional (or technical), political and cultivated.[13] Functional spillover is the most known and says that one step of integration in one area leads automatically to the next step, because all areas and politics are interconnected. The modern economies of individual countries are so interconnected that it's not actually possible to integrate in one location. Pierson argues, that the spillover is not able automatically move from one field to another, because there is a system which lead in particular direction, and pressures alone are not creating policies. Therefore, functional spillover can generate to political spillover, which is created by political elites or interest groups who are convinced that further integration is needed in order to solve current specific problems, which also can cause sunk cost as unanticipated effect. Cultivated spillover is the result effort of players on supra national level, particularly European Commission and the Court, in order to deeper integration during mediation between EU member states. Pierson argues, that the political organs of the EU are not the tools of the member states due to two considerations (the need to create mechanism that would allow efficient decision-making together with member governments and the need to take into consideration that governments might overturn their designs in the future) which changed over the time. The EU institutions become more powerful and their powers are increasing and member states recognized that collective organizations is becoming more and more difficult and the EC cannot to pass proposals that ignore member states preferences, so they are maximize the room for independent initiatives. They are creating more regulations, which are policies with distinctive qualities. Today the policymaking and future institutional development can be considered as uncertain compared to the past.[14]

3. The shift in government policy preferences and the significance of the "acquis communautaire". The preferences of governments can change over time due to electoral

[12] Paul Pierson "The Path to European Integration: A Historical Institutionalist Perspective" Harvard University, page 11, 1994 <https://ces.fas.harvard.edu/files/working_papers/PSGE_WP5_2.pdf>
[13] Michelle Cini "European Union Politics" *online books*, p.90, 2007 <https://books.google.de>
[14] Paul Pierson "The Path to European Integration: A Historical Institutionalist Perspective" Harvard University, page 20, 1994 <https://ces.fas.harvard.edu/files/working_papers/PSGE_WP5_2.pdf>

turnover. The new government may have different preferences than previous one and also can find out that it's not possible to implement their own preferences due to previous institutional development, so governments may feel "immobilized by the dead weight of past initiatives". The governments are changing frequently and have different opinions on policy matters on the EU level. The policy preferences can shift due to several reasons, for example new information or changed circumstances. The "acquis communautaire", the scope of existing legislations and practices of the EU might narrow the fields of possible changes and the new policies causing that the scope is growing. The previous institutional and policy decisions made on the EU level are liming the member states in political maneuver and it's not possible take them back even they become to be costly or violating national sovereignty. [15]

4. The sunk cost and rising price of exit, because the work on path dependency emphasized how policy decisions, even suboptimal ones, can become self-reinforcing over the time. The initiative choices have social consequences and individuals in response to governments actions are making commitments which can "lock in" previous decision. For example, the new technology with the large cost may increase returns which can be further investigated into given technology, what creating motivation for individuals to stick with this opinion. This system provides additional source of increasing returns and individuals are receiving benefits for this activity if others will also adopt same opinion. At the end, the individuals will start to feel a need to pick the option which will not fail later. Many of individual commitments are "locking in" suburbanization, but some policies can also encourage individuals for example to buy some goods or investigate into new technology, but all of those decisions generate sunk costs. The development of the EU policy can also "lock in" the member states over time, for example, the policies of the EU made in past increased the cost of exit for member states.[16]

The governments short-term decisions, decisions with unanticipated consequences and governmental preferences which don't fit their needs, all those "slack" or gabs which Pierson argued, can be captured only through investigation into history and are creating room for autonomous action by supranational actors. There are gaps in member states control and it's not possible to reassert it, because "slack" is extensive and the expectations of its recapturing become limited over the time.

[15] Paul Pierson "The Path to European Integration: A Historical Institutionalist Perspective" Harvard University, page 16, 1994 <https://ces.fas.harvard.edu/files/working_papers/PSGE_WP5_2.pdf>

[16] Paul Pierson "The Path to European Integration: A Historical Institutionalist Perspective" Harvard University, page 17, 1994 <https://ces.fas.harvard.edu/files/working_papers/PSGE_WP5_2.pdf>

3.4. Theory of Intergenerational Change

The post-materialism is the transformation of individual values (physical, economic and materialist) to new individual values (autonomy and self-expression) in sociology. In 1970s, the sociological theory of post-materialism was developed by American political scientist Ronald Inglehart, who assumed that the Western societies were transforming individual values, switching from materialist values, emphasizing economic and physical security, to a new set of post-materialist values, which emphasized autonomy and self-expression. Inglehart argued that rising prosperity was gradually liberating advanced industrial societies from basic materialistic needs and observed that the younger people were much more likely to accept post-materialist values. Inglehart speculated that this "silent revolution" was not just a case of a life cycle change when people becoming more materialist as they aged, but it is an example of generational replacement causing intergenerational value change.[17]

The theory of intergenerational change is based on two key hypotheses, which are the scarcity and socialization hypotheses.[18]

1) The Scarcity Hypothesis - Inglehart assumed that individuals follow various goals in something close to a hierarchical order. While people may desire for freedom and autonomy, the most needs like hunger, thirst and physical security have to be satisfied first, since they are immediately linked with survival. According to Inglehart´s interpretation of Maslow´s hierarchy of human goals, in the time of war or economic crisis, humans are first of all taking care of their physical safety and economic ensuring what constitute the basic conditions for survival. After achieving basic conditions, when human is not living in fear but in the peace, is occurring change of priorities and into the front are coming values such as participation on political decision-making, environmental quality, personal fulfilment, etc.

2) The Socialization Hypothesis – Inglehart assumed that the basic structure of the human personality is shaped in the early stage of formation and ends before reaching adulthood. All values which individuals learned during the formation period, mostly remain during all life, but formed values are not necessary preserved and unchanged for all individuals. Inglehart pointed out, that the biggest changes in the human personality are happening in the period before reaching adulthood, while there is a minimum statistical probability that significant changes in

[17] Ronald Inglehart "Example 1: The Silent Revolution" *example from The Silent Revolution in Europe*, 1971 <http://users.polisci.wisc.edu/kritzer/Teaching/ps551/example1.pdf>

[18] Ronald Inglehart "Culture Shift in Advanced Industrial Society" *online book*, page 69, 1990 <https://books.google.de>

the structure of personality will occur after adulthood. The biggest influence on the value orientation of people are having events and conditions which individuals experienced in childhood, during their early formation.

The combination of those two hypotheses allows formulating the theory of intergenerational value change in developed Western societies. After the 2nd World War, those countries experienced a relatively long period of economic growth and peace, and the population didn't suffer from hunger as in the historical period. Therefore were created good conditions favourable to promote the post-materialist values in Western societies.

Inglehard was also aware that significant changes in the individuals' value don't take place in the short period of time. If younger generations are growing up in completely different conditions than previous generations, then younger generations are having different value priorities than older generations. The process of replacing older generation will result to the gradual change in value orientation. If individuals and society as a whole cannot change their values during a short period, the increase in post-materialist values is occurring during the process of intergenerational exchange, when younger cohorts, who lived in peace and economic growth, are replacing the older cohorts, who experienced war and adverse economic conditions. According to Inglehart, the impact of socio-economic conditions on political change is characterized by significant time gap (approx. 10-15 years), when the right to vote will get individuals who lived in the period of economic growth. Subsequently, it will take several years more until those people will get into political positions.

Inglehart was also aware of the fact, that an increase or fall in the change in values over time is not occurring only due to leave of older generation and the emergence of new one who prefer other values. Therefore, in his work wondered about three factors that can play important role in the value systems of society and individual cohorts.[19]

1) Effect of life cycle – the fact is that from various reasons (biological), the younger age cohorts are less materialistic than older age cohorts and more the younger cohorts are older, their value orientation come closer to the values of older cohorts – decreasing number of post-materialist and increasing number of materialists.

2) Cohort effect – differences between the number of materialists and post-materialists are not only explained by the fact that young people are generally more post-materialistic, while they are

[19] Ronald Inglehart, Paul Abramson "Economic Security and Value Change" *The American Political Science Review*, 1994 <http://www.people.fas.harvard.edu/~iversen/PDFfiles/Inglehart1994.pdf>

becoming more materialistic by higher age. But on the other hand, the differences are caused by various conditions in which were different generations socialized. Society as a whole should under suitable conditions become more post-materialistic due to the fact that older more materialistic generations will be gradually replaced by new post-materialistic generation.

3) Period effect – according to Inglehart's scarcity hypothesis, the period of economic recession, crisis or war should lead to more materialistic society, vice versa, economic growth and peace should lead to more post-materialistic society. Inglehart assumed, that the economic crises caused by "oil shocks" early in 70s and 80s should lead to higher number of materialists, and following period of economic recovery and growth should lead to their return to the original values which were before the crisis.

Inglehart in his model explains, that the change of values in the society is influenced by effect of life cycle, by effect of period which reflects the short-term of socio-economic changes (scarcity hypothesis), and by cohort effects emanating from socialization hypothesis when older cohorts are replaced by younger who are socialized in different conditions.

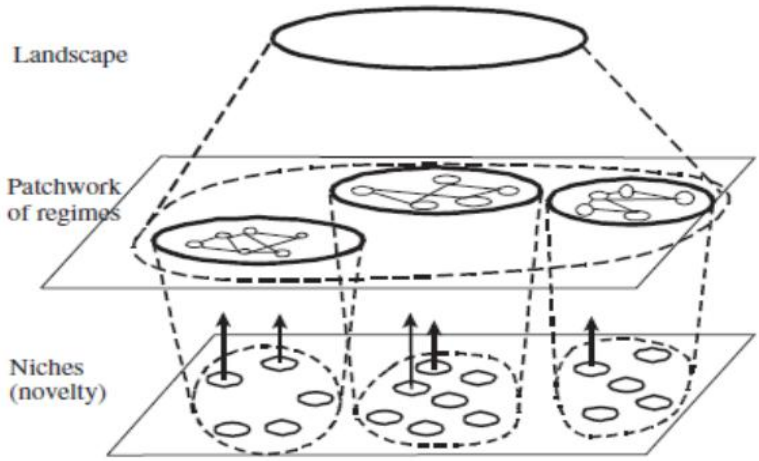
3.5. Multi-Level Perspective Concept (MLP)

Frank Geels is the Professor of System Innovation and Sustainability at the Sustainable Consumption Institute (inter-departmental institute at the University of Manchester), the chairman of the international Sustainability Transitions Research Network and scholar on socio-technical transitions.[20] He is well known for MLP theory, what is the bridge between evolutionary economics and technical studies and is about how the society is changing and developing. It's explaining interaction between actors, environments and innovations, and how technological transitions come about. Our world is made up by socio-technical systems, which are made up by people who are using technologies for different activities and society. People's behaviour in society is influenced by social norms and technical structures.

The structure of MLP:[21]

[20] The University of Manchester "Frank Geels" *Home page of the Manchester University*, 2016 <http://www.sci.manchester.ac.uk/people/professor-frank-geels>

[21] Frank W. Geels "The MLP on sustainability transitions" Environmental Innovation and Societal Transitions, 2011 <http://community.eldis.org/.5ad501d7/Geels%202011%20EIST%20response%20to%20seven%20criticisms.pdf>



Made by Sussex Energy Group: https://www.researchgate.net/figure/235922484_fig1_Figure-1-Multi-Level-Perspective-nested-hierarchy-Source-F-W-Geels-2002-The-MLP-has

Landscape - with global changes which influence and pressure the regime

Regime - which is main stream society supported by social norms and integrated systems

Niche - developments which allow new ideas to grow until they have an opportunity to change the existing regime

In the energy sector, it is a system made up by energy generation, transmission infrastructure to get energy to our homes and work places and how we use the power in those places. This system is called the regime what refers to main stream activities and structure. The regime is influenced by changes in society in globally and this refers to a landscape, what for energy sector could be climate change, high oil and gas prices, and public awareness of energies. While the regime is continuing along, a few groups of people started to developing new ideas in research and development labs, where are developed a brand new processes or products such as solar, wind or wave power (niche developments). Consumers of main stream society are all connected to a traditional energy sector grid, but with the new developed products some consumers may prefer and switch from the main stream into this new niche idea. The change and the landscape make it stronger and put pressure on the regime, the traditional energy sector. This may create an opportunity for the niche ideas to convinced more consumers how good the new product is, and make a change in a structure of the regime. This would result in that the traditional generation, transmission infrastructure system and associate social structure has to be significantly redesigned to support the new renewable technologies.

4. Empirical Chapter

This chapter starts with the explanation of history and main targets of the European Union, Slovakian and Danish energy policy, including general framework regarding renewable energy sources. This continues with the economic situation, taxation system of Denmark and Slovakia and their cultural differences.

4.1. History of the EU energy policy

The energy sources were main reason for establishing the cooperation in the Europe. After the 2nd World War, the European countries started to think about a new arrangement of Europe in order to protect the continent from future wars.

In 1950 was proposed the Schuman declaration, which suggested joint control of coal and steel in order to protect the Europe from wars. The outcome of the declaration was that the European governments (France, Germany, Italy, Belgium, Luxembourg and the Netherlands) decided to sign the Treaty establishing the European Coal and Steel Community (ECSC) in 1951.[22]

The Treaty of ECSC was signed for 50 years and it expired in 2002. A few years later, the European society started to deal with the issue regarding nuclear energy because they was afraid that it will be abused for military purposes as in the case of coal and steel during the 2nd World War. In 1957, the Treaty establishing the European Atomic Energy Community (Euratom) was signed. The Euratom is separate unit but fully integrated into the European Union (EU). The main purpose of this Treaty was transnational control over nuclear energy, higher living standards and the development of relationships with other countries.[23] Today, the Euratom loans are used to improve the safety and efficiency of nuclear power stations.[24]

Since the 2nd World War until 1957, the most common problem of the ECSC' member states was own energy supply, so the energy cooperation has developed to wider political and economic cooperation. Later, the nuclear energy was centrepiece of attention and became a key factor for ensuring the future energy supply and the peace in the Europe. In the '60s the Europe was experiencing the economic growth. The oil was at that time imported for relatively cheap prices what means that the process of oil extraction was in relatively low cost.

[22] European Union "The Schuman Declaration" *Europa.eu*, 2015 <http://europa.eu/about-eu/basic-information/symbols/europe-day/schuman-declaration/index_en.htm>

[23] Access to EU law "Treaty establishing the Euratom" *EUR-Lex*, 2007 < http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV%3Axy0024>

[24] European Commission "Press Release Database" *EC* ,2015 <http://europa.eu/rapid/press-release_P-92-66_en.htm>

In 1960 was established the Organization of the Petroleum Exporting Countries (OPEC) on the Baghdad conference. The founding members were Iraq, Iran, Kuwait, Saudi Arabia and Venezuela and later were successively added Qatar, Indonesia, Libya, United Arab Emirates, Algeria, Nigeria, Ecuador, Gabon and Angola. It's estimated that OPEC controls ¾ of the world oil reserves.[25] The main purpose of the organization was to integrate and coordinate the oil policies of the Member States, to ensure fair and stable oil prices, effective and regular oil supplies and an adequate return on capital invested into oil industry.[26]

During 50s and 60s, the price of natural gas was relatively stable and low in the Europe (See Appendix 2) and the oil price was also very low. The Europe was in the process of post-war recovery (See Appendix 1), and the leaders didn't pay a significant attention to the Energy policy. If we compare both graphs from Appendix 1 and Appendix 2 we can see, that the prices of oil and natural gas had the price fluctuation in approximately same period of time with a time delay, what means that the price of natural gas of world market depends on the oil price of world market. The low prices positively contributed to the European economic growth. Significant fluctuations in the oil prices can be observed during the '70s when the position of OPEC was strengthened because of the fact that around 70% [27] of the world oil reserves was located right on the territory of its member states and in 2014 it raised on 81%.[28] The control over such a large amount of the oil is associated with influencing oil prices on the world market. The member states of OPEC were and still are aware of their strategic position and dependence of the rest of the world on their oil. This led to the fact, that in 70s they reduced the oil supplies and then raised the price because of the war between Arabic countries and Israel. Those price fluctuations, also known as "oil shocks", significantly affected the economic growth of the countries and caused a worldwide recession and rise of inflation. There was another oil shock in 1979, when was a Muslim revolution in Iran which erupted in to the military conflict between Iran and Iraq and this caused a significant decrease in the oil production.[29] In the time when the oil price was low, nobody addressed the issue of energy consumption. During the oil shocks, everyone realized how much are countries vulnerable in the case of higher oil prices, so they started to intensively discuss issues regarding the reduction of energy intensity.

[25] OPEC "Member Countries" *Opec home page*, 2016 <http://www.opec.org/opec_web/en/>
[26] OPEC "Our Mission" *Opec home page*, 2016 < http://www.opec.org/opec_web/en/about_us/23.htm>
[27] Organization of the Petroleum Exporting Countries "Annual Statistical Bulletin" *Opec home page*, 2009, Page 24 <http://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB2009.pdf>
[28] OPEC "Annual Statistical Bullet" *Opec home page*, 2015 <http://www.opec.org/opec_web/en/data_graphs/330.htm>
[29] James D. Hamilton "Historical Oil Shocks" *NBER organization*, 2011 <http://www.nber.org/papers/w16790.pdf>

On December 1973 was hold European Summit in Copenhagen after the first oil shock, where member states of the European Community discussed how to ensure a stable oil supplies to the Europe, but they didn't reach any consensus.[30] In December 1974, they started to discuss the problem of European energy security in Paris and urged the institutions of the European Community to develop a common European energy policy.[31] After the second oil shock, the European Council on the meeting in Dublin in 1979 agreed that it is necessary to pay more attention to the European energy policy.[32] This plan was not implemented. At that time the EU had internal market with free movement of goods, services, capital and people.

The 70s can be described as a period when the European energy policy began to form. During the '80s, the oil prices gradually declined after the oil shocks and again increased in early '90s because of Iraq invasion to the Kuwait (See Appendix 1). At that time, the Europe was in the process of revitalization of common energy policy and also appeared first activities associated with the usage of renewable sources.[33] At the beginning of a new millennium the development of oil prices slightly decreased and then increased for several years. At the end of the first decade of 21st century, the oil prices again started to get lower. In the following years, the situation changed again under the influence of incidents also known as "Arab Spring" and there was a significant increase in oil prices (See Appendix 1).

In 1997 was introduced the EU Directive on the liberalisation of electricity, the EU Directive on the promotion of electricity from renewable energy sources in the market, and the "Koyto Protocol" what was The United Nations Framework Convention on Climate Change signed in Japan, the international agreement against the global warming.[34]

In 2000, the EU member states agreed to adopt so-called the Lisbon strategy because of low economic growth in the Europe compared to other world regions at the end of '90s.[35] The Lisbon strategy set up the goals by 2010, which was to increase the competitiveness and dynamics of

[30] Hagen Schulz-Forberg, Bo Strath "The Political History of European Integration" *online books*, Page 41, 2010 <www.books.google.de>
[31] European Community Information Service "Meeting of the Heads Of State or Government, Paris 9-10 December 1974" *Archive of European Integration* , 1974 <http://aei.pitt.edu/1459/1/Paris_1974.pdf>
[32] European Community Information Service "The European Council, Dublin 29-30 November 1979" *Archive of European Integration*, 1979 < http://aei.pitt.edu/1402/1/Dublin_nov_1979.pdf>
[33] European Commission "Energy and environment overview" European Commission home page, 2016 <http://ec.europa.eu/competition/sectors/energy/overview_en.html >
[34] University of Strathclyde "Danish energy policy" *University of Strathclyde home page*, 2012 <http://www.esru.strath.ac.uk/EandE/Web_sites/01-02/RE_info/denmark.htm>
[35] Leszek Balcerowicz, Rzonca, Kalina and Laszek "Economic Growth in the European Union" *Lisbon Council*, 2013 <http://www.lisboncouncil.net/growth/documents/LISBON_COUNCIL_Economic_Growth_in_the_EU%20(1).pdf>

economy and to achieve sustainable economic growth in the EU. In 2001, the Lisbon strategy also included the environmental sustainability.[36]

The Lisbon strategy was under investigation in 2004 and the result was that some countries met the objectives defined in the policies without any problems, and some had problems with economic growth, high unemployment and low level of innovation, so they was not able to fulfil specified objectives.[37] From the evaluation report was evident that the year 2010 as the deadline for the completion of defined objectives was unrealistic. One of the main problems was the fact that member states didn't consider the Lisbon strategy as a primary objective and they supported it only verbally.

The Lisbon strategy was reassessed in 2010 and the result was a new economic plan for 2020 named the Europe 2020, which was presented by the President of the European Parliament, José Manuel Barroso on March 2010. The Europe 2020 replaced unsuccessful Lisbon strategy and was response to the economic, financial and climate crisis.[38] The main purpose is to reduce the greenhouse gas emissions, to increase the share of renewable sources and energy efficiency by 2020.[39]

EU targets in Energy Policy:

The topics in connection with the energy policy and energy security are getting more and more under the spotlight in the recent years and this leads to the formation of a new strategic concept in this field. The EU is aware of exiting facts such as dependence on imports of energy sources, the existence of imbalances in consumption and production of energy from the territorial point of view, relatively high energy prices, and the negative impact of energy on the environment.

According to statistical information of the Eurostat from 2014, the countries which are the most dependent on imports of energy sources (close to 100%) are Malta, Cyprus, Luxemburg, then its Ireland (85,3%), Belgium (80,1%), Lithuania (77.9%), Italy (75.9%), Spain (72.9%), Portugal (71.6%) and Slovak Republic (60.9%). The overall energy dependence of the EU countries was almost 54%. On the other hand, there are countries such as Estonia (8.9%), Denmark (12.8%),

[36] Leszek Balcerowicz, Rzonca, Kalina and Laszek "Economic Growth in the European Union" *Lisbon Council*, 2013 <http://www.lisboncouncil.net/growth/documents/LISBON_COUNCIL_Economic_Growth_in_the_EU%20(1).pdf>

[37] Oliver Traidler "Evaluating the Lisbon Strategy" *Wurzburg University website*, 2011 <http://www.wiwi.uni-wuerzburg.de/fileadmin/12010400/sonstigebeitraege/DP_115.pdf>

[38] Annette Bongardt and Francisco Torres "Europe 2020- A Promising Strategy?" *Intereconomics* , 2010 <http://archive.intereconomics.eu/year/2010/3/europe-2020-a-promising-strategy/>

[39] European Commission "Europa 2020, A strategy for smart, sustainable and inclusive growth" *European Commission home page*, Page 9, 2010 < http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

Iceland (13.9%), Romania (17%), the Poland (28.6%), and Netherlands (33.8%), which has the most energy self-sufficiency within the EU.[40] If there will not occur any changes in the energy policy and in the current tendencies such as rising energy consumption and the depletion of primary energy resources in the near future, then the European dependence on energy sources imports will increasingly growth. It's expected that the Europe dependence on the energy will increase to 70% by 2030.[41] The main targets of EU are first of all to reduce greenhouse gas emission by 20% compared to 1990, to use 20% energy from renewable sources and to increase energy efficiency by 20% by 2020. Second of all, to reduce greenhouse gas emission by 40%, to use 40% energy from renewable energy sources, to increase energy efficiency by 27-30% and power system interconnection by 15% by 2030, and to reduce greenhouse gas emission by 80-95% by 2050.[42]

4.1.2. Energy Policy of Denmark

In 1891, the Danish government first time fund research in wind energy due to lack of energy sources. After the 1st and 2nd World Wars, there was a shortage of imported fossil fuels in the world, but at that time Danes was able to use the energy from wind turbines in rural areas of Denmark, due to previous governmental support of renewable energy sources.[43]

In 1977, the Association of Danish Electricity Utilities incorporated the Wind Power into Danish Power System based on gathering data from testing of Gedser turbine, which was designed by J. Juul and installed in 1957. The oil crisis in 70's together with wide world concerns regarding environment and high prices of oil led the Danish government to adopt energy plan in 1976, which was further developed in 80's. They explored oil and gas in North Sea, increased the usage of renewable energy sources, energy efficiency and saving, reduced consumption and explored steps to secure and environmental friendly energy supply.[44]

In 1990 was introduced the "Energy 2000"policy, and in 1996 "Energy 21"policy, in order to reduce CO2 by 20% in 2005. The Danish government made taxation reform in 1992, where they exempt renewable energy tax, introduced environmentally friendly forms of electricity

[40] Eurostat "Energy Dependence" *European Commission home page*, 2014 <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdcc310&plugin=1>

[41] Commission green paper "Green Paper on the security of energy supply" *European commission home page*, 2000<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3Al27037>

[42] European Commission "Energy Strategy" *EC home page*, 2016 <https://ec.europa.eu/energy/en/topics/energy-strategy>

[43] J. Vetergaard, L. Brandstrup, R.D. Goddard "A brief history of the wind turbine industries in Denmark and USA" *Academy of International Business*, Page 3, 2004 <http://www.hha.dk/man/cmsdocs/publications/windmill_paper1.pdf>

[44] University of Strathclyde "Danish energy policy" *University of Strathclyde home page*, 2012 <http://www.esru.strath.ac.uk/EandE/Web_sites/01-02/RE_info/denmark.htm>

production and applied combined energy and CO2 tax. In 1993, the government examined the "Energy 2000"policy and found out that the target would not be able to reach by 2005 as they predicted. In order to achieve the target, they expanded Green taxes and introduced "Biomass Agreement "which was supposed to increase the usage of biomass by 2000. These policies for emission reduction mostly from transport and power plants and the introduction of energy taxes on fossil fuels and electricity in household sector caused higher usage of renewable energy sources to 12-14% in 2000.[45]

In 1995, the Danish government introduced the "Green Tax Package" and increased taxes for trades and industries which was energy intensive in order to increase effectiveness of energy consumption in those sectors. In the same year, the Development Programme for Renewable energy (DPRE) created two legislations which were to promote the solar cell systems and to promote expansion of household wind turbines. The combination of Green tax packages and the DPRE's legislations created the development of usage of renewable energy sources in the country. Within the "Energy 21" policy from 1990, was run the Renewable energy island project in 1997, which was successful and in 2008 showed to general public, that it is possible to change the community (in this case it was the Island of Samso) to 100% renewable energy supply. In 1997, the EU Directive on the liberalisation of electricity, the EU Directive on the promotion of electricity from renewable energy sources in the market and the "Koyto Protocol" against the global warming shaped the future Danish energy policy.[46]

In 1999 was introduced "The Electricity Reform" in order to increase demand of renewable energy sources and to create a green internal market by the obligation of the consumers to ensure that 20% of their energy will be from renewable energy sources. On the green market could sell only companies who gained green certificates in order to protect the consumer against high prices for renewable energy sources. This reform increased the usage of renewable sources on 27% before 2003 and the CO2 emissions dropped by 11% in 2000. In 2000, the Danish government started to implementing climate strategy by introducing "Climate 2012" due to "Biomass Agreement of 2000" which established plan of supplementary burning of wood chips

[45] Videncenter for Halm "Danish Energy Policy", *Videncenter for Halm*, 2001 <http://www.videncenter.dk/groenne%20trae%20haefte/groen_engelsk/kap_01.pdf>

[46] University of Strathclyde "Danish energy policy" *University of Strathclyde home page*, 2012 <http://www.esru.strath.ac.uk/EandE/Web_sites/01-02/RE_info/denmark.htm>

and straw at plants in Denmark by 2004. In the same year were also established fixed prices for offshore and onshore wind farms. [47]

Between 2001 and 2008, there was a change in government and the stagnation in the wind sector. In 2005, the previous strategy "Energy 21"from 1996 was replaced by "Energy Strategy 2025"focused on energy saving and renewable energy, energy markets, technology and climate change. The Danish energy policy agreement for the years 2008-2011 was signed in 2008 by political parties, based on previous agreements in order to ensure the development of renewable energy sources, incensement of energy efficiency and higher investments into research into energy technologies.[48]

In 2011, the Danish Commission on Climate Change Policy published "Energy Strategy 2050" with detailed recommendations on how to achieve the long-term target to become 100% energy independent with no usage of fossil fuels.[49]

In 2012, the Danish government adopted "Energy Efficiency Directive "of the EU's common climate and energy policy, where is expected to realise energy savings by 17% in 2020 in EU. This new energy agreement contains wide range of ambitious initiatives in order to achieve their main goal what is 100% renewable energy in the energy and transports by 2050. But this agreement requires a lot of investments.[50]

The Danish Energy Agency presented four different energy strategies in 2014 which outlining various ways how to achieve their climate and energy targets by 2020, 2035 and 2050.[51] In 2015, there was a new national election in Denmark and the new government wants to keep environmental level but for less money and in budget for 2016 are proposed spending cuts in the fields of environment together with tax reliefs for businesses what will increase competitiveness on the market.[52]

[47] University of Strathclyde "Danish energy policy" *University of Strathclyde home page*, 2012 <http://www.esru.strath.ac.uk/EandE/Web_sites/01-02/RE_info/denmark.htm>

[48] International Energy Agency "Danish Energy Agreement for 2008-2011" IEA home page, 2014 <http://www.iea.org/policiesandmeasures/pams/denmark/name-24487-en.php>

[49] The Danish government "Energy Strategy 2050" *Energi-Forsynings og Klimaministeriet*, 2011 < http://www.efkm.dk/sites/kebmin.dk/files/news/from-coal-oil-and-gas-to-green-energy/Energy%20Strategy%202050%20web.pdf>

[50] Martin Lidegaard "Accelerating Green Energy Towards 2020" *Ministry of Climate, Energy and Building*, 2012 <http://www.ens.dk/sites/ens.dk/files/dokumenter/publikationer/downloads/accelerating_green_energy_towards_2020.pdf>

[51] Greenpeace "Denmark's commitment to 100% renewable energy" *Greanpeace home page*, Page 3, 2014 <http://www.greenpeace.org/international/Global/international/briefings/climate/2014/BRIEFING-Denmarks-commitment-to-100pct-renewable-energy.pdf>

[52] Helene Dyrhauge "Green realism" *EU track*, 2015 <http://eutrack.ideasoneurope.eu/2015/11/16/green-realism-assessment-danish-governments-climate-energy-policy/>

Danish targets in Energy Policy:

The energy policy in Denmark is based on political consensus, stability and energy agreements. Denmark is one of the EU countries which are exporting the energy and for them the energy security is guaranteed by self-sufficient. Their long-term goal in energy policy is a gradual transition to the renewable energy sources on 100% in the energy and transport sectors by 2050. In order to achieve that goal, the Danish energy policy is focusing on energy efficiency, rise of energy from renewable energy sources and further electrification of the system. Those target areas are supported by a strong research and development.[53]

The other ambition of Denmark is to discard an imported coal from energy mix by 2030. Due to the fact that they are net exporter of oil and natural gas, the issue of energy security doesn't have a geopolitical dimension than in other countries. Currently, the issue of energy supply security and the balance of power systems capacity can be characterized as an emerging problem.

The potential of development of Danish bilateral cooperation lies primarily in the development of cooperation with neighbours and in the multilateral sphere it's the cooperation on EU level with the purpose to increase the level of social security of population and the support of customers and manufacturers. The international cooperation of Denmark with neighbouring countries in energy sector has a long tradition and also is developing the cooperation on European level mostly through ENTSO-E. Denmark has well developed cooperation with Sweden in the gas sector because a south-western part of Sweden can be supplied with gas only through Danish transmission gas system. Their cooperation also includes energy security of gas and the development of well-functioning gas market. Denmark also cooperates with Germany in the field of expansion of gas infrastructure between those two countries and security of gas supply. Denmark supports the improvement of energy infrastructure and the rise of trade between EU member states and also recognizes the importance of new energy supply routes from third countries into the EU.[54]

Denmark is one of the countries where science, research and innovation are the most important. Denmark's performance improved from 2.39% in 2005 to 3.08% in 2014. The main aim of the government is to become one of the most competitive countries in the world and in order to ensure this goal, they increased spending on R&D, increased the support of competitive schemes

[53] The Danish government"Energy Strategy 2050" *Energi-Forsynings og Klimaministeriet*, 2011 < http://www.efkm.dk/sites/kebmin.dk/files/news/from-coal-oil-and-gas-to-green-energy/Energy%20Strategy%202050%20web.pdf>

[54] Embassy of Slovak Republic in Denmark "Denmark" Export Slovakia, 2013 < http://export.slovensko.sk/wp-content/uploads/2015/03/D%C3%A1nsko-Ekonomick%C3%A9-inform%C3%A1cie-o-terit%C3%B3riu_November-2014.pdf>

for financing the projects and established R&D funding on universities based on results. In 2008, the Danish Council for Strategic Research's Commission on Sustainable Energy and Environment supported 6 strategic energy projects and in 2010, the overall Danish budget for R&D in energy technologies reached DKK one billion in 2010. In 2014, the European Commission ranked Denmark on second place after Sweden in "European Innovation Scoreboards 2014".[55]

4.1.3. Energy Policy of Slovak Republic

Since 1918 until 1992, the Slovak Republic was a part of Czechoslovak Socialist Republic. In the time of communism, the private property was destroyed and everything were owned by state, the economy was centrally controlled and planned, the Czechoslovakia become agrarian-industrial where were built mainly heavy and chemical industries. The Czechoslovakian economy stagnated in the 70's, but the living conditions rose due to cheap loans and cheap raw materials, especially oil and gas, imported from the Soviet Union.[56]

In 1989, after the fall of communism, the country went through the process of transformation from communist regime to democracy and the main priority was to achieve the economic growth and to have functioning market economy. Since fall of communism until now, the Slovak Republic is struggling with high unemployment rate, high level of corruption, weak education and healthcare, distrust of people in politics and courts. The usage of renewable energy sources was not important topic at that time. In 1993, the Czechoslovakia split on Czech Republic and Slovak Republic.[57]

In 1998 was adopted the "Energy Act" in order to create conditions for energy liberalization. In 1999, the Slovak government approved the "Program for reducing energy intensity" and in 2000 the "New Energy Policy of Slovak Republic". In the new energy policy was stated, that the country is poor in primary energy sources and imports are diversified. The only one domestic source is brown coal in poor quality. The energy system in Slovakia was determined by natural conditions, historical, social and economic development and therefore, the development of the Slovak energy sector will have a long process. To adopt the new energy policy was necessary due to Slovakian accession to EU who required to adopt the new EU directives into national law,

[55] European Commission "Country Report Denmark 2016" *EC home page*, page 41, 2016
< http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_denmark_en.pdf>
[56] New World Encyclopedia "Czechoslovakia" *New World Encyclopedia*, 2016 <http://www.newworldencyclopedia.org/entry/Czechoslovakia>
[57] Jiri Pehe "Czech Republic and Slovakia 25 years after the Velvet Revolutions" *Hinrich Boll Stiftung homa page*, 2014
<https://eu.boell.org/en/2014/09/15/democracies-without-democrats>

and it would also help to increase an economic development and liberalization of energy market. In 2001 was also created Regulatory Office for Network Industries in order to protect consumers from abuse of monopoly energy suppliers, to ensure the investment return of business entities, basically to keep balance between the customers and investors interests by creating law.[58]

In May 2004, the Slovak Republic became the member of the EU. In the same year, the Slovak government updated the "Energy Act" from 1998. The law was defining the basic processes related to electricity and renewable energy sources, including conditions for electricity production through renewable energy sources, conditions for construction of renewable energy sources, rights and obligations of distributors and producers of energy. In the same year was also adopted the act regarding thermal energy and the amendatory act of regulations in network industries. The adoption of all three acts was an important step to the liberalization of energy market, even though the rules were much stricter than the EU directives required.[59]

In 2007, the "Energy Act" was amended by specified rules regarding conditions of connection, access, transmission and distribution of electricity. It defines necessary contractual arrangements in order to connect the production equipment, when it is possible to connect the manufacturer to the system, to perform distribution of electricity also from the renewable energy sources.

The Slovakian government first time adopted the separate law to promote renewable energy sources in June 2009 due to gas crisis at the beginning of the year, when the energy supplies from Russia through Ukraine completely stopped for few days because of conflicts. This act provides the method of support and conditions for the production of electricity from renewable energy sources and the rights and obligations of electricity producers from renewable energy sources. The renewable energy sources under this act means non-fossil energy sources which are replenished by natural processes or human activity, including hydropower, sun, wind and geothermal energy, biomass, biogas and biomethane. This act also specifies the method and procedures of setting prices for electricity produced by renewable energy sources.[60]

In 2014, the Slovakian government amended the law from 2009 regarding renewable energy sources and the new energy policy is moving from the support of the electricity production from renewable energy sources to the support of biomass to produce heat. The government took into

[58] Ministry of Economy "Energy Policy of Slovak Republic" *Ministry of Economy home page*, 2005 <www.mhsr.sk/index/open_file.php?ext_dok=119405&idc=121492>

[59] Slovak innovation and energy agency "The Energy Policy of Slovak Republic" *SIEA home page*, page 2, 2006 <https://www.siea.sk/materials/files/poradenstvo/legislativa/energ_politika/en_politika.pdf>

[60] Fakulta elektrotechniky a informatiky STU "Renewable Energy Sources Legislative" *Slovakian Technical University*, 2016 <http://www.oze.stuba.sk/oze/legislativa/>

consideration the advantages and disadvantages of the support system from 2009. The new legislation created pressure on costs reduction and efficient usage of biomass.[61]

The Slovakian Ministry of Environment, within the operational programme which aimed at improvement of environment quality, run the national project "Green to Household" since December 2015. This project is the first stage of support the usage of renewable energy sources (mostly photovoltaic panels and wind turbines for production of electricity, and solar collectors, biomass boilers and heat pumps for the production of heat) in family houses and apartment buildings with the budget of €115 million in total from European and national sources.[62] The main purpose of this project is to help the householders to overcome economic barriers, to increase the usage of renewable energy sources, to reduce the emissions, and to increase the interest in renewable energy study and its installation.

Slovakian targets in Energy Policy:

The energy policy of Slovakia is in the line with the objectives of the Lisbon Treaty and based on the fundamental EU objectives of the Europe 2000 strategy in energy sector.

The strategic target of Slovakian energy policy is to achieve competitive low-carbon energy, secure and efficient delivery of all forms of energy for affordable prices with taking into consideration the consumer protection and sustainable development. The pillars of energy policy are the energy security and efficiency, competitiveness and sustainable development. The priorities of the Slovakian energy policy are to keep optimal energy mix, to increase the supply security, to develop energy and transport infrastructure, to reduce energy consumption, to increase energy market competition, to use nuclear power as a carbon-free source of electricity and to increase the safety of nuclear power plants and to promote high efficiency combined production of electricity and heat.[63]

The Slovakia is doing well in increasing energy efficiency. Between 2002-2009, the Slovakia reduced energy consumption by 38%, what was the highest percentage of reduction among all

[61] Marek Staron, Zoran Draskovic "New Energy Policy in Slovakia" *CEE Legal Matters*, 2015 <http://www.ceelegalmatters.com/index.php/legal-analysis-energy/162-energy/2420-new-energy-policy-in-slovakia>

[62] Erik Redli "Project promotes renewables in homes" *The Slovak Spectator*, 2016 <http://spectator.sme.sk/c/20114728/project-promotes-renewables-in-homes.html>

[63] Ministry of Economy of the SR "Energy Policy of Slovak Republic" *Ministry of Economy home page*, page 21, 2014 < www.economy.gov.sk/energy-policy-of-the-slovak...2014.../145533s >

OECD countries and EU member states and between 2005-2010 they reduced more than 21% in EU. Together, they reduced the energy demand by almost 45% between 2002-2012.[64]

According to Eurostat, the Slovakia is one of the EU member states with highest price of electricity due to high network charges for industrial consumers and are higher than costs for power supply what hamper the competitiveness of Slovak enterprises.[65]

In 2010, was adopted "National Renewable Energy Action Plan", where government approved to reach 15.3% of renewable energy sources usage by 2020. The priority is also to use renewable sources for heat, while the support for electricity will be gradually limited. By 2040 the share of electricity consumption will rise from 19% to 29% and the share of heat consumption from renewable sources will rise from 10% to 30%.[66]

Slovakia is supporting natural gas which has an important place in the field of energy security and is in the line with the principles of sustainable development. Natural gas is the cleanest fuel among all hydrocarbons in the term of greenhouse gas emissions and will play a leading role in the energy mix of Slovak Republic in the future because of lower emissions by 50% compared to usage of coal. The Slovak Republic is behind in the usage of renewable energy sources, but the correct support mechanisms would contribute to the obligation of Slovakia to raise the usage of renewable sources from 6.7% in 2005 on 14% in 2020 to gross energy consumption. The biggest potential of renewable energy sources has biomass because its interchangeable with natural gas and it can be distributed through existing gas infrastructure. The intensity of R&D increased from 0.46% to 0.83% between 2007-2013, what is the lowest in the EU due to low level of spending on research and development. The country was not able to attract large volumes of R&D activities.[67]

4.2. Cultural differences between Denmark and Slovak Republic

There are different social and cultural values in each country and those values are changing over the time. According to political scientists Ronal Inglehart and Christian Welzel, the increasing

[64] Michal Kolcun "The Energy Policy of Slovak Republic Approved by Slovakian government" *Technical University of Kosice* ,2014 <http://web.tuke.sk/fei-ses/data/pdf/energeticka_politika_sr.pdf>

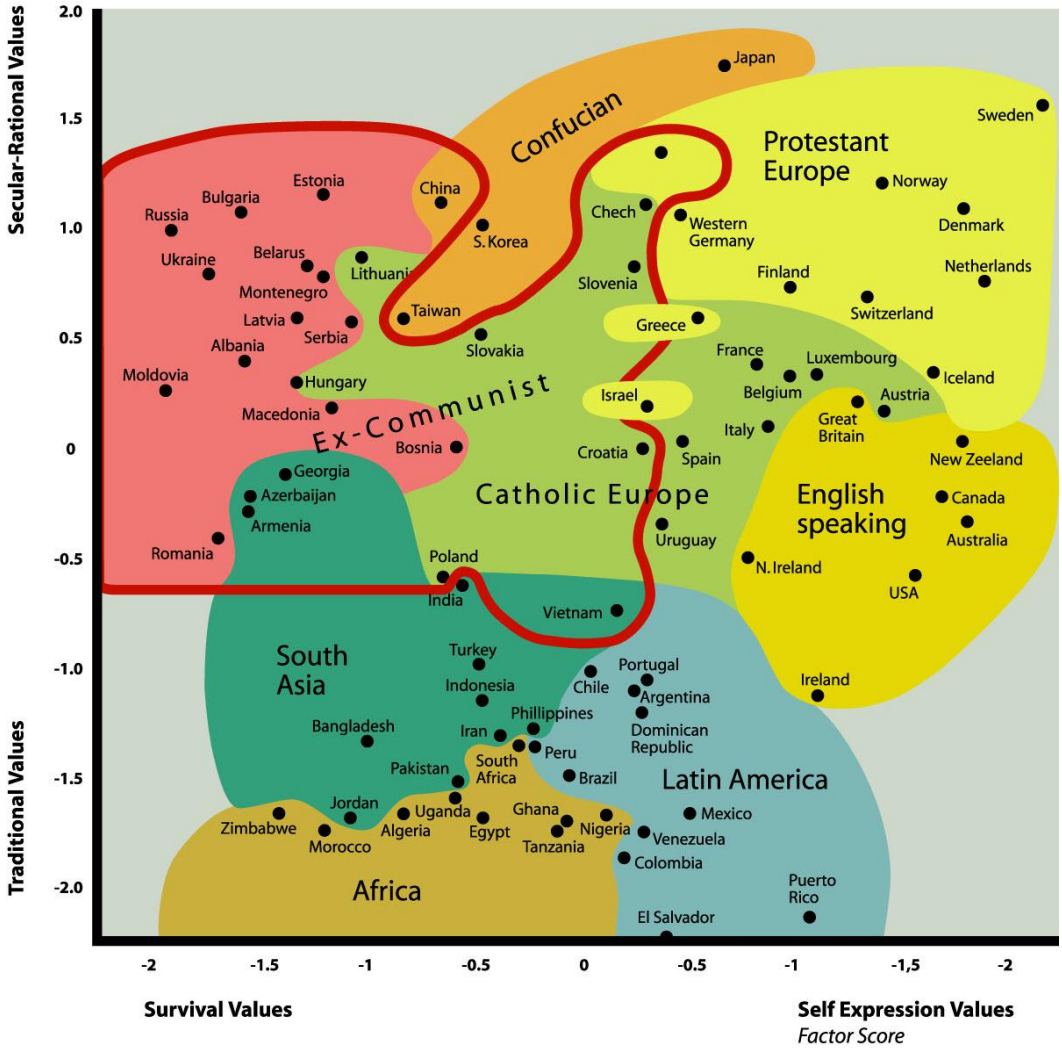
[65] European Commission "Country Report Slovakia 2015", *EC home page*, page 28, 2015 < http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_slovakia_sk.pdf>

[66] Ministry of Economy of the SR "National Renewable Energy Action Plan" *Ministry of Economy home page*, 2010 < www.economy.gov.sk/national-renewable-energy-action-plan/141782s>

[67] World Bank "GDP per Capita", World bank data, 2016 <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>

economic development leads to a shift in values in all spheres of life, including political and social, from traditional (conservative) to modern (liberal). These changes are able to predict in all cultures, are happening spontaneously and the elites are not able to prevent those changes. The industrialization is leading the society to predictable development. The growth of materialistic way of life causes change in values from materialistic to post-materialistic and postmodern values. In this point is increasing the educational level, economic income and also is changing the traditional approach on religion, abortion, divorce, etc. The great emphasis is put also on quality life when the society don't have to worry about the security of basic needs for survival and in the same time the society is starting to be organized and is able to regulate itself, to coordinate and to promote their own needs according to their specific interests. The despite to foreseeable development, involving industrialization, it will not come to absolutely identical results of the process in all societies. Inglehart and Welzel worked with the Samuel Huntington cultural zones, who divided the societies on the world to several cultural zones with similar characteristics. The authors demonstrate, that even here are appearing deviations caused primarily by wealth rate of the society. Analysis of the World Value Survey data made by Inglehart and Welzel claiming, that there are two major dimensions of cross cultural variation in the world: the Traditional vs. Secular-rational values, and the Survival vs. Self-expression values.[68]

[68] Ronald Inglehart and Christian Welzel "Changing Mass Priorities: The link between modernization and democracy" *Indicator info,* 2010 <http://indicatorsinfo.pbworks.com/f/Inglehart+Mass+Priorities+and+Democracy.pdf>



World Value Survey: *http://www.worldvaluessurvey.org/WVSContents.jsp?CMSID=Findings*

The table above shows the position of countries by belonging to larger cultural environment and also determines which values prevalent in the society according to rate of industrialization (wealth). The higher the country is located on the vertical axis, the more modern values has. According to that, the Slovak Republic is placed a bit lower than Denmark, what means that in Denmark are prevalent more modern values as in Slovakia. The more modern values means that there is a little emphasis on religion, nationalism in the negative sense, respect for authority, minorities, divorces, etc. The shift of values is also influenced by cultural heritage, for example, whether the country has communist experience or not. In our case, the Slovak Republic is one of the ex-communist countries, while Denmark is not.

The horizontal axis reflects the level of post-materialistic values. If the country is situated more to the right, for example Denmark, it means that it has greater emphasis on the quality life and self-realization. Here is also reflected the country´s wealth. The Slovakia is placed more to the left side, what means that is not as rich country with quality life of citizens as Denmark. The countries with low income and low GDP production are located in the lower left quadrant, while countries with high income are placed in the right upper quadrant. From this picture it's obvious that Denmark has higher income and the GDP than Slovakia.

According to European Commission, the overall risk of poverty is stable in Slovakia, but below the average of EU member states and there are existing significant regional differences. The social benefits reducing child poverty in Slovakia and are below the EU average (33.7% in Slovakia and 41.3% in the EU). In 2015, the minimum wage increased by almost 8% what is €380 (net €339), what exceeds the limit of poverty, is not based on cost living and doesn't help in the fight with poverty.[69] Most of the population in Eastern part of Slovakia are earning minimum wages. According to the Economic Co-operation and Development (OECD) organization which was established in order to help to recover the Europe after 2nd Word War, the net salary of Slovakian employees with an average income was in 2014, one of the lowest among the OECD member states (See Appendix 3).[70] The tax deduction from the average gross wage shows the purchasing ability of employee, and from the graph in Appendix 3 we can see that employees in Denmark are able to afford much more for their average wages than are able to afford in Slovakia.

In 2015, according to Transparency International, the Denmark was the less corrupted country from all OECD countries, number 1 with the score of 91, and Slovakia was placed on number 50, with the score of 51. Slovakia is one of the most corrupted countries of EU member states. [71]

In Slovakia, the transformation from socialism to capitalism caused the change of human values. The family and friendship were more important than work and property in the time of socialism and in the time of capitalism, people become more selfish, unrespectful, the highest value become money, and also increased crime, individualism, materialism and distrust. In Denmark, the typical values are post-materialist values such as freedom of speech, protection of the

[69] European Commission "Country Report Slovakia 2015", EC home page, page 20, 2015
< http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_slovakia_sk.pdf>
[70] OECD "Taxes and levies of employees" *Finance Ministry of Slovakia* , 2015
<http://www.ozkovo.sk/_uploaded_files/rozne/2015_10_Zdanovanie_miezd_20151404.pdf>
[71]Transparency International "Corruption perceptions index 2015" *TI home page,*2015 <https://www.transparency.org/cpi2015/>

environment, tolerance, active participation in public and social matters, gender equality, and attention to quality of life. The shift to those values occurred when they reached a relatively high standard of living and they don't have to fight for basic material security. In Slovakia, only the financial secured young generation with an education started to recognize post-materialist values, but the rest of the population are materialist for who is important economic and physical security.[72]

In Slovakia, the human values are mostly influenced by the economic situation and high corruption, but there are also other factors, for instance, distrust in the state and institutions and that people are more conservative. It is impossible to expect the smooth transition to tolerance, fairness and equality with the combination of above mentioned negative values which are occurring in the country. There is a strong spirit of materialism in Slovakian people who believe that more money will solve everything and better economic results will lead to quality life. In order to increase life standard in Slovakia, it is important to eliminate corruption and to increase people's confidence in the state and institutions, increase tolerance for diversity through education, increase support of citizens in public affairs, separate religion from the state and establish equal rules for everyone.

4.3. Economic situation and taxation systems of Denmark and Slovakia

Denmark

During the last five years, the Danish economy went through slow recovery and further economic growth should increase the surplus savings in the private sector, stabilize consumer confidence, reduce the inflation and interest rate and improve conditions on the labour market.

The GDP per capita in Denmark was $59,831 in 2013 due to weak exports what reflected subdued global demand. The Danish economy started to grow and in 2014 the GDP per capita reached $60,718 due to growth of private consumption, greater purchasing power and lower unemployment. According to forecasts of the EC, the GDP per capita should increase even more due to grow of domestic demand and exports.[73]

Between 2010 and 2015, the investment rate was on average 18% of GDP. In 2016 is expected investment growth due to the high surplus savings in the private sector and low interest rates.

[72] Monika Sustekova "Sweet Western life" *Sme online news*, 2014 <http://sustekova.blog.sme.sk/c/353851/Sladky-zivot-na-zapade.html>
[73] European Commission "Country Report Denmark 2016" *EC home page*, page 4, 2016
< http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_denmark_en.pdf>

Denmark is self-sufficient in energy production and depends on foreign trade, and is exporting mostly machinery, chemicals, animals, beverages, food, and tobacco.[74]

In 2015, the export decreased due to drop in service exports but it should slowly increase in 2016 due to improved competitiveness. The strong barrier to competition is construction and retail sectors, and competition is very important driver of productivity and economic growth. The import should evolve along with export. The inflation rate was low in 2015 due to drop in energy prices, but it should pick up in 2016 as the result of economic growth.

The conditions on the labour market are better since 2009 and in last five years, the employment rate increased. In the third quarter of 2015, the unemployment rate reached 5.7% and in 2016 it should continue to decrease due to ongoing economic recovery.

The general deficit of public finance was -1.1% of GDP in 2013 and in 2014 got into plus on 1.2%, but it is expected to decline again in the future. The deficit of public finance is influenced by various unstable items such as revenues from the oil and gas production in the North Sea or pension yield tax. The Danish current account has high surplus due to combination of high savings and low investments. In 2014 it decreased from 7.7% on 7.1% of GDP in 2015. [75]

Taxation System

The Danish tax system is progressive, what means that people with higher income also pay higher taxes. The tax burden is one of the highest from all EU countries, but on the other hand, the Danish population has education and other services for free.[76] Denmark has Ministry of Taxation based in Copenhagen and the legislative and control activities related to taxes are divided among several institutions. The value added tax in Denmark is 25% and people are paying variety of local taxes and fees.[77] According to European Commission, the tax burden mainly on land, property and personal income should decline in 2016.[78]

In Denmark, the revenue from environmental taxes is 4.1% of GDP, what is the highest from all EU member states. The EU average is 2.5% of GDP.[79] The environmental taxes are divided into three groups: taxes on environmentally, harmful products involved in manufacturing and

[74] Trading economics "Denmark exports" *Trading economics home page*, 2016 <http://www.tradingeconomics.com/denmark/exports>
[75] European Commission "Country Report Denmark 2016" *EC home page*,page 6, 2016
< http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_denmark_en.pdf>
[76] Skat "Taxation in Denmark" *Skat*, 2016 <http://www.skat.dk/skat.aspx?oId=2068705&vId=0>
[77] Skat "VAT" *Skat*, 2016 <http://www.skat.dk/skat.aspx?oId=2122141&vId=0&lang=us>
[78] European Commission "Country Report Denmark 2016" *EC home page*,page 12, 2016
< http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_denmark_en.pdf>
[79] European Commission "Country Report Denmark 2016" *EC home page*,page 13, 2016
< http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_denmark_en.pdf>

consumption (for example insecticides and pesticides), taxes on discharge pollutants (for example carbon dioxide tax and wastewater tax), and taxes on scarce resources (for example raw materials and water).[80]

Slovak Republic

According to World Bank, the GDP per capita increased from $17.207 in 2012 to $18.500 in 2014. The GDP per capita is expected to rise in the future due to new production capacities in the automotive industry what will create new jobs and increase household consumption.[81]

In 2015, it was a spike in investment due to EU funds and in 2016, the investment rate is expected to growth on 3.8%. It is expected that the public investments will drop due to less EU funds, but on the other hand, the private investment activity should increase. The new planned project in the automotive industry will cause the investment growth in the future, but only in the Western part of the country. The Central and Eastern part of the country failed to attract foreign investors due to low infrastructure and sufficient interconnections. There is a big regional division what is also seen in income differences.

The exports in Slovakia increased a lot in the last 10 years compared to the past. In 2016, slower economic growth of emerging countries will restrain the export and the import should slightly increase, but since 2017, the export should increase due to new investment activities.

In 2014 the inflation rate was -0.1% and in 2015 it raised close to zero due to decline of energy prices. In 2016, the inflation rate should be 1.4%, because it is expected that the fall of energy commodity price can cause further prices reduction for gas and heat.[82]

The labour market improved in 2015 due to economic expansion and the unemployment rate was 11.5%. In 2017, it is expected to fall on 9.3% due to growth of nominal wages by around 3% in 2016, what will lead to rise of employment and household consumption. The Slovak Republic has one of the highest long-term unemployment rate among EU member states due to a big geographical labour market differences. The wages are very low in Eastern part of the country, but the risk of poverty decreased in last years.

[80] Bc. Peter Gola "Environmental Taxes in Denmark" *Confederation Fiscale Europeenne*, 2016 <https://www.cfe-eutax.org/taxation/environmental-taxes/denmark>

[81] World Bank "GDP per capita" World bank data, 2016 <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>

[82] National Bank of SR "Expected Macroeconomic development of SR" *NBS home page*, 2015 < http://www.nbs.sk/_img/Documents/_PUBLIK_NBS_FSR/Biatec/Rok2015/02-2015/01_biatec_15_2_Ocakavany_vyvoj.pdf>

The deficit of Slovakian public finance should decline from 2.7% in 2015 to 2.1% of GDP in 2016 due to economic growth. In 2017, it is expected that the deficit will rise on 51% of GDP due to project to build motorway ring around Bratislava.[83]

Taxation System

In Slovakia, there is a flat tax which favouring individuals with higher income and by that reducing tax revenues. In 2012, the Slovakian Ministry of Finance found out a large loss of revenue due to tax fraud and evasion. The government started a fight against tax fraud, especially in value added tax (VAT) which is 20% on most goods and services, and implemented around 50 measures. In 2015, the government launched a new strategy which presents 30 additional measures, covering tax related issues of criminal, commercial and tax law area.[84] The government didn't pay a big attention to the property and environmental taxation, so it continues to be inefficient. The property taxes brought about 0.4% of GDP since 2000, what is around 1% lower than the EU average. The Slovakian government is planning to deal with a new property taxation system in 2016. There was not introduced any substantive changes in the area of environmental taxes and the taxation of pollution and usage of renewable energy sources remains very low, the lowest from the EU, what is around 1.8% of GDP . The last changes was in 2012, when the government introduced a registration tax on vehicles which depends on the engine power, and in 2015 was introduced "ecological discount" based on the age of vehicle, what was a change in the system of road taxes paid by businesses. Currently, there are no future plans to extend this tax also on privately owned automobiles. According to European Commission, the review of environmental taxes system can in a long-term generate additional revenues in amount of 2.3% of GDP.[85] According to European Commission, the Slovak Republic environmental incentives are very weak due to high rate of landfilling in EU what is 57% because of low tariffs for landfill. In 2014 the Slovakian government increased tariffs for residual municipal waste, but not enough so to achieve the EU target for recycling 50% of waste within the Europe 2020 will be hard for Slovakia. The country doesn't meet EU standards regarding air quality because of low pollution taxes what results to bad health of citizens.[86]

[83] European Commission "Country Report Slovakia 2016" *EC home page*, page 8, 2016 <http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_slovakia_en.pdf>

[84] European Commission "Country Report Slovakia 2016" *EC home page*, page 14, 2016 <http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_slovakia_en.pdf>

[85] European Commission "Country Report Slovakia 2015", EC home page, page 13, 2015 < http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_slovakia_sk.pdf>

[86] European Commission "Country Report Slovakia 2015", EC home page, page 31, 2015 < http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_slovakia_sk.pdf>

5. Results and Analysis

In this chapter, the chosen theories are going to be examined with the empirical data, which might help to explain the barriers which are standing in the way of implementation of renewable energy sources in the EU member states.

5.1. Analysis of Path Dependence concept and Energy Policy

Firstly, it will be explored whether the data gathered regarding the EU, Slovak and Danish energy policy supports the Path Dependence concept what should lead to discovering barriers of renewable energy sources implementation in the EU member states.

According to concept of the Path dependence, it is necessary to study historical processes and decisions made by government regarding energy policy in the past. The history of the EU, Slovak and Danish energy policy was studied, in order to answer the research question. According to Paul Pierson, the history matters, and what happened in the past can influence the future path. If some country starts to follow some way, it's very hard to cancel it and any change can cost a lot. For example, if some country is a member of the EU, it's hard to exit, and if member state signed the EU treaties in the past, it's difficult to change it, what influencing future decisions. The Path dependence is unpredictable because we are not able to predicts if the result of some event will have positive or negative impact. For example in the case of Slovak Republic, people in the socialism didn't know what impact will have the change of regime for their today lives. It is inflexible because, for example, if renewable energy sources were supported by Danish government in early time, it will be hard to change the direction today. The Path dependence is also nonergodic, what means that past events should serve as feedback for the decision in the future and it's also inefficient in the case we chose a wrong path.

Paul Pierson come up with the thesis about Path dependence, where he tried to explain his idea that more integration of states leads to narrow future options. Each level of the integration means less options on how to continue in the future, what decisions to make. Pierson is explaining that the trajectory of the European integration can be changed only by dramatic twists. He explained four gaps in his work, which are standing in the way of member states to have a control over policies and institutions on the EU level, what can be also applicable in the case of energy policy. The first one is that the elections are frequent, what makes governments to think more

short-term than long-term. Also may happen that they will support policies which can affect their national sovereignty. The second gap is that the EU is creating policies with unintended consequences and member states have to apply them even if they can have negative impact on the country. The EU policies are overloaded and also spillover effect might negatively affect some other areas because one are is not isolated. The third one is often shift in government policy preferences due to frequent elections what supporting short term decisions and influencing long term decisions. The member states future decisions are very much influenced also by treaties signed in the past ("acquis communautaire", the scope of existing legislations) and are limiting future changes. The last one is sunk cost what means that member states future decisions are locked in due to social consequences.

In order to protect the Europe from future wars, the European government decided to sign the Treaty establishing the ECSC in 1951, to have control over the coal and steel what was the main material for production of weapons, and in 1957 was established the Euratom, to control the nuclear energy. At that time, each member state of the ECSC had own energy supply what furthered political and economic integration to energy cooperation. Earnest Haas, the representative of neo-intuitionalism would say that this spillover was automatic, functional. But according to Pierson, the functional spillover is not possible because in the EU is system which is leading to some direction and its politicians who are creating policies, not the pressure alone. So the functional spillover can generate to political, in which politicians are creating policies. During the 60's, the Europe was in the process of economic growth and prices of oil and natural gas were low and stable what even more contributed to the growth. The leaders of ECSC didn't pay a big attention to the energy policy and issues regarding energy consumption at that time. They started to form the energy policy, but still not intensively, when the Europe faced three "oil shocks" during the 70s. The first one was when the group of countries, OPEC, strengthened their position on the market due to rose reserves on 70% in 70s and the prices for oil and natural gas rose. Next two "oil shocks was due to conflicts among OPEC member states what caused the higher prices for oil and natural gas what affected the economic growth worldwide. The politicians considered these oil shocks as a problem and in order to solve it they created energy policy which was not intensive what had negative unanticipated consequences because since 80´s until first decade of new millennium the conflicts in the OPEC continued. The prices for natural gas and oil continuously fluctuated so much that it strongly disrupted the EU´ economic growth.

In 1997 the EU decided to take an action and introduced Directive on the liberalisation of electricity, Directive to promote the electricity from renewable energy sources on the market, and the international agreement against the global warming "Koyto Protocol". The EU started intensively solving this situation by introducing the Lisbon strategy in 2000, which had to be applied into all national law and also started to follow the general definition of the EU Energy policy which saying that in order to keep the economic growth it's necessary to secure the energy supply for a long term in required quality, quantity and optimum cost, to secure the energy efficiency with the respect of nature and to introduce energy legal norms in order to secure future development of energy sector. The European Commission found out in 2004, that the objectives stated in the Lisbon strategy was impossible to reach for some members of the EU due to low level of innovation, economic growth and high unemployment rate. The governments didn't support it properly, what was also the case of Slovak Republic. Therefore, this strategy was in 2010 replaced by Europe 2020 strategy, which main purpose was to increase the energy efficiency and share of renewable energy sources, to reduce emissions by 2020, to lower dependence on energy imports and to balance energy consumption.

From this situation it's obvious that the EU politicians introduced the Lisbon strategy in order to strengthen the integration in the energy field and to solve problems regarding fluctuation of prices for oil and natural gas what caused low economic growth, but in 2004 they found out that some countries are not able to implement the Lisbon strategy due to economic problems. Ernes Haas defined cultivated spillover as a spillover where politicians on supra national level are creating policies due to integrate, but Pierson argues that by time the EU institutions, the European Commission and the Court, stopped creating the mechanism where all governments would efficiently making decisions together and the institutions also don't need to be afraid that some of the member state would overturn their design in the future. The reason is that the EU institutions gained power over the time and started to create regulations from own initiatives. This can be today considered as uncertain development of the EU regarding energy policy. The EU is creating policies with unintended consequences and member states have to apply them even they will have negative impact on the country. The application of EU policies into national law limits the ability of governments to control the development of policy because policies are overloaded and also because of spillover effect, what means that the new policy in one area can negatively affect some other area.

Denmark started to concentrate on renewable energy sources a long time before they become the EU´ member state. The Danish government already in 1891 first time investigated into the wind power energy, so during world wars they were able to use energy from wind turbines. During the "oil shocks" in 70s, the Danish government was active and adopted energy plan "Energy 2000" to increase the usage of renewable energy source, energy efficiency and security and to reduce energy consumption in order to become even more independent. In this period, the Danish government was more active in adopting energy policies and in supporting renewable energy sources than the EU generally, while Slovakia didn't exist. During 80s and 90s, the Danish government updated "Energy 2000" plan from 70s and on the top they introduced other plan named "Energy 21" to reduce emissions, "Biomass Agreement" to increase the usage of biomass and also made taxation reform "Green Tax Package" to increase taxes for trades and industries in order to increase the usage of renewable energy sources, energy effectiveness and to lower emissions and energy consumption. In 1997, all three EU Directives was implemented into Danish energy policy and shaped the future policies. In 1999, was introduced "The Electricity Reform" to increase purchase of renewable energy sources one year later "Climate 2012" what was updated version of "Biomass Agreement". The Slovak Republic has very short history in the energy policy compared to Denmark, as it was a part of Czechoslovak Socialist Republic until 1992. In Czechoslovakia was communism, what means that everything was owned by state and economy was centrally controlled and planned. They went through the transformation process from communism to capitalism and the Czechoslovakia split on Czech and Slovak Republic in 1993, so the renewable energy policy was not discussed at that time. The main priority was economic growth, and both countries were in the process of preparation to become the EU member states. One of the EU conditions for Slovakia was to adopt a new energy policy to liberalize energy market, to reduce energy intensity and also to adopt EU Directives into national law. The Slovakia did so at the end of 90s and in 2004 officially become the member of the EU.

In this case, Denmark is the country which has traditional long-term decision making in their system and was not that much influenced by the EU compared to Slovak Republic which started to be separated country few years before it become the member of the EU. Denmark is the country which was paying attention to a long term consequences and holding their national sovereignty, while Slovakia is the country with a short term thinking due to fact that their energy

policy history is very short and their national sovereignty was strongly violated by the EU, when they had to adopt all policies which the EU required in order to enter the EU. Their long term decisions become discounted and are losing their control over policies by time.

Since the new millennium, the Danish government continued to be active in the field of energy and introduced "Energy Strategy 2025", "Energy Strategy 2050" and "Energy Efficiency Directive" with the focus on the EU energy targets and Danish energy goal, what is to become 100% independent in energy and transport sectors with no usage of fossil fuels by 2050. They also updated their green taxes and introduced other policies within the energy field. After the Slovakia became the member of EU in 2004, the government started to pay attention to the energy policy due to the influence of European Commission. They was said to adopt energy policy and to apply EU directives in order to become the member of the EU. Denmark already had a strong energy policy, green taxes, was using and increasing renewable energy source, reducing consumption and emissions, and was constantly adopting policies in order to increase energy efficiency and security. The Slovakian government was not very active in energy policy and first policy regarding the usage of renewable energy sources was adopted in 2009, and amended in 2014. The government started to support the usage of renewable sources in households just since December 2015 by financial support.

From this situation we can see that the governmental policy preferences in the field of energy are not as strong in Slovakia as in Denmark. One of the reasons is that Denmark has a long tradition in the energy policy while Slovakia started to pay attention to energy policy only since 90´s. But as Slovakia is not very developed country and was economically devastated, they was not able to implement the Lisbon strategy at that time, and the governmental preferences were more focused to other fields. Because of the bad economic situation they also focused a lot on short term decisions as on a long term. In the case of Denmark, the new government wants to keep environmental level but for much less money as previous government, so they are having different preferences than previous government. Sometimes it's not possible to implement own preferences due to previous institutional development. In both countries, the treaties and policies in the energy field made by the EU are strongly influencing their future energy policy as well as government preferences, what is according to Pierson narrowing their possible change in the future. Other thing is that the policy decisions, including suboptimal, can become self-reinforcing over the time, what means that response on politicians choices and social

consequences can "lock in" future decisions. For example, some products are dominant not because they are good or cheap but because they are increasing returns, so decision makers are influenced by the dominance of specific product what is locking in their preferences. In the case of Denmark the dominant products on energy market are renewable energy sources because it was supported by government for long time until it become dominant on the market and the country is having a benefits from it, what is locking in other products even if the government will change their preferences now. In the case of Slovakia, the customers are preferring products which are financial cheaper for them due to bad economic situation. So even if the government will change their preference from nuclear power to renewable energy sources, people will not accept it so it might lock in their decision. All Pierson´s gaps in member states control over policies, are creating room for actions by EU institutions and it's impossible to reassert their control.

From this analysis it is clear, that it was necessary to study the historical processes of the EU, Slovak and Danish energy policies due to see the gaps in the ability of member states to control policies in the process of European integration. This helped to find out barriers which standing in the way of implementation of renewable energy sources. By the examination of Path Dependence theory with the reality was find out:

First of all, the transformation from communism to capitalism in the past causing the barrier in usage of renewable energy sources today. The ex-communist countries of the EU have a very short history of the energy policy, because everything was planned and owned by the state. This creates a barrier in the implementation of renewable energy sources as at the beginning of the new millennium their main priority was to recover the low economy and they didn't have any knowledge about the renewable energy sources in the time of socialism, as it was not the preference of previous government. Second of all, there are gaps in the process of European integration, which standing in the way of member states to have a control over energy policy. The EU law in the field of energy has different unintended consequences for each member state. The “oil shocks” in 70s and other conflicts in OPEC during 80´s and 90´s caused the price fluctuation of oil and natural gas, and led to low growth of the European economy. In 2000, they decided to introduce Lisbon Strategy in order to solve their economic problem, but it had unintended consequences. In 2004 was find out that some countries, including Slovakia, were not

able to implement the Lisbon strategy due to economic problems in the country. The EU institutions have a much more power today as in the past and started to introducing regulations and directives without efficient discussion with the governments of member states, what creates a big barrier. Third of all, the dominance of products on the energy market creating a big barrier too and each EU country is having different product preferences. For example, Danish dominant products on the energy market are renewable energy sources because they are increasing returns of the country for a long time. This dominance of renewable energy sources on the market are locking in the decisions of new government who think that the investment into this field is too high. On the other hand, the Slovak Republic is ex-communist country, so dominant products on the energy market today are partly influenced by the preferences in the past. Citizens prefer cheaper energy sources which are more affordable, for example, nuclear power or natural gas. This means, that even if the government will prefer the renewable energy sources, customers might not accept it due to high price, what will lock in the government decision.

In this case the reality data supports the Path Dependence concept, and it was proven that history matters. The decision made in the past are influencing future decisions, what could explain the barriers which are standing in the way of implementation of renewable energy sources in the EU member states.

5.2. Analysis of Intergenerational Change and Cultural Differences

Thirdly, it will be explored whether the data gathered regarding the cultural differences between Denmark and Slovakia supports the theory of Intergenerational Change by Ronald Inglehart, what should lead to discovering barriers of renewable energy sources implementation in the EU member states.

The political scientists Ronald Inglehart and Christian Welzel argues that increasing economic development leads to shift of values from traditional to modern. The growth on materialistic way of the life is leading to change from materialistic to post-materialistic values. In the countries with post-materialistic values, people take a little emphasis on religion, traditional family values or respect for authority and growing their tolerance to environmental protection or gender equality. The countries with materialistic values place emphasis on physical and economic security, there is a low level of tolerance and trust and for people with such values are important family values, religion, parent-child ties or deference to authority. According to analysis of World Value Survey data made by Inglehart and Welzel, the Denmark is typical country with

post-materialistic values, while Slovakia is more with materialistic values. The shift of values was in the case of Slovakia influenced by the fact that it was one of the ex-communist countries, where everything was owned and planned by state, so people didn't have freedom. Danish citizens emphasis on their quality life and is considered as a country with high income and wealth, while Slovakia is not one of the most developed countries and the income is not very high.

Ronald Inglehart, the American political scientist, found out that the transformation of individual values from materialist to post-materialists is influenced by economic and physical security, and by age of individuals. The intergenerational change theory is based on scarcity and socialization hypotheses. The scarcity hypothesis saying, that individuals are following several goals. If the basic needs connected to survival, such as hunger, thirst and physical needs are satisfied, then people may desire for freedom, autonomy, personal fulfillment and environmental quality. The Slovak Republic is not considered as the country with the poverty risk but it's below the EU average. The most people living in the Eastern part of Slovakia are earning minimum wage which is very low (339EUR), what means that there are big regional differences. The purchase ability in Slovakia is much lower than in Denmark and employees are generally not able to afford as much in Slovakia than in Denmark for their salaries. According to Transparency International, the Slovak Republic is one of the most corrupted countries in the EU and Denmark is the less corrupted from all EU member states. In this case, the Slovak Republic didn't reach economic and physical needs due to low wages and plus there is high level of corruption, what creates a big distrust to institutions and government. The purchase ability of citizen is generally much lower than in Denmark, where all basic needs are satisfied, so people moved to post-materialistic, more environmental thinking. The socialization hypothesis saying, that all values which individuals learned during childhood are mostly staying for all life. The events and conditions which individuals experienced during their childhood are influencing their value orientation.

Inglehard also assumed that if the young generation is living in different conditions than the old one, then they have different value priorities. If the old generation, who experienced 2nd world war, will be replaced by the young generation, who experienced economic growth, then this process of intergenerational exchange will result to the gradual change in value orientation of whole society. The Slovak Republic went through the transformation process from communism

to capitalism, what also caused change in human values. In socialism was Slovakia more collectivist country, people was equal, more friendly and family was more important, and in democracy people became more individualistic, selfish, increased materialism and distrust. In Slovakia there are many poor families who are not economically secured and only small percentage of young population who are financial secured are starting to recognize post-materialist values. Denmark didn't go through any transformation processes and they already reached relatively high living standards, so people are more post-materialistic. The quality life, freedom and environmental protection are important values for them. According to Inglehart, there are three factors which are influencing this value system. First one is effect of life cycle, what means that inside of this process, the younger individuals are less materialistic than older, but by time, when the younger become older, their value orientation become close to the older one and in this point is increasing number of materialists. The second one is cohort effect, what means that differences in the number of materialist and post-materialist are not explained only by life cycle, but also by suitable conditions in which were generations socialized. The number of post-materialists will gradually increase in the whole society if there will be created suitable conditions for them. The last one is period effect, what means that the time of economic recession is leading to more materialistic society and the time of economic growth is leading to more post-materialistic society. It will take many years to increase life standards in Slovakia and in order to reach that goal, it's necessary to create suitable conditions for citizens, to decrease the level of corruption what will cause higher trust of citizens in state and institution, establish equal rules for everyone, and to increase citizens' support in public affairs and tolerance. After increasing the life standard, the people will change their materialistic thinking to post-materialistic.

From this analyze is clear, that the investigation into cultural differences of Slovakia and Denmark together with Inglehart and Welzel findings regarding country values was useful in order to find out if the cultures are more materialistic or post-materialistic, what also helped in discovering barriers which are standing on the way of renewable energy sources implementation. By the examination of the theory of Intergenerational Change with the reality was found out:
First of all the domination of materialistic values in the country influencing application of renewable energy sources. According to Inlegart and Welzel findings, the Slovak culture is more

materialistic, than post-materialistic. It's caused mostly due to low life quality of the citizens and low wages. The transformation of the country from one regime to another also changed the values of the citizens and Slovakian people after the socialism was economically destroyed and people learn to be materialistic. Most of the people are having living problems until today, so it's impossible for them to think environmentally and investigate into renewable energy sources.

Second barriers is a low purchasing ability of citizens. Most of the Slovakian citizens didn't reach economic and physical needs due to low wages, there is a big difference between poor and rich and the purchasing ability of poor people is very low. Most of the Slovak citizens are not able to investigate into renewable energy sources due to low wages and low purchasing ability.

In Slovakia is a high level of corruption according to International Transparency, what creates a big distrust to institutions and government, so creating other barrier in implementation of renewable energy sources. This also means that the government due to corruption prefers to use finance into other sectors than to energy sector, healthcare or education.

In this case the reality data supports the theory of Intergenerational Change and could explain the barriers standing in the way of implementation of renewable energy sources in the EU member state.

5.3. Analysis MLP concept

The MLP concept is explaining how the interaction between actors, environments and innovations and also saying that behaviour of the people in society is influenced by social norms. It consists of the landscape, regime, and niche.

The regime is basically system which is transferring the energy from the production to consumers, including energy consumption of the end users and this system is supported by norms. This regime is also pressured by changes, landscape, such as high prices for energy or climate change. The EU intensively started to introduce directives regarding the energy policy since 90s due to fluctuation of prices for oil and natural gas. Those directives (to reduce emissions in the EU, to increase the usage of renewable energy sources, the energy efficiency and electricity interconnection) have to be implemented into national energy policy of its member states. The EU wanted to become more independent from the energy imports, to balance energy consumption, increase energy efficiency and security with the respect to the environment. According to Eurostat, the EU overall energy dependence was 54% in 2014 and if the EU would not solve this situation, the overall energy dependence will increase on 70% by 2030. In this

case, the EU regime was supported by directives due to often price changes for oil and natural gas, what is landscape. If the EU would not try to change the regime by directives, then the EU will become even more dependent on the energy imports as its now.

Denmark is one of the energy self-sufficient country of the EU (dependence on energy imports is 12.8%), because they started changing their regime in 70s after "oil crises" and their main goal back then was to become energy independent and they managed to achieve that target. Danish government main target today is to have 100% of renewable energy sources usage in energy and transport sectors by 2050, to discard imported coal from energy mix by 2030 and plus are following general targets of the EU. In the case of Denmark, their regime was influenced by changes, landscape, in the prices for oil and natural gas "oil crises" in 70s, what caused that Denmark is energy self-sufficient country. Today, their regime is influenced by the EU directives and also by the governmental goals which are with the respect to our nature, what is to use 100% energy from renewable sources. This has a positive impact on citizens.

The Slovakian energy regime is supported by EU Directives and strategies, as their goals are on the line with the EU main targets and is one of the EU countries with high dependence on energy imports (60.9%). Their priorities are to increase the energy supply security, market competition and the energy efficiency, to develop transport and energy infrastructure, to reduce energy consumption, to use nuclear power as a carbon-free source of electricity because it's cheap and increase nuclear power plants. The EU directives influenced the Slovakian regime, and the positive result was that the government was able to reduce the energy demand by 45%, what was the most among all EU member states. Slovakia is behind in the usage of renewable energy sources, but due to EU Directives which had to be adopted by members, was in 2010 introduced action plan to increase their usage on 15.3% in 2020, where the biggest potential has biomass because it can be distributed through existing gas infrastructure. The Slovak government is supporting natural gas because it's cheap and reducing emissions by 50% compared to coal. The electricity price for the end users is very high in Slovakia because of high network charges for industrial consumers what is a big barrier in competitiveness of enterprises. The regime of the Slovak Republic is strongly influenced by the EU directives, what is only one landscape in this case. There are high network charges, so the end users are having the highest prices for electricity in the EU. The Slovak government doesn't prefer to use renewable energy sources as Danish government, but they prefer to use natural gas and nuclear energy because it's much

cheaper. Due to this fact, the Slovak citizens are not so much motivated to use renewable energy sources as Danish citizens.

The niches are new innovations which are capable to change the regime if they are supported by the regime. Customers which are a part of the traditional regime can switch from traditional grid to innovative. The Danish government strongly supporting their energy targets by increasing their spending on science, innovation and research development, and they increased their spending from 2.39% in 2005 on 3.08% in 2014 because they want to become one of the most competitive countries in the world. Denmark was ranked by the EC on the second place after Sweden in "European Innovation Scoreboards 2014". Their innovations are changing the regime because they are strongly supported by the government, who is supporting environmental quality, what is motivating citizens to switch from traditional to renewable energy sources. In the case of Slovakia, their spending on science, innovation and research development is one of the lowest from EU member states and they rose from 0.46% on 0.83% between 2007-2013. The Slovak government is not very much supporting niches so they are not able to change the regime and people are staying with the traditional regime (usage of natural gas and nuclear energy because its cheap) in this case. The new niches together with the landscape can make even stronger pressure on the regime and convinced more consumers to switch to innovative ideas what will make change in the regime.

The economical situation and taxation system in the country can also influence consumers to switch from traditional regime to usage of renewable energy sources. The fact, that Denmark is almost as big as Slovakia and that both countries having similar amount of the citizens (5.690.921 in Denmark and 5.429.884 in Slovakia)[87], and from empirical of this paper it is obvious, that Denmark is producing 2 times more than Slovakia. In Slovakia the export of goods was very low 10 years ago and it started to increase due to new foreign investments (only Western part of Slovakia) into production capacities in the automotive industry what should even more increase in the future, but they are still very low compared to Denmark. It's because the Central and Eastern part of Slovakia is not so attractive for investors as the Western part due to poor infrastructure and insufficient interconnections. Denmark is depending on the foreign trade and is considered as a rich country compared to Slovakia. There are big differences on the labor

[87] Country meters "Population Clock" Country meters home page, 2016 <http://countrymeters.info/en/>

market, mainly in salaries and in the level of poverty, between the Western and Eastern part of Slovakia what creating a high unemployment rate for long period. The Denmark had general deficit of public finance in 2013 and one year later they got on plus 1.2% and it should again decline in the future due to revenues from the oil and gas production or pension yield tax. The Slovak Republic has deficit of public finance which should decrease from -2.7% on -2.1% of GDP in 2016 and is expecting to increase on -51% due to building motorway around the capital city.

Denmark has better economy, much lower unemployment rate, equal salaries and very good infrastructure compared to Slovakia. First of all the Slovak Republic should start to think about how to satisfy citizens' needs, how to increase their living conditions and to increase salaries mostly on the Eastern part of Slovakia. If the government of the Slovak Republic will increase the infrastructure between East and West, then also the Eastern part will become more attractive for investors, what will create new jobs and decrease unemployment rate. But the Slovak Republic is planning to investigate in motorway around the Western part of Slovakia what will not increase interconnection with the Eastern part of Slovakia and plus it will increase the public depth by 51% and too high deficit of public finance means, that the government will have to tighten the budget in certain areas. The Slovak government should first of all solving the living the conditions of their citizens and after that will be able to think about the incensement of renewable energy sources usage and decrease the usage of primary sources.

The taxation system in Denmark is progressive (higher income, higher taxes), citizens are paying several local taxes and fees, and their taxes are high compared to EU member states. But on the other hand, high taxes reflect free education and health care and all activities related to taxation are divided among several institutions, including Ministry of Taxation. In Slovak Republic is flat tax for everyone, so people with high income are paying same taxes as people with minimum salaries, what is very unequal and there is a big difference between poor and rich. In 2012 was adopted strategy against tax fraud, due to big tax evasion. The Slovak government didn't pay a big attention to property and environmental taxation in the past, but they are planning to. According to EC, the Slovak republic has very low tariffs for landfill and for residual municipal waste, and they don't meet the EU standards regarding air quality, while Denmark revenue from environmental taxes is 4.1% of GDP, what is higher than EU average. Denmark applied environmental taxes into their taxation system longer time ago and divided them in three main

groups: taxes on environmentally, harmful products involved in manufacturing and consumption, taxes on discharge pollutants, and taxes on scarce resources.

This analyse showing the interaction between actors (regime), environments (landscape) and innovations (niche) in Slovakian and Danish systems. By using the MLP concept was find out three other barriers: First one is low investment into R&D. The Danish government is strongly supporting the R&D in order to reach their main goal, what is to use only energy from renewable sources, and to become the most competitive in the world. According to EC, the Slovakia is the country with the lowest investments into R&D. The low investments into research and development causing a slow economic growth. The other barrier. The new renewable energy sources require initial investments into building the infrastructure. The road infrastructure is important for economic growth, the labour distribution, and competitiveness on the international trade. The Slovakia has very poor infrastructure between Eastern and Western part, and this is also the reason for low level of investments into Eastern and Central part of Slovakia. Due to low infrastructure, there are big differences in living conditions between Eastern and Western part of Slovakia, mostly in income and jobs. People with low income will not investigate into renewable energy sources as they are having existential problems. The last one is Inefficient taxation system. Danish tax system is progressive, effective and organized. The citizens are paying several taxes and fees which are high, but on the other hand they are getting for example free education or health care. The tax system in Slovakia is flat, what causing a big difference between poor and rich, it's inefficient. In 2012 was find out a big tax evasions, so the government adopted strategy against tax fraud, which is not very effective, so the country is losing a big amount of money.

5.4. Questions of Interviews

The ten open questions for interviews were made in order to gain the key information regarding barriers standing in the way of implementation of renewable energy sources in the Slovak Republic. The first question refers to the demand of renewable energy sources in Slovakia since 2013. The next three questions should answer the governmental insufficient support of investments into development of renewable energy sources and if the Slovakian current energy policy will contribute to the higher usage of renewable sources in the future. The next questions should answer if the high prices for renewable energy sources, high level of corruption, or very

few environmental taxes contribute to barriers of renewable energy sources implementation. The last three questions should give the answer to the political economic and social problems related to the implementation of renewable energy sources and if transition of Slovak Republic from socialism to capitalism influenced the occurred problems.

5.4.1. Results of Interviews

After analyzing the answers from interviews can be said, that there is not so much differences between them.

Why is your company offering only some of renewable energy sources? How demanding are renewable energy sources in Slovakia?

The interviewers answered, that the company is offering those renewable energy sources into which is government willing to invest. There are some types of renewable energy sources which requiring a full service, it's very difficult to install and there is lack of education and skills regarding installation. There is a little demand for renewable energy sources in Slovakia now, but the government is trying to increase it. For example, since December 2015 is running the project which should increase the usage of renewable sources in households by offering financial help for its purchase.

Are the governmental investments into development of renewable energy sources insufficient? Why are the investments into R&D low? Will the Slovakian current energy policy contribute to the higher usage of renewable sources in the future?

One of the interviewers answered, that the government is supporting the usage of renewable energy sources, but there is missing the effort to create their own products and everything is imported. Three of the interviews answered, that the government is trying to support the usages of renewable sources and also stated that the targets which are set for 2020 will be achieved, but they have to put a lot of effort into it.

All of the interviewers agreed, that the support of R&D is very low and in the background together with the education and healthcare. There is a very bad redistribution of the state budget and the consumption is on the first place.

The Slovak Republic will increase the usage of renewable energy sources in the future, but on the other hand, the Slovak energy policy is based on nuclear energy, what allows the stability of the development of the country. The Slovakian energy strategy involves energy mix and the higher usage of renewable energy sources will disrupt this balance and the energy system would

be unstable. For example, the Danish energy policy is based on wind energy and the manufacture of wind turbines is the key industry. The complications might occur if the wind will stop blowing due to clime change. According to other interviews, the higher usage of renewable energy sources in Slovakia might bring much more complications, for example, Slovak people are used to regular energy prices what influence their motivation to change from traditional grid to renewable sources. The big questions are how this higher use of renewable sources will influence the administration and support.

Is the high level of corruption, high prices for renewable energy sources, or lack of environmental taxes contributing to barriers of renewable energy sources implementation?

One of the interviewers answered, that prices for renewable energy sources, its installation and services are set by market, so the prices are equal. The general price for wind energy is about €1000-2000 / kW, and for solar energy about €3000-4000 / kW. The rest of interviews also added, that prices are generally very high and without subsidies, the money will not return. Here is also occurring the problem regarding the expenses on their liquidation.

One of the interviewer answered, that there already are a lot of different taxes in the Slovak Republic and if the government will adopt environmental taxes, they will have more money for unreasonable spending due to high level of corruption. The high level of corruption is also in the field of energy. The other three interviews sad, that each new adopted tax is the burden for competitiveness, so in this case the introduction of ecological tax would be worse for our competitiveness, as well as for payer. On the other hand, the tax shifting can be not endurable for Slovak taxation system due to high risk of its fail which is not possible to repair.

What are the political economic and social problems related to the implementation of renewable energy sources? Did the transition of Slovak Republic from socialism to capitalism influence the occurred problem?

According to one of the interviewers, the renewable energy sources in Slovakia become for some individuals in the society one of the tool for personal enrichment what caused, what also influenced the way how citizens are looking at renewable sources. Their promotion is too weak. The other respondents answered, that the renewable energy sources are very expensive and purchasing power of citizens is very low. The support for its application is too low and is not increasing. It will take many years until the prices for renewable sources will drop and their usage will become beneficial, and their prices are necessary to regulate within all EU.

One of the answers was, that the average Slovakian person who doesn't have any job and was disengaged from the Labor Office by state, doesn't have a time to think about environmental issues. There is also a lack of effort and time from the government to think environmentally. For example, Denmark is also not thinking economically on 100%, because in the time of windless, they are buying nuclear energy from Sweden. The ideal would be to create energy complexes which are able to react on requirements of the network. In Denmark, the number of power companies depends on power production, regardless to the impact on transmission systems in the Europe. The other answers, that Slovakians are only in the process of introduction regarding renewable energy sources because before 1989 they never been here. For example, the Slovak people are still having problem with the garbage separation what is connected with the cultural traditions, but we are slowly getting there. The other thing is that wages of Slovak citizens are low and they are not able to afford it, especially without governmental financial supports.

Three of the responded answered, that in the time of socialism everything was automatic and managed by the state, and after change of the regime, people lost the stability and security. The wages are low and people are accounting each cent. For example, they prefer to rent the LED light for 20 cents per month, than buy one due to saving money. The other respond was, that Slovakians are materialists and money are important for them. Another problem is that they are messy and leaving too much mess in the forest and nature, and are cutting too much trees.

6. Conclusion

The problem of energy supply security, the fluctuation of oil and natural gas prices, climate change or risk of high energy dependency, are the most discussed topics in the field of energy within the European Union. An effort to solve these problems leads to adoption of new legislations, which are suppose to promote the usage of renewable energy sources, because they are a possible solution to the energy inefficiency. There are a big differences in the energy policy of EU member states and in some countries the energy from renewable sources cover higher percentage of energy consumption than in others. The main aim of this paper is to answer the research question which is: *"What barriers are standing in the way of implementation of renewable energy sources in the EU member states?"*

In order to find out the answer, the two explanatory theories were used which could directly explain barriers of renewable energy sources implementation. The third concept was able to indirectly explain the problem of this paper.

The examination of explanatory concept of Path Dependence with the data of European Union, Slovak and Danish Energy Policy discovered three barriers of implementation of renewable energy sources. First one is the transformation from one political regime to another. The Slovak Republic is an ex-communist country with a short history of energy policy because in the time of socialism, everything was owned and planned by the state. The renewable energy sources were not preferred by politicians in this regime. On the other hand, Denmark is the country with a long history in the energy policy because it didn't go through the transformation process of regimes, and their preference of renewable sources started a long time before they become the member of the EU. This barrier is also supported by interviewers who stated, that the Slovak nation is only in the process of introduction of renewable sources because in the time of socialism were not discussed and everything was managed by the state. Today people don't have a stability and security, so they are accounting each cent. Secondly, there are appearing gaps in the European integration according to the concept, mostly in the adoption of EU law into national law of member states, what sometimes have a negative unintended consequences for some of the countries due to lack of discussions between the EU institutions and its members, so governments are losing control over policies. This is creating other barrier in implementation of

renewable sources. One of the case was when the EU introduced the Lisbon strategy and after some time they found out that some of the EU member states was not able to apply it due to low economy. As the third it was find out, that the dominance of products on the energy market, what is influencing customers preferences, is a big barrier. In each country is different dominance of products. In Denmark the dominant products are renewable energy sources and in Slovakia are more preferred primary energy sources because they are cheaper and were also preferred in the time of socialism. This barrier is also supported by interviews who stated that too high usage of renewable energy sources in Slovakia would cause unstable energy mix what will create complications and chaos in administration. Besides that, the citizens are used to regular energy prices what decreasing their motivation to switch from traditional energy sources to renewable. In this case the examination of history with the EU, Slovak and Danish energy policy could explain barriers of implementation of renewable sources, so the concept of Path Dependence fits with the empirical data.

The analyses of the other explanatory Intergenerational Change theory with the data regarding cultural differences of Denmark and Slovakia, together with Inglehart and Welzel findings regarding values in different countries, led to discover other three barriers of implementation of renewable energy sources. The first one is the domination of materialistic values in the country due to low quality life. This barrier is also supported by the interviewers who stated that the promotion support of renewable sources is too weak, the prices are too high and the citizens' income is low. There is no time for citizens to think environmentally. The second is low purchasing ability of citizens who are not able to afford to purchase renewable energy sources due to high cost and the last barrier is high level of corruption. According to one of the interview, the renewable energy sources become the tool for personal enrichment. The theory of Intergenerational Change fits the empirical data and could explain barriers in renewable energy sources implementation.

The MLP concept, which could indirectly explain the problem of this paper, was analysed with the energy policy of Denmark and Slovakia together with their economic situation and taxation system, what helped in discovering barriers of renewable energy sources implementation. The first and a big barrier is a low investment into research and development of new technologies, as well as renewable energy sources, what causing the risk of technology dependence and leading to slow economic growth. This barrier is also supported by interviews who stated, that the

Slovak government' investments into R&D are very low and there is missing the effort to create own products, everything is imported. One of the reason is that the redistribution of the state budget is very bad and there is also a high level of corruption. The second is insufficient interconnections in the country because the usage of renewable energy sources require a good infrastructure. The other barrier is inefficient taxation system. There is a big tax evasion in Slovakia what causing that government is losing a big amount of money. This barrier is also supported by interviewers who said that prices for renewable sources and for their installation are high also with subsidies for Slovak citizens so even the introduction of environmental taxes will not help to increase the usage of renewable sources in Slovakia as it helped in Denmark due to bad taxation system.

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