Legal Regulation of Slovenian Electricity Market

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***Abstract*—** Legal regulation of Slovenian national electricity market is necessary to provide a framework for ensuring secure and competitive supply of energy. National laws have to comply with EU legislation, where directives need to be transposed into national legislation. One of the main goals of European energy policy is to create a single European energy market. The directives regulate the future connection of energy markets, whereas regulations have a direct effect in the national legislation of each EU Member State. Furthermore, certain directives are adopted in order to encourage use of renewable sources for electricity production.

***Keywords*—** Renewable sources, electricity market, production of electricity, transport of electricity

I. INTRODUCTION

ELECTRICITY is considered as phenomena of 20th century. Electricity production was developed from small individual producers and consumers. The development went through several phases, and today we have large energy systems. The usual day cannot be imagined without the use of electricity [1, 2]. Electricity became a public good, and in order to provide effective and transparent use of it, certain laws and regulation are adopted by national authorities [3].

II. ELECTRICITY MARKET

Energy market can be considered as a market which differs from the other markets for goods and services. In this market there is an agreement between demanders and suppliers about the prices of energy. The agreement can be established due to the short-term and long-term contracts or directly at the energy market.

EU countries undertook liberalisation of the energy market with directive 96/92 EC, which refers to electricity market. The directive concerns to common rules for energy market in all EU countries. The directive resulted with changes associated with both, production and distribution, of energy in the past decades.

Before the directive 96/92 EC was adopted, only few EU countries (Great Britain, Norway, Finland and Sweden) had started with reforms for establishing competitiveness in the energy market. With the adoption of the directive also the other countries of EU realized the necessity of reforms, and nowadays all countries cooperate in order to obtain greater competitiveness in energy market. It is agreed that this goal would be achieved by further opening of the market and the directive 96/92 EC is replaced with directive 2009/72/ES.

Furthermore, on July, 2009 European Council and European Parliament adopted the third package of acts in order to obtain common rules for internal energy market and to increase the possibility of choices for all consumers in the EU. Nevertheless, it encouraged cross-border cooperation and trading. Other goals of acts were to increase the effectiveness of national authorities, to obtain competitive prices and to ensure stable supply of energy. In order to control the application of these goals the national Agency for the Cooperation of Energy Regulators (ACER) was established [4].

As it was stated above, energy market differs from markets for other goods. It differs in such a way that in order to operate all of the following conditions must be fulfilled :

- There is a sufficient amount of energy available on the market at any time.
- There is enough number of suppliers and demanders.
- Distribution network are built in a way to ensure proper coverage, security and reliability.
- Network operators allow access to the network for all consumers without privileges and discrimination.
- Price is set by the institution, which must not be under the influence from either side enrolled in the market.
- Possible disputes are governed by institutions which must not be under the influence from either side enrolled in the market.
- Suppliers supply energy due to the previously agreed conditions.
- The competitiveness and security of consumers is ensured.

A. The Production of Electricity

Electro-energetic system of Slovenia (EES) is one of the smallest in the EU, having about 2.880 MW of production capacity, and about 15TWh of annual production. In the past, the whole EES was operated at the lower limit that ensures rentable and effective performance. EES is interesting because of its location. Slovenia lies between west and east, and north and south, which is the reason why our EES represent a bridge between markets with the energy surplus (Austria, Swiss, France) and energy deficient markets such are Italy, Croatia and other Ex-Yu countries [5].

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Energy production must be adjusted to consumption because the sufficient amount of energy cannot be stored. That is why also legislation has to be set in such a way which will obtain an optimum between supply and demand. That goal is achieved by daily quotas which are set in advance. Energy can be stored in accumulators or pumping plants, but the amount of energy stored using this method is negligible. Because of that it is essential to adjust production to current consumption, and it is usually done by setting quotas for each hour, one day in advance. Actual demand usually follows predicted consumption, but deviations are always possible.

Electricity production is a process in which primary energy is transformed to electrical. There are several forms of useable energy:

- Primary energy stored in natural resources;
- Secondary energy produces by transformation of primary energy;
- The final energy received by consumers;
- Useable energy, which can be used for cooling and heating.

The schematic representation of the energy production can be seen from the following figure:

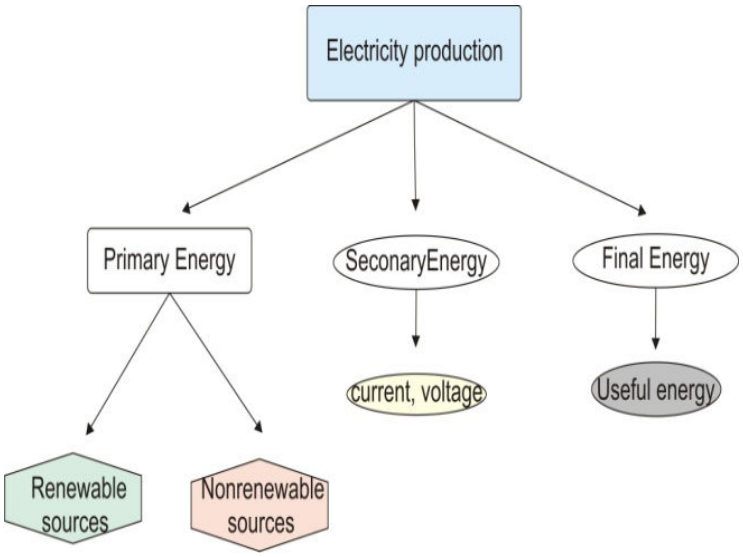

Fig 1: Energy production [5]

The above division is done in accordance with the degree of possibility for changing the energy from unusable to usable form. Natural process of lost (associated with the transferring the electrical power into thermal energy or simply loss in transport), is the main reason why the division looks like this.

Forms of energy can also be divided in terms of the sources of production. There are two main groups of sources: nonrenewable and renewable. Nonrenewable sources are: fossil fuels, coal, natural gas, uranium… Renewable sources are solar energy, wind energy, geothermal energy, water energy… Solar energy can be directly accumulated using passive or active solar systems. The use of: water free fall, moving of air masses, and gasification of biomass can also result in energy being produced Furthermore, energy can be also obtained from thermal or nuclear power plants using nonrenewable sources of energy.

Energy produced, either from renewable or nonrenewable sources, can be used as electricity of heat. Electricity is considered to be a secondary energy source because it is produced from natural sources. International Energy Agency (IEA) provides two categories of electric power: primary and secondary. Primary power is obtained directly form water, wind, etc., and secondary is obtained from nuclear fission, combustion of fuels, etc. Electricity is the most useable form of energy, and its consumption doesn't contribute to exhaustion of greenhouse gases. The usage of electricity for heating and transport is still limited to cheaper fossil fuels, but in recent years a lot of research is done in order to increase the amount of electricity used for transport (hybrid cars…) [6].

Price of electricity production varies because of the difference in environment, geopolitical situations, and primary sources. In production there are several things important for producers:

- Who decides when the particular object is meant to operate and the time interval of operation,
- The way of billing of energy at the market, which depend on a type of market,
- The price of the most expensive object operating,
- Cross-border capacity for transport and the price of energy at the foreign energy market.

The producers must be aware of both domestic and international energy prices, since all the companies for electrical power production, starting with market opening, are trading freely both at domestic and common European market. They are, together with traders and suppliers, part of the wholesale market. At Slovenian wholesale market, there are also foreign traders, and furthermore Slovenian traders are part of international energy market. The connection between traders and domestic market started in December 1996 when the directive 96/92ES was adopted. Other dates which had led

to the further opening of energy market (Slovenian) are listed below [7]:

- October, 1999: the implementation of the directive 96/92 started in Slovenia,
- June, 2000: establishment of Slovenian regulation authority in charge for energy and nature gas market,
- April, 2001: the market was opened for clients with power input above 41 kW,
- June, 2003: adoption of directive 2003/54/ES regarding common rules for internal electricity power market,
- May, 2004: implementation of the directive 2003/54/ES,
- July, 2004: market was open for all non-households clients,
- July, 2007: market was open for all clients,
- November, 2009: Enforcement of new support scheme for encouragement of energy production from renewable sources and coproduction of electricity and heat.

III. Liberalization of the Electricity Market in Slovenia

Market liberalization allows consumers to choose the supplier. It is reasonable to expect that changes would be more frequent at the markets which are opened more time, and with consumers with huge consumption. Small consumers are limited in using benefits from liberalization of market especially in countries in which the market is not completely open and free. That is why the percentage of consumers' changes of suppliers varies from 50 % (Denmark, Great Britain, Italy) to 5 % (Belgium, Portugal) [8].

Greater possibility of choices at open market would lead to the lower energy price for large consumers (industrial), and that would increase their competitiveness. On the other hand the prices of guaranteed amounts (households) will be higher. This can be considered as a subvention to huge consumers an account of households and service sector. At the following diagram the prices of electricity for last five years in Slovenia is represented.

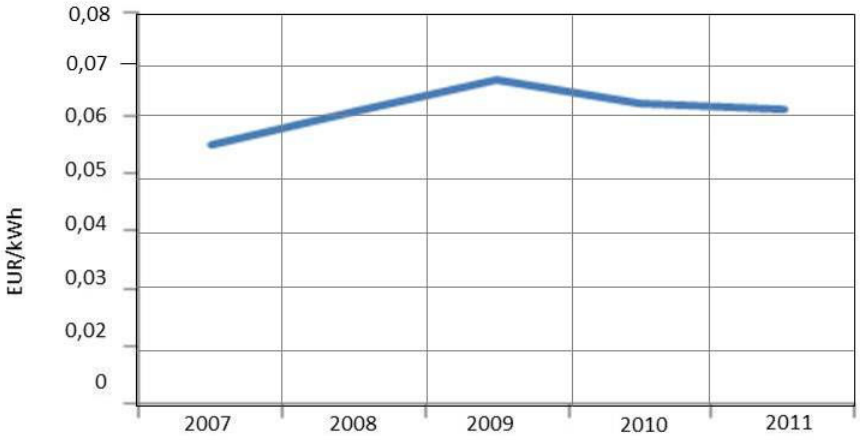

Fig. 2: Price of electricity in Slovenia for large consumers (2-20 GWh) [9]

From the diagram, it can be seen that price of electricity for great consumers is decreasing after reached maximum in 2009. Even more important, is the relative stability of electricity price. It would be very naïve to think that decrease in price is only due to the government regulation and directives. The main reason for this trend is global economy crises, which ended up with decrease in consumption of energy in Slovenia, and consequentially decrease in price.

Supply of energy (electrical energy, heat, natural gas, fossil fuels) is considered as typical market activity, for which all the laws of market are applied. The person who offers energy is supplier, and that person's role is to set the price and amount of energy together with the demander. The agreement can be established due to the short run and long run contracts, and in the case of electrical power the agreement can be established at the market directly. Producers of electricity are not only suppliers of energy, but they also offer the system service, because that is essential for transport of energy.

A. Structure of Slovenian energy market

Providers: It can be energy producer by himself, or energy trader. Both can sell electricity at the market. On the other hand both of them have limited access to the market (limited by access to distributional network), if there is a limited selection of different energy products and amount of energy. The access is also limited by cross-border exchange of energy (capacity of exchange).

Producers: The one who produces energy for their own purpose.

Qualifier Producers: The one who has above average productivity as a consequence of synergy between electricity and heat production. Qualifier producers are also those who produce energy from wastes or from renewable sources due to the regulative made by state authorities.

Suppliers: Include traders, agents or intermediaries, and producers of electricity. They have to posses suitable license issued by local authorities for energy production and trading.

There are two types of suppliers: for tariff consumers and for eligible consumers. Energy for the first type of consumers is supplied only by regional distribution companies. Those companies must take into account common rules for determination the price, and for energy distribution. Common rules are suggested by European Council and adopted by local government.

Transport of electricity: In order to increase the efficiency of transport, current should be transformed to the greater voltage, and this is done in transformers. After transformation, lines distribute energy to the segregation transformers, where the electricity is transformed to voltage useable for household or industry. Together with transformation, the distributional network form national energetic network. Parts of such networks are also power plants. National networks are connected in order to achieve stability of supply and electricity trading [10].

Distribution: Public contractor in charge of electricity distribution.

Consumers: There are two types of consumers' tariff and eligible. Eligible consumer is the one who can choose supplier. Tariff consumer is the one who cannot choose supplier, but the supplier is chosen due the tariff system (part of public service). Since in 2007 market was open for all consumers, the group of tariff consumers doesn't exist anymore [11].

The organizer of market: From 15th of April, 2001 energy trading has been a part of business of almost every company, because from that day companies have a possibility of choosing a price and a supplier of electricity. Companies, therefore, become a part of energy stock. The energy stock in Slovenia is organized by Borzen d.o.o Company. At the energy stock, like at any other stock, there is a possibility for demanders and suppliers to trade by setting the price and the amount of electricity. The organizer of market must record contract obligations between demanders and suppliers, receive offers for electricity, and control buying guaranties. It, also, has to control the price in order to balance between demand and supply, since it is obligatory to ensure that all amount of energy produced is sold at same conditions. In order to become the part of the market companies and individuals have to have suitable license. Traders (who tade fot third parts) are also the part of the market.

Regulator of market: In Slovenia the regulator of electricity market is National Agency for Energy. It has been operating since 2001, in order to obtain appropriate conditions for market liberalisation. The aim of regulators slightly differs from country to country, but basic goals are. Their aim is usually connected to establishment of proper conditions for developing competitive markets, and also controling of existing energy markets. Furthermore, one of the main goals is to provide impartiality, effective competition, in order to provide stable and accurate supply of electricity, natural gas and heat. The national agency also ensures fair tariff system, and controls the quotas for energy production of the individual producers. The scheme of structure of Slovene electricity market is represented on the following figure:

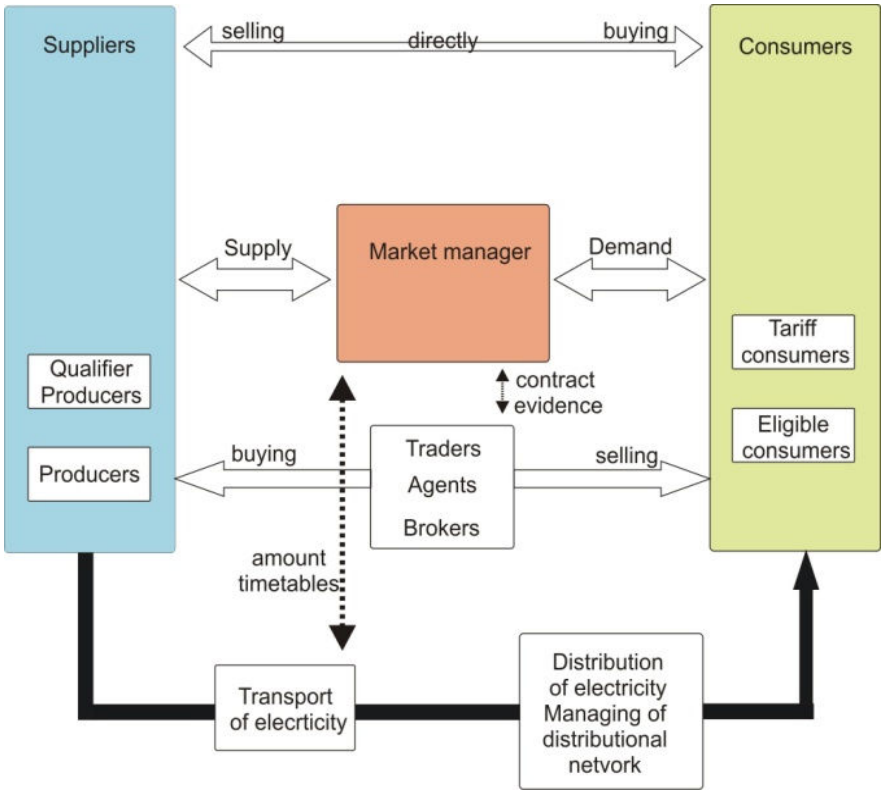

Fig. 3: Structure of the market [12]

IV. Electricity transport

Transport of electrical energy is arranged by systematic operator (full name is ''Systematic operator for distributional network''). It makes timetables, one day in advance for every single hour, and determines which object would operate with what amount of operation power. When timetables are made, it is necessary to make sure that several things are taking into account:

- priority distribution of energy from primary producers,
- order of other producers regarding to contracts,
- amount of energy produced must follow the predicted amount consumed for each time interval,
- the use of systematic services, when the prediction is possible.

There is a possibility for making the connection between distribution networks for all the producers and eligible consumes (since 2007, all consumers have been included). Technical and other conditions for enrolment to the distributional network are determined with operating instructions. The network manager can refuse access to the network for producer of consumers if there are technical or operating problems. Otherwise, members of network can access freely and without limitation. The network manager has obligatory duty to put out data for network occupancy every month, and to protect confidential information about distribution.

Distribution of energy is defined as transfer of energy over distribution network from producers to consumers. It includes operating, maintenance and developing of transport network. Distribution has all properties of monopoly, because of the network price. Therefore there is no possibility for competition in distribution of electricity (construction of network is almost always financed by the state). Because of monopolist properties distribution is not considered as market, but as regulation activity.

A. Supply of electricity

Producers supply (directly or over traders) to consumers. The supply is usually done due to the contracts between suppliers and demanders, and suppliers or delivers have to have suitable license. On the other hand consumer is a person who is, considering the contract, served by electricity for its own use, or for further selling. Household's consumer is final consumer, and the one who buys electricity for its own purpose. It includes energy consumption in flats and houses for heating, lightening, etc.

B. Cross-border trading

Cross-border includes export of electricity from Slovenia, import to the country and transit across national territory. In order to participate in cross-border trading, network user, has to ensure access to the cross-border transfer pathways. In EU the accesses are arranged and controlled by the regulation EC 1228/2003 [13].

Cross-border trading is important for Slovenia, since Slovenian electricity market connects three different regional markets with different prices of energy. These markets are: Central-Eastern Europe market (Germany, Austria, Poland, Czech Republic, Slovakia, Hungary), Italian electricity market and South-Eastern Europe energy market [5]. The prices of electricity in some countries are represented on the following diagram:

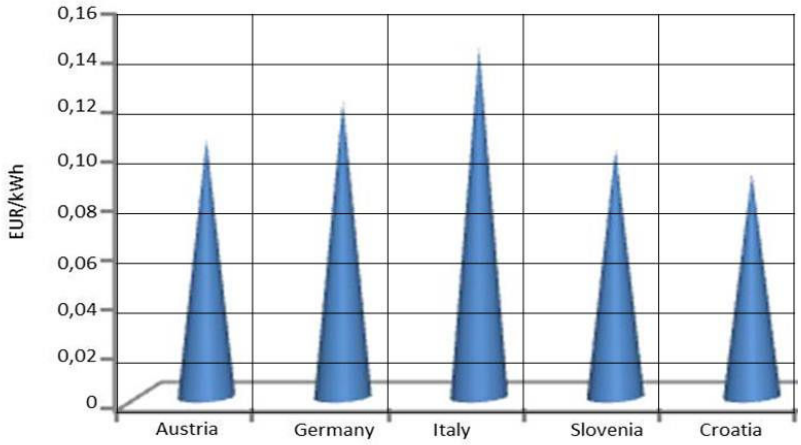

Fig. 4: Price of electricity in Slovenian region [14] for large consumers

In recent years, due to the global economy crises, the amount of energy consumed in these regions is decreasing when compared with the years before crisis. The decrease is more obvious In Eastern and South-Eastern regions, and the consequence of that is greater difference in price in comparison to the price at Italian market, where price staid relatively high. Because of the increase in capacity of cross-border network between Slovenian and common Austrian-Germany market, the difference in price between these two markets is decreased. As a consequence of above stated facts,

the Slovenian distributional network is faced with great energy flows from Croatia and Austria to Italy. The schematic representation of electricity flows between the countries can be seen from the following figure:

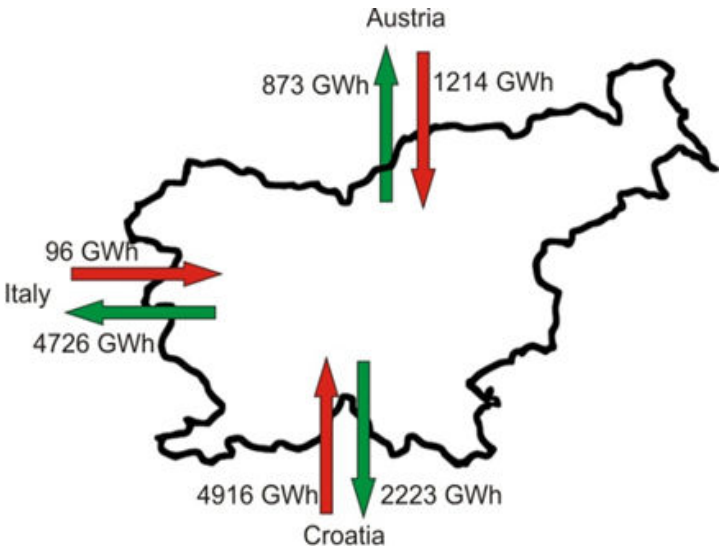

Fig. 5: Cross-border exchange of electricity [12]

The safety of the whole network is sometimes threatened by these energy flows and that problem is solved by transverse transform in RTP Divača.

As it was stated above, the difference in prices in Slovenian and Germany market decreased, and this is because the price of energy in Slovenia in 2010 followed the price of the German electricity stock EEX, which was lower than before. The decrease in price is due to the increase in capacity of cross-border network between Slovenia and Austria. Till 2010, the capacity of cross-border exchange of energy between Germany, Czech Republic, Poland and Slovakia was determined at common auctions, and between other countries with the use of the bilateral agreements. It was planned that from 2010, the auction company CAO would start to allocate the capacity of exchange for whole region, but that was postponed to 2011, because of the problems associated with decrease in accuracy of energetic systems.

During the preparation for common allocation, in December, 2010 the new way for determination of timetables for distribution was promoted. Furthermore in order to apply new way of the allocation certain changes at Slovenian and South European market (include Italy and neighboring countries) had to be made. Those changes were done due to the Directive 1228/2003, and the main goal of these changes was to control the overcrowding of network. Since April, 2011, the capacity of cross-border exchange has not been determined by bilateral agreement, but the capacity of transport has been allocated by auction company CASC. This was done for whole region and in accordance to the previously agreed conditions.

The electricity markets of Slovenia and Italy have to be merged in order to implement new way of determination of capacity. This had to be done as a consequence of the difference in price of electricity at these markets. In 2010, all needed agreements and contracts were prepared by group of both, Slovenian and Italian, regulators, systematic operators, government representatives. Two main agreements are General and Pent lateral agreement signed by systematic operatives. One of the greater challenges of the working group was financing the role of intermediaries between stocks, and the problem was associated with the great difference in price for supplied electricity. The roles of intermediaries were taken by systematic operators [5].

Similar changes were done in other region such as South-East European region. In these regions the liberalization of market started later, and because of that process of connection is still in progress. One of the main barriers to this process are political problems between countries involved in future common market.

C. *Transparency of the market*

In order to cooperate, participants of the open market must possess certain information needed for making reasonable business decision. The information usually consider status of distributional network and cross-border connections, availability of producing units.

Seven regulators form the Middle-East European market demand that this information has to be available online, because this would make the information available to all participants of the market [13].

V. Production of Energy from Renewable Sources

In recent years a lot of directives and laws were adopted in the field of production for renewable sources. The energy produced in such a way is considered as green energy, since it is environmental acceptable.

In order to increase the ratio of energy produced from these sources, and in order to regulate production a few directives and regulations were adopted by European council. With the aim to implement these directives, certain laws are adopted by Slovenian government.

The law that follows Directive 2009/28/ES is accepted, and its main goal is to encourage energy production from renewable sources by variety of subsidies provided. It differs from previous law because the new law content claims that the use of renewable sources for production of heat for district heating is obligatory.

One chapter of the same law regulates the measures for encouragement of the investments for production from renewable sources. Benefits are also provided for increasing the capacity and efficiency of existing plants. The produces which receive subsidies, must confirm (by certain documentation) that the source of energy, used in production, is renewable. Furthermore, the measures for connecting with the distributional network for these producers, are determined. These measures are due to the directive 2004/8/ES (about encouragement of the coproduction from renewable and nonrenewable sources) and in the accordance to the directive 2009/28/ES, about encouragement of use of renewable sources.

In 2011, European Council adopted the energy efficiency plan. The main goals of this plan were to increase the ratio of renewable sources to 20%, and to decrease the amount of energy consumed for 20%, by 2020. At the following diagram the ratio of energy produced from renewable sources, in EU and Slovenia, is represented:

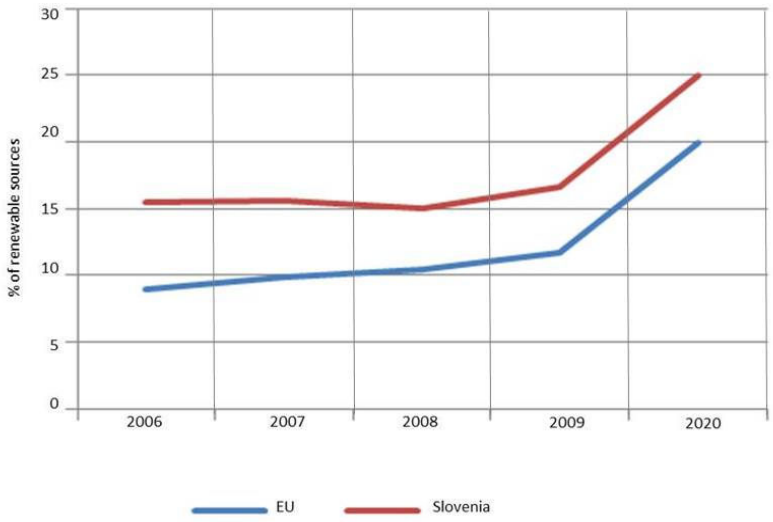

Fig. 6: Ratio of renewable sources in electricity production [15]

It is reasonable to expect directives and laws associated with this plan in future years.

VI. Conclusion

Energy sector has a great influence on the development of economy and also on quality of life [16]. On the other hand, the production of energy is associated with huge negative externalities of production, such as emission of greenhouse gases, which emerges with use of nonrenewable sources (fossil fuels, coal). Solutions of reducing negative externalities lie in planning, effective use, and usage of renewable energy sources.

The policy for increasing energy effectiveness, and consequentially decrease in amount of energy used, have an advantage, when the costs are acceptable in comparison to providing new energy sources.

One of the main goals of the European Parliament is to ensure accurate, competitive and environmentally acceptable supply of energy. Realization of this goal started in 1999, when energy market began to operate due to the common market and sustainable development principles. These principles include effective use of energy, use of renewable sources for energy production and protection of the environment. The goal is achieved through common European energy policy. Slovenian energy policy is coordinated with European policy by set of laws and directives adopted by national parliament.

Furthermore, one of the goals of the policy is low-carbon energetic industry. That goal should be achieved, together with competitiveness and reliability of the market, with change in energy use habits.

Development of electricity market, and provision of transparent and effective market, would have great influence on competitiveness, accuracy, and stability of supply in the long run. The connection between the markets is predicted (Slovenian with neighboring countries). Furthermore, the provision of fair market, increase in liquidity of stocks, and enforcement of action for customer's protection is expectable.

The main aim of policy is to increase the ratio of energy produced from renewable sources (energy efficiency plan). That includes energy gained from hydropower, geothermal power, etc. Since the efficiency plan was adopted a few years

ago, there is a lot of implementation to be done in Slovenia in future years. Implementation includes efficient use of energy, usage of renewable sources and development of suitable distributional network (both national and cross-border).

It is reasonable to expect an increase in integration of energy from production facilities, and more active cooperation between participants of the market. All these things should be done with the following goal: producing the effective use of energy.

In order to provide accurate supply of energy, it is essential to provide basic infrastructure, and to upgrade it with new technologies.

At the very end, the most important thing, for this plan to be realized, is a sufficient level of investments. This should be ensured by the government.

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