premiums is meant during the entire term of the insurance contract, and in case of non-payment of premiums within a certain period of time, it means that the insurance contract is interrupted. As a result, such an important branch of insurance as life insurance remains unclaimed.

Thus, in order to develop the investment activities of insurance organizations towards the formation of an investment portfolio, firstly, it is necessary to create a suitable situation in the financial market, provide the market with a large number of various financial instruments and ensure the "transparency" of the securities market. Regarding the insurance organizations themselves, there is a development of the life insurance industry, since this will attract long-term resources, transformed in the future into long-term investments in securities; it is necessary to increase the investment potential of insurance organizations and increase its effective use. With the development of the insurance business, the presence of a well-developed infrastructure of state regulation of the insurance market is becoming increasingly important, on the basis of which, the powers of such participants in the insurance market as surveyors, underwriters, emergency commissioners, etc. are required by law. The development of these market participants is due to the need to make an accurate assessment of the insured risks and the amount of harm caused during the occurrence of the insured event. A significant stage in the development of the insurance sector will be the further improvement of the guarantee institutions' activities bringing it in line with international experience. In order to ensure the safety and multiplication of the guarantee reserve amounts, it is necessary to expand the list of financial instruments allowed for their investment.

In the nearest future, the situation in the insurance market of Kazakhstan will probably not improve. Insurance companies will be in a difficult financial situation and without stabilization of the entire economic system, the situation in the insurance market of Kazakhstan will not change for the better.

3.2. CAPACITY REMUNERATION MECHANISM (CRM) IN RESPONSE TO MARKET CONDITIONS FOR ELECTRICITY PRODUCTION IN A SMALL OPEN ECONOMY[4]

Introduction

The electricity market is specific. Because it is inherently unstable in the long run, a special form of its regulation has been developed, in effect throughout the world. According to this regulation, the electricity market operators use special instruments to prevent a cyclical shortage of electricity. One of these instruments, Capacity Remuneration Mechanism (CRM), is presented in this research. Here, a theoretical introduction is followed by a presentation of the potential losses to a small open economy in the case of a blackout. Then an analysis is given of the electricity prices in two chosen EU countries (Germany and Slovenia) with clear signs of deep

[4] *The authors acknowledge the financial support from the Slovenian Research Agency (research core funding No. P5-0287)*

instability in the market. Our research ends with the CRM description in its different forms, as established around the world.

General economic framework associated with blackout emergence

Sudden and unexpected interruption of electricity supply (a "blackout") is a typical and ever present possibility once electric power has been implemented as a fundamental part of the modern infrastructure. Attributing electricity supply interruptions during the period of early electrification to the typical problems of new technologies early in their development and standardization, plus unpredictable electricity supply interruptions resulting from individual extreme weather events, war and sabotage, then with regard to the more mature stages of development of electric power systems major interruptions in the supply of electricity have appeared for two reasons:

(1) In the industrialization period based on the development of the steel industry, and later on the widespread use of petroleum products, electricity consumption was rising rapidly in both industry and transport, as well as in households. The electricity system (production, transport and distribution) often failed to follow the growth of demand. An unstable supply of electricity was a common "bottleneck" to faster overall economic development. This was the period when the state took over the role of organizer and direct investor in the power industry. The energy industry's development then assumed the nature of infrastructure, and in such context reserve capacities were also provided.

(2) During the economic development period based on flexible information and communications technologies (after the oil shocks of 1973 and 1979 (Freeman and Perez, 1988)) a whole range of infrastructure activities came under management according to market basics. Electricity providers became sovereign entities (normal companies), and the supply and demand of electricity started to be balanced on the market (Pompei, 2013). This transition in electric power supply improved management and efficiency for the industry (Fiorio & Florio, 2011), but had some strong negative side effects (Erdoglu, 2011). One and most painful is the modern type of blackout. It is the result of a mismatch in supply and demand in the long run and requires the active role of a market regulator.

The possibility of a blackout increases considerably from cross-border electric power trade. It proceeds on unrealistic expectations that some national economies are able over the long run and in any conditions to receive a sufficient, stable supply of imported electricity. The real consequence is vulnerability of such an electric power system to supply shocks due to a lack of reserve electricity production capacities.

The modern electricity market is unstable in the long term. This instability can be seen in the occasional blackouts in the most developed parts of the world. In economic theory there are two main reasons for the inherent instability of the electricity market. The first is in rigid electricity demand: in the short term electric power generally cannot be replaced by other goods (electricity has poor substitutes), it cannot be stored (or it can be stored only in limited amounts with high costs and for a short period), and its utilization cannot be shifted by a certain length of time (again, only in exceptional cases). Essentially, consumers need electricity of appropriate quality (stable voltage) at all times and at any time. A lack of supply of this energy imposes high costs on the area affected by an electric power shortage (blackout). Another cause of the inherent instability of the electricity market is the limited ability of the supply to adjust to substantial increases in demand. In this case, new electric power producing capabilities are needed that minimize the time lag to fulfill demand.

In the short term, the electricity market's rigid supply (when production capacities are near full output) adjusts to the even more rigid demand. Supply adjustment processes to match increased demand need a certain time to come online, and this time lag creates the circumstances described by the Cobweb theorem (Kaldor, 1934). This theorem explains the balancing of the market, when supply adjusts to the demand, but with a time lag.

Electric power producers can respond to the price in the present (increase the supply if prices are high) only after a relatively long period of time (when they are already working at full capacity, such adaptation takes a few years). When electricity supply and demand meet each other in accordance with the Cobweb theorem, the long term market is balanced, if the elasticity of demand is greater than the elasticity of supply. In the case that the demand is more rigid than the supply, the market cannot be balanced in the long term: the quantities and prices oscillate progressively. From time to time a great imbalance arises between supply and demand in the market. In the case of the electricity market these imbalances are manifest as blackouts.

The cost of electricity shortage for Slovenia

A stable supply of electricity is essential for the normal functioning of a modern national economy and it is essential to maintain a normal living standard. Any disruption of this delivery causes higher costs on devices, downtimes, a reduction in value added and a reduction of alternate goods' utility, as well as longer-term change in the behavior of participants in the electricity market, i.e. a change of investment flows, suspension of business relations, higher prices and the like (Hamhaber, 2015).

The average economic damage caused by one kWh loss of electricity supply is calculated with a special indicator: Value of Lost Load (VoLL). Usually it is calculated by a combination of the so-called proxy method (calculation of costs tied to the security of electricity supply, e.g. lost value added – in this way, the results are obtained for businesses and other institutions) and the so-called contingent method (with a survey on a representative sample of households to assess how much consumers of electricity would be willing to pay to avoid a failure of the supply of this good – Willingness to Pay, or WTP).

An alternative method is the so-called market assessment based on observation of consumer choices, but this method is rarely used in practice. The calculation of VoLL is standardized and already defined by Directive 2008/114/EC. VoLL is estimated for a shorter 4-hour and a longer 48-hour blackout.

An internationally comparable assessment based on a comprehensive review of literature presenting the VoLL estimation for different countries all over the world, was carried out by Van der Welle and Van der Zwaan (2007)[5]. They assessed a 90% interval of VoLL for developed countries at 5-25 USD/kWh (4.4-22.1 EUR/kWH) and a VoLL for developing countries at 2-5 USD/kWh (or 1.8-4.4 EUR/kWh). It should be noted that the majority of the authors' estimates lie closer to the lower limit of the interval. The assessment is therefore asymmetrical. The Van der Welle-Van der Zwaan study reveals that with higher development of the national economy VoLL grows.

Slovenia is a country with GDP per capita of more than 19 thousand EUR, with stable average growth of 2.7% in real terms since 2014, with manufacturing accounting for 28% of value added, with less than 1% annual inflation and a current account surplus reaching 5% of GDP in 2015 (Bank of Slovenia, 2016). The country is vitally dependent on a safe and efficient electric power supply. Nominally, Slovenia produces enough electric power for its needs. The current (data for 2015) structure of electricity net output stands at 38% from a nuclear power plant, 32% from coal based thermal power plants, 28% from hydroelectric power plants and 2% from solar power plants (Statistical Office of Republic of Slovenia, 2016). Considering that the Slovenian nuclear power plant exports half of the produced electricity to Croatia and the accordingly divided ownership of the plant, 11% of Slovenian electricity consumption then depends on imported electric energy. Long term projections (Košnjek et al, 2015, p. 53) predict a 7% to 13% increase of electricity consumption from 2015 to 2025 and a 43% to 80% increase in consumption from 2025 to 2050. Taking into account that two older coal power plants are set for decommissioning by 2025 and that there remains the possibility of gaining some new sources of renewable energy from hydroelectric power plants on the rivers Sava and Mura, Slovenia in next decade would still need to proceed with the investment in a new nuclear power plant (1000 MW), as well as in a new natural gas power station (550 MW) and pumping station (400 MW). The alternative to a new nuclear power plant is more new natural gas power stations (Košnjek et al, 2015, p. 60-82). Signals on the regional electric power market (Slovenia with its neighboring countries) put the realization of this investment at serious risk, and given the management structure, these signals also undermine the normal operation of existing power plants.

Given that Slovenia is in the catching up stage of development, for the long term projection of a possible blackout in Slovenia, it was decided to use the cost category

[5] *In the literature we can see several VoLL calculations for different countries. Reich et al (2013) estimated the VoLL for Austria and broke it across sectors and industries. Their results vary across sectors: in the case of a 48-hour blackout the VoLL is on the interval of 1.0 EUR/kWh (for mining) to 31.1 EUR/kWh (for construction), and in the case of a 4-hour blackout the VoLL lies between 1.9 EUR/kWh and 73.7 EUR/kWh. Caves et al (1990), in their review article estimated that for the service sector VoLL varies from 6.00 EUR/kWh to 25.99 EUR/kWh and for industry from 1.52 EUR/kWh to 26.86 EUR/kWh. Sullivan (1996), on the basis of the survey results for a large blackout in the United States, estimated VoLL at USD/kWh 62.52 for all businesses and 10.37 USD/kWh for industrial enterprises. A comparison of the results of several authors shows that for industrial enterprises VoLL lies in the interval from 10.93 USD/kWh to 97.49 USD/kWh, while for trading companies it lies between 13.88 USD/kWh and 28.28 USD/kWh. Yoshida & Matsuhashi (2013) using the survey calculated that VoLL in Japan is 672 Yen/kWh or 5.17 EUR/kWh (at the rate of 1 EUR = 130 Yen). De Nooij et al (2007) estimated VoLL for the Netherlands at 6.94 EUR/kWh*

that Van der Welle and Van der Zwaan estimated for the developed countries[6]. The assessment can be given in ranges. According to the optimistic scenario, the loss per kWh is equal to the lower limit of the mentioned studies; according to the pessimistic scenario, this loss equals the upper limit of Van der Welle-Van der Zwaan estimations for the developed countries. Like Reich et al (2013) did for Austria, we have taken into account Slovenian data from summer (July 10, 2014, from 12:00-16:00) for the short 4-hour blackout and data from winter (January 10, 2014) for the longer 48-hour blackout, obtained from ELES (2016). In our estimations, we account for the size of blackout in accordance with the actual consumption of electricity in Slovenia on the selected days in 2014. In the long term this loss will be greater, as the volume of electric power consumption tends to increase with time. Our estimations of VoLL for Slovenia are shown in *Table 3.2.1*. Here we see that the total loss from the shorter 4-hour blackout will be 0.1% of annual GDP in the optimistic scenario and 0.4% of annual GDP the pessimistic scenario. For the longer, 48-hour blackout, however, the Slovenian macroeconomic loss varies from 0.9% of annual GDP to 4.3% of annual GDP.

Table 3.2.1

Blackout costs for Slovenia

Indicator	Short interruption (4 hours)	Longer interruption (48 hours)
	Optimistic scenario	
VoLL	5 USD/kWh	= 4.43 EUR/kWh
Average loss per hour of interruption (M EUR)	6.97	6.68
Amount of missing electricity (MWh)	6,300	72,426
Total loss due to the failure of electricity supply (% of annual GDP)	0.1	0.9
	Pessimistic scenario	
VoLL	25 USD/kWh	= 22.13 EUR/kWh
Average loss per hour of interruption (M EUR)	34.85	33.39
Amount of missing electricity (MWh)	6,300	72,426
Total loss due to the failure of electricity supply (% of annual GDP)	0.4	4.3

Source: calculated by authors

In the case, where domestic producers of electricity fail, resulting in the closure (decommissioning) of its power plants, Slovenia will become a highly energy-dependent country. Having in mind that stable supply of electric power is a Member State's responsibility in European institutional framework, the result of Slovenian energy dependence is going to be occasional shortages of electricity supply in the country. Slovenian electric power system operator has a lot of measures to assure the market adequacy, but they are all more or less dependent on: (1) possibility to call to the work now still existing power plants; (2) probable possibility to enlarge electric power imports and (3) starting to implement the prepared plan of disconnecting certain electricity consumers. Of course, these are all very short time measures. When EU

[6] *Taking into account the exchange rate 1 EUR = 1.1299 USD (ECB on June 19, 2015, obtained from Bank of Slovenia (2015))*

Member States (especially Germany), end or significantly reduce subsidies to the electricity production from renewable energy sources, it will suddenly be clear that there is not enough capacity for electric power production in the EU. It will cause major electricity price increases – a kind of energy shock. The electric power supply will be unable to follow the demand, and blackouts will follow. If from 2008 to 2015 the EU experienced the emergence of so-called banking nationalism (each country managed its own banking system), in the coming years it can be faced similarly with energy nationalism. Intermittent disconnections and interruptions of electricity supply will be the most common and long lasting in countries that will have insufficient electricity production capacities.

Electricity prices as a result of state aid for renewable energy sources

In this section we analyze the electricity price in Slovenia and Germany (also wholesale prices in Austria) from 2011 to 2014, when different state aid schemes significantly distorted the electric power market. Viz. in 2011 an extensive subsidization of electricity production from renewable energy sources was introduced (particularly wind power installations in Germany (Sattich, 2016), whereas Slovenia focused on subsidization of solar power plants (Borzen, 2016)).

For Slovenia, we based our analysis on data from auction trading in the preceding day (BSP South Pool, also signed as SI), and for Germany we took into account the data on the electricity price on the stock market EEX (European Energy Exchange). Here, with regard to electric power wholesale prices in Germany (and Austria), the most appropriate index is the PHELIX (Physical Electricity Index), recorded as a daily average electricity price in trading on the EEX spot market. It also represents a reference wholesale price for electricity in Germany, Austria and much of Central Europe. For the purposes of our analysis, daily prices were converted into monthly or semi-annual averages (*Figure 3.2.1*).

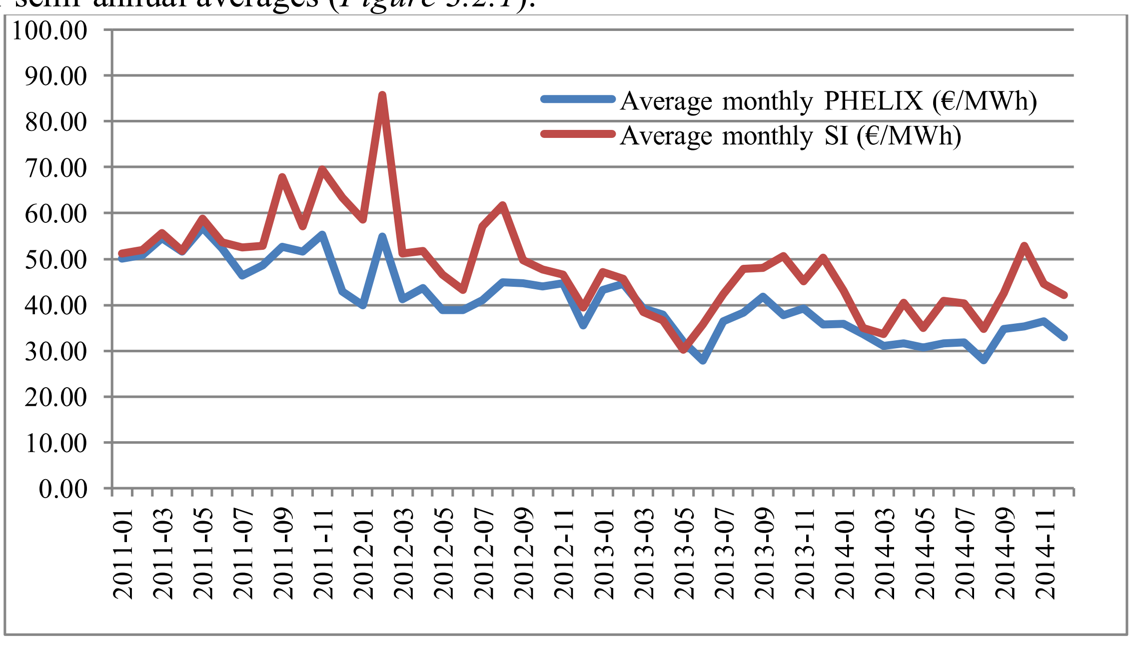

Figure 3.2.1: Average monthly electric power price on BSP and PHELIX (€/MWh)

Source: summarized by authors

In *Figure 3.2.1* we see that in almost all observed periods, except March 2013-May 2013, the stock market electricity prices in Slovenia (BSP or SI) exceeded the prices on PHELIX. The greatest difference was during the winter of 2011-2012, when Slovenian prices in particular months exceeded the comparable PHELIX price level by as much as 50% (the extreme was in February, 2012, with an excess of 56%). In this case, there was a temporary and limited energy crisis in Slovenia connected with the country's inability to purchase enough electric power on the European wholesale electricity market. When Slovenia was in trouble, its electricity prices were about 50% higher than the market average shown by PHELIX. A similar extreme case of excess pricing (+50%) of Slovenian electric power wholesale prices over the comparable prices on PHELIX also occurred in October, 2014. In *Figure 3.2.1* we can see a decline in wholesale prices on the German/Austrian market (PHELIX), as well as on the Slovenian (BSP) electricity market. On the Slovenian market, these prices fluctuate considerably more than on the German/Austrian market.

Data on electricity prices for final consumers in EU Member States are published on a semi-annual level in Eurostat statistics (Eurostat, 2016). *Figure 3.2.2* presents four types of electric power pricing over the period from the first half of 2011 to the second half of 2014: prices for final consumers that annually use between 2500 kWh and 5000 kWh electric power (with all taxes and charges) in Slovenia and Germany, and wholesale prices of electricity on the BSP and PHELIX.

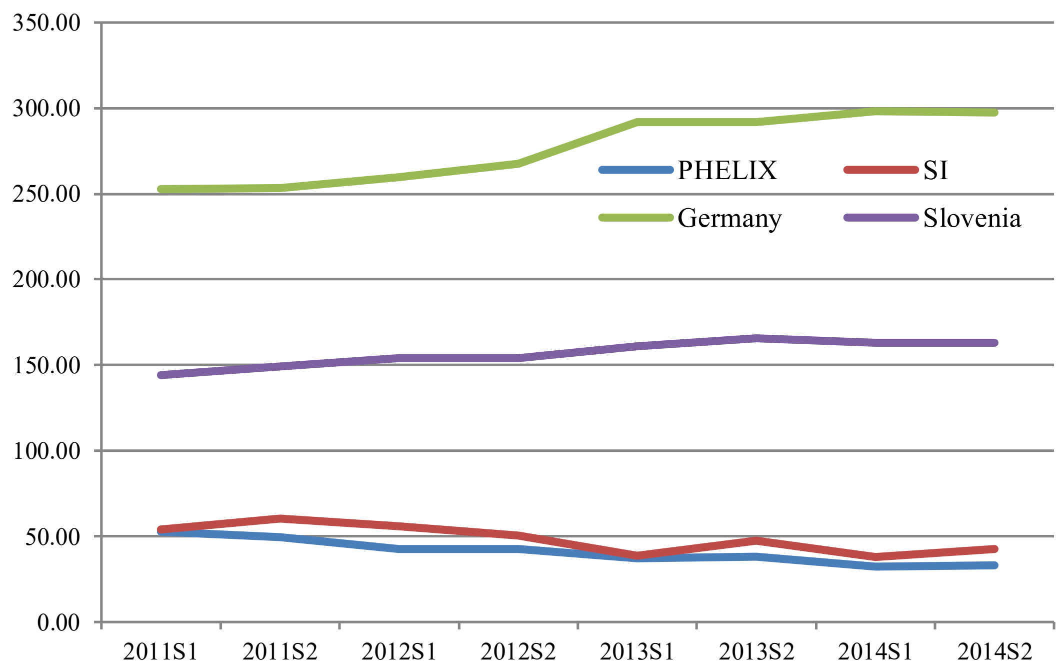

Figure 3.2.2: Semi-annual average electricity prices for end users with consumption between 2500 kWh and 5000 kWh including all taxes and charges in Germany and Slovenia; semi-annual prices PHELIX and BSP from the first half of 2011 up to the second half of 2014 (€/MWh)

Source: summarized by authors

Figure 3.2.2 shows the great difference between the level and variability in the price of electricity on the wholesale market in comparison to the electric power prices for the final consumer. At the lowest level are the prices on PHELIX, with slightly higher prices on BSP; however, the price for the end user in Slovenia is on average (throughout the period) 3.2 times the price on BSP, while the same comparison for the end user in Germany shows 6.7 times as high prices for the end user as the prices on the PHELIX. Accounting for the difference between the wholesale and retail prices includes raised funds for subsidies in the German and Slovenian power industries. In *Figure 3.2.2*, the decline in prices on both stock exchanges (EEX and BSP) can be observed while the electricity prices for the end users in Slovenia and Germany rose throughout the period. Estimations of correlation coefficients between different variables[7] are shown below:

- Measured semi-annually, Slovenian wholesale electricity prices on BSP stock market are strongly connected to PHELIX (correlation coefficient is 0.848). Average monthly prices between the two energy exchanges are also strong and positive (correlation coefficient is 0.782).
- Semi-annual electric power prices for the end users in Germany and Slovenia are also in very strongly agreement (correlation coefficient is 0.941).
- Comparing the semi-annual electricity prices in a particular stock market and those for end users in a given country shows a strong but (surprisingly) negative relations (correlation coefficient of PHELIX and electricity prices for German end users is -0.94, and correlation coefficient of the prices on BSP and electric power prices for Slovenian end users is -0.77).

The amount of state aid and intervention in the energy sector that have caused the situation are shown in the data from German Transmission System Operators (TSO) (Netztransparenz.de, 2016) and the data from the Slovenian power market operator Borzen (2016).

In 2014, German consumers of electricity made it possible for the German producers of renewable energy sources to receive 21.5 billion EUR in subsidies (state aid). Similarly, in the same year, electric power end users in Slovenia contributed to subsidizing producers of renewable energy (including cogeneration) with up to 131 million EUR. German subsidies for renewable sources accounted for 0.7% of GDP, while subsidies to renewable energy sources and cogeneration in Slovenia represented 0.4% of its GDP.

Increasing electricity prices for the end users with concurrent drops in these prices on the wholesale market fails to give a clear account or proper information about the relative scarcity of electric power.

The effect is in fact the opposite: Providers (power producers) receive market information that the EU has abundant electricity with expectations this will continue into the future. Consumers are expected to adapt to the rising electricity prices by reducing their use of electric power, but those savings cannot be sufficient to prevent new fundamental instability in this specific and very important market. The demand for electricity is rigid, so any consumer adjustment to the higher prices will be

[7] *In all presented correlation coefficients t-statistic exceeds the critical value at the rate of 0.05 confidence. The results are statistically significant*

relatively small. But we can expect on the other side that electric power producers will significantly reduce their production capacities. Here, they will follow different patterns of behavior. Some will go bankrupt and their power stations will be decommissioned; others will be taken over by their competitors, reducing their production capacities, again partly ending in decommission; a third group will shift their production orientation to other industry, perhaps using state aid to decommission their uncompetitive power plants.

It is important that potential electric power producers are going to be completely destimulated for the investment in new power plants (missing money problem) with increased market imbalances in the coming years. In order to avoid such complication in coming years, EU Member States already introduced a special mechanism of incentives to traditional electricity producers.

CRM instrument and its application

Capacity market fundamentals are explained by Cramton, Ockenfels & Stoft (2013). The need for a capacity market stems from several market failures; one particularly notorious problem of electricity markets is low demand flexibility (ibid, 2013). Authors describe the economics behind the adequacy problem and address several challenges in designing the capacity markets. The paper builds on earlier work of Cramton & Stoft (2005, 2006, 2008). Cramton & Ockenfels (2012) point out limited demand response that makes market clearing problematic in times of scarcity and discuss the suitability of the market for Europe and Germany in particular.

Battle & Perez-Arriaga (2007) review the main criteria for implementing a capacity mechanism in deregulated electricity markets. According to these authors, general objectives of capacity mechanisms are to enhance firmness (increasing the availability of installed units in critical periods) and/or adequacy (encouraging new investments in generation). Ohren (2000) discusses alternative approaches that have been adopted around the world for guaranteeing the appropriate level of investment in electric generation capacity. "Capacity payments" is argued to be a less desirable approach that could under circumstances undermine the long-term efficiency objectives of the electric industry restructuring.

Due to the inherent instability of the electricity market, a specific mode of its regulation emerged. Subjects that want to appear on the market as electricity providers are obliged to finance enough reserve electricity generation capacity to prevent the market from potential blackouts (Fabjan, 2007). This specific form of regulation (in fact a kind of insurance) acquired the name Capacity Remuneration Mechanism – CRM. Such regulations differ around the world, but what they have in common is a necessity to be applied following the liberalization and deregulation of the electric power market. Furthermore, it is evident that interconnection between neighboring electric power transmission systems doesn't prevent given economy from blackouts, if there is a long-term instability (shortage of supply) on its electric power market[8].

[8] *See, the case of California blackout in 2001 (Weare, 2003) or Italian blackout in 2003 (Johnson, 2007)*

CRM has existed as a special form of electricity market regulation long enough that researchers of the electricity market have managed to establish a typology,[9] in which they classify different CRM types according to similar characteristics (however, there is still no common CRM typology). The combination of approaches variety gives the following classifications:

- *Energy-only market* means self-regulation of the electric power market that operates without CRM. It assumes very high electricity prices, when there is scarcity of this good. This high level of electric power prices enables the producers with high marginal costs to operate profitably over their lifetime. The losses in times of low electricity prices are more than compensated with the profits in times of high electric power prices. Introduction of smart meters will increase the electricity demand elasticity and decrease the tendency of the electric power market to function in accordance with the Cobweb theorem. This will make more sense for market self-regulation. An Energy-only market reduces the possibility of overcapacity or stranded investments in electric power production. Nevertheless, nowadays this type of market self-regulation opens the probability of large social costs in a period of electric power shortage. Sooner or later, during cyclical peaks in prices with low levels of supply, self-regulation of the electricity market becomes unacceptable.
- *Decentralized capacity market – capacity obligations* – is a type of electric power market regulation that ensures long-term stability by establishing a market for tradable capacity certificates. Electricity producers with available capacities are selling these certificates, which are supposed to be bought by other electric power producers, traders, large customers and even electric power system operators. In doing this they are provided with sufficient electricity supply capacity to meet the needs of their customers or to cover their own demand in all cases. When sold reserve capacities for electricity production are not available, a specially designed sanctions regime follows.
- A *Centralized capacity market* operates through the auctions, where a special centralized body at the level of a given national economy leases production, accumulation or the ability to make demand adjustments in exchange for a fixed fee (price for megawatt of installed power) to ensure a long-term stable supply of electricity. Individual producers of electricity may offer such capacities (calculated in EUR/MW) as available reserves while utilizing the second part of their capacities to provide electric power to the market (calculated in EUR/MWh). In this way, they can stay in the market and even build new capacities. If the provider fails to comply with obligations, it is subject to sanctions. The cost of the auction shall be distributed among the electric power consumers proportional to their consumption.
- *Full payment auctions with no energy price risk* represent auctions with ex-ante formed prices for reserve electric power producing capacities, so that the provider of capacity does not bear the risk of prices in the electricity market. The arrangement

[9] *Adapted from: EURELECTRIC: RES issue manager, Draft 26/03/2014; ACER, Capacity Remuneration Mechanisms and the Internal Market for Electricity, July, 30, 2013; and the EUROPEAN COMMISSION, Commission Staff Working Document, Generation Adequacy in the Internal electricity market – Guidance on Public Interventions, Accompanying the document: Delivering the Internal Electricity Market and Making the Most of Public Intervention, Brussels, November, 05, 2013*

is similar to options trading in the financial market. This type of CRM influences a lower cost of capital in the construction of new electric power producing capacities.

- *Strategic reserve* represents the type of electricity market regulation, where an independent body (the power market operator, transmission system operator, etc.) defines the amount of production capacity needed in the network to operate reliably. These capacities are bought in advance. At the same time, this independent body also determines the level of electric power prices, when reserve capacities are supposed to produce electricity.

- *Capacity payments* are carried out by an independent authority (market regulator or operator), such that different producers or large consumers of electrical energy effectively hire a certain production capacity (or issue a commitment to reduce consumption). It is more flexible way to provide the necessary capacity as a "strategic reserve" method, where an independent authority reserves an entire power plant.

Resources for CRM financing are collected by an independent authority (the power market operator or transmission system operator) in different ways. These costs can be transferred to the end user directly over the prices for the use of the electricity grid; they can be covered by ex-ante compulsory payments of electric power wholesale market participants and then passed on to end users (if the electricity provider has a monopolistic position that allows to set a price with markup). It is possible, however, that such costs would be covered by the profits reduction from the electric power wholesale market participants (electricity producers and merchants on the supply or demand side), presupposing that the structure of the electricity market does not allow monopolistic practices. There is also an alternative approach: in a time of high electric power prices the regulators of one part of the revenues generated at this price across various levels of the supply chain (viz. wholesale) can create a reserve for times of abnormal conditions in the market. They can create a kind of "insurance reservation" for a period of opposite short-term market conditions. In this way, subjects on both sides would not suffer pricing shocks or complications in supply continuity even if the market signals lead to closing certain electric power producing capacities that were created over long periods. Of course, there is the question about adequate size of capacities used under CRM regime. To avoid overcapacities or the lack of supply in electricity producing sector, there is a need for system operator's analysis based in particular on eliminating the missing money problem to provide stimulation of sufficient investment in new power plants for replacement of old ones and for covering expected enlarged electricity demand in future. Obviously, the optimal use of specific CRM type depends on the market development of a given national economy. If there are institutional, historical and cultural foundations for the efficient functioning of the market and the resource optimization used, then decentralized capacity market (capacity obligations) fulfills conditions for the cheapest provision type of a long-term stable electricity supply. On the other side of the scope is strategic reserve CRM type with strong role of central body (most likely the transmission system operator). In view of the market economy development in Slovenia, it is the best to introduce CRM in the form of a centralized capacity market. On the market with only a few participants, this is going to prevent potential disturbances in balancing supply and demand of capacities for electric power production, as well as higher CRM price deviations and possible missed incentive for investments that are going to lead to overcapacity.

CRM was introduced in different countries all over the world with a shorter or greater time lags, but always together with the deregulation of the electricity market. Chile introduced it in 1982, the United Kingdom in 1990, Belgium, Denmark, France and Germany have been in the implementation stage in last two years. In addition to the inherent instability of the electricity market and the specific nature of electricity CRM, introduction in abovementioned countries is affected by the fluctuation of quantities and prices on the electric power market due to the mass subsidization of electricity generation from renewable sources. Characteristics of this situation are an electricity price reduction in the wholesale market and an expected price jump together with decreased supply when the subsidies cease, or are at least substantially lessened. CRM was introduced in the form of strategic reserves in Finland, Norway, Sweden and Russia, in the form of capacity payments in Chile, Argentina, the United Kingdom (now transforms), Spain, Portugal, Ireland, Greece and Italy, while in the form of a centralized or decentralized capacity market a stable supply of electricity is provided in the northeastern part of the US, New York, California, in Colombia and Brazil.

In theory, the need for CRM in a given national economy is considered to be small or non-existent, where there are already high electricity prices at the wholesale stage, where producers of these goods at market prices cover their costs and can maintain a reserve capacity, where there are no CO_2 quotas or charges, where the electricity system in the national economy is strongly interconnected with neighboring electric power systems and where electricity production is based mainly on hydroelectric power. Slovenia meets none of these conditions.

Long-standing use of CRM in the EU Member States, which liberalized and deregulated their electricity market before Slovenia has yielded a well-crafted legal basis for the CRM introduction in any of the EU Member States. At the European Union level, CRM acts as an instrument for the stability of a single European market. It means that CRM has already been politically selected in the EU as a long-term hedging instrument to ensure safety of electric power supply in Member States. If European Commission (and Agency for the Cooperation of Energy Regulators (ACER)) would prefer the only market solution for keeping long term equilibrium on electric power market, they will have to assure common legislative basis in this direction for all Member States without exceptions. At the current European institutional framework, CRM serves as a support for the effectiveness of this market to the degree that this fact is recognized in the legal framework of the European Union[10]. To implement

[10] *Directive 2005/89/EU (Electricity Security of Supply Directive) determines the Member State responsibility to assure sufficient capacity in its electricity market*

Article 8 of Directive 2009/72/EU (Electricity Directive) imposes on the Member States special procedures to ensure the reliability of the electric power supply

Article 3 of Directive 2009/72/EU imposes on the Member States to provide reliable, clearly defined, transparent and non-discriminatory process of ensuring a reliable electricity supply, as well as the ability to control this process. It also stipulates that measures to ensure security of supply in electricity should give such notification to the Commission better this legal framework, the European Commission has issued a recommendation of how to use CRM in the Member States[11] and written guidelines with procedures for CRM implementation. First of all, a Member State must clearly define the potential lack of production capacity (capacity gap) and the expected loss on the probable failure of the electricity supply (VoLL); then a Member State must take into account the functioning of the single European electricity market, objectives of the EU climate policy, interaction with neighboring Member States, the influencing possibility the balance of the electricity market through the control of spending and the views of stakeholders at this market. The legal framework emphasizes the importance of such relevant information. Furthermore, CRM cost must be distributed to the electricity consumers without discrimination. The Commission specifically addressed possible CRM implementation beyond the borders of Member States. Doing so, it stresses the avoidance of discrimination, the need to lease reserve production capacities together with the right to transfer energy (interconnection rights) and the need to build additional capacity in the electric power cross-border transmission. The Commission requires cooperation between neighboring Member States at an early stage of CRM planning. In the implementation of the European legal framework Slovenia established a legal basis for CRM introduction as a centralized capacity market[12].

Conclusions

1. Due to the inherent instability of the electricity market, a specific mode of regulation has been established for this market – Capacity Remuneration Mechanism (CRM), where electricity providers agree to coordinate some sort of insurance to ensure sufficient electric power producing capacity and to prevent blackouts from arising in the long term.
2. Among the EU Member States in addition to the inherent instability of the electricity market further fluctuations result from massively subsidizing the electricity production from renewable energy sources, reduction in wholesale electricity prices, as well as an expected jump in these prices, when the subsidies cease or at least substantially decrease. This presents a typical market distortion.
3. From 2011 on, there is a strong and statistically significant negative relations between the wholesale electric power prices and the electricity prices for the final consumer. The correlation coefficient is -0.94 for Germany and -0.77 for Slovenia. If this persists, the electricity market will sooner or later fall into deep unbalance.
4. Resources for the CRM financing can be transferred to the end users of electric power directly through the prices for using the electricity grid or alternatively by the compulsory payments from the electric power wholesale market participants. A well-functioning market can enable final electricity consumers to avoid building in costs for maintaining a stable electric power supply.

[11] *Commission Staff Working Document, Generation Adequacy in the Internal Electricity Market – Guidance on Public Interventions, related to the document: Delivering the Internal Electricity Market and Making the Most of Public Intervention (Brussels, November, 05, 2013)*
[12] *Energy Law (EZ-1), O.p. RS 17/2014, March, 07, 2014*