ГОДИШНИК НА МИННО-ГЕОЛОЖКИЯ УНИВЕРСИТЕТ "СВ. ИВАН РИЛСКИ", Том 59, Св. IV, Хуманитарни и стопански науки, 2016
ANNUAL OF THE UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKI", Vol. 59, Part IV, Humanitarian sciences and Economics, 2016

ENERGY SECURITY RISK IN THE REPUBLIC OF SERBIA AND BULGARIA: A COMPARATIVE STUDY

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ABSTRACT: Due to inability to provide sufficient amount of energy sources, the problem of energy security risk occurs. Oil and gas demands in both Serbia and Bulgaria are mostly fulfilled by means of import, which leeds to significant energy dependence, whereas coal demands are covered by domestic production. Energy dependence is the most important indicator used in evaluation of a country's energy security risk. In this work, using international index of energy security risk of Serbia and Bulgaria, we are indicating the dimensions of energy dependence in cases of oil, gas and coal, as primary energy sources.

Keywords: energy security, energy dependence, risk, Serbia, Bulgaria, oil, natural gas

РИСК ЗА ЕНЕРГИЙНАТА СИГУРНОСТ В СЪРБИЯ И БЪЛГАИЯ: СРАВНИТЕЛНО ИЗСЛЕДВАНЕ

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РЕЗЮМЕ: Поради невъзможността да се осигурят достатъчно източници на енергия съществува риск за енергийната сигурност. Пазарното търсене на нефт и газ в Сърбия и България се удовлетворява най-вече чрез внос, което води до значителна енергийна зависимост, докато необходимостта от въглища се осигурява от местния добив. Енергийната зависимост е най-важният индикатор, който се използва при оценка на риска за енергийната сигурност в дадена страна. В настоящия доклад, използвайки международния индекс за риска за енергийна сигурност в Сърбия и България, авторите разглеждат измеренията на енергийна зависимост по отношение на нефта, газта и въглищата като основни енергийни източници.

Ключови думи: енергийна сигурност, енергийна зависимост, риск, Сърбия, България, нефт, природен газ

Introduction

Regional and national energy security of the Western Balkans countries has been a topic in EU for some time, drawing the attention of politicians, as well as many experts, investors interested in energy projects, and consumers, as mass and final users. The Western Balkans Region is highly dependent on import of Russian oil, natural gas and nuclear technology. This dependence is heightened, and thereby energy security decreased, by the latest events between EU and Russia, problems with the Ukraine crisis and Annexation of Crimea. The result of that was abundance of South Stream pipeline project, which is very important for Serbia and Bulgaria. These issues between EU and Russia concerning the pipeline, together with conduct of Russian company Gazprom in several antimonopoly cases, and disrespect of European regulations, are now basis and framework for energy security policy for the western Balkans countries.

Geopolitical, that is, geo-economics influence of Russia on the western Balkans territory is increased by unstable political situation, political and economy protectionism, non-transparent business practices, corruption and association with organized crime. Over the last few years, this was very visible in both Serbia and Bulgaria. Russia has skilfully used its dominant position on energy market and connections with political and economy oligarchy in order to achieve its interests.

The goal of this paper is to point out the most significant dimensions of energy security in both Serbian and Bulgarian economy, within the context and framework of latest events in geopolitical/geo-economic plan between EU and Russia. The work is divided in several sections; section 1 deals with importance of energy security on global level; section 2 analyses basic features of Serbian and Bulgarian economy through several elemental components of energy security; section 3 presents international index of energy security risk and rang scores EU28, Bulgaria and Serbia. Section 4 considers energy intensity and energy losses of said economies. In section 5, we analyze operation of most important state companies in Bulgaria and Serbia. Finally, we draw conclusions and give certain recommendations.

Energy security

Economy development without stable energy sources supply is impossible. Global problems, such as poverty and environmental pollution problems are impossible to solve without economy stability. Energy supply and demand, competition, joint investments, global warming, reduction of CO2 emission, joint stability and many other factors indicate that energy security is, above all, global question. Within this context, energy security is an inseparable part of global and national security (Kovač, Popović, 2013; Milosavljević, 2013).

Considering increased importance of the subject for Serbia as well, many analyses became available for general public and academia, wherein it has been stressed, almost by rule, that energy security presents stable, reliable and at reasonable cost, supply of oil and gas. In other words, energy security was presented with three key words: **accessibility, availability and adequacy**. At this spot, it is vital to perceive that in that way energy security was represented almost exclusively from consumers' point of view, which is common for most countries that are classified as "energy addicts", that is, countries which mostly import required energy (gas and oil) (Djordjevic, 2016). Nevertheless, energy security can not be observed from consumer's point of view exclusively, since it is, as life itself, a "two-way street" and great role and interests have producers. And they are looking upon energy security from slightly different corner then consumers, i.e., as a stable and predictable demand and prices which, typically, account for big investments in research, production and transport of energy. (Winzer, 2011). Another term regarding the energy security that became "popular" is **diversification.** There is a different approach by consumers and producers. Consumers imply that diversification is a possibility of using various sources of gas and oil supply, while producers consider it a possibility to transport gas (and oil) to the main markets by different routes. (Winzer, 2011).

Security in today's multipolar world, besides military and political dimension, gains economy dimension, with energy as its primary element. Questions regarding fossil fuels are leaving purely economic domain and entering strategy questions. In operational sense, sphere of energy remains essentially geopolitical, with accent on so-called *energy hunger*, combined with fear of interruptions in supplies. In spite of diversification based on renewable energy resources and return to coal due to recession, gas (natural and liquid) remains the source whose consumption has utmost growth. (Kolev, 2011). In theory, actual meaning of energy, besides geopolitical approach, should be analyzed through the prism of geo-economy, in which "energy diplomacy" gets more on importance in the area of providing energy and economy social security, and above all western civilization that is the most conscience of advantages and limits when using accessible energy sources. (Grubić, 2014).

Components of Energy security of Bulgaria and Serbia

As previously said, several projects and difficulties pushed energy security to the top of strategic and political questions in Serbia and Bulgaria. First of all, there was a gas crisis in January 2009 and South Stream project. Gas crisis in 2009 and then-existing Ukrainian-Russian gas dispute brought to light the fact that Serbia almost entirely depends on that one source of gas and that one supply route.

In further text, we give analysis of energy security of Serbia and Bulgaria, based on four basic components: 1. Availability of resources, 2. Reliability of supply, 3. Ecological sustainability and 4. Accessibility.

Availability of resources

Bulgaria and Serbia are energy poor countries and highly dependent on energy resource imports – mainly oil and gas. First of all, they both count on Russia as their only provider -or, in case of gas -their only transit route. Both countries have substantial reserves and local production of lowest rank lignite coal, which covers about 53% of overall domestic gross energy consumption in Serbia and 37% in Bulgaria. Due to high share of local coal and hydro-energy in the entire energy mix, both sides could have solid future perspectives regarding their energy independence, but only if they manage to lower energy intensity of their economies and to enlarge energy efficiency in residential, public and business sector. Among strong points of both countries is local capacity of hydro-energy production (in case of Bulgaria, nuclear as well) and existing coal resources, and also potential unconventional energy resources. Bulgaria was one of the first EU countries that started research on shale gas excavation, but in 2012 it imposed a moratorium on this activity. Despite that, the country became more active in researches of oil and gas in the Black Sea. After adopting European goals on renewable energy resources (RER), during 2007 began quick development, with huge donations, of solar energy resources and wind energy, which, although improving energy stability in long term, are in the base of financial outflow of energy system, thus causing consumer's dissatisfaction. At the same time, development of RER in Serbia was reduced to a minimum, except the adoption of some restrictive policies after 2009.

Reliability of supply

Serbia and Bulgaria were among the countries that were highly affected by gas cut off crisis in 2009, since they imported gas exclusively from Russia, and used only one route, Ukrainian. Concerning the delivery of natural gas, Serbia isolated itself from other SEE countries, putting up a great deal of its political efforts to support Gazprom regarding gas transport, South Stream and Turkish Stream above all. The fact that Serbia isn't looking for possibility of diversification gas delivery by building inter-connector with Bulgaria and Croatia, additionally reinforces its dependence. After long term focus on expensive and huge projects for gas transmission, such as Nabuko and South Stream, which became victims of economy and geopolitical decisions, Bulgaria has lately intensified work on possible projects for diversification, building inter-connectors with neighboring countries, namely Romania and Greece, as part of South gas corridor. Regardless of that, Bulgaria still depends on its big investments in South Stream, with no possibility to give up on the project, because Russia

decided to freeze it, but not to official stop it. For both countries, Bulgaria and Serbia, existence and strict implementation of long term national energy strategy are determinants for improving security of energy resources supply. Both countries should significantly lower energy intensity of their economies and improve energy efficiency of their business, public and housing sector. As for Serbia, modernization and expenditure of coal mines and thermal power plants are necessary in order to secure reliability of deliveries, regardless of natural catastrophes. Serbia learned that the hard way in 2014, when disastrous floods blocked the biggest coal mine, which led to mass restrictions of electrical energy.

Ecological sustainability

In both Serbia and Bulgaria there is a very considerable capacity for production of electrical energy through hydroelectric power plants. In Serbia almost one third of entire electrical energy production comes from hydroelectric power plants, while in Bulgaria that percentage is much smaller (about 7% for 2012), due to priority given to costly production of wind and sun energy, which led to expansive growth of overall share of renewable energy resources up to 19% during 2013. Production of energy, 43% in Serbia and about 40% in Bulgaria, comes from traditional thermal power plants that use coal. While Bulgaria managed to renew its basic powers for production of coal, regarding CO_2 emission, Serbia's investments in desulphurization technology and dust particles filtering remained quite limited, which contributes to still high levels of CO_2 emission in the air. Energy poor households in both countries still use coal and wood, which leads to deterioration of city's air quality, and CO_2 emission per capita is still among highest in Central and Eastern Europe – approximately 23% and 37% higher for Serbia and Bulgaria from average world level (Evropska energetska zajednica, 2012). High energy intensity of both economies (therefore 652,9 and 610,6 kg oil equivalent per GDP 1000 euros in 2013), compared to average EU28 value (141,1 kg oil equivalent per GDP 1000 euros), also contributes to high level of carbon emission, regardless of positive reduction tendency, notable in the past fifteen years.[1]. Despite that, use of coal in energy production is not elementary factor of overall emission level.

Accessibility

In the past years energy security in Bulgaria and Serbia remains constant, mainly due to combination of two factors. On one hand, due to subsidized energy cost, especially electrical energy in Bulgaria and central heating in Serbia, growing number of inhabitants find it difficult to settle the bills at the moment when prices begin to rise, with liberalization of the market. On the other hand, outdated infrastructure of public utility companies and energy efficiency of households which are under middle level for OECD, affect price hikes for energy. It resulted in energy poverty among population, which is considered cheap electrical energy supply that leans on traditional biomass for heating (above all wood and coal, and inefficient stoves for their combustion), lately in increase in both countries. During 2010, more than one third of Bulgarian households could not afford adequate heating of their homes, and about 60% claims that the main sources of heating energy are wood and coal. (CSD, 2014). Population census data from 2011 confirm that over 54% of households use wood and coal for heating, while in rural areas figure reach 95%. In Serbia around 40% of population can not afford adequate household heating (Štadmiler, 2014).

Unlike Bulgaria, where more than half of population uses solid fuels for heating and cooking, Serbian share stopped at approximately 18%. Possible price hikes of electrical energy and central heating, in order to reach market level, could bring disproportionally negative influence on energy poverty among population; especially in big cities were it is the main source of heating energy. At the same time, solid fuels remain the most adequate for replacement, since their price probably won't rise in the future. Unfortunately, that would further lead to CO2 emission growth, which will damage the environment.

Energy security rankings: International Energy Security Risk Index (IESRI)

The International Energy Security Risk Index (IESRI) a first-of-its-kind energy risk indicator, uses quantifiable data, historical trend information, and government projections to identify the policies and other factors that contribute positively or negatively to international energy security.[2]

If we look at the countries in the region, IESRI sets Romania to 15th place out of 75 biggest energy consumers in the world (edition 2015), which is the best result of all SEE countries. Other countries are significantly behind – Bulgaria 57th and Serbia 61st– followed only by Ukraine, Uzbekistan, Turkmenistan and Singapore. Compared to average results of OECD countries after 1990, Romania showed stable tendency of improvement of energy security position, since its hardest moment back in 1990 (53% more then average OECD), until its best evaluation during 2009 (1% less then average OECD); while expecting slight deterioration of results in the course of following years. Index components show that major risks for energy security of Romania are connected to energy expenditure volatility, intensity of energy costs and energy intensity of economy, especially in the sector of transport. These results are mainly based on large number of various factors, such as dependence on oil and gas import and non-reconstructed highly energy intensive economy, including energy sector itself. Despite of falling behind Romania, after 1990 Bulgaria also improved its position in IESRI classification, whilst slowly closing the open gap with OECD middle levels. Still, the best result for Bulgaria was 1398 points in 2009, which is worse from OECD average (939) by nearly 49% (see Table 1. and Figure 1.

[1] Eurostat, 2014. Energy intensity is calculated as gross energy consumption measured in kilograms of oil equivalent per GDP 1000 euros

[2] See more at: http://www.energyxxi.org/international-energy-security-risk-index

Table 1.
Energy security risk scores for Bulgaria and Serbia 2006-2014

Year	Bulgaria	Serbia
2006	1,539	1,415
2007	1,437	1,410
2008	1,413	1,326
2009	1,368	1,326
2010	1,477	1,395
2011	1,555	1,616
2012	1,508	1,568
2013	1,521	1,511
2014	1,464	1,389

Source:http://www.energyxxi.org/international-energy-security-risk-index

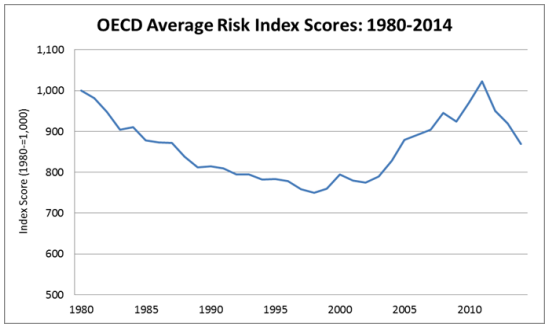

Fig. 1. Average IESRI for OECD countries 1980-2014
Source:http://www.energyxxi.org/international-energy-security-risk-index

Basic risks for SEE energy security are connected to instability of energy costs, mainly due to countries' dependence on oil and gas import, which in addition incites high prices, paid due to the lack of delivery diversification. The second important factor is critically high level of energy intensity of their economies, mostly because of outdated infrastructural base and limited modernization investments, including the energy sector itself. However, the foundation of all these challenges is bad management of energy sector, which raises the possibility of risky consequences, especially in time of crises.

Instable energy consumption and energy losses

For SEE countries, high energy intensity of their economies and, at the same time, low energy efficiency of housing and public sector, are the major challenges for energy security, particularly when high share of energy poverty among population is added. Expected liberalization of gas and electricity market, combined with negative expectation regarding current economy development, can significantly heighten energy poverty in these countries. High level of energy intensity is caused by insufficient modernization of outdated technology and infrastructure, as well as economy structure and lack of stimulant for improvement, due to subsidized energy prices during the period of time. The same factors negatively affect on energy intensity in Serbia and Bulgaria, who are, regardless of descending tendency, still among the countries with highest level in SEE and EU, while their values are almost four times bigger than EU28 average in 2013. (See Figure 2).

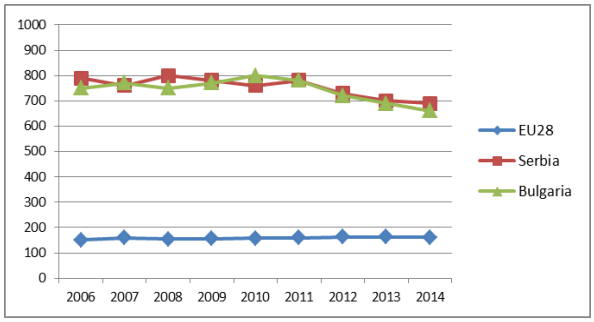

Fig. 2. Energy intensity of Serbian and Bulgarian economy
Source: Eurostat, 2014.

Serious problems of all Central and Easter European countries are constant losses of energy in the process of transformation, transfer and distribution of electricity that occur because of outdated base and electricity network, and shortage of sufficient investments for their modernization. High energy intensity is a result of unstable consumption, stimulated by artificially low subsidized prices of energy for the final consumers. In Bulgaria, almost half (48% average share for 2000-2013) of energy available for internal consumption is lost, while in Serbia that share is slightly smaller (41%), and in Romania 32%, but even this last one is bigger than average EU28 per 298%.[3] (See Figure 3.)

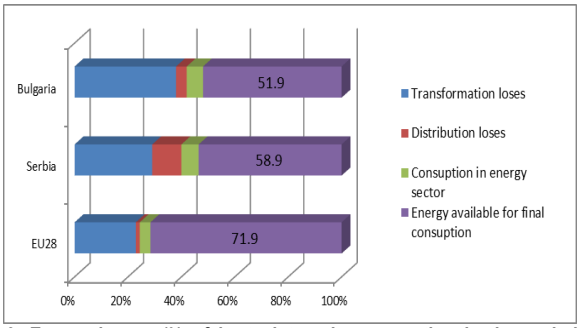

Fig. 3. Energy losses (% of bruto internal consumption in the period 2000-2013)
Source: Eurostat, 2014.

Clearly, outdated and not enough modernized electricity network in Bulgaria sets serious challenges of adaptation to greater quantity of electricity produced from sustainable energy resources, particularly when those sources are focused in specified geography parts of the country. Situation in housing sector is more or less the same, where the reasons for still existing inefficiency are flaws in appropriate building maintenance, limited wall and window isolation and outdated heating systems.

Since two thirds of all residential buildings in Bulgaria and Serbia were built before 1990, when no attention whatsoever was paid to abidance of terms for energy efficiency, outdated residential fund, combined with high consuming appliances, resulted in low energy efficiency in housing sector.[4] According to official estimates, energy consumption in such buildings is 2-3 times bigger than in newer buildings that applied EU standards for energy efficiency.

[3] Authors, based on Eurostat data
[4] 88% of residential buildings in Bulgaria was built before 1990, 74% in Serbia before 1985

In addition, potential of these countries for decentralized energy production is still at large unused, because just a few number of buildings have solar panels on its roofs, for example. Elementary obstacles to energy efficiency improvement in housing sector are: unavailable detailed information on energy consumption; restricted implementation of energy savings measurements, which disables certain goals, as well as their monitoring; and low average income and high level of energy poverty among households.

Operations of state energy companies in Bulgaria and Serbia

State energy companies (SEC) are inseparable part of energy market in SEE and often decide on its development. Managing SEC is frequently under direct political influence, which affects independent energy company management and national regulatory body. In Bulgaria and to some extent in Serbia also, system corruption and occupation of SEC by private economy and political interests obstruct liberalization of market and expose organization to management abuse, performed in favor of private interest.

In Bulgaria, financial situation of SEC worsened in past two years, while some of the greatest companies (for example National electric company – NEC) are in technical loss for at least a year. One country kept governed prices of electricity surrealistically low and lesser than market, which led to accumulation of financial losses in NEC. Governed rates for households are at least 54% less than what's NEC paying when buying the energy. On the other hand, due to bad management and "state occupation" that refer to big energy infrastructural projects, like Nuclear plant Belene and hydro-energy plant Cankov kamak, Bulgarian energy holding (BEH), together with its subsidiary, were overburdened with long term debts. Financial indicators of state energy companies for period 2007-2014 show that NEC and national electro system operator (ECO) had a minimum loss in past three years. Financial results for these two companies are expected to be negative for 2015, and in medium-term period. Coal power plant Marica Iztok 2 and Mini Marica Iztok are also in a very difficult situation. Annual financial report shows deterioration of current and fast liquidity ratio, exposing their inability to pay off their debts if asked. Besides, a financial report unveils company's limited access to liquid assets, which would demand extra outside financing, if companies were forced to pay their creditors. Overall, deterioration of organization's financial results after 2007, negatively affected their ability to cover their own expenses. Financial results of nuclear plant Kozloduj and especially Bulgratransgaz are much more positive.

Bulgartransgaz is a champion among Bulgarian SEC when it comes to short-term and long-term financial stability, because profits from gas transit were constantly higher than working costs on pipelines. At the same time, nuclear plant Kozloduj is the cheapest producer of energy in the country, producing more than one third of energy for internal consumption, along with substantial amount of energy for exports. In spite of that, their future options were frequently obstructed with BEH's practice to rearrange their earnings among companies in loss. Absence of transparency and public presentation of contracts and financial flows between BEH organizations increases the risks for good management of holding, especially because of doubts of political influence and protection of certain private interests on behalf of others.

Opposed to Bulgaria, in which governed energy rates set state suppliers under great pressure, Serbian vertically integrated monopoly, Elektro privreda Srbije (EPS) is still very stable company, as can be seen from its financial reports. Company's net profit grew 36% in 2014, in spite of decrease of produced energy, due to disastrous floods. The government started a difficult process of re-structuring, separating units for obtaining ore and units for electrical energy production and creating company EPS Supply (delivery of electricity for households and small businesses) and EPS Distribution (wholesale for industrial users). Energy Company with majority state ownership – Naftna industrija Srbije (NIS) also significantly improved its position since GazpromNeft bought it for 400 million euros in 2007. From company that accumulated losses of around 50 million dollars per year, new management succeeded to turn it into a company with a profit of over 300 million dollars in 2013. Major part of this change is a result of over 750 million dollars investment in modernization of refineries in Novi Sad and Pančevo and oil production growth. In that way, GazpromNeft continued to expand its presence in entire region, including Bosnia, Bulgaria and Romania, after modernizing its refineries in accordance with strict EU ecological standards.

Romanian Transgas was a central topic in EU and Russia dispute, regarding the rules of good management, transparency and public presentation of state company's affairs. Energy Secretariat demanded official inquiry due to company's disregard of transparency terms listed in Third energy package, specifically for covering information on Russian gas transit through Tranbalkans pipeline, with entering and exiting points in Ukraine and Bulgaria. Admitting to disregard of terms, Transgas cited that according to long-term contract with Gazprom Neft, it is obligated to keep these data secret, which disrupts synchronization of its transparency policy that is in harmony European demands. Transgas commented that any disrespect of commercial relations with Gazprom could initiate lawsuit compensation, or endanger energy security of the region. This case revealed one of the most persisting flows in SEC management in entire Central and Eastern Europe, especially where countries are very dependable on Russian energy imports. Russia is still using its dominant position on regional markets, in order to influence decision making in SEC, disrupting transparency and obstructing national and regional initiatives for energy diversification. Practice overview on SEC management in SEE region reveals existence of bad management, which often results in widely spread practice of "conquest of state", all that being in third party's interest in national and regional context. Existence and public access to basic information and data on financial situation in SEC management in our selected countries, makes good foundation for further analyses of our companies flaws, enabling proposition of extra recommendations for improvement of energy sector management in the region.

Conclusion

Based on given comparative analyses and overview of basic dimensions of energy security risk in Serbia and Bulgaria, we can conclude the following:

- ✓ Great dependence on a single source and just one route for gas delivery is the most serious energy security risk in both countries. This risk is enhanced with oil import from the very same source – Russia. While Bulgaria and surrounding countries are striving to achieve energy diversification, Serbia seems to support current condition, regardless of the fact it's paying one of the highest prices of natural gas in Europe;
- ✓ Management of SEC in inspected countries is under strong political influence, affecting their institutional independence and regulatory control. It is visible in Bulgaria, above all. Political pressure to cut down prices of electricity and natural gas in both countries additionally adds to instability of their energy sectors;
- ✓ Main challenge in energy management is the lack of political consensus related to long-term national energy strategy supported by financial instruments. It would constrain the making of "partial" decisions, often suspicious of being made under influence of private political and economy interests;
- ✓ Unstable democracy tradition, non-transparent business practice, attended by corruption and connection with organized crime, are enhanced with negative consequences of Russia's economy and geopolitical influence.

In order to lessen the energy security risks of Serbia and Bulgaria, we can conclude it is necessary to take certain political actions. We emphasize following:

- ✓ Transformation of national energy policies in order to stop the construction of new production capacities and to fulfill EU goals for 2020. It is vital that this change should be guidance toward securing stability and security of energy deliveries. It should also affect source diversification and delivery routes, working its way to reduce the energy poverty, as one of the biggest risks for Central and Eastern Europe energy;
- ✓ Introduction of decision making procedures for determination of priority and big investment projects. They should be based on clear and transparent criteria that are supported by fact-based analyses and synchronized with EU and CEE regional priorities;
- ✓ Expansion of existing and introduction of new long-term programs for improvement of long-term energy efficiency in housing and public sector, as well as reduction of energy intensity of Bulgaria and Serbia. That should include elaboration of innovative financial instruments of public-private partnerships (including participation of international financial institutions for application of the best practice referring to monitoring and influence evaluation – such as EBRD, EIB, World Bank, IMF, IFC and so on);
- ✓ Acceleration of national energy market liberalization with aim to improve long-term financial stability of SEC, as well as implementation of the EU Third liberalization package. Adaptation to market liberalization reforms by synchronization of energy, economy and social government policies, in order to moderate negative social consequences (like growth of energy poverty and price hikes for vulnerable groups);
- ✓ Reduction of administrative, regulatory and political obstacles on national level, for acceleration of those energy infrastructural projects who can have regional and European effect, for example gas inter-connector between Bulgaria, Romania and Greece, as part of South Stream gas corridor, as well as construction of a regional energy market (like South East European Power Exchange – SEEPEX).

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