RESEARCH FORUM

Accession of Serbia to the European Union – importance of material requirements in the energy sector

European Movement Serbia

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*Aleksandar Kovačević**

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Abstract

Material requirements in the energy sector are the key determinant of the accession process for the Accession of Serbia to the European Union. They connect the process of Accession of Serbia to the European Union with an improvement of living conditions and achievement of basic rights for the population. Implementation of the material requirements in the energy sector proves the readiness and capability of the public administration to act in public interest. Actually, faster and more complete implementation of these material requirements is in the best interest of the majority of the Serbian population, as well as the population of the neighbouring countries, some of which are members of the European Union. Fulfillment of these requirements would be necessary even if they were not envisaged in the process of Accession of Serbia to the European Union. This text describes material requirements where the implementation has already been agreed on, and it also explains the importance of implementation of these requirements for the accession process, for greater employment and economic development. Implementation of material requirements in the energy sector is a measurable category, and the impact of implementation of these requirements may also be measured in respect of the quality of life and basic human rights. The future of the Serbian population, in terms of the economy and all other aspects, depends on the way of implementing the agreed material liabilities. The text includes tables with a summary of material liabilities and cross-line mutual inter-connections as well as corresponding recommendations regarding the fulfillment of such liabilities.

Key words:

Energy sector, Accession to the European Union, Large Combustion Plant Directive, energy efficiency, renewable energy sources, environment, health, Years of Life Lost, human rights

* The author is a member of the Research Forum of the European Movement in Serbia.

Preface

The material requirements in the energy sector concerning the Accession of Serbia to the European Union is the least familiar and the least analyzed aspect of the Accession of Serbia to the European Union. These requirements have been defined in the treaties signed with the European Union and other candidate countries for EU membership. In other words, these requirements have been defined in the existing ratified international obligations. Accordingly, it is necessary to adopt well-coordinated local regulations prescribing the effective procedure of fulfilling such material requirements and appropriately directing the limited national resources.

Under the material requirements (or material liabilities), for the purpose of this paper, are assumed obligations to carry out, within the envisaged deadline, certain physical changes in respect of the plants, technical processes or quality of material (fuel and other), which can be expressed in physical units of measure.

From the survey on the perception of the EU Accession process carried out for the needs of the European Integration Office in December 2012[1], we found that the vast majority of the population is completely unfamiliar with the material requirements for Accession to the European Union. The interviewees (as well as the interviewers) included in this survey do not mention this at all. This survey shows a certain downward trend of the population's support of the European Union Accession, so that the current support of the Accession to the European Union may now be considered the lowest, since the beginning of such surveys. The total support has dropped from around 64 per cent to 73 per cent as it was in 2009, to a total of only 41 per cent in December 2012. However, the population is clearly aware that certain requirements pertaining to the process of Accession to the European Union need to be fulfilled for their own benefit, and not merely for the sake of EU Accession. The need to actually implement the conditions for Accession to the European Union was supported by over two thirds of the interviewees. This indicates that even the part of population which does not generally support the Accession to the European Union, very clearly supports the need to fulfill certain material requirements prescribed in this process, and to enforce reforms. Contrary to that, the population considers adoption of new regulations as some kind of pressure and complication in the actual process of European Union Accession.

From the survey on the perception of the EU Accession process we found that the vast majority of the population is completely unfamiliar with the material requirements for Accession to the European Union.

The National programme for EU Accession of February 2013[2] is not considering material liabilities. This programme envisages that the already set up material liabilities, which have by ratification become an integral part of the Serbian law, should be re-confirmed by passing some new or some additional Serbian regulations, which means putting them off again. Likewise, in the recently issued European Commission report on the progress of Serbia in achieving the required

[1] Serbian European Integration Office. (December 2012). *European Orientation of the Serbian citizens – trends*. Government of the Republic of Serbia: available at: www.seio.gov.rs

[2] Serbian European Integration Office, (February 2013). *National programme for adoption of EU legal inheritance (2013-2016)*. Government of the Republic of Serbia: available at: www.seio.gov.rs

degree of compliance with the criteria for EU membership[3], there is no mention of the material liabilities which will be discussed here.[4]

Contrary to that, the European Commision's report to the European Parliament regarding the Energy Community Treaty of March 2011[5], observes a delay in the implementation of material liabilities under this Treaty, requesting focusing on implementation thereof and pointing out the European Commission's obligation to judge reports on further progress in the Accession process exclusively on the basis of the actually implemented liabilities, and also to report on the fulfillment of such liabilities in regular Reports on progress in the Accession process.

This Report also indicates a certain evolution in the cognition of the social role of this Treaty. According to the European Commission communiqué of 25th October 2005[6] on the accasion of the signing of Treaty, one of the basic purposes of the Treaty is to resolve some specific local issues including energy poverty, increased mortality and environmental degradation. The Report of March 2011 deals with managing the social consequences of the actual Treaty implementation by means of an optional Memorandum on social issues. By leaving out the implementation of key material liabilities and by taking the issues of energy poverty out of the focus of the Treaty, the key purpose of the actual Treaty – **to help eliminate poverty and promote economic development**, has slipped away.

1. Serbia to the European Union Framework

1.1. Energy Community Treaty

The Energy Community Treaty of Southeastern Europe was signed as a result of the Athens process of negotiations initiatiated in 2003 and continued until the signing of Treaty in 2005, and later resumed in the context of implementing the obligations under the actual Treaty to date. This Treaty envisages the obligations of the signatory countries to achieve compliance of their national legislation and their energy infrastructure with the EU regulations within the defined deadlines. Likewise, this Treaty envisages the implementation of certain European or international regulations in the actual processes of compliance of the energy infrastructure with the obligations under this Treaty. The Treaty therefore includes regulations, objectives and procedures for accomplishing such objectives. A certain number of objectives have been defined in the material categories and they mostly refer to the existing infrastructure, as well as the obligation to build a new infrastructure at some time. Also, when building the new infrastructure, application of the Treaty regulations and procedures is envisaged.

1.2. Stabilisation and Association Agreement (SAA)

The Stabilisation and Association Agreement of Serbia with the European Union and EU member countries includes implementation of many regulations and procedures in force within the EU, with an objective to bring the Serbian legal system, in respect of its structure, closer to the EU legal systems. This Agreement confirms the importance of the Treaty establishing the Energy

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[3] European Commission. (April 22, 2013). "Common Report to the European Parliament and Council on the progress of Serbia in achieving the required degree of compliance with the criteria for EU membership, especially key priority of taking steps towards a visible and sustainable improvement of relations with Kosovo *. Brussels: available at: www.seio.gov.rs

[4] Regular Progress Report for 2013 is expected in the second half of the year.

[5] European Commission. (March 3, 2011). *Report from the Commission to the European Parliament and the Council under Article 7 of Decision 2006/500/EC (Energy Community Treaty)*. Brussels: Available at: http://www.energy-community.org/pls/portal/docs/888181.PDF

[6] "The EU and South East Europa sign a historic treaty to integration". (Octobar 25, 2005). *Europa –Press Releases*. Dostupno na: http://europa.eu/rapid/press-release_IP-05-1346_en.htm?locale=en

Community, signed at an earlier date. This Agreement, however, also introduces new regulations, more closely defining the procedures for implementing the materialial liabilities prescribed by the Energy Community Treaty of Southeastern Europe, such as procedures concerning the equal status of bidders from the host country and other EU members in the public procurement processes in respect of plant construction or reconstruction.

It is important to take into account that the period for possible support of public utilities through various mechanisms of state aid expired on 1st February 2013, in accordance with the Transitional trade agreement[7] (Article 28 in connection with Article 43, the Stabilisation and Association Agreement - SAA and Article 39 in connection with Article 74, SAA) and thereafter investments earmarked for fulfillment of liabilities which will be discussed here must be implemented through commercial forms of financing.

2. Rationality of the Accession of Serbia to the European Union process

The material requirements in the energy sector concerning the Accession of Serbia to the European Union should be considered as rational from the standpoint of human development, economic development and general betterment for the majority of the Serbian population. As most of the Serbian population think (and as expressed in the recently conducted survey of the European Integration Office), there are obligations from the process of EU Accession to be put into force, irrespective of the development of the actual Accession process. For the purpose of this paper, we point out that there is multifunctional rationality in the implementation of these obligations, irrespective of the actual status of the EU Accession process. This rationality is reflected in the context of **better achievement of basic human rights, better environmental quality, inclusion in the common market, greater reliability of energy supply and finally, better chances for economic development**.

2.1. Human rights

The recently conducted research by a group of European non-government organizations (HEAL)[8] indicates that Serbia is spending annually from 1.8 to over 4.9 billion Euros on additional health care costs[9] due to emission of harmful pollutants from large power plants incinerating lignite. Behind this figure lies massive jeopardy to the lives and health of the Serbian population. In addition to that, part of this pollution is considered as cross-border pollution which has an impact on the lives and health of the neighbouring countries' population, including some EU member countries. This is the most obvious example of the impact of inherited infrastructure on the state of human rights, particularly including the right to life and unhindered enjoyment of residence and property. Serbia is considerably behind many EU member countries in respect of the mortality rate of its citizens:

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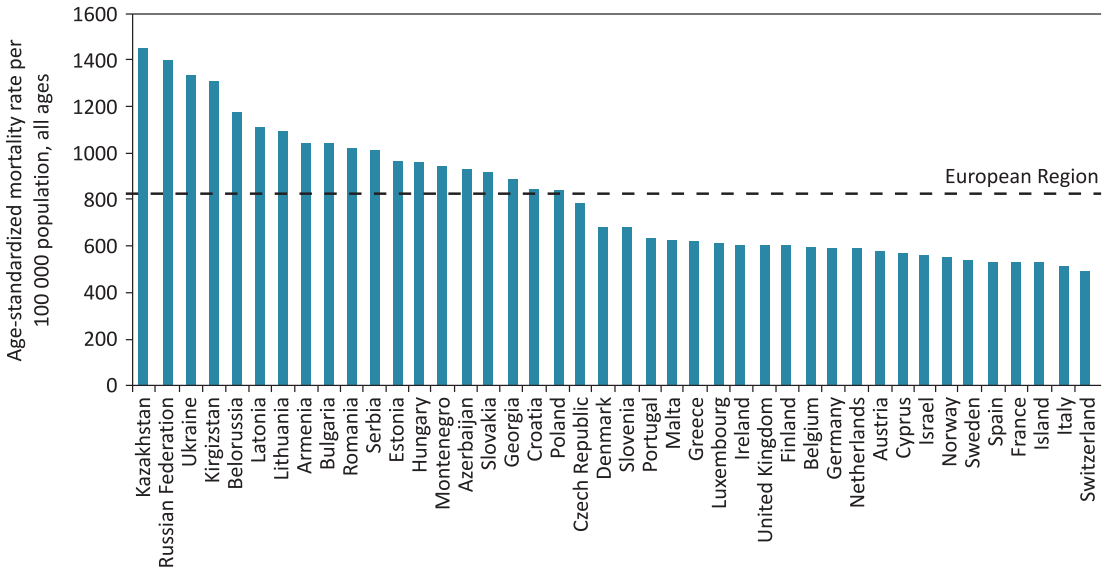
[7] Serbian European Integration Office. Interim Agreement on trade and trade-related matters between the European Community and the Republic of Serbia. Government of the Republic of Serbia: available at: http://www.seio.gov.rs/upload/documents/sporazumi_sa_eu/ssp_prelazni_potpisani_bez_aneksa_sr.pdf

[8] The Health and Envirnoment Alliance. (2013). *The Unpaid Health Bill, How coal power plants make us sick, A report from Health and Environment Alliance*. Dostupno na: http://www.env-health.org/IMG/pdf/heal_report_the_unpaid_health_bill_how_coal_power_plants_make_us_sick_final.pdf particularly the table on page 35

[9] This includes health care costs, public costs, deployment of health services, working hours lost due to illness and years of life lost for the population of Serbia and the neighbouring countries. It should be born in mind that this calculation was made based on data referring to emissions which indicate somewhat smaller emissions compared to the data published in the European PRTR database or reports from corresponding Serbian utilities. Accordingly, it should be taken into account that the actual state of affairs is much more unfavourable and would be better described by higher estimated costs.

Diagram 1: All-cause mortality rates in countries in the European Region, last reported data, 2006-2010[10]



It is interesting that even EU member countries (Lithuania, Latvia, Romania, Bulgaria) which have greater all-cause mortality rates, report a certain line of improvement concerning some critical causes of mortality. The following map[11] indicates that Serbia is a country with the greatest mortality rate from lung cancer[12] in Europe, where most countries show a declining mortality rate from this disease.

Map 1: Changes in premature mortality from lung cancer in the European Region 1995-2009[13]

[10] See: World Health Organization Regional Office for Europe, "The European Health Report 2012", Copenhagen, Denmark, 2013

[11] Ibid., page 38

[12] There is sufficient literature with a great amount of analyses which clearly differentiate causes of lung cancer between smoking, environmental air pollution and internal household pollution. Bearing in mind large use of solid fuel (wood, residue, lignite) for residential heating in Serbia, use of inadequate stoves and reduction of living space during the heating season (accommodation of more members of the family in a reduced number of rooms) we may conclude that the energy processes have prevailing importance. The impact of smoking (including passive smoking and epidemics) on health is increased due to reduced living space, and hence the complex energy causes are absolutely prevailing.

[13] Videti: World Health Organization, Regional Office for Europe. (2013). *The European Health Report 2012*. Page 36

In the period from 1950 to 2010 an epidemiological transition occurred in Serbia: chronical non-contagious diseases replaced the contagious diseases as the leading cause of mortality. Among the chronical non-contagious diseases, cardio-vascular diseases, oncological diseases and diseases of the respiratory system stand out. The demographic review issued by the Ministry of labour and social policy No. 45/2012 gives an insight into the issue of premature mortality of the Serbian population. Premature mortality of the population is analyzed according to the standard demographic index known as Potential Years of Life Lost - PYLL. This index perceives the social and economic consequences of mortality. It emphasizes the degree of harm to the society in case of mortality at an earliear age and establishes the extent of loss in the case of death of an individual before some envisaged age limit, in other words, before he/she accomplishes his/her total potential lifetime. Prevention of mortality of an individual is considered to be the major objective of the society, as every individual is expected to give a maximum contribution to the societal development during his/her lifetime.

This index, however, does not include the years of life during which an individual cannot be productively involved due to illness. Such circumstances have been covered by another index – by analysis of Years of Life Lost - YOLL[14].

In 2010 the Serbian population suffered a loss of 410 622 years of life from premature death, or 64 years per 1000 population. In 1950, as much as 424 years were lost per 1000 population. A significant improvement of this index was noted over the 60 years' time span. However, most of this improvement was achieved on account of better survival of newborn children and children up to 5 years of age. This improvement had the greatest impact on this betterment over the sixty years' time span. Analysis of the index showed that after the late 60's of the past century (more precisely after 1966) there had practically been no improvement. In the period from 1976 to 1992, the years of life lost increased from 62 years per 1000 population to 78 years per 1000 population. From 1992 to 2010, a certain improvement was perceived. In the same period, cardio-vascular diseases, respiratory and oncological diseases – chronical non-contagious diseases – took the lead as the cause of mortality.

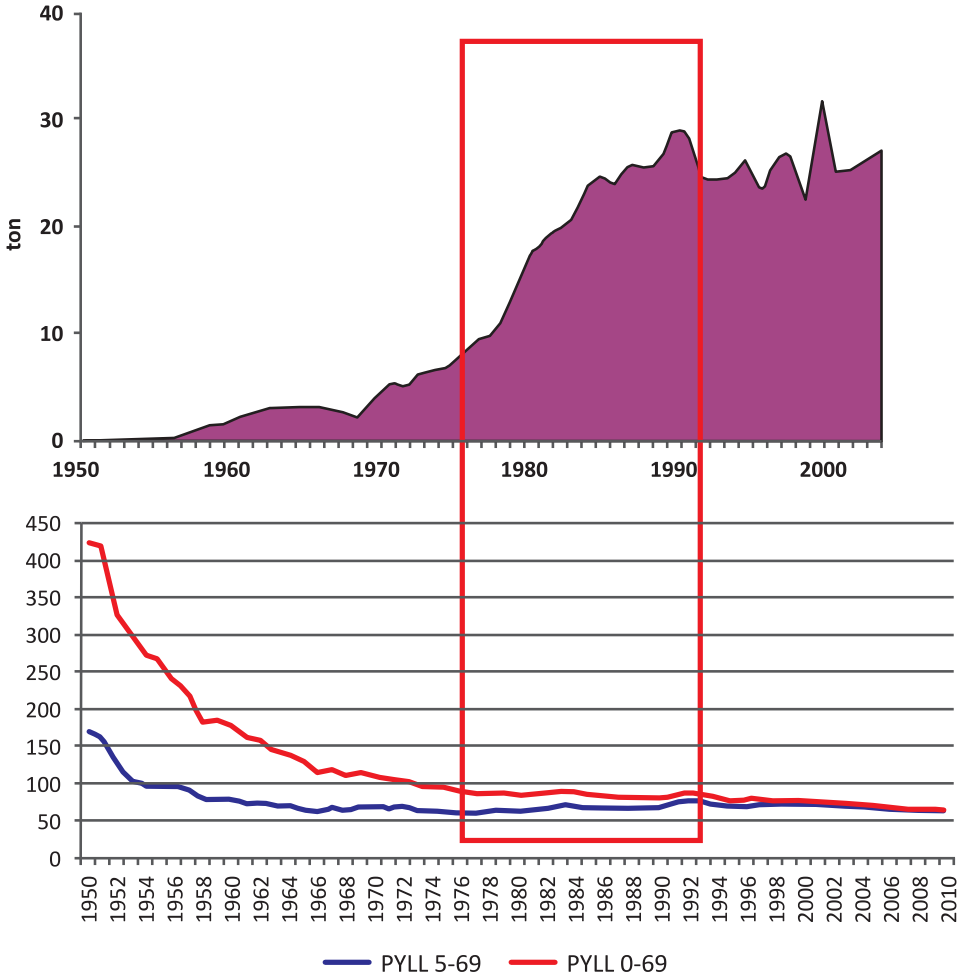
We here present a comparative PYLL curve and the growth curve of lignite production at the Kolubara open-cast mine over the time span from 1950 to 2006. Certain synchronization of these curves was perceived in the time span from 1976 to 1992. Such circumstances indicate a need for further multidisciplinary research.

The apparent PYLL improvement since 1992 to date is mostly the consequence of interpretation of the census results referring to years 2002 and 2011. Another demographic review (No. 43/2012) indicates different coverage and methodologies applied in the census of 1991, 2001 and 2011. When harmonizing these results, a slight growth of the Serbian population was noted in the period 1991-2002, due to immigration of the population from other parts of former Yugoslavia. The consequence of this was an improved PYLL index, as the newcomers were not exposed to the same influences to which the native population on the territory of Serbia was exposed. In addition to that, a wave of emigration was marked among the native population, and therefore possible mortality of that part of population was recorded at the emigrants' destination.

Taking into consideration the continual increase of cardio-vascular diseases, oncological diseases and diseases of the respiratory system, it may be assumed that there has been permanent progress in the PYLL index as well as the YOLL index to date. As we shall see later on, these qualitative demographic indices are among major determinants of economic development.

[14] The cost review based on the YOLL analysis in accordance with the European Union EXTERN-E methodology for Serbia can be found in Arcades Ecolas, IEEP, "Task 2 - Benefits for the former Yugoslav Republic of Macedonia and other countries of SEE of compliance with the environmental acquis Final report – Part I: General", Contract N° 07010406/2006/441662/MAR/E3, The European Commission, DG Environment, October 2007. The conclusions of this study do not differ in general from those quoted here and it is therefore sufficient to take this study into account.

Diagram 2: Comparative review of the PYLL curve and the growth curve of lignite production at the Kolubara open-cast mine in the time span from 1950 to 2006[15]



The Serbian population, just like the rest of the population in Europe and other parts of the world, is entitled to a healthy environment, has a right to normal human development, a right to life, a right to economic development, and a right to public administration which will protect those basic human rights. Bearing in mind that the mentioned Energy Community Treaty envisages significant environmental improvement, reduced pollution, reduced impact on health and life, reduced impact on property, actually greater freedom of enjoying the property, it would be rational to implement these obligations even before the deadlines envisaged in the Treaty. In other words, taking into account that the costs of health are greater than the value of generated and sold electricity, lignite and heat[16], it is clear that the impact on health and life needs to be reduced as soon as possible in accordance with the afore-signed and ratified Treaty.

[15] These two curves are compared for the purpose of illustration of considerably more complex processes of environmental and PYLL impact.The illustration may be considered very indicative, taking into account that thermal power plants using lignite from Kolubara make emissions covering considerably over half of the aggregate emission of pollutants in Serbia.

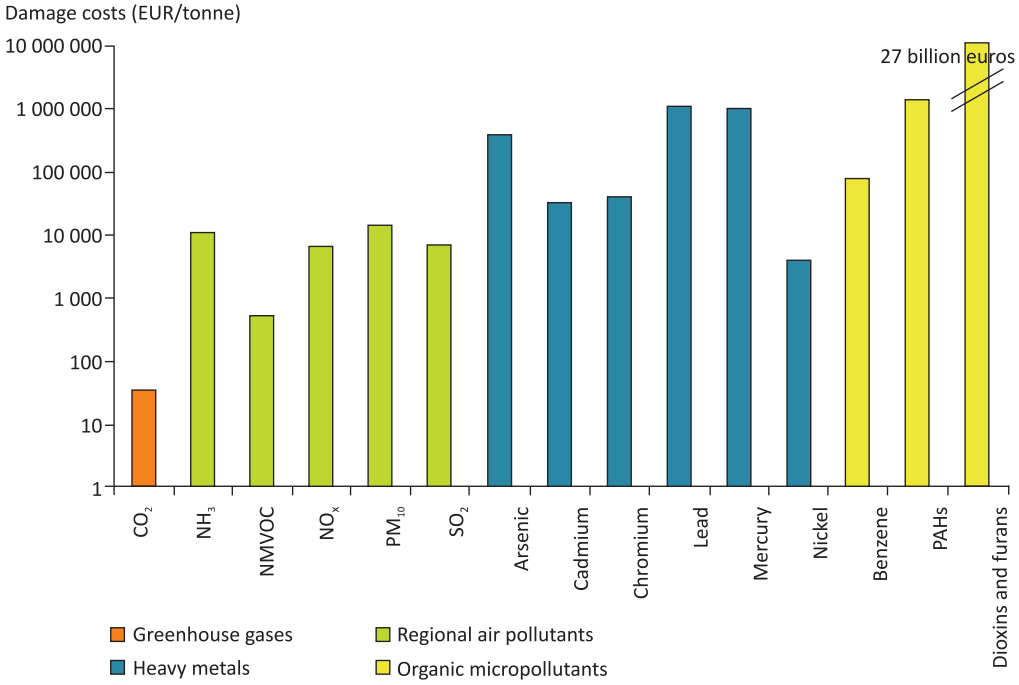
[16] The consolidated annual financial statement of PLC EPS for the year 2011, indicates that the aggregate value of sold goods and services (out of which one third of electricity was generated in hydro power plants, and a significant part of services was realized in electricity distribution) is less than two billion Euros. The value of electricity and heat produced by incineration of lignite is clearly much less than that and therefore the grand total of all revenues of thermal plants at Kostolac and Obrenovac amount to an aggregate value of cca 1.1 billion Euros. Hence, the health care costs which are partly covered from the public budget, and partly by loss of health and life, exceed the revenues realized by sold electricity.

2.2. Environmental matters

In respect of environmental matters, the Energy Community Treaty envisages application of the Large Combustion Plant Directive on the existing power facilities as of 31st December 2017. Also, better quality of liquid fuels was envisaged both for use in transport, as well as for stationary use, as of the end of 2011. These two regulations together with corresponding process regulations, such as direct application of the Aarhus Convention on Public Participation in Decision-Making concerning environmental matters, access to environmental information and justice, and elimination of state aid, enable an essentially better quality of life, state of human rights and state of environmental matters in Serbia if actually applied in reality.

The following diagrams show an estimate of average damage costs caused by different air pollutants. These are average values calculated on a sample of EU countries, where the meteorological, geographic and other circumstances are much more favourable than in Serbia. It is assumed that the same amount of pollution in Serbia (where there is not so much wind as in other European countries) creates even higher economic costs.

Diagram 3: Estimates of the European average damage cost per tonne emitted for selected air pollutants (note the logarithmic scale on the vertical Y-axis)[17]



In the European PRTR database we also find data on emissions from major power facilities in Serbia. This data is given in the following table. By simple application of the unit costs from the previous graph to the given table, we note the economic costs which are significantly above **3 billion Euros annually**, only from plants included in this table and, as can be observed, the table does not contain all major energy facilities in Serbia.

[17] See: European Environment Agency, "Revealing the costs of air pollution from industrial facilities in Europe", EEA Technical report, No. 15/2011, Copenhagen.

Table 1: Emissions of pollutants from some plants in Serbia, according to the PRTR database[18], and according to incomplete reports by national institutions in Serbia

Ord. No.	PLANT	NITROGEN OXIDES (t)	POWDERY MATTER (t)	SULPHUR OXIDES (t)
1.	TPPNT A	15700	6300	105000
2.	TPPNT B	15200	2150	85200
3.	Kostolac A	3190	1690	53000
4.	Kostolac B	5570	2670	58700
5.	Kolubara A	2300	2340	11800
6.	Morava	908	3100	10600
7.	Processing (Prerada)Vreoci	224	109	1120
8.	Smeltery and refinery Bor	-	-	308
9.	Heating Plant Bor	-	-	290
10	Energy Industry(Energetika) Kragujevac	349	-	156
11.	Heating Plant Novi Beograd	253	-	445
12.	**TOTAL[19]**	**43694**	**18359**	**326619**

2.3. Common market

The Treaty establishing the Energy Community envisages participation of Serbia in the Common Energy Market of the European Union and signatory countries of the Treaty. Access to this common market enables Serbia access to different sources of energy and different directions in energy supply. Likewise, provisions concerning the common market participation enable Serbian companies the use of infrastructure in third countries without any discrimination and at appropriate comparable prices. Bearing in mind that Serbia is a country with no access to the sea, and that it does not have an opportunity to directly participate in the international energy market, these provisions are of essential importance with regard to the development aspects in Serbia.

In order to take part in the common market, Serbia must also ensure equal rights for companies from third countries on its territory. This primarily refers to the right of access to the energy infrastructure and elimination of state aid and corresponding environmental protection standards.

We may conclude that participation in such common market, right of access to the energy infrastructure on the territory of third countries and possibility to take part in the international energy market through the territory of third countries is of extreme importance for Serbian economic development. This assumes observation of all common market rules from the Serbian side.

[18] Compare: http://prtr.ec.europa.eu/ (data for 2011) Database - European register of polluters (*The European Pollutant Release and Transfer Register* (E-PRTR)) - provides an overview of industrial sites with significant environmental impacts. The database is established on the basis of the Kiev Protocol of the Aarhus Convention, see: *Kiev Protocol on Pollutant Release and Transfer Registers*. United Nations Economic Commission for Europe (UNECE). Available at: http://www.unece.org/env/pp/prtr.html

[19] Report on environment matters at PLC EPS for 2011, issued in April 2012, presents the following data covering only the EPS facilities: Nitrogen oxides 52835.49t, powdery matter 22814.84t and sulphur oxides 369924.80t which are in turn greater than the PRTR indices, and these are again greater than the indices taken into account in the aforementioned HEAL study.

2.4. Reliable supply

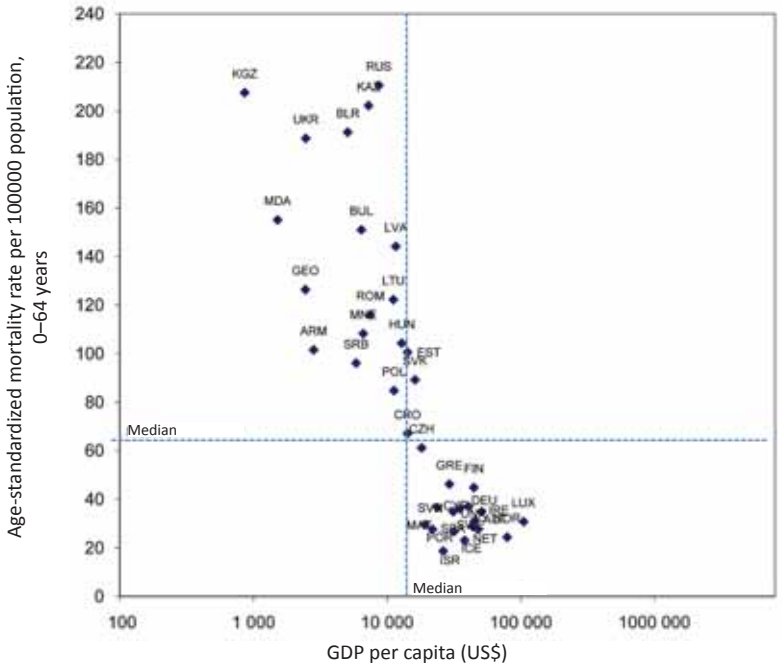
The Treaty envisages two basic mechanisms which should ensure greater energy supply reliability for the signatory countries: this refers to the right of access to the energy infrastructure on the territory of third countries and existence of mechanisms for mutual assistance in emergency and mutual improvement of energy supply reliability. Also, this will assume an obligation for better use of the cross-border energy infrastructure. This would then enable development of the regional energy market and inclusion of such regional market into the Common European Market.

2.5. Economic development

The present state of Serbian economy is subject to significant limitations resulting from the energy sector. Life expectancy of labour in Serbia has become shorter due to pollution from large power plants and transport. The health of the population has been damaged, and accordingly, labour health care costs have increased and time spent by individuals in productive work has become considerably shorter. The ability of such labour to achieve high productivity, if at all at work, has considerably decreased. In addition to that, emission from large power facilities has an impact on the agricultural land and facilities. These impacts are not well-described and there is very little information on that. **We can**, however, **conclude that the impact on reduced agricultural land productivity is not irrelevant and this, in addition to the old age of facilities, equipment and vehicles used by Serbian companies considerably reduces the total Serbian productivity potential, and therefore Serbia's economic competitiveness at the international market.**

The following diagram demonstrates the connection between the economic development and premature mortality from cardio-vascular diseases. The connection between these diseases and air pollution from using fossil fuel is well-described in available literature and well-illustrated in the aforesaid documents, so no detailed elaboration is required.

Diagram 4: Premature mortality from cardio-vascular diseases (diseases of the circulatory system) and GDP per capita in the European Region, last reported data, 2006-2009[20]



[20] See: World Health Organization, Regional Office for Europe, *The European Health Report 2012*. Page 74.

Insufficiently reliable energy supply has an impact on the Serbian industrial production. In periods of low temperature in December and January, the industrial production tends to drop considerably. **The Serbian energy infrastructure is not capable of simultaneously providing heat supply to the population and energy supply to the industry.** During that period the hourly use of industrial facilities, transport and energy infrastructure drops. All this has an impact on recurring investments which can be realized in the Serbian economy. In addition to that, poor use of the available energy infrastructure requires that the fixed costs of such infrastructure should be split into a small number of hours, when actually using the energy infrastructure. The percentage of companies which look upon energy supply as an issue in performing their work, more than doubled in the period from 2006 to 2008, when around one third of the companies considered that to be a limiting factor[21]. Accordingly, the average price of energy supply is higher for the Serbian economy than in countries with a competitive energy market.

In these aspects the energy sector presents an **efficient prevention of economic development** in Serbia. Elimination of the basic impacts of the energy sector on economic development, is a prerequisite for any conceivable improvement in respect of employment and economic competitiveness in Serbia.

3. Material requirements concerning the energy sector in accession of Serbia to the European Union

This chapter gives a brief analysis of the basic material requirements concerning the energy sector in the Accession of Serbia to the European Union. A detailed review of these requirements is given in sub-item 4.5.2. in the form of summarized tables. We here point out the details in connection with these material requirements.

3.1. Environmental matters

In the environmental area the material obligations are focused to implementation of the EU Large Combustion Plant Directive and Sulphur Content in Liquid Fuel Directive[22]. In addition to that, other general circumstances should be taken into account regarding the implementation of material obligations in the environmental area, such as the impact on climate changes and obligations in the environmental area which are yet to become compulsory for Serbia. Namely, bearing in mind the expected timing of international obligations concerning climate change, it is assumed that the existing obligations need to be implemented in accordance with the obligations which will subsequently take place during further accession process and, more specifically in context of further development of the situation at the global level.

Liabilities described in this chapter are considered to be the least possible achievement required in order to implement the liabilities from Article 11 of the European Charter of Social Rights adopted in 1966, the realization of which is an essential prerequisite for Accession to the European Union.

3.1.1. Large Combustion Plant Directive

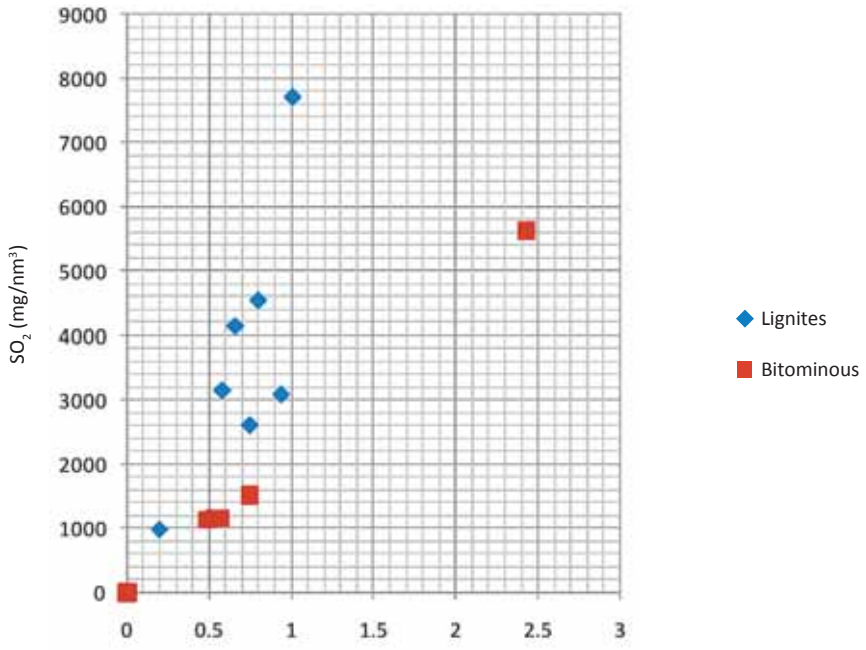
This directive establishes the upper limits of emission of pollutants from large combustion plants. These emissions depend on the character of combustion plants and type of fuel used in a

[21] World Bank (January 17, 2012). "Republic of Serbia, The Road to Prosperity: Productivity and Exports - Country Economic Memorandum". *Volume II: Main Report*, Report No. 65845-YF

[22] Energy Community. (August 19, 2013). "EU legislation". Available at: http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Legal/EU_Legislation#THEACQUISONENVIRONMENT

combustion plant. The following diagram indicates the connection between emission of sulphur-dioxide and the sulphur content in some types of coal. It can be clearly seen that small percentages of sulphur in lignite give considerably larger emissions of sulphur-dioxide in the air than similar or smaller percentages of sulphur content in hard coal. This is the consequence of considerably lower calorific value of lignite compared to hard coal. This directly applies to Serbia. Low calorific value lignites mostly burned in the large combustion plants in Serbia, contain a relatively low percentage of sulphur. However, the resulting emissions, taking into account the very low calorific value of lignite, are considered to be a major source of pollution.

Diagram 5: Effect of sulphur content in coal on sulphur-dioxide emitted during combustion of various lignite or high-calorific value coals[23]



Currently, **Serbian power plants are the largest individual source of sulphur-dioxide in Europe** and are among the first few sources of particulate matter and nitrogen oxides in Europe. These emissions have an effect both on the Serbian population and economy, as well as on the population and economy of the neighbouring countries, reaching even a number of EU member countries.

According to the Energy Community Treaty for Southeastern Europe, pollution from the existing combustion plants needs to be reduced to the prescribed values from this Directive, not later than by 31st December 2017. Taking into the account the volume of this task, which assumes that in Serbia around 4000 megawatts of plant electrical output and almost the entire district heating infrastructure need to be replaced or reconstructed, it was necessary to start with the implementation of this obligation immediately upon ratification of the Energy Community Treaty. In addition to that, implementation of this requirement cannot be expected within the given deadline if, immediately as of today until the expiry of deadline, adequate actions are not taken and adequate improvements referred to in the Directive are not made at power plants.

[23] Parsons Brinckerhoff, (11. November 2011). *Continued Operation of 'Opted-Out' Large Combustion Plants under the IED*. Available at: http://www.pbworld.com/pdfs/regional/uk_europe/continued_oper_under_IED.pdf

So, it would be necessary for Serbia to have the implementation schedule of the Directive, an adequate amount of budgetary funds reserved in public utilities which are the users of plants referred to in the directive, and a certain on-site implementation time-schedule. Also, it would be necessary to monitor the execution of this obligation by reporting in regular annual reports. In addition to that, which is not prescribed in this obligation, it is assumed that all parties concerned should be regularly notified on the environmental impact of these plants, and that measures should be taken in order to reduce, by means of various methods, the effects on the population's health and the quality of land, air and water, even before the plants have ensured compliance with the Large Combustion Plant Directive.

These obligations can be realized in many ways. The simplest way is installation of adequate equipment for purification of flue gases at the existing plants. The second way, of course, is replacement of boilers at the existing plants, and the third way would be abandoning these plants and replacing them by new plants. We also indicate a number of comparative analyses dealing with the economic and development aspects of these alternatives. Here we have chosen an analysis such that takes an example of a power plant of 500 MWe which uses considerably high quality lignite as the main fuel and which has comparatively high energy efficiency. This example is closest to the inherited situation in Serbia, whereas the available lignite quality is lower, and the net energy efficiency of available Serbian plants is considerably lower, amounting to around 30 per cent (compared to around 38 per cent as envisaged in this example).

Table 2: A summary of the base reference thermal power plant parameters:

Parameter	Value	Unit
Unit size	500	MW
Gross plant elecrtical output	2000	MW
Net plant electrical output	1835	MW
Net heat rate (LHV)	9466	kJ/kWh
Net efficiency (LHV)	38.0	%
Ambient dry bulb temperature	9	°C
Relative humidity	80	%
Fuel type	Lignite	-
Fuel LHV (moisture and ash included)	9053	kJ/kg

The following table (Table 3) indicates the outcome of several alternatives for ensuring compliance with the Large Combustion Plant EU Directive. Alternatives are considered by columns:

- Built flue gas purification equipment to the existing plant (FGD/SCR),
- Boiler replacement by new supercritical boiler,
- Boiler replacement by new boilers with subcritical parameters and new turbine,
- New subcritical boiler with new turbine,
- New subcritical fluidized bed combustion boiler,
- Boiler adjustment and fuel replacement (fuel replacement by natural gas),
- Abandoning the exising power plant and constructing a combined heat and power production plant using natural gas.

Table 3: Comparative financial analysis of different alternatives

	*FGD/ SCR**	New sub-critical boiler	New sub-ricital boiler and ST	New super-critical boiler and ST	New sub-critical *****CFB boiler	Boiler replace-ment repower-ing	New ****CCGT
Capital cost (€m)	780	1616	1846	2389	1128	590	873
Increase in capital cost over FGD/SCR (€m)	0	836	1066	1609	348	-190	93
Total net electrical power output FGD/SCR (MW)	1798	1811	1800	1785	1828	1739	1779
Reduction in electri-cal power output over FGD/SCR (MW)	0	-13	-2	13	-30	60	19
Annual electrical power generation (GWh)	13860	13961	13876	13760	14412	14079	14649
Reduction in annual electrical power gen-eration over FGD/SCR (GWh)	0	-100	-15	100	-552	-219	-789
***NPV of electricity sales (€m)	7297	7350	7305	7244	7587	7412	7712
Reduction in NPV of electrical sales over FGD/SCR (€m)	0	-53	-8	53	-290	-115	-415
Total net plant ef-ficiency (%)	37.5%	37.9%	38.6%	41.0%	38.4%	49.5%	58.1%
Reduction in plant heat rate over FGD/SCR (%)	0.0%	1.8%	3.6%	10.1%	3.2%	33.0%	55.9%
Annual fuel cost (€m)	241	238	233	217	243	473	545
NPV of fuel cost (€m)	2188	2164	2115	1973	2205	4296	4946
Increase in lifetime fuel cost over FGD/SCR (€m)	0	-24	-74	-215	17	2108	2758
Lifetime cost relative to FGD/SCR (€m)	**0**	**759**	**985**	**1447**	**75**	**1803**	**2435**

* FGD - Flue Gas Desulphurization
** SCR - Selective Catalytic Reduction
***NPV - Net Present Value
****CCGT - Combined Gas - Steam Cycle
*****CFB - Fluidized Bed Combustion Boiler

As shown in the enclosed table, comparison of these alternatives indicates that the least cost alternative is construction of a new subcritical fluidized bed boiler [24]. This alternative gives the lowest costs, compared to built-in flue gas purification equipment. Here we should have in mind that in the analyzed case flue gas purification equipment (option 1) was added to a power plant which was relatively new, with high efficiency, and that the quality of available fuel (lignite) was much better than the one available in Serbia. When taking these circumstances into account, much lower efficiency of inherited plants in Serbia indicates that building-in flue gas purification equipment is not at all a sustainable alternative. Selection of such alternative would (due to greater lignite demand for the same amount of electricity sold) increase the relative impact of Serbian power plants on climate change and, as a result of that, expose the whole country to economic and political risks.

In other words, **if the obligations of the Treaty establishing the Energy Community concerning emissions from large combustion plants are to be implemented in Serbia in that way at the existing power plants, with their low efficiency and with the existing available fuel (low calorific value of lignite and inadequate procurement and supply process), the total costs, due to reduced electrical power generation and increased maintenance costs of such power plant, as well as reduced availability of power plants for electrical power generation, would be so large that (without any state aid) they would implicate considerably higher electricity prices and lower competitiveness of the entire Serbian economy.** Such reaction would lead to a lower growth rate of the domestic product, and most probably, also to a net discrease in the domestic product and employment in Serbia. The consequence of this would probably be the elimination of total energy intensive products and services. Contrary to that (and as shown in the comparative table 3), considerably better alternatives can also be found, which could lead to greater total energy efficiency of power plants, lower unit prices of electrical power, greater use of renewable energy sources and, on the whole, provide considerably better conditions concerning electricity supply for industrial and residential use.

The current costs of the impact on human health and the environment are being putt off for the future and accumulated in the form of deteriorated vital properties of population and productivity of land. Such costs, or most of them, are not included in the electricity price in accordance with the existing Serbian regulations. By reducing emissions on account of built-in additional equipment at the existing power plants (FGD /SCR variant) the costs (future, hidden and uncalculated) of impact on human health and the environment would be reduced (and would slow down accumulation of negative effects), but would result in additional running costs of electrical power generation[25]. These additional costs would have to be transferred to the final users who would have to assume an obligation of using such energy until they achieve a return on investment, which implicates that customers would have no right of selecting a new supplier for a long period of time. Taking into account that the opening of the market to competition is one of the requirements included in the Treaty establishing the Energy Community, and that bidders offering lower costs can appear, it is unlikely that such requirement can be accepted. Bearing in mind the prohibition of state aid, it is very unlikely that the state can cover such costs by its guarantees and additional borrowing[26].

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[24] Oka, S. and associates. (2004). "Testing the suitability of the Kolubara and Kovin lignite for combustion in circulating fluidized bed boilers", Belgrade, 2004, Expert Paper: UDC: 662.642:662.992.8-912. In this paper experts from the Vinca Institute and the Faculty of Mining and Geology present their findings resulting from extensive research carried out in the above institutions, where the suitability of Serbian lignite deposits was established for use by means of the above combustion technology.

[25] These circumstances of the European Agency for environmental matters precisely describe in the report: "Late lessons from early warnings: the precautionary principle 1896–2000"(EEA, Copenhagen, 2001)

[26] It should also be taken into account that the European Investment Bank, World Bank and other important international financial institutions have already made decisions to terminate or considerably reduce investments in power plants using coal as the main fuel. "European investment bank to stop financing coal-fired power plants". (24. July 2013). *The Guardian*. Available at: http://www.theguardian.com/environment/2013/jul/24/eu-coal-power-plants-carbon-emissions-climate, i McGarrity, J., Volcovici, V. (23. July 2013). "EU finance arm to decide on curbing loans to coal-fired power". *Reuters*, *US edition*. Dostupno na: http://www.reuters.com/article/2013/07/23/eu-coal-finance-idUSL6N0FT1HN20130723

At present, the Republic of Serbia is trying to ensure loans from non-European sources for reconstruction of a part of power plants in this manner (uneconomical), with state guarantees which is kind of unpermitted state aid. If this method is applied, Serbian thermal power plants will find themselves in unequal position compared to other competitors on the Common Market, which may affect the energy supply reliability in Serbia, EU accession and regional cooperation. In respect of the economy, it does not matter whether the additional costs are paid through electricity price or taxes.

The most economical solutions from Table 3 require innovative implementation of the latest technologies. Application of state of the art solutions may simultaneously reduce the costs of environmental impact and the costs of electrical power generation in addition to a beneficial effect on the national (domestic) product and employment. Simultaneously, state of the art solutions may lead to reduction of the impacts on climate change. However, innovative solutions cannot be applied within the existing institutional framework[27] of state-owned companies.

It should be taken into account that the European regulations on environmental protection from power plant impact are considerably behind the corresponding USA regulations. This particularly includes regulations on very complex impacts, such as emissions of mercury and arsenic. Harmonization of European and American regulations is invevitable. Even the strictest regulations and the best available technologies for reduction of emissions from coal combustion cannot eliminate the impacts on human health. The survey mentioned in Chapter 3.1., indicates significant (although considerably smaller than in Serbia) health care costs in the European countries which really apply adequate protection procedures. Accordingly, in making decisions on alternative ways of implementing this material obligation, it is necessary to take into consideration the use of other available indigenous fuel (such as woody biomass) instead of lignite. This option probably has a powerful potential in terms of economic growth and employment, which should be taken into account when considering the alternatives.

3.1.2. Sulphur in fuel

The Treaty establishing the Energy Community envisages reduction of sulphur in liquid fuel used on the territory of member countries. Directive 1999/32/EC of 26th April 1999, indicates a need for considerably reducing the percentage of sulphur in liquid fuel. It also sets a limit regarding the emission of sulphur oxides from the use of liquid fuel. The signatory countries may to a certain extent mitigate the requirements prescribed by this Directive or put off implementation thereof in case they completely meet the requirements of Directive 80/779/EEC concerning air quality, particularly regarding the presence of sulphur oxides and particles in the air. As may be seen from available literature, in Serbia, taking into account the extent of data which is actually measured and made available to the public, the air quality in inhabited regions is not completely satisfactory. Accordingly, implementation of the Directive concerning Sulphur content in Fuel is of great importance.

Unfortunately, among many countries-signatories of the Treaty establishing the Energy Community, the implementation of this directive had been put off in one way or another, and to a lesser or greater extent, so the Community Secretariat was forced to take adequate legal action[28]. This reminds us of multiannual delay of obligation established in United Nations documents to eliminate lead from liquid fuel. Implementation of that international convention was several

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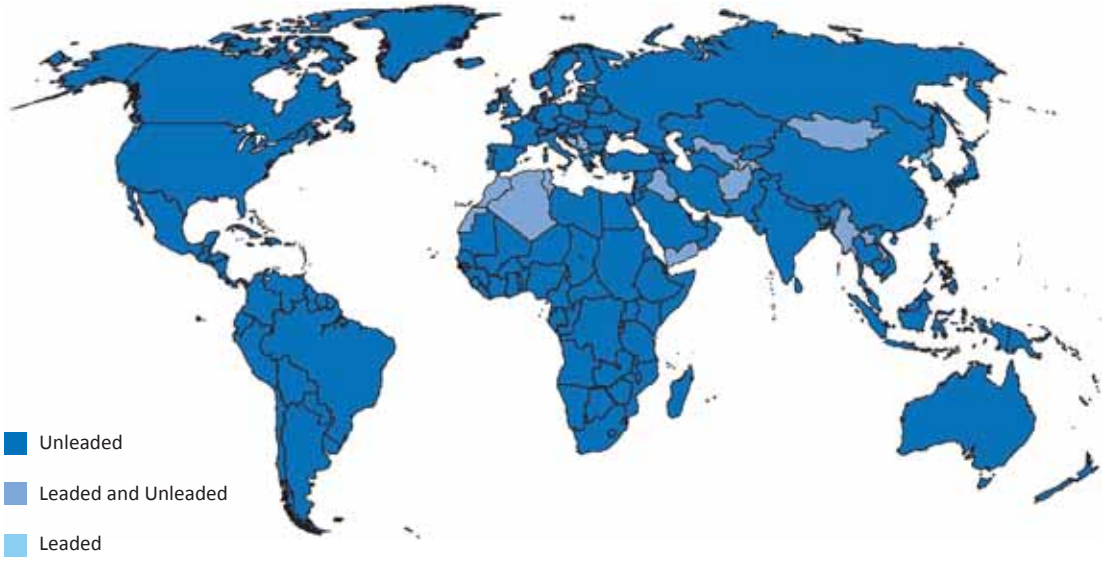
[27] The Energy Community Secretariat issued on 22nd October 2012, the Tender for selection of consultants which made a survey on the Needs for modernization of large power plants in signatory countries according to Directive 2001/80/EC on Large Combustion Plants. See: Energy Community. (October 22, 2012). *Tender Documents for the Selection of a Consultant for the Study on the Need for Modernization of Large Combustion Plants in the Contracting Parties of the Energy Community in the context of the implementation of Directive 2001/80/EC* . Vienna: Available at: http://www.energy-community.org/pls/portal/docs/1770180.PDF. This Tender document prescribes that all intellectual property rights concerning all economic solutions provided by the consultant while doing this analysis should belong to the ordering party. Taking into account that innovative solutions of great value cannot be provided upon consulting compensation, we point out that in this way the most economical solutions are not going to be taken into consideration.

[28] http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Dispute_Settlement/2013/CASES%20NO.%2001-0513

years overdue, and the effect of that continuance on the human health (and mental abilities) of the population, particularly children, was measurable[29]. In a similar way, adjourned implementation of obligations concerning sulphur in liquid fuel results in permanent and cumulative consequences. The inherited situation as of the beginning of 2008 was shown on the following map:

Map 2: Status of elimination of leaded fuel phase-out as of January 2008[30]



3.1.3. Other obligations in the environmental sector

Cross-border courses

Large energy sources emit long-distance pollutants. The following graph shows typical distribution of the impacts of a large coal-fired power plant in relation to distance from the actual plant. Taking into account the position of Serbian plants which are great pollutants and the distance from the state borders, it can be easily assumed that emission from those plants has an impact on the territory of neighbouring countries, and even countries which are not direct neighbours to Serbia.

In addition to that, we also perceive the existence of large sources of pollution in the neighbouring countries, outside the Serbian borders, taking into account that those plants have a major impact on the Serbian territory and population.

Accordingly, **it is of great importance that provisions of the Energy Community Treaty are consistently applied, both in Serbia, as well as in the neighbouring countries and that the impact of these plants on the population in the region is thus reduced crosswise.** We point out that large sources of pollutions are found in Romania, Bulgaria, Macedonia, at Kosovo[31], in Montenegro, and Bosnia and Herzegovina, which are all in the direct vicinity of their borders with Serbia. With the entrance of Croatia into the European Union, the impact of pollutants from Serbia on the EU territory and population has increased. Bearing in mind the regional cooperation concerning reliable energy supply in Serbia, all cross-border impacts should be observed very carefully.

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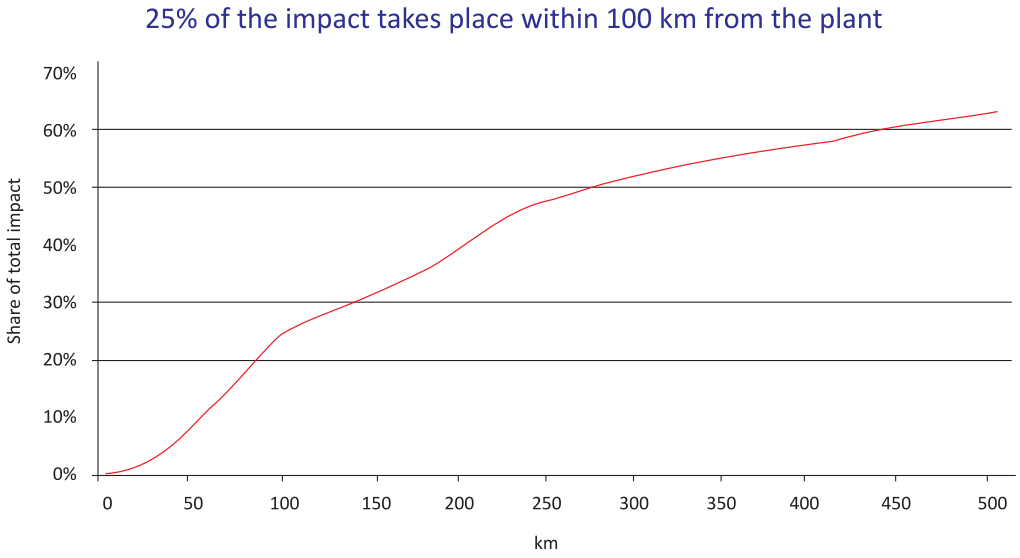
[29] Detailed popular review of the consequences of multiannual lead exposure is available in the following text: „The consequences of exposure to lead from motor fuel". (January 14, 2013). *Feasible Serbia*. Available at: http://www.mogucasrbija.rs/Vest/1/Vesti/830/Posledice%20izlo%C5%BEenosti%20olovu%20iz%20motornih%20goriva.html

[30] See: UNEP.

[31] Without any prejudgement as to the political status of this territory as well as the administrative line between the territories. We here have in mind only the existence of large sources of pollution on that geographic location.

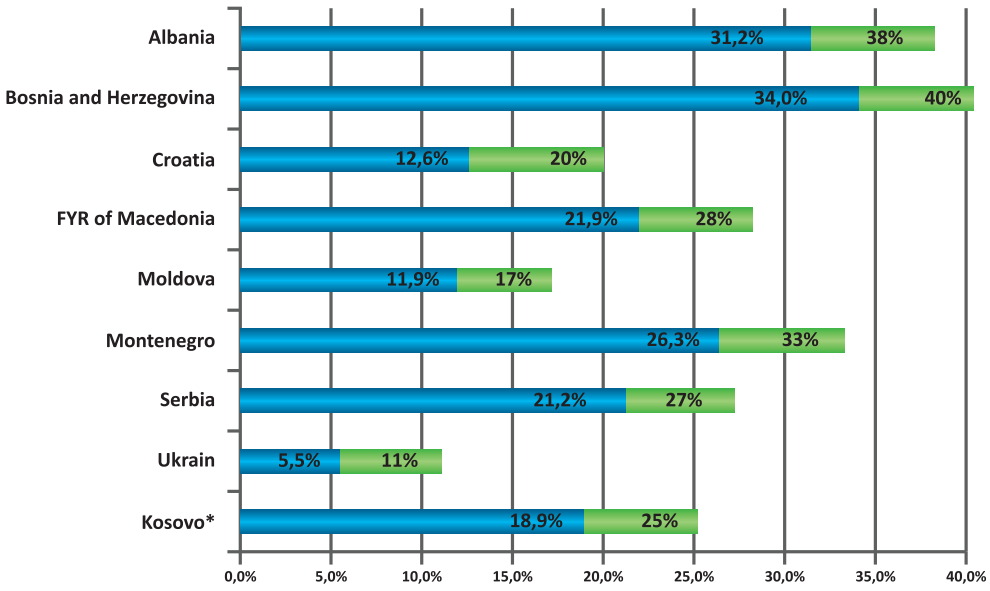
Diagram 6: Cumulative impact of pollution depending on distance from source[32]



3.2. Renewable energy sources

The extended Energy Community Treaty of Southeastern Europe envisages that the signatory countries acquire corresponding liabilities regarding the renewable energy share in the total energy generation. Such liabilities are included in the following diagram.

Diagram 7: Targets regarding renewable energy share in the final energy according to Directive 2009/28/EC as adopted by the Energy Community Ministerial Council in October 2012.[33]



[32] See: Lauri Myllyvirta. *Air pollution impacts of the proposed Kosovo C lignite plant*. Greenpeace. Availabe at: http://www.kosid.org/wp-content/uploads/2012/09/Air-pollution-impacts-of-Kosovo-C-v1.1-email.pdf

[33] See: Gabriela Cretu, Karolina Cegir. (23–24 April 2013). *New Renewable Energy Acquis – Directive 2009/28/EC as adopted by the Ministerial Council in 2012*. Energy Community Secretariat. Available at: http://www.energy-community.org/pls/portal/docs/2014179.PDF

It is perceived that The Energy Community Secretariat established that in Serbia 21.2 per cent of available final energy is generated from renewable energy sources, and that this percentage should be increased to **27 per cent.**

We should here emphasize possible arbitrariness of this estimate. Namely, there is insufficient accuracy in establishing the amount of fuel wood used in final energy. If this estimate were lower than the actual demand, there would be a chance of showing, by simple improvement of the statistical calculation, an increased future share of renewable energy sources in the final energy. This would thus be achieved without any efforts and without any additional investments. This, however, is not the intention of European Directives, nor the total process of Accession to the European Union, where the states are required to make certain efforts in proportion to the inherited status and available resources and show their commitment to cooperation in this area. On the other hand, an extremely small estimate shows that in reality there is a smaller amount of woody biomass available for efficient energy transformation into electrical power and heat. Accordingly, it may be more difficult to achieve targeted electrical power and heat generation from renewable sources. Therefore, if the estimate is too low, this may lead to serious issues in implementing this obligation. In the case of Serbia, we perceive that the estimated value is completely uncertain. A series of different estimates is available in literature, and it is interesting that the same authors at different times and on different occasions, and even when referring to the same material sources, give different estimates. The estimate of fuel wood use, applied for calculating the above liability was around 13 per cent. It is based on a very simplified statistical methodology applied in survey conducted by telephone and on a relatively small sample for the needs of the Energy Community Secretariat. Contrary to that, two estimates (UNDP, 2004[34] and FAO, 2011[35]) made on account of large crosswise verified samples and by direct on-site inspection, indicate that use of fuel wood is considerably greater and that it amounts from 18 per cent to 19 per cent of the total demand.

3.2.1. Electrical power and heat

Greater use of renewable energy share for electrical power and heat production is in the best interest of the Republic of Serbia. Serbia has relatively inefficient fossil fuel resources and their conversion into electrical power and heat requires high costs, implicates low productivity, creates a negative environmental and health impact, as well as extremely great dependence on import. Contrary to that, renewable energy sources – particularly biomass – are or can be available with a higher degree of productivity than the European average. Electrical power and heat production from these sources could have lower costs than in other places in Europe, especially lower costs compared to the currently used fossil fuel. Most probably, no additional public incentives are necessary in Serbia for using renewable energy sources – particularly biomass – for electrical power and heat production, taking into account that biomass is more efficient, productive and cheaper than the currently used low-calorific value fossil fuels. If normal market mechanisms were effective, this use could be very beneficial for the country's economic development. We note that the available strategic documents concerning increased use of renewable energy sources[36] do not contain a comparative analysis of costs concerning the use of these energy sources in Serbia, but rather give directions for greater use of renewable energy sources with support from public funds, and funds from consumer and greater taxation.

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[34] UNDP. (2004*) Stuck in the Past 'Energy, Environment and Poverty in Serbia and Montenegro*. UNDP.

[35] Final FAO survey, 2011 is still not available to the public, so that the results of this survey, presented to the public through presentations and scientific papers of the actual authors of the survey, vary from 13 per cent to 19 per cent . We hereby consider that the data to be trusted most is the data presented immediately after the survey conducted in 2011.

[36] Compare: Ministry of Energy, Development and Environment. (December, 2012). *Simplified National Action Plan for Renewable Energy of the Republic of Serbia*. Belgrade: Government of the Republic of Serbia. Available at:http://www.merz.gov.rs/sites/default/files/Pojednostavljeni%20nacionalni%20akcioni%20plan%20za%20obnovljive%20izvore%20energije.pdf

3.2.2. Fuel

In the context of greater use of renewable energy sources in the final demand, there is a commitment prescribing that 10 per cent of fuel used in transport should come from renewable sources. This, of course, can be achieved by production of liquid fuel from renewable sources (biodiesel, ethanol, biogas). However, this can also be achieved by changes in the transport policy and changes in respect of the total transport. For example, if participation of electrical transport in the total transport (railway transport and public transport) is increased, and if those forms of transport are simultaneously supplied by electrical power from renewable energy sources, the commitment coming from this directive can be achieved quite efficiently.

In a similar way, as in the case of other renewable sources, no comparative analysis of the costs and benefits from different ways of achieving this commitment can be found in available literature.

3.3. Reliable supply

The Republic of Serbia is responsible for certain aspects of reliable supply and is obliged to increase the supply reliability by certain improvements in the material infrastructure and by implementation of certain material liabilities.

3.3.1. Infrastructure and diversification of sources of supply

There is an obligation to make cross-border energy infrastructure (gas pipelines, long-distance lines) available to all parties concerned on the commercial energy market. In addition to that, there is a need for two-way functioning of this infrastructure. Taking into account that Serbia has or is planning to have a larger number of cross-border gas pipelines, we point out the requirement that all those facilities need to have a defined right of third party access and physical possibility to be used for two-way gas transport and that the international agreements and treaties need to be in accordance with the Treaty establishing the Energy Community[37].

In addition to that, there is an obligation to enable undisturbed access to commercial participants within the infrastructure of high-voltage long-distance power lines[38]. We perceive that the existing cross-border long-distance power lines in Serbia are used to a lesser extent than they were used in the late 80's of the past century, and that the available infrastructure is not found in the operating regime which would enable the development of a commercial electricity market in Serbia and the region.

3.3.2. Compulsory oil and oil derivative reserves

The Repulic of Serbia is obliged to provide sufficient oil and oil derivative reserves for market supply in a period of 90 days, providing that those reserves are under public control. Implementation of this obligation includes a good statistical estimate of the real oil and oil derivative demand in Serbia, possible reduction of oil and oil derivative demand and formation of reserves in propor-

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[37] Compare: Nikolic Kokanović Otašević Law Office. (December 21, 2009). Legal analysis of the arrangement between Serbia and Russia in the oil and gas industry. International and Security Affairs Center ISAC: Available at: http://www.isac-fund.org/download/Pravna%20Analiza%20Aranzmana%20Rusije%20i%20Srbije%20u%20obalasti%20Naftne%20i%20Gasne%20Privrede-FINAL.pdf

[38] In this case aswell the Community Secretariat has taken legal procedures regarding Serbia: http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Dispute_Settlement/2011/01_06_11 as well as http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Dispute_Settlement/2011/9_10_11 i http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Dispute_Settlement/2008/03_08

tion to the volume of demand which cannot be economically replaced. However, in the estimates and analyses we perceive an intention to increase the oil and oil derivative demand, and accordingly the volume of compulsory reserves. The volume of compulsory reserves and financing of these compulsory reserves from the public funds certainly increase the total energy costs with an impact on the possible economic growth. As mentioned above, if a part of transport activities would be performed by other, more efficient forms of transport, such as railway and water transport, the required volume of compulsory reserves would be reduced in proportion to that. We also note, that this obligation is not included in the budgetary financial projections.

3.3.3. Energy efficiency

An obligation is established concerning the improved energy efficiency of different forms of energy demand in Serbia. This requires certain private investments and is closely connected to the security of property rights. Namely, investments can be achieved only if the owners are completely ensured in the security of their property.

3.4. Competition and right of supplier selection

The Energy Community Treaty for Southeastern Europe also envisages opening of the electrical power and gas market, and therefore also the consumers' right to free selection of power supplier. This right assumes correct measurement of energy consumption and adequate billing transparency.

If the electrical power demand gauging is done by the company selling the electrical power and if the gauging instruments also perform remote reading and remote control, without any adequate calibration done by an accredited, and independent institution, the consumer may have some doubts about the accuracy of the bill and may have some difficulties in freely selecting the supplier. Accordingly, it is probably necessary to enable commercial investments in instruments for measuring the energy consumption. On the other hand, there are forms of energy (such as district heating), where measuring by an individual consumer is not economically viable, and it would not lead to freedom of supplier selection, nor better energy efficiency. In other words, achievement of this requirement is to be organized so that it would be economical and beneficial for the consumer.

3.5. Incomplete summary review of material requirements

We here give a summary of the most important material requirements envisaged in the context of the Energy Community Treaty. In addition to that, we give a summary of cross connections between these obligations which may effect their implementation. We here point out that that by careful analysis of these obligations and their cross-connections, simultaneous implementation of these obligations may become more economical, reducing public costs, and ensuring a very effective public policy in this context.

3.5.1. Summarized tables

Table 4: Summary of material obligations in the energy sector resulting from the EU Accession process

Obligation	Assumed obligation and implementation/realization deadline	Public benefit from implementation of obligation	Ways of obligation implementation	Prohi bited access or limitations in implementation of obligation	Issues and remarks
Reduced pollution from large power facilities in compliance with the prescribed EU regulations	- EnCT - Immediately for all new facilities and not later than 31st Dec.2017 for exiting facilities postrojenja with possible minimum continuance	- Improved protection of basic human rights including the right to life Improved public health and reduced healthcare costs - Greater productivity of agricultural and forest land under the impact of large power facilities. If an adequate technical solution is selected, this may lead to considerably lower costs of energy and greater energy efficiency, which may bring about considerably better employment and greater competitiveness - Reduced land accident risk (land slides,erosion) - The total favourable effect could get to be over 10 per cent of the Serbian GDP - Possible and considerable technical promotion of local industry - Greater employment - Reduced chances for collection of natural resource rents with unfavourable impacts on the quality of governance	- Investment in return or technical improvement of existing large power facilities - With application of the Aarhus Convention on public participation in decision-making at the time when all options are open - Elaboration and public access to comparative feasibility analysis Training companies which are now public property to make commercial decisions and realize investments - Enable participation of of other investors and construction of alternative plants	- Application of technical solutions which are not allowed in the system Best available technologies (BAT) of the European Union - Making exclusive arrangements with suppliers of technology or investors with disturbed principle of free competition - Providing state support (such as money, rights, assets, state guarantees or other benefits) to public utilities which are operators of large power facilities which this obligation refers to - Making investment decisions wih no public participation - Reduced access to information on the environmental and health impact of power plants	- Insufficient EU insistence and that of other contracting parties to the Energy Community Treaty on implementation of this obligation within agreed deadlines, creates unpredictability for domestic and foreign investors, which puts off or eliminates possible investments. Each year of delayed implementation of obligation incurs costs of over 600 Euros/ citizen to the region population affected by emissions in respect of healthcare costs and lost revenues. It costs the Republic of Serbia over 200000 productive years of life lost and over 2 billion Euros of additional annual costs.

Obligation	Assumed obligation and implementation/realization deadline	Public benefit from implementation of obligation	Ways of obligation implementation	Prohi bited access or limitations in implementation of obligation	Issues and remarks
Reduced sulphur content in liquid fuel	EnCT	- Improved public health and reduced health care costs - Longer vehicle life - Possible improvement of energy efficiency	- Investment in new or existing facilities for production of liquid fuel with lower sulphur content - Investment in terminals and other transport routes with adequate market opening - Alternatively: replacement of domestic fuel by imported fuel - Alternatively: replacement of domestic fuel by other types of energy: gas fuel, electrical power - When adopting spacial and urban plans, it is necessary to open possibilities for alternativne fuel	Favouring some ways of obligation implementation, at the expense of some other options, through measures of industrial, tax or trade policy	- Prolonged use of fuel with a high sulphur content in public road or agriculture transport increases the amount of above-mentioned costs each year. - Costs of devastated agricultural land are accumulated.
Greater share of renewable energy sources in the total energy consumption	EnCT extensions from 18th Oct. 2012 to 2020	- Improved public health and reduced health care costs - If an adequate technical solution is selected, this may lead to considerably lower costs of energy and greater energy efficiency, which may bring about considerably better employment and greater competitiveness - Also possible considerable technological advancement of domestic industry Greater employment - Improved return on investments	- Investment in return or technical improvement of existing large power facilities or construction of new large power facilities - Alternatively: improved energy efficiency may reduce energy demand to the extent that the existing amount of energy production from renewable energy sources makes an increased percentage of the total energy consumed - Elaboration and public access to comparative feasibility analysis as the basis for decision-making on providing permitted state aid - With application of the Aarhus Convention on public participation in decision-making at the time when all options are open	- Favouring some ways of obligation implementation, at the expense of some other options, through measures of industrial, tax or trade policy - Providing unpermitted state support (such as money, rights, assets, state guarantees or other benefits) to selected utilities - Providing permitted state support (incentives) in an untransparent way. - Providing permitted state support if it is possible to implement an obligation through commercial investments	Continuance of major use of renewable energy sources as well as unambitiously set targets reduce the national product and employment and growth potential.

Obligation	Assumed obligation and implementation/realization deadline	Public benefit from implementation of obligation	Ways of obligation implementation	Prohi bited access or limitations in implementation of obligation	Issues and remarks
Formation of compulsory oil and oil derivative reserves	EnCT enlargement from 18th Oct. 2012 to 2023	Greater energy reliability and independence	- Investments in warehouse (or ship) capacities and formation of supplies Alternatively: reduced oil derivative demand and replacement by other types of fuel - Adequate energy statistics managed by the independent institution - the Statistical Office with no impact of state administration or energy utilities	Procurement of warehouse capacities and the actual supplies must be carried out within the public procurement procedure in compliance with the EU acquis	Adjourned establishment of compulsory reserves gives a false perception of the real total costs of fossil fuel with an impact on adjourned reforms of the transport policy
Improved energy efficiency	EnCT enlargement from 18th Oct. 2012 to 2020	- Possible and considerable technical promotion of local industry - Greater employment - Improved balance of payments with other countries	- Investments in better energy efficiency of power plants and processes - Observation of property rights	Regulation of contractual relations between the power plant owner (process) and utility providing services with better efficiency irrespective of the customary commercial relations Interference of the state administration in the work of professional organizations, in the acquisition of titles or the right to perform their activities	Promotion of property rights is a critical prerequisite for better energy efficiency
Ensure that all cross-border gas pipelines can be used in both directions	EnCT	- Greater energy reliability and independence - Improved balance of payments with other countries - Reduced opportunity for collecting transit rent with unfavourable impact on the quality of governance	- Investments in improvement of existing gas pipelines and construction of new cross-boder gas pipelines - Greater transparency and public responsibility of regulatory institutions	Treaties limiting the freedom of access to cross-border gas pipelines	Serbia needs to consider the existing and possible agreements on cross-border infrastructure from the aspect of promotion of the competitive local gas market
Ensure that each consumer may freely select the energy supplier	EnCT	- Improved competitiveness and development of market suitable for investment in power plants - Providing conditions for construction of renewable sources of energy with the consumers	- Investments in measuring and regulatory equipment in gas and electrical power grids - Greater transparency and public responsibility of regulatory institutions	- Favouring selected providers of measuring services. - Presence of conflict of interest where the energy vendor or distributer simultaneously measures the consumption	Implementation of this obligation may have a major impact on possible financing of required investments for the purpose of realizing the aforementioned obligations

3.5.2. Cross and horizontal connections

Table 5: Summary of interactions in implementation of material obligations concerning the energy sector during the EU Accession process

Obligation	Reduced pollution from large power facilities in compliance with the prescribed EU regulations	Reduced sulphur content in liquid fuel	Greater share of renewable energy sources in the total energy consumption	Formation of compulsory oil and oil derivative reserves	Improved energy efficiency	Ensure that all cross-border gas pipelines can be used in both directions	Ensure that each consumer may freely select the energy supplier
Reduced pollution from large power facilities in compliance with the prescribed EU regulations	Depending on selected technologies, certain plants may be increased or reduced, which will have an impact on the required amount of investments in other plants	Reduced pollution may enable a major economic increase in fuel production from renewable energy sources	Reduced pollution from existing plants gives a chance for greater participation of renewable energy in the total energy demand	Reduced or increased lignite extraction shall affect the volume of required liquid fuel reserves	Depending on selected alternatives, reduced pollution from existing plants will essentially affect energy efficiency in both directions	Timing and selection of alternatives for reduced air pollution shall affect the future volume of domestic gas demand	Required investments in reduced pollution shall enable introduction of supply competition and essential market opening
Reduced sulphur content in liquid fuel	Reduced pollution from large combustion plants in proportion to the amount of liquid fuel burned in those combustion plants	–	Reduced sulphur content in liquid fuel can be achieved by using renewable sources	Changing structure of reserves towards reserves with lower sulphur content.If that process does not include introduction of alternative fuel and better efficiency, it increases the financial costs of reserve storage	It can, but need not lead to improved energy efficiency in fuel use. If the plant production process remains below the competitive economy of scale, there may be further energy efficency deterioration	Possible transfer to gaseous fuel, increases the need for diversification of supply routes	–
Greater share of renewable energy sources in the total energy consumption	Renewable sources enable economical reduction of pollution from large combustion plants	Renewable sources enable economical elimination of sulphur from liquid fuel	Economy of scale and standardization improve the chances for using renewable sources and reduce the unit price	Using renewable sources reduces the need for compulsory oil and oil derivative reserves	Depending on the selected alternatives, use of renewable energy sources shall either improve or deteriorate energy efficiency	Affects the volume of gas demand	Available renewable resources provide more choices to consumers

Obligation	Reduced pollution from large power facilities in compliance with the prescribed EU regulations	Reduced sulphur content in liquid fuel	Greater share of renewable energy sources in the total energy consumption	Formation of compulsory oil and oil derivative reserves	Improved energy efficiency	Ensure that all cross-border gas pipelines can be used in both directions	Ensure that each consumer may freely select the energy supplier
Formation of compulsory oil and oil derivative reserves	Formation of reserves from the local production affects the increase of pollution if the reserves are formed before the pollution from existing plants is reduced	Formed reserves increase the market inertia to accept new fuel	The obligation to form reserves raises the fossil fuel costs and increases alternative fuel competition	–	Greater supply reliability shall increase domestic prices and encourage investments in energy efficiency	Encourages greater use of gaseous and alternative fuel and increases the need for diversification of gas supply	–
Improved energy efficiency	Reduces the need for energy production capacity	Reduces the need for fuel production capacity as well as for required reserves	Enables considerably greater choice of renewable sources, reduces the need for capacities and unit investments and therefore increases the chances for introducing renewable sources	Reduces the need for fuel storage capacity as well as for required reserves. Changes in transport mix in the direction of public, water and railway transport reduce the need for reserves	Improved energy efficiency enables investments in further improvement of efficiency	Improved energy efficiency increases the chances for cross-border trade, supply diversification and greater reliability	Reduces the need for power transmission and distribution capacities and therefore enables connection of new consumers and producers to the existing infrastructure
Ensure that all cross-border gas pipelines can be used in both directions	Greater gas supply reliability reduces the need for using facilities with great environmental impact and also reduces ihe investment costs of alternative facilities i	Greater supply reliability increases the chances for using gas instead of liquid fuel	Improves the chances for using intermittent renewable resources (wind, small hydro power plants, solar energy) and provides prerequisites for using bio-gas	Reduces the need for reserves	Enables increase of general energy efficiency	There is mutual motivation concerning cross-border trade when there are several two-way cross-border streams	Chances are increasing for selection of suppliers of gas,heat and electrical power
Ensure that each consumer may is free to select the energy supplier	- Right of choice is not sufficient for introducing competition. - Existing facilities need to pay full costs of environmental impact. - It is only then that market opening can bring investments and alternative sources of supply	–	Consumers confronted with market prices of energy may choose to invest in alternative rresources. The right of consumer choice increases market chances for renewable resources	Reduces the need for reserves	Improves the chances for investment in energy efficiency	Increases demand for alternative resources and trade and therefore demand for cross-border capacities	There is economy of scale in improvement of infrastructure for demand measuring and control. The more consumers who have an opportunity choose the supplier, the smaller the costs of each individual consumer. (Measuring in district heating is an exception to to this rule).

3.5.3. General circumstances of importance for implementation of material obligations

The following table gives the process requirements envisaged in the Energy Community Treaty of Southeastern Europe and Agreement on stabilization and association, concerning the implementation of these material obligations. We point out that the material obligations must be achieved in the prescribed manner, with adequate public participation in decision-making, public access to data and other different requirements given in the following table.

Table 6: Important aspects of implementation of material obligations

Obligation	Procesni uslovi
Reduced pollution from large power facilities in compliance with the prescribed EU regulations	• Transparency and access to data on the inherited status and emissions provided and processed by an independent institution • Implementation of the Aarhus Convention principles in the process of solution formulation and making investmest decisions • Restraining from all acts of state support including: expropriationof land and rights including the right to judicial protection, state guarantees, direct payment from state funds, inadequate or incomplete control of environmental impact, etc. • Implementation of public procurement procedures which enable equal access to local and foreign suppliers • Implementation of the Aarhus Convention principles in the process of solution formulation and making investmest decisions. • Takeover and implementation of all protocols of the LRTAP Convention on cross-border impacts • Implementation of obligations from the context of NATURA 2000 protected regions
Reduced sulphur content in liquid fuel	• Transparency and access to data on the inherited status and emissions provided and processed by an independent institution • Restraining from all acts of state support including: expropriationof land and rights including the right to judicial protection, state guarantees, direct payment from state funds, inadequate or incomplete control of environmental impact, etc. • Fuel quality control by independent internationally recognized companies
Greater share of renewable energy sources in the total energy consumption	• Implementation of the Aarhus Convention principles in the process of solution formulation and making investmest decisions • Enable freedom of private investments without any unnecessary limitations which may result from space plans or energy strategies or plans. • Adequate and independent energy statistics • Encouraging investments by acts of permitted state assistance and development of appropriate investment environment • Right of access to power transmission grids and sale to final customers • Freedom of speech, trade and import - export of energy and energy services
Formation of compulsory oil and oil derivative reserves	• Transparency and access to data on the inherited status and emissions provided and processed by an independent institution • Adequate and independent energy statistics • Freedom of contract, trade and import - export of energy and energy services • Financial reporting on budgetary revenues and expenditures, as well as assets engaged in the process of keeping compulsory reserves
Improved energy efficiency	• Effective protection of property rights • Implementation of the Aarhus Convention principles in the process of solution formulation and making investmest decisions • Freedom of speech, trade and import - export of energy and energy services • Restraining from interference of public administration in commercial agreements and performance of professional activities and licensing of professionals • Adequate and independent energy statistics • Restraining from all acts of state support including: expropriationof land and rights including the right to judicial protection, state guarantees, direct payment from state funds, inadequate or incomplete control of environmental impact, etc.

Obligation	Procesni uslovi
Ensure that all cross-border gas pipelines can be used in both directions	• Implementation of public procurement procedures which enable equal access to local and foreign suppliers • Implementation of the Aarhus Convention principles in the process of solution formulation and making investmest decisions • Enable and accept private investment in increased capacities or functionality of cross-border infrastructure in accordance with the Directive • Implementation of the principle of free of third part access to the available infrastructure • Using profit coming from the auction on available capacities in periods of congestion, exclusively for increasing the available capacities and elimination of congestion and and other functional limitations • Supervision of the independent regulator with public participation in passing regulatory decisions and periodical regulatory impact assesments • Implementation of obligations from the context of NATURA 2000 protected regions
Ensure that each consumer may freely select the energy supplier	• Freedom of speech, trade and import - export of energy and energy services • Clear definition of property and contractual relations between theconsumers and utilities servicing energy gauging, invoicing and distribution • Protection of the consumer rights by the effective consumer associations

The following table points out the importance of aforementioned material obligations from the standpoint of certain chapters envisaged in the negotiations on European Union membership. Great importance of these material obligations is perceived in most chapters.

Table 7: Importance of fulfilled material obligations for some aspects of the European Union Accession process

Criteria groups in EU Accession	Importance of the Accession process material obligations in respect of some criteria
1. Free trade	Free third-party access to the energy infrastructure and right of choice concerning energy supplier and energy services determine the degree of criteria fulfillment
2. Free flow of labour	Jeopardy caused to the lives and health of workers and members of their families from the energy sector environmental impact calls for necessary displacement
3. Right of establishing companies and freedom of providing	Freedom of professional association to form independent associations, and cooperation with professional associations of EU member countries
4. Free capital flow	Freedom of energy sector investments in plants and projects not envisaged in governmental decisions
5. Public procurement	Equal status of all local participants and EU participants, without favourizing participants from some countries on the basis of specific interstate agreements
6. Company rights	Implementation of International Accounting Standards in power utilities in addition to calculation of all direct and indirect costs
7. Intellectual property right	Protection of intellectual property in the area of energy technologies
8. Competition policy	Competition in the energy sector without favourizing local utilities and envisaging the environmental impact of inherited costs
9. Financial services	Restraint of state from providing financial services to the energy sector
10. Information society and media	Freedom of media impact and the ratio of measuring and electronic infrastructure in the energy sector and electronic media
11. Agriculture and rural development	Undisturbed enjoyment of assets including agricultural and forest land

Criteria groups in EU Accession	Importance of the Accession process material obligations in respect of some criteria
12. Good quality of food, veterinary and phitosanitary policy	Good quality of food and protection of food sources against the impacts of the energy sector
13. Fishery	Compliance between the fishery policy and environmental protection policy in the energy sector, taking into account the impact of mercury and arsenic on life in the water courses
14. Transport policy	Energy efficiency and use of renewable energy sources in transport and liquid fuel quality
15. Energy sector	Fulfillment of material obligations under the Treaty establishing the Energy Community before the envisaged deadlines
16. Taxation	Taxation in the energy sector and compliance between the taxation policy and material obligations under the Treaty
17. Economic and monetary policy	Contribution of fulfillment of material requirements in the energy sector to economic development
18. Statistics	Veracity and autonomy of energy statistics in respect of the Government and sectoral Ministries and energy entities
19. Social policy and |em-ployment	Health care and reduction of energy poverty by fulfillment of material requirements
20. Entrepreneur and industrial policy	Energy policy promoting fulfillment of material requirements and entrepreneurship in the energy sector
21. Trans-European grids	Freedom of access to power grids
22. Regional policy and coordination of structural instruments	Reduction of cross-border pollution and promotion of cross-border cooperation in the energy sector
23. Cooperation in the area of judiciary and basic rights	Protection of basic human rights from negative energy sector impacts
24. Justice, freedom and safety	Implementation of the Aaruhus Convention
25. Science and research	Participation of local researchers in European programs in the energy, healthcare and environmental sectors
26. Education and culture	Health of schoolchildren
27. Environment	Environmental protection and health care in accordance with the material obligations and within agreed deadlines
28. Consumer protection and health care	Access to information and consumer protection from the energy sector impact in accordance with the taken material obligations
29. Customs union	Restraint from od non-customs barriers in the energy sector and energy equipment
30. External economic relations (External relations)	Inclusion in external economic relations in the energy sector in accordance with the principles promoted by EU
31. Foreign, security and defence policy (CFSP)	Reduction of energy dependence and dependence issue management
32. Financial control	Efficient and transparent financial control in the energy and environmental sector in the context of fulfillment of material obligations
33. Financial and budgetary provisions	Separation of the energy sector from public finance for the pupose of execution of material obligations and improved public finance sustainability
34.Institutions	The public administration's capability of implementing material obligations is the measure of capability for participating in European institutions
35.Other	

Conclusion

We conclude that Serbia has to deal with important material obligations from the European Union Accession process and that implementation of these material obligations is in the best interest of the Serbian population. Even if there were no European Union Accession process, these or similar obligations should be implemented as soon as possible. This is in line with the perception of most Serbian citizens, as reflected in the available survey on public opinion.

We believe that the achievement of the afore-described material obligations is in the public interest and that it would be good for the Serbian public administration to make a greater effort in order to achieve these material obligations, so that the achieved progress could be perceived and measured, which would lead to greater public confidence in the public administration and have an impact on the further European Union integration processes.

Accession to the European Union appears here as a critical determinant for the survival of not such a small part of the Serbian population. Fulfillment or unfulfillment of these material obligations **shall have an impact on the life expectancy, diseases and population productivity, the possibility of undisturbed enjoyment of property, basic human rights, public safety** and other. These existential and public values are of priceless importance and they should have absolute priority in the public policy. This circumstance should be taken into account when estimating the costs and benefits of the European Union Accession process. We here particularly have in mind that the **quality of human life** has no real economic price. We can add a certain estimated economic value to the years of human life, but for an individual who after all makes the decisions, his life is of priceless value.

The environmental costs and implementation costs of these liabilities, will grow within time. Most environmental impacts of the energy sector have a cumulative character, and therefore the future removal thereof may have a very, very high price. Accordingly, the above obligations should be realized as soon as possible, and possibly even faster than the deadlines envisaged in the agreements. The speed and manner of achievement of these obligations is a crucial determinant of the quality of public administration and public participation in decision-making. On the other hand, these are the key characteristics of the Serbian process of democracy and it goes without saying that they affect the chapters of the European Union Accession Treaty referring to the basic human rights, health care, economic development and so on. Taking into account that the system of reporting on the progress in the European Union Accession process, based on non-material parameters, is very unreliable[39], reporting based on the achievement of material obligations may be a very useful improvement.

Adjournment of implementation of the above obligations and insufficient optimization between phases of implementation of some obligations affects the value of public assets committed to the energy sector and the capacity of power utilities to independently proceed with their business activities.

By all accounts, it would be necessary to perform, during the actual accession process or during the negotiations on the European Union Accession, an appropriate cross-integration between some chapters of the negotiations. Accordingly, fulfillment of these material obligations would have to be the subject of many chapters, apart from the actual chapters on energy and environmental matters according to Table 7.

The impact of the European Union authorities in implementing these material obligations is of extreme importance. **By all accounts, the inhabitants would have considerably greater confidence in the actual European integration process and in the good intentions of the European Union if the Union authorities would insist more resolutely on the implementation of the above material obligations and if there would be public access to a reliable reporting system. This would give a better perception to most of the population as to the observation of their basic rights.**

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[39] Compare: Veebel, V. (2011). *Relevance of Copenhagen Criteria in Actual Accession: Principles, Methods and Shortcomings of EU Pre-accession Evaluation. Studies of Transition States and Societies*, Vol. 3/ Issue 3. Available at: http://www.tlu.ee/stss/wp-content/uploads/2011/11/stss_nov_2011_veebel.pdf

Simultaneous implementation of these obligations in an innovative manner has a potential of stabilizing public finance and providing better employment and national product without any currently discussed draconic austerity measures. **In addition to the fact that implementation of the above obligations would considerably reduce the budgetary and private costs of health care and increase the labour, land and plant productivity, this may lead to a dramatic decrease of fossil fuel import and reduction of foreign trade deficit by at least 1/6 compared to the average level from the previous years, with simultaneous increase of local demand but unchanged revenues of the population – salaries and pensions. The consequence of this would be reliable growth of employment and national product of around 3-5 per cent annually in a longer period. Here we should add general improvement of the quality of life for all inhabitants. This would enable faster progress in the fulfillment of requirements for European Union Accession.**

Recommendations

On the basis of the previous analysis, the following recommendations can be made:

- It is necessary that the national parliament, in cooperation with the civil sector and professional organizations, adopts the National strategy for elimination of energy poverty by improvement of energy efficiency and implementation of renewable energy sources which will direct the Government to take adequate measures within their jurisdiction.
- The National energy efficiency action plan, National action plan for using renewable energy sources and National plan for reduction of emissions need to be modified according to the procedures prescribed by the Aarhus Convention, on the basis of comparative analysis of numerous alternatives and in accordance with the National strategy for erradication of energy poverty. These plans need to include measurable annual targets and be mutually reconciled.
- The process of adoption of the above plans and consideration of alternatives need to be supported by international donors through funds and technical support. Within this context, support will be required in terms of ensuring independence and development of professional organizations and non-government organizations.
- All plants to which the Large Combustion Plant Directive applies should be excluded from the assets of public utilities which are now managing them, and should be given for management to private operators, selected by public tender, through public – private partnership and BOT (build-operate-transfer) agreement or shut down in a realistic procedure. In this way, a chance will be given for applying innovative technical solutions in accordance with the recommendations of the best available technologies (BAT) standards.
- Only after defining the future of most plants by adequate agreements and decisions on shutting them down, the decision-making process on construction of new plants can be opened in accordance with the design proposals made by the new private or public investors.
- Foreign donors and creditors could restrain from making the investment funds available to the public administration and public utilities.
- Authorization concerning professional qualifications, licences and responsibilities could be transferred from the public administration and quasi-public institutions to corresponding professional organizations.
- It is necessary to provide technical support and material aid for the National Bureau of Statistics so that it would grow into an independent regulatory institution accountable to the parliament and capable of establishing efficient systems of gathering, processing and publishing data on energy and environmental matters.
- Establish a system of public reporting on the fulfillment of material liabilities under the European Union Accession process which will directly inform corresponding progress reports on the Serbia Accession process.

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