UNIVERSITY OF SARAJEVO
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MASTER'S THESIS

THE HARMONIZATION OF THE POWER SECTOR IN BOSNIA AND HERZEGOVINA WITH THE EU LEGISLATION AND PRACTICE

Sarajevo, October 2013 SNJEŽANA ALEKSIĆ

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INTRODUCTION

Strengthening and development of electricity markets through the reforms became one of the most important issues in the power sector. Monopoly, as a model of electricity markets, has proven to be ineffective in terms of ensuring the real price of electricity and equal conditions to all market participants. Thus the European Union (hereinafter: EU) countries started the process of liberalisation of electricity market in order to remove all deficiencies of monopoly, eliminate favouritism of some participants and encourage competition. The European electricity market is open not only to the EU countries but to all countries of the European economic area. Each country that is potential member for European electricity market has to pass a process of gradual adaptation of the domestic power sector to the EU rules and standards. It implies big modifications of the power sector that can last for many years. That is why the integration process is a complex activity.

Bosnia and Herzegovina (hereinafter: BiH), as a potential candidate for internal EU energy market, started reform process of the power sector. The electricity market in BiH is still not the single place with common institutions, laws and conditions for all consumers in BiH. Hence, BiH is facing many more problems and obstacles in electricity market integration than any other country. BiH has huge energy potential. Since the energy sector of BiH is of strategic importance and contributes significantly to the general economic development, BiH authorities have recognized the importance and necessity of reform.

The main purpose of the master thesis is to analyse the current situation in the power sector, to identify the most critical issues and propose the necessary changes and possibilities for integration of BiH into the EU electricity market. Therefore, several objectives of the study are identified:

1. to get acquainted with the existing structure of the electricity market in BiH;
2. to identify the basic legal framework of the electricity market in BiH;
3. to determine the extent of the conformity (legal and institutional) of the BiH electricity market with the conditions of the EU market;
4. to identify the obstacles that BiH is facing with in the process of harmonisation of the power sector with the EU legislation and practice;
5. to make recommendations for further steps in the process of integration according to the comparisons of electricity legislation of BiH and EU.

The research methodology is based on a comparative – descriptive analysis of the state in the BiH power sector. It describes the level at which the conditions for membership are fulfilled as well as the necessary measures that have to be implemented before the integration. Therefore, critical assessment of the BiH electricity reform will be carried out together with the analytical approach to formulate the recommendations for necessary steps that should be taken for further integration into the EU internal electricity market. The bases for research are secondary data of EU and BiH, such as annual energy reports, studies and documents from legal framework as well as energy statistics.

In accordance with the set objectives the master's thesis is divided into three main chapters. The first chapter describes the role of the EU electricity market and its benefits for all Member States' generators and consumers as well as the key EU legislation of market opening. It also presents the rules of the electricity market liberalisation through electricity regulatory packages, i.e. directives and regulations of the European Commission (hereinafter: EC), when it comes to generation, transmission, distribution and supply of electricity.

The second chapter gives an overview of the power sector of BiH and its potentials. It also identifies the legal framework of the electricity market in BiH. Due to fragmentation of electricity market, the institutional framework, generation and consumption of electricity in Federation of Bosnia and Herzegovina (hereinafter: FBiH) and Republic of Srpska (hereinafter: RS) are particularly presented, while Brčko District is omitted because of absence of generation capacities as well as its minor share in the total electricity consumption. The chapter also covers analysis of retail and wholesale prices as well as network tariffs for transmission and distribution.

The last chapter of the thesis deals with the reform of the electricity sector in BiH. It describes the level of harmonisation of the BiH power sector with the EU legislation and practice. The analysis shows the current level of fulfilments of BiH requirements for membership in the EU electricity market. The section primarily examines progress in terms of unbundling, regulation issues, investment as well as third party access and competition. An integral part of the third chapter is analysis of renewable energy sources, the efficiency in the power sector of BiH and their impact on the environment. At last, the chapter shows the most important findings and recommendations regarding the barriers and challenges for entering EU electricity market.

1 EUROPEAN UNION ELECTRICITY MARKET

1.1 The role of the EU electricity market

Development of the electricity market has begun after the World War II. Generally, in the past the power sector was vertically integrated monopoly in the state ownership. In fact, one company performed all activities from generation, transmission, distribution to supply of electricity. The state was at the same time owner, operator and regulator. That was prevailing type of organising the electricity market. Over time it has been proved as ineffective in terms of equal rights for all market participants as well as the real price of electricity. There were especially huge differences between the power systems of developed Western countries and the power systems of Eastern European countries i.e. countries in transition (Tominov, 2008, p. 266). However, common to all these countries is the dominant position in the area they cover, so customers practically had no rights to choose electricity suppliers. In this way the price of electricity was unrealistic and

customers had no impact on prices. The price discrimination, i.e. different price for different customers was also widespread. It has imposed the need for the power sector reforms. In 1957 the Treaty of Rome was the first legislation that planned and announced liberalization of electricity market.

The unique and fair rules for all market participants on the supply as well as the demand side are the basic postulates of the power sector. Before joining the electricity market, each country must go through the process of electricity reform which differs from country to country. But generally, four main steps are identified in the reform process (Table 1).

Table 1. Main Steps in Electricity Reform

Restructuring	- Vertical unbundling of generation, transmission, distribution, and supply activities
	- Horizontal splitting of generation and supply
Competition and Markets	- Wholesale market and retail competition - Allowing new entry into generation and supply
Regulation	- Establishing an independent regulator
	- Provision of third-party network access
	- Incentive regulation of transmission and distribution networks
Ownership	- Allowing new private actors
	- Privatising the existing publicly owned businesses

Source: T. Jamasb & M. Pollit, *Electricity Market Reform in the European Union: Review of Progress toward Liberalization & Integration*, 2005, p. 13, Table 1.

Creating the single EU electricity market means equal rules and non-discriminated approach for all participants. The basic objectives of the electricity liberalisation are lower prices, increasing efficiency and enhancing competition. Jamasb and Pollitt (2007, p. 1) say: "An innovative and important part of the regulation of natural monopoly networks has been the use of an incentive-based regulatory regime which, in the absence of competition, attempts to mimic competitive market pressures."

From the beginning of 80s to the present the power sector has been a subject of reforms. The electricity reforms divided activities within power sector on potentially competitive (generation and supply) and uncompetitive activities (network) that should be regulated (Jamasb & Pollitt, 2007, p. 3). One of the most noted and successful early electricity reform was in Chile. Although in that period there were very few examples of reforms, Chile tried to incorporate those experiences and conduct vertical disintegration of generation, transmission and distribution systems in the best way. Chile developed competition system for power generation based on marginal prices (Jakovac, 2010, p. 263-264). According to Pollitt (2005, p. 29), Chile's electricity reforms were good example how the protection of property rights within a regulatory system can capture most of the gains from reform and limits the power of incumbents. Argentina also made one step forward and privatised generation sector in order to attract investment. For Europe the best

example was the UK electricity reform that is followed by privatisation of the power sector. On the other hand, privatisation is not a condition for the liberalisation of the sector and the development of competition, i.e. this can be done in the situation of a dominant state ownership (Hrovatin & Zorić, 2011, p.6). Regarding the privatisation of the existing publicly owned businesses Helm (2001, p. 299) also explains that privatisation is desirable only if the private sector is more efficient in creating and managing infrastructure assets and offsetting the higher cost of capital.

Although the EU made large steps in integration process there is still market division. According to Haas, Glachant, Keseric & Perez (2006, p. 2) the EU electricity market consists of at least seven different sub-markets with insufficient transmission capacities and different access rules to the grid. Therefore, the full integration of the electricity energy market is not yet completed. It is only achieved formal liberalisation of 65% because monopolists still defend themselves against the competition (Duić, Jureković & Carvalho, 2001, p. 2). Third regulatory package seeks to specify all the requirements towards full electricity market liberalisation in the EU.

1.2 The key EU legislation for market opening

First of all, the power sector reform requires creation of legal framework that would act as a landmark for implementation of reform. During the electricity reform in Europe the European Parliament and the Council of the European Union adopted three regulatory packages concerning common rules for the internal electricity market. These documents constitute the most important parts of the EU electricity legislation.

Generally, the liberalisation of the electricity market in the EU has been a top-down process driven by the EU directives (Meeus, Purchala & Belmans, 2005, p. 26) and it formally began with the adoption of the Directive 96/92/EC. The Directive entered into force on 19 February 1997. It set common rules for the internal EU market in electricity, when it comes to generation, transmission, distribution and supply of electricity. The gradual elimination of monopoly in the electricity sector was one of the aims of the Directive as well as objectivity, transparency and non-discriminatory criteria to be provided to all market participants. It also meant that the Member States had to bring into force many new laws and regulations within two years. In domain of construction of new generation capacity Member States could choose between an authorisation procedure and tendering procedure (Official Journal of the EU, no. 27/20). The Directive also required at least accounts unbundling of transmission (high voltage) and distribution systems (medium and low voltage) of electricity. Member States could choose between three network accesses – regulated, negotiated third party access (hereinafter: TPA) and single buyer procedure. In regulated network access, eligible customers access to the network on the basis of published network tariffs. According to the Directive (Official Journal of the EU, no. 27/20), in the case of negotiated access to the network, Member States take the necessary measures to ensure that electricity generators and suppliers, together with

eligible customers, negotiate access to the system so as to conclude supply contracts with each other on the basis of voluntary commercial agreements. In single buyer procedure 'single buyer' refers to any legal person who is responsible for the unified management of the transmission system and/or for centralised electricity purchasing and selling (Official Journal of the EU, no. 27/20). The first Directive introduced the concept of eligible customer who is free to choose from whom to buy the electricity. There were three thresholds regarding obtaining the status of eligible customer. According to the Article 19 (Official Journal of the EU, no. 27/20), all customers with annual electricity consumption over 40 GWh were eligible customers. In the second phase, three years after Directive adoption (in 2000), the threshold was 20 GWh and finally in 2003 customers with consumption over 9 GWh per year obtained status of eligible customers. However, the process of liberalisation of the electricity market has been slow and encountered obstacles. According to Joskow (2008, p. 14), if the reforms are not implemented correctly, they can cause significant costs instead of benefits. The first Directive partly led to the liberalisation of the European electricity market.

The second Directive 2003/54/EC attempted to eliminate all deficiencies and to accelerate the process of liberalisation. It came into force on 4 August 2003. The Directive introduced the most important innovations in the following areas: dynamics of market opening, manner of issuing permits for the construction of new generating capacity, network access, obligation of unbundling system operators and obligation of public service (Tominov, 2008, p. 273). Regarding the power sector activities the Directive introduced unbundling of vertically integrated activities into generation, transmission, distribution and supply (Trevino, 2008 p. 6). It meant separation of trading and non trading activities. Therefore, the vertical unbundling of the electricity business is crucial in establishing a competitive electricity market in the EU (Hrovatin & Zorić, 2011, p. 5). The construction of new generation capacities was based on an authorisation procedure. The Directive advocated regulated TPA. Cross border trade was also regulated. Where the distribution or transmission system operator is part of vertically integrated undertaking, it shall be independent at least in terms of its legal form (Official Journal of the EU, no. 176/37) to eliminate discrimination. With the aim of progressive market opening electricity customers had rights to freely choose their suppliers. It meant that from 1 July 2004 the eligible customers were all non-households customers and from 1 July 2007 all customers, including households (Official Journal of the EU, no. 176/37). In domain of regulatory institutions new Directive made step forward. It required establishing of independent National regulatory authority (hereinafter: NRA) as well as European Regulators' Group for Electricity and Gas (hereinafter: ERGEG). One of the most important rules was also public service obligation, i.e. customers' right on electricity of a specified quality at transparent prices. The Directive is amended with the Regulation 1228/2003 which concerns conditions for access to the network for cross-border exchanges in electricity. The proportion of the total amount of the network charges borne by generators shall be lower than the proportion borne by consumers and transmission system operators (hereinafter: TSOs) shall receive compensation for hosting cross-border flows of electricity

(Official Journal of the EU, no. 176/1). In order to ensure balance of supply and demand, the EC also adopted Directive 2005/89 concerning measures to safeguard security of electricity supply and infrastructure investment. Fairly, second regulatory package made significant progress in market opening but there were still needs for improving some areas of the reform.

Table 2. Directives for Creating Internal EU Electricity Market

	Most common form pre-1996	**1996 Directive**	**2003 Directive**	**2009 Directive**
Generation	Monopoly	Authorisation Tendering	Authorisation	Authorisation Tendering (energy efficiency/demand -side management)
Transmission (T) Distribution (D)	Monopoly	Regulated TPA Negotiated TPA Single Buyer	Regulated TPA	Regulated TPA
Supply	Monopoly	Accounting separation	Legal separation from transmission and distribution	Legal separation from transmission and distribution
Customers	No choice	Choice for eligible customers (= 1/3 of consumption)	All non-household (2004) All (2007)	All (2007)
Unbundling T/D	None	Accounts	Legal	Ownership independent TSO Legal (T) Legal (D)
Cross-border trade	Monopoly	Negotiated	Regulated	Regulated ENTSO
Regulation	Government Department	Not specified	NRA ERGEG	Strengthened independence and authority of NRA ACER established
Universal services	Not specified (social tariffs)	Not specified	Universal service obligation specified	Enhanced control of NRA, possibility to extend to small firms, energy poverty

Source: N. Hrovatin & J. Zorić, *Monografija. Reforme elektrogospodarstva v EU in Sloveniji,* 2011, p. 7, Table 1.2.

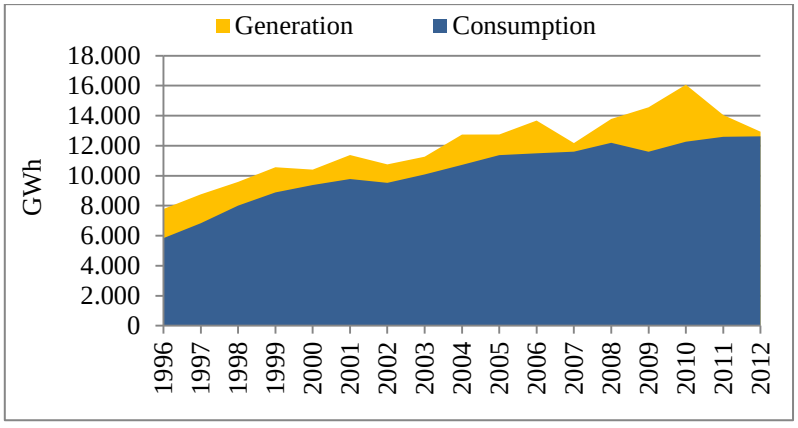
Hence, the important step towards the completion of the internal market in electricity was adoption of the third regulatory package. According to Jong (2008, p. 1), the Directive 2009/72/EC, that has become effective on 3 March 2011, contains the far-reaching and ultimate step of the ownership unbundling, requiring a full divestment of the transmission networks from the vertically integrated electricity industry. The competition was also underpinned by adoption of the Regulation 714/2009 on conditions for access to the network for cross-border exchange in electricity market. The package brought the new institutional set-up. The European Network of Transmission System Operators for

Electricity (hereinafter: ENTSO) is responsible for managing the electricity transmission system and support trading of electricity across borders. The European Agency for the Cooperation of Energy Regulators (hereinafter: ACER) seeks to assist and complement the work of NRA. In this way, it was attempted to increase the power and independence of NRA. The ACER and the ENTSO also tightly cooperate with EC in domain of technical rules, cross-border issues, monitoring of market functioning and network development plans. The last electricity Directive brought an authorisation procedure for the construction of new generation capacities as well as a tendering procedure with the aim of energy efficiency/demand-side management (Official Journal of the EU, no. 211/55). In domain of customers' protection the Directive provides same rights for universal services with no discrimination. They would have opportunity to switch suppliers in a short period. On the other hand, suppliers are obliged to provide information to consumers and to protect vulnerable customers (Official Journal of the EU, no. 211/55).

2 THE POWER SECTOR IN BOSNIA AND HERZEGOVINA

Development of the power sector in BiH started in the middle of the 20th century with the generation of electricity in hydro power plants (hereinafter: HPPs). However, with installation of thermo power plants (hereinafter: TPPs) in 60s the share of electricity generation in HPPs has gradually started to decrease and in 80s TPPs took more than half of total generation (Federal Ministry of Energy, Mining and Industry, 2009, p. 93). The power sector in BiH has huge potentials and it holds the stability of the industrial sector of BiH. According to Office of the Coordinator for Poverty Strategy Paper (2004, p. 179), large thermo and hydro potential allowed BiH to contribute with almost 50% to Yugoslavia's electric power. What makes the advantage of the BiH power sector is the fact that BiH is a net exporter of the electricity (Figure 1).

Figure 1. Total Generation and Consumption of Electricity 1996-2012 in GWh



Note. *Own figure created using reports of the State Electricity Regulatory Commission.

Source: State Electricity Regulatory Commission, *Izvještaj o energetskom sektoru Bosne i Hercegovine za 2009. godinu*, 2009a, p. 40; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59.

During the period of 1996-2009 BiH had a surplus of generation in relation to consumption around 1,634 GWh (State Electricity Regulatory Commission, 2009a, p. 40). In 2009, the difference between exports and imports of the electricity in BiH was +2,991 GWh, compared to Croatia -5,663 GWh, Montenegro -1,293 GWh, Serbia -1,316 GWh and Macedonia -1,539 GWh (Centre for Policy and Governance, 2010, p. 4). This is a proof that BiH has huge advantages in the power sector over other countries in the region.

Jenko (2007, p. 4) says: "At present, BiH is among the countries with very high energy intensity due to pure industry development and low living standard of the population, as well as inefficient use of energy." It is also the area for big investments in the future, thus it should be covered with legal reforms that would lead BiH electricity market into the internal EU energy market. BiH made few steps in the domain of electricity reform. However, the basic problem of a long and difficult process of integration in the EU electricity market is abundance of institutional, legal and political barriers. The war in BiH divided electricity market. All pre-war infrastructures were significantly damaged and destroyed. Furthermore, outdated infrastructure is just one of the factors that have limited the catching up with the EU electricity market.

BiH does not have unified domestic electricity market with three regulatory agencies and three electric power companies that act as incumbents. Political division causes heterogeneity of laws, regulations and institutions (Appendix B) in the power sector. According to Granić et al. (2008, p. 60), organisation of the power sector of BiH is certainly one of the most complicated structures in Europe for creating single legal and regulatory framework.

2.1 The legal framework of the electricity market in BiH

BiH has an extremely complex legal and institutional framework due to the constitution of the state. The basic legal framework that underpins power sector in BiH consists of:

1. Law on Transmission of Electric Power, Regulator and System Operator of BiH,
2. Law on Establishing an Independent System Operator for the Transmission System of BiH,
3. Law on Establishing the Company for the Transmission of Electric Power in BiH,
4. Law on Electricity of FBiH,
5. Law on Electricity of RS.

Law on Transmission of Electric Power, Regulator and System Operator of BiH, adopted in 2002, was the base for creating a unique electricity market in BiH. It incorporated the most important things of the EU Directives for electricity. The main objective of the Law was to provide unlimited and free trade as well as uninterrupted supply of electricity at defined quality standards (Official Gazette of BiH, no. 7/02). From the institutional side, the Law required establishment of the State Electricity Regulatory Commission (hereinafter: SERC), Independent System Operator (hereinafter: ISO) and Transmission

Company. SERC is established as an independent, non-profit organisation in 2002. The objectivity, transparency and equality are the main SERC's principles. According to the Law on Transmission (Official Gazette of BiH, no. 7/02), the SERC's competences include:

- provision of transmission of electricity and transmission system operations,
- international trade of electricity in accordance with international norms and in harmony with EU standards,
- approving, monitoring and enforcing tariffs and tariff methodologies for transmission and regulation of ancillary services,
- establishment, monitoring and enforcement of rules related to fair and non-discriminatory third party access to the transmission network,
- establishing, monitoring and enforcing quality standards for electricity transmission and ancillary services,
- consumer protection,
- coordinating and approving investment plans of the company for transmission of electric energy, including those plans related to the transmission network and the quality of electricity transmission.

Although there is a state regulator, the electricity market is still divided between entities. There are also two entity regulatory commissions – the Regulatory Commission for Energy in the Republic of Srpska (hereinafter: RERS) and the Regulatory Commission for Electricity in the Federation of Bosnia and Herzegovina (hereinafter: FERK). However, instead of direct regulation by the government department, the establishment of fully or partially independent regulatory agencies has been favoured (Zhang, Parker & Kirkpatrick, 2006, p. 6).

One of the steps of the electricity market reform, wholesale market development and unbundling of the monopoly activities in BiH was establishment of the Independent System Operator in BiH and the Elektroprenos BiH (Transmission System Operator, TSO) in the state ownership. The separation of transmission activities from generation, supply and distribution activities is provided by creating these companies. The ISO was established according to the Law on Establishing an Independent System Operator for the Transmission System of BiH in 2004 as a non-profit organisation. The basic activities of ISO include the transmission system managing in order to ensure reliability, managing of devices in the central control centre, managing the balancing market and the provision of system services and ancillary services (Official Gazette of BiH, no. 35/04). The ISO works under jurisdiction of SERC and it is financed by cost-based system operation tariffs (Official Gazette of BiH, no. 35/04).

The Elektroprenos/Elektroprijenos BiH was established with the Law on Establishing the Company for the Transmission of Electric Power in BiH from 2004. It officially began to work in 2006 as a share holding company. The activity of the Elektroprenos BiH is regulated by SERC. According to the Law (Official Gazette of BiH, no. 35/04) the

Elektroprenos BiH shall provide continuous supply of electricity at defined quality standards for the benefit of the citizens of BiH. It connects the power system of BiH with power systems of other countries, i.e. enables exports, imports as well as transit of electricity. Hence, the transmission of electricity from power plants (hereinafter: PPs) to distributive areas or large industrial consumers is the main task of the company. The company shall collect revenues from transmission tariffs and other sources, such as connection fees approved by SERC (Official Gazette of BiH, no. 35/04).

BiH has not adopted the state law on electricity, therefore the entity electricity laws regulate power sector in BiH, complying with the Law on Transmission of Electric Power, Regulator and System Operator of BiH. The entity laws on electricity were adopted in 2002. The subjects of regulation are electricity generation, distribution, supply as well as trade, representation and mediation in domestic electricity market (Official Gazette of the FBiH, no. 41/02). Briefly speaking, the Law regulates rights and obligations of eligible and tariff customers. It also covers the areas of issuing licenses for operation, construction and utilization of the power companies, quality of supply, competitiveness etc. (Official Gazette of the RS, no. 8/08).

2.2 The power sector in Federation of Bosnia and Herzegovina

2.2.1 The main characteristics of the power sector

The power sector in BiH is not only divided at the state level but also within FBiH. In FBiH electricity market is divided between two companies responsible for generation of electricity as well as distribution and supply, Elektroprivreda BiH (hereinafter: EP BiH) and Elektroprivreda HZHB (hereinafter: EP HZHB). Although the legal and regulatory framework generally supports electricity supply to customers on the whole territory of BiH, in practice market is divided between the two political entities (Energy Community Secretariat, 2011, p. 65). Hence, these two companies operate only in FBiH and they share the electricity market that belongs to FBiH (Table 3).

Most of the installed capacities in BiH are located in FBiH (63%[1]). The generation of electricity in FBiH operates within TPPs and HPPs. The TPPs Tuzla and Kakanj are connected with coal mines. However, more than half of the installed capacities in FBiH belong to HPPs. This indicates that FBiH abounds in natural energy resources. Nearly half of the total capacity in FBiH (46.3%) consists of two TPPs that belong to EP BiH. There are also three HPPs that are under jurisdiction of EP BiH. Small distributive HPPs are in ownership of the EP BiH that has status of eligible generator (Regulatory Commission for Electricity in FBiH, 2012a, p. 41). Therefore, the EP BiH owns about 67% of the total installed capacities in FBiH, i.e. 1,681 MW, while EP HZHB Mostar owns 33% (835 MW). The last one generates electricity only in HPPs. These two companies have the

[1] Own calculations based on data in Tables 3 and 4 in the whole paragraph.

status of incumbents in FBiH. All TPPs' generation facilities (blocks) in FBiH started operating between 1966 and 1988. Similarly, the most of HPPs' generation facilities started operating before 1992 except two HPPs, Peć-Mlini and Mostarsko blato that started operating from 2004 and 2010 respectively.

Table 3. Generation Capacities in FBiH in 2011

	Production facilities	**Initial year of operation**	**Installed Capacity (MW)**
1	Elektroprivreda BiH Sarajevo		1,681
	Thermo Power Plants		1,165
	Tuzla	1966-1977	715
	Kakanj	1969-1988	450
	Hydro Power Plants		504
	Jablanica	1955	180
	Grabovica	1982	114
	Salakovac	1982	210
	Distribution HPP		12
2	Elektroprivreda HZHB Mostar		835
	Hydro Power Plants		835
	Rama	1968	160
	Mostar	1987	75
	Čapljina	1979	420
	JajceI	1957	60
	JajceII	1954	30
	Peć-Mlini	2004	30
	Mostarsko blato	2010	60
	FBiH		2,516

Source: Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2011. godinu,* 2012a, p. 33 and 35, Tables 13 and 14.

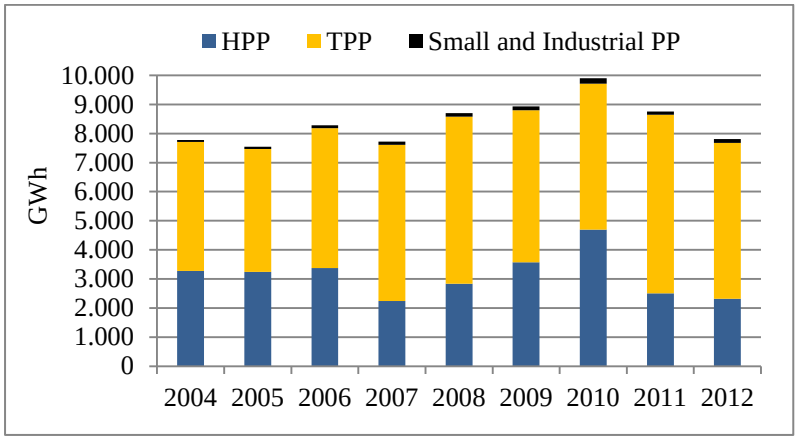
2.2.2 Generation and consumption of electricity

The generation of electricity in FBiH is made within two public companies, EP BiH and EP HZHB. Since the majority of generation capacity belongs to EP BiH (Table 3), the largest generation volume comes from EP BiH.[2] The total generation in FBiH in 2012 was 7,807 GWh, of which 84% belongs to EP BiH. Although most of the installed capacities are in HPPs, the average electricity generation in HPPs in 2004-2012 was about 37% of the total generation in FBiH (Figure 2). The TPPs generated 61% of electricity. All generators plan their generation in advance according to their capacities and the consumption, but the real generation usually vary more or less because of unpredictable circumstances. Thus the oscillations in electricity generation in HPPs are the result of unfavourable hydrological

[2] Own calculations based on appendix data of the SERC's Report on Activities in 2008 and 2012 in the whole Chapter.

conditions, especially in 2007 and 2011 when the total generation in HPPs decreased by 33% and 47% respectively in comparison to the previous year. In observed years, the generation in TPPs attempted to compensate reduction of generation in HPPs. Contrary, in 2010 favourable hydrological conditions significantly increased generation level by about 31.6%. On the other hand, the electricity generation in FBiH depends on the level of consumption. It is particularly noted in 2009 and 2010 when the electricity generation from TPPs decreased, which was the consequence of global economic crisis and low demand. Repair works in some TPPs in 2010 have also resulted in reduction of electricity generation compared to the previous year (Directorate for Economic Planning, 2012, p. 15).

Figure 2. The Structure of Generation of Electricity in FBiH in GWh



Note. *Own figure created using reports of the State Electricity Regulatory Commission.

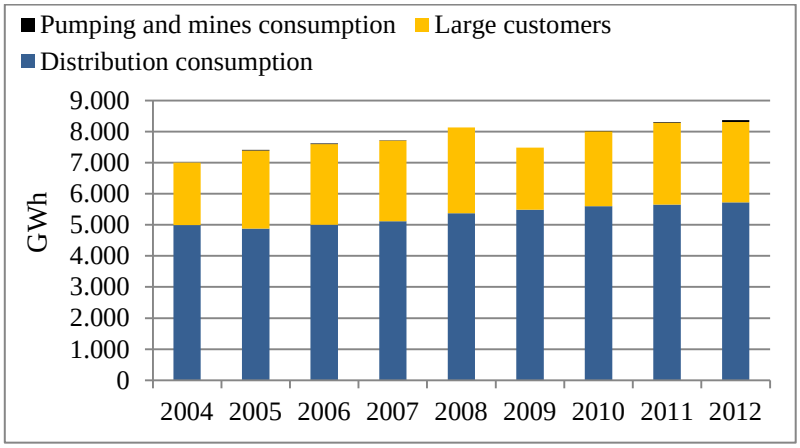
Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini,* 2008a, p. 33, Appendix A.2.

Observing the generation of electricity separately in EP HZHB and EP BiH, some important differences can be identified. Generally, the generation of electricity within EP HZHB is more risky than in EP BiH because their generation takes place in HPPs (Table 3). Despite the less participation of generation of EP HZHB, it can significantly affect the total generation in FBiH which is especially evident in 2007 and 2011. On the other hand, generation of electricity in EP BiH takes place mostly in TPPs that usually cover the lower level of generation in HPPs. In 2011 about 83.5% of the total generation was from TPPs Thus in 2007 and 2011 the generation in TPPs compensated decreased generation in HPPs and the total generation growth within EP BiH was positive compared to the previous year. The exception was in 2012 when it was impossible to compensate the reduced generations in HPPs due to the overhaul works in TPPs.

The consumers in FBiH are divided between two electricity companies EP BiH and EP HZHB. The average level of electricity consumption in FBiH in the period 2004-2012 was 7,832, GWh where 57% belongs to consumption within the EP BiH territory and 43%

belongs to EP HZHB. The total consumption in FBiH has upward trend in observed period, except 2009 when the consumption decreased by about 8% in comparison to the previous year (Figure 3).

Figure 3. The Structure of Consumption of Electricity in FBiH in GWh



Note. *Own figure created using reports of the State Electricity Regulatory Commission.

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini,* 2008a, p. 33, Appendix A.2.

Although distributive consumption in FBiH dominates (68%), the negative trend of consumption in large customers' consumption contributed to the overall reduction of consumption in 2009. The beginning of economic crisis underpinned the reduction of consumption not only in BiH but in all EU countries. The final electricity consumption in EU 27 in 2009 decreased around 5% in comparison to the previous year (European Commission, n.d.). Similarly, in FBiH in 2009 decreasing of consumption of large customers by 27.4% (y/y) was noted because of lower business activities. In that way the share of large industrial consumers decreased by about 6 p.p. (y/y) in favour of distributive consumption. During the period of 2008-2012 the average number of consumers in FBiH continuously grew. It shows that the level of consumption was directly related to the volume of consumption rather than the number of customers.

While in the territory covered by the EP BiH distribution consumption dominates, in the territory of the EP HZHB large customers' consumption dominates. Hence, the reduction of electricity consumption was higher within the EP HZHB in 2009. In the territory of EP HZHB there is a large industrial company "Aluminij Mostar" that has significant impact on electricity consumption. The large consumers' consumption within EP HZHB in 2009 decreased 22% and that is mostly connected with electricity consumption of "Aluminij Mostar" (State Electricity Regulatory Commission, 2012a, p. 59). The large consumers' consumption within EP HZHB makes around 82% of the total large consumers' consumption in FBiH in the period 2004-2012 (State Electricity Regulatory Commission,

2012a, p. 59; State Electricity Regulatory Commission, 2008a, p. 33). The EP BiH also has contributed to reduction of consumption in large customers' category in FBiH where reduction of 44% (y/y) is registered. The pumping and mines consumption has minor share in total consumption and therefore its impact was negligible in observed period. After 2009 the increasing trend of electricity consumption was noted, mainly due to the modest recovery of industrial production. On the other hand, distribution consumption has increased, but with more decelerated growth rate than before the crisis.

2.2.3 Institutional framework

The power sector in FBiH is regulated by FERK that is established in 2002. According to the Electricity Law (Official Gazette of the FBiH, no. 41/02), it is specialized, autonomous, independent and non-profit organization in the Federation of BiH whose main responsibilities are:

- supervising and regulating the relations between power generation, distribution and electricity customers including power traders,
- prescribing methodology and criterion for defining the prices for supplying of non-eligible customers,
- defining of tariffs for distribution systems users and tariffs for non-eligible customers,
- issuing and revocation of licenses for generation, distribution and tariffs for non-eligible customers,
- issuing the preliminary construction permits and licenses for usage of power facilities except the facilities for power transmission,
- defining general conditions for electricity supply.

The generation, distribution as well as supply of electricity in FBiH are organized within two electric power companies (hereinafter: EP):

1. Public enterprise Elektroprivreda BiH, Joint Stock Company (hereinafter: JSC) Sarajevo,
2. Public enterprise Elektroprivreda HZHB, JSC Mostar.

These companies, together with Elektroprivreda RS, are incumbents in the territory they cover. The primary responsibilities of EPs are generation, distribution and supply of electricity in FBiH (through their subsidiaries) as well as trading in domestic market. Both companies remain 90% state owned with no legal unbundling along with their main activities (Energy Community Secretariat, 2010, p. 48). Ten percent of capital is in private ownership. These EPs exist in their present form from 2004 and EP BiH is the largest electric company in BiH. Electricity distribution in the territory covered by EP BiH is operated through its five subsidiaries in Sarajevo, Mostar, Zenica, Tuzla and Bihać. On the other hand, EP HZHB, within its three subsidiaries Sjever, Centar and Jug, carries out electricity distribution.

2.3 The power sector in Republic of Srpska

2.3.1 The main characteristics of the power sector

Unlike in FBiH, where the electricity market is divided between two electric companies, in RS there is Elektroprivreda RS (hereinafter: EP RS) that acts as an incumbent. The power sector in RS characterises generation of electricity from TPPs as well as HPPs. The largest part of installed capacities is in HPPs (Table 4), which shows huge potentials of natural energy resources.

Table 4. Generation Capacities in RS in 2011

	Production facilities	**Initial year of operation**	**Installed Capacity (MW)**
1	Thermo Power Plants		600.0
	RiTE Gacko	1983	300.0
	RiTE Ugljevik	1985	300.0
2	Hydro Power Plants		851.2
	Trebišnjica	1965-1981	404.0
	Drina	1989	315.0
	Vrbas	1982	110.0
	Small HPPs		
	Mesići	1950	3.2
	Bogatići	1947	8.0
	Tišča	1990	2.0
	Vlasenica	1950	0.9
	Štrpci	1998	0.1
	Sućeska	2005-2008	1.8
	Divič	-	2.3
	Bistrica	2010	3.9
3	Energolinija		24.0
	Republic of Srpska		1,475.2

Source: Regulatory Commission for Energy of RS, *Izvještaj o radu za 2011. godinu,* 2012a, p. 44, Table 7; Power Utility of RS, *Profil,* n.d.; State Electricity Regulatory Commission, *Izvještaj o energetskom sektoru Bosne i Hercegovine za 2009. godinu,* 2009a, p. 19.

While 41% of the total installed capacity in RS belongs to TPPs, around 57.7% of installed capacities belong to HPPs.[3] HPPs Trebišnjica, Drina and Vrbas have the biggest installed capacities (about 56% of the total installed capacities in RS). According to Regulatory Commission for Energy of RS (2011, p. 37), the generation of electricity is primary (licensed) activity of the mentioned power plants. There are also four small HPPs (Mesići, Bogatići, Tišča and Vlasenica) with the generation license within the company EP RS. The small HPPs (Table 4) generated electricity sell through two distribution companies

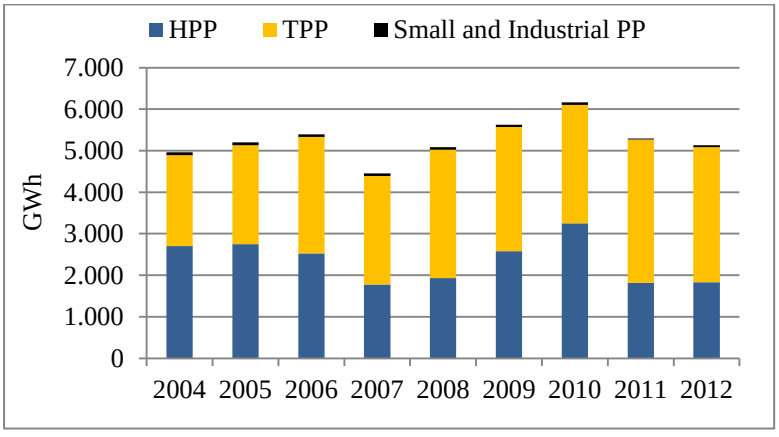
[3] Own calculations based on data from Table 4 in the whole paragraph.

Elektrokrajina and Elektrodistribucija Pale. Energolinija is a small private company that generates electricity only for its own use (Regulatory Commission for Energy of RS, 2012a, p. 44). However, more than half of the total electricity generation comes from TPPs Gacko and Ugljevik, which are connected with large coal, i.e. lignite mines used in TPPs' operation. Majority of installed capacities started operating before 1992. Although RS has huge potentials for electricity generation from renewable energy sources, up to now it has not installed any power plants (except HPPs). Generally, BiH holds 3,991 MW of the installed capacities, where 63% belongs to FBiH (Table 3) and 37% belongs to RS (Table 4).

2.3.2 Generation and consumption of electricity

The electricity generation in RS is organised mainly within TPPs and HPPs. In the period 2004-2012 increasing trend in electricity generation was interrupted in 2007 and 2011. Although most of the installed capacities belong to HPPs (Table 4), the average electricity generation from TPPs dominates (54%), in regards to the generation from HPPs (45%).[4] Unpredictable hydrological conditions, especially in 2007 and 2011, contributed significantly to the reduction of generation in HPPs and the share of HPPs' generation decreased by about 7 p.p. and 18 p.p. respectively in comparison to the previous year (Figure 4). In 2007, total generation of electricity in RS decreased by 17.4% because of reduction of HPPs' electricity generation as well as TPPs' generation. The extended duration of the overhaul in the TPP Gacko and unstable operation after overhaul (Regulatory Commission for Energy of RS, 2008, p. 40) were the main reason for decreasing in electricity generation in TPPs.

Figure 4. The Structure of Electricity Generation in RS in GWh



Note. *Own figure created using reports of the State Electricity Regulatory Commission.

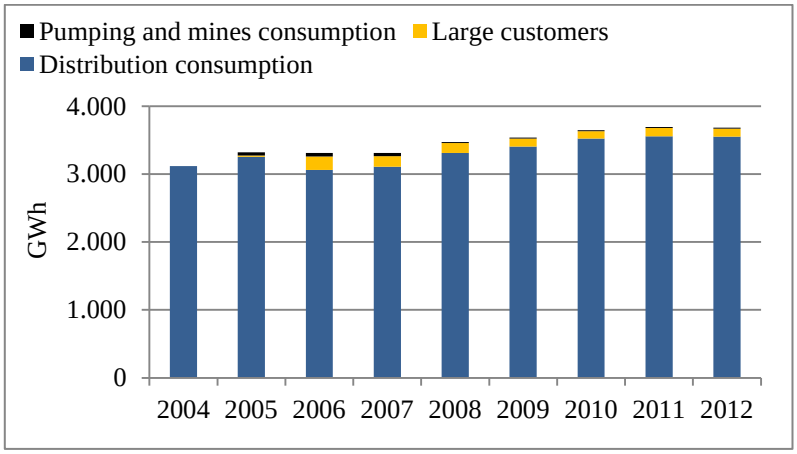
Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini,* 2008a, p. 33, Appendix A.2.

[4] Own calculations based on data of the SERC's Reports in 2012 and 2008 in the whole Chapter.

Similarly, in 2011 the reduction of the total electricity generation in RS was caused by lower generation in HPPs (44% y/y) because of weather conditions. Therefore, the TPPs' generation attempted to compensate it by increasing the generation. The opposite situation was registered in 2009 and 2010 when the extremely good weather conditions increased electricity generation in HPPs by about 33% and 26% respectively. In the same period the reduction of generation in TPPs has also been registered. The global economic crisis, significantly determined by the activity of industrial sector, was the main factor of lower electricity generation in TPPs. The same situation happened with small and industrial producers. Although the share of small and industrial power plants is negligible they also decreased their electricity generation in crisis period.

In the period 2004-2012 moderate growth trend of total electricity consumption was registered in RS. Unlike in FBiH, where the share of large consumption is not negligible, in RS different structure of consumption is registered. The share of large consumption in RS is only 3% of total consumption while distribution consumption dominates (about 96%) in the observed period (Figure 5).

Figure 5. The Structure of Consumption of Electricity in RS in GWh



Note. * Own figure created using reports of the State Electricity Regulatory Commission.

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini*, 2008a, p. 33, Appendix A.2.

It is noticed that distribution consumers were increasing their consumption from 2007 to 2010. In the same period the large consumers decreased their share in total consumption. It was probably consequence of the negative economic environment, i.e. global economic crisis which had a negative influence on large customers' consumption as well as on pumping and mines consumption. Further analysis of consumption within distribution network in RS shows that the share of households' consumption in 2011 decreased by about 4% in comparison to the share in 2004, as well as the share of consumption at 110 kV voltage level (Regulatory Commission for Energy of RS, 2005, p. 32; Regulatory

Commission for Energy of RS, 2012a, p. 69). Conversely, 35 kV and 10 kV voltage level consumers increased their share in distribution's consumption. Public lighting and other consumption consumers did not change their shares in consumption in the above mentioned period. Comparing the total consumption in FBiH and RS it is obvious that there had been fewer oscillations in RS because of lower share of large customers' consumption which was affected by crisis.

2.3.3 Institutional framework

The central place in the institutional framework of the power sector in RS takes RERS. In 2002, according to the Law on Electricity in RS, Regulatory Commission for Electricity of RS was founded and it covered only the power sector. Later in 2007, it was renamed to RERS (Law on amendments to the Law on electricity). It monitors and regulates not only electricity sector but gas and oil sector as well. Generally, as independent non-profitable company, it provides conditions for market opening as well as non-discriminatory position on the electricity market, quality of services and fair prices to all participants (State Electricity Regulatory Commission, 2009a, p. 4). According to the Law on Electricity (Official Gazette of the RS, no. 8/08, p. 3), the basic competences of RERS within the power sector are:

- monitoring and regulation of relationships between generation, distribution and customers of electricity including traders of electricity,
- prescription of methodology and criteria for determination of both, the price for using distribution network and for supply of non-eligible customers with electricity as well as the methodology for determination of the fee for connection to the distribution network,
- making tariff system for selling electricity and using distribution network,
- determination of tariff rates for distribution system users and tariff rates for non-eligible customers,
- issuance or revocation of the licenses for generation, distribution and trade of electricity,
- supporting competitiveness, efficiency, transparency as well as security and quality of supply of electricity.

The generation and distribution activities in RS are organised within Mixed Holding EP RS. The EP RS was founded in 2005. In the period of 1992-2005 it was organised as a public enterprise. The company is 100% state owned, responsible for electricity generation, distribution and supply of electricity in RS, domestic electricity trading, optimisation of generation and provision of technological unity of the system for more efficient and rational business of companies (Power Utility of the Republic of Srpska, n.d.). The generation activity in RS is carried out within five JSCs which are part of the EP RS: Hydro Power Plants on Trebišnjica, Hydro Power Plants on Drina, Hydro Power Plants on Vrbas, RiTE Gacko and RiTE Ugljevik. The EP RS has a share of 65% in equity capital of dependent companies (Power Utility of the Republic of Srpska, n.d.). Besides these

generators there are four small HPPs (Mesići, Bogatići, Tišča and Vlasenica) operating within the electric power distribution companies and four small HPPs in private ownership (Divič, Štrpci, Sućeska and Bistrica) that deliver electricity to Elektrokrajina and Elektrodistribucija Pale (Table 4). There is also private company Energolinija that generates electricity for its own purposes (Regulatory Commission for Energy of RS, 2012, p. 44). Within EP RS there is the Research and Development Centre of Electrical Engineering, with the share of EP RS in equity capital 51% (Power Utility of the Republic of Srpska, n.d.).

The distribution activity in RS is carried out within five JSCs which are part of EP RS: Elektrokrajina, Elektro Doboj, Elektro Bijeljina, Elektrodistribucija Pale and Elektrohercegovina Trebinje. According to Regulatory Commission for Energy of RS (2011a, p. 50), each distributor is in charge of performing activity at certain geographical area and there are separate legal structures which shows that the legal unbundling is met. The EP RS has share of 65% in equity capital of distribution companies (Power Utility of the Republic of Srpska, n.d.).

2.4 The price of the electricity in BiH

2.4.1 Wholesale tariffs

In the wholesale market it is trading with electricity that is not intended for final consumption but resale. The wholesale market also covers international (cross border) trade in electricity. The main participants in the wholesale electricity market in BiH are generators, traders and suppliers. They hold licenses for the performance of their activities issued by the relevant Regulatory Commissions in BiH. The SERC issues licenses for international trade while the other activities are under jurisdiction of the entity regulatory commissions.

In BiH there is no trading on the organised or institutional market (stock exchange) and the electricity trading takes place under bilateral agreements, i.e. there is a bilateral wholesale market (State Electricity Regulatory Commission, 2009a, p. 7). The bilateral agreements are concluded between traders and generators, i.e. three power companies in BiH or with other traders. Due to the lack of stock exchange electricity trading in BiH there is no official published data of wholesale electricity tariffs in BiH so it is difficult to compare wholesale prices. This is one of the disadvantages of bilateral model because the price and terms of contracts are unknown to other market participants (counterparty risk).

Anyway, it is certain that the wholesale prices of electricity in BiH vary according to global economic activities. This is especially evident in the period of economic crisis in 2009 when large industrial companies decreased their electricity consumption. As a result there has been a decrease in wholesale electricity prices on European Energy Exchange (hereinafter: EEX), Leipzig. According to SERC (2009a, p. 24), the realized wholesale

prices in BiH, from the level of 90 €/MWh in the middle of 2008, dropped to the level of 40 €/MWh, and even lower in the middle of 2009. Comparing the level of the wholesale prices in BiH with the level of electricity prices (Pan-Euro Day Ahead Base Load Index) published by Energy Market Observation System, it is noted that they do not differ too much. In 2011 wholesale electricity prices in Europe were 45-60 €/MWh while in RS they ranged around 42.97 €/MWh (Regulatory Commission for Energy of RS, 2012, p. 97). It can be assumed that wholesale prices in BiH are in range with the prices on the EEX stock exchange.

BiH transmission lines enable free international trade in electricity. Good connections of the BiH transmission system with the neighbours provide imports and exports activities to Croatia, Serbia and Montenegro. The SERC has approved activities about ITC agreements to the ISO. The Inter-TSO Compensation Mechanism is a method of compensation for costs in the national transmission network caused by electricity flows due to cross-border trade (State Electricity Regulatory Commission, 2009b, p. 8). The Mechanism involves the implementation of EU Regulation1228/203. In this way BiH realises a substantial income on the basis of the ITC mechanism.

The first step in international wholesale trade in BiH is allocation of cross-border capacities. The SERC issues licences for international trade and in the end of 2012 there were 19 licensed companies in BiH (State Electricity Regulatory Commission, n.d.). The ISO organises auctions on a daily, weekly, monthly and annual basis and provides licensed companies the use of cross-border capacities. The auction is performed through Auction Module where all companies submitted their bids to the ISO (Independent System Operator in BiH, 2010, p. 5). Each company pays at least marginal price for allocated capacity. In case of higher required capacity than available, capacity will be awarded to a company with the highest price. The companies have to sign an agreement on the allocated capacities with Elektroprenos BiH. The Elektroprenos BiH has to prepare plan of use of collected revenue from auctions in accordance to the EU Regulation 1228/203 on Conditions for Access to the Network for Cross-Border Electricity Trade at the beginning of the year and present it to SERC (Independent System Operator in BiH, 2010, p. 9). It means that collected funds will be used mainly for development and construction of cross-border capacities.

All participants in the market independently decide on the purchase or the sale of electricity. The ISO has proposed and SERC approved Market Rules for the first time in 2006 and new draft is prepared in 2010. Activities on bilateral trade market in BiH are performing until “ID Gate Closure”, time after which no daily schedules or re-nominations are accepted from market participants (Independent System Operator in BiH, 2011, p. 5). After ID Gate Closure market participants do not have the ability to modify the program. The ISO takes full control of the power system and performs balancing of supply and demand because of potential development unforeseen or unexpected events (Independent System Operator in BiH, 2011, p. 8).

2.4.2 Retail tariffs

Methodology for calculation of retail prices was changing during the period before electricity reforms and after them. Before the electricity market liberalisation prices of electricity were fixed, while with market opening 40%-50% of the price is variable and 50%-60% of the price is fixed and it corresponds to the fees paid for access to the networks (Percebois, 2008, p. 3). The market liberalisation in BiH has not finished yet and retail electricity prices are still fixed for tariff customers. All consumers in BiH form 1 January 2012 are eligible consumers (except households, small customers) that can buy electricity in the market or from public suppliers.

Based on division of the electricity consumers retail electricity prices in BiH are formed. Suppliers of tariff customers are users of licenses for supply of tariff customers issued by the RERS and the FERK who purchase and deliver electricity for end customers in a regulated manner. On the other hand, eligible suppliers are holders of licenses for performance of the activities of trade and supply of electricity in the territory of BiH issued by RERS as well second-tier licenses (supply of eligible customers) issued by FERK. In FBiH, the EP BiH and the EP HZHB have licenses for supply of tariff customers, and in RS there are five distribution companies within the EP RS that supply tariff customers.

Since the electricity, from its generation to final consumption, causes costs for all participants in the electricity market, thus the tariff customers pay the price that includes all the costs of electricity system through their electricity bills. The retail electricity prices include the following tariffs:

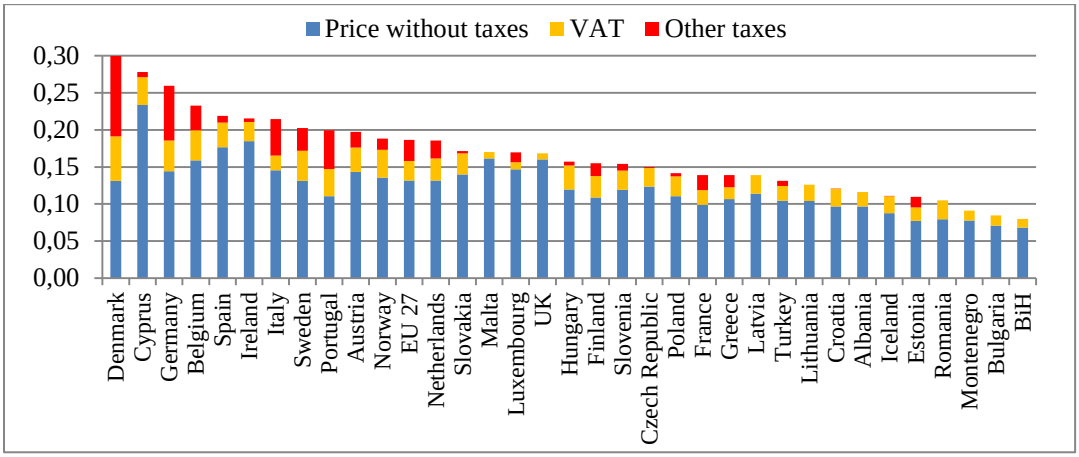
1. Tariffs for generation of electricity,
2. Tariffs for network use that includes
    a) Tariffs for transmission network (fees for transmission network use and losses, ISO fees, ancillary services, secondary and tertiary services);
    b) Tariffs for distribution network (included losses) if the customers are connected to the distribution network,
3. Tariffs for supply of electricity.

In comparing the electricity prices for households and industrial consumers in BiH with the prices in EU countries it is noted that BiH has the lowest electricity prices with or without taxes (Figures 6 and 7). The TPP Ugljevik is linked with the coal mine Ugljevik with considerable reserves of lignite. They operate together within JSC RiTE Ugljevik. The mine and TPP Gacko have the same principle of operation. From the other side, significant hydro potentials in BiH has impact on electricity prices generated from HPPs. These are some of the key factors that contribute to the low electricity prices.

The lowest prices in the region are probably main reason why eligible customers in BiH will still be using public suppliers till January 2015. Later on, they will have to purchase electricity in the market, i.e. they will not be allowed to buy electricity from the public

supplier. However, in BiH only one company (eligible customer, Aluminij Mostar) that buys electricity from public supplier as well as abroad is currently registered. Other potential eligible customers buy electricity from the EPs in FBiH and RS that cover region where they belong.

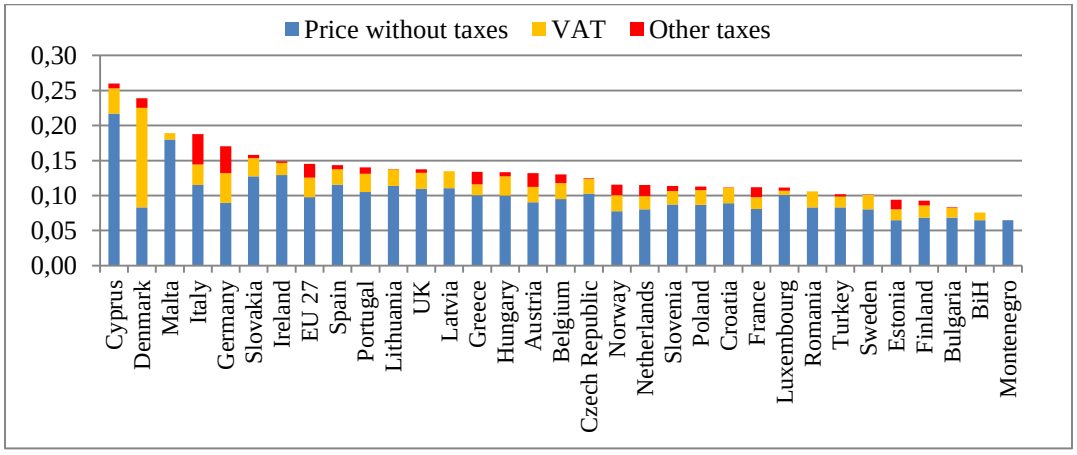
Figure 6. Domestic Consumers Prices (€c/kWh) in H1 2012, Band DC: 2,500 kWh < Consumption < 5,000 kWh



Note. *Own figure created using data from Energy Statistics.

Source: European Commission, *Energy Statistics*, n.d.

Figure 7. Industrial Consumers Prices (€c/MWh) in H1 2012, Band IC: 500 MWh< Consumption < 2,000 MWh



Note. *Own figure created using data from Energy Statistics.

Source: European Commission, *Energy Statistics*, n.d.

All tariff customers in BiH are divided into groups according to voltage and their consumption. For each category of consumers there are calculating tariff rates for tariff elements, i.e. metering point of customer, billing demand, active electricity and reactive electricity (Regulatory Commission for Electricity in FBiH, 2005, p. 14). The shares of energy, network and taxes in final price for industrial consumers and households differ in

BiH. In industrial consumers' price, the largest share belongs to energy while households' prices have almost the same share of energy and network in the total price (Table 5). The taxes share is the same for both categories of consumers.

Table 5. Share of Individual Components in the Electricity Price of Industrial Customers and Households According to Eurostat Methodology

Components	**Industrial consumers 10 kV in %**	**Households 10 kV in %**
Energy	54	44
Network	31	41
Taxes	15	15

Note. *Own table created using the SERC's Report.

Source: State Electricity Regulatory Commission, *Izvještaj o energetskom sektoru Bosne i Hercegovine za 2009. godinu*, 2009a, p. 29, Figures 10 and 11.

Historically, electricity prices in BiH for tariff customers had a growing trend. It is also noticeable that the prices of electricity in FBiH are slightly higher than in RS (Table 6).

Table 6. Average Retail Electricity Prices in €c (taxes excluded)

Electricity prices		**2008**	**2009**	**2010**	**2011**
Average households prices	EP BiH	6.18	6.20	6.17	6.73
	EP HZHB	6.75	6.74	6.71	6.71
	EP RS	5.93	5.94	6.37	6.40
	BiH	-	6.16	6.32	6.59
Average electricity prices	EP BiH	6.52	6.71	6.66	7.14
	EP HZHB	6.62	6.80	6.48	6.19
	EP RS	5.97	5.95	6.25	6.19
	BiH	-	6.47	6.48	6.59

Note. *Own table created using the Regulators' Reports.

Source: Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2011. godinu*, 2012a, p. 75; Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2010. godinu,* 2011a, p. 75; Regulatory Commission for Energy of RS, *Izvještaj o radu za 2011. godinu,* 2012a, p. 99; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2011. godini*, 2011a, p. 20; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2010. godini*, 2010, p. 21; State Electricity Regulatory Commission, *Izvještaj o energetskom sektoru Bosne i Hercegovine za 2009. godinu*, 2009a, p. 28.

2.4.3 Network tariffs for transmission

SERC has jurisdiction on approval, monitoring and enforcing network tariffs for transmission activities. The tariff pricing methodology for transmission explains the structure of tariffs as well as a method of their determination. It is based on the cost of service regulation, i.e. rate of return regulation. That means that SERC approves annual

revenue to regulated company that is sufficient to cover justified costs of operation and maintenance, depreciations costs, return on assets and other expenditures (State Electricity Regulatory Commission, 2011b, p. 8). The regulatory period is usually one year. While the cost of service regulation limits profit, the price cap regulation limits prices and allows companies to increase their profits at the expense of reducing the costs. The tariffs issued by SERC cover transmission fees, tariffs for the ISO and tariffs for ancillary services (cover costs of purchasing services). Both customers and generators pay transmission fees.

According to the Tariff Pricing Methodology (State Electricity Regulatory Commission, 2011b, p. 7-8), the transmission fee paid by customers shall comprise two components:

a) Part of the transmission fee pertaining to energy,

$$p_{LE} = k \times \frac{RR_L}{W_C} \qquad (1)$$

b) Part of the transmission fee pertaining to capacity,

$$p_{LC} = (1 - k) \times \frac{RR_L}{P_C} \qquad (2)$$

where:
RR_L – part of the revenue requirement pertaining to network fees paid by customers,
W_C – active electric energy taken over by customers,
k – the ratio of the revenue requirement of the component for energy and total revenue requirement pertaining to customers.
P_C – peak load measured at customer, which represents an annual summation of all monthly maximum capacities measured at customers.

The transmission fee paid by generators shall be (State Electricity Regulatory Commission, 2011b, p. 8):

$$p_G = \frac{RR_G}{W_G} \qquad (3)$$

where:
RR_G – part of revenue requirement pertaining to network fees paid by generators (it usually ranges from 0%-10% of the total necessary revenue),
W_G – active electric energy injected in the transmission network by generators connected to the transmission network.

The tariffs for the ISO operation (State Electricity Regulatory Commission, 2011b, p. 11-12) are also paid by customers (4) as well as generators (5):

$$p_{ISOL} = \frac{RR_{ISOL}}{W_C} \qquad (4)$$

where:
RR_{ISOL} – part of the revenue requirement of the Independent System Operator pertaining to the tariff paid by customers,
W_C – active electric power taken over by customers.

$$p_{ISOG} = \frac{RR_{ISOG}}{W_G} \qquad (5)$$

where:
RR_{ISOG} – part of the revenue requirement of the Independent System Operator pertaining to the tariff paid by generators,
W_G – active electric power injected in the transmission network by generators connected to the transmission network.

In order to maintain the balance of the power system the ISO identifies all generators that have possibilities to provide ancillary services (secondary and tertiary). Hrist & Kirby (1996, p. 19) explain that it is impossible for each control area to exactly match its generation to load in an interconnected system. In case of imbalance of power sector, the ISO activates generators (providers of secondary and tertiary services) to maintain power system balance. The tariffs for ancillary services are the main sources of financing of these activities. In this way, the ISO is obliged to plan and estimate annual quantity of ancillary services as well as necessary funds for these services (State Electricity Regulatory Commission, 2011b, p. 13).

Generally, the main objective of the transmission pricing methods is covering transmission system costs as well as providing some profit. The basic transmission pricing methods are incremental transmission pricing method and embedded or rolled-in pricing method (postage stamp method). According to Murali, Kumari & Sydulu (2011, p. 35), postage stamp method is traditionally used by electric companies to allocate the fixed cost among the transmission system users. While it has advantages in terms of full cost recovery, it fails to set incentives for the reinforcement of the network which is characteristic of incremental transmission method (Krause, 2003, p. 20). In BiH the postage stamp method for determination of transmission fees is used. The transmission tariffs are the same in the entire territory of BiH. Currently approved transmission tariffs in BiH are presented in Table 7 and historically observed they have had growing trend.

Regarding the EU requirements for the transmission tariffs the Directive 2009/72/EC prescribes that transmission tariffs shall be non-discriminatory and cost-reflective. However, national regulators shall ensure that transmission system operators are granted appropriate incentive to increase efficiency i.e. transmission tariffs shall allow necessary investments in the network in order to ensure the stability of the system and security of supply (Official Journal of the EU, no. 211/55). The incremental pricing method provides

efficiency requirements but at the same time it fails to cover total system costs. That is why embedded method is widely used in the practice (Krause, 2003, p. 20).

Table 7. Currently Approved Transmission Tariffs in BiH

Transmission tariffs	**pf/kW**
Transmission charge pertaining to energy	0.5640
Transmission charge pertaining to capacity	1.4730
ISO operations	0.0538
Tariff set for ancillary services secondary and tertiary regulation	0.2176
Tariff set for ancillary services for covering losses in the transmission network	7.6100

Note. *Own table created using the SERC's Decisions.

Source: State Electricity Regulatory Commission, *Odluka o tarifama za usluge prenosa*, 2012b, p. 1; State Electricity Regulatory Commission, *Odluka o tarifi za rad NOS-a*, 2013, p. 1; State Electricity Regulatory Commission, *Odluka o određivanju tarifa za pomoćne usluge*, 2011c, p. 3-4.

2.4.4 Network tariffs for distribution

The network tariffs for distribution in BiH are under jurisdiction of the entity regulatory commissions. Both entities adopted separate tariff methodology and tariff proceedings developed by FERK and RERS. The duration of regulatory period is not specified, i.e. tariff proceedings may be initiated whenever there are reasonable arguments for their change. Generally, there are three main steps in determination of distribution tariffs:

1. Initiative for new distribution tariffs (by Regulator or electricity companies),
2. Benchmarking analysis of distribution network costs and losses,
3. Making decision on acceptance (fully or partially) or rejection of proposed tariffs.

The usage of distribution network causes costs and all customers connected to distribution network are obliged to pay for that service to corresponding distribution company. The costs of usage of the distribution system are based on the approved revenue requirement that is harmonised with power balance of distribution (Regulatory Commission for Electricity in FBiH, 2005, p. 12). According to the FERK's Rules on Tariff Methodology (2005, p. 16), the tariff of the distribution network recovers performance and maintenance costs, costs for managing distribution network, development of the distribution network and the electricity losses incurred within the distribution network in an amount approved by the FERC. On the other hand, the tariff rate of the monthly fee recovers the costs related to the metering point of customer (maintenance of connection and maintenance, reading and calibration of metering devices).

The revenue requirement for performance of regulated activity is calculated (Regulatory Commission for Electricity in FBiH, 2005, p. 7):

$$RR = C_{O\&M} + \big((PV - AD) + WC\big) * WACC + C_D + T - OR \qquad (6)$$

where:
$C_{O\&M}$ – operation costs
PV – purchase value of fixed assets
AD – accumulated amortisation
WC – permanent operation assets
WACC – weighted average cost of capital
C_D – amortisation
T – taxes and other duties
OR – other revenues.

Before 2006 electric power companies in FBiH have, with the consent of the Government of the Federation, determined the price of electricity. The FERK adopted the tariff rates for the first time in 2006. Network tariffs for distributions in FBiH are determined by Rules on Tariff Methodology and Tariff Proceedings. They are based on international standards and electricity Directives of the EU. FERK makes decisions on tariffs for users of distribution system of the EP BiH as well as the EP HZHB. The tariff rates are determined for medium voltage and low tariff group (hereinafter: TG).

Table 8. Approved Distribution Tariffs in FBiH

Consumers	**Distribution tariffs (including distribution losses) in pf/kWh**	
	EP BiH	**EP HZHB**
35 kV	0.090	0.153
10 kV	0.272	0.326
0.4 kV Households	5.143	5.136
0.4 kV Other consumption I TG (peak load > 23 kV)	4.130	3.987
0.4 kV Other consumption II TG (peak load ≤23 kV)	6.095	6.409
0.4 kV Other consumption III TG*	-	5.818
0.4 kV Other consumption III and IV TGs**	5.143	-
0.4 kV Public lighting	6.331	8.064

Note. *III TG - Single-tariff or two tariff meter without timer or any other device for registering the tariffs. **III TG - Single-tariff or two tariff meter without timer or any other device for registering the tariffs; IV TG - Two tariff meter without timer or any other device for registering the tariffs

Source: Regulatory Commission for Electricity in FBiH, *Odluka o tarifnim stavovima za korisnike distributivnog sistema Javnog preduzeća Elektroprivreda BiH*, 2011b, p. 8; Regulatory Commission for Electricity in FBiH, *Odluka o tarifnim stavovima za korisnike distributivnog sistema Javnog preduzeća Elektroprivreda Hrvatske zajednice Herceg Bosna*, 2012b, p. 6.

The regulatory commission in RS also adopted Rules on tariff methodology and tariff proceedings. Similarly to FBiH, distribution companies in RS submit an application to the RERS for approval of new price, i.e. tariff rates based on required revenue, which consists

of the justified costs increased by the return on capital (Regulatory Commission for Energy of RS, 2012a, p. 61). RERS has also adopted the first Decision on tariff rates of distribution network in 2006.

Table 9. Approved Distribution Tariffs in RS

Consumers	**Distribution tariffs (including distribution losses) in pf/kWh**
	EP RS
35 kV	0.27
10 kV	0.43
0.4 kV Households	3.44
0.4 kV with power measuring	0.94
0.4 kV without power measuring	3.44
0.4 kV Public lighting	7.54

Source: Regulatory Commission for Energy of RS, *Rješenje o utvrđivanju cijene distribucije električne energije,* 2009, p. 14.

It is noted that distribution tariffs of electricity power companies differ (Table 8 and 9) even though the tariff methodology is essentially the same. However, they all share opinion that customers from the same group pay the same price for distribution, regardless of location (non-discrimination). RERS, in accordance with the principle of equal treatment of customers and customer protection in remote and poorly inhabited areas, identified the same tariff rates for all customers in the territory of RS by introducing coefficients for alignment of incomes of distribution companies (Regulatory Commission for Energy of RS, 2012a, p. 62). There is the same principle in FBiH. Therefore the postage stamp method is used for determination of distribution fees. This is the best solution for both, consumers and distribution companies. The Regulators usually do benchmarking analyses of distribution costs and make decisions about unique distribution tariff within one consumer's group.

The Directive 2009/72/EC highlights several issues regarding determination of distribution tariffs. First of all, the Regulator approves methodology and tariffs prior to their entry into force (in a transparent manner), which is applied in BiH. Secondly, no cross-subsidies are required. And finally, in creation of distributive tariffs, Regulator should provide the distribution operator tariffs with appropriate incentive to increase efficiency, foster market integration and security of supply (Official Journal of the EU, no. 211/55). However, since the cost of service regulation limits the profit of electric companies there is no incentive by companies to decrease them. Therefore, most of the EU countries favour price cap regulation (Schweinsberg, Stronzik and Wissner, 2011, p. 2).

3 THE HARMONISATION OF THE BIH POWER SECTOR LEGISLATION WITH THE EU LEGISLATION AND PRACTICE

3.1 Electricity Road Map – market opening dynamics

The power sector reform in BiH officially began with the adoption of the entity laws on electricity, by which important institutions in the energy market have been established. BiH is a signatory of several important international agreements related to the reform, aiming to enter into the single electricity market of the EU. There are three essential documents that BiH has signed:

1. Energy Community Treaty (hereinafter: ECT) in 1995 and ratified it in 2000,
2. Treaty establishing the Energy Community of South East Europe signed as well as ratified in 2005,
3. Stabilisation and Association Agreement (hereinafter: SAA) signed in 2008.

The ECT was one of the most important agreements that BiH has signed in domain of energy sector. According to ECT (Official Journal of the EU, no. 198/18), the main tasks of Energy Community are stable regulatory framework, single regulatory space, security of supply, energy efficiency, competition and use of renewable energy. In this way BiH has assumed certain obligations arising from the signed agreement. It refers to the implementation of Acquis Communautaire (hereinafter: Acquis) in all areas of energy. Generally, the final result of implementation of Acquis should be single mechanism for cross-border transmission of network energy without internal borders and mutual assistance in a case of disturbance on energy networks (Official Journal of the EU, no. 198/18). With the aim of gradual integration in the EU electricity market, the Southeast European countries have signed Memorandum of Understanding on the Regional Energy Market in South East Europe and its Integration into the European Community Internal Energy Market in 2002 in Athens. The Memorandum has been exactly made in accordance with the rules of market opening. In this way BiH accepted the application of the EU Directives to the national energy market. However, the implementation of the commitments is still very poor. Newbery (2002, p.11) says: "The central problem of energy liberalisation is the tension between the desire for efficient, competitive and unregulated wholesale and retail markets, and for long-term investment and security of supply."

The ECT was the base for creating the road map for market opening. The road map prescribes guidelines and dynamics of implementation of key reforms in five areas that relevant institutions of each country should conduct within their jurisdiction. It consists of six chapters and the first step in the market opening is creation of legal framework (in accordance with Acquis, i.e. EU Directives) which underlines all other steps (Energy Community, n.d.). The market structure refers to separation of market activities (generation, transmission, distribution, supply) and decreasing market concentration of

incumbents. The road map also covers rules for electricity trade (wholesale and retail) and strengthening of competitiveness. It deals with licenses for international and internal trade, eligibility and customers as crucial issues. Last but not the least step before full market integration is tariff reform in tariffs as well as affordability of payment of tariffs by customers.

Following the example of the prior mentioned necessary steps in reform of power sector, BiH developed electricity road map with adoption of the Decision on the Scope, Conditions and Time Schedule of Electricity Market Opening in BiH in 2006. Market opening dynamics in BiH is defined in accordance with obtaining the status of eligible customer, and percentage of openness in 2007 should be 33.3% (State Electricity Regulatory Commission, 2006a, p. 4). In 2006 the entity Regulators adopted separate Rule Books on Eligible Customer that cover market opening conditions (Regulatory Commission for Energy of RS, 2006, p. 2-3; Regulatory Commission for Electricity in FBiH, 2006, p. 3):

1. Customers with annual electricity consumption over 10 GWh from 1 January 2007,
2. All customers except households from 1 January 2008,
3. All customers from 1 January 2015.

Analysis of the actual market openness shows that BiH has had only one eligible customer (Aluminij Mostar) by 2012 although from 2008 all tariff customers (except households) had opportunity to freely choose their suppliers and become eligible customers. According to Regulatory Commission for Energy of RS (2012b, p. 2), the eligible customers were entitled to be supplied as non-eligible (tariff) customers until 1 January 2012 and after July 2012 to choose supplier of eligible customers. However, the eligible customers did not make a choice of eligible supplier in the observed period and they continued to buy electricity from suppliers (public service obligation) as eligible customers. Only small customers may buy electricity from the public suppliers as tariff customers till 1 January 2015. According to International Energy Agency report (2008, p. 169), because of three vertically integrated electricity companies that behave as incumbents eligible customers still do not use their right to choose suppliers. The rate of market openness of electricity market in BiH is extremely low (Table 10). In comparing to the rate of openness of electricity market of BiH and EU countries it is noted that BiH considerably lags behind EU (Appendix C). Although in 2004 the large number of EU countries did not fully opened to competition, the situation till 2009 has changed significantly. Almost all EU countries, except Cyprus, Estonia, and Hungary, were fully opened (100%) to competition in 2009. Hypothetically, if we divide all potential eligible customers' consumption of electricity in BiH (except households' consumption) with total consumption, the electricity market opening would be about 65% (State Electricity Regulatory Commission, 2011a, p. 45; Regulatory Commission for Energy of RS, 2012a, p. 69; Regulatory Commission for Electricity in FBiH, 2012a, p. 66) while the actual market openness is around 7% (Table 10).

Table 10. The Rate of Openness of Electricity Market in BiH

	2007	2008	2009	2010	2011	2012
Rate of openness (in %)	4.7	10.0	7.6	8.7	7.0	7.2

Note. *Own calculations based on data from SERC's Report. The rate of openness is calculated as eligible consumers' consumption divided by total annual consumption.

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B.

However, there are two important reasons for low market opening in BiH.

1. When comparing electricity prices in BiH with the prices in the EU countries (Chapter 2) it is noted that BiH has the lowest prices for industrial customers (with or without taxes). This is not motivating fact in terms of purchasing electricity from abroad.
2. The price of electricity for eligible customers should be slightly higher than the price for tariff customers in order to gradually approach the market prices. Unfortunately, according to the RERS's Conclusion on Supply and Prices of Electricity for Customers' Categories 110kV, 35kV, 10 (20) kV, Other Consumption (I TG) and Public Lighting (Regulatory Commission for Energy of RS, 2012e, p. 1), from 1 July 2012 electricity prices are equal to the prices at which they are supplied as tariff customers.

3.2 Current level of fulfilment of the requirements for membership in the EU electricity market

3.2.1 Unbundling

In order to prevent the monopoly behaviour in the electricity market the EU attempted to gradually decrease the impact of incumbent companies through introducing the process of unbundling of activities. The unbundling was important step in development of the wholesale and retail competition as well as increasing the efficiency. Thomas (2007, p. 4) emphasises that it is necessary to provide non-discriminatory and equal access to the network to all generation companies, in order to develop competition in the electricity market. Generation and supply activities are market activities and thus they must be freely opened to competition. On the other hand, network activities must be regulated and controlled in order to provide fair access to network to all participants. The process of unbundling is usually implemented in several stages: unbundling of accounts, legal unbundling and ownership unbundling.

The simplest form of unbundling is unbundling of accounts. According to the EU Directive 96/92/EC (Official Journal of the EU, no. 27/20), integrated electricity companies shall keep separate their accounts regardless of the form of ownership or their legal form and transmission system operator shall be independent form other activities, at least in the

management terms. The only problem was the sharing of costs for common activities. The strengthening of unbundling was further developed by the Directive 2003/54/EC, which supported unbundling of accounts and introduced legal unbundling of system operators. It simplified the solution of the problem of cost sharing for common activities because legal unbundling means legal separation of TSO and distribution system operator (hereinafter: DSO), which requires separate management and premises. The TSO and the DSO are also obliged to preserve the confidentiality of commercially sensitive information. However, the second stage in unbundling process was not enough for complete separation of activities. Actually, because of bundled ownership of companies that perform different activities there was possibility of favouring some companies that are in the same ownership. The European Commission (2007, p. 10) says: "Inherently, legal unbundling does not suppress the conflict of interest that stems from vertical integration, with the risk that networks are seen as strategic assets serving the commercial interest of the integrated entity, not the overall interest of network customers." Keeping it in mind, the last EU electricity Directive introduced the third stage of unbundling, the ownership unbundling. This stage of unbundling is not obliged. When DSO is a part of vertically integrated undertaking it shall be independent in terms of its legal form, organisation and decision making (Official Journal of the EU, no. 211/55). The ownership unbundling is certainly the most difficult stage because it requires that vertically integrated companies sell their assets. Pollitt (2007, p. 296) says that ownership unbundling requires transaction costs of separation but the benefits such as lower prices, higher investment and lower corruption are much more valuable.

Before 2004 the degree of electricity market opening in BiH was 0%. The separation of transmission activity from market activities (generation, distribution and supply) in BiH is achieved in 2004 by establishment of two companies, the ISO and Elektroprenos BiH. These companies have separate accounts and are legally unbundled. In domain of ownership unbundling companies are owned by the entities, FBiH and RS. Although there are accounting, legal and ownership unbundling of generation, distribution and supply activities between entities (which is a consequence of the territorial division of BiH), this is not the case within the entities. The level of unbundling within entities is not satisfactory.

The power sector in FBiH consists of two vertically integrated electricity companies (EP BiH and EP HZHB) responsible for generation, distribution and supply of electricity and small (private) independent power generators. EP BiH and EP HZHB are incumbents in the area of FBiH. Although there are separate accounting activities defined by founding acts (the statutes of the companies), these two electric companies in FBiH have still not achieved full legal unbundling because each EP performs generation, distribution and supply activities within its subsidiaries. The EP BiH has three subsidiaries for generation and five subsidiaries for distribution activities. Similarly, EP HZHB has two subsidiaries for generation and three for distribution activities. In domain of ownership unbundling these electricity companies are 90% in ownership of FBiH and 10% in hands of shareholders. In RS the unbundling process is only partially improved. The electricity

company EP RS covers generation, distribution and supply activities of electricity in the area of RS. The EP RS is 100% in entity ownership and it legally unbundled generation activities from distribution and supply activities. The EP RS has five generation companies and five distribution companies and it holds majority share in the capital of these companies (65%). There is no legal unbundling between distribution and supply activities in RS and the same distribution companies also supply electricity to customers. Based on analysis it can be concluded that BiH has not yet made a complete unbundling of activities in the electricity market.

3.2.2 Rules for the access to networks

Rules for the access to the electricity networks define conditions as well as procedures for access to transmission and distribution networks. They are one of the main instruments for opening the electricity market to competition. The organization of access to networks is allowed through negotiated TPA, regulated TPA or single buyer procedure (Chapter 1.2). The third EU electricity Directive advocates regulated TPA.

BiH has made some important steps in terms of equal access to the network. It has established regulated TPA to both transmission and distribution networks. SERC issued two essential documents in order to provide objective and non-discriminated access to transmission network: Rules of Third Party Access to the Transmission System in BiH and Connection Rules. The TPA is based on transmission tariffs approved by SERC. The SERC provides: equal access to transmission system, respecting of applicable tariffs, quality standards, planning of enlargement of system in order to meet customers' needs and respecting of greed codes and market rules (State Electricity Regulatory Commission, 2006b, p. 1). In 2008, SERC adopted Connection Rules for generators' and customers' facilities on the transmission network, which describe connection conditions and procedures for networks use. All users pay connection costs (fixed and variable part) to Elektroprenos BiH which approves connection. According to SERC (2008b, p. 6), fixed part of connection costs consists of the price of connected capacity of the user per unit defined by the price list (approved by SERC) and granted installed capacity of the user while the variable costs include purchase of the land, construction of the transmission line, instalment of measurement and protection system as well as the instalment of devices required for operation and management of the system. The distribution operator shall issue an approval for connection of the user to the middle voltage (hereinafter: MV) network and it pays the fee for MV connection to Elektroprenos BiH.

Regarding the access to distribution networks in BiH, both entities covered the conditions for connecting to their distribution networks in their legislation. The entity Regulators approved separate documents: Distribution Network Rules and General Conditions for Delivery of Electricity. These documents are applicable in the areas covered by three EPs. In this way, there are precisely defined rights and obligations of the DSO, generators, and suppliers of electricity as well as final customers. Each generator has to get electric power

permit before connecting to distribution network. The DSO makes analysis of request. If it is considered that applicant meets all requirements, they conclude the contracts on connection, usage of distribution network or electricity supply. Finally, equal rights/conditions for all users of distribution network are achieved.

3.2.3 Competition

The development of competition in the electricity market is one of the most important aims in creating internal EU electricity market. Before the electricity reform there was a huge concentration of incumbents in all national markets. The competition in the electricity market was seen as necessary to prevent incumbents from taking advantage of their monopolistic position and ensure the security of supply to all users (Thomson, 1995, p. 9). The high concentration of incumbents in the market limits customers to freely choose suppliers (and generators as well). It allows the electric companies to keep the higher prices with no risk of losing their market shares. Therefore, the liberalisation process attempts to increase efficiency through the pressure of competition, where greater efficiency leads to lower costs and prices, which are improving competitiveness (Ilie & Horobet, 2007, p. 43).

The indicator that shows level of competition, i.e. degree of concentration of generation companies in the electricity market is Herfindahl-Hirschman Index (hereinafter: HHI). It is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers (Herfindahl Index, n.d.):

$$H = \sum_{i=1}^{N} {S_i}^2 \qquad (7)$$

where:
S_i – the market share of firm "i" in the market,
N – the number of firms.

While calculating the HHI for EU countries it is noted that even after introduction of the second Directive there are still countries with highly concentrated or very highly concentrated generation companies (Table 11). In 2009 some countries increased their degree of concentration of generation companies (e.g. Estonia). In contrast to this, there are good examples of countries that decreased their degree of concentration in comparison to the previous year (Italy in 2008 as well as Germany and Hungary in 2009).

The analysis of market shares of the largest generators in the electricity market in 2010 shows that in Malta and Cyprus the largest generators hold 100% of electricity market, as a percentage of the total generation (Appendix D). The same situation is in BiH (Table 12) where the total electricity generation belongs to three incumbent companies. In the period 2004-2010 Ireland, Italy and Lithuania are the only countries in the EU that significantly reduced the shares of the largest generators in the electricity market.

Table 11. Degree of Concentration of Generation Companies in EU Member States

Degree of concentration	**Electricity Generation**		
	2007	**2008**	**2009**
Very highly concentrated (HHI >5,000)	BE, DK, FR, GR, LU, LV, PT, SK	BE, FR, GR, LU, LV, SK	BE, FR, GR, LU, LV, SK
Highly concentrated (HHI 1,800-5,000)	CZ, DE, ES, IT, LT	CZ, DE, LT, PT, RO, SI, HU, DK	ES, LT, PT, RO, SI
Moderately concentrated (HHI 750-1,800)	AT, FI, HU, PL, UK, NL	AT, FI, PL, UK, ES,IT, NL	DE, UK, HU, IT, NL, NO, PL

Source: European Commission, *2009-2010 Report on Progress in Creating the Internal Gas and Electricity Market, Technical Annex*, 2011, p. 12, Table 3.1; European Commission, *Technical Annex to the Communication from the Commission to the Council and the European Parliament*. *Report on Progress in Creating the Internal Gas and Electricity Market*, 2010, p. 12, Table 3.1; European Commission, *Report on Progress in Creating the Internal Gas and Electricity Market, Technical Annex*, 2009, p. 13, Table 3.1.

Table 12. Degree of Concentration of Generation Companies in BiH in %

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
EP BiH	47	54	53	48	46	52	51
EP HZHB	14	9	10	13	16	10	10
EP RS	39	37	37	39	38	38	39
HHI - BiH	3,934.5	4,356.4	4,293.5	3,976.1	3,794.9	4,258.7	4,222.0

Note. *Own calculations based on data from Appendix E and equation 7.

The power companies in BiH have status of the incumbents and dominate in the region they cover. The calculation of HHI for generated electricity shows that there is a high concentration because HHI exceeds the upper limit of moderate concentration (Table 12). The same results were obtained for calculation of HHI for installed generation capacities in BiH. In 2011 HHI index for installed generation capacities in BiH was 3,574 (based on data from Chapter 2 and equation 7).

Although there are accounting, legal and ownership unbundling between generators and suppliers in FBiH and RS, there is no competition between entities' electric power companies. Each EP covers geographic area it belongs to. Probably the policy is also one of the key factors in developing competition between entities. The overall conclusion regarding competition is that there is no competition between power companies in BiH and the degree of concentration of generation companies is huge.

3.2.4 Investments in electricity infrastructure

The electricity Directive 2009/72/EC (Official Journal of the EU, no. 211/55) emphasises the importance of ten-year development plan for investment, where the ISO shall provide investors with information needed to realise the investment and shall generally make its best efforts to facilitate the implementation of the investment project. The Directive prescribes two mechanisms for investment in the generation capacities: authorisation or tendering model (if security of supply is at stake). In the EU authorisation mechanism is prevailing for the construction of new generation capacities (Official Journal of the EU, no. 211/55).

BiH also implements an authorisation model. Every year the ISO receives proposals from stakeholders/investors and all projects that fulfil conditions are included in the Development plan with no discrimination among investors. In this respect, from 2007 ISO BiH consolidates all data and every year it publishes Indicative Production Development Plan (hereinafter: Development Plan) with projections of consumption, generation and installed capacities for ten years in advance. It gives the overall picture of future investment in electricity sources as well as security of supply. It is a landmark for estimation of possibilities for electricity export, especially for BiH which is net exporter. The Development Plan has to be approved by SERC. In 2011 the ISO published Grid Code that covered development and planning code of generation and transmission network. It describes in details criteria, procedures and content of development plan with the aim of obtaining quality information.

Before creating investment plans it is necessary to analyse main indicators that have impact on the electricity consumption: gross domestic product (hereinafter: GDP) and population. The GDP growth is in direct correlation with electricity consumption because higher GDP growth means higher electricity consumption. Historical data for BiH show moderate degree of elasticity between GDP growth rate and electricity consumption growth rate (0.5 for period 2005-2010), which means that change of GDP growth of 1% causes change in electricity consumption by about 0.5% (Independent System Operator in BiH, 2013, p. 39). Similarly, the higher population means higher electricity consumption. There are also exceptions such as period of economic crisis in 2009 or some other unforeseen circumstances.

Generally, the ISO has developed three scenarios of consumption forecasts - optimistic, baseline and pessimistic scenario (Independent System Operator in BiH, 2013, p. 51). The first scenario bases on GDP growth and it is pessimistic scenario, while the second one bases on the Development Plan 2007-2016 supplemented until 2023 (baseline scenario). The third scenario is optimistic and it bases on consumption projections from the Energy Study and the Energy Sector Strategies of FBiH and RS.

Regardless of the scenario, it is noted that electricity consumption in BiH is growing in the future, which means that it is necessary to plan the expansion of generation capacities, i.e. higher generation in order to keep the position of the large net exporter. The ISO published the latest Development Plan 2014-2023 in May 2013 (Table 13).

Table 13. Planned Generation Capacities in HPPs and TPPs in 2014-2023 in MW

Year	New capacities HPPs	New capacities TPPs	Existing capacities (2012)	Total capacities (old + new)*
2014	36.3	-	3795.6	3831.9
2015	34.4	-	3795.6	3866.3
2016	19.6	300	3695.6	4085.9
2017	-	-	3695.6	4085.9
2018	225.3	450	3695.6	4761.2
2019	-	300	3385.6	4751.2
2020	-	-	3385.6	4751.2
2021	-	-	3385.6	4751.2
2022	-	-	3385.6	4751.2
2023	-	-	3385.6	4751.2

Note. *Total capacities are sum of existing capacities of observed year, new capacities of observed year and new capacities from previous years.

Source: Independent System Operator in BiH, *Indikativni plan razvoja proizvodnje 2014-2023*, 2013, p. 59, Table 8.3.

According to the last Development Plan, increasing of generation capacities by about 24% is expected in 2023 in comparison to 2014 (Table 13). The increase in total electricity capacities will be achieved through new HPPs and TPPs capacities and the main investors in future generation capacities are EPs (Independent System Operator in BiH, 2013, p. 59). In particular, the investment in new HPPs capacities is expected in the first five years of development plan and it makes about 23% of the new capacities in the observed period. The rest of the new planned capacities belong to TPPs (77%). However, it is important to emphasise the risk of implementation of the development plan. In earlier years prolonging of deadlines for putting into work installed capacities has occurred. Thus the planned dynamic of expansion of capacities is questionable. Regarding the TPPs, the closing of thermal blocks Tuzla G3 in 2016 and Tuzla G4 and Kakanj G5 in 2019 should not be neglected (Independent System Operator in BiH, 2013, p. 59). In a case of prolonged activation of new capacities it could cause a deficit.

It is noted that there are no wind power plants (hereinafter: WPP) capacities as well as biomass or solar power plants. BiH still does not have overall targets for the share of energy from renewable sources in gross final consumption of energy, i.e. there are only defined targets in RS (Table 19). In FBiH the target minimum share of electricity generated from renewable sources by the end of 2012 was 5% of the total electricity consumption (Official Gazette of the FBiH, no. 36/10), while after 2012 it should be

subsequently defined at least six months after adoption of the Law on use renewable energy sources in FBiH. Currently there is only a draft of the law which has not been adopted.

The ISO registered and included all investments in renewable sources of electricity in 2014-2023 (Table 14) in the Annex of Development Plan, but it did not include them in total planned generation capacities (except HPPs). The ISO (2013, p. 54) underlined that the main reason of exclusion of these energy sources from Development Plan are incomplete documentation, absence of concession contract and absence of study of technical solutions to connect to the transmission network for WPPs. However, every year there are intensive preparations for the installations and commissioning of PPs from renewable energy sources. Hence, the inclusion of these facilities into planned generation capacities expects in the near future, especially if economic conditions in BiH would be favourable.

Table 14. Registered Potential Generation Capacities from Renewable Sources in BiH

Power Plant	**Number of objects**	**Installed capacities (MW)**
WPP	48	2,713.35
Biomass PP	2	21.10
Solar PP	1	10.00

Note. *Own table created using the ISO's Indicative Production Development Plan.

Source: Independent System Operator in BiH, *Indikativni plan razvoja proizvodnje 2014-2023. Dodatak,* 2013, p. 13, 28, 29 and 30.

3.2.5 Regulation

3.2.5.1 Regulatory institutions

The adoption of key laws in the power sector was the prerequisite for establishment of new regulatory institutions. Officially, the necessity of regulatory institutions in electricity market has been emphasised in the EU electricity Directive. In the first Directive (Official Journal of the EU, no. 27/20) it is noted that Member States shall designate a competent authority, independent from the parties. The new Directives gave stronger support to regulatory institutions. The independence of regulators became important in limiting political interference in business decisions and limiting regulatory risks because of government failure (Larsen, Pedersen, Sorensen & Olsen, 2006, p. 4).

Before electricity reforms the electricity market in BiH was characterised by disintegration. The jurisdiction over power sector was in hands of Governments, Ministry of Foreign Trade and Economic Affairs of BiH, Ministry of Energy, Mining and Industry of FBiH, Ministry of Industry, Energy and Mining of RS and three power utilities. Unfortunately, administrative and political separation of BiH prevented faster institutional reforms,

especially in domain of adoption of uniform laws that were the base for creating the key institutions. With adoption of entity laws on electricity BiH created conditions for establishing regulatory institutions according to the EU Directives. The establishment of the new regulatory institutions started in 2002 and took the important role in the process of electricity reform in BiH. Due to the impossibility of forming a unified regulatory agency in BiH, there are three independent non-profit regulators, the state and two entity ones, with clearly divided responsibilities not overlapping in their work (Chapter 2).

Operation of SERC is mostly complied with the EU legal framework. The commission of SERC consists of three members (two from FBiH and one from RS) who manage SERC according to the principle of annual rotation. Members from FBiH are proposed by the Parliament of FBiH while the member from RS is proposed by the National Assembly of RS, and finally the Parliament of BiH makes decision about their appointment (Official Gazette of BiH, no. 7/02). Currently the Regulator has 26 employees including commission members (Power Utility of BiH, n.d.). SERC is financed from regulatory fees paid by licensed companies and it submits the budget proposal to the Parliament of BiH that is responsible for its approval. The Law on Transmission of Electric Power, Regulator and System Operator of BiH requires that SERC makes decisions on transmission tariffs in accordance with the Rule of Tariff Proceedings and Tariff Pricing Methodology for Services of Electricity Transmission, Operation of ISO and Ancillary Services. All decisions shall be approved by unanimous vote of all members of commission (Official Gazette of BiH, no. 7/02).

The financing of the RERS is provided by the Law on Energy of RS from the annual compensations of energy companies, users of licenses for different energy activities and other one-time fees that users of licenses pay as well as from donations. The RERS submits the budget proposal to the National Assembly of RS and the National Assembly approves and adopts it. The general director of RERS is appointed by the National Assembly of RS on the suggestion of Government of RS (Official Gazette of the RS, no. 8/08). In 2011 the RERS had 33 employees (Regulatory Commission for Energy of RS, 2012, p. 34) with corresponding profiles. Based on the jurisdiction granted by the Law on Electricity of the RS, the RERS adopts decisions on distribution and supply tariffs in accordance with the Rule on tariff methodology and tariff proceeding and the Statute of the RERS (Chapter 2.4.4). Decisions are made by majority vote and sessions of the RERS are opened to the public.

The FERK operates similarly. It submits the budget proposal to the Parliament of FBiH and the Parliament of FBiH adopts the budget. The Government of FBiH gives a proposal for president and two members of FERK and the Parliament of FBiH appoints them (Official Gazette of the FBiH, no. 41/02). In 2011 the FERK had 31 employees (Regulatory Commission for Electricity in FBiH, 2012a, p. 6). In accordance with its Statute and the Law on electricity, the FERK adopts decisions on the basis of the Rules on tariff methodology and tariff proceeding. Decision making procedure is the same as for

RERS. The financing of the FERK is provided by the Law on Energy of FBiH from compensations and taxes of companies for generation, distribution, supply and trade, revenues from fees for issued licenses as well as from donations (Official Gazette of the FBiH, no. 41/02).

In the area of institutional reform of power sector BiH has shown good results. However, it is important to emphasize some deficiencies. Although the transmission company Elektroprenos BiH is formed in accordance with the Law on electricity, there are some problems in the distribution of profits and investments from 2007. From the very beginning Elektroprenos BiH makes profit that should be used for transmission investments. There are contradictory opinions regarding the division of accumulated profits which is not defined by the Statute of the company. Division of profits according to share in equity capital of the founders is probably one solution of distribution. It means that FBiH should get 59% and RS 41% (Elektroprenos BiH, 2006, p. 1). Poor state of the company caused lack of investment plan in transmission network and practically company performs its tasks partially.

Furthermore, BiH still does not have legislation on the energy efficiency at the state level, although it is prescribed in the ECT and other important documents that BiH has ratified. Therefore, there is still no established agency for energy efficiency and energy efficiency strategy. Although BiH fulfils condition regarding establishment of key regulatory institutions it is evident that BiH has to work on strengthening of regulatory institutions as well as establishing all relevant energy institutions in accordance with the EU legislation.

3.2.5.2 Regulation of network prices

Since there is no competition in the electricity network market, the market must be regulated so that network fees could be reasonable. Price regulation is needed to correct monopolistic tendencies by the incumbents in BiH, i.e. three electric power companies. In BiH the regulation of network prices is divided between Regulators. While SERC is responsible for approving prices for transmission network that are the same for all participants in BiH, the entity regulators are responsible for approving distribution network tariffs. All tariffs are based on the cost of service methodology (Chapter 2.4) and limit electric companies to achieve a large profit with no incentives to reduce costs. It also leads to less investor's uncertainty. The EU legal framework explains that cost reflectivity in determination of network tariffs is necessary to avoid cross subsidies which are potential source of discrimination. SERC adopted Tariff Pricing Methodology for Services of Electricity Transmission, Independent System Operator and Ancillary Services, and Rule on Tariff Proceedings. The Pricing Methodology describes in details calculation of tariffs as well as revenue requirement for performance of the transmission activity while Rule on Tariff Proceedings describes steps in the process of tariffs change (Chapter 2.4.3).

Regarding distribution tariffs, entities have developed separate Rules on Tariff Methodology and Tariff Proceedings, adopted by entity regulators FERK and RERS (Chapter 2.4.4). The duration of regulatory period is not specified, i.e. tariff proceedings may be initiated whenever there are reasonable arguments for their change. Tariff of the distribution network will recover performance and maintenance costs, control of the distribution network costs, development of the distribution network and cover the electricity losses incurred within the distribution network.

3.2.5.3 Quality regulation

The quality regulation in electricity supply is one of the most important indicators of successful business of electric power companies. It also reflects the level of reputation of company and in a competitive market it is crucial factor for customers in the selection of suppliers. According to Seršen and Voršič (2008, p. 1), in the open market the expenses of electricity quality are very important not only to customers but to suppliers as well because of their productivity and reliability of generation. Customers are also very sensitive to all aspects of service quality, particularly the reliability of the electricity supply and in case of low quality customers demand lower prices or switch suppliers (Davidson, Giesbertz & Petrajev, 2004, p. 6).

Generally, there are three main categories that reflect the quality of supply of electricity (Fumagalli & Schiavo, 2009, p. 9):

1. Continuity of supply/delivery,
2. Voltage quality and
3. Commercial quality.

Entity Regulators in BiH adopted General Conditions for Delivery and Supply of Electricity. In this way distributors and suppliers are obliged to provide continuous, reliable and quality supply of electricity to customers (Regulatory Commission for Electricity in FBiH, 2008, p. 8; Regulatory Commission for Energy of RS, 2011b, p. 42). The continuity of supply of electricity is measured by statistical indicators (CEER, 2008, p. 20 and 22):

1. System Average Interruption Frequency Index (hereinafter: SAIFI), average number of interruptions per customer per year,
2. System Average Interruption Duration Index (hereinafter: SAIDI), average interruption duration per customer per year (in minutes per customer),
3. Energy not Supplied (hereinafter: ENS), sum of energy not supplied because of interruptions.

In analysis of the quality indicators in BiH it is noted that in the period 2008-2012 the total number of interruptions per customer decreased more significantly (Table 15). Comparing data in 2008 and 2012, the number of interruptions per customer on transmission network decreased by about 50% (SAIFI), while the average interruption duration of electricity

supply per customer decreased by 52% (SAIDI). Particularly good improvements have been achieved in the category of planned interruptions on transmission network. These results show that BiH has improved continuity of supply of electricity.

Table 15. SAIFI and SAIDI for the Transmission Network in BiH

		2008	2009	2010	2011	2012
SAIFI	Planned interruptions	2.49	1.89	2.06	0.90	0.87
	Unplanned interruptions	1.58	1.73	1.00	0.94	1.16
	Total	4.07	3.62	3.06	1.84	2.03
SAIDI	Planned interruptions (min/customer)	503.58	324.46	213.07	142.69	146.62
	Unplanned interruptions (min/customer)	103.03	77.14	94.17	52.00	142.40
	Total (min/customer)	606.60	401.60	307.24	194.69	288.87

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 17, Table 3.

Satisfactory results have been showed in analysis of SAIFI and SAIDI including interruptions of middle voltage feeders (Table 16). It is noted that both indicators in totals are decreased (30% and 35% respectively) in 2012 in comparison to 2008. The reason for higher indicators, including interruptions of MV feeders in comparison to the high voltage (hereinafter: HV), is the size and branching of distribution network which is more sensitive regarding the interruptions.

Table 16. SAIFI and SAIDI Including Interruptions of MV Feeders Caused by Interruptions in the Distribution Network in BiH

		2008	2009	2010	2011	2012
SAIFI	Planned interruptions	6.2	6.2	7.1	4.9	4.3
	Unplanned interruptions	12.0	11.9	10.0	9.1	8.5
	Total	18.2	18.0	17.1	14.0	12.8
SAIDI	Planned interruptions (min/customer)	847.6	810.0	533.8	516.2	393.9
	Unplanned interruptions (min/customer)	877.2	661.7	742.9	459.3	730.0
	Total (min/customer)	1,724.8	1,471.7	1,276.7	975.5	1,123.9

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 17, Table 4.

The calculation of ENS indicator in the transmission network in BiH showed certain oscillations (Table 17). Comparing data in 2008 and 2011, energy not supplied due to unplanned interruptions in the transmission network decreased by about 40% (in MWh), while energy not supplied due to planned interruptions in the transmission network

decreased by about 30% (in MWh). The most important fact is that the total energy not supplied due to interruptions (in minutes or MWh), was lower in 2011 than in 2008 which is a good sign of quality improvements.

Table 17. Energy-Not-Supplied due to Interruptions in the Transmission Network

	2008		**2009**		**2010**		**2011**	
	MWh	min	MWh	min	MWh	min	MWh	min
ENS_{unpl}	1,526.60	17,642	1,570.86	17,683	1,340.79	22,865	906.80	14,593
ENS_{pl}	2,991.66	40,241	2,252.23	35,225	2,042.28	33,842	2,106.92	36,032
Total	4,518.26	57,883	3,823.09	52,908	3,383.07	56,707	3,013.72	50,625

Note. *ENS_{unpl} – Energy not supplied due to unplanned interruptions of energy supply.
ENS_{pl} – Energy not supplied due to planned interruptions of energy supply.

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2011. godini*, 2011a, p. 14, Table 3.

However, it is presented in the Global Competitiveness Report that BiH holds 31st place among 144 countries in the world in a category quality of supply of electricity, where lack of interruptions and lack of voltage fluctuations were the main indicators in comparisons (World Economic Forum, 2012, p. 418). Compared with the former Yugoslav Republics, BiH is among the best positioned. Only Slovenia is ranked higher, at 29th positions (Appendix F).

Comparisons of disputes regarding voltage quality in 2009-2011 showed that number of disputes in FBiH has increased while in RS it has decreased (Appendix G). The important thing in improving overall voltage quality is acceptance of the application of international and European standards (IEC 60038 and EN 50160). According to the General Conditions for Delivery and Supply of Electricity (Regulatory Commission for Electricity in FBiH, 2008, p. 11; Regulatory Commission for Energy of RS, 2011b, p. 74), the deadline for full implementation of European standards is 1 January 2015 in RS and 1 January 2016 in FBiH.

Regarding the quality regulation, the important area is customers' protection, i.e. settlement of disputes. Energy Laws in BiH include customers' protection, and entity Regulators are obliged to solve all disputes. In observing presented data in annual reports of FERK and RERS it is noted that entity regulators were expeditious in 2011 in solving settlement of disputes. They solved over 90% of applications in 2011 (Appendix G) and the biggest number of disputes in FBiH was caused because of the right to be supplied with electricity (33%) while in RS it was caused because of tariffs (43%). The unsolved applications were in the process of settlement in 2012 because they are submitted at the end of the 2011.

BiH electric power companies seek to improve customer care and technical services as commercial quality indicators. The EPs provide information on web sites about phone lines and email where they can make comments, complaints and suggestions. They also publish a list of works with dates of executions. Generally, regarding commercial quality, entity regulators solve customers' requirements on time or even before legally prescribed deadline (Table 18). In comparison of commercial quality indicators in BiH to EU standards it is also noted that BiH has extremely good results in achieving quality.

Table 18. Commercial Quality Indicators in BiH and the EU

Indicators of Commercial Quality	**RERS**		**FERK**		**EU**
	Standard	**Average achieves**	**Standard**	**Average achieves**	**Standard median value**
	Working days				
Connecting the new LV customers to the network	30	4.8-10.5	30	14	14
Average time between signing contract and the start of supply	30	1-10.5	30	7	6
Average time of response on the written complaint	10-15	1.8-8	15	15	15
Notice on interruption (planed interruption)	1	2-3	2	2	*2
Reconnection (due to non-payment)	1-3	0.9-20.9	2	1	*2
Settlement of complaints related to the voltage quality	15	5-10	15	-	15

Note. *Measure unit is day not work day. **Own table created using Quality reports.

Source: Energy Institute Hrvoje Požar, *Quality of Electricity Supply BiH National Report,* 2010, p. 7, 8, 22, 23, 24 and 25; Council of the European Energy Regulators, *4th Benchmarking Report on Quality of Electricity Supply 2008,* p. 114, 116, 118 and 120.

3.2.6 Energy efficiency

Energy efficiency is an essential step in the power sector reform, because it deals with issues of using less energy to perform the same activity. In order to achieve climate and energy goals by 2020 the EU adopted three targets (20-20-20). They refer to increase of energy efficiency to save 20% of the EU energy consumption, reducing greenhouse gas emissions by 20% and reaching 20% of renewable energy in the total energy consumption. The EU Directive 2012/27/EU on Energy Efficiency underpinned the objective of 20% saving of the EU primary energy consumption by 2020. It sets a legal obligation to establish energy saving measures in all member states in the amount of 1.5% of the average total sold amount of energy in the last three years (Official Journal of the EU, no.

315/1). Special emphasis is placed on efficient energy consumption in public buildings and public enterprises. The experience shows that developed countries first develop energy efficiency policy with action plans for implementation of policy, set efficiency targets and adopt relevant regulatory framework (Stuggins, Sharabaroff & Semikolenova, 2013, p. 4).

Regarding the electricity efficiency BiH is in the process of adopting necessary legislation in accordance with the EU requirements. Through the Instrument for Pre-Accession Assistance the EU tries to support BiH in harmonising its legislation with the EU Directive on energy efficiency. BiH has not established agency for energy efficiency and there is no legislation on energy efficiency and strategy at the state or entity level. In FBiH and RS there is only a draft of Law on Energy Efficiency. At present, three ministries for energy (state and two entity ministries) are responsible for energy efficiency policy. Each entity develops its own efficiency policy, for the implementation of which cantons and municipalities are responsible. BiH also does not have a prepared national energy efficiency action plan. Therefore it has no national energy efficiency targets. Without this institution and crucial documents that would lead BiH in the process of increasing energy efficiency it is hard to determine the level of energy efficiency in BiH. The financing of energy efficiency projects is also difficult and commercial loans (with unfavourable interest rates) are usually the main sources for investors. That is why these investments are very poor. Regarding increasing efficiency in electricity consumption EP BiH introduced energy-saving light bulbs but the most important thing is the rational use of electricity by customers as well as avoiding the use of old devices in the future.

3.2.7 Renewable energy sources

Renewable energy sources (hereinafter: RES) are becoming more important in the electricity generation. The protection of environment, i.e. emission controls and increasing efficiency are only some of the reasons why the need for using RES in electricity generation is desirable. The importance of generation from RES is presented within the EU Directive 2009/28/EC on the Promotion of the Use of Energy from RES. The main focus is to increase their share in final consumption. According to the EU Directives (Official Journal of the EU, no. 140/16 and Official Journal of the EU, no. 211/55), the overall target is at least 20% share of energy from RES in the Community's gross final consumption of energy in 2020. In this respect, Directive 2009/28/EC presented individual targeted shares of energy from RES for EU 27 that should be achieved by 2020. In 2011 some EU countries reached and exceeded targeted share of energy form RES in gross final consumption of energy (Denmark, Ireland, Spain, Portugal, Sweden, Germany etc.) while Austria, Romania, Slovakia as well as Slovenia have already exceeded the targeted shares in 2002 (Appendix H). Many EU countries have not yet reached the quota.

BiH is a pioneer in use of RES although it has a huge water, wind, biomass and solar potentials. Currently, the HPPs are the only PPs for electricity generation from RES. In 2011 more than half of the installed capacities belonged to HPPs (Chapter 2). Regarding

the regulatory framework there is no unified law, regulation or decision at the state level. The entities' Law on Energy and the Law on Electricity regulate area of RES. In FBiH there is only draft of the Law on Use of Renewable Energy Sources and Efficient Cogeneration. Both entities adopted Regulation on Generation and Consumption of Energy from RES and Rulebook on Issuance of Certificates for the Generation Facility which Generates Electricity from RS or in Efficient Cogeneration. In this way, in RS the jurisdiction of RERS is defined (with approval of the Government of RS), which provides a system of incentives for generation of electricity from RES as well as methods for obtaining and using of incentives. In 2011, the Government of RS made a decision and authorised the EP RS, as a temporary System Operator for Incentives (hereinafter: SOI). The EP RS carries out the administrative, financial and operational activities of the SOI and encourages generation of electricity from RES. The Regulation on Generation and Consumption of Energy from RES defined goals and measures for incentives generation of electricity from RES, the way of provision and use of funds for RES as well as indicative targets for the share of energy from RES in gross final consumption (Official Gazette of the RS, no. 28/11).

Table 19. Overall Targets for the Share of Energy from Renewable Sources in Gross Final Consumption of Energy in RS

	2011-2012	**2013-2014**	**2015-2016**	**2017-2018**	**2020**
Targets (%)	30.54	31.22	32.24	33.60	35.98

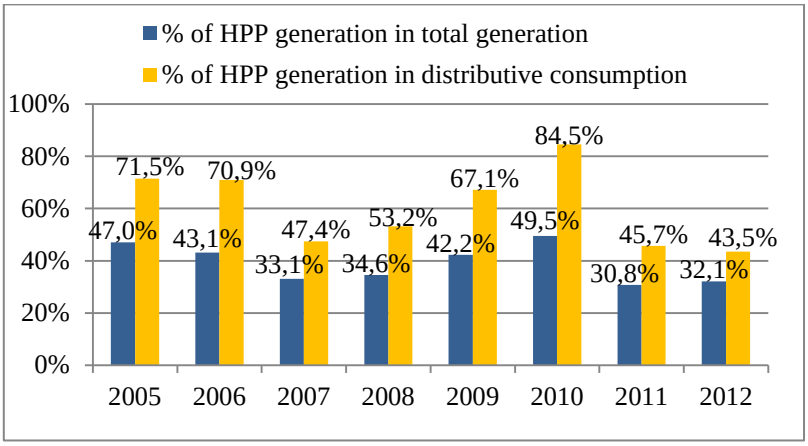
Source: Uredba o proizvodnji i potrošnji električne energije iz obnovljivih izvora i kogeneracije u RS**,** *Official Gazette of the RS,* no. 28/11, p. 28, Table b.

The Rule Book on Incentives for Generation of Electricity from RES (Regulatory Commission for Energy of RS, 2011c, p. 7) defines the incentives for generation of electricity from RES are reflected through connecting to the network, access to the network (dispatching), obliged redemption of electricity, feed-in tariff and right to the premium for consumption of electricity for its own needs or sale. Regarding the fees that users pay for connection to the network to Elektroprenos BiH, SERC (2008b, p. 6) defined in Connection Rules that electricity generation facilities using RES shall pay 50% of the fixed part of connection fees and HPPs may use this benefit only if their capacity does not exceeding 10 MW. From January 2012 in RS all final customers have to pay fees for providing incentive for generation of electricity from RES. These fees cover the calculated premiums for the electricity generated from RES as well as financing of operation of the SOI. The amount of compensation in RS in 2012 was 0.0018 KM/kWh, while in 2013 it has decreased by 0.0009 KM/kWh because more funds are collected than is necessary to cover mentioned premiums and operation of SOI (Regulatory Commission for Energy of RS, 2012c, p. 1-3). The RERS (2012d, p. 1) determined redemption/guaranteed prices (feed-in tariffs) of electricity which consist of reference price (5.41 pf/kWh) and different premiums according to the type of power plant.

Contrary to the RS, in the FBiH operator for RES and cogeneration is not established. According to the Regulation Amending Regulation on Using RES and Cogeneration (Official Gazette of the FBiH, no. 11/11), the FERK is responsible for guaranteed prices (feed-in tariffs) and incentives fees while all other activities from the Regulation are under jurisdiction of EP BiH and EP HZHB. The guaranteed prices in the FBiH consist of reference price (12.26 pf/kWh) and corresponding tariff coefficient for the particular type of the power plant (Official Gazette of the FBiH, no. 36/10). Regarding the fees for providing incentive for generation of electricity from RES and cogeneration, they are determined for different consumers' categories. Consumers in the category 0.4 kV voltage pay 0.001 KM/kWh, in 10 kV voltage 0.0008 KM/kWh, in 35 kV voltage 0.0007 KM/kWh and in 110 kV voltage 0.0005 KM/kWh (Official Gazette of the FBiH, no. 36/10). Hence, there are some differences between the RS and the FBiH in determination of incentive's fees and guaranteed prices. In 2013, the Government of the FBiH decided to suspend invoicing compensation for incentives of generation from RES because the funds collected by the EPs are not spent. In FBiH there are still no adopted targets for the share of energy from renewable sources in gross final consumption.

In calculation of the share of generation from HPPs in distributive consumption it is noted that it varies and depends on hydrological conditions. In 2010 good hydrological conditions increased the share of electricity generated from HPPs. Reverse in 2011 drought decreased the share of electricity generation from HPPs. Generally, BiH is country with high share of generation from RES in distributive consumption in comparison to EU countries (Figure 8, Appendix H).

Figure 8. The Share of Generation in HPPs in Total Generation and in Distributive Consumption



Note. *Own figure created using the SERC's Reports.

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini*, 2008a, p. 33, Appendix A.2.

In BiH there is no registered generation of electricity from wind, solar or biomass sources. There are only several private companies (Eko energija, Bičakčić, Ivex) that started generation of electricity from solar sources with a small capacity while the first WPP in BiH should be put into operation in 2013 in Tomislavgrad. In 2012 BiH prepared analysis of the integration of WPPs in the electricity system and the impact assessment of generation of WPPs on the dispatching system. However, there is no study of technical solutions to connect to the transmission network for WPPs. According to Dokić (n.d., p. 16), one of the reasons for poor attractiveness of investing in WPPs is extremely long period of return on invested capital and higher costs. The prices of electricity generated from wind power in BiH would be higher compared to the prices of electricity from conventional energy sources. Despite of all, it is a risky and expensive investment (high costs) with risky outcomes because of variability of electricity generation wind power (Freris & Infield, 2008, p. 28). In addition, economic crisis contributed to slow start-up of generation from wind sources and generally BiH currently has unfavourable business environment for investment. It can be concluded that the water remains the main RES potential for electricity generation in BiH. Even if the construction of certain wind or solar power plants happens in the near future, their share in the total RES capacity will be probably small.

3.2.8 Environmental issues

Environment issues are integral part of the power sector reform with a main goal of pollution reduction. The most important agreement regarding protection of environment is the Kyoto Protocol, whose main objectives were to limit greenhouse gas (hereinafter: GHG) concentrations in the atmosphere at a certain level and to introduce GHG emissions targets. The EU has also adopted the Directive 2003/87/EC that deals with the GHG emissions allowance trading scheme and reduction of GHG emissions by 20% by 2020. The scheme enabled the EU countries, as well as other countries, to limit GHG emissions in accordance with the Kyoto Protocol. All countries that have pollution quotas and polluters (usually industrial companies) are obliged to get allowances for GHG emissions. If emissions exceed permitted level polluters have to buy allowances from other companies (trading with allowances).

In BiH there is no state legislation in the area of environment. The most important laws in the FBiH and the RS are Law on Environmental Protection, Law on Air Protection, Law on Water, and Law on Waste Management. BiH has prepared a National Environmental Action Plan (hereinafter: NEAP) in 2003, as the first national document in the area of environment. The Government of the FBiH adopted Federal Strategy of Environmental Protection 2008-2018 in 2009 while the Government of the RS adopted Strategy of Air Protection in 2007.

The ECT obliged BiH to implement Directive 2001/80/EC until 2017. BiH has ratified Kyoto Protocol in 2007 when it also came into force. As a developing country BiH has no

quantified obligation of gas emission in 2008-2012. According to the Article 10 of Kyoto Protocol (United Nations, 1998, p. 9-10), developing countries should publish and implement national and regional programmes in order to mitigate climate change, participate in international cooperation in the area of climate research, inform public about climate change, know-how, etc. It should be kept in mind that the new Treaty on limiting emissions of greenhouse gases for the period 2013-2020 will include countries that were not obliged to conduct some obligations from Annex B of the Kyoto Protocol. It means that BiH will be obliged to participate in decreasing of GHG emissions in the future. BiH is currently not a part of the EU GHG emission trading scheme and there is no estimations of GHG emissions of major pollutants.

In BiH all electricity generators have to get environmental permits to prove that their generation activity is not harmful to environment or it is in the range of permitted level. They are issued by the Ministry of spatial planning, civil engineering and ecology as it is defined in the Law on Environmental Protection. The RERS and FERK adopted separate Rulebooks on the Limit Values of Emissions into the Air from the Combustion Plants with the same limits for emissions of pollutant. According to RERS (2012a, p. 55), BiH has still not harmonised regulation regarding NO_x emission (650 mg/m^3) with the Directive 2001/80/EC (500 mg/m^3). The important step in limiting CO_2 emissions in the electricity generation is shutting down old and inefficient TPPs' power blocks and reconstruction of new blocks. BiH made some steps concerning these issues. In 2000 TPPs Kakanj and Tuzla put some blocks out of work. Later on, they modernized other blocks which resulted in achieving greater efficiency in generation through lower emission of CO_2. According to EP BiH (Power Utility of BiH, n.d.), the CO_2 emissions in TPPs for the same generation facilities and the same level of generation have reduced from around 9.5 million t/y in 1991 to around 6.5 million t/y today.

3.3 Barriers and challenges for entering the EU electricity market

Although BiH has made significant steps in the power sector reform it reveals several important obstacles that slowed down integration into the EU electricity market. While some barriers will probably be removed in the future, the others will be result of political agreements between entities and the frequency of their overcoming is uncertain.

The harmonisation of the BiH legislation with the EU requirements in electricity domain is slow. The crucial fact is that BiH still does not have the state energy law and the law on energy efficiency. The state Energy Strategy and the Strategy of Energy Efficiency is still not prepared. In the institutional framework BiH has not established energy agency and/or agency for energy efficiency. The energy statistics and database are also poor and inadequate for regional comparisons. The regulatory framework for environmental protection is divided between entities with separate laws, regulations and rule books and it is not fully harmonised with the EU requirements. The process of activities unbundling is not fully completed in none of the entities. There is no unbundling of distribution and

supply activities in BiH. Furthermore, in FBiH there is no unbundling of generation and distribution (supply) activities.

The rate of openness of electricity market is very low with high concentration of incumbents (electric power companies) that have significant market power. Therefore, the competition is limited, i.e. there is a geographic division between entities so each electric power company in BiH covers specific region. Additionally, low electricity prices discourage investors from investing in new generation capacities in BiH. The cost of service regulation in tariffs determination is one obstacle more for new companies in the market (profit limitation, incorrect assessment of the costs). There is also low interest of eligible customers for switching suppliers due to possibility to buy electricity from the local electric power companies (public suppliers) at the favourable price, lower than at the market.

Future investments in new generation capacities are still mostly focused on TPPs and there is uncertainty regarding investment in RES (except in HPPs). Investment in generation from other RES is still risky in BiH (unfavourable business environment). There are also different incentives for the generation from RES between entities with no state strategy for promoting generation from RES. National energy efficiency targets still do not exist. In analysis of environment several issues are pointed out. There is no national program for monitoring the air quality, no national plans related to air quality nor officially published estimations of GHG emissions of major pollutants. BiH still has not implemented the system of issuing environmental permits based on integrated pollution prevention and control.

3.4 Recommendations

The implementation of Acquis in the area of electricity remains the priority in the power sector reform in BiH. It refers to complete harmonisation of the legal framework with the EU Directives. Therefore, it is necessary to adopt the state law on electricity and law on energy efficiency. Preparing the state Strategy for promoting generation from renewable energy should also be priority in the future work. In the institutional area it is necessary to establish energy agency as well as agency for energy efficiency. Besides, it is necessary to overcome the problems within Elektroprenos BiH as soon as possible in order to provide use of collected profit and investment in transmission network. Gradual adjustment of database and unification of energy reports in accordance with EU energy statistics should also be one of the future tasks. Completion of the legal unbundling of activities is one issue more in the power sector reform.

Strengthening of competition through reducing the power of incumbents remains the priority in the electricity market. Since the electricity prices in BiH are the lowest in the region, gradual increasing of electricity prices is desirable in order to attract new investors and develop competition in the power sector of BiH (the proper assessment of the costs). It

would probably increase the number of eligible customers who buy electricity abroad. Otherwise, investors will give up because the actual prices do not ensure them adequate return capital (which would be possible in the case of price cap regulation for transmission and distribution tariffs). Development of stock exchange electricity trading model in BiH would also be desirable and the wholesale prices would be much more transparent and public.

Encouraging the generation form RES through determination target share of electricity generated from RES at the state level is also necessary. Acceleration of the process of turning on WPPs into the power sector through preparation of technical solutions to connect WPPs to the transmission network is precondition for increasing generation from RES. Harmonisation of incentives for RES between entities is also desirable in the future. Development of energy efficiency targets at the state level remains the key priority after adoption of necessary laws and establishment of efficiency agency.

CONCLUSION

The power sector of BiH went through significant changes in the last decade. These modifications are the result of ongoing reforms. The reforms have brought significant improvement in the functioning of the power sector but also revealed shortcomings that have to be removed in the future in order to fully fulfil the EU requirements. In the legal and institutional framework BiH has achieved a certain level of formal compliance with the EU regulations. It adopted many crucial laws, regulations and made important decisions after 2000. It has also signed many international agreements and showed willingness to transform the power sector. However, there are lots of issues that have to be done, particularly in terms of adoption of necessary laws (energy, energy efficiency and RES) and strategies. Although institutional capacities are quite consistent with the EU legislation in terms of establishment of key regulatory institutions there is still need to strengthen their work and independence. It addition, it is necessary to finish the process of establishment of remaining institutions (especially in the area of efficiency) in order to create conditions for continuation of reforms.

In terms of market issues BiH has also made modest progress. Despite the specified electricity road map, BiH reached extremely low level of market openness in the last decade. The incumbents, i.e. electric power companies still hold considerable power in the region they cover, which is consequence of the fragmentation of electricity market between entities in BiH. Therefore, there is no competition in the electricity market of BiH. On the other hand, price developments negatively contribute to competition. As electricity prices in BiH are the ones of the lowest in the region, eligible customers' initiative to switch suppliers and buy electricity in the market is very low. In the future BiH has to work on market issues and stimulate competition by increasing the electricity prices and attracting new participants and investors in the market.

However, the biggest future tasks in the electricity reform remains within the EU's 20-20-20 goals. This is probably the area were BiH has the poorest results so far. This implies an urgent creation of legal and institutional framework for energy efficiency issues as well as definition of state targets for GHG emissions, energy efficiency and generation from RES.

In order to reach all the goals and finish the reform process, BiH has to clearly assign responsibilities and tasks to main counterparts with strict deadlines specified for each of them. This implies rushed decisions and faster reaction of BiH authorities. Otherwise, the integration in the EU electricity market will be delayed and one of the sectors with the highest potentials would not be sufficiently used in the overall economic development of BiH. As long as entity interests are above national, the power sector will lag behind in development.

REFERENCE LIST

1. Centre for Policy and Governance. (2010). *Izvještaj o politikama energetskog sektora u Bosni i Hercegovini* [Report on the Policies of the Energy Sector in Bosnia and Herzegovina]. Sarajevo: Centre for Policy and Governance.
2. Council of European Energy Regulators. (2008). *4th Benchmarking Report on Quality of Electricity Supply 2008.* Bruxelles: Council of European Energy Regulators.
3. Davidson, E., Giesbertz, P., & Petrajev, E. I. (2004). Reliability of Supply in Liberalised Power Markets. *Russian/CIS Energy and Mining Law Journal, 2004/2,* 5-10.
4. Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity. *Official Journal of the European Union* L 27/20.
5. Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants. *Official Journal of the European Union* L 309/1.
6. Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC. *Official Journal of the European Union* L 176/37.
7. Directive 2009/28/EC of the European Parliament and of the Council of 23April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. *Official Journal of the European Union* L 140/16.
8. Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC. *Official Journal of the European Union* L 211/55.
9. Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC. *Official Journal of the European Union* L 315/1.

10. Directorate for Economic Planning of the Council of Ministers of BiH. (2012). *Ekonomski trendovi, Godišnji izvještaj 2011. godina* [Economic Trends, Annual Report 2011]. Sarajevo: Directorate for Economic Planning of the Council of Ministers of BiH.
11. Dokić, B. (n.d.). Obnovljivi izvori električne energije, Energetski potencijal vjetra u Republici Srpskoj [Renewable Energy Sources, Energy Potential of Wind in Republic of Srpska]. Retrieved April 12, 2013, from http://www.acips.ba/bos/uploads/dokumenti/izlaganja/Sesija_I_PDP.pdf
12. Duić, N., Jureković, T., & Carvalho, M. G. (2001). Efekti liberalizacije tržišta energenata u Portugalu [Effects of liberalising the Portuguese energy market]. *Zbornik radova X foruma Dan energije u Hrvatskoj, Liberalizacija i privatizacija energetskog sektora u ekonomijama u tranziciji i Europskoj Uniji* (83-89). Zagreb: Hrvatsko Energetsko Društvo.
13. Elektroprenos BiH/Elektroprijenos BiH. (2006). *Odluka o izmjeni statute kompanije za prenos električne energije u BiH "Elektroprenos BiH/Elektroprijenos BiH"* [Decision on Amendment of the Statute of the Company for Transmission of Electricity in BiH "Elektroprenos BiH/Elektroprijenos BiH"]. Banja Luka: Elektroprenos BiH/Elektroprijenos BiH.
14. Energy Community. (n.d.). *Road Maps.* Retrieved April 11, 2013, from http://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/ELECTRICITY/Road_Maps
15. Energy Community Secretariat. (2010). *Annual Report on the Implementation of the Acquis under the Treaty Establishing the Energy Community.* Vienna: Energy Community Secretariat.
16. Energy Community Secretariat. (2011). *Annual Report on the Implementation of the Acquis under the Treaty Establishing the Energy Community.* Vienna: Energy Community Secretariat.
17. Energy Community Treaty. *Official Journal of the European Union* L 198/18.
18. Energy Institute Hrvoje Požar. (2010). *Quality of Electricity Supply, Bosnia and Herzegovina National Report.* Zagreb: Energy Institute Hrvoje Požar.
19. European Commission. (n.d.). *Energy Statistics.* Retrieved April 1, 2013, from http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database
20. European Commission. (2005). *Technical Annexes to the Report from the Commission on the Implementation of the Gas and Electricity Internal Market.* Brussels: European Commission.
21. European Commission. (2007). *Communication from the Commission to the Council and the European Parliament. Prospects for the Internal Gas and Electricity Market.* Brussels: European Commission.
22. European Commission. (2009). *Report on Progress in Creating the Internal Gas and Electricity Market, Technical Annex.* Brussels: European Commission.

23. European Commission. (2010). *Technical Annex to the Communication from the Commission to the Council and the European Parliament. Report on Progress in Creating the Internal Gas and Electricity Market.* Brussels: European Commission.
24. European Commission. (2011). *2009-2010 Report on Progress in Creating the Internal Gas and Electricity Market, Technical Annex.* Brussels: European Commission.
25. Federal Ministry of Energy, Mining and Industry. (2009). *Strateški plan i program razvoja energetskog sektora Federacije BiH - finalni tekst* [Strategic Plan and Program of the Energy Sector Development of the Federation of BiH - final text]. Sarajevo: Federal Ministry of Energy, Mining and Industry.
26. Freris, L., & Infield, D. (2008). *Renewable Energy in Power Systems.* New York, USA: John Wiley & Sons, Ltd.
27. Fumagalli, E., & Schiavo, L. L. (2009). Regulating and Improving the Quality of Electricity Supply: the Case of Italy. *European Review of Energy Market, 3*(3), 1-27.
28. Granić, G., Zeljko, M., Moranjkić, I., Martínez, J. A., Olano, M., & Jurić, Ž. (2008). Module 6 – Power Sector Restructuring and Regulatory Framework. In *Energy Sector Study BiH* (1-104). Zagreb: Energy Institute Hrvoje Požar.
29. Haas, R., Glachant, J. M., Keseric, N., & Pere, Y. (2006). The Liberalisation of the Continental European Electricity Market - Lessons Learned. *Energy Studies Review, 14*(2), 1-29.
30. Helm, D. (2001). The Assessment: European Networks - Competition, Interconnection and Regulation. *Oxford Review of Economic Policy, 17*(3), 297-312.
31. *Herfindahl Index.* Retrieved February 26, 2013, from http://en.wikipedia.org/wiki/Herfindahl_index
32. Hrist, E., & Kirby, B. (1996). *Electric-Power Ancillary Services.* Oak Ridge, USA: Oak Ridge National Laboratory.
33. Hrovatin N., & Zorić, J. (2011). *Monografija. Reforme elektrogospodarstva v EU in Sloveniji* [Monograph. Reforms in the electricity industry in the EU and Slovenia]. Ljubljana: Faculty of Economics, University of Ljubljana.
34. Ilie, L., & Horobet, A. (2007). The European Energy Market at the Crossroads. *Studies in Business and Economics, 2*(2), 41-45.
35. Independent System Operator in Bosnia and Herzegovina. (2010). *Pravilnik o dodjeli prava na korištenje prekograničnih prijenosnih kapaciteta* [Rulebook on the Allocation of Rights for the Use of Cross-Border Transmission Capacities]. Sarajevo: Independent System Operator in Bosnia and Herzegovina.
36. Independent System Operator in Bosnia and Herzegovina. (2011). *Tržišna pravila, Nacrt* [Market Rules, Draft]. Sarajevo: Independent System Operator in Bosnia and Herzegovina.
37. Independent System Operator in Bosnia and Herzegovina. (2013). *Indikativni plan razvoja proizvodnje 2014 – 2023* [Indicative Production Development Plan 2014-2023]. Sarajevo: Independent System Operator in Bosnia and Herzegovina.
38. International Energy Agency. (2008). *Energy in the Western Balkan. The Path to Reform and Reconstruction.* Paris: International Energy Agency.

39. Jakovac, P. (2010). Važnost električne energije i osvrt na reformu elektroenergetskog sektora u Europskoj uniji i Republici Hrvatskoj [The Importance of Electricity and Review of Power Sector Reform in the European Union and the Republic of Croatia]. In *Ekonomska misao i praksa* (151-276). Dubrovnik: University of Dubrovnik.
40. Jamasb, T., & Pollitt, M. (2005). Electricity Market Reform in the European Union: Review of Progress toward Liberalization & Integration. *The Energy Journal, 26,* 11–40.
41. Jamasb, T., & Pollitt, M. (2007). *Incentive Regulation of Electricity Distribution Networks: Lessons of Experience from Britain.* Working Paper No. 0701. Cambridge, UK: Electricity Policy Research Group.
42. Jenko, J. (2007). Power Sector Development. Background Paper. *World Bank - 4th Poverty Reduction Strategies Forum.* Athens: World Bank.
43. Jong, J. (2008). *The Third EU Energy Market Package: Are We Singing the Right Song?* Briefing Paper No. 8. Hague, NL: Clingendael Institute.
44. Joskow, P. L. (2008). Lessons Learned From Electricity Market Liberalization. *The Energy Journal, 29*(Special Issue No. 2), 9-42.
45. Krause, T. (2003). *Evaluation of Transmission Pricing Methods for Liberalized Markets. A Literature Survey.* Zurich, Switzerland: EEH – Power System Laboratory.
46. Larsen, A., Pedersen, L. H., Sorensen, E. M., & Olsen, O. J. (2006). *Independent Regulatory Authorities in Europe.* Copenhagen, DE: Danish Institute of Governmental Research AKF.
47. Meeus, L, Purchala, K., & Belmans, R. (2005). Development of the Internal Electricity Market in Europe. *The Electricity Journal, 18*(6), 25-35.
48. Murali, M., Kumari, M. S., & Sydulu, M. (2011). A Comparison of Fixed Cost Based Transmission Pricing Methods. *Electrical and Electronic Engineering, 1*(1), 33-41.
49. Newbery, D. M. (2002). *Regulatory Challenges to European Electricity Liberalisation.* Working Paper No. 0230. Cambridge, UK: Department of Applied Economics, University of Cambridge.
50. Office of the BiH Coordinator for Poverty Reduction Strategy Paper. (2004). *Mid-term Development Strategy of Bosnia and Herzegovina 2004–2007.* Sarajevo: Office of the BiH Coordinator for Poverty Reduction Strategy Paper.
51. Percebois, J. (2008). Electricity Liberalization in the European Union: Balancing Benefits and Risks. *The Energy Journal, 29*(1), 1-20.
52. Pollitt, M. (2005). *Electricity Reform in Chile: Lessons for Developing Countries.* Working Paper No. 0448. Cambridge, UK: Department of Applied Economics.
53. Pollitt, M. (2007). Vertical Unbundling in the EU Electricity Sector. *Intereconomics, 42*(6), 292-310.
54. Power Utility of BiH. (n.d.). *Eneregtska efikasnost u proizvodnji* [Energy Efficiency in Generation]. Retrieved May 20, 2013, from http://www.elektroprivreda.ba/stranica/enef-u-proizvodnji-jp-epbih
55. Power Utility of the Republic of Srpska. (n.d.). *Profil* [Profile]. Retrieved January 11, 2013, from

http://www.ers.ba/index.php?option=com_content&view=article&id=14&Itemid=31&lang=ba
56. Regulation (EC) No. 1228/2003 of the European Parliament and of the Council of 26 June 2003 on conditions for access to the network for cross-border exchanges in electricity. *Official Journal of the European Union* L 176/1.
57. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2005). *Pravilnik za tarifnu metodologiju i tarifne postupke* [Rules on Tariff Methodology and Tariff Proceedings]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
58. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2006). *Pravilnik o sticanju statusa kvalifikovanog kupca* [Rule Book on Eligible Customer]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
59. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2008). *Opšti uslovi za isporuku električne energije* [General Conditions for Delivery of Electricity]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
60. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2010). *Izvještaj o radu FERK-a za2009. godinu* [FERK's Activity Report 2009]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
61. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2011a). *Izvještaj o radu FERK-a za 2010. godinu* [FERK's Activity Report 2010]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
62. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2011b). *Odluka o tarifnim stavovima za korisnike distributivnog sistema Javnog preduzeća Elektroprivreda Bosne i Hercegovine d.d. - Sarajevo* [Decision on tariffs for users of distribution system of Public Utility Elektroprivreda JSC Sarajevo]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
63. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2012a). *Izvještaj o radu FERK-a za 2011. godinu* [FERK's Activity Report 2011]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.
64. Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina. (2012b). *Odluka o tarifnim stavovima za korisnike distributivnog sistema Javnog poduzeća Elektroprivreda Hrvatske zajednice Herceg Bosne d.d. - Mostar* [Decision on tariffs for users of distribution system of Public Utility Elektroprivreda JSC Mostar]. Mostar: Regulatory Commission for Electricity in Federation of Bosnia and Herzegovina.

65. Regulatory Commission for Energy of Republic of Srpska. (2005). *Izvještaj o radu za 2004. godinu* [Activity Report 2004]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
66. Regulatory Commission for Energy of Republic of Srpska. (2006). *Pravilnik o sticanju statusa kvalifikovanog kupca* [Rule Book on Eligible Customer]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
67. Regulatory Commission for Energy of Republic of Srpska. (2008). *Izvještaj o radu za 2007. godinu* [Activity Report 2007]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
68. Regulatory Commission for Energy of Republic of Srpska. (2009). *Rješenje o utvrđivanju cijene distribucije električne energije* [Decision on determination of tariff rates for distribution system users]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
69. Regulatory Commission for Energy of Republic of Srpska. (2010). *Izvještaj o radu za 2009. godinu* [Activity Report 2009]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
70. Regulatory Commission for Energy of Republic of Srpska. (2011a). *Izvještaj o radu za 2010. godinu* [Activity Report 2010]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
71. Regulatory Commission for Energy of Republic of Srpska. (2011b). *Opšti uslovi za isporuku i snabdijevanje električnom energijom* [General Conditions for Delivery and Supply of Electricity. Mostar]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
72. Regulatory Commission for Energy of Republic of Srpska. (2011c). *Pravilnik o podsticanju proizvodnje električne energije iz obnovljivih izvora i u efikasnoj kogeneraciji* [Rule Book on Incentives for Generation of Electricity from Renewable Sources and in Efficient Co-Generation]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
73. Regulatory Commission for Energy of Republic of Srpska. (2012a). *Izvještaj o radu za 2011. godinu* [Activity Report 2011]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
74. Regulatory Commission for Energy of Republic of Srpska. (2012b). *Odluka o izmjeni Odluke o tarifnim stavovima za nekvalifikovane kupce električne energije u Republici Srpskoj* [Decision on Amendment of Decision on Tariff Rates for Non-Eligible Customers of Electricity in Republic of Srpska]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
75. Regulatory Commission for Energy of Republic of Srpska. (2012c). *Odluka o visini naknade za podsticanje proizvodnje električne energije iz obnovljivih izvora i u efikasnoj kogeneraciji* [Decision on the Fee for Providing Incentive for Generation of Electricity from Renewable Energy Sources and in Efficient Cogeneration Facilities]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
76. Regulatory Commission for Energy of Republic of Srpska. (2012d). *Odluka o visini garantovanih otkupnih cijena i premija za električnu energiju proizvedenu iz*

obnovljivih izvora i u efikasnoj kogeneraciji [Decision on the Level of Guaranteed Redemption Prices and Premiums for Electricity Generated from Renewable Energy Sources and in Efficient Cogeneration Facilities]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.

77. Regulatory Commission for Energy of Republic of Srpska. (2012e). *Zaključak o načinu snabdijevanja i cijenama električne energije za kupce iz kategorije potrošnje 110kV, 35kV, 10(20)kV, 1 tarifne grupe Ostale potrošnje i javne rasvjete kod javnog snabdjevača od 1. Jula 2012. godine* [Conclusion on Supply and Price of Electricity for Customers from Categories 110kV, 35kV, 10(20)kV, 1 Tariff Group Other Consumption and Public Lighting by Public Supplier from July 1, 2012]. Trebinje: Regulatory Commission for Energy of Republic of Srpska.
78. Schweinsberg, A., Stronzik, M., & Wissner, M. (2011). *Cost Benchmarking in Energy Regulation in Europien Countries.* Bad Honnef, Germany: WIK-Consult.
79. Seršen, E., & Voršić, J. (2008). *Quality of Electricity Supply as a Service.* Santander: International Conference on Renewable Energies and Power Quality.
80. State Electricity Regulatory Commission. (2006a). *Odluka o obimu, uvjetima i vremenskom rasporedu otvaranja tržišta električne energije u Bosni i Hercegovini* [Decision on Scope, Conditions and Time Schedule of Electricity Market Opening in Bosnia and Herzegovina]. Tuzla: State Electricity Regulatory Commission.
81. State Electricity Regulatory Commission. (2006b). *Pravila o pristupu treće strane na prijenosni sistem* [Rules on access to third parties on a transmission system]. Tuzla: State Electricity Regulatory Commission.
82. State Electricity Regulatory Commission. (2008a). *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini* [Report on Activities of the State Electricity Regulatory Commission in 2008]. Tuzla: State Electricity Regulatory Commission.
83. State Electricity Regulatory Commission. (2008b). *Pravilnik o priključku* [Connection Rules]. Tuzla: State Electricity Regulatory Commission.
84. State Electricity Regulatory Commission. (2009a). *Izvještaj o energetskom sektoru Bosne i Hercegovine za 2009. godinu* [Report on the Energy Sector of Bosnia and Herzegovina in 2009]. Tuzla: State Electricity Regulatory Commission.
85. State Electricity Regulatory Commission. (2009b). *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2009. godini* [Report on Activities of the State Electricity Regulatory Commission in 2009]. Tuzla: State Electricity Regulatory Commission.
86. State Electricity Regulatory Commission. (2010). *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2010. godini* [Report on Activities of the State Electricity Regulatory Commission in 2010]. Tuzla: State Electricity Regulatory Commission.
87. State Electricity Regulatory Commission. (2011a). *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2011. godini* [Report on Activities of the State Electricity Regulatory Commission in 2011]. Tuzla: State Electricity Regulatory Commission.

88. State Electricity Regulatory Commission. (2011b). *Metodologija za izradu tarifa za usluge prijenosa električne energije, nezavisnog operatora sistema i pomoćne usluge – prečišćeni tekst* [Tariff Pricing Methodology for Services of Electricity Transmission, Independent System Operator and Ancillary Services – Revised Text]. Tuzla: State Electricity Regulatory Commission.
89. State Electricity Regulatory Commission. (2011c). *Odluka o određivanju tarifa za pomoćne usluge* [Decision on Determination of Tariffs for Ancillary Services]. Tuzla: State Electricity Regulatory Commission.
90. State Electricity Regulatory Commission. (2012a). *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini* [Report on Activities of the State Electricity Regulatory Commission in 2012]. Tuzla: State Electricity Regulatory Commission.
91. State Electricity Regulatory Commission. (2012b). *Odluka o tarifama za usluge prenosa* [Decision on Tariffs for the Transmission Services]. Tuzla: State Electricity Regulatory Commission.
92. State Electricity Regulatory Commission. (2013). *Odluka o tarifi za rad NOS-a* [Decision on Tariff for the ISO]. Tuzla: State Electricity Regulatory Commission.
93. Stuggins, G., Sharabaroff, A., & Semikolenova, Y. (2013). *Energy Efficiency: Lessons Learned from Success Stories.* Washington, USA: World Bank.
94. State Electricity Regulatory Commission. (n.d.). *Osnovne informacije* [Basic information]. Retrieved June 30, 2013, from http://www.derk.ba/en/aboutus
95. Thomas, S. (2007). *Unbundling of Electricity Transmission networks: Analysis of the European Commission's Position.* University of Greenwich, UK: Public Services International Research Unit.
96. Thomson, R. (1995). *The Electric Power Industry - Deregulation and Market Structure*. Working Paper No. 004. Cambridge, UK: Center for Energy and Environmental Policy Research.
97. Tominov, I. (2008). Liberalization of the Electricity Market – Is it meeting expectations? *Energija, 57*(3), 256-299.
98. Trevino, L. (2008). *Liberalization of the Electricity Market in Europe: An overview of the electricity technology and the market place.* Working Paper No. 002. Lausanne, Switzerland: Chair Management of Network Industries.
99. United Nations (1998). *Kyoto Protocol to the United Nations Framework Convention on Climate Change.* Kyoto, Japan: United Nations.
100. Uredba o korištenju obnovljivih izvora i kogeneracije [Regulation on Using Renewable Sources and Cogeneration]. *Official Gazette of the FBiH* no. 36/10.
101. Uredba o izmjenama i dopunama Uredbe o korištenju obnovljivih izvora i kogeneracije [Regulation Amending Regulation on Using Renewable Sources and Cogeneration]. *Official Gazette of the FBiH* no. 11/11.
102. Uredba o proizvodnji i potrošnji električne energije iz obnovljivih izvora i kogeneracije u RS [Regulation on Generation and Consumption of Energy from Renewable Sources and Cogeneration in RS]. *Official Gazette of the RS* no. 28/11.

103. World Economic Forum. (2012). *Global Competitiveness Report 2012-2013.* Geneva: World Economic Forum.
104. Zakon o električnoj energiji [The Law on Electricity]. *Official Gazette of the FBiH* no. 41/02.
105. Zakon o električnoj energiji [The Law on Electricity]. *Official Gazette of the RS* no. 8/08.
106. Zakon o osnivanju kompanije za prenos električne energije u Bosni i Hercegovini [The Law Establishing the Company for the Transmission of Electric Power in Bosnia and Herzegovina]. *Official Gazette of BiH* no. 35/04.
107. Zakon o osnivanju nezavisnog operatora sistema za prenosni sistem u Bosni i Hercegovini [The law Establishing the Independent System Operator for Transmission System in Bosnia and Herzegovina]. *Official Gazette of BiH* no. 35/04.
108. Zakon o prenosu, regulatoru i operateru sistema električne energije u Bosni i Hercegovini [Law on Transmission of Electric Power, Regulator and System Operator of Bosnia and Herzegovina]. *Official Gazette of BiH* no. 7/02.
109. Zhang, Y., Parker, D., & Kirkpatrick, C. (2006). *Electricity Sector Reform in Developing Countries: An Econometric Assessment of the Effects of Privatization, Competition and Regulation.* Manchester, UK: Centre on Regulation and Competition Institute for Development Policy and Management, University of Manchester.

APPENDIXES

TABLE OF APPENDIXES

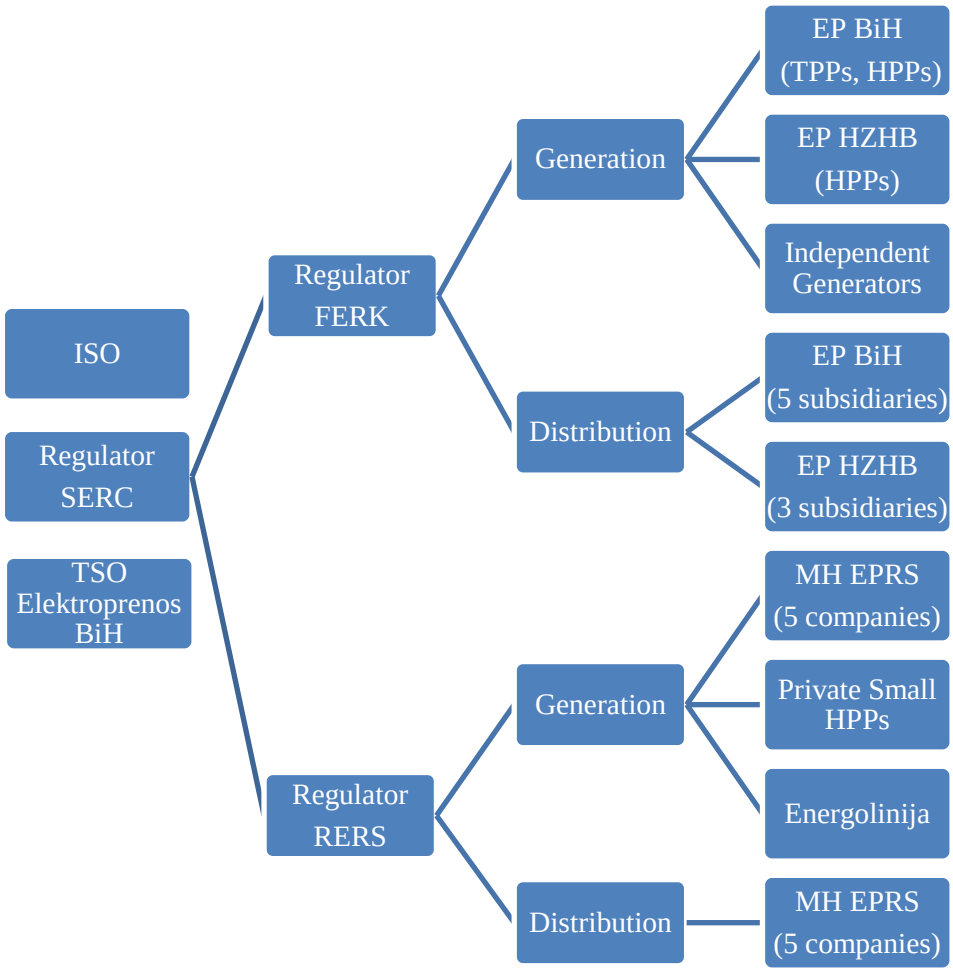
Appendix A: List of Abbreviations

ACER – Agency for the Cooperation of Energy Regulators
BiH – Bosnia and Herzegovina
CEER – Council of European Energy Regulators
D – Distribution
DSO – Distribution System Operator
€c – Euro cents
EC – European Commission
ECT – Energy Community Treaty
EEX – European Energy Exchange, Leipzig
ENS – Energy Not Supplied
ENTSO – European Network of Transmission System Operators for Electricity
EP – Electric Power Company
EP HZHB – Elektroprivreda Hrvatske zajednice Herceg-Bosna
ERGEG – European Regulators' Group for Electricity and Gas
EU – European Union
FBiH – Federation of Bosnia and Herzegovina
FERK – Regulatory Commission for Electricity in Federation BiH
GDP – Gross Domestic Product
GHG – Greenhouse Gas
GWh – Giga Watt hour
H1 – The first half of the year
HHI – Herfindahl-Hirschman Index
HPP – Hydro Power Plant
HV – High Voltage
ISO – Independent System Operator
JSC – Joint Stock Company
KM – Convertible Mark
kWh – Kilo Watt hour
kV – Kilovolts
MV – Middle Voltage
MW – Mega Watt
MWh – Mega Watt hour
NEAP - National Environmental Action Plan
NRA – National Regulatory Agency
pf – pfennig
PP – Power Plant
p.p. – percentage points
RS – Republic of Srpska
RERS – Regulatory Commission for Energy of Republic of Srpska
RES – Renewable energy sources
SAA – Stabilization and Association Agreement

SAIDI – System Average Interruption Duration Index
SAIFI – System Average Interruption Frequency Index
SERC – State Electricity Regulatory Commission
SOI – System operator for incentives
T – Transmission
TG – Tariff group
TPA – Third Party Access
TPP – Thermo Power Plant
TSO – Transmission System Operator
UK – The United Kingdom
WPP – Wind Power Plant
y/y – year on year comparison

Appendix B: Institutional Framework of the Power Sector in BiH

Figure 1. The Power Sector in BiH



Note. *Own created figure.

Appendix C: Market Opening

Table 1. Proportion of Market Opening to Competition

Market opening (%)			
	2004	**2008**	**2009**
Austria	100.0	100.0	100.0
Belgium	90.0	100.0	100.0
Bulgaria	22.0	100.0	100.0
Cyprus	35.0	31.8	66.7
Czech Republic	47.0	100.0	100.0
Denmark	100.0	100.0	100.0
Estonia	10.0	13.0	28.0
Finland	100.0	100.0	100.0
France	70.0	100.0	100.0
Germany	100.0	100.0	100.0
Great Britain	100.0	100.0	100.0
Hungary	67.0	64.5	60.1
Ireland	56.0	100.0	100.0
Italy	79.0	100.0	100.0
Latvia	76.0	100.0	100.0
Lithuania	-	100.0	100.0
Luxembourg	57.0	100.0	100.0
Northern Ireland	-	100.0	100.0
Norway	100.0	100.0	100.0
Poland	52.0	100.0	100.0
Portugal	100.0	100.0	100.0
Romania	33.0	100.0	100.0
Slovak Republic	66.0	100.0	100.0
Slovenia	75.0	100.0	100.0
Spain	100.0	100.0	100.0
Sweden	100.0	100.0	100.0
The Netherlands	100.0	100.0	100.0

Source: European Commission, *2009-2010 Report on Progress in Creating the Internal Gas and Electricity Market Technical Annex*, 2011, p. 5, Table 1.1; European Commission, *Technical Annexes to the Report from the Commission on the Implementation of the Gas and Electricity Internal Market*, 2005, p. 2, Table 1.

Appendix D: Market Share of the Largest Generator in the Electricity Market

Table 2. Market Share of the Largest Electricity Generator (% of the Total Generation)

Country	2004	2005	2006	2007	2008	2009	2010
Belgium	87.7	85.0	82.3	83.9	80.0	77.7	79.1
Croatia	86.0	87.0	83.0	84.0	85.0	92.0	88.0
Cyprus	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Czech Republic	73.1	72.0	73.5	74.2	72.9	73.7	73.0
Denmark	36.0	33.0	54.0	47.0	56.0	47.0	46.0
Estonia	93.0	92.0	91.0	94.0	96.5	90.0	89.0
Finland	26.0	23.0	26.0	26.0	24.0	24.5	26.6
France	90.2	89.1	88.7	88.0	87.3	87.3	86.5
Germany	28.4	31.0	31.0	30.0	30.0	26.0	28.4
Hungary	35.4	38.7	41.7	40.9	42.0	43.1	42.1
Ireland	83.0	71.0	51.1	48.0	45.6	37.0	34.0
Italy	43.4	38.6	34.6	31.3	31.3	29.8	28.0
Latvia	91.1	92.7	95.0	86.0	87.0	87.0	88.0
Lithuania	78.6	70.3	69.7	70.5	71.5	70.9	35.4
Malta	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Norway	31.2	30.0	30.9	32.5	27.4	29.5	29.8
Poland	18.5	18.5	17.3	16.5	18.9	18.1	17.4
Portugal	55.8	53.9	54.5	55.6	48.5	52.4	47.2
Romania	31.7	36.4	31.1	27.5	28.3	29.3	33.6
Slovakia	83.7	83.6	70.0	72.4	71.9	81.7	80.9
Slovenia	53.0	50.1	51.4	82.0	53.0	55.0	56.3
Spain	36.0	35.0	31.0	31.0	22.2	32.9	24.0
Sweden	47.0	47.0	45.0	45.0	45.2	44.0	42.0
UK	20.1	20.5	22.2	18.5	15.3	24.5	21.0

Source: European Commission, *Energy Statistics*, n.d.

Appendix E: Total Generation of Electricity in BiH

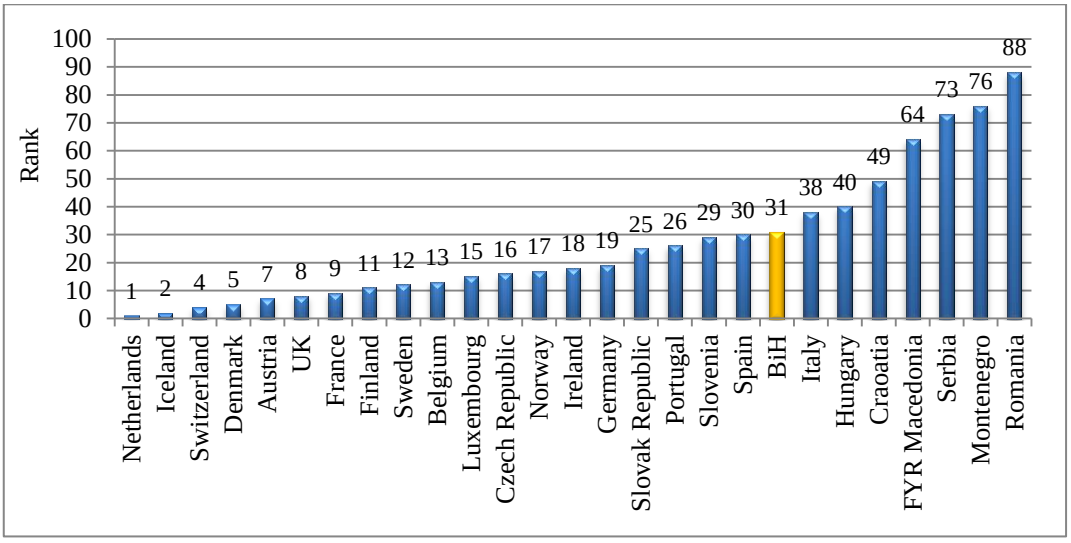
Table 3. Total Electricity Generation in BiH (GWh)

	2005	2006	2007	2008	2009	2010	2011	2012
EP BiH	5,779	6,401	6,593	7,340	6,993	7,290	7,353	6,570
EP HZHB	1,769	1,884	1,128	1,360	1,945	2,613	1,402	1,237
EP RS	5,201	5,391	4,454	5,085	5,623	6,165	5,296	5,128
BiH	12,748	13,675	12,175	13,784	14,562	16,068	14,050	12,935

Source: State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2012. godini*, 2012a, p. 59, Appendix B; State Electricity Regulatory Commission, *Izvještaj o radu državne regulatorne komisije za električnu energiju u 2008. godini, 2008*, p. 33, Appendix A.2.

Appendix F: Quality of Electricity Supply

Figure 2. Quality of Electricity Supply (Rank between 144 Countries in the World)



Source: World Economic Forum, *Global Competitiveness Report 2012-2013*, 2012, p. 418, Table 2.07.

Appendix G: Quality Regulation

Table 4. Applications for Settlement of Disputes According to the Reasons of Submission in 2011

Disputes	FERK			RERS		
	2009	2010	2011	2009	2010	2011
The right of access to the distribution network	43	54	22	12	2	7
The right to be supplied with electricity	52	45	57	34	8	4
The obligation to be supplied with electricity	9	7	13	-	-	-
The tariffs at which electricity is delivered	15	24	37	132	147	117
The refusal to deliver electricity	17	27	25	23	33	27
The quality of electricity supply (voltage)	8	12	17	14	10	7
Other reasons (debt write-off, barred debt, measuring)	-	-	-	390	106	111
Total applications	144	169	171	605	306	273
Solved applications	103	162	163	605	292	252

Source: Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2009. godinu*, 2010, p. 26; Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2010. godinu*, 2011a, p. 28-29; Regulatory Commission for Electricity in FBiH, *Izvještaj o radu FERK-a za 2011. godinu*, 2012a, p. 23; Regulatory Commission for Energy of RS, *Izvještaj o radu za 2009. godinu*, 2010, p. 22; Regulatory Commission for Energy of RS, *Izvještaj o radu za 2010. godinu*, 2011a, p. 19; Regulatory Commission for Energy of RS, *Izvještaj o radu za 2011. godinu*, 2012a, p. 23.

Appendix H: The Share of Energy from Renewable Sources in Gross Final Consumption of Energy

Table 5. The Share of Energy from Renewable Sources in Gross Final Consumption of Energy

Country	2002	2005	2011	2020*
Austria	66.3	58.8	55.2	34
Belgium	1.3	2.3	9.0	13
Bulgaria	6.0	11.8	9.8	16
Cyprus	0.0	0.0	2.5	13
Czech Republic	4.6	4.5	10.3	13
Denmark	18.4	26.3	38.8	30
Estonia	0.4	1.3	12.6	25
Finland	22.8	26.8	27.7	38
France	13.4	11.0	12.8	23
Germany	7.5	10.0	20.4	18
Greece	6.2	10.0	13.0	18
Hungary	0.6	4.5	6.4	13
Ireland	5.4	6.7	19.4	16
Italy	14.4	13.7	23.6	17
Latvia	39.3	48.4	41.9	40
Lithuania	3.2	3.9	9.6	23
Luxembourg	2.1	2.9	3.0	11
Malta	0.0	0.0	0.0	10
Netherlands	3.5	6.3	10.1	14
Poland	2.0	2.6	8.3	15
Portugal	20.3	15.5	43.6	31
Romania	30.9	35.8	27.1	24
Slovakia	19.2	16.6	17.0	14
Slovenia	25.4	24.2	26.2	25
Spain	13.9	14.3	30.2	20
Sweden	46.8	53.8	58.7	49
United Kingdom	2.8	4.2	9.2	15

Note. *Overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020.

Source: European Commission, *Energy Statistics*, n.d.; Directive 2009/28/EC of the European Parliament and of the Council of 23April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, *Official Journal of the EU*, no. 140/16.