

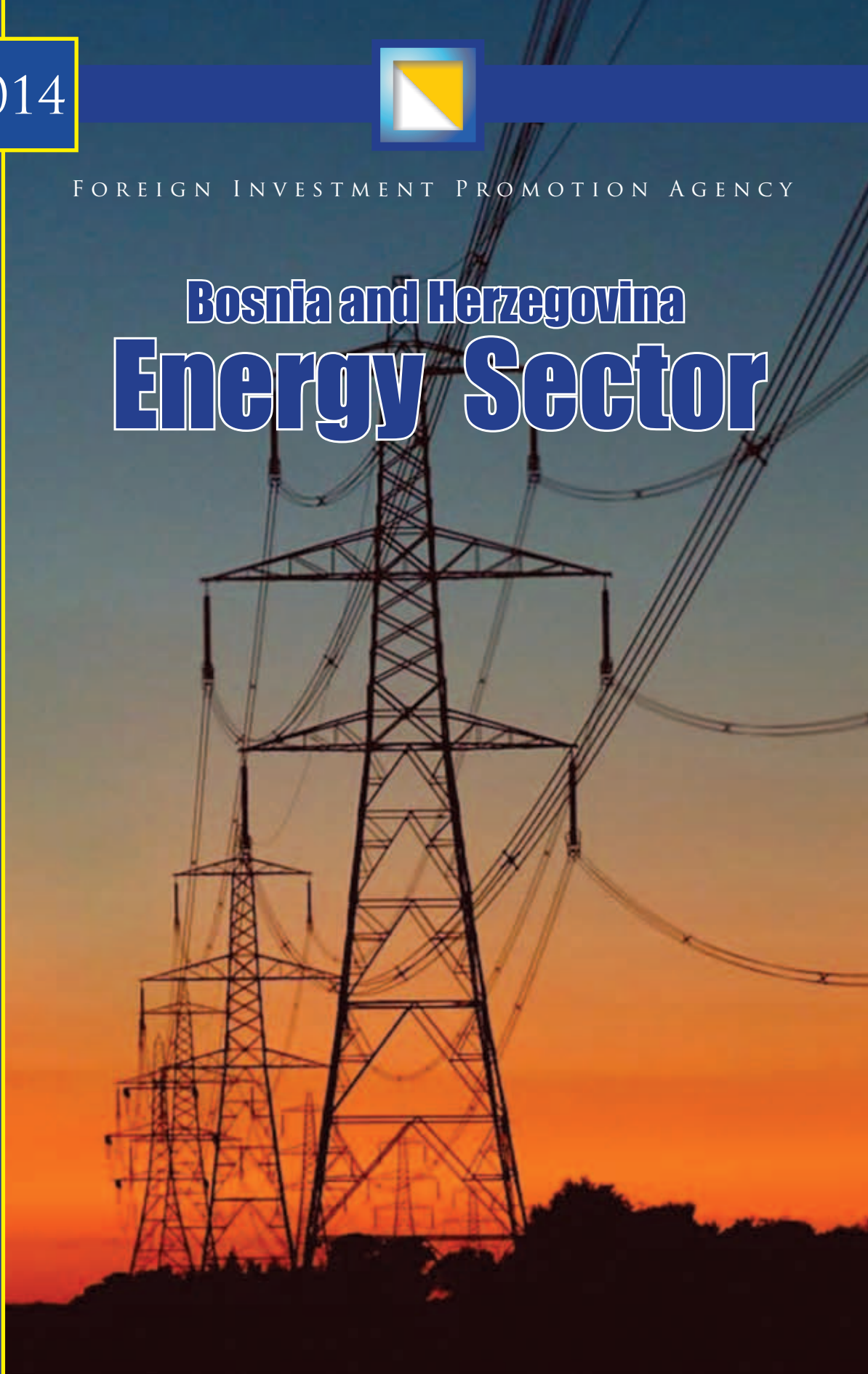
2014



FOREIGN INVESTMENT PROMOTION AGENCY

# Bosnia and Herzegovina Energy Sector

BOSNIA AND HERZEGOVINA INVESTMENT OPPORTUNITIES





# Bosnia and Herzegovina Energy sector

FOREIGN INVESTMENT PROMOTION AGENCY



BOSNIA AND HERZEGOVINA

# COMPARATIVE ADVANTAGES



# TABLE OF CONTENTS

General information .....	6
Why invest in B&H Energy sector .....	7
Energy subsectors .....	7
Coal subsector .....	8
Oil & natural gas subsector .....	10
Oil subsector .....	10
Natural gas subsector .....	10
Power Generation .....	11
New power generation projects development .....	11
Large Thermal Power Generation Projects .....	12
Large and Small Hydropower Projects .....	12
Mini Hydropower Projects (capacity of 5 MW or less) .....	12
Wind Energy potentials .....	13
Solar energy potentials .....	14
Projection of Investment Plan .....	15
Institutional framework .....	16
Legal Framework .....	17
Energy Community .....	17
Energy Related International Obligations .....	17
The EU documents relevant for power sector policy of B&H .....	18
The Foreign Companies that already Invested In B&H Energy Sector .....	19

## GENERAL INFORMATION

Energy has a major impact on the growth and development of the economy of each country , primarily through technological development and the increasing competitiveness of the economy. Energy is a generator of development in the technological , economic , scientific and educational terms.

The energy supply is essential for the sustainability of economic development of the countries of the Western Balkans, especially due to the fact that it is a large number of relatively small economies.



From the perspective of the European Union ,SEE region has been identified as a major transit region for gas, oil and electricity. World Bank research shows that the lack of energy and energy demands throughout the region will be dramatically increased in the near future.

Energy sector is one of the most powerful in B&H, with long tradition, huge potentials and opportunities for further development and investment as well as with intentions to become integral part of European Energy Market and European Community. B&H is a net exporter of electricity.

In the last few years a significant growth of foreign investment in Bosnia and Herzegovina Energy sector, has recorded. Foreign investors have recognized the potential of this sector in B&H , and also the B&H Public Companies producing electricity, invest substantial means in order to this sector enable sustainable development and growth.



## WHY INVEST IN B&H ENERGY SECTOR?

### ENERGY RESERVES AND POTENTIALS

Bosnia and Herzegovina is endeavoured with significant and diverse indigenous natural energy resources that are still untouched or only partly exploited, such as:

- The main energy resource of B&H is coal (brown coal and lignite), with estimated reserves of 6 billion tons( average annual coal consumption for electricity production is about 8 million tons)
- The hydropower potential is 6000 MW which locates B&H on the eight place in Europe and currently installed capacity of 2 054 MW represents 36% of total hydro potential ,
- According to the extensive researches, there is significant wind energy potential which is estimated at 2000 MW
- Raw material resources for the bio-mass energy are extremely favourable, including approximately 1.5 million m3 of forest / wood industry residues (all wood waste, sawdust, chips, and chipped technical wood), etc.
- Potential for exploitation of geo-thermal and solar energy are available too, but have not been sufficiently explored and exploited
- Preliminary research surveys of oil and gas, had indicated the presence of promising deposits on a number of sites in B&H(off-balance sheet reserves are estimated at about 50 million tons of oil)

### ENERGY SUBSECTORS

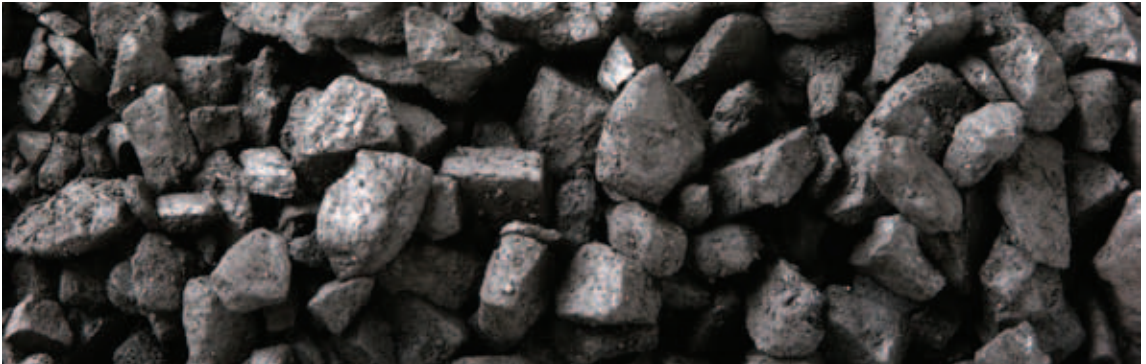
B&H energy sector encompasses the following main subsectors:

- Coal
- Electric power
- Oil & Natural gas



## COAL SUBSECTOR

Coal is one of the most important energy resources in Bosnia and Herzegovina. Major deposits of lignite and brown coal are sited all around Federation of B&H (FB&H) and Republic of Srpska (RS). Most of the existing coal mines fuel thermal power plants (TPP) in both entities. Coal mines situated in Northeast and Central Bosnia serve two TPPs, Kakanj and Tuzla, operated within the company Elektroprivreda Bosne i Hercegovine (EPB&H), whereas Ugljevik Coal Mine and TPP, and Gacko Coal Mine and TPP are operated within the company Elektroprivreda Republike Srpske (EPRS).



Production of coal in Bosnia and Herzegovina for 2010 is 10.985.152 tons, out of which 5.617.896 tons is lignite and 5.367.256 tones is brown coal. In final coal consumption of 772.823 tons in 2010, lignite participates with share of 56,6%, brown coal with 38,4% and cooking coal and anthracite with 5%. The effective demand of thermal power plants is a regulator of coal production to a major degree since it absorbs 88% of total coal production. The remaining balance is supplied to industry and to broad consumption, whereas only negligible quantities are exported.

### COAL MINES IN FEDERATION OF B&H

- Banovići (brown coal) surface mines Čubrić, Turija and Grivice; underground mine Omazići
- Durđevik (brown coal) surface mines Višća II and Potočari ; underground mine Durđevik
- Kakanj (brown coal) surface mine Vrtlište and underground mine Haljinići
- Zenica (brown coal) underground mines: Stara jama, Raspotočje and Stranjani
- Breza (brown coal) underground mines: Sretno and Kamenice
- Bila (brown coal) underground mine and surface mine Grahovčići
- Kreka (lignite) surface mines Šikulje and Dubrave; underground mines Mramor and Bukinje
- Livno (lignite) Tušnica surface mine
- Gračanica, G.Vakuf/Uskoplje (lignite): Dimnjače surface mine

### POTENTIAL COAL MINES:

- Surface mine Kongora to fuel TPP Duvno
- Surface mine Kotezi to fuel TPP Bugojno
- Surface mine Kamengrad (brown coal) Sanski Most





## COAL MINES IN RS

- Ugljevik (brown coal) surface mines Bogutovo Selo and Ugljevik-East; TPP Ugljevik
- Gacko (lignite) surface mines Gračanica and Gacko ;TPP Gacko
- Stanari (lignite) surface mine Raškovac

## POTENTIAL COAL MINE

- Miljevina (brown coal) surface and underground mine



Reviews of geological coal reserves in B&H are shown in following table:

COAL	RESERVES (000 t)				
	Balance	Out of balance	Potential	Total geological	Mineable
Total Lignite	1 437 635	412 103	1 386 653	3 236 391	1 004 593
Total Brown Coal	1 181 491	214 991	1 124 320	2 526 802	825 512
<b>TOTAL</b>	<b>2 625 126</b>	<b>627 094</b>	<b>2 510 983</b>	<b>5 763 193</b>	<b>1 829 805</b>

## OIL & NATURAL GAS SUBSECTOR

B&H is predominantly dependent on import of the liquid fuel and natural gas. A total of about 150 million USD were invested in oil and gas exploration, and the results indicated that both areas were rather perspective in terms of oil and gas prospecting. The oil and gas exploration results in B&H justify further explorations and indicate that there are realistic possibilities of finding commercially viable deposits.

### OIL SUBSECTOR

B&H oil industry encompasses imports and refining of imported crude oil and production of petroleum products. The B&H oil sector developed significant production capacities, comprising two refineries based on the most up-to-date world technologies, but presently only partly employed, including:

- Refinery Brod, which capacity is 4 million t/year, processes imported crude oil into various products (motor fuels, liquid petroleum gas, bitumen, etc)
- Refinery Modriča, which produces motor oils and various special purpose technical oils for the industry and other commercial purposes.

Year	Value of oil imports - (U.S. dollars –billions)	Percent Change
2001	0.332	5.06 %
2002	0.359	8.13 %
2003	0.455	26.74 %
2004	0.686	50.77 %
2005	0.925	34.84 %
2006	1.129	22.05 %
2007	1.367	21.08 %
2008	2.009	46.96 %
2009	1.33	-33.80 %
2010	1.782	33.98 %

### NATURAL GAS SUBSECTOR

Within B&H energy sector the gas subsector is the least developed and the development of the gas sector in B&H is unquestionable in terms of strategy. Currently, the gas is procured / imported over only one pipeline, with the length of 191 km and the projected annual capacities of 1 billion m3. The demand projections until 2020 amount from 1.5 to 3 billion m3 of gas, foreseeing serious gas sector reform and development, which comprises:

- Construction of an alternative supply route
- Distribution network development
- Construction of the underground storages
- Diversification of the gas supply sources, etc.

The option of substituting the imported natural gas with the gas produced by coal gasification is under consideration too.



## POWER GENERATION

Electricity is predominantly produced in hydro and thermal power plants. Currently, the production facilities, with total installed capacities of 4000 MW, exceed the domestic demand, and the electricity



is exported. Overall production of electric energy in B&H in 2011 amounted to GWH 14049, presenting a decline of around 13% compared to the same period of the previous year.

The main cause of this decline was an extremely bad hydrological situation in comparison to the previous year, which resulted in reduced generation of electric energy in hydropower plants of ca. 45% in comparison to the same period of the previous year. Overall consumption of electric energy in B&H during 2011 continued the trend of growth and amounted to 3% as compared to the previous year.

## NEW POWER GENERATION PROJECTS DEVELOPMENT

Intending to harness the substantial and diversified energy resource base in B&H, all relevant stakeholders in B&H are adopted development and investment programs for construction of new generation plants, entirely respecting recommendation from EU Directive 2003/54.

Significant investments in new power system facilities and expansion of power generation capacities are foreseen by these programs, in order to meet growing electricity supply deficit within regional and larger European markets.

Investment programs encompass a number of the development projects, based on coal, hydro and renewable energy sources, including both expansion of existing and construction of new power generation capacities.

## LARGE THERMAL POWER GENERATION PROJECTS

There are a total of seven new coal-fired thermal power generation projects, with potential incremental electricity production capacity of approximately 3450 MW; including both, rehabilitation and expansion of the existing facilities and construction of entirely new coal mine / power generation plant complexes.

Coalmine / Power Plant	Installed Capacities in MW (estimation)
Kongora - Coalmine/power plant	2x275
Bugojno – Coalmine / power plant	G1 300 ; G2 300
Stanari – power plant	420
Ugljevik 2 - Coalmine / powerplant	2 x 300
Gacko 2 - Coalmine / powerplant	660
Tuzla – G7	370
Kakanj - G8	250

## LARGE AND SMALL HYDROPOWER PROJECTS

Development programs identified fifteen potential new large and small hydropower projects, and four rehabilitation and expansion projects, with potential incremental electricity production capacity of approximately over 2000 MW in total. Rehabilitation and expansion projects are foreseen in hydro-power plants Jablanica, Rama, Jajce and Čapljina.

### MINI HYDROPOWER PROJECTS (CAPACITY OF 5 MW OR LESS)

In the river basins of B & H there were identified over 400 potential micro locations for construction of the mini hydro power plants, enabling cumulative increase of the electricity production capacity of approximately 1000 MW.

Location / Municipality area /	Installed Capacities in MW (estimation)	Location / Municipality area /	Installed Capacities in MW (estimation)
Ustikolina	3x22	Dabar	160
Vranduk	21	Bileca	36
Rmanj Monastir	2x36	Paunci	42.3
Vrilo 2x26 MW		Krupa & Banja Luka	48.5 + 37.2
Glavaticevo	3x9,5	Mrsovo	43.8
Bjelimici 2x50 MW + PH	2x300	Ulog	30
Dubrovnik 2	2x152	Ugar	40
Buk Bijela & Foca	250		



## WIND ENERGY POTENTIALS

Measurement results for sites in Herzegovina in the period of 2004-2005 give wind speed in the range of 7 to 9 m/s. The application of extrapolation models and the use of long-term scaled data sets on these locations result in expected average annual wind speed in the range of 6 to 8 m/s 50m a.g.l. However, model data can be more reliably used for regional wind resource assessment and for the wind climate comparison of different regions of B&H. Thus, the southern part of B&H can be considered as the most perspective for wind power plant development. The world wind atlas shows very similar results of the wind speed in the region of Herzegovina.

Currently there are many macro and micro locations for wind power plant construction that are evaluated as advantageous for wind power plant construction as it is shown at the table below:

Location / Municipality area /	Installed Capacities in MW (estimation)	Location / Municipality area /	Installed Capacities in MW (estimation)
• Mostar		• Duvno	
- VelikaVlajna	42	- Ugrovaca	40
- Jastrebinika	20	- Duvanjsko polje	50 – 90
- Raška Gora	20	• Livno municipality area	
- Krešića Gaj	20	- Borova glava	30
- Jasenjani	20-30	- Cincar	30-40
- Podveležje	160-180	• Bihać	
- Pločno	20	-2 locations	40-60
- Bahtijevice	30	• Čvrsnica mountain	
• Stolac		- Pločno	20
-Hrgud	20	• Čapljina	
-Dabarskopolje	20	-Hrasno	20 – 30
• Kupres		• Nevesinje	
- Debelo brdo	20-30	- Morine	150
- Zlo selo	20-30	- Kruševljani	20-30
- Šuica	20-30	- Grebak 20-30	
- Ravanska vrata	20-30	• Berkovići	
- Filipovića polje	20	- Gornjatrusina	20
• Glamoč	20-30	• Trebinje	
• Bosansko Grahovo		- PopovoPolje	50– 60
- Medenopolje	20-30	• Bjelašnica Mountain	20 – 50

According to the actual findings, the total wind power potential of eighteen sites under development was estimated to about 1030 – 1180 MW. It is estimated that possible total production of electrical energy at these locations could amount to 2.4 TWh/year, with the average utilization factor of about 30%, which represents the top level of productivity, even in European terms.

It is important to emphasize here the figure stated above is in the domain of assumption and it is necessary to have it confirmed by detailed analyses.

However, the total wind potential in Bosnia and Herzegovina is probably much higher, in the order of 2000 MW. This estimate results from the analyses of available space, but doesn't take into account possible limitations (like grid integration possibilities, environmental protection, etc).

## SOLAR ENERGY POTENTIALS

The theoretical potential of solar energy amounts about 74.65PWh. It can be said that B&H is one of the most favourable locations in Europe, where solar radiation is concerned.



The solar irradiation values vary accordingly with about 1,240kWh/m<sup>2</sup> in the north to 1,600kWh/m<sup>2</sup> in the south where the number of sunny days can reach 270 days per year with a solar thermal potential of approximately 1,900 TWh.

All above mentioned opportunities requiresignificant capital investments, as well as reliable strategic partners.



## PROJECTION OF INVESTMENT PLAN

Basic structure of economic and financial analysis of investment projects, in preparation of long term development of the energy sector of Bosnia and Herzegovina from 2010 to 2020 presumes creation of an information the basis of which is, inter alia, made of investments in construction of new and rehabilitation of the existing plants and installations of the energy sector.

Input data for investment proposals are collected from the Energy Companies and private investors from Bosnia and Herzegovina. The investors' estimates are given separately for each project or group of projects in the framework of the proposed development plan of the BIH energy sector for development-investment cycle 2010 to 2020.

A review of total investments by energy sector within the framework of the BIH energy sector development until 2020 is shown at following table:

Energy sectors	Amounts in million EURO				
	Investment period				
	until 2010.	2011. - 2015	2016. - 2020	Total investment	%
Power Sector	1.447	1.535	1.044	4.057	65,8 %
EP B&H	539	495	414	1.449	23,5 %
EP HZHB	507	423	155	1.085	17,6 %
EP RS	337	511	396	1.244	20,2 %
Elektroprijenos B&H	89	105	78	271	4,4 %
NOS B&H	6	2	0	8	0,1 %
Coal mines	239	329	177	745	12,1 %
Federation B&H	130	125	85	340	5,5 %
Republic of Srpska	108	205	92	405	6,6 %
District heating sector	179	162	167	508	8,2 %
Zone 2	42	41	43	126	2,0 %
Zone 3	72	66	68	206	3,3 %
Zone 8	50	40	41	131	2,1 %
Zone 9	15	15	15	46	0,7 %
Gas sector	141	241	13	394	6,4 %
Gas transmission systems	106	99	0	205	3,3 %
Underground storage	13	27	0	40	0,6 %
Gas distribution systems	21	115	13	149	2,4 %
Oil sector	323	142	0	465	7,5 %
Modernization & construction	279	0	0	279	4,5 %
Storage facilities	44	142	0	186	3,0 %
<b>Total investment</b>	<b>2.358</b>	<b>2.410</b>	<b>1.401</b>	<b>6.169</b>	<b>100,0 %</b>

Source: B&H Energy Sector Study-World bank -Energy Institute H. Požar-Croatia, 2008



## INSTITUTIONAL FRAMEWORK

The key actors in the electric power sector in B&H are:

Institution	Responsibilities	Contact
Council of Ministers of B&H	Energy sector development strategy on the state level, international relations, drafting energy law on state level	<a href="http://www.vijeceministara.gov.ba">www.vijeceministara.gov.ba</a>
Government of FB&H	Energy sector development strategy and energy policy on entity level	<a href="http://www.fbihvlada.gov.ba">www.fbihvlada.gov.ba</a>
Government of RS	Energy sector development strategy and energy policy on entity level	<a href="http://www.vladars.net">www.vladars.net</a>
Ministry of Foreign Trade and Economic Relations of B&H	Coordination of energy policy and international relations at the level of B&H	<a href="http://www.mvteo.gov.ba">www.mvteo.gov.ba</a>
Ministry of Energy, Mining and Industry of the Federation B&H	Implementation of state policy, energy policy of Federation B&H and coordination of entity's activities	<a href="http://www.fmeri.gov.ba">www.fmeri.gov.ba</a>
Ministry of Economy, Energy and Development of the RS	Implementation of state policy, energy policy of RS and coordination of entity's activities	<a href="http://www.vladars.net">www.vladars.net</a>
State Electricity Regulatory Commission (DERK)	Regulation of electricity transmission activity and international trade investment electricity	<a href="http://www.derk.ba">www.derk.ba</a>
Regulatory Commission for Electricity of Federation of BiH (FERK)	Regulation of production, distribution and supply of electricity in the Federation B&H	<a href="http://www.ferk.ba">www.ferk.ba</a>
Regulatory Commission for Energy of Republic of Srpska (RERS)	Regulation of production, distribution and supply of electricity in the Republic of Srpska	<a href="http://www.reers.ba">www.reers.ba</a>
Independent system operator B&H (NOS)	Transmission system management, energy market balancing ,system services ensuring etc	<a href="http://www.nosbih.ba">www.nosbih.ba</a>
Electricity transmission company Elektroprenos - Elektroprivreda B&H	Electric power transmission	<a href="http://www.elprenosbih.ba">www.elprenosbih.ba</a>
Public Company Elektroprivreda B&H (EPBiH)	Production,distribution and supply of electricity	<a href="http://www.elektroprivreda.ba">www.elektroprivreda.ba</a>
Public Company Elektroprivreda Hrvatske zajednice Herceg Bosne (EPHZHB)	Production,distribution and supply of electricity	<a href="http://www.ephzhb.ba">www.ephzhb.ba</a>
Combined holding Elektroprivreda RS (EPRS)	Production,distribution and supply of electricity	<a href="http://www.ers.ba">www.ers.ba</a>



## LEGAL FRAMEWORK

### LEGAL FRAMEWORK FOR B&H POWER SECTOR

Legal framework for power sector in Bosnia and Herzegovina is defined by:

State level:

- Law on transmission, regulator and system operator of electricity in B&H (Official Gazette of B&H, 07/02)
- Law on establishment Transmission Company in B&H (Official Gazette of B&H, 35/04)
- Law on establishment Independent System Operator in B&H (Official Gazette of B&H, 35/04)
- Law on Implementation of Tariff System (Official Gazette B&H, 6/04)

Entity level:

- Law on electricity in the Federation B&H (Official Gazette FB&H, 66/13),
- Law on electricity in the RS (Official Gazette of RS, 8/08, 01/11, 92/09)
- Energy Law (Official Gazette of the RS, 49/09)
- Law on Renewable Energy Sources and Cogeneration in Federation B&H (Official Gazette FB&H, 70/13, 04/14)
- Law on Renewable Energy Sources and Cogeneration in RS (Official Gazette RS, 39/13)

## EUROPEAN ENERGY COMMUNITY

Bosnia and Herzegovina is a member of the Energy Charter Conference and signatory of two Athens Memorandums of Understanding on the Regional Energy Market in South East Europe and its integration into the European Community Internal Energy Market.

## ENERGY RELATED INTERNATIONAL OBLIGATIONS

Bosnia and Herzegovina ratified the following Agreements, Protocols and Conventions:

- Agreement on the Energy Charter Treaty (ECT) and the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), which main issue areas include investments; trade, transit; and energy efficiency (2000)
- UN Framework Conventions on Climate Changes (2000)
- Convention on Cross boarder Traffic Control of dangerous waste and its disposal (2000)
- Convention on Adriatic Sea Pollution Protection (1998)
- Kyoto Protocol (2008)
- Agreement on Energy Community Establishment (2006)

## THE EU DOCUMENTS RELEVANT FOR POWER SECTOR POLICY OF B&H

The Energy Community Acquis follows the development of the European Union legal framework and at present it includes its key energy legislation in the fields of electricity, gas, environment, competition, renewable energy sources, energy efficiency, oil and statistics.

In addition to the EU acquis, the Ministerial Council adopted several independent measures pertaining to dispute resolution, establishment of the '8th Region' aimed at facilitation of cross-border electricity trade and measures for coordination of security of supply.

The EU documents relevant for the energy policy of B&H include the following:

- White Paper on preparation of Central and East European associate states for integration in to internal market ,
- Directive 2009/72/EC concerning common rules for the internal market in electricity
- Directive 2009/73/EC concerning common rules for the internal natural gas market
- Regulation 714/2009/EC on conditions for access to the network for cross-border exchanges in electricity,
- Regulation 715/2009/EC , on conditions for access to the natural gas transmission network
- Directive 2004/67/EC concerning measures to safeguard the security of natural gas supply,
- Directive 2005/89/EC concerning measures to safeguard security of electricity supply and infrastructure investments,
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources

EU legislation on energy efficiency includes:

- White Book on Energy Policy,
- Green Book Towards a European Strategy for the Security of Energy Supply,
- Directive 2010/30/EC on the indication by labeling and standard product information of the consumption of energy and other resources by energy-related products.
- Regulation on Cross-border Trade in Electricity (1228/2003/EC),
- Directive 2010/31/EC on the energy performance of buildings
- Directive 2006/32/EC on Energy End-use Efficiency and Energy Services,
- Action Plan on Energy Efficiency: "Saving 20% by 2020".

EU legislation on renewable energy sources includes:

- White Book on Renewable Energy Sources,
- Communication on alternative fuels for road transportation and on a set of measures to promote the use of Bio-fuels,
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources
- Directive 2004/8/EC on Promotion of Cogeneration.

Third Legislative Package for an internal EU gas and electricity market was adopted with the implementation deadline set for January 1, 2015.

Exceptionally, the implementation deadline for Article 11 of Directive 2009/72/EC shall be January 1, 2017.



## THE FOREIGN COMPANIES THAT ALREADY INVESTED IN BIH ENERGY SECTOR

Top 5 Foreign Direct Investment in B&H Energy sector where the Foreign companies invested more than 15 million €, are shown at following table:

Country	B&H Company	Foreign Company	Subsector	Investment in 000 €
Russia	Rafinerija nafte Brod Rafinerija ulja Modriča	NefteGauinKor (Zarubežnjjet)	Oil	245 423
Slovenia	Petrol BH Oil Company d.o.o. Sarajevo	Petrol Ljubljana	Oil	43 460
Croatia & Hungary	Energopetrol d.d. Sarajevo	Consortium MOL / INA	Oil	23 520
Denmark	EFT Group Rudnik lignita Stanari d.o.o. Stanari	EFT (Holdings) ApS Kopenhag	Coal	18 200
	European Energy Group d.o.o. Trebinje	EFT (Holdings) ApS Kopenhag		
Germany	Messer Sarajevo-Plin d.o.o. Sarajevo	Messer Gresheim H.	Gas	15 313
	Messer Mostar-Plin d.o.o. Mostar	Messer Griesheim Funfee V.		

*Source: Ministry of Foreign Trade and Economic relations of B&H*

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