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EcoInn Danube

NATIONAL REPORT ON O&O – BOSNIA AND HERZEGOVINA

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1. ABSTRACT

Science and technology are the areas that are built into the foundation of any modern society and the development and prosperity of every human community relies on them.
Eco-innovation represents an innovative process of creating and introducing new technologies, products, processes and services into the market that reduces the overall negative impact on the environment and enables business and innovation to create sustainable solutions together.
Science, technological development and innovation are the most important part of the economic growth. Research and development have a crucial role in the process of education and training of future generations of workers. Innovative and motivating working environment and constant innovation intended users, enabling the company to respond quickly to the needs of customers and make offers to their demands. Innovation is not just new technology or new products, but also to new and smarter ways of conducting business, new management methods, new business systems or new services. Innovations not only bring more development, more jobs and money, innovation leads to the creation of a "smart" development. Innovations in the area of ecology makes sustainable growth a reality and practically ensures the future of the human race.
Constitutional structure of BH fully reflects in the field of science and, as such, significantly determines its development. Jurisdiction for decision making in the area of science is, in accordance with present constitutional arrangements, divided by territorial principle between several entities or levels of legislative power. Existing constitutions does not treat the issue of science and scientific research but they transfer authorization for legal standardization from “higher” to “lower” governmental structures. State jurisdiction in the terms of legal regulation of scientific research activities is not explicitly stated, with that is, with the exception of fulfilment of international obligations, established assumed jurisdiction in favor of the entity. The situation seems more complicated with the fact that identical regulations also exists in Constitution of Federation of Bosnia and Herzegovina, which means that jurisdiction for normative regulation in the science area, here belongs to cantons.
Yet there is a high level of awareness among the key stakeholders of the importance of investing in R&D and innovation for economic and social development. There is an effort to establish and strengthen R&D and innovation policies and system in the country. In terms of policy agenda, progress has been made in recent years, in particular with the adoption of the Strategy for the Development of Science in BH 2010-2015 (STI Strategy), the Framework Law on Scientific and Research Operations and Coordination of the Inter-entity and International Scientific and Technical Cooperation (2009) and the Framework Law on Higher Education (2007) on country level but also progress has been made by adopting needed documents on entity level. Likewise major steps have been made in the last decade in the area of ecology and protection of the environment. Both entities have formed the agencies dealing with the ecology and energy efficiency issues, operating successfully.
The major problems facing the current innovation system are: weak R&D capabilities in both the public and private sector; R&D undertaken at universities having a weak relevance to industry; a marginal government funding; absence of links between science and industry.
Very important for development of scientific – research activities in BH and its adaptation to European developments in this field is Agreement of Stabilization and Association to European Union from the 16th June 2008. In section VIII of Agreement is defined a total of 25 policies of cooperation between BH and EU, of which the larger number, directly or indirectly is related to the area of science, technology and research (research and technological development, information society, education and training etc.). For achieving the strategic goals in mentioned areas and realization of priorities, there is a possibility of obtaining financial and technical assistance.

General obstacle in BH R&D field is the lack of available statistical data. Given the BH EU accession process the statistics are also being adopted and adjusted. The lack of data and impossibility of comparison with the EU and region is making the process of planning and management also difficult and often mistaken. Even making this National Report is not in line with the methodology developed within the EcoInn project.

2. OVERALL NATIONAL RANKING

Viewing the rankings within the European Innovation Scoreboard 2017 it is evident that Bosnia and Herzegovina is not ranked.
If data were available for Bosnia and Herzegovina one can suspect that BH economy would belong to the lowest segment of South East European Countries. These results would be in line with expectations when we look at the individual components of EIS. The individual parameters which EIS is composed of are indicating the situation in the fields of human resources, research systems, innovation-friendly environment, finance and support, firm investments, innovators, linkages, intellectual assets, employment impacts and sales impacts of innovative actions in the country. Having this in mind, it is more than safe to state that Bosnia and Herzegovina is in the lower segment in most of these fields measured by general indicators of the segments.
The similar conclusions can be made in the field of eco-innovation.

Having in mind the above stated, one can introduce the Global innovation index (GII)1 as a measure of innovative status of Bosnia and Herzegovina in comparison to the rest of the world. The Global Innovation Index provides detailed metrics about the innovation performance of 127 countries and economies around the world. Its 81 indicators explore a broad vision of innovation, including political environment, education, infrastructure and business sophistication. Therefore the information on innovation performance gains significance for ranking the world's countries and economics.
By analysing BH ranking since 2013, one can observe the ranking is constantly falling. In 2013 out of 142 countries ranked, BH was on 65th place and in 2017 BH rank in 86 even there are only 127 countries on the ranking list.
There are few indicators indicating strengths by the opinion of the creators of this ranking. For example, "Ease of resolving insolvency". Having in mind, the business community is strongly stating this area as a grate obstacle in doing business in BH it is unclear why is this raised as a strength. On the other hand, indicator "Ease of starting a business" is discussed as a weakness of BH economy event though major reforms have been done in recent years in this area especially in Republika Srpska.
Nevertheless, BH economy is in the lower segment in most of the indicators forming the Global innovation index.

[1] https://www.globalinnovationindex.org/

3.INNOVATION

New doctorate graduates

Missing the data of age of new doctorate graduates in Bosnia and Herzegovina, we find the comparison of total annual number of doctorate graduates in BH and number of doctorate graduates aged 25-34 in benchmarks is also information of a good value. Comparing the two data series, knowing the latter is just a portion of the first, we find the results very poor. BH number of new graduates per 1000 people is still under 0,1 while the MI countries are close to 1,5.

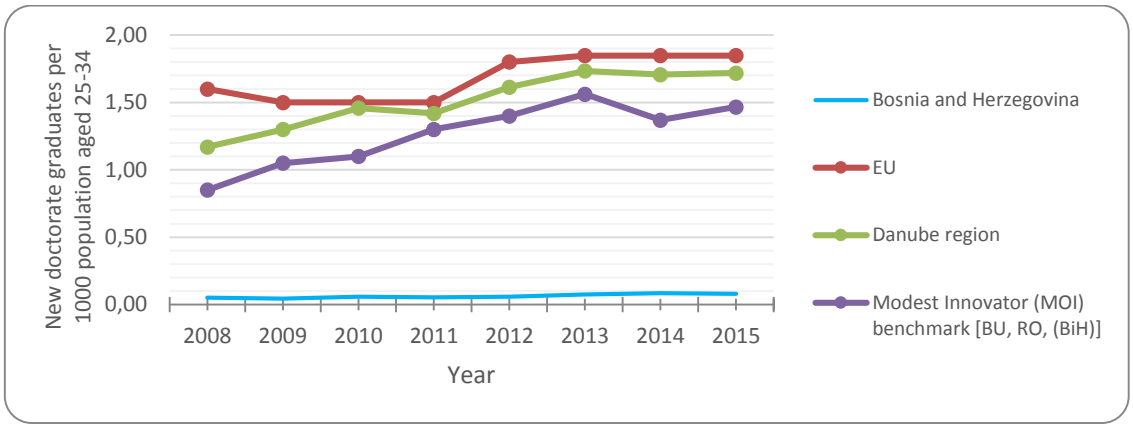


Figure 1: New doctorate graduates per 1000 population indicator in Bosnia and Herzegovina compared to MI benchmark and the average of the EU and Danube region of New doctorate graduates per 1000 population aged 25-34[2]

OBSTACLE: Number of doctorate graduates is ten and more time lower in BH then in the MI countries stating the poor level of development of overall education process in the country starting from schools and all the way to government and private sector appropriations for education system and the scholarships. Living in the era where most of the innovations come from the highly sophisticated technology, educated scientists are a spine of innovation capacity in the country which is apparently week in BH.

Public R&D expenditure

According to the data in 2015, Bosnia and Herzegovina invested in research and development 0,21 per cent of GDP. In the same period Slovenia allocated 0,53% of its GDP to fund research and development activities in the public sector, including the government and higher education. In the last years the average of EU countries ranges between 0,7 and 0,8 % making Bosnia three times smaller investor in this crucial field of general economic and social growth and development.
Gross domestic expenditures on R&D in the period 2012 - 2016 were highest in the field of Engineering and Technology ranging from 33,5% in 2012 to 70,7% in 2015. In 2013, Natural sciences prevailed shortly and shared 44,5% of total expenditures while in the period they mostly were on the second place ranging from 6,2% in 2015 to 35% in 2014 and 44,5% in 2013.

[2] http://www.bhas.ba/ 25th November 2017, 9 a.m.

ESA 2010	2007.	2008.	2009.	2010.	2011.	2012.	2013.	2014.	2015.
Bruto domaći proizvod, mil. KM *Gross domestic product, mln KM*	23.488	26.165	25.921	25.995	26.799	27.492	28.374	28.365	29.666
Nominalne stope rasta (%) *Nominal growth rate (%)*		11,40	-0,93	0,29	3,09	2,59	3,21	-0,03	4,59
Realne stope rasta (%) *Real growth rate (%)*		3,37	-3,58	-0,29	1,76	0,07	2,64	0,26	3,84

Figure 2: Real GDP growth (%) in BH[3]

OBSTACLE: Given the real GDP growth in Bosnia since 2009 has been evident, resources for public spending for research and innovation are available but their share must be raised.

Private sector R&D expenditure as % of GDP

Expenditure on research and development is one of the most widely used measure of innovation inputs. The main aggregate used for international comparisons of R&D expenditures is gross domestic expenditure on R&D (GERD). GERD is often displayed as a percentage of GDP, to indicate the intensity of research and development in the economy. Expenditures for research and development are investments in new knowledge, products or processes. GERD is usually divided into four sectors: the business sector, government, higher education and private nonprofit sector. Government funding has mainly aimed at investing in new fundamental knowledge and satisfying social needs, such as health, defence and not expected to affect productive in the current variable.

Data regarding the R&D financing in BH vary largely within categories and periods showing the low level of activities where a single large scale research action distorts data significantly.
Regarding the sources intended for R&D own resources range from 18,9% in 2013 to 47% in 2015, while from central government resources and other levels R&D receives 54% in 2014 but 24,8 % in 2012. These data don't show any permanent trend of growth or decrease.

	2012	2013	2014	2015	2016
B- Mining and quarrying		63,5%			
C – Manufacturing	13,7%	12,4%	50%	12,9%	13,7%
D – Electricity, gas, steam and air conditioning supply	30,5%		7%	45%	
K - Financial and insurance activities	17%	10%	19%	20,4%	17%

Figure 3: Sections of highest expenditure for research and development (according NACE Rev.2 classification)

OPPORTUNITY: The above two indicators are not showing any positive pictures for BH innovators, but to look at some positive sides; BH`s community abroad is investing a significant amounts in BH economy and this stands as an opportunity. Part of the income of BH citizens could be directed into research and development, which has been and can be additionally capitalized with increased transfer of know-how from the same subjects from abroad.

Government budget appropriations or outlays for R&D

The amount of government budget appropriations or outlays for R&D as a share of general governmental expenditure in countries within the Danube region is notably less than that of the European Union, on average about 20%. In 2007 this amounted to 25,5%. However, with a slight decrease within countries of the EU and a substantial increase of budget appropriations and outlays in

[3] http://www.bhas.ba/ 25th November 2017, 10 a.m.

the Danube region (+10% from 2007 to 2016), the trend has converged to achieve the smallest difference in 2016 (less than 15%).

Planned budget funds for research and development in 2017 amount to 7.121.085,92 EUR. According to socio-economic objectives, most funds are planned in Education (59,1%).

In Bosnia and Herzegovina in 2016, government budget appropriations of institutions that finance the R&D activity amounted to 6.708.940,96 EUR. The data is composed of the data on the Budget institutions of Bosnia and Herzegovina, Entity institutions Budget and District Brcko appropriations or outlays according to the socio-economic objectives.

Analysed by sector, budget appropriations are mostly dedicated for the sector of higher education 72%, followed by government sector with 19,8% of government budget funds. Other budgetary funds are intended to business sector with 7,1% and non-profit sector with 1,1%.

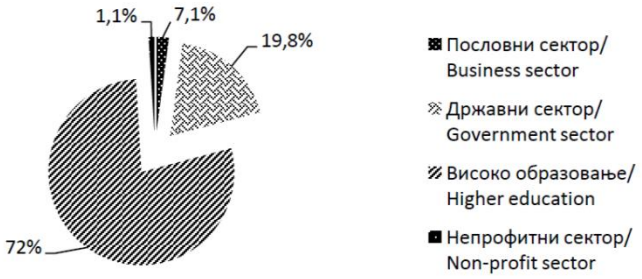


Figure 4: Government budget appropriations or outlays for R&D, by sector (actual outlays), 2016[4]

OBSTACLE: Government budget appropriations or outlays for R&D as is the case in general for public funding in BH are by far the lowest in the region. Low government budget appropriations and outlays for R&D are a major obstacle in further development and application of Eco-innovations.

Total Intramural R&D expenditure (GERD)

The amount of total intramural R&D expenditure (GERD – Gross domestic expenditure on R&D) from all sectors (inclusive of funding from the business enterprise sector, the government sector, the higher education sector and the private non-profit sector) measured as a share of GDP has been on average almost 25% lower in the countries of the Danube region compared to the European Union.

[4] http://www.bhas.ba/ 25th November 2017, 10 a.m.

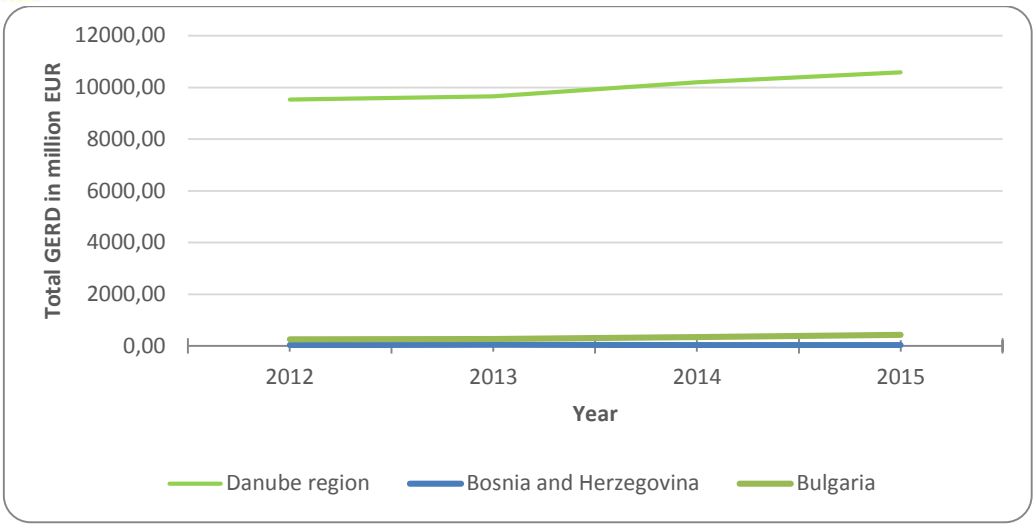


Figure 5: Total Intramural R&D expenditure in million EUR (all sectors)

However, the countries of the Danube region have steadily decreased the divergence from a maximum of 32% in 2009 to just 18,5% in 2015, as the European Union share has stagnated at around 2%, while the Danube region increased the share to 1,66% from a modest 1,32% (a more than 26% increase).
In absolute terms BH is falling far behind compared to the Danube region and even to the modest innovator such us Bulgaria.
The graphical representation of the data is almost impossible due to the large differences in amounts represented.

	2012	2013	2014	2015	AVG
European Union	270.321,52	274.499,98	286.121,33	299.328,73	267.797,12
Bosnia and Herzegovina	35,57	44,00	36,50	31,95	37,01
Bulgaria	253,70	266,74	339,93	433,20	273,34
Danube region	9.530,98	9.648,16	10.192,47	10.579,58	9.728,48

Figure 6: Total Intramural R&D expenditure (GERD)[5]

Within the four years period shown in the table above, the values in absolute terms show a single raise in 2013 and continuous diverge following that. Moreover, BH averagely spends for R&D almost 100 times less than EU.

OBSTACLE: Total Intramural R&D expenditure is too low. There is a clear lack of intramural expenditure for R&D across all sectors, which can be seen as an obstacle of further development of Eco-innovations.

Persons engaged in R&D

Number of persons in full-time and part time employment engaged in R&D in Bosnia and Herzegovina is relatively constant and is around 3000 which makes less than 0,1% of total population. Even this percentage is quite low, the data show that the share of researchers in the overall number of persons engaged in R&D is raising for 22% in previous five years.

[5] http://www.bhas.ba/ 30th November 2017, 9 a.m.

	2012	2013	2014	2015	2016
Number of persons in full-time and part time employment engaged in R&D (share of women)	1 705 (44,1%)	2 167 (44%)	3 189 (47%)	3 088 (46,1%)	2 807 (48%)
Share of researchers in total number of persons engaged in R&D (share of women)	46,8% (34.5%)	57,5% (38,9%)	57% (44%)	58,2% (44,4%)	69,2% (47,1%)
Share of doctors of science among researchers (share of women)		38,9% (31,4%),	77% (76%)	74,2% (42%)	70.4 % (13.9%)
Share of masters of science among researchers (share of women)		20,7% (47,7%)	13% (14 %)	12% (49,1%)	15% (52,1%)

Figure 7: Number of persons in full-time and part time employment engaged in R&D in BH[6]

OBSTACLE: Highly educated persons present a vital part of the national workforce. They are main resource for development processes in one country's economy. Bosnia lacks in this resource. One reason is low number of educated persons but more important is the brain drain of the most promising scientist of BH.

Number of researchers is showing positive trend for the reason of introducing the private educational sector. More and more private faculties are being established and they are producing new posts for researchers among the teachers and other personnel.

Business-Academia Collaboration

OECD assessment conducted in SEE economies (2015) (methodology and assessment process section can be found in Competitiveness Outlook 2016 (p. 31)[7] proves the vital obstacle in development of innovativeness in BH as well as ecoinnovation. Bussines-academia collaboration in BH in 2015 is rated 1,2 and in comparison to other SEE countries it is behind Serbia (2,2), FYR Macedonia (1,4) and Montenegro (1,3). Situation is worst only in Albania (0,8).

There are various instruments which can be implemented in order to improve the eco innovative environment in BH, such as launching of centres of excellence, technology transfer and launching "spin-off" companies by the research community and many other forms of cooperation of the economy and science / innovation.

It is difficult to estimate the extent to which the private sector is involved in R&D given the lack of data. However, the government offers very few incentives for innovation and investment in R&D.

The Ministry of Science and Technology RS supports projects of introduction of modern technologies, projects of testing and introduction of significantly improved existing technologies, projects of manufacturing and testing of one's own equipment, procurement of modern equipment, and participations at, and organizations of, professional conferences focusing on new technologies. The financing of these programmes (around 130,000 EUR per annum) is carried out through the process of transparent public competition. In addition to the universities and institutes the target group of these activities is private sector, in particular small and medium enterprises. Minority of applicants are SMEs.

In the FBiH, this area is under the jurisdiction of the Federal ministry of development, entrepreneurship and crafts.

Infrastructure for support to business development and innovation consists of business centres funded through international programs that support SMEs through business consulting services. These international programs also support other initiatives to improve the business climate in BiH, however, such initiatives only have an indirect effect on the level of innovation and R&D investment in BiH.

[6] http://www.bhas.ba/ RESEARCH AND DEVELOPMENT, 2016, page 1-2

[7] OECD assessment conducted in SEE economies (2015), https://www.oecd-ilibrary.org/development/competitiveness-in-south-east-europe/research-development-and-innovation-in-south-east-europe_9789264250529-9-en

The majority of them are based on international donor support.[8]

Participation in European Union external actions

Participation of BiH in FP7 (European Union's 7th Framework Programme for Research, Development and Demonstration Activities), Horizon 2020 (the EU's 8th Framework Programme for Research and Innovation, H2020) and other pan-European research collaborations (like COST and EUREKA) remains below expectations.

In FP7, there were 46 BiH grant holders with a total funding of 3.16m€. In H2020, as of 15 July 2015, 6 BiH research teams (incl. 2 SMEs) participated in 4 grant agreements benefiting from a total of 0.24m€. While the BiH success rate of 14% (share of grantees as % of all applicants) is in line with the other associated countries (14,3%), the EU financial contribution success rate amounts to only 4.5% against 11.8% for the average of the associated countries. Participation and success rates of BiH researchers in mobility programmes show similar pictures. According to eCORDA BiH research teams participate in 94 projects in the running 286 COST actions (in comparison to other countries in the region: Serbia has 221, Slovenia 217, Macedonia 131, and Montenegro 20 participations).

Researchers interviewed complained that opportunities in H2020 are more limited due to the lack of geographically targeted calls. There is little confidence in the possibility to be accepted by international consortia in the framework of international competitive programs such as the EU FPs, whereas an important number of researchers are involved in Erasmus+ and its predecessors (e.g. Tempus, Mundus, etc.). Potential participants seem to be aware of the possibilities offered to them in international contexts, but in general do not make efforts for their integration in the international scientific community.[9]

OPPORTUNITY: An additional chance for faster development of the innovation infrastructure in BH is a membership in Horizon 2020. This programme offers an involvement in international cooperation which is an opportunity to approach modern scientific and research equipment for a lowest financial investment possible.

[8] Policy Mix Peer Review Reports – Background Report of Bosnia and Herzegovina, 2016.
[9] Policy Mix Peer Review Reports – Background Report of Bosnia and Herzegovina, 2016.

4. ENERGY

General overview of energy sector

Just before the 1990's war, the energy sector played an important role in the economy with a share of 80% in GDP. At the time, there was one state power company, vertically arranged.
Today in BH there are three vertically integrated electric power companies: Elektroprivreda Bosne i Hercegovine (EP BH), Elektroprivreda Hrvatske zajednice Herceg Bosne (EP HZHB), Elektroprivreda Republike Srpske (ERS), where EP BH produces ~7,2 TWh, ERS ~5,8 TWh, and EP HZHB ~1,5 TWh. Their relationship is synchronized and interconnected without competitiveness, which brings them to the virtual position of the monopoly within their ethnic territory.
The main production power plants in BH are thermal power plants (coal) and hydroelectric power plants.
During the war, about 56% of the production facilities and about 60% of the distribution were destroyed networks. After the war, most of the damaged infrastructure was restored.

„Elektroprivreda Republike Srpske" is organized as a mixed holding operating with two thermo power plants: Gacko and Ugljevik with ascending coal mines, three hydro plants: on Trebišnjica, Drina and Vrbas, and four mini hydro plants: Bogatići, Mesići, Tišća and Vlasenica. In Republika Srpska energy is also being produced in plants which use renewable energy sources, privately owned. These plants are users of state incentives. There are 16 mini hydro plants (total 40,82 MW) and 38 mini solar plants (total 3,7 MW). During 2016, privately owned „Termoelektrana Stanari" is operating with 300 MW of power and currently exporting the entire production with annual production of 2TWh.
Gross sales in BH in 2016 was occupied by 16 legal entities who traded ~7,8 TWh. In 2016 BH exported ~5,3 TWh and imported ~1,5TWh.
„Elektroprenos BH" owns ~6.330 km of distribution lines in four regions (Banja Luka, Sarajevo, Tuzla and Mostar) and is in charge of transmission, maintenance and development while NOSBH runs the high voltage lines, balances the market, plans the production development and revises the development of transmission network. Distribution of electricity in Republika Srpska is operated by 5 entities united in Holding ERS („Elektrokrajina", „Elektro-Bijeljina", „Elektrodistribucija Pale", „Elektro Doboj" and „Elektro-Hercegovina"). Due to the low prices, especially for the households, byers are still using this source of supply with the electricity.
Number of byers of electricity in BH is ~1.5 million in 2016. In retail in 2016 first changes in suppliers have been made with 58 byers buying 321,77 GWh (~ 2,8%) from suppliers which are not public.

Energy sector is one of the most powerful in Bosnia and Herzegovina, with long tradition and huge potentials and opportunities for further development and investment. B&H is a member of the Energy Community of South East Europe established in November 2002 between EU and South East European countries in order to extend the EU internal energy market to South East Europe and beyond.
Bosnia and Herzegovina is endeavored with various indigenous energy recourses, as follows:

- The main energy resource of BH is coal (brown coal and lignite), with estimated reserves of 10 x 109 tons
- Only about 35 % of huge hydro potential of over 6000 MW is in use
- According to the extensive researches, there is significant wind energy potential
- Raw material resources for the bio-mass energy are extremely favorable, including approximately 1.5 million m^3 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 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)

The legislative framework of the energy sector

Below is a review of the basic laws regulating the energy sector in Bosnia and Herzegovina and the Republika Srpska. On the basis of these laws, regulations and technical regulations were adopted, as well as bylaws that regulate certain issues in more detail. In addition to the enumerated laws, laws from other sectors closely related to the regulations of the energy sector, such as regulations in the field of environmental protection, spatial planning and construction, and others, are also applied.

Bosnia and Herzegovina

1. Law on Transmission, Regulator and Operator of the Electricity System in Bosnia and Herzegovina (Official Gazette of BH 7/02, 13/03, 76/09 and 1/11)
2. Law on the Establishment of an Independent Transmission System Operator in Bosnia and Herzegovina (Official Gazette of BH 35/04)
3. Law on the Establishment of a Electricity Transmission Company in Bosnia and Herzegovina (Official Gazette of BH 35/04, 76/09, 20/14)
4. Law on Concessions of Bosnia and Herzegovina (Official Gazette of BH 32/02 and 56/04)

Republika Srpska

1. The Law on Energy (Official Gazette of RS 49/09)
2. Law on Electricity (Official Gazette of RS 8/08 - consolidated text, 34/09, 92/09 and 01/11)
3. Gas Act (Official Gazette of RS 86/07 and 121/12)
4. Law on Pipeline Transport of Gaseous and Liquid Hydrocarbons and Distribution of Gaseous Hydrocarbons (Official Gazette of RS 52/12)
5. The Law on Oil and Oil Derivatives (Official Gazette of RS 36/09 and 102/12)
6. Law on Geological Surveys (Official Gazette of RS 110/13)
7. Law on Mining (Official Gazette of RS 59/12)
8. Law on Fees for the Use of Natural Resources for the Purpose of Electricity Generation (Official Gazette of RS 52/14)
9. The Law on Renewable Energy Sources and Efficient Cogeneration (Official Gazette of RS 39 / 13,108,13 and 79/15)
10. Law on Energy Efficiency (Official Gazette of RS 59/13)
11. Law on Business Companies (Official Gazette of RS 127/08, 58 / 09,100 / 11 and 67/13)
12. Law on Public Enterprises (Official Gazette of RS 75/04 and 78/11)
13. Law on Concessions (Official Gazette of RS 59/13)
14. Law on Public Private Partnership (Official Gazette of RS 59/09)
15. Law on Spatial Planning and Construction (Official Gazette of RS 40/13, 106/15 and 3/16)

Energy dependence

Energy dependency shows the extent to which an economy relies upon imports in order to meet its energy needs. The indicator is calculated as net imports divided by the sum of gross inland energy consumption plus bunkers.

BH largely relies on domestically produced energy. Two main reasons are low level of economic development and substantial domestically available hydro-energy sources and coal. BH imports gas and liquid fossil fuels but has capacities in processing oil (Rafinerija nafte Brod[10] and Rafinerija ulja Modrica[11]). The overall energy dependency of the country was 4,4 in 2009 and making a grate raise to 21,4 in 2014. BH is a country with low dependency considering that the average for the European Union member states (EU-28) was 54,0% in 2015.

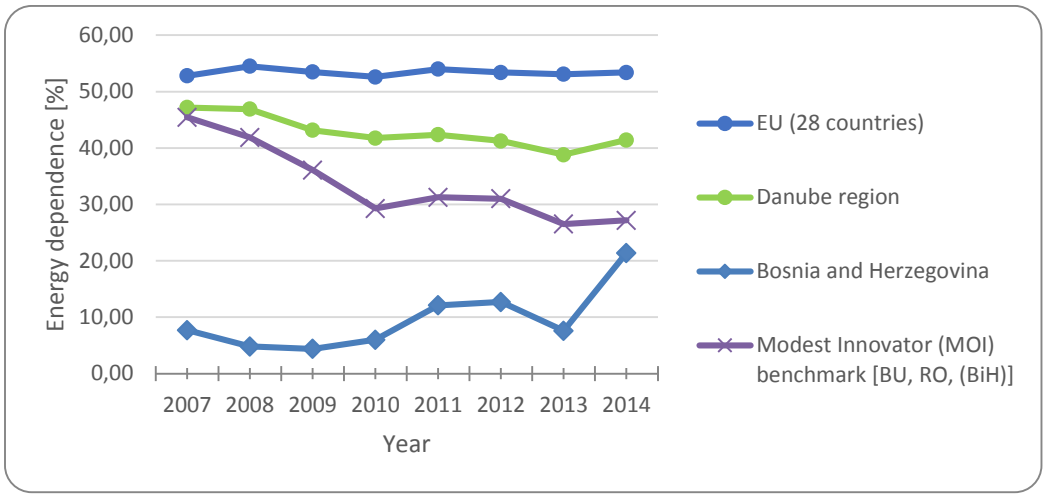


Figure 8: Energy dependence of BH compared to EU-28, Danube region and MI countries

OPPORTUNITY: Having in mind the availability of energy sources and the determination of all strategic plans to support development of the sector of energy production, this area shows the opportunities for innovative action. If one expects grater investments and large project in the area of energy production, innovation society should find additional demand for their projects, funding sources and support infrastructure.

Electricity generated from renewable sources

Renewable energy sources produce negligible or zero greenhouse gas emissions.

In 2001, the Directive on electricity production from renewable sources established an indicative framework to increase the share of renewables in gross electricity consumption in the EU-15 to 22,1 % by 2010, later modified to 21 % for the EU-27.

Despite the fact that BH belongs to the European countries with significant solar radiation, which ranges from 1240 kWh/m^2 to the north of the country to 1600 kWh/m^2 in the south annually, the use of solar energy in this area can be considered insignificant.

One of rare positive data for BH is the Share of electricity generated from RES in Bosnia and Herzegovina making BH electricity more clean than the one produced in EU and Danube region.

[10] https://rafinerija.com/
[11] https://modricaoil.com/

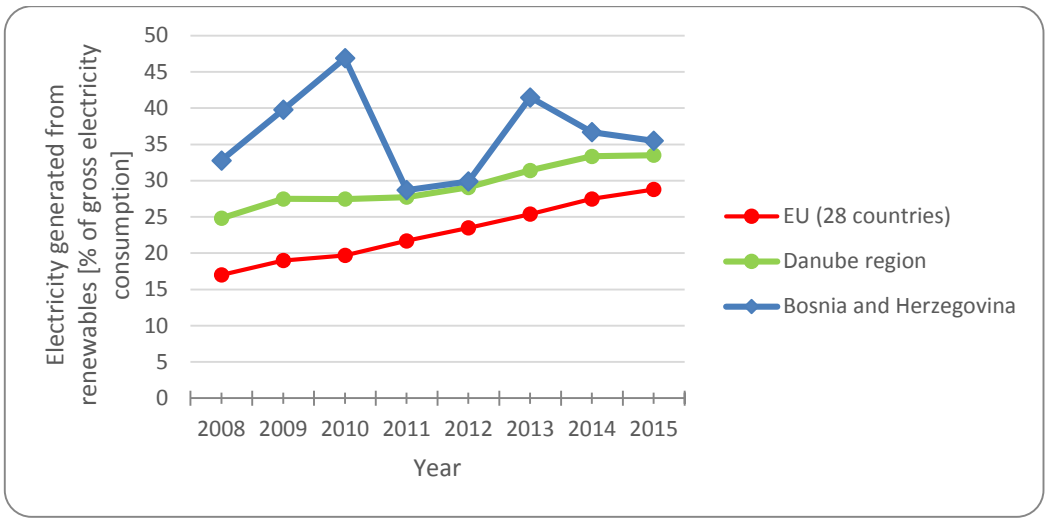


Figure 9: Share of electricity generated from RES in Bosnia and Herzegovina compared to EU-28 and Danube region countries

OPPORTUNITY: Vast resources in hydropower are the main reason for BH excellent results in production of electricity from RES. Other types of RES are also available, such as wind, solar and geothermal energies and are making an excellent opportunity for development of this economic branch and the entire economy.

Primary production of energy by resource

Any kind of extraction of energy products from natural sources to a usable form is called primary production. Primary production takes place when the natural sources are exploited, for example in coal mines, crude oil fields, hydro power plants or fabrication of biofuels. Transformation of energy from one form to another, like electricity or heat generation in thermal power plants or coke production in coke ovens is not primary production.

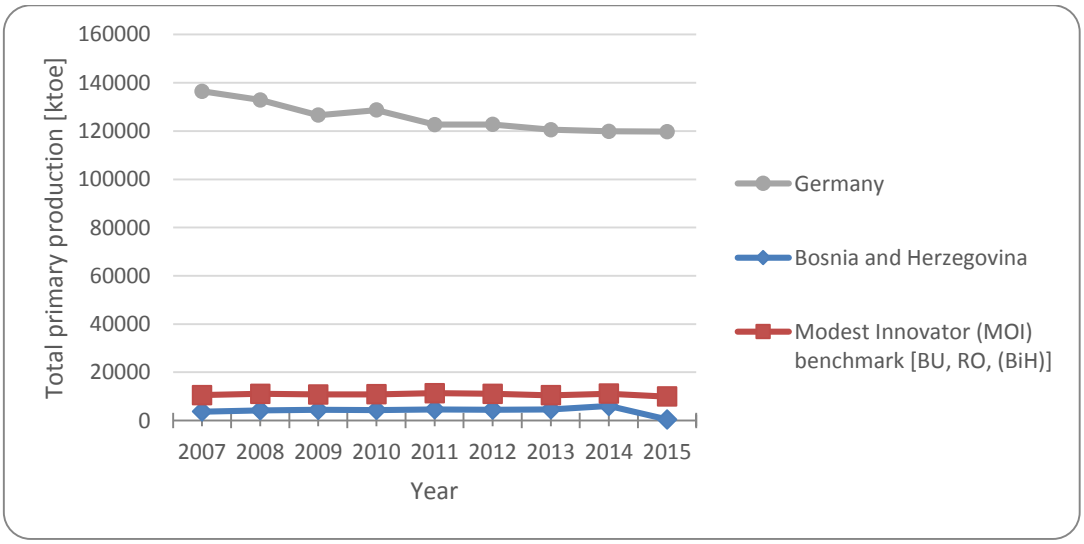


Figure 10: Total primary production in Bosnia and Herzegovina compared to Germany and MI countries

OPPORTUNITY: Bearing in mind the significant energy potential of Republika Srpska, it is necessary to encourage special research in the areas of maximum energy consumption, with a strong emphasis on renewable energy sources and their protection.[12] Eco-innovations need to be the specialisation of BiH.

[12] Strategija naučnog i tehnološkog razvoja RS 2017-2021 (Strategy of development of science and technology of Republika Srpska 2017-2021)

Electricity consumption and electricity prices

In Bosnia and Herzegovina, the highest price of electricity is paid by commercial customers at a voltage level of 0,4 kV, while the lowest price is paid by buyers at 110 kV and 35 kV voltage level[13].

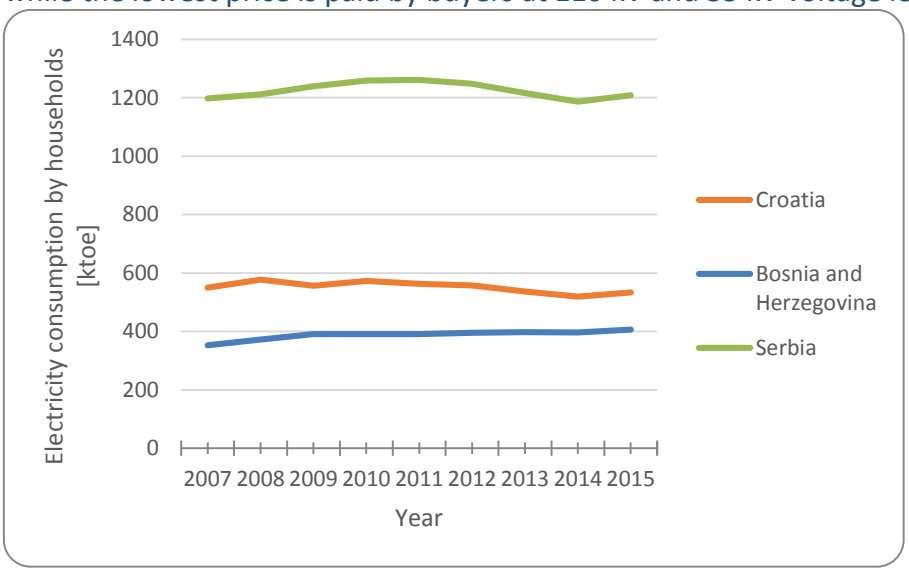


Figure 11: Electricity consumption by households in Bosnia and Herzegovina compared to the neighbouring countries

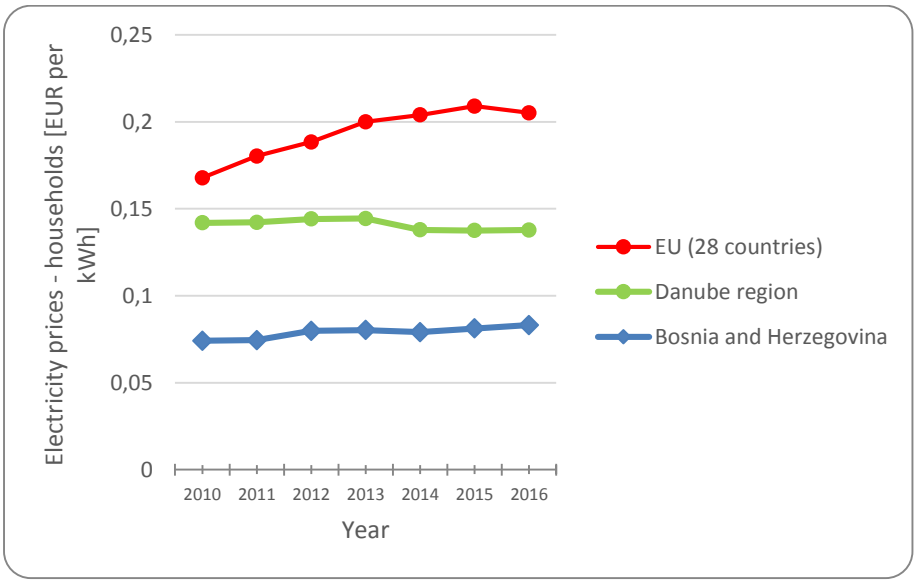


Figure 12: Prices of electricity for households of Bosnia and Herzegovina in comparison to EU and Danube region

[13] DERK Work report for 2016.

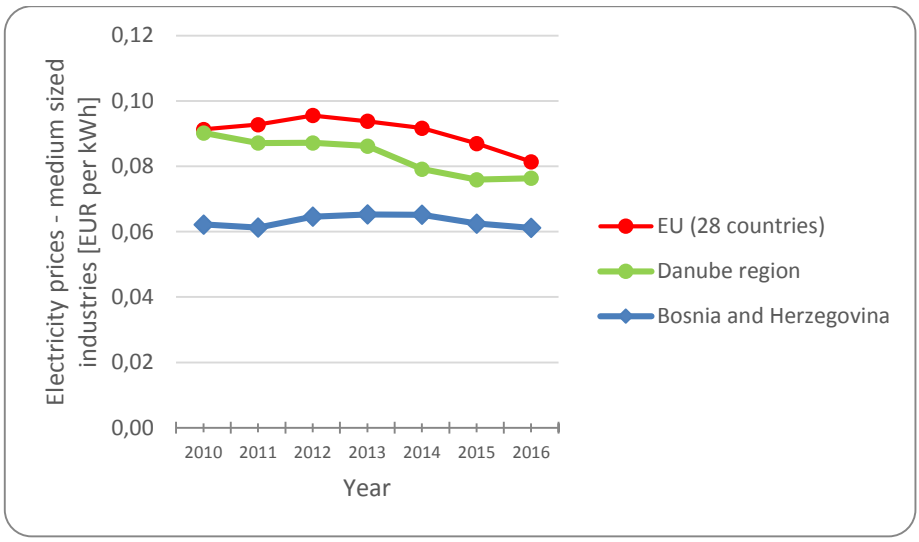


Figure 13: Prices of electricity in medium sized industries of Bosnia and Herzegovina in comparison to EU and Danube region

Electricity prices in Bosnia and Herzegovina have been, for many years now, very low compared to prices in the rest of the region. However, in the last few years there has been a tendency of a slight increase in prices, while prices of electricity in the wider region recorded a slight decline.

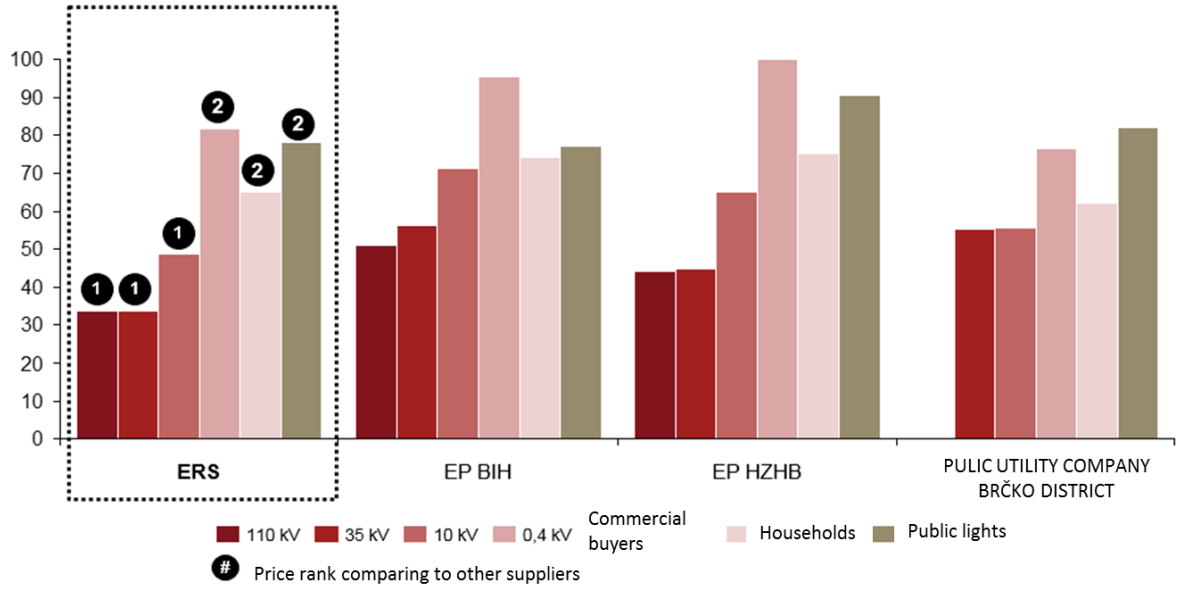


Figure 14: Average electricity price in electric power companies in EUR/MWh, 2016 (VAT excluded)14

Prices el. of energy without VAT and industrial taxes, in 2016, in Bosnia and Herzegovina amounted to 61 EUR/MWh, and there were no significant changes compared to previous years. For comparison, in 2010, the average price of electricity in the region was 106 EUR/MWh, and in 2016, 85 EUR/MWh, which is significantly higher than the prices in Bosnia and Herzegovina. If electricity prices are converted according to PPP (Power Purchase Parity), i.e. of the living standards of individual countries, it is evident that there is a kind of convergence and reduction of the price gap between Bosnia and Herzegovina and the region.

Prices for households are also lower than the regional average. From 2010, the price of electricity ranged between 74 and 84 EUR/MWh, with the price peak in 2016 at 84 EUR/MWh. For the same

[14] DERK Work report for 2016.

period, the average price for households in the region was 138 EUR/MWh. Looking at prices for purchasing power parity, there is a slight upward trend for Bosnia and Herzegovina, while the region was characterized by a slight decline. However, prices in Bosnia and Herzegovina remain at very low levels.

OPPORTUNITY: Observing prices for 2016 by individual countries, industrial consumers have prices that are in the range with average wider regions, while household prices in Bosnia and Herzegovina are lower than average by 11%, where only Serbia had lower prices than Bosnia and Herzegovina.
In the coming period it is necessary to work on continuous improvement of efficiency of production facilities and competitiveness of prices of production mix in the liberalized market.

National energy policy

BH does not have a long term strategy of national energy policy. It would be ideal to have it and that it contains two or three scenario, or at least a realistic vision of future planed development of energy sector and environmental protection, i.e. optimal, no change (business as usual) and one in the middle. Energy Strategy of Republika Srpska until 2030 has been developed and in June 2017 the Energy Strategy of RS until 2035 has been drafted. Strategic Plan And Program of the Energy Sector Development of Federation of BH was adopted in 2009 elaborating the priority activities (until year 2010), activities of the mid-term development (until year 2020), and indicate the projection of the development in the third decade of this century (until year 2030) of the sector.
In this situation, as a base for initiating changes, delivering measures and other activities for improvement of status and adjusting to trends and policies in the region and EU one only has some of documents made for an entity level (ministries, chambers, electric companies) such as a document “Long-term development plan of Elektroprivreda BH”.
The energy sector, according to the constitution of BH and entity constitutions, is in the responsibility of the entity. However, some of the activities were transferred by special agreements to the level of BH, which, according to current practice, does not function as expected.
Laws and bylaw acts for the energy sector (at the level of the RS and BH) were used to establish legislative and institutional framework for restructuring the energy sector, opening of energy market, regulation of energy activates, determination of market rules, public service obligation and the separation of energy activities.
Adjustment with the relevant EU directives in the field of electricity, gas, oil and oil products is mostly done by legal resolutions.
In terms of renewable energy sources, cogeneration and energy efficiency it is expected to adopt bylaw regulation for stimulating use of renewable energy sources, cogeneration and energy efficiency.
Further ensure of full market opening, preventing distortion of the market, developing and promoting the use of renewable energy, energy efficiency and environmental protection requires strict enforcement of existing legislation. In addition, it is necessary to monitor and accept new requests and recommendations of the European Commission, bearing in mind the specifics of the domestic market and the need to ensure economic development.
The most important international agreements that affect the energy sector to which BH has approached, are the CEFTA agreement, Energy Charter Treaty, The Treaty on establishing Energy Community, The Stabilization and Association Agreement and the international agreements on environmental protection (LRTAP, UNFCCC, biodiversity, environmental impact assessment, etc.).
It is predicted by some agreements to adopt the legal heritage of the European Union in the field of energy sector, especially of so called second EU liberalization package for electricity and natural gas,

the directive on security of supply, promoting development of renewable energy sources, environmental protection, market bid and competition.

BH has commitments in the field of energy (namely electricity, gas, environment, renewables, energy efficiency) through the Energy Community Treaty. The country has electricity and gas legislation at entity level, but no state-level laws or energy strategies. Currently the EU is providing assistance to develop energy efficiency legislation, and continues to offer support, when there is political willingness, to approximate existing legislation to EU best practice and to develop a state-level energy strategy and gas law.

Although the retention of the surplus of electricity production is a clear strategic determinant of the energy sector, and the security of supply of the most prominent feature of today's production portfolio, in the coming period, other components, such as competitiveness and sustainability of natural resources, will need to be placed in a higher balance.

A more conservative approach to large-scale Western European economies has been adopted a few years ago by passing negative experiences of early decommissioning or conservation of power plants and the write-off of debts of non-competitive portfolios. On the other hand, there is a clear trend towards an increasing number of smaller projects, especially in the RES segment, that is, incentive systems that lead to greater contribution to small and medium-sized entrepreneurship in overall economic activity.

Apart from domestic electricity production, security of supply is also positively contributed by the clear trend of integration of energy markets, therefore, it is important, along with physical integration, to constantly invest in the knowledge and competencies of trading in electricity.

Bosnia and Herzegovina, is heading towards the increase of RES and reduction of emissions from the thermosector. Transition to cleaner energy requires the creation of a strategic framework for more powerful exploitation of hydro and other renewable resources, as well as investing in new technology.

5. ENVIRONMENTAL PROTECTION

Environmental challenges

Bosnia and Herzegovina (BH) still suffers from the effects of environmental neglect and deterioration due to an administrative system that did not took care of sustainability of economic and infrastructural development, the consequence of economic downturn and conflict in the region. At the very end of the regional conflict, environmental issues were not given a greater significance. Environmental protection is largely perceived as an expensive luxury that BH can not afford and a priority is given to political stability, the economic development, employment and post-conflict reconstruction and purification. The recently observed shortcomings in the implementation of different strategies, including those dealing with environmental protection, have highlighted the need for the development of the BiH Environmental Policy / Environment Strategy (EAS) and strategies in the Federation of BiH (FBiH), Republika Srpska (RS) and the Brčko District of BiH (BD BiH), in particular the Implementation Directives (DSIP) for BH and Action Plans for Implementation of Directives (APID) at the level of the FBiH, RS and BD BiH.

Environmental Protection and Energy Efficiency Fund of Republika Srpska was established as a legal entity with public authorizations, with rights, obligations and responsibilities determined by the Law on the Fund and Financing of Environment Protection of Republika Srpska (Official Gazette RS 117/11), the Statute of the Fund and by other regulations. The activities of the Fund include activities related to the collection of funds, as well as financing of preparation, implementation and development of programs, projects and similar activities in the field of sustainable use, protection and improvement of the environment, as well as in the field of energy efficiency and the use of renewable energy sources.

The Environmental Fund of the Federation of BiH was established by the Law on the Environmental Fund FBiH 01-337/03 of 8 July 2003. According to the Law, the Fund includes activities related to fundraising, encouraging and financing the preparation, implementation and development of programs, projects and similar activities in the area of preservation, sustainable use, protection and improvement of the state of the environment and the use of renewable energy sources.

The establishment of a harmonised legal framework for environmental protection, adequate institutional capacity and a functioning environmental monitoring system remain the priorities. Improvements remain to be made to horizontal and vertical communication and exchanges of information on environmental and climate change issues between all authorities. Regarding climate change, considerable efforts are required on awareness-raising, aligning with and implementing the acquis, as well as strengthening administrative capacity.

Additional support is needed to accelerate investments especially in solid waste management, access to drinking water and wastewater treatment.

In the area of environment / environment, the biggest (and most expensive) shortcomings lie in the area of wastewater treatment, which currently stands at 10%, and in the control of industrial emissions. Specifically the SO 2 emissions are very high mainly due to the export-oriented energy production industry and the fact that it relies heavily on low-quality coal in a large percentage. Solid waste management requires the upgrading and construction of custom dumps, the closure of illegal waste dumps, the rehabilitation of larger and older landfills and the development of a modern waste collection and transportation system.[15]

[15] Strategy of EU aquis harmonisation in environmental protection of BH, May 2017, Ministry of foreign trade and economic relations of BH

Environmental legislation

The issue of environmental protection is partly entrusted to the Ministry of Foreign Trade and Economic Relations of BH, but it is also significantly limited through the Department of Natural Resources, Energy and Environmental Protection. Also, at the BH level, the existence of the Management of BH for Plant Health[16], the BH Veterinary Office[17] and the Inter-Entity Environmental Authority is important for this area.

Based on the analysis of the existing constitutional and legislative frameworks in BH, it is possible to draw up a brief overview of the competencies of public institutions in BH regarding environmental protection. In accordance with existing regulations, Bosnia and Herzegovina is responsible for:

- Implementing international agreements;
- defining policies, general principles, coordinating the activities and harmonizing the plans of entity institutions and institutions at the international level, within the competence of BiH;
- Coordination of activities to harmonize BiH legal system with the standards required for EU accession (acquis communautaire);
- environmental statistics in cooperation with competent entity institutions;
- protection of the ozone layer;
- quality of liquid petroleum fuels;
- coordination of activities in the field of phytosanitary protection;
- Freedom of access to information and the right to legal protection;
- protection of animals used for scientific purposes; and
- airplane noise.

All other environmental competencies fall under the jurisdiction of the FBH, RS, BD BH and local communities. According to the FBH Constitution, the FBH Government and cantonal governments share responsibility for environmental protection. The Constitution allows this responsibility to be fulfilled jointly or separately, or by a canton under the control of the Government of the FBH. The FBH Constitution gives the Federation Government the authority to draft policies and implement laws related to environmental policy. The FBH Parliament has the power to pass laws to fulfil the responsibilities assigned to the FBH Government. A number of cantons adopted environmental regulations.

Article 68 of the RS Constitution stipulates that the RS shall regulate and provide protection of the environment. The Law on Territorial Organization of Republika Srpska (Official Gazette of RS 69/09 and 70/12) 64 municipalities are settled. The Constitution does not mention the division of powers in environmental issues between RS and its municipalities. Municipalities in the RS are obliged, through their authorities and in accordance with the law, to satisfy the needs of citizens in the field of environment.

The amendment to the BH Constitution is determined by the BD BH as a unit of local self-government (JLS) which owns its own institutions, laws, regulations, authorizations and statute. BD BiH has jurisdiction over all environmental / environmental issues that do not fall under the jurisdiction of BH authorities.

The Law on Energy Efficiency in both Entities was adopted. Its purpose is to achieve the goals of sustainable energy development, ie reducing the negative impacts on the environment, increasing the security of energy supply, meeting the energy demand of end consumers and meeting the international commitments undertaken by Bosnia and Herzegovina in terms of reducing greenhouse gas emissions using energy efficiency in final consumption.

[16] http://uzzb.gov.ba/sr/
[17] http://www.vet.gov.ba/

Environmental taxes

Law on the FBiH Environmental Protection Fund, stated that Fund operations are funded from:

- compensation of environmental pollutants;
- compensation of environmental users;
- special environmental fees paid at each registration of motor vehicles.

In accordance with Article 26 of Law on the Fund, the Fund's funds are used to finance environmental protection, in particular for:

- protection, conservation and improvement of the quality of air, soil, water and seas, and mitigation of climate changes and protection of the ozone layer;
- remedying, encouraging avoidance and reducing waste generation;
- exploitation of valuable properties and waste treatment;
- protection and conservation of biological and landscape diversity;
- implementation of energy programs;
- implementation of the demining program;
- improvement and construction of environmental protection infrastructure;
- improvement, monitoring and assessment of the state of the environment and the introduction of an environmental management system;
- encouraging the sustainable use of natural resources;
- encouraging sustainable economic activities and / or sustainable economic development;
- encouraging research, development studies, programs, projects and other activities, including demonstration activities.

Similar to this, Environmental Protection Energy Efficiency Fund of Republika Srpska is funded from fees paid by environmental polluters, charges for environmental burdening with waste and fees for water protection paid by the owners of transport vehicles using oil or petroleum products in accordance with the Law on Waters ("Official Gazette of the Republic of Srpska", No. 50/06 and 92/09), which are then used to finance projects of environmental protection, energy efficiency and renewable energy sources. These projects have common goals which are:

- protection, conservation and improvement of the quality of air, water, soil and forest, as well as mitigation of climate change and protection of the ozone layer,
- remediation of waste dumps, incentives for reduction of waste generation, reuse and recycling of waste,
- encouraging the introduction of technological processes that reduce or completely eliminate negative environmental impacts,
- protection and preservation of biodiversity and geodiversity,
- encouraging the sustainable use of protected natural assets,
- encouraging the sustainable development of rural areas,
- encouraging improvement of energy efficiency,
- encouraging the realization of energy efficiency and renewable energy projects in the public sector,
- encouraging the use and research of renewable energy sources and their use in order to increase energy efficiency,
- encouraging cleaner transport,
- encouraging educational, research, innovation and development studies, programs and projects in the field of environmental protection,
- financing environmental education programs and raising public awareness on environmental issues and sustainable development.

Resource productivity and domestic material consumption

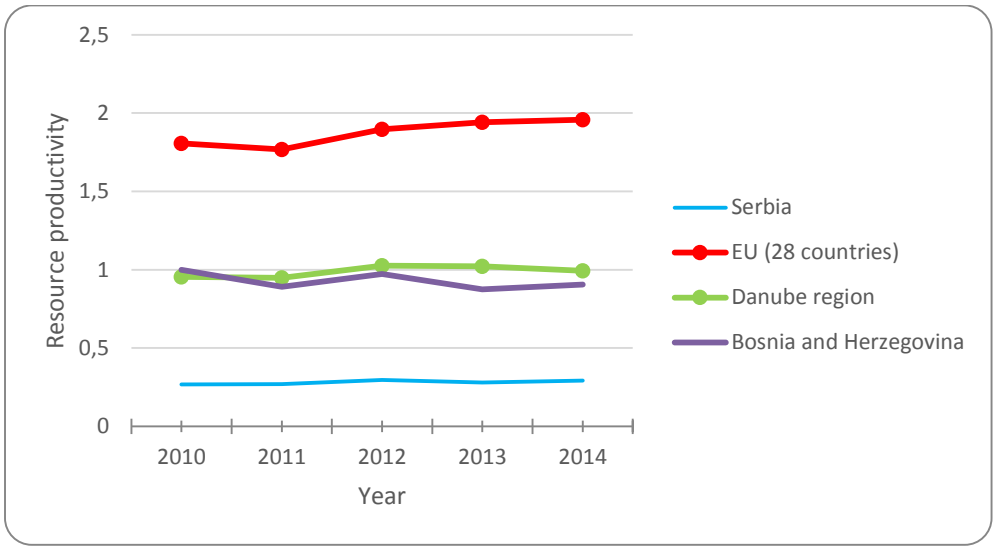
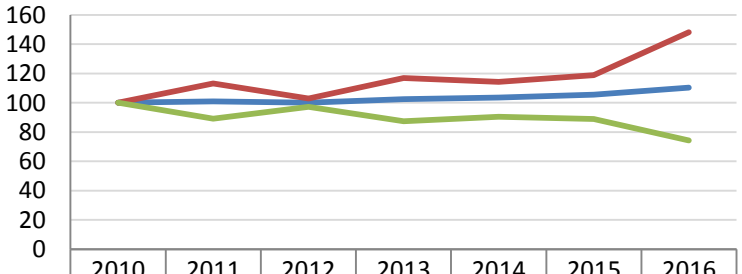


Figure 15: Resource productivity in BH (reference year 2010) in comparison to EU and Danube region (reference year 2000) [18]

Having in mind the differences in reference year the data are calculated upon, one can observe a trend of the resource productivity. BH shows greatest variations between two consecutive years and comparing to other data series only BH shows the reduction of the indicator in the observed period.

The indicator Domestic Material Consumption (DMC) is defined as the total amount of material directly used in an economy.



	2010	2011	2012	2013	2014	2015	2016
GDP in chail linked volumes (reference year 2010)	100	100,9	100	102,4	103,5	105,6	110,3
Domestic Material Consumption	100	113,3	102,9	117	114,3	118,8	148,2
Productivity of resources	100	89,1	97,2	87,5	90,5	88,9	74,4

Figure 16: Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP, 2010-2016 (reference year is 2010) [19]

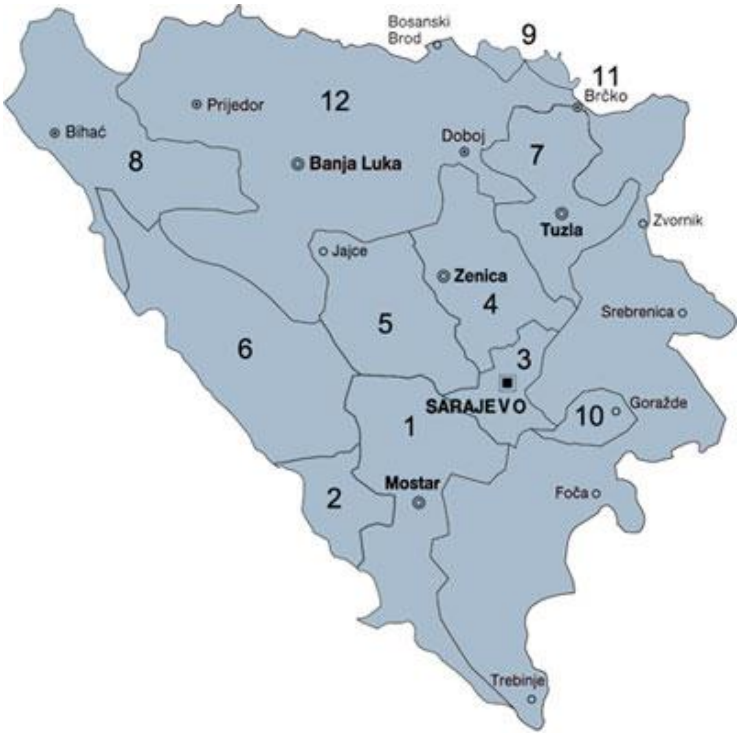
OBSTACLE: BH has great potential in the resource-based sectors. Increase in resource productivity would be followed by overall economic development. Unfortunately, statistics show the opposite.

[18] Eurostat
[19] www.bhas.ba

6. ECONOMY AND DEMOGRAPHY

Economy and demography

Bosnia and Herzegovina is a country located in the western Balkans, bordering Croatia (932 km or) to the north and south-west, Serbia (302) to the east, and Montenegro (225 km) to the southeast.
Bosnia and Herzegovina is largely decentralized and comprises two autonomous entities: the Federation of Bosnia and Herzegovina and Republika Srpska, with a third region, the Brčko District, governed under local government. The Federation of Bosnia and Herzegovina is itself complex and consists of 10 federal units - cantons.



12	**Republika Srpska**
11	**Brcko district**
Federation of Bosnia and Herzegovina	
10	Bosnia Podrinje Canton
9	Posavina Canton
8	Una Sana Canton
7	Tuzla Canton
6	Canton 10, Livno Canton
5	Central Bosnia Canton
4	Zenica Doboj Canton
3	Sarajevo Canton
2	West Herzegovina Canton
1	Herzegovina Neretva Canton

Bosnia and Herzegovina has eleven official cities. Five cities are placed in Federation of Bosnia and Herzegovina (Sarajevo, BHac, Jajce, Zenica, Mostar) and six in Republika Srpska (Banja Luka, Istočno Sarajevo, Doboj, Bijeljina, Trebinje, Prijedor). Also, Federation of Bosnia and Herzegovina is divided in 74 municipalities and Republika Srpska in 63.

Before the war, Bosnia-Herzegovina had a relatively developed industry based on mining, manufacturing industry and forestry. Fifty per cent of Bosnia's industrial capacity was destroyed during the war (1992-1995) and it has not been fully redeveloped since then. However, the economy is growing and between 2000 and 2008 the growth was on an average five to six per cent. Since then growth rates have fallen and have for the last few years been around 2 per cent per year. The country's GDP is still below pre-war level and represent a third of the average for EU countries (per capita).
Bosnia is one of Europe's poorest countries and about one Bosnian out of six and 30 per cent of children are estimated to live below the poverty line. The average income is about half of the cost of an average family of four's expenses which makes single income households very vulnerable.
Bosnia and Herzegovina is a parliamentary democracy with a bicameral parliament (House of Representatives and House of Peoples), three-member rotating presidency, Council of Ministers, and Constitutional Court. However, the central government's power is highly limited. Federation of Bosnia and Herzegovina and Republika Srpska have largely autonomous political power, as well as the district

of Brčko, which is jointly administered by both. Each of the Entities has its own constitution. Federation of Bosnia and Herzegovina within it political system has following institutions: President of Federation of Bosnia and Herzegovina, Government of the Federation of Bosnia and Herzegovina and Parliament of the Federation of Bosnia and Herzegovina. Beside federal institutions each canton has separate government with defined jurisdiction. Republika Srpska has following institutions: President of Republika Srpska, Government of Republika Srpska and National Assembly of Republika Srpska. Brcko district also has separate government.

Bosnia and Herzegovina is a transitional economy which is pursuing membership in the European Union. In 2003, EU identified Bosnia-Herzegovina as a potential membership candidate. Since then, a number of agreements between the EU and Bosnia and Herzegovina have entered into force. The Stabilisation and Association Agreement (SAA) was signed in 2008 and entered into force on 1 June 2015 and in 2016 a formal membership application was submitted. Since then the process towards a membership has been taking few and small steps. In 2015 a national reform agenda was adopted, aimed at reforming the country's institutions in accordance with EU demands. The implementation of these reforms is however very slow.

Bosnia-Herzegovina is also pursuing a NATO membership. In 2010 NATO decided on an action plan outlining the conditions for future membership of Bosnia-Herzegovina. Just as in the EU membership process, progress towards a NATO membership is slow and many necessary reforms require that political authorities are transferred from local to state level and are therefore blocked by the entity governments.

In the period January-December 2017, export amounted to 5,7 billion EUR (11 billion 053 million BAM), which is 17,4% higher than in the same period of 2016, and import amounted to 9,3 billion EUR (18 billion 134 million BAM), which is 12,2% higher than in the same period of previous year. The coverage of import by export was 61% and foreign trade in goods deficit amounted to 3,6 billion EUR (7 billion 080 million BAM). Main BH sectors in foreign trade are agriculture, chemicals, wood, furniture, ore and products of metal processing industry.

	2012	2016
Size of the territory (km^2)	51.209 km^2	51.209 km^2
Number of inhabitants, census 2013	3.840.000	3.531.159
GDP per capita (euro)	3.419	4.145
Number of employed persons	685.117	801.000
Unemployment rate (%)	28	25,4
Inflation rate (consumer price index) (%)	2,1	-1,1
Export sales - compared to the previous year (%)	7.9 billions BAM, -3.5	9,4 billions BAM, 4,8
Investments - compared to the previous year (%)	346 millions BAM 19.31	4.567 millions BAM, 0,88
Industrial production - compared to the previous year (%)	12.323 millions BAM -5.2%	15. millions BAM 4,4%

Figure 17: Basic statistical data[20]

Research and development and gross domestic product

In Bosnia and Herzegovina in 2016, Government budget appropriations institutions that finance the R&D activity amounted to 6.708.941 Euro. The most of budget funds institutions according to socio-economic objectives are spent in Education (70,4%). Planned budget funds for research and

[20] Agency for Statistic of Bosnia and Herzegovina, FIPA

development in 2017 amount to 7.112.086 Euro. According to socio-economic objectives, most funds are planned in Education (36,3%).

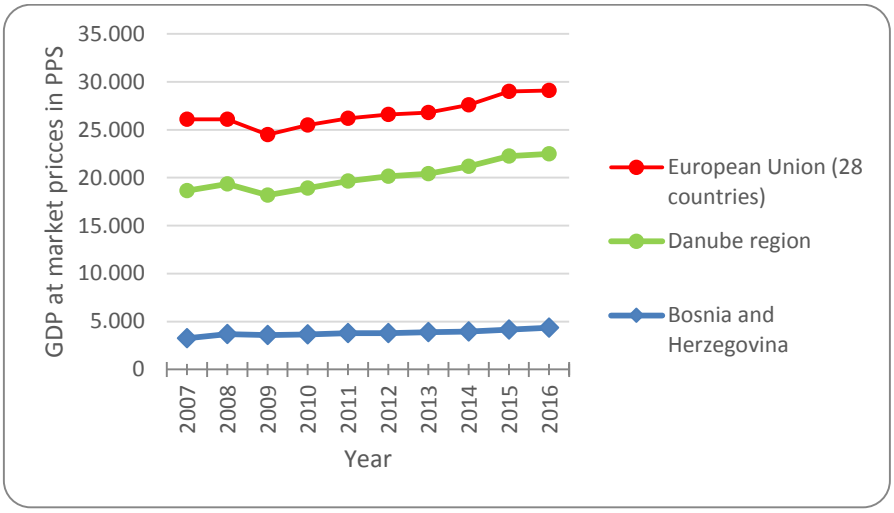


Figure 18: Gross domestic product at market prices in PPS per capita in BH, the EU and the Danube region

GDP for BH for 2016 had a nominal value of 15287 million EUR. The nominal increase of GDP in relation with 2015 was 4.59% while real increase was 3.07%. GDP deflator for 2016 was 1.47%.
GDP per capita amounted 8,516 KM or 4,354 EUR or 4,817 USD.
Regarding by the activities the significant real increase of the gross value added was recorded in: Agriculture, forestry and fishing (7.64%), Other service activities (7.59%), Electricity, gas, steam and air conditioning supply (7.0%); Transportation and storage (4.94%).

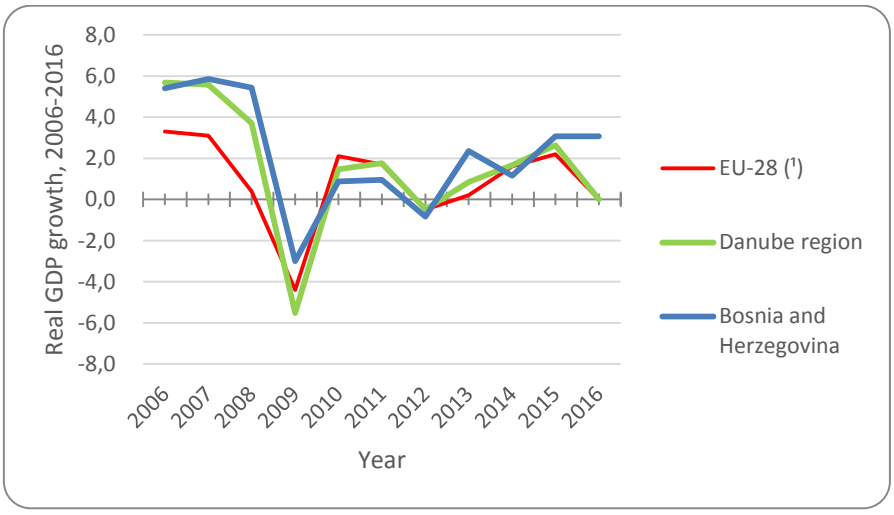


Figure 19: Real GDP growth in BH, the EU and the Danube region

Gross Domestic Product (GDP) has been rising for years with average real growth rate of 2,2 % in the last decade. Negative effects of the global financial and economic crisis on BH economy peaked in 2009. World economic recovery in 2010 and 2011 leads to the growth of BH economy with the GDP growth rate of 0,9 % and 1.0%. The next couple years were expected to be a continuation of the slow but sustained growth of economy but only in 2015 and 2016 the growth rate surpassed the 3%.

Human resources of Bosnia and Herzegovina

Unemployment rates in BH are among the highest in Europe. One can observe a recent trend of reduction of number of people searching for job. According to official statistics and entity agencies for employment, unemployment rates in previous two years have been significantely reduced. But this for sure is not the result of positive trend but mostly the indicator of intensive brain drain to western European countries.

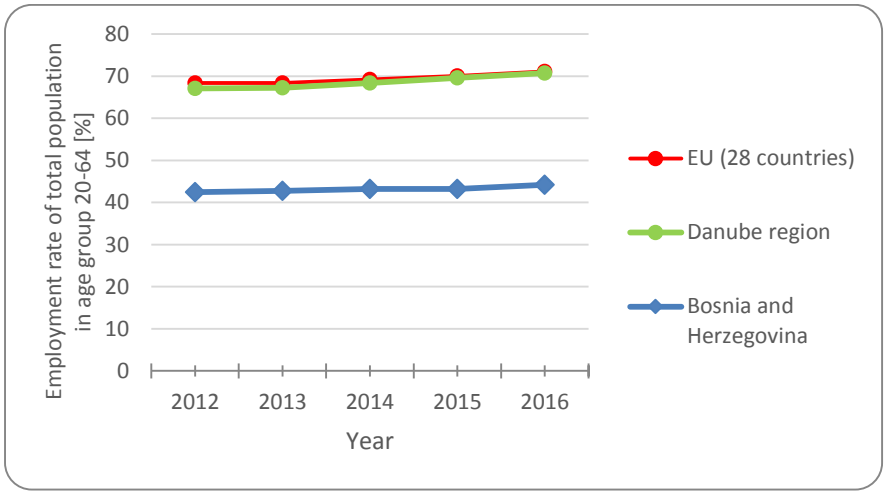


Figure 20: Employment rate as a share of population age 20-64 in Bosnia and Herzegovina

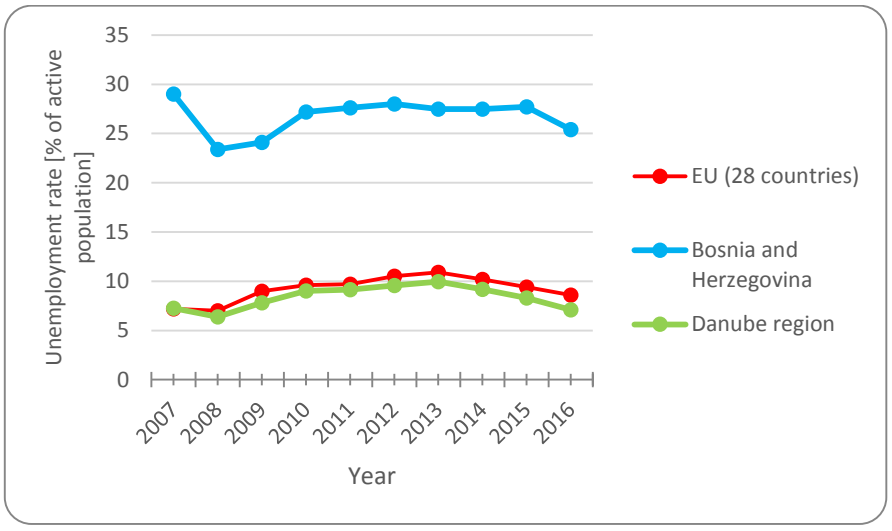


Figure 21: Total unemployment rate in Bosnia and Herzegovina

OPPORTUNITY: Still, human resources remain one of the strongest resources of BH. The skill of the local workforce is seen in productivity growth of industrial production over the past period, while employees in BH are considered highly productive, motivated and loyal.

Overview of corruption in Bosnia and Herzegovina[21]

Corruption presents a comprehensive challenge to Bosnia and Herzegovina (BiH). Its complex legal and regulatory frameworks create opportunities for corruption. Further, despite political figures and agencies increasingly voicing their concerns over the dangers presented by corruption, there has been limited activity or political will to combat the issue directly.

[21] https://knowledgehub.transparency.org/helpdesk/bosnia-and-herzegovina-overview-of-corruption-and-anti-corruption April 2018.

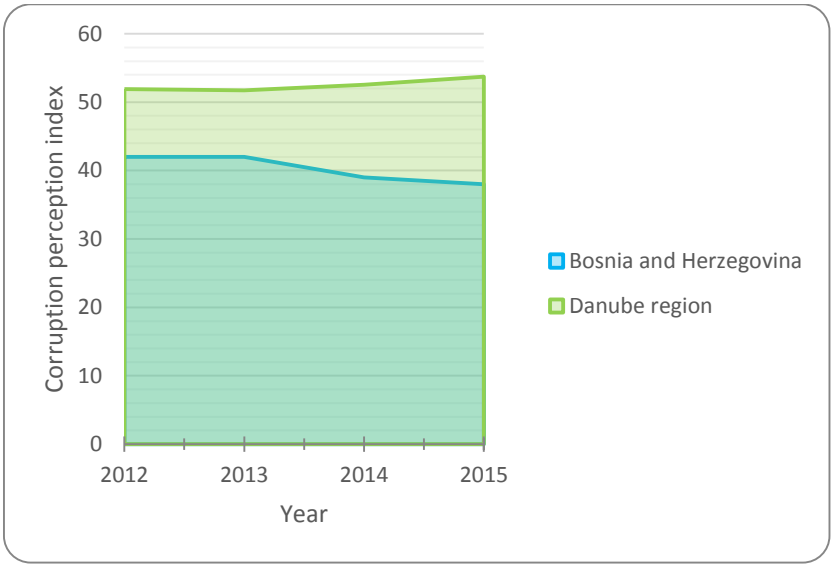


Figure 22: Corruption perception index for Bosnia and Herzegovina and Danube region

The European Commission and Group of States against Corruption (GRECO) assessments has repeatedly issued recommendations that BiH do more to curb corruption, a precondition to its accession to the European Union. Recently, steps have been made to strengthen the anti-corruption framework in BiH, including measures aimed at political party financing and anti-money laundering. However, many of these efforts have been declarative only and failed to substantially improve the anti-corruption legislative framework.

Many of the resulting amendments have been viewed as “lost opportunities”. In 2017, GRECO released the Fourth Interim Compliance Report on BiH which concluded that the country’s current level of compliance with GRECO’s recommendations was no longer “globally unsatisfactory”. Despite this revision in level of compliance, corruption remains a significant concern in BiH.

Taxes in Bosnia and Herzegovina

Tax rates in BH make our country extremely competitive in Europe, where the average income tax rate is 30 percent. BH has unique income tax rate of 10 percent, with additional employee benefits. In neighboring countries, there is a progressive taxation of income. In Croatia, taxes amount to 12, 25 and 40 percent, and in Serbia, 10, 15 percent and 20 percent. In Slovenia they range from 16 to 41 percent, and in EU countries the rates of income tax are between 15 and 51 percent, without contribution.

The basic taxation categories in BH are:

- Value Added Tax - 17%
- Corporate income tax - 10%
- Personal income tax - 10%
- Property tax
- Social security contributions paid by employers and employees
- Excises, a special type of sales tax paid on some commodities like oil products, tobacco products, soft drinks, alcohol drinks, beer, wine and coffee.

Unique VAT rate is 17%. Indirect Taxation Authority is in charge of collecting value added tax and coordinating fiscal policy issues in general. This body is also responsible for collecting customs and excises on the entire territory of BiH.

Only indirect taxes are collected at the level of BH. They are accumulated on a single account, and later distributed proportionally to the entities. The Indirect Taxation Authority[22], apart from collecting the Value Added Tax (VAT), has jurisdiction for collecting customs duties, tolls and excise duties.

All other taxes and fees are regulated and collected at the entity level. Furthermore, competencies within the entities are delegated to the level of municipalities and cantons.

Profits transferred from abroad are not taxed by corporate income tax in BH. Profits transferred from abroad are not taxed if they were previously subject to taxation abroad.

Profits are calculated in accordance with applicable laws, by deducting (real) expenses from revenues. The tax base includes profit gained through revenues and capital gains, according to the accounting regulations. The expenditures must conform to the accounting standards.

But, BH is not competitive when it comes to rates of contributions where BH has for the highest rates of contributions in the region. The total collection rate for contributions in Federation of BH is 41,5 percent, and in RS 33 percent (gross calculation). The overall contribution rate in Croatia is 37,2 percent and in Serbia 37,8 percent. The contribution base does not include a warm meal up to the prescribed amount of 8,00 KM per day (about 168 KM per month), transportation (about 50 KM), refund. This means that the amount of about 220,00 KM, which is paid to the employee as part of the net salary, is tax-free.

[22] http://www.new.uino.gov.ba/en

7. CONCLUSION

Science and technology are the areas that are built into the foundation of any modern society and the development and prosperity of every human community relies on them. Scientific and technical achievements permeated all aspects of human life, especially now in the era of globalization and ever faster technological progress.

The situation in the area of research and innovation is similar to the countries of the region, although there are specificities relating to Bosnia and Herzegovina, such as complicated political and social environment, continued brain drain and no increase in allocations for R&D.

The major problems facing the current innovation system are: *weak R&D capabilities in both the public and private sector; R&D undertaken at universities having a weak relevance to industry; a marginal government funding and absence of links between science and industry*.

In the *field of research*, it is characterized by an *institutional framework that is insufficiently aligned with good European practices, unsatisfactory level and quality of scientific productivity, low level of cooperation between scientific research community and economy, extremely low investment in scientific research, repulsion to the introduction of external evaluation of work of individuals and organizations and insufficient interdisciplinary approach in research.*

In BiH, FBiH, RS and BD BiH, a certain degree of compliance of environmental regulations with relevant EU acts has been achieved. It is necessary to go towards the complete *harmonisation with EU legislation* in the area of environmental protection and harmonization of the same in both entities and BD.

Given the complicated political composition in the country there is a poor coordination between key institutions tackling with ecology and innovation, and especially lack in instruments for cooperation with the economy.

The *field of technological development* is characterized by the *low awareness of decision-makers about the importance of innovation and the necessity of using modern technology*. At the same time, there are a *small number of large companies investing in innovation*.

Statistic overview of R&D in BH is available since 2012. *Lack of statistical data* is a major obstacle in any attempt of systematic approach to the development in BH.

According to the *Global Innovation Index*, ranking 128 countries in 2016, BH ranks 87th (in 141 countries in 2015, BH was 79th), with extremely low ratings in the field of innovation and business sophistication. This situation is a consequence of *poor commercialization of research results and underdeveloped human resources*. A small number of researchers and published papers per capita are evident. It is a common belief that this can be significantly overcome with the increase in international cooperation.

The largest number of researchers is engaged in the higher education sector (56.9%), the state sector (39.8%), while the non-profit and business sector engages 1.7% of total number of researchers. When looking at the scientific field of research work, most researchers are engaged in the field of Social Science (43.1%). In Republika Srpska, out of 350 promoted science doctors between 2010-2015, 179 or 51% of them are in social sciences, with 42 doctors of science in the field of humanities make up 63% of all doctors of science.[23] The number of doctoral scientists in the field of engineering and technology (16%), medical and health sciences (15%) and only 6% in natural sciences is far less than the EU

[23] Program ekonomskih reformi Republike Srpske za period 2018–2020. (Programme of Economic Reforms of Republika Srpska 2018-2020)

average. The average number of scientific papers by authors from BH is barely more than 30 per year between 1996 and 2015.[24]

Opportunities for the development of R&D in BH, hence the development of innovation activities and eco-innovation do exist. The territory of ex-Yugoslavia is traditionally fertile ground for scientific and research activities. One of the largest issues is a poor regulation of innovation environment but improvements have been made and legal framework for R&D is being adjusted to the EU requirements. Low level of development in all aspects of innovation support infrastructure makes a possibility to create a technology transfer system from scratch.
Eco innovative solutions are mostly based on renewable energy sources, either using them for powering new technology or inventing new ways of their protection. RES are one of the greatest economic development potential of BH.
An additional chance for faster development of the innovation infrastructure in BH is a membership in Horizon 2020. This programme offers an involvement in international cooperation which is an opportunity to approach modern scientific and research equipment for a lowest financial investment possible.

For the development of eco-innovation in BiH, a stimulating environment should be created were experts in different ecology sub-areas will be able to run companies firmly and plan their future in BiH. This can not be done in all environments. It is necessary to develop "ecoinnovation" environment (cities) that will, after two or three years, create recognizable products for the world market. Such products have multiple roles: they increase the volume of exports in the total economic output; they stimulate the development of other areas, and most importantly, the products contribute to the branding of ecoinnovation environments and BiH.

In order to fight all the listed obstacles and problems, there is a long and hard road in front of BH innovative population but chances are available. Besides making an easiest conclusion such as necessity of increasing the allocation for R&D from all sources, there is one more powerful instrument for the improvement of the eco innovative environment in BiH - launching of centres of excellence, technology transfer and launching "spin-off" companies by the research community and many other forms of cooperation of the economy and science / innovation.
Bearing in mind the significant energy potential, it is necessary to encourage special research in the areas of maximum energy consumption, with a strong emphasis on renewable energy sources and their protection.[25] Eco-innovations need to be the specialisation of BiH.

[24] Program ekonomskih reformi Republike Srpske za period 2018–2020. (Programme of Economic Reforms of Republika Srpska 2018-2020)
[25] Strategija naučnog i tehnološkog razvoja RS 2017-2021 (Strategy of development of science and technology of Republika Srpska 2017-2021)