

Environmental policies on which is based
the economic development of Bosnia and Herzegovina

**THE ANALYSIS
OF
THE FRAMEWORK ENERGY STRATEGY OF
BOSNIA AND HERZEGOVINA BY 2035**



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1.

Introduction

The energy sector is one of the strongest economic sectors in Bosnia and Herzegovina (BiH). It has a long tradition and significant potential, and as well, possibilities for further development and investment. As such, the energy sector of BiH can, and must, play a key role in enhancing the overall economy of BiH. In order to make a full use of all the potential, without jeopardizing at least the same opportunities for the next generations, there is a logical need to develop a comprehensive energy strategy. Its main principle should be a sustainable development of the energy sector.

Accession to the European Union (EU) is the strategic priority for Bosnia and Herzegovina. The Stabilization and Association Agreement with the European Union entered into force and intensified the process of integrating and assuming full responsibility for this process. Integration of Bosnia and Herzegovina into the European Union is a very important process that requires fundamental changes in society and meeting the priorities of the European partnership. As the Stabilization and Association Agreement entered into force, Bosnia and Herzegovina undertook the obligations of respecting the *Acquis Communautaire* (in the text: *Acquis*) of the European Union and adapting the existing national laws and regulations to the relevant laws of the European Union.

According to the Third National and Second Two-Year Report on Greenhouse Gas

Emissions of Bosnia and Herzegovina, the most important source of CO₂ is the energy sector. It contributes with 53% to the total CO₂ emissions, followed by agriculture (14%), industrial processes (6%) and waste (5%). In the energy sector, besides power generation and distribution, a significant segment represents energy efficiency. As mentioned, the second most important source of CO₂ emissions is agriculture (14%). Climate changes have effects on all economic sectors, but mostly on energy and agriculture. Still, no national development strategy has been developed for a single sector nor one sector has been approached in a strategically developmental, sustainable way, but in an unorganized way in line with individual interests.

The strategy needs to be developed in accordance with the principles of sustainable development, in line with best world practices, respecting the energy trends, energy policy and EU legislation for the energy sector, as well as specific opinions and recommendations of the academic community and the civil sector operating in the territory of Bosnia and Herzegovina. On the basis of the Stabilization and Association Agreement, i.e. the Energy Community Treaty, as well as other agreements and treaties, which BiH signed (the Energy Charter Treaty, the Kyoto Protocol, the Western Balkans Initiative, the Paris Agreement, etc.), and due to it, clearly committed itself to sustainable development of the energy sector, Bosnia and Herzegovina is obliged to harmonize the strategy with the requirements and legislation of the EU.

By signing the Stabilization and Association Agreement, Bosnia and Herzegovina entered into the first contractual relationship with the European Union, thereby took the

obligation to implement the provisions of the Agreement and to continue with its activities to meet the criteria for the full membership in the EU.

Regarding the energy sector, the Agreement defined the cooperation devoted to the priorities of the Acquis of the Union in the field of energy, based on the Energy Community Treaty, with the aim of a gradual integration of Bosnia and Herzegovina into the European energy markets.

Given the above, it is clear that BiH has to have an energy strategy that will: in a comprehensive way create development of an energy sector (and based it on the principles of sustainable development); be aligned with EU energy and climate strategies; direct to the use of domestic resources; open new, so-called green jobs; include renewable sources to meet energy needs; introduce and stimulate energy efficiency measures; and apply modern energy technologies, together with the requirements for environmental protection and reduction of the adverse impacts of the energy sector to the smallest possible measure.

The energy sector development should be seen in terms of the open market, the introduction of competition and the setting the energy prices on an economically viable level, taking into account the economic potential of BiH and its citizens, since it also has a primary impact on the opportunities for development of the energy sector. The strategy should address coal, oil, natural gas, electrical power, renewable energy sources (RESs), energy efficiency (EE) and thermal energy, putting them in different scenarios, for a chosen period, deploying the policies of EE across all sectors. Only with targeted sector efficiency and an efficient use of resources, Bosnia and

Herzegovina will fully enable parallel convergence to the EU commitments and policies, and position the energy sector as the backbone of stability and sustainable development of the economy. It is expected that secondary effects will lead to employment, reduction of public debt, increase competitiveness, launch real investments in the energy sector, and most importantly, ensure a better quality of life for citizens of BiH.

The adoption of the Energy Strategy of Bosnia and Herzegovina is a prerequisite for accessing the EU funds, since the Instrument for the Second Pre-Accession Assistance (IPA II) takes a strategic approach to support candidate and potential candidate countries on their path to accession. Regardless of whether the EU funds were allocated through IPA II national programs or through programs for more countries (e.g. WBIF), Bosnia and Herzegovina still has to adopt concrete and comprehensive strategies for sectors for the whole country, covering at least a period by 2035. In the energy sector, adopting such a comprehensive strategy for the whole country is a prerequisite for providing the necessary assistance, including financial grants and loans.

This document is a critical review of the document "The Framework Energy Strategy of Bosnia and Herzegovina by 2035", which is currently in the process of adoption. The Framework Energy Strategy should point to the necessity of an urgent change in energy policies, if BiH does not want to have the so-called "stranded" investments in this sector, what will have a detrimental effect on citizens. Therefore, the importance of this document is even greater, since it gives a realistic critical review of the existing "Framework Energy Strategy", from the

perspective of domestic experts and the civil sector.

2.

Process of creating the Framework Energy Strategy of BiH by 2035

In January 2017, three ministers: Mirko Šarović (from the Ministry of Foreign Trade and Economic Relations), Nermin Džindić (from the Federal Ministry of Energy, Mining and Industry) and Petar Đokić (from the Ministry of Industry, Energy and Mining of Republika Srpska) agreed with the British Ambassador Edward Ferguson and the Head of the Delegation of the European Union in Bosnia and Herzegovina Ambassador Lars-Gunnar Wigemark on starting developing a framework energy strategy for the period by 2035.

The British Embassy provided the technical assistance and Pricewaterhouse Coopers was in charge. The main reason of this project was to create a Framework energy strategy of BiH on the basis of the updated Energy Strategy of Republika Srpska, the Framework Energy Strategy of the Federation of Bosnia and Herzegovina and Brčko District (within the Framework Energy Strategy of Bosnia and Herzegovina), what is a non-standard methodology that brings a lot of risks.

Based on the project task, the goal of the Framework Energy Strategy of Bosnia and Herzegovina was to prioritize the key energy strategic guidelines of Bosnia and Herzegovina, with clearly set goals and priorities for implementation in the coming years, keeping in mind the EU requirements

and priorities and obligations that BiH has on the basis of signed contracts and agreements. The Strategy should have provided clear strategic guidelines that would be the basis for applying and obtaining, among other, funds from IPA and WBIF for energy sector in BiH and, as well, for attracting other investors to the energy sector.

The overall approach of strategic planning life cycle should have included six tasks, as presented in the following figure:



Figure 1 – Aborted lifecycle of strategic planning¹

Unfortunately, the second step of the analysed document did not clearly give directions or strategic goals and planned activities, what certainly left space for the unsustainability. Within the Strategy, the first two tasks were addressed:

- Diagnostics: within which a strategic analysis was done and a breakdown of the current situation and a clear understanding of the current situation of the energy sector at the level of entities and Bosnia and Herzegovina
- Strategy: identification of strategic goals, vision and elaboration of key

¹The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

strategic priorities in all segments of energy sector (electrical power, oil, gas, thermal energy, energy efficiency, renewable energy sources).

The Framework energy strategy should provide:

- Context and direction of energy sector development in Bosnia and Herzegovina, taking into account the EU Energy and Climate Strategies
- Guidelines for BiH, based on sustainable development policies:
 - a) security of supply
 - b) price competitiveness and
 - c) decarbonisation policy, i.e. clean energy
- Definition of the optimal way for BiH to fulfil its decarbonisation policy - determining the share of renewable sources or increasing energy efficiency, reducing CO2 emissions
- A roadmap for the implementation of the international obligations of BiH

The final result of the created document (“Strategy”) is the strategic analysis and a review of the strategic priorities of Bosnia and Herzegovina's energy policy in its key segments, with simulation of several indicative scenarios of development of a production mix for the period up to 2035, without a clear selection and vision.

The process of creating the Strategy lacked a wide communication with citizens and all interested parties. Although the public consultations were published on the website, they were not transparent, because there were no widespread public consultations, what this important Development Strategy deserves. The suggestions and remarks of a small number

of NGOs, involved in the process, were not adopted.

3. The Analysis of the Framework Energy Strategy of BiH by 2035

The analysis of the Framework Energy Strategy of BiH by 2035 put a special focus on compliance with the above-mentioned, most important requirements for strategy development.

In the section related to the context and direction of energy sector development in Bosnia and Herzegovina, with regard to the EU Energy and Climate Policies, the most important requirements of the EU, concerning energy, were analysed, i.e. what they were and how were included in the Strategy of BiH.

The project task outlined that the guidelines of the Framework Energy Strategy of BiH should be based on sustainable development policies, first taking into account security of supply, price competitiveness and decarbonisation policy.



Figure 2 – An illustrative overview of the strategic priorities of Bosnia and Herzegovina

It was necessary that the guidelines define an optimal way for implementing decarbonization policy of BiH, i.e. determining share of renewable sources, increasing energy efficiency and reducing CO₂ emissions.

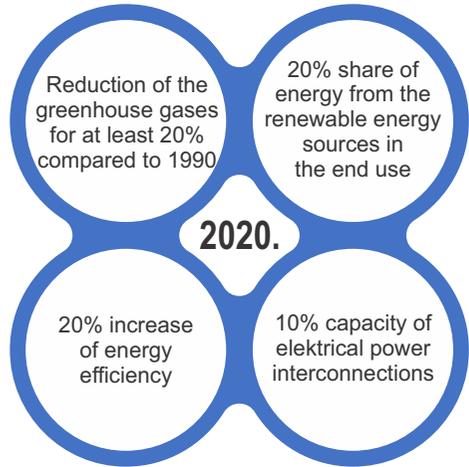
This document gives an overview of the sectors covered by the Framework Strategy and analyses the Strategy's compliance, in a relevant area, with the EU objectives and the obligations towards the EU objectives and, as well, the obligations on the basis of the signed international treaties, in particular, the Energy Community Treaty, and proposes amendments and additions to the Strategy in these sectors.

3.1.

Context and direction of development of the energy sector in Bosnia and Herzegovina with regard to the Energy and Climate Policies of the EU – other relevant documents which should have been incorporated into the strategic document

The European Union's strategic goals by 2020 are defined within the ten-year European Union Strategy called Europe 2020. These goals include employment, research and development, climate change/energy, education, social inclusion and poverty reduction. The Strategy's objectives support "leading initiatives", which provide a framework within which the EU and national bodies jointly promote the main priorities, most of which relate to sustainable growth, in particular, the efficient use of resources and industrial policy in the

globalization era.



Some of the most important initiatives, in which BiH participates, are: the Paris Agreement, the Western Balkans Charter on Sustainability, etc.

The Paris Agreement is the climate agreement signed at the 21st Session of the Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris on 12 December 2015 and entered into force on 4 October 2016 after the ratification of the European Union.

The main objective of the Agreement is to limit global warming to "substantially below" 2°C, to provide food supplies, but also to strengthen the capacity of states to tackle the consequences of climate change and development of new "green" technologies, and to provide assistance to weaker, economically less developed, members to achieve their national emission reduction plans.

The Presidency of Bosnia and Herzegovina, at its 32nd Regular Session, held on 20 December 2016, adopted a decision on the

ratification of the Paris Agreement. By signing this agreement, the EU states committed themselves to reduce greenhouse gas emissions by 2030 by at least 40% compared to 1990. The Decision of the Presidency of BiH on ratification was published in the Official Gazette of BiH - International Agreements, No. 1, on 9 February 2017. Bosnia and Herzegovina is so far the only country in the South East Europe that has ratified the Agreement, in order to alleviate the consequences of global warming and prevent further rising the air temperature. BiH will also have to adapt its activities to such an ambitious goal, because planning of both climate and energy have to be interdisciplinary and viewed as one, and this strategic document has not done it.

BiH, as a contribution to the fulfilment of the Paris Agreement, adopted the document "Intended Nationally Determined Contributions (INDC)". The document is based on already adopted strategic documents such as the Second National Climate Change Report under the UNFCCC and the First Two-Year Greenhouse Gas Emission Report, in accordance with the UNFCCC. According to the created scenarios within the INDC, the highest emission level will be reached in 2030, when – according to the basic scenario – are expected 20% higher emissions than were in 1990. Reduction of emissions, which BiH can make by its own means in comparison to the so-called BAU (business as usual) scenario, is 2% by 2030, what would mean 18% higher emissions compared to 1990. Significant emission reductions can only be achieved with international support, what would result in a 3% reduction in emissions compared to 1990 and, in comparison to the BAU scenario, a potential decrease of 23%

would be possible.

Sustainability Charter

Six Balkan Countries (WB6) signed The Sustainability Charter at WB6 Summit in Paris in 2016 and committed to do everything to increase the sustainability of national and regional energy markets, as well as their production and consumption, while, at the same time, they will speed up the ongoing efforts on reforming and integrating the electricity markets.

In accordance with the Paris Climate Change Agreement of 2015, this Charter defines the steps for implementing an enhanced program that will improve energy efficiency and help greater use of renewable energy in the region. This will be of a crucial importance not only for the fulfilment of the obligations of most of WB6 countries, given in the Paris Agreement, but will, also, contribute to the global response to climate change.

Countries from the WB6 group requested from the Secretariat of the Energy Community to assist them in coordinating and implementing the obligations from the Charter, and to supervise that implementation. In line with this, the Secretariat has undertaken to prepare a progress report every three months to show the achievement and the challenges that three priority areas, defined by the Charter, are facing in the process of developing a more sustainable energy sector:

- Improvement of energy efficiency management
 - Implementation of smart support measures that improve the sustainability of energy systems
 - Encouraging climate action and the transparency of sustainable energy markets
- The Energy and Climate Strategy 2030

includes goals and policy directions for the period from 2020 to 2030. It refers to the creation of a European society as a competitive, safe and energy efficient system, ready to reach the long-term goal of reducing greenhouse gas emissions by 2050. The Strategy sends a strong signal to the market, encouraging private investment in new energy infrastructure and low-carbon technology.

This Strategy is complementary to the already existing climate and energy package by 2020 and to the plans of the Commission on Energy and Competitive Low-Carbon Economy by 2050. The Green Paper of the Commission from March 2013 preceded the communication on the political framework for 2030 and it stirred a large public consultation on the appropriate range and the structure of climate and energy targets for 2030. These documents reflect the EU's goal to reduce greenhouse gas emissions by 2050 in the range of 80 to 95% below the level on which they were in 1990, as a part of the efforts of developed countries.

Within the Energy Strategy, a strive to modernize the EU economy is present and it works in conjunction with other leading initiatives such as the single digital market, the union of capital market and the investment plan for Europe to meet the goals regarding jobs, growth and investment. This package is an opportunity to accelerate the transition to clean energy, growth and job creation.

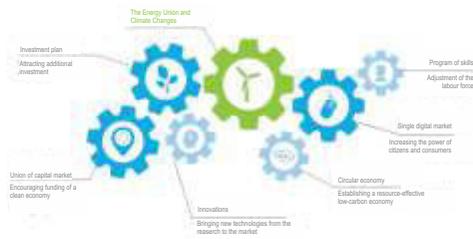


Figure 3 - Modernization of the economy - the role of the Energy Union and Climate Policy

40% reduction of emission of greenhouse gases

at least 27% share of energy in the RES

increase of EE from 27% to 30%

15% EPS interconnections

Goals of the EU by 2030:

The EU Energy Roadmap 2050 represents a set of some kind of planning policies that should enable a sustainable use of resources at the level of the European Union. Clean technologies are a key element of the future European economy. The EU has set the long-term goal of reducing greenhouse gas emissions by 2050 by 80 to 95%, compared to those measured in 1990.

The roadmap defines an economically viable way of achieving this goal, with the particular goals of 40% reduction by 2030 and 60% by 2040. In the short term, the EU has adopted legislation that should allow a reduction of 20% by 2020, compared to

1990, and for the time being, this goal is successfully achieved. The EU, also, suggests increasing this goal to 30%, if other, economically developed, countries reach an agreement on global efforts for emission reduction.

To achieve these goals, it is necessary to make a significant investment in new low-carbon technologies, renewable energy sources, energy efficiency and network infrastructure.

EU Goals by 2050:

- 80 - 95% reduction of greenhouse gases
The transition to a low-emission society should be based on the introduction of innovation and investment in cleaner technologies and the production of low- or no-emission energy. Energy efficiency will be a key driver of this transition, considering the fact that the EU has the potential to use 30% less energy by 2050 compared to 2005. Also, greater use of clean technologies will significantly reduce air pollution in European cities.

Low-emission economy has a much greater need for renewable energy sources, energy-efficient building materials, hybrid electric vehicles, smart grid equipment, low-carbon based electricity production and the technology development for capturing and storing carbon.

The Roadmap has set four major routes for a more sustainable, competitive and secure energy system in 2050: energy efficiency, renewable energy and capture and storage of coal. The routes are combined in different ways to create and analyze the seven possible scenarios for 2050.

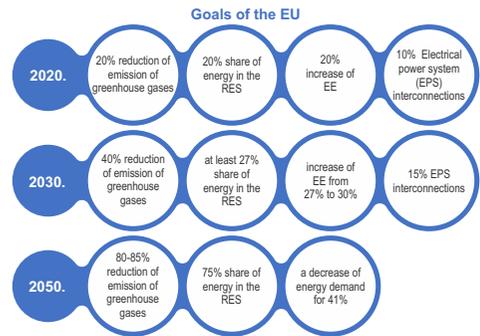
Scenario of Decarbonisation

- High energy efficiency. Political dedication to very high energy savings; it includes, for example, more stringent minimum requirements for devices and new buildings; high rates of renovation of existing buildings; establishment of obligations of energy saving in energy services. This leads to a reduction in demand for energy from 41% by 2050, compared to the peaks in 2005-2006.

- Various supply technologies. No technology is preferred; all energy sources can compete on a market basis without any special support measures.

- High share of renewable energy sources. Strong support measures for RES lead to a high share of RES in gross final energy consumption (75% in 2050)

- and the share of RES in electricity consumption, which reaches 97%.



3.1.1.

Analysis of the context and direction of development of the energy sector in Bosnia and Herzegovina within the Framework Energy Strategy of BiH by 2035

The trends of development in the EU are certainly crucial for defining BiH policy in the context of development of production, markets and electricity consumption, coal, oil and natural gas markets, renewable sources, as well as defining priorities for energy efficiency, environmental protection and climate change prevention – practically, in all segments of application of the Strategy, where scenarios and priorities are defined. The Strategy brings the objectives of BiH, given with regard to the EU goals by 2030, and they are shown below:

The task of the Strategy is to unequivocally emphasize the imperative of respecting priorities of the EU strategies (especially those derived from the legal obligations of BiH within the Energy Community), as well as, to clearly show the impact of individual scenarios on possible deviations from the EU priorities and their relevance in choosing a favourable scenario of the Strategy on Energy Development of BiH.

In the analysis of the Framework Energy Strategy of Bosnia and Herzegovina by 2035, given the EU objectives and obligations of Bosnia and Herzegovina, we did not consider all the parts of the strategic document, but we focused on the defined direction of the sector decarbonisation and its orientation towards renewable energy sources with the application of measures of energy efficiency.

In the process of defining BiH strategic priorities, the essential provisions of the Roadmap of the European Union for Energy

20-20-20 Goals of the EU	Goals of the EU by 2030	Current plans in Bosnia and Herzegovina	
Decrease of emissions of greenhouse gases for at least 20%	Decrease of emissions of greenhouse gases for at least 40%	The goal by 2028 is to reduce SO ₂ for 95%, NO _x for 62% and solid particles for 88% comparing to 2014 ⁴	
		By 2030, the level of CO ₂ emissions to be 18% above or 3% below the values from 1990	
Increase of the share of RES to at least 20% of consumption	Increase of the share of RES to at least 27% of consumption	The state goal of BiH is to achieve a share of RES of 40% in the gross final production of energy	
Reaching the rate of energy savings of 20% or more	Reaching the rate of energy savings of 30% or more	A developed, but not adopted, goal of BiH for reduction of energy consumption of 9% by 2018 comparing to 2010	

Table 1 – Goals of Bosnia and Herzegovina with regard to the EU Goals by 2020 and 2030

⁴The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

Sector Transformation Towards the Competitive Low-Carbon Economy in 2050 have been neglected, as well as, all other EU strategic provisions to mitigate the

consequences of climate change, that set specific numerical goals in this area.

Given the contractual obligations of BiH within the membership in the Energy Community, it is essential for this key BiH document to be designed in this context.

The Roadmap of the EU for the energy sector transformation by 2050 contains clearly quantified goals for reducing greenhouse gas emissions – for 40% by 2030 compared to the base year, by 60% by 2040 and by 80% by 2050, what must be achieved by increasing energy efficiency and increasing a share of renewable energy sources.

In the Framework Energy Strategy of BiH by 2035, the above mentioned energy and climate trends in Europe were presented mainly for the sectors of electrical power and renewable sources and to a lesser extent for the processing of crude oil and the market of petroleum products and natural gas. Production and use of coal is not part of the EU's priorities. It is indicative that global trends differ drastically from the European development priorities - particularly in the use of renewable energy sources and in relation to climate change, which is understandable given the European development policy, on the one hand, and the strong influence of the energy sectors of developing countries (India and China) at the global level, on the other.

In the Strategy, during the planning of development of production portfolio, implicitly were taken into account only the obligations of BiH under the Paris Climate Agreement of 2016 (based on the indicative national goals for the reduction of greenhouse gas emissions - GHG emissions). Although the preliminary goals for reduction of GHG emissions, given by BiH (in an optimistic scenario, a 3%

decrease by 2030, compared to 1990), were "not harmonized" with the EU ambitions on full decarbonisation of the EES by 2050, the analysed scenarios of the Strategy did not meet even goals set in a such way. This means that absolute CO₂ emissions were not taken as hard constraints in the planning process.

In the EU, the adoption of the Clean Energy Package meant the start of the process of adopting the objectives of energy and climate policies for the period 2020-2030. These objectives are in line with the EU goals, submitted along with the adoption of the Paris Climate Agreement and the Map of the EU by 2050. Although the adoption of new EU goals for the next decade is yet to come, the current communication of EU officials with EnC members, and thus with BiH, indicates their expectation to exploit the potentials of RES and EE in the region and to contribute to the EU's efforts to decarbonise the electrical power system.

It is unfortunate that a document, as the Framework Energy Strategy of BiH by 2035, has so inadequately treated the agreed goals and ignored the obligations. It is necessary, before adopting, to make major changes, that is, if the strategy, as it is now, in the process of adoption, is adopted, it is obvious that in the very near future BiH will need to adapt its development plans of the energy policy to the EU climate policies, as well as, to the general international trends in this area. Namely, the decarbonisation of the energy sector, and in particular the EES, is a key policy not only of the EU. This will require development of not only a low-carbon development strategy and adaptation to climate change but, also, creation/development/change of energy development strategy. It will be necessary to involve the wider community, especially

representatives of civil society and experts. Therefore, the Framework Energy Strategy is only the beginning of the process of building a social consensus on the sustainable development of energy/electrical power sector, and all expert criticism from this document points out that it is urgent to make corrections in the document.

3.2.

Guidelines for sustainable energy future of Bosnia and Herzegovina based on the sustainable development policies

Guidelines for BiH, based on sustainable development policies, should respect the basic principles of security of supply, availability (price) of energy and decarbonisation scenarios. Also, guidelines should give the necessary activities to meet the obligations under the Treaty establishing the Energy Community, in particular in the field of electrical power, natural gas, renewable energy sources (with an emphasis on obligations from NREAP), energy efficiency (with an emphasis on obligations from NEEAP), the environment (with an emphasis on obligations from NERP), as well as, other contracts and agreements that BiH signed, and its obligations on the basis of the Strategy on Climate Change Adjustment and Low-Carbon Development of Bosnia and Herzegovina, and the obligations from the INDC. In the process of drafting a Strategy, projections should be made by 2050, and in line with it, drafting the guidelines should follow the EU trends by 2050.

Only an integrated access to all issues will lead to a sustainable development. Use of RES and EE should be considered in a much broader context than that of production and use of energy, while EE should be combined in all areas as a common link. In the context of civil energy and energy transformation, in the EU, energy cooperatives have proved to be a good form of local community organization. Energy cooperatives develop the RES projects, which are wholly or partly owned by the community that lives in the area where the project is being built. The community participates in investment that will use local RES potential such as biomass, manure, wind, geothermal energy, roofs of buildings for the construction of solar systems, etc. The cooperative members join and share human, financial and material resources for investment in renewable energy sources' projects in their communities. The projects are not only developed for the financial reasons, but also for addressing social and environmental problems of the community through the creation of new jobs, improving the air quality (e.g. by replacing coal-based heating with locally collected biomass), building the local infrastructure, etc. Therefore, it is necessary, at the strategic level, to express the commitment to introduction of new business models in the energy sector, as are energy cooperatives, public-private partnership (PPP), ESCO, etc. The introduction of these business models would, also, have a positive effect on resource efficiency of the public sector.

3.2.1.

Analysis of guidelines of the Framework Energy Strategy

The Framework Energy Strategy of BiH by 2035, despite the defined goals and international commitments, dominantly elaborates the scenarios, most of which lead to increasing the share of fossil energy in the total consumption, i.e. lead to further carbonization.

The methodological approach for assessing the efficiency of scenarios should be based on three basic criteria:

- security of supply of energy and services,
- availability and cost of supply and
- sustainability of supply (in the context of clean and sustainable energy):

Within the Strategy, four indicative scenarios for development of a production mix were elaborated, and a cogeneration scenario was given as an alternative option. The aim was to demonstrate the understanding of different strategies and policies of the production mix development and their indicative consequences. Scenarios, elaborated in detail, were:

1. The entity scenario was based on data of the working groups of the Federation of Bosnia and Herzegovina and Republika Srpska. The existing documents and relations with current and potential investors, and other stakeholders, were also considered in the course of planning. Since the scenario envisioned a significant export of surplus of produced energy, a scenario on a lower level was also created and it took into consideration a presumption of limited export of electrical power in the amount of 30% above domestic consumption for the thermal power sector for the Federation of Bosnia and Herzegovina and 70% above domestic consumption for the thermal power

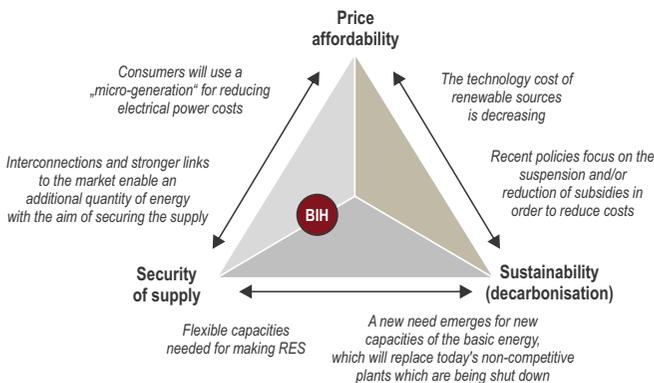


Figure 4 - Illustrative presentation of Bosnia and Herzegovina within an energy trilemma⁵

⁵The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

sector of Republika Srpska (excluding TE Stanari, which produces 2 TWh per year) with the priority of entering hydro and other RES facilities in EES.

2. IP Scenario, i.e. the scenario based on the Indicative plan on the production development of an independent system operator from 2017 to 2026, with a projection by 2035, which represents a framework for development of a production mix, according to the various projects that are consolidated in the NOSBiH report.

3. The cost-optimized IP scenario was based on the philosophy of development of a production mix, in line with the NOSBiH indicative plan, but with certain corrections, primarily in the domain of the year of launching and/or decommissioning larger projects and installed power for TE Ugljevik 3 with 600 MW to 300 MW.

4. Mild Renewable Scenario encouraged a higher share of renewable energy sources and stimulated energy efficiency measures as an alternative to other scenarios that were traditionally based on a greater involvement of the thermal sector.

The key effects of the scenario of the electrical power mix 2016 - 2035 are shown in the table below:

The scenario, called Mild Renewable Scenario, encourages a larger share of RESs. However, this encouragement is still based on traditional business models. It is expected, in this scenario, to be emphasized the importance of civil energy from renewable energy sources in the context of decarbonisation. Civil energy refers to decentralized energy production from renewable sources owned or managed by citizens, energy cooperatives, local initiatives, local government, charitable organizations, NGOs or farmers, and it creates a value at a local level that stays in a particular region. In 2012, 12 million citizens in the EU produced electricity for their own needs. It is expected that by 2050 every other EU citizen will produce electricity for his/her own needs. The document "Strategy" brings no strategic guidelines (either positive or negative) about these issues.

Although the Framework Strategy defines three objectives: security of supply, price eligibility and sustainability (decarbonisation), the fact is that all scenarios of the production mix in the Framework Strategy envision the production surplus in relation to domestic needs and planned consumption, and, therefore, it is

	CAPEX interval of new objects (mid EUR)	Average price of production without CO ₂ (EUR/MWh)	Cumulative production (TWh)	Cumulative export as % of the national consumption	An average % of RES in the installed capacity	An average % of RES in the total production / consumption	Cumulative consumption of coal (MM tonnes)
Entity scenario without a limit on export	8.6 – 10.5	44 – 48	480-590	80% – 90%	59%	35%-40%	330-358
Entity scenario with a limit on export	8.6 – 10.5	48 – 53	390-480	40% – 50%	59%	43%-50%	230-250
Indicative plan (IP)	4.3 – 5.2	46 – 52	410-500	50% – 60%	46%	29%-40%	300-322
Cost-optimized IP	3.9-4.8	41 – 44	360-440	30% – 40%	57%	33%-40%	260-278
Mild renewable scenario with EE	3.2 – 3.9	40 – 47	320-390	23% – 33%	62%	43%-50%	180-199

Table 2 - Key Effects of the Electrical Power Production Mix Scenario 2016 – 2035⁶

⁶The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

logically to conclude that the export of electrical power is perceived as one of the goals of the implementation of any production mix scenario (Table 2 - Key Effects of the Electrical Power Production Mix Scenario 2016 – 2035). Given the average market prices of MWh on stock exchanges in the region and Europe, which are currently below the average production prices (without CO₂) planned by the Framework Strategy, and with a tendency for further stagnation or decline, the strategic orientation towards production for export is more than questionable, no matter how much of a positive effect it would have on the country's balance of payments, because in the conditions of an open market of electrical power, there is a great danger of so-called "stranded" investment, and the final price of the misguided strategic decisions, eventually, would have to be paid by domestic consumers (population and the economy).

The Framework Strategy foresees, depending on the chosen scenario, investment in new production capacities will be between 3.2 and 10.5 billion euros by 2035, what is more than ambitious, given that in the last 20 years in building new production capacities was invested less than 1 billion euros. It also raises the questions: who will be the main carrier of new capacity development, how it will be funded and what models will be used.

Since the Framework Strategy has not answered these questions, it is realistic to assume that the carriers of development and new investments in production capacities should be three existing electrical power companies (Electrical Power Supply Company of BiH, Electrical Power Supply Company of RS and Electrical Power Supply Company of HZHB). Also, these subjects

have given the largest number of projects, and produced almost 90% of the total electrical power in BiH. However, when the results of business operating of all three electrical power supply companies in BiH over the last few years are looked at, it is obvious that they operate at the edge of profitability and are unable to invest in new energy capacity from their own accumulation. Namely, the Electrical Power Supply Company of RS and the Electrical Power Supply Company of HZHB have in the past few years even shown losses in business operating. In contrast, the Electrical Power Supply Company of BiH has had a positive operating in the past period, but it should be kept in mind that if the business results of mining operations, that supply production capacities of the Electrical Power Supply Company of BiH, are added to the business overview of this Company, and this data is devastating, the system would present losses. Under these conditions - all three power supply companies do not have a stable accumulative capacity that could provide at least 20-30% of their own equity investment in new production capacities - the question arises if any of the proposed scenarios mixes from the Framework Strategy is real and viable. It is certain that investment could be financed solely from credit, but in that combination of production factors in power supply companies, where ROE (return on equity) is less than 1%, all costs of financing and possible future non-profitable business operating would be paid by the end customers, what is not just from the social point of view. Considering the stated, the authors believe the strategy on electrical power sector development necessary has to foresee and plan, as its first activity, to restructure, consolidate and modernize the business operating of public

power supply companies and mines in the Federation of BiH. It is a fundamental prerequisite for any serious investment in future capacities. Given that power supply companies and mines are burdened with redundant workforce, irrational business operating, lack of vision and modern management, the whole process should take at least five years and require significant financial resources.

In order to achieve the objectives, planned within the electrical power sector development strategy, while simultaneously respecting the international commitments in an effective and efficient way, in addition to the need for restructuring all three existing electrical power supply companies, it is necessary to give up the idea that the export of electrical power is an opportunity for development of BiH and it is needed to plan the future capacity building solely for satisfying domestic consumption. New production capacities should be based on renewable energy sources, and the priority should be given to wind power and photovoltaic power plants as the most clean forms of energy, where - in the next eight years – is expected a fall of the needed investment and the prices, of the electrical power from these sources, by nearly 40% compared to the present situation with regard to the required investments of 1 MW (thermal power plants 1.4 - 2 million EUR/MW, wind power plants 1.2 - 1.8 million EUR/MW, photovoltaic plants 1.6 million EUR/MW, hydro power plants 0.6 - 4.3 million EUR/MW).

Effects of the production mix scenario	Investments (mid EUR)	PPC without CO ₂	Cumulative export as % of the national consumption
Entire scenario without a limit on export	8,6 – 10,5	44 – 48	80 – 90
Entire scenario with a limit on export	8,6 – 10,5	48 – 53	40 – 50
IP scenario	4,3 – 5,2	46 – 52	50 – 60
Cost-optimized IP scenario	3,9 - 4,8	41 – 44	30 – 40
Mild renewable scenario with EE	3,2 – 3,9	40 – 47	23 – 33

Table 3 - Effects of Production Mix Scenarios⁷

Given all the above and the fact that BiH is one of the most inefficient countries in terms of energy use, the strategy for development of the electrical power sector in BiH, based on the production of additional electrical power, should be transformed into a strategy based on reduction of electricity consumption and a very aggressive approach to achieving as much energy efficiency as possible, what could cause savings in consumption for at least 30% in relation to the current situation and, thus, reduce the need for construction of new production capacities, especially in the case of TEs and HEs that have a major impact on the environment. Instead of spending billions of euros in BiH on the construction of new production capacities, that money would be more efficient and effective to invest in energy efficiency and reduction of electricity consumption, because the immediate effects of such an approach would be felt by citizens and the economy, since their costs would be reduced and indirectly they would have one cleaner and healthier environment.

Furthermore, after comparing these scenarios, it becomes apparent that only an additional scenario involving the extensive use of renewable sources and energy efficiency, which is not given in the Framework Energy Strategy of BiH, provides a lower level of CO₂ emissions

⁷Financial aspects of development of electrical power sector in BiH, Damir Miljević, 2017.

(compared to the present level) with the reduction of other pollutants. All other energy mix models, involving more intensive coal use, contribute to increase of CO₂ levels and/or other pollutants. This fact has to be clearly stated as the dominant factor in the process of assessing development priorities.

This part of the Strategy is particularly important, since, according to the fact from the EES of BiH, for the next ten years a construction of production capacities has been planned to “replace” the outdated facilities in the existing thermal power plants. The PEST analysis, presented in the Strategy, brings key political (P), economic (E), social (S) and technological (T) aspects of the BiH environment. These aspects define the possible directions of development of the EES production portfolio.

Even the most favourable, the mild renewable scenario, predicts an increase in the capacity of thermal power plants, and in line with it, potentially higher CO₂ emissions, compared to the current state, what would be contrary to the EU Strategy and climate objectives. Thus, it is not certain that the mild renewable scenario would not result in larger CO₂ emissions, and it confirms a lack of a strategic direction, a realistic one, in the current context in which the BiH energy sector operates, especially, in the context of future trends, expected regarding CO₂ prices and lower costs of RES technology.

An estimation of total CO₂ and local

emissions by the thermal sector by scenarios for Bosnia and Herzegovina, for 2016-2035, is given below:

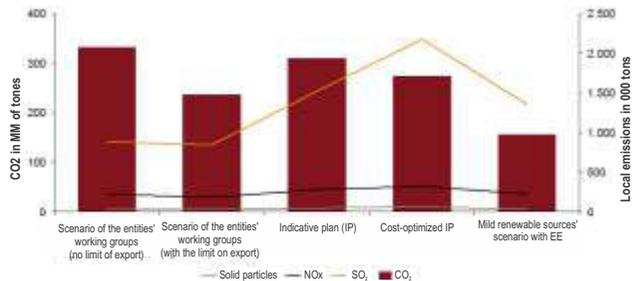


Figure 5 – An estimation of total CO₂ and local emissions by the thermal sector by scenarios for Bosnia and Herzegovina for 2016-2035⁶

This strategy does not give any direction and obligation of development to the energy sector stakeholders, so all four described scenarios are left to be implemented according to the business-as-usual principle. Therefore, it is not clear to which, of the four development scenarios, the strategic guidelines, defined in the table at the end of each section's chapter, refer.

The Nationally Determined Contribution (NDC) should be confirmed in the context of values accepted by BiH under the UNFCCC. The strategy should take into account the Third National Communication and the Second Biennial Update Report of the Greenhouse Gas Emissions that were adopted by the Council of Ministers and submitted to the UNFCCC on 13 June 2017. Concrete steps on preventing climate change were not explicitly presented in the Strategy. The strategy could propose a development of legal legislative for climate change, institutional capacity building and formal definition of competencies and responsibilities in this domain, including the establishment of a system of sources inventory of greenhouse gases, what is a

⁶The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

key mechanism for implementing EU climate policies. Also, the Energy Community started approaching more seriously the transposition of the EU Acquis in the sector of climate change. The initiated activities, such as the introduction of the EU Greenhouse Gas Monitoring Mechanism Regulation (GHG MMR) and the establishment of a Climate Action Group (CAG) in 2017, indicate that in the near future the contracting parties of the Energy Community will be asked for an integrated approach to planning in the sectors of energy and climate change. The CAG's action enables the contracting parties to prepare a joint representation in the negotiations within the UNFCCC.

Considering this, it is necessary to update concrete data on sustainable development and greenhouse gas emissions. In the further elaboration of the Strategy should be included: a criterion of ambition, comparable to the priorities applied in the EU and related the sustainability of development of individual energy activity domains, and the activities mentioned in the context of climate change prevention (with a specific time schedule of activities and energy efficiency as a common criterion).

The application of the criteria is asymmetric - the scenarios arise from documents or suggestions of relevant political authorities or dominant market participants in BiH, and the Strategy in most cases emphasizes the priority of security of supply and low energy prices to disadvantage of criteria that support sustainability. Therefore, it is necessary, in the area of definition of priorities and before implementation, to make an additional assessment of scenarios with harmonized relations among priorities. At the same time, the assessment should include the previously undertaken

commitments and objectives, as well as the aspect of regional priorities - diversification of sources or transport directions, and market integration at the regional level.

Macroeconomic data on development of BiH economy was presented and applied as a part of the framework for the evaluation of the priorities - specifically, in the estimation of the growth of energy consumption, a method based on GDP growth was applied, while the climate of direct investment was presented as one of the important factors of energy development, etc.

Not to disagree with the statistical value of data on economic trends in BiH, its application as a starting point for assessing and predicting strategic energy parameters derives from constraining conditions in the process of drafting the Strategy (short deadlines, divergent priorities, lack of basic data, regulatory framework fragmentation and fragmentation of the administrative environment). The parameters, thus, defined (the consumption forecast and the estimation of price movements) can only be used as indicative. Since all subsequent analyzes, action plans and recommendations are based on these baseline forecasts, on their accuracy depends the realistic feasibility of the proposed goals and can greatly affect the sensitivity analysis, the quality improvement and the applicability of the document.

In this respect, it is necessary to revise these parameters and to provide a new, more precise analysis of the forecast of consumption by individual sectors (electrical power, gas, oil and derivatives, coal, and thermal energy).

⁹ Hasović, Z., et al.: *Impact of New Power Investments up to Year 2020, THERMAL SCIENCE: Year 2015, Vol. 19, No. 3, pp. 771-780*

3.2.2.

Analysis of scenarios from the Framework Energy Strategy of BiH

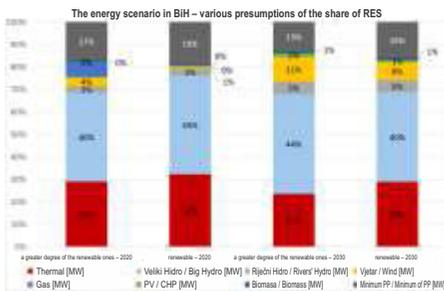
In order to point out the shortcomings in the Framework Energy Strategy of BiH, we use the results of Hasovic et al. al. (2015), where are, on the basis of EnergyPLAN Model, investigated the current and future investment in new power plants in Bosnia and Herzegovina and their impact on the energy sector, CO₂ emissions and internationally agreed renewable energy goals by 2020. This includes the export orientation of TE Stanari; the influence of a dry, a humid and an average year; delayed construction of Block 7 in Tuzla, limited construction of hydro-electrical power plant; and decommissioning of thermal power plant. Based on the assumed demand for energy by 2020, several scenarios are analysed. In order to model a whole range of possible outcomes, these scenarios imply a construction of various energy power plants and various hydrological conditions. This analysis helps point to the factors or variables the Framework Energy Strategy for BiH does not consider or, at least, there are no conclusions in the document to prove it does. The underlying conclusion is that the energy system can be significantly affected by a delay of investment, but in order for BiH to comply with goals regarding renewable energy sources (RES), it will be needed to

include and explore production from other sources of renewable energy. The scenarios, presented in the Framework Energy Strategy, are just a starting point for modelling. And, in addition, this document does not choose a starting point, i.e. does not select an initial scenario as a basic presumption for modelling the potential effects of reducing the cost of energy from the RES, reducing the wholesale electricity price on the market, and increasing the price of CO₂ emissions that is likely to occur. The impact of these factors on the energy sector of BiH should be explored, even in the mild renewable scenario, under the assumption of the construction of the power plants, given in the NOS and in accordance with the plan on decommissioning of the thermal power plants, but, what is the most important, outside the framework provided by NOS, i.e. in a strategic scenario of decarbonisation.

The limitations of the scenarios, presented in the Framework Strategy, regarding the use of renewable energy sources in the energy production mix, can be demonstrated by comparing the extremely renewable scenario and a path of the energy mix, if, within the scope of NOS's assumptions, the construction of new production capacities would be fully implemented. The plan of decommissioning of thermal power plants is, also, a basic assumption, defined by the special dynamics of NOS. The development of the scenario for 2020 in the mentioned paper, therefore, implies only the plants balanced by the NOS are put into operation.

The main difference between the indicative model and the scenarios, presented in the Framework Energy Strategy, and the

analysis of Hasovic et.al. (2015) is that the analysis of the energy mix by 2020 in this later, extremely renewable scenario implies a significant change in the construction of wind power plants, i.e. about 656 MW of additional capacity, planned to be operational by 2030 by NOS. The scenario implies that all hydro power plants, presented in the indicative plan, are put into operation and 50MW PVs and 50 MW biomass power plant. The analysis implies only one consumption scenario of 16.46 TWh in all scenarios of development of energy mix production by 2020 and 2030. The impact of the EU directives and variables has been analyzed in many scenarios. Scenarios 2020, considering the given assumptions and different hydrological conditions, were created and analyzed. The figure presents the outcome in an optimal energy mix for BiH under certain assumptions.



The conclusion of the comparison of the above-mentioned outcomes of the energy mix, i.e. the production of electrical energy from different sources in relation to the scenarios from the Framework Strategy, is that the mild renewable scenario from the Framework Strategy implies about 5% higher level of participation of energy produced from thermal power plants.

Therefore, the analysis, done by EnergyPLAN model, in the mentioned paper for programming various paths for production mix, proves that the existing plan for introduction additional capacities permits movements within the parameters, which are not significantly different from the mild renewable scenario from the Framework Strategy, and allows the reduction of the energy produced from thermal power plants compared to the cost-optimized scenario of the World Bank of about 20%.

Ultimately, the analysis, under the assumption of 'renewable' scenarios in this model, proves the importance of selection of the 'mild renewable scenario,' in comparison to other scenarios presented in the Framework Strategy, and demonstrates significant differences in strategic scenarios that potentially result in significant differences in the outcomes for citizens of BiH, especially when external pollution costs are concerned. Apart from the criticisms of the Framework Strategy, previously mentioned, its fundamental weakness is the lack of choice of the 'mild renewable scenario' as its strategic commitment. In other words, the basic recommendation for decision-makers is to adopt a strategic approach. Regarding the scenarios presented in the Framework Strategy, the 'mild renewable scenario' is the closest to the outcomes of this model, which result in the above-stated outcome, i.e. the percentages of energy produced from different sources, if the assumptions regarding putting to use a new electrical power potential come to its full implementation.

However, the essential weakness of the Framework Strategy is that it does not, in any way, answers the essential issues on how the outcomes of the models differ in

each scenario, when the basic entry assumptions - that relate to the movements of the wholesale price of electrical energy on the market, the price of the CO₂ emissions and prices of the technology for obtaining electricity from the RES, and the prices of thermal power plants, which can ultimately be more expensive than the input assumptions that were taken for modelling - are changing. In order to emphasize the importance of these factors, it is necessary to model the impact of these on the energy sector in BiH in many basic scenarios, including a strategically renewable scenario, which will take into account all the commitments BiH has taken concerning the energy sector. The assumption is, and it is likely to happen, that the 'mild renewable scenario' from the Framework Energy Strategy of BiH, will prove that thermal power plants' cost-effectiveness is very sensitive to increase of price of CO₂ emission (0.10 and 20 euros per ton of CO₂) in relation to variations of the wholesale price of electrical power on the external market (downfall from EUR55 to EUR30 by 2030). Given that the existing document does not analyse the impact of these variables on the profitability of thermal power plants, current and new ones, we can conclude that we do not have a document that could serve decision-makers to consider the impact of trends of these variables up to 2050 on decisions, which will be made in relation to investment in new power plants, and that these analyses are urgently needed.

With regard to the European trends of increasing the CO₂ tax, i.e. the cost of CO₂ emissions, the reduction of the electrical power prices on the market, and the reduction of the price of electrical power production technology from the RES, it is

very possible that the conclusion of modelling, based on the assumed scenarios from the Framework Energy Strategy of BiH, clearly point to the decline of profitability of investment in thermal power plants, and the initial scenario, which is - comparing to other presented scenarios - the most advanced in terms of share of the RES, may represent one not sufficiently good response to the challenges of reaching the goals, set by the EU, and those deriving from membership in the Energy Community.

There is an equally important need to explain to decision makers the impact of these variables on outcomes from one such model, in order to understand that scenarios are just the initial step in modelling and that trends in these key variables will affect the viability of investment, which BiH currently considers. If the investment happens to be made under wrong assumptions, it could potentially result in a "stranded" investment for citizens of BiH, what they will ultimately pay by their tax money.

3.3.

Sectors of coal, oil, natural gas, electrical power, renewable energy sources (RES), energy efficiency and thermal energy

One of the tasks of the Strategy is to consider different scenarios for the sectors of coal, oil, natural gas, electrical power, RES, EE and thermal energy for the period up to 2035.

The description of the markets of electrical energy, coal, natural gas, oil and derivatives, and thermal energy has to be elaborated in

detail and provide a good picture of the market structure, definition of the main participants, their obligations and function. In this regard, within the Strategy, for each of the sectors should be presented a current legal and regulatory framework for all administrative levels and all segments and a list of needed reforms in the context of sustainability.

In all parts of the Strategy, where the scenarios and priorities of crucial importance for defining BiH policy in the context of development of production, market and consumption of electrical energy; use of coal; oil and natural gas markets; renewable sources; as well as for defining priorities of energy efficiency, protection of environment and the prevention of climate change, their compliance with the EU development trends should be taken into account.

3.3.1.

Analysis of the electrical power sector

The analysis of the electrical power sector is the most elaborated and richest with detail. The elements of the market structure, price dynamics, market functions and performance, as well as production and transmission infrastructure are consistently described. Also, the processes of sector restructuring are defined, as well as other reform aspects related to the implementation of the EU legislation, aspects of decarbonisation and necessary reforms in the context of sustainability.

The main domain of development policy includes the assessment of the proposed combinations of individual production technologies ("production mix"). The rating parameters range from the deadline for the functioning of the existing capacities, their necessary substitutions, and their complement needed due to the projected increase of consumption and increase of their capacity due to the policy orientation to the production's surplus as a strategic priority in the function of development of economy. The decision is also influenced by development of the market, energy efficiency (what was not taken sufficiently into account as a priority in this overview), obligations of applying the renewable energy resources (they are in a strategic disposition when compared with the policy on domestic coal combustion) and conditions of production balancing, especially from variable renewable sources (partially opened up the possibility of regional co-operation, but not sufficiently elaborated it in the Strategy).

The consumption prognosis was made using a simplified methodology based on the estimated GDP growth, but no segmentation was done in regard to the types of consumption (by the basic division into "industrial" and "broad" consumption). No real evaluation was made using different scenarios. In addition, the presented prognosis was incorrect, because higher consumption was taken for the reference year 2016 than the one actually made.

The role of the electrical power market in the development context of the energy sector is not sufficiently present. The priority of satisfying electrical power consumption dominates the Strategy - in the context of security of supply and energy prices with production, exclusively from domestic

capacities, while the import of electrical power is completely omitted. An additional priority is a certain surplus of production, what allows export of electricity, and what is regarded as a strategic contributor of economic development of BiH. An analysis of sustainability of this policy is not given and the assessment lacks. In this regard, liquid cross-border exchange (trade) and integration of the organized electrical power market and services within the region, and beyond, is one of the main priorities of the EU policy and the Energy Community, what is not sufficiently present in the definition of the scenario and in the evaluation of priorities. Therefore, the analysis has to be supplemented by the role of the market as competitive and commercial (not just auxiliary one) resource for meeting the needs, as well as, for determining the price of electrical power and services in BiH. The electrical power market, as well as, the EU price policy on CO₂ emissions will determine the profitability of investment in new production capacities in BiH and the region.

The commitments accepted within the LCPD directive are crucial ones for the implementation of plans for reducing pollution from existing thermal power plants (TPPs). Namely, in a final version of the National Emission Reduction Plans (NERP), which have to be delivered by the end of 2017, will be defined the options for continuing work of existing blocks in thermal power plants. The analysis of data, provided by the relevant institutions in the process of making the Strategy, suggests that some of the power supply companies have not yet defined their final standpoints on this issue. The standards, prescribed in the IED directive, set more strict technological limitations for new (planned) TPPs.

Because of all this, after the adoption of the final versions of the NERPs and the alignment of the plans for the construction of new TPPs with the standards of the IED directives, it will be necessary again to make a production portfolio development plan in EES BiH, that will, in particular, more consistently, acknowledge the influence of regional market (e.g. by using a regional market model in the process of choosing the most economical investment).

3.3.2.

Analysis of the coal sector

The coal sector is given disproportionately high importance. The strategy deals with the assessment of the availability of coal resources and the level of price efficiency of mining exploitation in the context of increase of production, without considering an alternative to production reduction and substitution (partial or complete) with alternative resources - what is obviously a consequence of the existing development policy on supplying from domestic production capacities and resources. A real economic analysis, that includes cost estimations, should include the cost of decarbonisation and desulfurization of waste gases, cost of health and environmental protection, cost of new technologies, impact of the coal market and the availability of cheaper electricity.

The proposal is to include in the assessment of the priorities of the electrical power production (in the context of increase of coal

exploitation policy) the legal obligation of using renewable sources and the obligation to apply emission reduction methods. Also, an economic analysis of the coal production sustainability should include the factors that really influence the cost of coal exploitation. An assessment of duration of exploitation of existing capacities should include the price of carbon dioxide emissions depending on the applied mechanism of CO₂ trading.

Given the importance of coal for the current BiH energy sector, the limited nature of this resource, as well as, the clear EU strategic goals, mentioned above in terms of decarbonisation of the energy sector, and the corresponding contractual obligations of BiH as the signatory party of the Energy Community Treaty, it is necessary in the Energy Strategy of BiH to set clear and unequivocal quantitative goals for BiH for the period covered by this Strategy, which relate to the planned scope and intensity of reduction of coal use in primary and final consumption, while simultaneously setting the objectives to increase the substitution solutions (energy efficiency, RES). At the same time, strategic priorities and strategic guidelines to achieve this goal need to be defined. Also, it is necessary, in due time, to initiate and plan "fair transition" programs for areas that are currently heavily dependent on the coal industry. For these areas, the greatest threat is an uncontrolled and only-by-market defined reduction of coal production (an example of liberal approach to this issue, with drastic consequences for workers and the mining regions, was the transition in the UK in the 1980s of the 20th century).

The Framework Energy Strategy of BiH approaches this issue in a traditional, arbitrary and declarative way, without a clear vision and firmly set qualitative targets for a

mandatory transition towards the low-carbon energy society. It is clear that coal is still the cornerstone of the energy sector in BiH and that this transition cannot be carried out overnight, but that is just another reason to oblige the creators of this Strategy to set SMART goals for a gradual but compulsory reduction (in the absolute amount) of coal use in energy production and consumption. This would, among other things, enable its use in a much longer period of time, with significantly lower intensity, what would specifically contribute to each of the set strategic priorities, in particular to the (1) efficient use of resources and (2) secure and available energy.

In this regard, for example, the goal, set in the newly established Action Plan for Energy Efficiency of BiH 2016-2018, was completely neglected. This goal referred to the reduction of primary energy consumption by the end of 2020 by 12% compared to consumption projections without implementation of energy efficiency measures, what for the relevant period is 963.84 ktoe. Also, it should be kept in mind that energy efficiency measures in final consumption help only partly achieve this goal, which cannot be reached without a significant reduction in primary energy consumption.

3.3.3.

Analysis of the natural gas sector

The analysis of the natural gas sector is not sufficiently specific in the action part - apart from the goal of "prioritization of the key energy strategic guidelines of Bosnia and Herzegovina", no projections of own growth of natural gas consumption, by sectors or all together, are carried out – there is a superficial estimation taken by ENTSOG (without sufficient reference to the applied methodology), but no further sensitivity analysis is performed, due to lack of data and space for analysis. In addition, the option of using gas in the production of electrical power, especially in cogeneration with thermal one, is not elaborated (only one production capacity is included in the analysis).

Plans for gas infrastructure development are incoherent - unjustifiably ambitious and contradictory. They lack clearly funded arguments (except the declarative need for gasification of BiH) in the context of security of supply. The priority rating is not consistent. There are approximately 18 priority infrastructure projects for natural gas and it is necessary that the Strategy identifies a small number of interconnectors that are relevant for both entities.

The Strategy does not sufficiently emphasize the need to comply with the specific provisions of Directive 2012/27/EU in regard to the increase of energy efficiency in the area of gas transport and distribution

(e.g. carrying out an assessment of the potential for increasing energy efficiency of gas infrastructure in relation to transport, workload management, distribution, and the connection of energy production facilities, including access to micro-generation of energy and the need for improving information systems and reporting on energy efficiency and achieved savings in gas sector, etc.).

It is necessary to formally separate the Sector for Oil and Derivatives from the Natural Gas Sector. In addition, it is necessary to include projections of gas consumption by sectors in the coming years. Exxon mobile projections are used in the global energy trends of the gas sector development, and the recommendation is that the projections of an independent international organization should be used for the reason of having a more objective approach, instead of the expectations of one international oil and gas company.

It is necessary in the document to emphasize the importance of adopting legislation at the level of Bosnia and Herzegovina, what would allow alignment with the Third Energy Package. It would open a possibility of investing in the natural gas sector.

3.3.4.

Analysis of the oil and oil derivatives sector

The analysis of the oil and oil derivatives sector has not been adequately done. The obligations of BiH are stated. They derive from the Energy Community legislation and refer to the legal framework and development of a system for fulfilment of the obligation of maintaining reserves of oil and oil derivatives. The strategy gives a status review and defines the need to build a legal framework. The construction of the system itself in the practice and context of planning is defined only as a framework - the methodology details, the necessary administrative measures and the regulatory instruments, the infrastructure and financial factors, and the timing of planning of implementation are not stated.

It is necessary to add into the Strategy the elements needed for the practical implementation of legal obligations (regulations, institutional framework, monitoring, storage cost prices methodology, financial alignment, capacity planning, cooperation elements, etc.) in the defined time. Also, all steps of implementation should be elaborated.

3.3.5.

1.1.1. Analysis of the thermal energy sector

The analysis of the thermal energy sector has not been adequately done. The mentioned strategic guidelines for the thermal energy sector need to be aligned with the relevant requirements of Article 14 of Directive 2012/27/EU, which are elaborated in detail in the Action Plan on Energy Efficiency of BiH 2016-2018 and the relevant action plans of entities. Furthermore, many times the Strategy mentions incorrect and arbitrary information that the remote heating system in Sarajevo is the only system in BiH/FBiH that is modernized and that provides an efficient service. Regarding the remote heating system, for example, in Tuzla, Public Company "Centralno grijanje" Tuzla is constantly and intensively working on the planning and implementation of development programs, aimed at increasing the energy efficiency of the heating system, which is why the heating price in this city is the lowest in BiH (key activities are given in EEAPF 2016-2018, Chapter 2.3.1.2.2).

3.3.6.

Analysis of the renewable energy sources sector

It is known that more than 1 100 000 persons are employed in the renewable energy sector in Europe, and Europe is still a global leader in wind power production. Some of the major European manufacturers produce 43% of all installed wind power plants in the world. The ambitious EU policies instigated reduction of technology costs in the field of solar and wind energy production. As a result, renewable energy has become cheaper and more accessible to the whole world. The largest employers in the renewable energy sector in Europe are the wind power industry, solar photovoltaic technology and solid biomass industry.

The renewable energy sector is relatively well discussed regarding the relevant EU policy in this domain, the available and applicable legal regulations of BiH at all levels, framework statistical data, factors influencing the renewable energy sector, and the current state of the sector's development. The part treating planning is relatively less represented and usually given in an aggregate way. A projection of costs of incentive measures for the two basic scenarios is given, but without a detailed analysis and without developmental parts on planning in the context of applying the market principles of stimulation. The strategy insufficiently treats the analysis of the scenario for achieving accepted commitments for 2020.

It is necessary to upgrade the Strategy by adding an analysis of the mentioned aspects of the application of incentive mechanisms in the forthcoming period.

In the field of electricity production in hydro-power plants, the analysis should include sensitivity to barriers in the field of the legal framework, environmental protection, diversification of water use and sustainable development principles.

In the application of biomass which, according to Strategy, would remain a dominant factor in this field of energy, the same aspects of analysis as in hydro-power are relevant. In developing heating capacities, the use of biomass may be overestimated for BiH. In any case, the Strategy does not include the assessment of harmful emissions (and the impact of price of decarbonisation on application of biomass), as well as the impact of use of biomass on increasing CO₂ emissions. Potential of heating and cooling for achieving the overall renewable energy goal is insufficiently explored. The document should encourage an increase of share of fuel from renewable sources for heating and cooling, and operators of system of central heating and cooling to open their network for competition and encourage the introduction of, for example, heating pumps.

Energy from biofuels represents a large part of our combination of renewable energy sources, what will continue in the future. It brings employment and economic development in rural areas, replaces fossil fuels and contributes to energy security. Regarding biofuels, the Strategy describes a ten-percent commitment by 2020, but does not specify the method of implementation: if domestic production is planned and for which generation of biofuels, what incentive system to use, etc. The Strategy should offer

a road map how to implement the commitment.

The current use of solid biomass for thermal and electrical power production in BiH is mainly on the local and regional basis and based on by-products of the wood processing industry. Also, at the current level, it has no adverse climate impact. However, there is a concern that this impact on climate will worsen if the level of use continues to increase. Insuring a long-term, favourable climate impact will, in particular, require posing a limit on any additional pressure on forests, what also has to find its place in the document.

In the document is needed to devote more attention to synergy between circular economy and various applications of biomass, especially because wood can be used for a number of products with higher added value, not just for energy production. For an optimal promotion of these synergies, only highly efficient conversion of biomass into energy (primarily in cogeneration facilities) should receive public support, in the form of financial support or preferential access to the network, except in cases of justified protection of energy supply.

Today, most of biomass, used for thermal and electrical power production, comes from the forests. Throughout BiH, the forests and forest management practices vary widely, ranging from forest farms, cantons and entities, to state level. There has been developed legislation that opposes the sustainable forest management. Therefore, in the document are needed the guidelines for cooperation with the EU and cooperation, for example, within the framework of Forest Europe process. Also, it is needed to call on action systems that complement and

support the practice of sustainable forest management.

There should be recommended a new approach to forest biomass, based on sustainable forest management and an appropriate calculation of greenhouse gas emissions, resulting from the use of land and forests in the part of BiH from which biomass is derived. Relevant ministries should monitor trends in production and use of biomass and, also, review them.

A general reference to new technologies in the use of renewable energy sources for public and private transport is present, but the application details are not elaborated and the trends, valid in Europe, are not defined in the context of their application in BiH. The process of rehabilitation and adaptation of public transport, as well as the planned dynamics (the percentage of transport using electrical power, e.g. railways, trams), should be defined with more applicative details as well as a system of stimulation of electric cars use and trends of growth that would affect the share of renewable sources in transport.

In the process of upgrading the Strategy, it is needed to elaborate a methodology for projection and planning of increase of share of renewable energy sources in the mentioned energy sectors, to define realistic goals in compliance with the commitments undertaken and to evaluate the needed resources, and to define objectives and development plans for application of renewable energy sources in transport.

¹² M International Energy Agency - IEA, *Capturing the Multiple Benefits of Energy Efficiency*, 2015

3.3.7.

Analysis of the energy efficiency sector

The analysis of energy efficiency sector is non-interdisciplinary and onesided. It caused the definition of energy efficiency was reduced to its first part, i.e. focused exclusively on the use of less energy, ignoring the concern for improving the quality of life. It is precisely about improving the quality of life, not only in the context of the city, but, also, considering the physical structure of cities, i.e. the objects where a person spends the most of time.

The figure below shows the most important benefits of energy efficiency measures that reveal a wide range of possible positive impacts:



Figure 6 – Multiple benefits of energy efficiency measures¹²

The energy efficiency is partially elaborated in accordance with the previously created Energy Efficiency Action Plan (EEAP), with the additional goals and projections by 2030, following the same trend and ambition level as in EEAP.

The entire chapter on energy efficiency has to be updated by using the newly introduced documents of the APEE BiH 2016-2018, the EEAPF 2016-2018. and the APEE of the RS (Amendments) by 2018. In line with this, a part of the Strategy, titled the Proposed programs for making savings in the final consumption, should be aligned with the measures and programs that are planned within these APEE documents. Parts of the text related to Action Plans for Energy Efficiency (APEE) for BiH, FBiH, RS and BD have to be modified to give a more accurate and precise description of the state in this area, as well as, the whole process of developing new APEEs in a format that was prescribed by the Energy Community. It consisted of a fully-harmonized process of creating EEAPF, APEE RS and APEE BiH, achieved through active co-operation of all stakeholders/working groups on the development of these documents. Thanks to this harmonized process, ended in April 2017, these three documents are fully compatible. Based on the current text of the Strategy, it is possible to get a misguided notion that each of these plans had been (or is being) done at different time periods and without coordination with the creators of the other two plans. Actually, all three documents are in the process of adoption, with distinction that in RS the APEE RS is in the adoption procedure under the title "Amendments to the current APEE of the RS 2010-2018". APEE of Bosnia and Herzegovina is submitted to the Council of Ministers of Bosnia and Herzegovina for

adoption, and the FBiH adopted its EEAPF 2016-2018 in July 2017 (in the previous period, the action plans for BiH and FBiH were not adopted for 2010-2018).

The goal of saving 12.47 PJ by 2018 complies with the EEAP, but in the context of reducing primary and final energy consumption at the Energy Community level by 20% by 2020 (defined as 187 Mtoe for primary and 133 Mtoe for final energy). The Strategy has to clearly define the goal of primary and final energy consumption (in Mtoe) for BiH.

Directive 2012/27/EU was considered in the Strategy, but it is necessary to add the provisions of the Directive, which for the first time clearly defines and quantifies the goal of increasing the EU energy efficiency as "energy consumption in the EU 2020 up to the most of 1,474 Mtoe of primary energy and 1,078 Mtoe of final energy".

In the European Commission's Communication of 10 November 2010 on Energy 2020, energy efficiency was placed at the heart of the Energy Strategy. In this BiH Strategy, energy efficiency is not set as an indispensable integral part of the overall strategy and the key segment of the energy market and the value chain of all sectors considered (electricity, oil, gas), but is considered separately, in Chapter 5.8. It is necessary to adequately integrate the increase of energy efficiency into the strategic goal of the entire BiH energy sector and all strategic priorities.

The key element is missing in the long-term vision of energy efficiency. It is the reduction of primary energy consumption, what is one of the key requirements of Directive 2012/27/EU. Only the "remote heating and cooling systems, cogeneration, trigeneration, generating, energy efficiency on the side of the final energy consumption"

are considered in this vision.

Since APEE BiH 2016-2018, as well as EEAPF 2016-2018 and APEE RS (Amendments), have been already made, and currently in the phase of adoption, it is necessary to align the Strategy, and especially the part on final consumption, with these documents. In line with this is needed, for example, after mentioning the Article 3 of Directive 2012/27/EU, to state the specific objectives given in these documents (objectives for BiH, FBiH, RS and Brcko District).

In the chapter Planned savings (in the final consumption), within the stated division of the planned final consumption in 2035, it is also necessary to foresee the share, what is in jurisdiction of the authorities at the level of BiH (currently, this division is done only for FBiH, RS and BD).

Chapter 5.8.6 (Cross-sectoral Measures) also has to be aligned with the new APEE BiH 2016-2018, the EEAPF 2016-2018, and the APEE RS (Amendments) by 2018, what specially refers to the updating of strategic priorities and guidelines in chapters 5.8.6.1, 5.8.6.2 and 5.8.6.3.

Chapter 5.8.8 (Strategic Guidelines) has to be changed in accordance with the objectives and measures set out in the new APEE BiH 2016-2018, EEAPF 2016-2018 and APEE RS 2010-2018 (Amendments), what primarily requires full restructuring of the existing Table 5.8.9 (Strategic guidelines) in all sectors considered - Final consumption; Transformation, transmission and distribution; Remote heating systems; Provisions. We emphasize that these APEEs (BiH, FBiH, RS) contain the measures elaborated in detail. The APEE format, established by the Secretariat of the Energy Community, requires adoption and application of these measures. In addition,

the APEE format will be applied for planning (and reporting on the reached qualitative and quantitative goals) not just for the period 2016 - 2018, but also after that period (including the period covered by the considered Energy Strategy of BiH).

For example, in the Table 5.8.9 (Strategic guidelines), the potential of increasing energy efficiency in the area of transmission and distribution is completely neglected and Directive 2012/EU/27 requires its utilization (and reporting to the Energy Community on achievements is mandatory). Here primarily belongs: the establishment of energy efficiency criteria in network tariffs and regulations, e.g. through the provision of regulatory incentives for operators to deploy and develop intelligent networks; measures to facilitate and stimulate demand responses; etc. Analogous modifications, for the purpose of alignment with the mentioned APEE, are also necessary in other sectors considered in this table.

Directive 2012/27/EU, also, requires from all contracting parties of the Energy Community to set a savings goal for the model of EEO of at least 0.5% reduction in energy use in 2017 and 2018, and 0.7% in 2019 and 2020 or to choose alternative measures that show that they will achieve the same goals. The Strategy does not adequately address the OEE model, nor does it explain how to reach the necessary level of investment through development of a market-oriented instrument for financing energy efficiency measures.

EEO schemes are a market instrument that requires from the obligated parties (distributors and/or energy suppliers) to save certain amounts of energy on the side of end-users within the defined deadline. The obliged parties, partially or fully, finance energy efficiency measures at end-users in order to make the envisioned savings and reimburse their own costs through the cost of energy. In other words, all energy buyers pay EEO compensation, and selected beneficiaries receive subsidies for performance in the field of energy efficiency. The figure below shows the process of administering the EEO scheme, defined by the EEO working group for BiH:

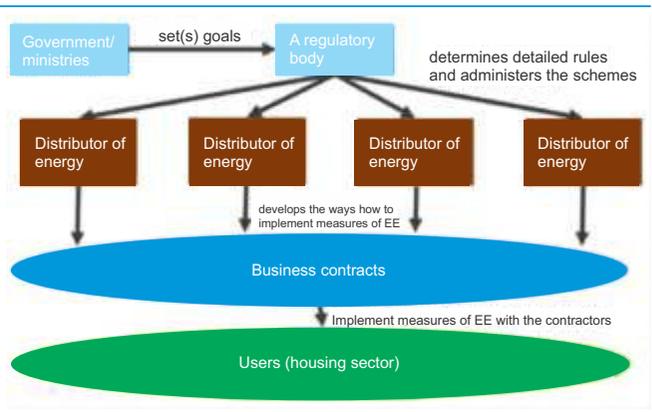


Figure 7 - The process of administering the EEO scheme, defined by the EEO working group for BiH³

EEO schemes have proven not only as an excellent tool to raise funds for energy efficiency measures, but also to stimulate the economy of the countries which are implementing them. Through this market instrument, energy efficiency measures are funded to a great extent, on the basis of domestic funds, which does not depend on donations or credits. In addition, EEO sets clearly defined goals, what gives security, increase confidence of investors and boost

the overall business confidence. This has a far-reaching effect on the job creation in the construction sector (companies that perform the works), the industrial sector (companies that produce the equipment and the necessary materials) and the service sector (companies that monitor the quality of services, issue different building certificates, etc.). EEO schemes can contribute to the development of the BiH economy, and that is why they are also considered as developmental mechanisms. In addition, the costs of implementing the EEO scheme are considerably low due to the existing infrastructure of the energy distributor and/or the retail energy sales companies, which are the contracting parties.

The Strategy also has to develop a full implementation of the Directive 2010-31-EU in BiH, what will allow significant savings, reduced emissions and energy consumption in the construction sector. This Directive has introduced into the certification process, of both materials and architectural objects, two new categories, which are evaluated and included in the overall assessment. First, the total primary energy consumption required for each separate material, or element incorporated in the facility, from the moment of its removal from the nature, transport, processing, placing to the moment of use is measured. The second category is CO2 emission, which is also now measured in the course of material processing, installation and use, and recycling. These two categories should be respected in the categories of green public procurement.

It is clear from the following that the construction sector, i.e. the construction industry in the broadest sense, is as big problem for the first part of the definition of

energy efficiency, which the Strategy emphasizes, just as it is for the second, to which this review refers more: the construction sector affects the energy consumption in the range of 50%, and its impact on pollution is 43%. Thus, considering this data and directions given by the Strategy, such as development of a database about the state of the housing properties, promotion and expansion of remote heating and inter-sector measures, the following necessary steps are required: development of a long-term renewal strategy, transition from solid biomass fuels and waste heat from industrial facilities (among others), and creation and opening green jobs.

The mentioned one-sided view and absence of interdisciplinary approach identified in the analysed document, also, stems from the fact that, for example, the findings gathered in earlier research and documents by the Green Council (as well as many other expert teams in this area) have not been recognized in the Strategy. The Strategy does not mention the alignment or reliance on the pillar of the European Energy Policy, the SET Plan, adopted in 2007, which generated, and supported, many initiatives and strategies that recognize the importance of incorporating the construction sector (EII) by bringing together key research organizations (ERA), developing a green infrastructure, bio-economy or waste reduction measures in this sector (SWD). Precisely in these documents and initiatives are solutions that need to be implemented in BiH to enable the secondary effects mentioned at the beginning. The key document, which implementation has to be emphasized by the Strategy, is the EU

¹⁴ Sanela Klarić, (2015) „SUSTAINABLE HOUSING: wood, sheep wool, straw – challenges and potential of traditional natural materials“; Internacionalni BURCH Univerzitet, ISBN 978-9958-834-46-2; COBISS BH-ID 22439174

Directive 2010/31. It refers to the energy performance of buildings and deals with the incentives for construction equipment manufacturers, for the reason of supporting adaptation of their products through innovations and research, considering the requirements of the Directive, and for contributing to reduce the energy consumption and CO₂ emissions in all lifecycle segments of materials, objects or settlements. The result of this Directive on the European market in 2012 was the introduction of two-stage certification in construction, i.e. the certification of the energy consumed in the production of each element of the final product and on the basis of CO₂ emissions released during production. It is clear that this Directive seeks to improve the overall contribution of the construction sector to achieving the strategic goal of 20/20/20. Bosnia and Herzegovina on the road to the European integration, if this road is not only a declarative one, must undergo a significant reform and harmonization of laws and regulations. The construction sector will undergo the same process, which still relies on rigid, conventional and outdated laws and regulations in order to ultimately achieve market competitiveness and reduce energy in production, construction and use of facilities, and to achieve a satisfactory quality of life. The shift in the construction sector in the context of energy policy will mean opening up new jobs, green jobs from the educational to the production system, and moving from a social to a strong development policy, which is more than necessary in an economically insecure society.

Changes within the construction sector in order to ensure infrastructure quality, by means of ensuring a linkage among the

research sector, university and general education sector, management and the legal sector, as well as production and energy sector, with the introduction of new technical regulations, assessment of harmonization, inspection supervision, green public procurement, with certification and accreditation, would surely boost the economic image of society and open new perspectives.

Ultimately, if the Strategy assumes the creation of a long-term strategy for housing renovation, then one of the important concrete measures is the adoption of CPR 305/100 of the Construction Products Regulation. Failure to adopt this Regulation has made it impossible to certify the construction products manufactured in our country, what directly affects the deepening of the economic insecurity of the whole society. In addition to this, it is necessary to harmonize the regulations of green public procurements at all levels of government.

Finally, signing the ACCA with the EU, what, naturally, requires a number of measures in the area of harmonization of regulations, would ensure the competitiveness of construction products from BiH on the EU market, what currently is not possible.

Strategic guidelines and measures to improve the efficiency and development of remote (central) heating systems are mentioned in the Strategy, but their harmonization and consolidation of criteria have to be made. Also, there should be included, as measures, a comprehensive assessment of the potential for the application of high efficiency cogeneration and the efficiency of remote heating and cooling, and establishing specific measures and investments - in accordance with the requirements of the Energy Efficiency Directive (EED). Deadline is 30 November

2018.

The segment of the Strategy, which refers to the promotion of energy efficiency regarding transformation, transmission and distribution of energy, should be supplemented by the EED request for the assessment of potential for increasing the energy efficiency of gas and electricity infrastructure, in particular with regard to transport, distribution, capacity management, interoperability, and connection of energy production facilities (including energy micro generators), as well as the identification of specific measures and investments, taking into account the implementation deadline in the EED in September 2018.

The energy-intensive industries (e.g. the steel industry, the production industry, and TE) will need to continue efforts on improving the energy efficiency. Such investments are generally paid off in the form of reduced energy costs. New sectors have additional, unused potential for energy efficiency, so the cost reduction will have a direct impact on public budgets.

In order to support achieving the objectives of the EU Strategy on low level emissions mobility in Bosnia and Herzegovina and increasing the use of electricity in transport, within the framework of the Energy Efficiency Directive of buildings, a strategic document has to ask for installing electricity charging stations. Regarding the existing buildings, this provision will apply from 2025 only to commercial buildings with more than 10 parking spaces. Regarding new buildings or buildings undergoing extensive renovation, this provision will apply to residential buildings with more than 10 parking spaces in the form of the requirement to install cable in the pre-erection phase. Regarding the commercial

buildings with more than 10 parking spaces, this provision will require from them to install charging stations. In this way, Bosnia and Herzegovina would support a package that also includes an EU development strategy for cooperative intelligent transport systems for increasing the efficiency of traffic and promotion of digital solutions for mobility.

The European Commission has set energy efficiency and climate-related action as the main driver in its proposal for a new European consensus on development. The Commission has proposed the European plan for external investment to provide an integrated financial package for investment financing outside the EU. The plan would include the European Fund for Sustainable Development; technical assistance for development of sustainable projects and attracting investors; and a range of development technical assistance programs to improve investment and political environments in the countries concerned, and in particular, promotion of private and public investment in the low-carbon economy, what should be included in the strategic document.

4.

Conclusions

The Framework Energy Strategy of BiH should be seen as a starting document that has to be in the additional upgrade/development urgently harmonized with the EU policies on energy and climate, what is also obligation of BiH according to the Stabilization and Association Agreement with the EU.

The Energy Strategy is a key document for the development of any country, and for this reason, it is necessary to involve all interested parties, what was not the case, although the MOFTER BiH gave the document for a public discussion on the website www.mvteo.gov.ba, what, however, points to the lack of transparency, and together with the short deadline for making such a demanding document, all points to a lack of strategic thinking.

The overall strategy has a conservative rather than a developmental character.

The ecologically viable strategic scenario has been completely omitted. Concrete steps towards preventing climate change are not explicitly present in the Strategy. Specific data on sustainable development and greenhouse gas emissions has to be updated. In the further elaboration of the Strategy, the criterion of ambition should be included in relation to the sustainability of development of individual energy activity domains, comparable to the priorities applied in the EU, and the mentioned activities in the context of climate change prevention, along with a concrete timeline of activities.

It is necessary for the Strategy to unequivocally highlight the imperative of respecting the priorities of the EU Strategy (arising from the legal obligations of BiH within the Energy Community) and to clearly present the impact of individual scenarios on possible deviations from EU priorities and the importance of EU priorities in choosing a favourable scenario of the Energy Development Strategy for BiH.

As a priority, the component of sustainable energy development in the Strategy is somewhat behind the principles of security of supply and availability (prices) of energy. The EU policy mostly is not sufficiently represented in the scenario definition. In general, it seems that BiH has not particularly ambitiously defined the priorities for the suppression of greenhouse gas emissions - as already mentioned – nor the "green" scenario does eliminate the full use of coal in the production of electricity and heat.

The objectives of the proposed measures in the Strategy should be defined in the five priority areas of energy policy: (1) efficient use of resources (in production or exploitation), (2) security and energy accessibility, (3) efficient use of energy, (4) energy transition (sustainable development) and environmental responsibility, and (5) the development (reform) of the institutional and regulatory framework. Through this structure, the Strategy defines and compares scenarios or alternative policy measures, and defines a set of strategic guidelines (recommendations).

Chapter 1.3, the Methodology of composing the Framework Energy Strategy for BiH, states that this document includes development of the first two elements of life cycle of the strategic planning: Phase 1 - Diagnostics and Phase 2 - Development of

the Framework Energy Strategy for BiH. However, the document for each of the sectors considered (power sector, coal sector, renewable energy sector, oil and derivatives sector, gas sector, thermal energy sector and energy efficiency) contains only a description of four scenarios of development without a clear commitment to a particular scenario and the desired state at the end of the time period covered by this Strategy, i.e. without any clearly defined qualitative goals what leads to the unsustainability.

It is needed to develop new models of collective and individual electricity production and new models of funding through energy co-operatives and public-private partnerships. In order to exploit the significant potential of renewable energy sources (RESs), it is necessary to harmonize the existing solutions in BiH regarding support to developing RES with current EU solutions, which have yielded good results (e.g. introducing feed-premium tariffs instead of feed-in tariffs; also, mechanisms for funding projects on the basis of public tenders without preferring RES technology). Also, it is necessary to urgently eliminate all obstacles to activation of net metering mechanism for small RESs (primarily PV).

In the EU, energy efficiency has been placed at the heart of the energy strategy. In the Strategy of BiH, energy efficiency has not been set as an indispensable integral part of the overall strategy and the key segment of the energy market and the value chain of all sectors considered (electricity, oil, gas), but is considered separately, in the Chapter on Energy Efficiency.

It is necessary to adequately integrate the increase of energy efficiency into the strategic goal of the entire energy sector of

BiH and all strategic priorities.

Energy efficiency is an interdisciplinary area and it must be approached interdisciplinary. Environmental protection through EE, green jobs, green public procurement, the latest EU demand for the so-called "nearly zero-energy buildings" (NZEB), education that brings developments of new technologies, as well as the construction sector, which is the largest consumer, but also the polluter, are not adequately addressed. EE implies in its definition the quality of life and health, what, also, has not been mentioned in one sentence.

Since there is no doubt about energy efficiency (EE) being "no-regret-strategy" for BiH, too, it is urgently needed to develop a NEEAP for the period after 2018. It is also necessary to implement already adopted laws on energy efficiency and high efficiency cogeneration (in both entities) on the basis of adopting necessary bylaws and establishing an Energy Efficiency Agency of BiH. For BiH, it is very important to approach in an organized way the enhancement of EE in the industry with focus on small and medium-sized enterprises, which are expected to be carriers of further economic development and employment.

It is a general conclusion that the principle of supply management was used more than the principle of demand management for developing this strategy, what means that less attention was devoted to energy demand management through strong promotion of energy efficiency, ESCO, etc.

The energy market (electricity, coal, natural gas, oil products and thermal energy) has been largely descriptive and without a detailed assessment of the impact on the achievement of the set goals. It is needed for some energy sources to improve the details of the analysis of market development

potential, the role of the market in the supply domain and the impact on the price of energy and services, measures to improve liquidity and the priorities of market integration at the regional level.

One very limited accent was given to regional networking. Energy strategies should not be seen as isolated islands without influencing regional events and vice versa. In the same way, BiH cannot create a strategy without taking into account the development trends in neighbouring countries.

The development of the electrical power market in BiH and the integration of this system into the regional (and later EU) market will result in the complete liberalization of the BiH electrical power system. The key consequence of this process is that the economic viability of investing in new conventional capacities (mainly in TEs), (their energy will be put in the market), will determine the trend of supply and demand in the region and in the EU. The introduction of electricity exchanges day in advance and during the day for Bosnia and Herzegovina is of crucial importance, given the comparative advantages (three power companies and TE Stanari), which Bosnia and Herzegovina has in relation to the countries in the environment, what also shows a school example of functioning the balanced market, which is the best in the region. In the submitted data for scenarios 1 and 2 in the Strategy, this fact was not adequately respected. This indicates that the conventional paradigm of EES development (EES development with geographic monopoly), in which a market impact is significantly underestimated, is still the dominant paradigm in the minds of the key (political and market) actors. The Strategy

implicitly (by defining alternative scenarios 1 and 2 and by specially selecting scenario 3 - mild renewable scenario) attempted to point out the challenges, that accompany the construction of new TEs on local coal in the market environment, and especially the risk of "stranded" investment. Due to lack of respect for the complexity of the process of replacing the coal-fired power plant with the RES ones (especially with regard to the just socioeconomic transition of mining-dependent regions), as well as, due to the insufficiently elaborated economic benefits of scenario 3 over scenarios 1 and 2, the desired objective is not realized.

The strategic document should be aligned with the obligations set out in the Paris Climate Change Agreement, governed by the EU decisions, since the EU has already taken certain measures to suspend the subsidies for fossil fuels, as well as other significant public support for coal and other high-carbon fuels, what continues to violate the energy market, creates an economic inefficiency and prevents investment in the transition to clean energy and innovation.

There are no new business models in the Strategy to enhance the competitiveness of thermal power plants (resource efficiency, back stop technology, conglomerate, etc.). Energy cooperatives are one of ways to support these initiatives, and they are not even mentioned in the Strategy. The chapter dedicated to the Remote Heating strategies uses outdated and inaccurate data and does not reflect the actual state of affairs.

The consumption prognosis was made using a simplified methodology based on the estimated GDP growth, no segmentation by consumption types done (not even the basic division into "industrial" and "broad" consumption). No real evaluation was made using different scenarios.

Since all subsequent analyzes, action plans and recommendations are based on these baseline forecasts, on their accuracy depend a realistic feasibility of the proposed goals and they can greatly affect the sensitivity analysis and the enhancement of quality and applicability of the document.

In this respect, it is necessary to revise these parameters and to undertake a new, more precise analysis based on the forecast of consumption by individual sectors (electricity, gas, oil and derivatives, coal, thermal energy) and sensitivity analysis considering a change of the main energy policy factors (use of renewable sources, energy efficiency, market development, gasification and production dispersion).

The strategic document has to take into account the guidelines from the Single European Digital Market Strategy of the European Commission from May 2015. The Strategy should offer a framework for focusing on creating the right environment and conditions for introduction the advanced digital networks and services in the energy sector.

Switching to clean energy will not happen without the involvement of more civil society participants at local and regional levels. The EU has a unique position to simplify the transition to clean energy across all sectors and levels of governance, what Bosnia and Herzegovina must follow. Therefore, it will be important for cities, regions, companies, social partners, universities, research centres and other stakeholders to engage themselves in development and implementation of a strategic document and other integrated energy and climate plans.

Regional cooperation between the Energy Community and the neighbourhood will help Bosnia and Herzegovina meet energy and climate objectives in an efficient and cost-

effective way. Legislative proposals from this package through membership in the Energy Community will facilitate regional co-operation.

Energy poverty is a big challenge in BiH, and it is caused by low incomes and energy inefficient housing. A new approach to the protection of vulnerable consumers has to be identified, including helping consumers reduce energy costs for consumers by supporting investment in energy efficiency and providing guidance. In line with this, a part of the energy efficiency measures has to be implemented as a priority in households affected by energy poverty (or in cases of social care and accommodation). Furthermore, this document has to guide and propose certain procedural measures of consumers' protection before disconnecting consumers from the network.

Potential of biomass (existing forest waste, biomass from urban garbage, organic industry, agriculture, strategic re-cultivation of wild forests, as well as plantation production) should be further explored. Certainly, the document has to make an initiative for planning afforestation in BiH.

BiH should actively participate in the work of the COP UNFCCC for the purpose of negotiating the definition of innovative NDCs for the period after 2020. It is clear that BiH has delivered the insufficiently ambitious goals (even in comparison with the countries of the region). After adopting the innovative goals on reducing GHG emissions, a strategy for low-emission/low-carbon development of BiH should be created. It should be in line with the binding objectives of the Paris Agreement. Finally, the vision of the energy sector development in Bosnia and Herzegovina, including the sector's transition to decarbonisation, must be thought of as a sustainable energy policy,

including aspects of the climate, economy and ecology, where the key reformers are universities and academic community in Bosnia and Herzegovina that, together, must carry the development of the energy sector, including its transition.

For Bosnia and Herzegovina, this must be a challenge for creating a new educational system, scientific and energy policies.

Many things have been mentioned in this conclusion, because the energy strategy integrates a large number of fields that have a major impact on climate change. The most important goal of strategic planning in BiH must be a citizen, his/her security, sustainability, employment, satisfaction, quality of life and the health of all generations.

5.

Literatura

The Framework Energy Strategy of Bosnia and Herzegovina by 2035 – the final draft

2020 Energy Strategy - EU

2030 Energy Strategy - EU

2050 Energy Strategy - EU

Stabilisation and Association Agreement

The Treaty establishing the Energy Community, (“Official Gazette of BiH – International agreements”, No 09/06)

Acquis on Electricity

Acquis on Gas

Acquis on Security of Supply

Acquis on Environment

Acquis on Competition

Acquis on Renewable Energy Sources

Acquis on Energy Efficiency

Acquis on Oil

Acquis on Statistics

Acquis on Infrastructure

List of abbreviations

ACCA – Agreement of Conformity Assessment and Acceptance of Industrial Product
 APEE BiH - Action Plan of Energy Efficiency of Bosnia and Herzegovina
 APEE RS – Action Plan of Energy Efficiency of Republika Srpska
 BAU – Business as usual
 BD – Brčko District
 BiH – Bosnia and Herzegovina
 CAG - Climate Action Group
 COP – Conference of Parties
 EE – Energy Efficiency
 EEAPF – Action Plan of Energy Efficiency of the Federation of Bosnia and Herzegovina
 EED - Energy Efficiency Directive
 EES – Electrical power system
 EEO – Energy Efficiency Opportunities
 EII – European Industry Initiatives
 EnC – Energy Community
 ENTSO – The European Network of Transmission System Operators for Gas
 ESCO – Energy Service Company
 ERA – European Research Area
 EU – European Union
 FBiH – Federation of Bosnia and Herzegovina
 GHG - Greenhouse Gas
 GHG-MMK - Greenhouse Gas Monitoring Mechanism Regulation
 HE – Hydro-power Plant
 IED – Directive 2010/75/EU on Industrial Emission
 INDC – Intended Nationally Determined Contributions
 IPA - Instrument for Pre-Accession Assistance
 MM – a million
 mld – a milliard
 Mtoe – Million Tonnes of Oil Equivalent
 MOFTER BiH – Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
 MW - megawatt
 NDC – Nationally Determined Contributions
 NEEAP – National Energy Efficiency Action Plans
 NERP - National Emission Reduction Plan
 NOSBiH – Independent System Operator in Bosnia and Herzegovina
 NREAP – National Renewable Energy Action Plan
 NZEB - Nearly Zero-Energy Buildings

PJ - petajoule
PPP – Public-Private Partnership
PV – photovoltaic
RES – Renewable Energy Sources
ROE – Return on Equity
RS – Republika Srpska
SWD – Solid Waste Disposal
TE – Thermal-power Plant
TWh – terawatt hour
UNFCCC - United Nations Framework Convention on Climate Change
WB6 – Six Countries of the Western Balkans
WBIF – Western Balkans Investment Framework

