ENERGY EFFICIENCY ACTION PLAN OF BOSNIA AND HERZEGOVINA FOR THE PERIOD 2016 - 2018

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Abbreviations

AMR	Automatic meter reading
EEAP	Energy Efficiency Action Plan
EEAP BiH 2016-2018	Energy Efficiency Action Plan of Bosnia and Herzegovina 2016-2018
EEAP RS 2018	Energy Efficiency Action Plan of the Republic of Srpska to 2018
RESAP FBiH	Renewable Energy Sources Action Plan of the Federation Bosnia and Herzegovina
BiH	Bosnia and Herzegovina
Brčko District BiH	Brčko District of Bosnia and Herzegovina
BD	Brčko District
GDP	Gross Domestic Product
BEMS	*Building Energy Management System*
BU	Bottom-up, energy savings verification methodology
CBA	Cost-benefit analysis
CHP	Cogeneration *(combined heat and power)*
SERC	State Electricity Regulatory Commission
EE	Energy efficiency
EEAPF 2010-2018	Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina 2010-2018
EEAPF 2016-2018	Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina 2016-2018
EED	Directive 2012/27/EU on Energy Efficiency (Energy Efficiency Directive)
EEO	Energy Efficiency Obligation
PS	Power system
EIHP	Energy Institute “Hrvoje Požar”
EC	Efficient cogeneration
EMEEES	Evaluation and Monitoring for the EU Directive on energy end-use efficiency and energy services
EnC	Energy Community
EnCT	Energy Community Treaty
ENTSO-E	European Network of Transmission System Operators for Electricity
EPBD	Directive 2010/31/EU on Energy Performance of Buildings (Energy Performance of Buildings Directive)
ESCO	Energy Services Company
ESD	Directive 2006/32/EC on energy end-use efficiency and energy services (Energy Services Directive)
EU	European Union
EUROSTAT	Statistical Office of the European Union
FBiH	Federation of Bosnia and Herzegovina
FERK	Regulatory Commission for Energy of the Federation of Bosnia and Herzegovina
FES	Final Energy Saving
FMoEMI	Federal Ministry of Energy, Mining and Industry
FMET	Federal Ministry of Environment and Tourism
FMTC	Federal Ministry of Transport and Communications
FMPP	Federal Ministry of Physical Planning
FBiH Fund	Environmental Fund of the Federation of Bosnia and Herzegovina
RS Fund	Environmental Protection and Energy Efficiency Fund of the Republic of Srpska
GHG	Greenhouse gases
MMRS	Main metering and regulation station (in the gas distribution network)
goe	Gram of oil equivalent

HPP	Hydro power plant
HVAC	Heating, ventilation and air conditioning
IEA	International Energy Agency
IPMVP	International Performance Measurement and Verification Protocol
LSGU	Local self-government unit
kgoe	Kilogram of oil equivalent
Final draft EEAP BiH 2010-2018	Final draft of the First Energy Efficiency Action Plan of Bosnia and Herzegovina 2010-2018
ktoe	Kilo tonne of oil equivalent
MC-EnC	Ministerial Council of the Energy Community
MoIEM	Ministry of Industry, Energy and Mining of the Republic of Srpska
MSPCEE	Ministry of Spatial Planning, Civil Engineering and Ecology of the Republic of Srpska
MRS	Metering and regulation station (in the gas distribution network)
MS	Metering station (in the gas distribution network)
MTC	Ministry of Transport and Communications
MVP	Monitoring and verification platform
MoFTER	Ministry of Foreign Trade and Economic Relations
NEEAP	National Energy Efficiency Action Plan
ISO BiH	Independent System Operator of BiH
NREAP BiH	Renewable Energy Action Plan in Bosnia and Herzegovina
NA RS	National Assembly of the Republic of Srpska
RES	Renewable energy sources
RES&EC	Renewable energy sources and efficient cogeneration
OA	Operating area
VAT	Value added tax
IS	Inlet station (in the gas network)
PRG	Programme
HW	Hot water
PV	Photovoltaic
RERS	Regulatory Commission for Energy of the Republic of Srpska
RS	Republic of Srpska
SPP	Solar power plant
SEAP	Sustainable Energy Action Plan
SHD	Specific Heat Demand
TD	Top-down, energy savings verification methodology
TPP	Thermal power plant
TFEC	Total Final Energy Consumption
toe	Tonne of oil equivalent
TPES	Total Primary Energy Supply
TR	Transformer
SS	Substation
TYNDP	Ten Year Network Development Plan
UFES	Unitary Final Energy Saving
WPP	Wind power plant

PREFACE

This document, *Energy Efficiency Action Plan of Bosnia and Herzegovina for the period 2016-2018*, was drafted in accordance with the obligations of Bosnia and Herzegovina arising from the Energy Community Treaty and decisions related to transposition of Directive 2006/32/EC (ESD), Directive 2010/31/EU (EPBD) and Directive 2012/27/EU (EED) into the signatory countries' legislation.

Please note that this document was drafted in line with the requirements stated in the *Format and Guidelines for Development of the Third National Energy Efficiency Action Plan*[1], prepared according to European Commission guidelines by the Energy Community Secretariat and the Energy Community coordination body for energy efficiency. The *Format* itself is a large and complex 48-page document which, for all required chapters, sub-chapters and corresponding tables, describes the scope and level of information that must be included in the energy efficiency action plan. Besides its highly important role in planning energy efficiency improvements through setting targets for planned final and primary energy savings, an action plan in this format must also include detailed reporting of energy savings achieved in the previous period for both final and primary energy. Energy Community guidelines clearly state that this action plan must be comprehensive and exhaustive, and cover reporting and planning for all of the above mentioned directives (ESD, EPBD and EED).

The content, level of information and scope of this document, *Energy Efficiency Action Plan in Bosnia and Herzegovina* for the period *2016-2018*, are a result of these requirements, as described above.

The fairly large volume of the *Energy Efficiency Action Plan of Bosnia and Herzegovina 2016-2018* is a consequence of Bosnia and Herzegovina's constitutional set-up and distribution of relevant competences. This EEAP therefore consists of the main document, which deals only with those measures and programmes that must be implemented directly by state-level authorities of Bosnia and Herzegovina and the authorities of Brčko District BiH, and the associated documents *Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina for the period 2016-2018* and *Amendments to the Energy Efficiency Action Plan of the Republic of Srpska for the period to 2018*, which provide detailed descriptions of actual energy savings in the previous period and of planned measures and programmes that will be implemented at the level of the Federation of Bosnia and Herzegovina and Republic of Srpska.

[1] https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3890294/2532D10DFCF27929E053C92FA8C0B166.PDF

EXECUTIVE SUMMARY

The *Final Draft of the First Energy Efficiency Action Plan of Bosnia and Herzegovina 2010-2018* (Final Draft EEAP BiH 2010-2018) was created in February 2012, however it was never formally adopted by the relevant institutions of Bosnia and Herzegovina.

Final Draft EEAP BiH 2010-2018 dealt only with energy savings in final consumption. This document, ***Energy Efficiency Action Plan of Bosnia and Herzegovina 2016-2018 (EEAP BiH 2016-2018)***, also takes into account the obligations related to energy efficiency in primary energy consumption, as prescribed in the Directive 2012/27/EU on energy efficiency. This resulted in the introduction of new energy efficiency measures in the area of generation of electricity and heating and cooling energy, inclusive of district heating, as well as new measures in the area of transmission and distribution of electricity and gas.

At the same time, the process of development of this document included an analysis and review of the structure of energy efficiency measures in the area of final energy consumption, as foreseen in the *Final Draft EEAP BiH 2010-2018*, and the content/description of these measures. This review included the following:

a. Additional obligations prescribed in Directive 2006/32/EC, Directive 2010/31/EC, and Directive 2012/27/EU;
b. Obligations arising from the current legislation in Bosnia and Herzegovina, which already contains some provisions transposed from these directives;
c. Impact of each measure on energy savings (direct - those that can be directly measured and identified, or indirect); and
d. Availability of modern technical and organisational solutions for energy efficiency improvements in various final energy consumption sectors, as well as local and international best practices in their implementation.

Regardless of the fact that the *Final Draft EEAP BiH 2010-2018* was never formally adopted, forecasting of final energy savings in this *EEAP BiH 2016-2018* is based on the corresponding indicative targets set in the *Final Draft* document. The new structure of all horizontal and sectoral energy saving measures planned in this document, *EEAP BiH 2016-2018*, is based on a review of measures presented in the *Final Draft EEAP BiH 2010-2018*.

Please note the following:

1. The structure of *EEAP BiH 2016-2018* contains the following components:
    a. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of state-level authorities of Bosnia and Herzegovina;
    b. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of Brčko District authorities (Brčko District of Bosnia and Herzegovina), which form an integral part of his document;
    c. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of the Federation of Bosnia and Herzegovina (Federation BiH), described in detail in the ***Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina for the period 2016-2018 (EEAPF 2016-2018)*** which is attached here in its entirety and forms an integral part of this document;
    d. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of the Republic of Srpska, described in detail in the ***Amendments to the Energy Efficiency Action Plan of the Republic of Srpska to 2018 (Amendments to EEAP RS 2018)*** which is attached here in its entirety and forms an integral part of this document.
2. It is also important to note that this document, *EEAP BiH 2016-2018* (together with documents *EEAPF 2016-2018* and *Amendments to EEAP RS 2018*), introduces for the first time the concept of **energy efficiency programmes**, where each programme comprises a specific set of appropriate sectoral and horizontal measures. Final energy consumption targets for measures planned in the *Final Draft EEAP BiH 2010-2018* were therefore rearranged in this document to reflect final energy savings targets at the programme level.
3. *EEAP BiH 2016-2018* provides a detailed overview only of energy efficiency programmes implemented at the level of Bosnia and Herzegovina and Brčko District BiH, while measures and programmes implemented in the Federation BiH and Republic of Srpska are elaborated in the above mentioned documents (*EEAPF 2016-2018 and Amendments to EEAP RS 2018*, respectively*).*

Table 1 contains a summary overview of all actual savings in Bosnia and Herzegovina in the period to date, together with the planned savings for both primary and final energy consumption in the next period.

Year	Primary energy							Final energy (PJ)						
								ESD						EPBD
	Primary energy savings target (ktoe)				Actual energy savings (ktoe)			Savings targets in EEAP BiH (PJ)			Actual energy savings (PJ)			Target for near-zero consumption buildings
	BiH	FBiH	RS	BD	BiH	FBiH	RS	BiH[2]	FBiH	RS	BiH[3]	FBiH	RS	
2012	N/a	N/a	N/a	N/a	N/a	N/a	N/a	0.6765	0.465	0.200	-	-	-	-
2015	N/a	N/a	N/a	N/a	N/a	N/a	N/a	4.6300	3.080	1.400	5.2347	3.7140	1.5207	N/a
2018	N/a	N/a	N/a	N/a	N/a	N/a	N/a	12.4689	8.404	3.766	N/a	N/a	N/a	N/a
2020	963.84	624.08	321.92	17.83	N/a	N/a	N/a	15.2400	10.271	4.610	N/a	N/a	N/a	N/a

Table 1 - Summary overview of planned and actual primary and final energy savings in BiH to date

The *Final Draft EEAP BiH 2010-2018* does not state final energy savings targets for individual sectors for the year 2015, so a direct comparison of planned vs. actual savings by sectors for 2015 could not be made. Still, by comparing actual energy savings by sector in 2015 with the planned sectoral targets for 2012 and 2018, we can conclude the following:

- Residential sector: Actual energy savings of 2.107 PJ represent 40.13% of the target value for 2018 of 5.25 PJ, which is a solid result;
- Service sector: Actual energy savings of 2.50 PJ represent 154.32% of the target value for 2018 of 1.62 PJ, which is an excellent result, achieved primarily through active participation of numerous international agencies providing not only technical assistance but also substantial grant financing for energy renovation of buildings in the public sector;
- Industry sector: Actual energy savings of 0.442 PJ represent 9.23% of the target value for 2018 (4.79 PJ), which is a very poor result; and
- Transport sector: Actual energy savings of 0.272 PJ represent 33.58% of the target value for 2018 (0.81 PJ), which is a satisfactory result.

According to the above, the best results were achieved in the service sector, where savings in 2015 already exceeded the 2018 target by 54.32%. In the residential sector, and to some extent in the transport sector, the rate of achievement was close to planned values, while the results in the industry sector were extremely poor.

On the basis of actual savings by sector in 2015, savings were redistributed across sectors as shown in Table 2:

Final consumption sector	**Expected energy savings in 2018** (according to Final draft EEAP BiH 2010-2016)	**Expected energy savings in 2018** (according to this EEAP BiH 2016-2016)
Residential sector	5.25	5.1910
Public and commercial service sector	1.62	4.6189
Industry sector	4.79	1.8690
Transport sector	0.810	0.7900
Total:	12.47	12.4689

Table 2 - Overview of redistributed final energy savings forecasts, by sector

Table 3 provides a summary overview of all energy efficiency improvement programmes and final energy savings planned in this document. The table includes programmes which will be implemented at all relevant levels - Bosnia and Herzegovina, Brčko District BiH, Federation BiH and Republic of Srpska. It states the amount of expected final energy savings in 2018 for each programme, authorities responsible for programme implementation, and the planned amounts and sources of funding.

[2]These aggregate values reflect total savings for Bosnia and Herzegovina and, in addition to FBiH and RS figures listed in the table, also list the targets under direct competence of Bosnia and Herzegovina and Brčko District BiH

[3] Ibid.

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[4] (BAM)	Financing sources	Financing methods
01	PRG.01BiH	Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina.	0.0249	MoFTER	3,503,252	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
02	PRG.02 BiH	Programme for coordination of energy efficiency in Bosnia and Herzegovina	N/a	MoFTER	-	Public budgets; Technical assistance	Regular budget lines; Grants
Total programmes at the level of BiH			***0.0249***		**3,503,252**		
03	PRG.01BD	Energy efficiency programme in the Brčko District BiH	0.1378	BD Government	33,135,471	Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
Total programmes at the level of BD			***0.1378***		**33,135,471**		
04	PRG.01 FBIH	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Federation BiH	N/a	FMoEMI FMPP FMET FMTC	-	Public budgets; Technical assistance	Regular budget lines; Grants
05	PRG.02 FBIH	Programme for energy efficiency information, professional development and education in the Federation BiH	N/a	FMoEMI FMPP FMET FMTC Cantons	-	Public budgets; Technical assistance	Regular budget lines; Grants
06	PRG.03 FBIH	Programme for energy efficiency obligation schemes in the Federation BiH through electricity distributors	0.7616	FMoEMI FERK	154,430,930	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants;
07	PRG.04 FBIH	Programme for energy efficiency obligation schemes in the	0.1323	FMoEMI Cantons	26,651,778	Energy taxes;	Energy efficiency obligation schemes /

[4] Stated amounts refer to total value of planned investments (including incentives at relevant levels of government) and include funds sourced from all stated sources and methods of financing. The structure of amounts required for implementation of planned programmes, i.e. financial contributions required for implementation of individual sectoral measures within programmes planned at the level of Bosnia and Herzegovina and Brčko District is shown in tables in Appendix 6.2 of this document, while for the Federation BiH and Republic of Srpska these amounts are shown in tables in Appendix 6.2 of *EEAPF 2016-2018* and Amendments to *EEAP RS 2018,* respectively. These amounts refer only to financing of sectoral measures within the programmes.

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[4] (BAM)	Financing sources	Financing methods
		Federation BiH through heating energy distributors				Technical assistance	alternative measures; Grants;
08	PRG.05 FBIH	Programme for energy efficiency improvements in the public service sector buildings in the Federation BiH	0.0170	FMPP FMoEMI	2,869,941	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
09	PRG.06 FBIH	Cantonal energy efficiency programmes for residential and public service sector buildings	1.6918	Cantons	285,697,577	Energy tax; CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
10	PRG.07 FBIH	Programme for energy efficiency improvements in public utility systems	0.2160	FMoEMI Cantons	29,562,730	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds;	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Income tax incentives (investment-based tax deductions)
11	PRG.08 FBIH	Programme for energy efficiency improvements in the industry and commercial service sector	1.220	FMoEMI Cantons	186,965,649	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Income tax incentives (investment-based tax deductions)
12	PRG.09 FBIH	Programme for promotion of sustainable road and urban transport in the Federation BiH	N/a	FMoEMI FMTC	-	CO2 tax; Air protection tax; Public budgets; Technical assistance	Preferential loans; Regular budget lines; Grants
Total programmes at the level of the Federation BiH			***4.0386***		**686,178,605**		
13	PRG.01RS	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Republic of Srpska	N/a	MoIEM	-	Public budgets; Technical assistance	Regular budget lines; Grants
14	PRG.02RS	Programme for energy efficiency information, professional development and education in the Republic of Srpska	N/a	MoIEM RS Fund	-	Public budgets; Technical assistance	Regular budget lines; Grants

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[4] (BAM)	Financing sources	Financing methods
15	PRG.03RS	Programme for energy efficiency obligation schemes in the Republic of Srpska through electricity distributors	0.3410	MoIEM RERS	73,981,664	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
16	PRG.04RS	Programme for energy efficiency obligation schemes in the Republic of Srpska through heating energy distributors	0.0600	MoIEM MSPCEE	12,516,469	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
17	PRG.05RS	RS programme for energy efficiency improvements in buildings in the public services sector	0.7680	MSPCEE	130,291,984	CO_2 tax; Air quality tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
18	PRG.06RS	Programme for energy efficiency improvements in public utility systems	0.096	MoIEM MSPCEE	15,604,110	CO_2 tax; Air quality tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
19	PRG.07RS	Programme for energy efficiency improvements in the industry sector and the commercial services sector	0.5480	MoIEM	83,582,242	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP;
20	PRG.08RS	Programme for promotion of sustainable road and urban transport in the Republic of Srpska	N/a	MoIEM MTC	-	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP
Total programmes in the Republic of Srpska			***1.8130***		**315,976,470**		
Total for Bosnia and Herzegovina			***6.0143***		**1,038,793,798**		

Table 3 - Summary overview of all programmes aimed at savings in final energy consumption

As can be seen from the above table, implementation of these programmes will result in 48% of the total savings target planned for 2018, or 6.0143 PJ of the total planned target (12.470 PJ). The remaining 52% of total savings will be achieved through market forces and use of own funds by target groups in different categories, which will arise primarily from the positive effects of implementation of the planned horizontal and cross-sectoral measures by the relevant authorities, international technical assistance programmes, local civil society organisations and business associations. Energy savings achieved in 2015, as presented in section 3.1, which have been achieved largely due to the effects of horizontal and cross-sectoral measures and use of own funds, confirm that these goals were set in a realistic manner.

1. INTRODUCTION

1.1 Context of the Energy Efficiency Policy in Bosnia and Herzegovina

The **Energy Community Treaty** was signed on 25 October 2005 in Athens between the European Community on the one hand and nine parties, countries of South East Europe, including Bosnia and Herzegovina, on the other. This Treaty, which came into effect on 1 July 2006, commits all parties to establish a common energy market which will function according to EU energy market standards and be integrated with it, and to transpose and implement the appropriate EU directives and regulations in the area of electricity, gas, energy infrastructure, oil, supply security, renewable energy sources, energy efficiency, environment, market competition, energy statistics and social issues.

On 18 December 2009, Ministerial Council of the Energy Community adopted the Decision no. 2009/05/MC-EnC to include Directive 2006/32/EC on energy end-use efficiency and energy services, Directive 2002/91/EC on energy performance of buildings, Directive 92/75/EEC on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances, together with eight implementing directives, into the Energy Community acquis.

Subsequently, on 24 September 2010, Ministerial Council of the Energy Community adopted the Decision no. 2010/02/MC-EnC amending Decision 2009/05/MC-EnC dated 18 December 2009 on implementation of energy efficiency directives. According to this decision, Directive 2010/31/EU of the European Parliament and Council on energy performance of buildings replaces and repeals Directive 2002/91/EC, while Directive 2010/30/EU of the European Parliament and Council on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances replaces and repeals Directive 92/75/EEC.

Directive 2012/27/EU of the European Parliament and Council on energy efficiency, dated 25 October 2012, amending Directive 2009/125/EC and Directive 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, was published in the Official Journal of the European Union no. L315/1 on 14 November 2012. Directive 2012/27/EU establishes the common framework for energy efficiency measures in order to ensure achievement of the EU's ultimate goal of 20% increase in energy efficiency by 2020, and to create the path for subsequent further improvements in energy efficiency. On 24 October 2013, Ministerial Council of the Energy Community adopted Recommendation R/2013/01/MC-EnC on energy efficiency. According to this Recommendation, Energy Community must harmonise its *acquis* with the recent changes in the EU legislation, taking into account its own institutional framework and the specific circumstances in individual Energy Community Treaty signatory countries. Furthermore, in October 2014 the Council of Europe declared that the indicative energy efficiency improvement target for European Union is minimum 27% of forecasted energy consumption by 2030. Evaluation of progress towards meeting this target will be done by 2020.

Directive 2012/27/EU, inter alia, commits each state party to set national energy efficiency targets for reduction of primary energy consumption, to state these targets in absolute amounts against the projected level of primary (as well as final) energy consumption in 2020, and to provide a clarification of data which formed the basis for calculations.

Consequently, the European Commission proposed a modification of Directive 2012/27/EU for Energy Community countries. This proposal was discussed at the Permanent High-Level Group meeting held on 24 June 2015. On 16 October 2015, Ministerial Council of the Energy Community adopted the Decision no. D/2015/08/MC-En, stating that each Energy Community contracting party must transpose this directive into national legislation and complete its implementation by 15 October 2017 at the latest.

For the reasons stated above, as an Energy Community contracting party, Bosnia and Herzegovina must ensure full transposition of the requirements of Directive 2012/27/EU.

1.2 Main characteristics of the EEAP BiH 2016-2018 development process

Directive 2006/32/EC requires all member states to prepare three national energy efficiency action plans (EEAPs) for the period 2008-2016 and submit them to the European Commission (or Energy Community Secretariat, in the case of its members). The *Final Draft of the First Energy Efficiency Action Plan of Bosnia and Herzegovina 2010-2018 (Final Draft EEAP BiH 2010-2018)* was created in February 2012. However, this document was never adopted by the relevant institutions of Bosnia and Herzegovina.

The *Final Draft EEAP BiH 2010-2018* dealt only with energy savings in final consumption. This document, *Energy Efficiency Action Plan of Bosnia and Herzegovina for the period 2016-2018 (EEAP BiH 2016-2018)*, was developed by also taking into account obligations related to primary energy consumption prescribed in the Directive

2012/27/EU on energy efficiency, which resulted in inclusion of new energy efficiency measures in the area of generation of electricity and heating/cooling energy, as well as measures related to transmission and distribution of electricity and gas.

At the same time, the process of development of this document included an analysis and review of the structure of energy efficiency measures in the area of final energy consumption, as foreseen in the *Final Draft EEAP BiH 2010-2018*, and the content/description of these measures. This included: (a) additional obligations prescribed in the Directive 2012/27/EU, (b) obligations arising from the current legislation in BiH, which already contains some provisions transposed from the above directives, (c) influence of each measure on energy savings (direct - those that can be directly measured and verified, or indirect), and (d) availability of modern technical and organisational solutions for energy efficiency improvements in various final energy consumption sectors, as well as local and international best practices for their implementation.

Regardless of the fact that the *Final Draft EEAP BiH 2010-2018* was never formally adopted, energy savings forecasts presented in this ***Energy Efficiency Action Plan of Bosnia and Herzegovina for the period 2016-2018 (EEAP BiH 2016-2018)*** is based on the corresponding indicative targets set in the *Final Draft* document. The new structure of all horizontal and sectoral energy saving measures included in this document, *EEAP BiH 2016-2018*, is based on a review of measures presented in the *Final Draft*.

Please note the following:

1. The structure of *EEAP BiH 2016-2018* contains the following components:
    a. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of state-level authorities of Bosnia and Herzegovina;
    b. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of Brčko District authorities (Brčko District of Bosnia and Herzegovina), which form an integral part of his document;
    c. Objectives, measures and programmes for energy efficiency improvements in primary and final energy consumption implemented by the Federation of Bosnia and Herzegovina (Federation BiH), described in detail in the ***Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina for the period 2016-2018 (EEAPF 2016-2018)*** which is attached here in its entirety and forms an integral part of this document;
    d. Energy efficiency targets, measures and programmes in primary and final energy consumption under direct competence of the Republic of Srpska, described in detail in the ***Amendments to the Energy Efficiency Action Plan of the Republic of Srpska to 2018 (Amendments to EEAP RS 2018)*** which is attached here in its entirety and forms an integral part of this document.
2. *EEAP BiH 2016-2018* provides a detailed overview only of energy efficiency programmes implemented at the level of Bosnia and Herzegovina and Brčko District BiH, while measures and programmes implemented in the Federation BiH and Republic of Srpska are elaborated in the above mentioned documents (*EEAPF 2016-2018 and Amendments to EEAP RS 2018*, respectively*).*
3. Concerning the Federation BiH, although the *Final Draft EEAPF 2010-2018* was never formally adopted, energy savings forecasts presented in the *Energy Efficiency Action Plan of the Federation BiH for the period 2016-2018 (EEAPF 2016-2018)* are based on the corresponding indicative targets set in the *Final Draft AEEAPF 2010-2018.* The new structure of all horizontal and sectoral final energy savings measures included in this document, *EEAPF 2016-2018*, is based on a review of measures presented in the *Final Draft EEAPF 2010-2018*.

1.3 Overview of targets and actual energy savings

Table 4 shows an overview of all sectoral measures for final energy savings from the ***Final Draft EEAP BiH 2010-2018***, with final energy savings targets planned in this document for 2012 and 2018, actual savings in 2015, and the current status of each measure against the initial plan[5].

[5]*Energy savings (both planned and actual) in the Federation BiH and Republic of Srpska are shown in corresponding tables in EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.*

Measure (according to Final Draft EEAP BiH 2010-2018)		Energy savings (PJ) (according to Final Draft EEAP BiH 2010-2018)				Measure status compared to *Final Draft EEAP BiH 2010-2018*
Index	**Title**	**Expected in 2012**	**In 2015**		**Expected in 2018**	
			Expected	**Actual**		
Measures in the residential sector						
R1	Minimum energy efficiency standards for household appliances	0.012	N/a	0.00000011	0.260	Not implemented
R2	Renovation of existing residential buildings and family houses	0.084	N/a	0.9921	1.840	Partially implemented
R3	Energy efficient construction of new buildings	0.084	N/a	0.0000	1.840	Not implemented
R4	Energy efficient heating systems	0.024	N/a	1.1085	0.530	Implemented
R5	Individual billing of heating costs in multi-apartment buildings and other buildings according to actual energy	0.024	N/a	0.0000	0.530	Not implemented
R6	Domestic energy generation from RES	0.012	N/a	0.0117	0.260	Partially implemented
	Total residential sector	***0.240***	***N/a***	***2.1122***	***5.250***	
Measures in the service sector						
C1	Energy efficient use of electricity in commercial and public buildings	0.003	N/a	0.0000	0.080	Not implemented
C2	Energy efficient HVAC systems in existing and new low-energy and passive commercial and public buildings	0.010	N/a	1.0707	0.320	Implemented
C3	Energy efficient renovation of existing buildings and sustainable	0.020	N/a	1.0739	0.650	Implemented
C4	Building energy management systems (BEMS)	0.001	N/a	0.0002	0.040	Not implemented
C5	Integrated energy generation from RES	0.004	N/a	0.3558	0.130	Implemented
C6	Integrated cogeneration/trigeneration systems	0.002	N/a	0.0002	0.070	Not implemented
C7	Energy efficient water supply networks	0.005	N/a	0.0000	0.160	Not implemented
C8	Energy efficient public lighting	0.005	N/a	0.0066	0.160	Partially implemented
	Total service sector	***0.050***	***N/a***	***2.5073***	***1.620***	
Measures in the industry sector						
IN1	Increased efficiency of industrial processes	0.120	N/a	0.1781	1.440	Partially implemented
IN2	Energy efficient non-residential buildings	0.080	N/a	0.0000	0.960	Not implemented
IN3	Improvement of thermal energy systems in industrial processes	0.080	N/a	0.0000	0.960	Not implemented
IN4	Industrial cogeneration (CHP)	0.060	N/a	0.0138	0.720	Partially implemented
IN5	Installation of systems for energy generation from RES for industrial	0.060	N/a	0.1518	0.720	Partially implemented
IN6	Energy efficiency network in industry	Indirect savings	N/a	0.0000	Indirect savings	Not implemented
	Total industry sector	***0.390***	***N/a***	***0.3437***	***4.790***	
Measures in the transport sector						
T1	Renewal of the vehicle pool in the public and commercial sector	0.120	N/a	0.0000	0.160	Not implemented

Measure (according to Final Draft EEAP BiH 2010-2018)		Energy savings (PJ) (according to Final Draft EEAP BiH 2010-2018)				Measure status compared to *Final Draft EEAP BiH 2010-2018*
Index	**Title**	**Expected in 2012**	**In 2015**		**Expected in 2018**	
			Expected	**Actual**		
T2	Information campaign on energy efficient behaviour in transport, demonstration (pilot) activities	Indirect savings	N/a	0.0000	Indirect savings	Indirect savings
T3	Transport infrastructure measures with energy saving effects	Indirect savings	N/a	0.2715	Indirect savings	Indirect savings
Total transport sector		***0,000***	***N/a***	***0.2715***	***0.810***	
Total (PJ):		**0.678**	**N/a**	**5.2347**	**12.470**	

Table 4 - Overview of sectoral measures for final energy savings from the Final Draft EEAP BiH 2020-2016

The above savings were calculated using the BU methodology, in accordance with the *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC*, *European Commission, Directorate-General for Energy,* and the Market Analysis of sales of EE materials and goods in Bosnia and Herzegovina described in section 3.3.4.

Table 5 below shows aggregate final energy savings achieved in individual sectors to date, through implementation of measures planned in the ***Final Draft EEAP BiH 2010-2018***.

Please note:
Energy savings (both planned and actual) in the Federation BiH and Republic of Srpska are shown in corresponding tables in EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.

Indicative energy savings target in 2018 (PJ) *(according to Final Draft EEAP BiH 2010-2018)*			**12.47 PJ**			
Indicative energy savings target in 2015 (PJ) *(according to Final Draft EEAP BiH 2010-2018)*			**4.63 PJ**			
Sector	**Sectoral targets (PJ)**		**Actual energy savings in 2015 (PJ)**		**Expected energy savings in 2018 (PJ)** *(according to Final Draft EEAP BiH 2010-2018)*	
	2015	**2018**	**Total (TD)**	**From measures (BU)**	**Total (TD)**	**From measures (BU)**
Residential sector	N/a	5.25	-	2.1122	-	5.25
Services	N/a	1.62	-	2.5073	-	1.62
Industry	N/a	4.79	-	0.3437	-	4.79
Transport	N/a	0.81	-	0.2715	-	0.81
Total (PJ)	**N/a**	**12.47**	**-**	**5.2347**	**-**	**12.47**
% (of referent consumption – 138,56 PJ)	**N/a**	**9.00%**	**-**	**3.78%**	**-**	**9.00%**

Table 5 - Aggregate final energy savings achieved in individual final consumption sectors in 2015

It should be noted here that, upon analysis of all existing sectoral and horizontal final energy savings measures planned in the initial *Final Draft EEAP BiH 2010-2018*, certain changes and amendments were made to individual measures, and their overall structure/position in individual consumption sectors was reviewed according to the following principles:

- Distinction was made between sectoral measures (residential sector, pubic and commercial services, industry, transport) and horizontal / cross-sectoral measures, and sectoral measures now include only those measures whose energy saving effects can be measured and verified using the BU (bottom-up) approach. All activities/sub-measures included in sectoral measures in the initial document which did not satisfy this criterion (e.g. awareness-raising campaigns, development of legislation, introduction of energy efficiency in public procurement procedures, energy audits of certain types of buildings, etc.), were removed from sectoral and transferred to appropriate horizontal measures. At the same time, this process eliminated a

certain inconsistency from the initial structure of measures, where in some cases these elements of horizontal measures were assigned to only one sector rather than all pertinent sectors.

- Some minor changes were made to the order of measures in the residential and service sector, to align the order of measures with the structure of building energy audits. This placed the measure related to procurement and use of energy efficient electric equipment in the last place.
- The measure which combined energy renovation of existing buildings and construction of new energy efficient buildings in the service sector was split into two separate measures. This change was made due to different financial and institutional support mechanisms required for their implementation, and different approaches to measuring their impacts.
- Descriptions were amended for some individual measures, both sectoral and horizontal, to more precisely determine the scope of the measure and the activities it entails, and also to remove any potential overlaps with other measures in the implementation stage. In some cases this step involved expansion of an existing measure through introduction of other potential technical systems and solutions (e.g. trigeneration and similar), as well as inclusion of illustrative examples of topics for public campaigns and professional training.
- Some existing horizontal measures (which were previously assigned to only one sector) were expanded to cover all relevant sectors. Several new horizontal measures were added, such as introduction of the system for energy efficiency training and professional development.
- All previous sub-measures related to introduction and use of various financial and regulatory mechanisms were merged in a new horizontal measure H.13.

The new structure of all horizontal and sectoral measures for final energy savings, planned in this *EEAP BiH 2016-2018,* is presented in detail in Table 6. The table contains a short description of changes made to each measure (in comparison to the *Final Draft EEAP BiH 2010-2018*) and its previous and new ID (reference number) in order to facilitate the use of this document.

Please note:
Although energy efficiency programmes implemented at the level of Bosnia and Herzegovina and Brčko District BiH do not include all listed measures (as most of these measures are implemented only at the level of the Federation BiH, Republic of Srpska or cantons in the Federation BiH), Table 3 shows an overview of all measures implemented at all levels of government. The table also shows the government level responsible for implementation of each measure and/or possibility that a measure may be part of energy efficiency programmes planned at several levels of government.

Measures from EEAP BiH 2016-2018		**Measure ID (in the *Final Draft EEAP BiH 2010-2018*)**	**Measure status against the Final Draft EEAP BiH 2010-2018**	**Government level responsible for implementation**
ID	**Measure title**			
Horizontal and sectoral measures				
H.1	Development and application of the legislative and regulatory framework for energy efficiency in final energy consumption	H.1, H.6 and sub-measures in individual sectors	Existing measure, expanded in accordance with EU legislation within the framework of the EnCT	All levels within their respective scope of competence
H.2	Drafting and adoption of strategic and planning documents on energy efficiency	H.5	Existing measure, expanded in accordance with EU legislation within the framework of the EnCT and the content of new and expanded existing measures	All levels within their respective scope of competence
H.3	Establishment, application and development of the energy efficiency information system in all final energy consumption sectors	H.4	Existing measure	All levels within their respective scope of competence
H.4	Public energy efficiency information and motivation campaigns	H.2, and sub-measures in individual sectors	Existing measure, expanded in accordance with the context, content and requirements of new and expanded existing measures	All levels within their respective scope of competence

Measures from EEAP BiH 2016-2018		**Measure ID (in the *Final Draft EEAP BiH 2010-2018*)**	**Measure status against the Final Draft EEAP BiH 2010-2018**	**Government level responsible for implementation**
ID	**Measure title**			
H.5	Introduction and implementation of the system for energy efficiency education, training and professional development	N/a (only as sub-measures in individual sectors)	Formally a new special Horizontal measure	All levels within their respective scope of competence
H.6	Inclusion of energy efficiency topics into the general education system	H.10	Existing measure, supplemented with individual activities	All levels within their respective scope of competence
H.7	Establishment of a system for training and certification of licenced professionals for energy auditing of buildings, public utilities, industrial plants and technological processes, and for issuing energy certificates	H.11 (in addition to establishment of a system for training and certification of licenced professionals, it included energy auditing	Existing measure, modified to include only training and certification of professionals, while energy audits were transferred to measure H.9	All levels within their respective scope of competence
H.8	Metering and informative billing of energy consumption to end consumers	H.12	Existing measure	All levels within their respective area of competence
H.9	Introduction and implementation of energy management	N/a	New measure	All levels within their respective area of competence
H.10	Strengthening capacities of the institutions responsible for energy efficiency	H.6	Existing measure, modified	All levels within their respective area of competence
H.11	Strengthening of existing institutional capacities for systemic energy management	H.8	Existing measure, expanded through introduction of systemic energy management as the wider context of EEAP	All levels within their respective scope of competence
H.12	Use of energy efficiency criteria in the public procurement system	N/a (only as a sub-measure)	Partially an existing measure, expanded in accordance with the needs individual final consumption sectors	All levels within their respective area of competence
H.13	Introduction and application of a financial framework for improvement of energy efficiency in final energy consumption	N/a (sub-measures as part of existing sectoral measures)	Partially existing measure, described in detail in Section 5.	All levels within their respective area of competence
Energy efficiency measures in the residential sector				
R.1	Energy renovation of the envelope of existing residential buildings and houses	R.2	Existing measure	FBiH, RS, BD
R.2	Energy performance improvements of existing systems and installation of new, energy efficient technical systems	R.4 (previously related to heating only)	Existing measure, expanded to cover cooling, air conditioning, supply of hot water and interior lighting;	FBiH, RS, BD

Measures from EEAP BiH 2016-2018		**Measure ID (in the *Final Draft EEAP BiH 2010-2018*)**	**Measure status against the Final Draft EEAP BiH 2010-2018**	**Government level responsible for implementation**
ID	**Measure title**			
	in residential buildings and family houses		expanded list of potential technical solutions	
N/a	N/a	R.5	Cancelled as a separate sectoral measure and re-introduced as horizontal measure H.8	N/a
R.3	Energy generation from RES in households	R.6	Existing measure, modified by transfer of certain activities to horizontal measures H.3 and H.13	FBiH, RS, BD
R.4	Construction of new residential buildings and family houses with prescribed energy performance characteristics	R.3	Existing measure, modified by transfer of certain activities to horizontal measures H.4, H.13	FBiH, RS, BD
R.5	Procurement and use of energy efficient electrical household appliances	R.1	Existing measure, modified by transfer of certain activities to horizontal measures H.1, H.2, H.13	FBiH, RS, BD
Energy efficiency measures in the public and commercial service sector				
U.1	Energy renovation of the envelope of existing non-residential buildings in the public and commercial sector	C.3 (previously included both renovation of existing buildings and construction of new EE buildings)	Existing measure, modified by moving construction of new energy efficient buildings to a new, separate measure, and transfer of certain activities to H.4 and H.13	All levels within their respective area of competence
U.2	Improvement of energy performance of existing systems and installation of new, energy efficient technical systems in buildings	C.2 (previously referred to HVAC)	Existing measure, expanded to cover cooling, supply of hot water and interior lighting; expanded list of potential technical solutions; measure modified by transfer of certain activities to horizontal measures H.4 and H.13	All levels within their respective area of competence
N/a	N/a	C.4	Cancelled as a separate sectoral measure and added to U.2	N/a
U.3	Energy generation from RES in the public and commercial sector	C..5	Existing measure, modified by transfer of certain activities to horizontal measures H.4 and H.13	All levels within their respective area of competence
N/a	N/a	C.6	Cancelled as a separate sectoral measure and added to U.2	N/a
U.4	Construction of new buildings with prescribed energy performance characteristics in the public and commercial sector	Part of C.3	Formally a new measure (practically an existing measure, part of measure U.3 which included renovation of existing and construction of new EE buildings).	All levels within their respective area of competence

Measures from EEAP BiH 2016-2018		Measure ID (in the *Final Draft EEAP BiH 2010-2018*)	Measure status against the Final Draft EEAP BiH 2010-2018	Government level responsible for implementation
ID	**Measure title**			
U.5	Procurement and use of energy efficient electrical equipment and lighting in the public and commercial sector	C.1	Existing measure, modified by transferring certain activities to horizontal measures H.4, H.12 and H.13	All levels within their respective area of competence
U.6	Energy efficiency improvements in the water supply and waste water treatment system	C.7 (previously related only to water supply systems)	Existing measure, expanded to cover wastewater treatment	FBiH, RS, BD
U.7	Improvement of energy efficiency of the public lighting system	C.8	Existing measure	FBiH, RS, BD
Energy efficiency measures in the industry sector				
I.1	Energy efficiency improvements in industrial processes	IN.1	Existing measure, modified by transfer of certain activities to horizontal measures H.5, H.9, H.13	FBiH, RS, BD
I.2	Improvement of energy performance of buildings in the industry sector	IN.2	Existing measure, modified by transfer of certain activities to horizontal measures H.9 and H.13	FBiH, RS, BD
N/a	N/a	IN.3	Cancelled as a separate sectoral measure and added to I.1	N/a
I.3	Use of cogeneration and trigeneration in industry	IN.4	Existing measure, modified by transfer of certain activities to H.13	FBiH, RS, BD
I.4	Energy generation from RES in the industry sector	IN.5	Existing measure, modified by transfer of certain activities to horizontal measures H.5 and H.13	FBiH, RS, BD
N/a	N/a	IN.6	Cancelled as a separate sectoral measure	N/a
Energy efficiency measures in the transport sector				
S.1	Use of energy efficient vehicles in road and urban transport	T.1 (previously related only to the public and commercial service sector)	Existing measure, expanded to cover all categories/sectors of participants in transport, as well as buyers of motor vehicles	All levels within their respective area of competence
N/a	N/a	T.2	Cancelled as a separate sectoral measure and re-introduced as a component of measure H.4	N/a
S.2	Infrastructural measures on the road network which provide energy saving effects	T.3	Existing measure	All levels within their respective area of competence

Table 6 - New structure of horizontal and sectoral energy efficiency measures planned in the EEAP BiH 2016-2018

Table 7 provides an overview of expected energy savings in Bosnia and Herzegovina in 2018, resulting from implementation of sectoral and horizontal /cross-sectoral measures planned in this *EEAP BiH 2016-2018.*

ID	Measure title (according to this EEAP BiH 2016-2018)	Expected energy savings in 2018[6] (PJ)
Horizontal and sectoral measures		
H.1	Development and application of the legislative and regulatory framework for energy efficiency in final energy consumption	N/a
H.2	Drafting and adoption of strategic and planning documents on energy efficiency	N/a
H.3	Establishment, application and development of the energy efficiency information system in all final energy consumption sectors	N/a
H.4	Public energy efficiency information and motivation campaigns	N/a
H.5	Introduction and implementation of the system for energy efficiency education, training and professional development	N/a
H.6	Inclusion of energy efficiency topics into the general education system	N/a
H.7	Establishment of a system for training and certification of licenced professionals for energy auditing of buildings, public utilities, industrial plants and technological processes, and for issuing energy certificates	N/a
H.8	Metering and informative billing of energy consumption to end consumers	N/a
H.9	Introduction and implementation of energy management	N/a
H.10	Strengthening capacities of the institutions responsible for energy efficiency	N/a
H.11	Strengthening of existing institutional capacities for systemic energy management	N/a
H.12	Use of energy efficiency criteria in the public procurement system	N/a
H.13	Introduction and application of a financial framework for improvement of energy efficiency in final energy consumption	N/a
Energy efficiency measures in the residential sector		
R.1	Energy renovation of the envelope of existing residential buildings and houses	2.4147
R.2	Energy performance improvements of existing systems and installation of new, energy efficient technical systems in residential buildings and family houses	2.6916
R.3	Energy generation from RES in households	0.0423
R.4	Construction of new residential buildings and family houses with prescribed energy performance characteristics	0.0303
R.5	Procurement and use of energy efficient electrical household appliances	0.0121
	Total residential sector	***5.1910***
Energy efficiency measures in the public and commercial service sector		
U.1	Energy renovation of the envelope of existing non-residential buildings in the public and commercial sector	2.3168
U.2	Improvement of energy performance of existing systems and installation of new, energy efficient technical systems in buildings	1.8538
U.3	Energy generation from RES in the public and commercial sector	0.1155
U.4	Construction of new buildings with prescribed energy performance characteristics in the public and commercial sector	0.0106
U.5	Procurement and use of energy efficient electrical equipment and lighting in the public and commercial sector	0.0095

[6] Stated amounts represent aggregate savings planned for individual measures at the level of Bosnia and Herzegovina, Federation BiH, Republic of Srpska and Brčko District BiH.

ID	Measure title (according to this EEAP BiH 2016-2018)	Expected energy savings in 2018[6] (PJ)
U.6	Energy efficiency improvements in the water supply and waste water treatment system	0.2072
U.7	Energy efficiency improvements in public lighting systems	0.1057
	Total public and commercial service sector	***4.6189***
Energy efficiency measures in the industry sector		
I.1	Energy efficiency improvements in industrial processes	0.9653
I.2	Improvement of energy performance of buildings in the industry sector	0.0193
I.3	Use of cogeneration and trigeneration in industry	0.0610
I.4	Energy generation from RES in the industry sector	0.8235
	Total industry sector	***1.8690***
Energy efficiency measures in the transport sector		
S.1	Use of energy efficient vehicles in road and urban transport	0.0390
S.2	Infrastructural measures on the road network which provide energy saving effects	0.7510
	Total transport sector	***0.7900***
Total all sectors		**12.4689**

Table 7 - Aggregate expected savings in 2018 from sectoral measures planned in EEAP BiH 2016-2018

Table 8 provides an overview of anticipated energy savings in 2018 resulting from measures planned in this *EEAP BiH 2016-2018* in parts of final energy consumption sectors under direct competence of state-level authorities in Bosnia and Herzegovina.

ID	Measure title	Expected energy savings in 2018 (PJ)
Energy efficiency measures in the public and commercial service sector		
U.1	Energy renovation of the envelope of existing non-residential buildings in the public and commercial sector	0.01245
U.2	Improvement of energy performance of existing systems and installation of new, energy efficient technical systems in buildings	0.01240
U.3	Energy generation from RES in the public and commercial sector	-
U.4	Construction of new buildings with prescribed energy performance characteristics in the public and commercial sector	-
U.5	Procurement and use of energy efficient electrical equipment and lighting in the public and commercial sector	0. 00005
U.6	Energy efficiency improvements in the water supply and waste water treatment system	-
U.7	Energy efficiency improvements in public lighting systems	-
Total public and commercial service sector		***0.02490***
Total all sectors		***0.02490***

Table 8 - Expected savings in 2018 from sectoral measures planned at the level of BiH in EEAP BiH 2016-2018

Table 9 provides an overview of anticipated energy savings in 2018 in Brčko District BiH, resulting from implementation of sectoral measures planned in this *EEAP BiH 2016-2018.*

ID	Measure title	Expected energy savings in 2018 (PJ)
Horizontal and sectoral measures		
H.1	Development and application of the legislative and regulatory framework for energy efficiency in final energy consumption	N/a
H.2	Drafting and adoption of strategic and planning documents on energy efficiency	N/a
H.3	Establishment, application and development of the energy efficiency information system in all final energy consumption sectors	N/a
H.4	Public energy efficiency information and motivation campaigns	N/a
H.5	Introduction and implementation of the system for energy efficiency education, training and professional development	N/a
H.6	Inclusion of energy efficiency topics into the general education system	N/a
H.7	Establishment of a system for training and certification of licenced professionals for energy auditing of buildings, public utilities, industrial plants and technological processes, and for issuing energy certificates	N/a
H.8	Metering and informative billing of energy consumption to end consumers	N/a
H.9	Introduction and implementation of energy management	N/a
H.10	Strengthening capacities of the institutions responsible for energy efficiency	N/a
H.11	Strengthening the existing institutional capacities for systemic energy management	N/a
H.12	Use of energy efficiency criteria in the public procurement system	N/a
H.13	Introduction and application of a financial framework for improvement of energy efficiency in final energy consumption	N/a
Energy efficiency measures in the residential sector		
R.1	Energy renovation of the envelope of existing residential buildings and houses	0.0297
R.2	Energy performance improvements of existing systems and installation of new, energy efficient technical systems in residential buildings and family houses	0.0356
R.3	Energy generation from RES in households	0.0003
R.4	Construction of new residential buildings and family houses with prescribed energy performance characteristics	0.0003
R.5	Procurement and use of energy efficient electrical household appliances	0.0001
	Total residential sector	***0.0660***
Energy efficiency measures in the public and commercial service sector		
U.1	Energy renovation of the envelope of existing non-residential buildings in the public and commercial sector	0.0983
U.2	Improvement of energy performance of existing systems and installation of new, energy efficient technical systems in buildings	0.0764
U.3	Energy generation from RES in the public and commercial sectors	0.0055
U.4	Construction of new buildings with prescribed energy performance characteristics in the public and commercial sector	0.0006
U.5	Procurement and use of energy efficient electrical equipment and lighting in the public and commercial sector	0.0004
U.6	Energy efficiency improvements in the water supply and waste water treatment system	0.0002
U.7	Energy efficiency improvements in public lighting systems	0.0007
	Total public and commercial service sector	***0.1820***
Energy efficiency measures in the industry sector		
I.1	Energy efficiency improvements in industrial processes	0.0063

ID	Measure title	Expected energy savings in 2018 (PJ)
I.2	Improvement of energy performance of buildings in the industry sector	0.0003
I.3	Use of cogeneration and trigeneration in industry	0.0060
I.4	Energy generation from RES in the industry sector	0.0125
Total industry sector		***0.0250***
Total all sectors		**0.2730**

Table 9 - Expected savings in 2018 from sectoral measures planned at the level of Brčko District BiH in EEAP BiH 2016-2018

Please note:

Expected energy savings in the Federation BiH and Republic of Srpska in 2018 are shown in EEAPF 2016-2018 (Table 5) and Amendments to EEAP RS 2018 (Table 5), which form an integral part of this EEAP BiH 2016-2018.

It is also important to note that this document, *EEAP BiH 2016-2018* (together with documents *EEAPF 2016-2018* and *Amendments to EEAP RS 2018*), introduces for the first time the concept of **energy efficiency programmes**, where each programme comprises several sectoral and horizontal measures. For this reason, final energy consumption targets for existing measures were rearranged to reflect final energy savings targets at the programme level.

Please note:

1. *Detailed description of programmes at the level of Bosnia and Herzegovina as well as those at the level of Brčko District BiH is shown in Section 3.3.3 (Overview of programmes aimed at achievement of planned final energy savings).*
2. *Programmes implemented at the level of Federation BiH and Republic of Srpska are described in detail in the corresponding chapters of EEAPF 2016-2018 and Amendments to EEAP RS 2018. This document, EEAP BiH 2016-2018, contains only a tabular overview of all entity programmes.*

Table 10 shows an overview of all final energy savings programmes planned at all levels, with planned and actual energy savings and a list of sectors to which these programmes apply.

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[7] (BAM)	Financing sources	Financing methods
01	PRG.01BiH	Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina.	0.0249	MoFTER	3,503,252	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
02	PRG.02 BiH	Programme for coordination of energy efficiency in Bosnia and Herzegovina	N/a	MoFTER	-	Public budgets; Technical assistance	Regular budget lines; Grants
Total programmes at the level of BiH			***0.0249***		**3,503,252**		

[7] Stated amounts refer to total value of planned investments (including incentives at relevant levels of government) and include funds sourced from all stated sources and methods of financing. The structure of amounts required for implementation of planned programmes, i.e. financial contributions required for implementation of individual sectoral measures within programmes planned at the level of Bosnia and Herzegovina and Brčko District is shown in tables in Appendix 6.2 of this document, while for the Federation BiH and Republic of Srpska these amounts are shown in tables in Appendix 6.2 of *EEAPF 2016-2018* and Amendments to *EEAP RS 2018,* respectively. These amounts refer only to financing of sectoral measures within the programmes.

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[7] (BAM)	Financing sources	Financing methods
03	PRG.01BD	Energy efficiency programme in the Brčko District BiH	0.1378	BD Government	33,135,471	Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
Total programmes at the level of BD			***0.1378***		**33,135,471**		
04	PRG.01 FBIH	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Federation BiH	N/a	FMoEMI FMPP FMET FMTC	-	Public budgets; Technical assistance	Regular budget lines; Grants
05	PRG.02 FBIH	Programme for energy efficiency information, professional development and education in the Federation BiH	N/a	FMoEMI FMPP FMET FMTC Cantons	-	Public budgets; Technical assistance	Regular budget lines; Grants
06	PRG.03 FBIH	Programme for energy efficiency obligation schemes in the Federation BiH through electricity distributors	0.7616	FMoEMI FERK	154,430,930	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants;
07	PRG.04 FBIH	Programme for energy efficiency obligation schemes in the Federation BiH through heating energy distributors	0.1323	FMoEMI Cantons	26,651,778	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants;
08	PRG.05 FBIH	Programme for energy efficiency improvements in the public service sector buildings in the Federation BiH	0.0170	FMPP FMoEMI	2,869,941	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
09	PRG.06 FBIH	Cantonal energy efficiency programmes for residential and public service sector buildings	1.6918	Cantons	285,697,577	Energy tax; CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds;	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[7] (BAM)	Financing sources	Financing methods
						EU funds	investments through reduction of future budget expenditure (budget capturing)
10	PRG.07 FBIH	Programme for energy efficiency improvements in public utility systems	0.2160	FMoEMI Cantons	29,562,730	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds;	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Income tax incentives (investment-based tax deductions)
11	PRG.08 FBIH	Programme for energy efficiency improvements in the industry and commercial service sector	1.220	FMoEMI Cantons	186,965,649	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Income tax incentives (investment-based tax deductions)
12	PRG.09 FBIH	Programme for promotion of sustainable road and urban transport in the Federation BiH	N/a	FMoEMI FMTC	-	CO2 tax; Air protection tax; Public budgets; Technical assistance	Preferential loans; Regular budget lines; Grants
Total programmes in the Federation BiH			***4.0386***		**686,178,605**		
13	PRG.01RS	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Republic of Srpska	N/a	MoIEM	-	Public budgets; Technical assistance	Regular budget lines; Grants
14	PRG.02RS	Programme for energy efficiency information, professional development and education in the Republic of Srpska	N/a	MoIEM RS Fund	-	Public budgets; Technical assistance	Regular budget lines; Grants
15	PRG.03RS	Programme for energy efficiency obligation schemes in the Republic of Srpska through electricity distributors	0.3410	MoIEM RERS	73,981,664	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
16	PRG.04RS	Programme for energy efficiency obligation schemes in the Republic of Srpska through heating energy distributors	0.0600	MoIEM MSPCEE	12,516,469	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
17	PRG.05RS	RS programme for energy efficiency improvements in buildings in the public services sector	0.7680	MSPCEE	130,291,984	CO_2 tax; Air quality tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
18	PRG.06RS	Programme for energy efficiency	0.096	MoIEM MSPCEE	15,604,110	CO_2 tax; Air quality tax; Public budgets; International	Preferential loans; Foreign loans; Commercial loans;

NO.	ID	EE programme title	Expected final energy savings in 2018 (PJ)	Responsible authority	Required financing in the period 2016 -2018[7] (BAM)	Financing sources	Financing methods
		improvements in public utility systems				financial institutions' funds (IFIs); UN funds; EU funds	Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
19	PRG.07RS	Programme for energy efficiency improvements in the industry sector and the commercial services sector	0.5480	MoIEM	83,582,242	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP;
20	PRG.08RS	Programme for promotion of sustainable road and urban transport in the Republic of Srpska	N/a	MoIEM MTC	-	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP
Total programmes in the Republic of Srpska			***1.8130***		**315,976,470**		
Total all programmes:			***6.0143***		**1,038,793,798**		
Expected total savings:			***12.4700***				
Share of savings resulting from programmes in total expected savings			***48%***				

Table 10 - Matrix of planned and actual final energy savings for all programmes planned in EEAP BiH 2016-2018

As can be seen from the above table, implementation of these programmes will result in 48% of the total savings target planned for 2018, or 6.0143 PJ of the total planned target (12.470 PJ). The remaining 52% of total savings will be achieved through market forces and use of own funds by target groups in different categories, which will arise primarily from the positive effects of implementation of the planned horizontal and cross-sectoral measures by the relevant authorities, international technical assistance programmes, local civil society organisations and business associations. Energy savings achieved in 2015, as presented in section 3.1, which have been achieved largely due to the effects of horizontal and cross-sectoral measures and use of own funds, confirm that these goals were set in a realistic manner.

Tables in Appendix 6.1 of this document provide a detailed structure of planned final energy savings shown in Table 10 for the level of Bosnia and Herzegovina and Brčko District BiH, which are expected to result from the implementation of planned programmes, as follows:

a. Individual measures are shown for each programme, together with the contribution of each measure to the savings planned for that programme; and
b. Total final energy savings are shown for each sectoral measure, stating the amount of savings achieved by implementation of that measure across all planned programmes.

Additionally, the table also shows the following information for each sectoral measure:

c. Total final energy savings achieved by the measure through market forces and use of target groups' own funds; and
d. Total savings expected from implementation of the measure as a combination of results of implementation of the measure within the planned programmes and the results of market forces and use of own funds.

Programmes planned in the Federation BiH and Republic of Srpska are shown in corresponding tables in Appendix 6.1 of EEAPF 2016-2018 and Amendments to EEAP RS 2018 respectively, which form an integral part of this document.

The Table in Appendix 6.2 provides a detailed breakdown of the structure of financing required to achieve final energy savings planned at the level of Bosnia and Herzegovina and Brčko District BiH, including the share of

financing required for implementation of planned programmes, as well as own funds expended through action of market forces. *Programmes planned in the Federation BiH and Republic of Srpska are shown, respectively, in corresponding tables in Appendix 6.2 of EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.*

Table 11 contains a summary overview of all planned and actual savings in Bosnia and Herzegovina in the period to date, for both primary and final energy consumption.

Year	Primary energy							Final energy (PJ)						
								ESD						EPBD
	Primary energy savings target (ktoe)				Actual energy savings (ktoe)			Savings targets in EEAP BiH 2016-2018 (PJ)			Actual energy savings (PJ)			Target for near-zero consumption buildings
	BiH	FBiH	RS	BD	BiH	FBiH	RS	BiH[8]	FBiH	RS	BiH[9]	FBiH	RS	
2012	N/a	N/a	N/a	N/a	N/a	N/a	N/a	0.6765	0.465	0.200	N/a	N/a	N/a	N/a
2015	N/a	N/a	N/a	N/a	N/a	N/a	N/a	4.6300	3.080	1.400	5.2347	3.7140	1.5207	N/a
2018	N/a	N/a	N/a	N/a	N/a	N/a	N/a	12.4689	8.404	3.766	N/a	N/a	N/a	N/a
2020	963.84	624.08	321.92	17.83	N/a	N/a	N/a	15.2400	10.271	4.610	N/a	N/a	N/a	N/a

Table 11 - Summary overview of planned and actual primary and final energy savings in BiH to date

Please note:
Primary energy savings targets are analysed in detail in section 2.1 (Primary energy consumption targets and forecasts).

2. SAVINGS IN PRIMARY ENERGY CONSUMPTION

2.1 Primary energy consumption targets and forecasts

In its existing planning documents, Bosnia and Herzegovina did not set targets for reduction of total primary energy consumption through energy efficiency measures. Based on the requirements of Directive 2006/32/EC, the Final Draft of the First National *Energy Efficiency Action Plan of Bosnia and Herzegovina for the period 2010-2018* sets only an indicative target for primary energy savings in Bosnia and Herzegovina until 2018 in the amount of 12.47 PJ, or 9% of the 138.56 PJ base value. The base value of 138.56 PJ represents average final energy consumption in the period 2006-2010 which, due to absence of a significant part of final energy consumption statistics for Bosnia and Herzegovina and its constitutional units, was partly calculated through statistical analysis in order to fill the gaps in the data. It is important to note that due to highly specific circumstances in the energy efficiency sector at the time (absence of the legal framework and financial mechanisms, low level of awareness of key stakeholders), this planning document employed a gradual approach to reaching the total target of 12.47 PJ. The period 2010-2018 was divided to 3 sub-periods, with two interim targets for 2012 and 2015. This gradual approach foresees the following:

- Lowest intensity of savings in the first three-year period (energy savings target for 2012 is 0.49% of the base value, or 0.67 PJ);
- Relatively low intensity of savings in the second three-year period (energy savings target for 2015 is 3.34% of the base value, or 4.63 PJ); and
- Highest intensity of savings in the third three-year period (energy savings target for 2018 is 9% of the base value, or 12.47 PJ).

With regard to the obligation to express the planned primary energy consumption level in 2020 in absolute terms, energy statistics in Bosnia and Herzegovina are sparse and lack long-term continuity. Still, there are several sources of past energy consumption data that can be used to extrapolate the requested energy consumption forecasts for the year 2020. These are:

[8]These aggregate values reflect total savings for Bosnia and Herzegovina and, in addition to FBiH and RS figures listed in the table, also list the targets under direct competence of Bosnia and Herzegovina and Brčko District BiH
[9] Ibid.

- The International Energy Agency - IEA[10];
- Energy Community Secretariat[11];
- Agency for Statistics of Bosnia and Herzegovina[12];
- Study of the Energy Sector in BiH, prepared by the Energy Institute "Hrvoje Požar" (EIHP) from Zagreb;
- *Study on the calculations of revised 2020 RES targets for the Energy Community (IPA Energy + Water Economics), June 2010*[13]; and
- National Renewable Energy Action Plan of Bosnia and Herzegovina - NREAP BiH.[14]

Based on the analysis of data for total annual primary energy consumption (TPES) and final energy consumption (TFEC) in Bosnia and Herzegovina, found in documents listed above, **the base value used for forecasting of primary energy consumption in 2020 was taken from the *Renewable Energy Action Plan of Bosnia and Herzegovina (NREAP BiH)*[15], because this is the only formally adopted document in Bosnia and Herzegovina which contains forecasts for final/gross final energy consumption in Bosnia and Herzegovina by 2020.** For the purposes of calculation of gross final consumption by 2020, this document used the baseline for Bosnia and Herzegovina and Republic of Srpska which corresponds to 2009 data obtained using the PRIMES[16] model, extrapolated values for the Federation BiH, and estimated values for Brčko District BiH based on existing data presented in the EIHP study of the energy sector in Bosnia and Herzegovina.

Table 12 shows the planned gross final energy consumption in Bosnia and Herzegovina, from NREAP BIH, as well as energy consumption for heating and cooling, electricity and transport by 2020.

Sector	Base year	2010		2011		2012		2013		2014	
		Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE
Heating and cooling (ktoe)	1861.5	1881.7	1877.3	1897.5	1897.5	1917.1	1913.1	1936.7	1898.8	1957.2	1899.5
Electricity (ktoe)	985.1	1035.8	1035.8	1073.3	1073.3	1083.4	1080.1	1082.5	1075.7	1113.4	1096.2
Transport (ktoe)	689.0	787.2	763.7	820.7	795.8	853.2	826.4	886.7	858.5	920.3	888.3
Gross final energy consumption (GFEC) (ktoe)	3839.8	4039.6	4039.6	4133.0	4133.0	4192.3	4178.3	4251.6	4121.8	4338.0	4166.5

Sector	2015		2016		2017		2018		2019		2020	
	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE	Reference scenario	Additional EE
Heating and cooling (ktoe)	1977.8	1900.1	1996.5	1898.3	2014.9	1896.0	2033.1	1893.2	2051.2	1889.3	2069.8	1886.1
Electricity (ktoe)	1137.4	1115.3	1169.3	1140.1	1201.8	1165.8	1235.0	1192.3	1268.9	1219.7	1303.6	1243.9
Transport (ktoe)	953.2	916.9	985.0	947.9	1017.0	975.9	1048.7	1004.4	1090.3	1042.8	1129.1	1081.2
Gross final energy consumption (GFEC) (ktoe)	4417.1	4205.0	4503.0	4248.8	4588.9	4290.1	4675.6	4331.7	4763.0	4372.3	4851.3	4407.7

Table 12 - Gross final energy consumption forecasts for BiH according to the Renewable Energy Action Plan of BiH

Table 13 presents the final energy consumption forecast for 2020, calculated as the difference between gross final energy consumption shown in Table 12 and the corresponding aggregate values for electricity and heat consumed for operating purposes by the energy sector and the losses in electricity and heat transmission and distribution taken from the IEA statistical data for Bosnia and Herzegovina[17]. Actual values for own operational consumption and losses, obtained from IEA statistics, were used for the period 2010-2014, while for the years from 2015-2020 the value used is the average from the period 2010-2014, or 261.60 ktoe. According to this

[10] http://www.iea.org
[11] https://www.energy-community.org
[12] http://www.bhas.ba
[13] https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/2514179/0633975AADE97B9CE053C92FA8C06338.PDF
[14] /www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4102377/304770E2BD97398FE053C92FA8C06461.pdf
[15] https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4102377/304770E2BD97398FE053C92FA8C06461.pdf
[16] http://www.e3mlab.ntua.gr/e3mlab/index.php?option=com_content&view=category&id=35&Itemid=80&lang=en
[17] https://www.iea.org/statistics/statisticssearch/report/?country=BOSNIAHERZ&product=balances&year=Select

calculation, final energy consumption in Bosnia and Herzegovina in 2020 will be 4589.70 ktoe (without energy efficiency measures in final consumption sectors).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GFEC (ktoe)	4039.60	4133.00	4192.30	4251.60	4338.00	4417.10	4503.00	4588.90	4675.60	4763.00	4851.30
Own consumption by the energy sector plus losses (ktoe)	269.00	270.00	268.00	256.00	245.00	261.60	261.60	261.60	261.60	261.60	261.60
TFEC (ktoe)	3770.60	3863.00	3924.30	3995.60	4093.00	4155.50	4241.40	4327.30	4414.00	4501.40	4589.70

Table 13 - Final energy consumption forecast for BiH in the period to 2020

The anticipated ratio between primary and final energy consumption (TPES/TFEC) of 1.75 in 2020 was calculated on the basis of average values of this ratio in the period 2010-2014, according to the Energy Community primary and final consumption data for Bosnia and Herzegovina in this period[18]. This calculation is shown in Table 14 below.

	2010	2011	2012	2013	2014	Average:
TFEC (ktoe)	N/a	4741.00	4906.00	4420.00	4554.00	
TPES (ktoe)	N/a	8460.00	8518.00	7900.00	7794.00	
TFEC/TPES	N/a	0.56	0.58	0.56	0.58	**0.57**
TPES/TFEC	N/a	1.78	1.74	1.79	1.71	**1.75**

Table 14 - Calculation of the average ratio of primary and final energy consumption in BiH

Based on the final energy consumption forecast of 4,589.70 ktoe in 2020 without energy efficiency measures, calculated using the average ratio of primary and final energy consumption of 1.75 (based on Energy Community data for Bosnia and Herzegovina for the period 2011-2014), **the primary energy consumption forecast for Bosnia and Herzegovina in 2020 is 8,031.98 ktoe without any form of energy saving measures**[19].

Primary energy consumption forecasts for 2020 for the Republic of Srpska, Federation BiH and Brčko District BiH

According to the EIHP *Study of the Energy Sector in BiH*, in the years from 2000 to 2005 final energy consumption in the Federation BiH accounted for 62.9 - 67.1% of the total energy consumption in Bosnia and Herzegovina. At the same time, the share of Republic of Srpska ranged from 31.0% to 35.3%, and of Brčko District BiH from 1.8% to 1.9%.

On the other hand, according to the *Renewable Energy action Plan of the Republic of Srpska*[20], the forecasted total final energy consumption in 2020 in the Republic of Srpska is 1,621.7 ktoe, or a 33.4% share of the total final energy consumption forecast for Bosnia and Herzegovina in 2020, which matches the findings of the *Study of the Energy Sector in BiH* in which this value ranged from 31.0 to 35.3% for the period 2000-2005.

In accordance with the above, the forecasted final energy consumption share for Brčko District BiH would be 1.85% and for the Federation BiH 64.75% of the total final energy consumption forecast for Bosnia and Herzegovina in the year 2020.

Using these percentages, primary energy consumption forecasts for 2020 for the Republic of Srpska, Federation BiH and Brčko District BiH would be as follows:

- In the Republic of Srpska: 2,682.68 ktoe without energy efficiency measures;
- Federation of BiH: 5,200.70 ktoe without energy efficiency measures;
- In Brčko District BiH: 148.59 ktoe without energy efficiency measures.

Determination of a realistic level of primary energy savings in 2020 in the development context of Bosnia and Herzegovina

The value of these savings is calculated as a sum of the following key categories of energy efficiency measures:

[18] https://www.energy-community.org/portal/page/portal/ENC_HOME/MEMBERS/PARTIES/BOSNIA_HERZEGOVINA
[19] 4,851.30 ktoe x 1,75 = 8,031.98 ktoe
[20] http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/Documents/%D0%B0%D0%BA%D1%86%D0%B8%D0%BE%D0%BD%D0%B8%20%D0%BF%D0%BB%D0%B0%D0%BD%20%D0%B5%D0%BD%D0%B5%D1%80%D0%B3%D0%B5%D1%82%D1%81%D0%BA%D0%B5%20%D0%B5%D1%84%D0%B8%D0%BA%D0%B0%D1%81%D0%BD%D0%BE%D1%81%D1%82%D0%B8%20%D1%80%D1%81%20%D0%B4%D0%BE%202018.pdf

i. Energy efficiency measures in final energy consumption sectors; and
ii. Energy efficiency measures in energy generation, transmission and distribution.

i. Primary energy savings achieved through energy efficiency measures in final energy consumption sectors

Final energy consumption sectors covered by this *Energy Efficiency Action Plan in BiH* are the following: residential sector, public and utility services sector, industry sector (excluding the energy sector) and the transport sector. Final energy savings in these sectors planned in the *Final Draft EEAP BiH for the period 200-2018*, is 12.47 PJ (= 138.56 PJ x 9%) in 2018, and 15.24 PJ (= 138.56 PJ x 11%) in 2020 as the relevant year for primary energy savings targets[21].

The stated final energy savings of 11%, compared to the baseline year value (2005-2010 average) of 15.24 PJ, will result in **primary energy savings in 2020 in the amount of 637.01 ktoe**[22].

ii. Primary energy savings achieved through energy efficiency measures in energy generation, transmission and distribution

Based on an analysis which included: (a) current status of these sectors; (b) growth trends in energy efficiency and reduction of losses in energy generation (primarily in electricity from coal and heat generation), electricity and gas transmission, and electricity and gas distribution; (c) available quantified targets and loss-reduction measures (partially provided for specific segments in some of these sectors in certain strategic and planning documents and available reports), it was estimated that, by 2020, implementation of planned measures could result in a maximum of **330.00 ktoe of primary energy savings against the forecasted consumption without measures, which represents approx. 4% of the forecasted primary consumption in 2020.**

This estimate was made using the available statistical data from the *Total Energy Balance in BiH for the Year 2014.* The ratio of electricity generated from coal in 2014 and the amount of coal used for this purpose is 0.26 (= 845.00 ktoe electricity / 3,244.00 ktoe coal). According to objectives stated in the relevant strategic and planning documents, the maximum anticipated increase of this ratio in 2020 would be approx. 0.29, which would - assuming the same quantity of produced electricity - reduce the amount of coal from 3,244.00 ktoe to 2,913.79 ktoe, or 330.21 ktoe in absolute terms.

From the above we can conclude that total potential primary energy savings in 2020 could amount to 967.22 ktoe (= 637.01 + 330.21) or approx. 12% of forecasted consumption without measures, estimated at 8,031.98 ktoe.

Table 15 shows the forecasted values of primary and final energy consumption in 2020 for Bosnia and Herzegovina, Federation BiH, Republic of Srpska and Brčko District BiH, for the scenario without energy efficiency measures and for the scenario with 12% savings compared to total primary energy consumption without energy efficiency measures.

Primary and final energy consumption	BiH	FBiH	RS	BD BiH
Total final energy consumption - without EE measures; (TFEC(ktoe))	4589.70	2971.83	1532.96	84.91
Scenario without energy efficiency measures				
Total primary energy consumption - without EE measures; (TPES (ktoe))	8031.98	5200.70	2682.68	148.59
Scenario with 12% savings in primary energy consumption				
Savings in primary energy consumption (12% TPES (ktoe))	**963.84**	**624.08**	**321.92**	**17.83**
Total primary energy consumption - with EE measures; (TPES-12% (ktoe))	**7068.14**	**4576.62**	**2360.76**	**130.76**

Table 15 - Matrix of anticipated final and primary energy consumption scenarios for 2020

Based on the above, the indicative target for savings in primary energy consumption in Bosnia and Herzegovina in 2020 is defined as follows:

[21]The 12.47 PJ of planned final energy savings and the base value for energy consumption (2006-2010 average) of 138.56 PJ were taken from the *Final Draft of the First National Energy Efficiency Action Plan of Bosnia and Herzegovina for the period 2010-2018.*
[22] 637.10 ktoe = 15.24 PJ x 1.75 x 23.885; 1 PJ = 23.885 ktoe

By the end of 2020, primary energy consumption will be reduced by 12% compared to forecasted consumption without energy efficiency measures. In absolute terms, in comparison to the forecasted primary energy consumption of 8,031.98 ktoe without any energy efficiency measures, this amounts to 7,068.14 ktoe with implementation of planned energy efficiency measures or a reduction of consumption by 963.84 ktoe.

2.2 List of strategies impacting primary energy savings

Table 16 shows a brief overview of strategic and planning documents in Bosnia and Herzegovina which have a direct/indirect impact on primary energy consumption.

Implementation of objectives, measures and activities planned in these strategic documents will contribute to primary energy savings targets, in accordance with the Directive 2012/27/EU. However, the exact value of this contribution cannot be stated because the relevant objectives in most of these documents have not been quantified.

Please note: This table contains only strategic documents adopted at the level of Bosnia and Herzegovina and Brčko District BiH. This table lists only titles of entity-level documents adopted in the Republic of Srpska and Federation BiH, and detailed descriptions are provided in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP BiH 2016-2018.

Document title; Legal status / publication	**Target sectors and relevant objectives**
Climate Change Adaptation and Low Emissions Growth Strategy of BiH to 2025[23] *Adopted by the Council of Ministers on 8.10.2013*	Sectors: Capacity building; Electricity generation (including mining); Buildings; District heating; Transport; Climate change adaptation goal: Improve the resilience of BiH to climate variability and climate change, with developmental benefits; Low-emissions growth goal: Achieve the highest value and stop the growth of annual emissions of GHG in BiH around 2025 at a level below the average emissions per capita in EU27; Relevant specific objectives: 1. Harmonisation and implementation of EU acquis in the area of climate change, energy efficiency and environment by 2020; 2. Improve energy generation efficiency in coal power plants to at least 40% by 2025; 3. Install a minimum of 150 MW of new capacities for generation of electricity from RES: biomass (in cogeneration), hydro power and wind power; 4. End the use of heavy fuel oil and coal for heating of households and in district heating systems and replace them with energy efficient systems, biomass, solar thermal and geothermal energy (using electricity to power these plants) by 2022; 5. Introduce heat consumption metering per building and per individual consumer in all district heating systems by 2020; 6. Reduce transport emissions by 10% compared to the baseline scenario, by 2025
National Economic Reform Programme for 2015[24] *The document was adopted by the BiH Council of Ministers on 11.2.2015.*	Sector: Electricity generation; Relevant sectoral measures/reforms implemented and planned in order to achieve 2014-2017 economic policy objectives: Republic of Srpska: Within economic recovery measures: Investment activities in the energy sector (construction of new TPP, HPP and WPP capacities); Federation BiH: Within economic recovery measures: Investment activities in the energy sector and transport infrastructure (construction of new TPP, HPP and WPP capacities);
BiH Council of Ministers / Directorate for Economic Planning: Strategic	Individual energy sectors are not specified; Relevant strategic objectives:

[23] http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Documents/Str%D0%B0t%D0%B5gi%D1%98%D0%B0%20pril%D0%B0g%D0%BEd%D0%B0v%D0%B0nj%D0%B0%20n%D0%B0%20klim%D0%B0tsk%D0%B5%20pr%D0%BEm%D1%98%D0%B5n%D0%B5%20i%20nisk%D0%BE%D0%B5misi%D0%BE.pdf

[24] http://www.dep.gov.ba/search/Default.aspx?q=nacionalni+program+ekonomskih+reformi+2015&searchDepth=0&selectedCategory=0&contentType=0&langTag=bs-BA&template_id=141&pageIndex=1

Framework for BiH, August 2015[25] *Prepared in accordance with the Decision on the Mid-Term Planning, Monitoring and Reporting Procedure in Institutions of BiH (Official Gazette 62/14)*	5.2 Smart growth; 5.2.1 Development of human resources; 5.2.2 Increased industrial competitiveness (development of research, innovation and new technologies); 5.3 Sustainable growth; 5.3.2 Improved environmental management and development of environmental infrastructure with increased resilience to climate change; 5.3.4 Development of energy potentials, especially renewable energy sources and improvements in energy efficiency (Priorities: Harmonise the domestic energy market at all levels with the EU *acquis*, including entity-level and state-level legislation, with the third energy package and the obligations of BiH under the Energy Community Treaty); 5.4 Inclusive growth; 5.4.1 Increased employment opportunities
BiH Economic Reform Programme 2016-2018[26] *Adopted by the BiH Council of Ministers on 28.1.2016.*	Sectors: (inter alia) Renewable energy sources; Structural reform priorities by sector: BiH: n/a Republic of Srpska: n/a Federation BiH: 4.2.2(4) Energy infrastructure improvements (through construction of WPP plants Podveležje and Mesihovina)
Elektroprenos BiH: Long-Term Transmission Network Development Plan 2015-2024 *Adopted by SERC on 3.3.2016.*	Sectors: Electricity - transmission; Relevant target: Estimated losses in the transmission grid for the observed planning period 2015-2024 are 2.2% of the planned production on the transmission grid
Renewable Energy Action Plan for Bosnia and Herzegovina[27] *Adopted by the Council of Ministers on 30.3.2016.*	Sectors: Electricity; Heating and cooling; Transport; *Objectives stated in this document refer only to final energy consumption. They are listed here because the primary energy target stated in this NEEAP (described in section 2.3) is extrapolated from the gross final consumption data in this document, which is currently the only official document in BiH that contains energy consumption forecasts for 2020*
Independent System Operator in BiH (ISO BiH): Indicative Production Development Plan 2017-2026 *This document was approved by SERC on 28.6.2016.*	Sectors: Electricity (generation); RES – electricity generation; This plan contains, inter alia, the following data for all power generation capacities in the BiH electricity sector (including TPPs, HPPs, WPPs and SPPs): (a) Production capacity parameters; (b) Balancing performance in the transmission grid in the previous period; (c) Electricity generation and consumption in BiH in the previous period; (d) Electricity balance on the transmission grid for 2016; (e) Consumption forecast 2017-2026; (f) Integration of renewable energy sources; (g) Energy and power balance on the transmission grid 2017-2026; (h) ENTSO-E ten-year transmission grid development plan
Energy Efficient Development Action Plan (SEAP) for Brčko District[28] *Adopted by the Brčko District Government on 29.4.2015.*	Sectors: Buildings; Public lighting; Transport; Objective: *Reduce* CO2 emissions by 22.07% by 2020 in comparison to base year 2012; *Objectives stated in this document refer only to final energy consumption. Listed here because this is the only strategic document in this area for Brčko District BiH and because it contains important energy consumption data for this part of BiH*
List of strategic and planning documents of the Republic of Srpska:	
RS Air Protection Strategy (as a component part of the RS Environmental Protection Strategy and Action Plan 2008-2020)[29]; *Document was adopted by the NA RS in 2011*	
Energy Development Strategy of the Republic of Srpska to 2030[30] *(Document adopted by NA RS on 14.3.2012)*	
Action Plan for Implementation of the Energy Development Strategy of the Republic of Srpska[31] *(This document, produced by EIHP and the Institute of Economics in Banja Luka, complements the Energy Development Strategy of RS)*	

[25] http://www.dep.gov.ba/naslovna/DEP%20Strateski%20okvir%20za%20BiH.pdf

[26] http://www.dep.gov.ba/search/Default.aspx?q=program+ekonomskih+reformi+2016+2018&searchDepth=0&selectedCategory=0&contentType=0&langTag=bs-BA&template_id=141&pageIndex=1

[27] http://www.mvteo.gov.ba/vijesti/saopstenja/default.aspx?id=7957&langTag=bs-BA

[28] http://www.bdcentral.net/index.php/hr/vijesti/3462-akcioni-plan-energetski-odrivog-razvoja-brko-distrikta-bih-

[29] http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Servisi/Poslovanje/Documents/%D1%81%D1%82%D1%80%D0%B0%D1%82%D0%B5%D0%B3%D0%B8%D1%98%D0%B0%20%D0%B2%D0%B0%D0%B7%D0%B4%D1%83%D1%85.pdf

[30] http://www.vladars.net/sr-sp-cyrl/vlada/ministarstva/mper/Documents/nacrt%20strategije%20razvoja%20energetike%20do%202030%20-%20latinica.pdf
https://www.dropbox.com/s/2pxvhwv0uzqm6bv/00.02.2012-RS-2-eng%20Energy%20Startegy%20of%20RS%20up%20to%202030.pdf?dl=0

[31] ibid.

Energy Development Plan of the Republic of Srpska[32] *(This document was produced by EIHP Zagreb and complements the Energy Development Strategy of the Republic of Srpska to 2030)*
Energy Efficiency Action Plan of RS to 2018[33] (*Document was adopted by the RS Government in December 2013)*
Renewable Energy Sources Action Plan of the Republic of Srpska[34] *(Document adopted by the RS Government in May 2014)*
RS Energy Balance - Plan for 2016 (*this document is adopted annually by the RS Government pursuant to the RS Law on Energy and Rulebook on Energy Balance*)
List of strategic and planning documents of the Federation BiH:
First Energy Efficiency Action Plan of the Federation BiH 2010-2018 *(never adopted, exists only in the final draft form)*
Environmental Protection Strategy of the Federation BiH 2008-2018[35] *(exists only in draft form, published in 2009)*
Development Strategy of the Federation BiH 2010-2020[36] *(adopted by the Government of FBiH on 21.9.2010) Due to the fact that BiH and the Federation BiH do not have a long-term energy strategy, the Government of FBiH opted for an energy sector strategy within the framework of this document*
Temporary Guidelines of Power Policy in the Federation BiH (Official Gazette of the Federation BiH, no. 12/14)[37] *(Decision on the guidelines adopted at the FBiH Government session on 30.1.2014)*
Renewable Energy Sources Action Plan of the Federation BiH (RESAP FBiH), (Official Gazette of the Federation BiH, no. 48/14)[38] *(Plan adopted by FBiH Government on 5.6.2014)*

Table 16 - Brief overview of strategic and planning documents in BiH with an impact on primary energy savings

2.3 Measures aimed at primary energy savings

2.3.1 Measures on the energy generation side

2.3.1.1 Measures implemented in the previous period and measures currently under implementation

2.3.1.1.1 Electricity generation measures

Competences for regulation of electricity generation in Bosnia and Herzegovina rest with the Federation BiH, Republic of Srpska and Brčko District BiH. *Detailed overviews of relevant measures, activities and projects implemented in the previous period and/or currently being implemented are shown in the EEAPF 2016-2018 for the Federation BiH and in the Amendments to the EEAP RS 2018 for the Republic of Srpska.*

Electricity generation in the territory of Brčko District BiH is currently negligible. The same applies to electricity generation from renewable sources and efficient cogeneration, as this area is still not regulated.

2.3.1.1.2 Heating and cooling measures

Article 14 of the Directive 2012/27/EU, referring to the obligation to promote efficient heating and cooling, considers the following viable alternatives for improved energy efficiency in this area:

i. Use of high-efficiency cogeneration[39];
ii. Efficient heating and cooling[40];
iii. Heating using waste heat from industrial processes and renewable energy sources;
iv. Use of other efficient heating and cooling options, in the case that none of the above options are economically feasible.

[32] Ibid.
[33] http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/std/Pages/Akcioni_plan_za_energetsku_efikasnost_.aspx
[34] http://www.reers.ba/lat/node/1298 i
http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/Pages/Obnovljivi_izvori_energije.aspx
[35] http://www.fmoit.gov.ba/download/Federalna%20strategija%20zastite%20okolisa.pdf
[36] http://www.fzzpr.gov.ba/bs/docs/24/3/strateski-dokumenti-fbih
[37] http://www.fbihvlada.gov.ba/bosanski/zakoni/2014/odluke/96.html
[38] http://operatoroieiek.ba/wp-content/uploads/2016/05/APOEF.compressed.pdf;
http://fmeri.gov.ba/akcioni-plan-za-koristenje-obnovljivih-izvora-energije-u-federaciji-bih.aspx
[39] According to the definition of high-efficiency cogeneration provided in Article 2(34) of Directive 2012/27/EU;
[40] According to the definition of efficient heating and cooling provided in Article 2(42) of Directive 2012/27/EU;

In Bosnia and Herzegovina to date the issue of heating was addressed solely on the local level, in individual cities and municipalities in the Federation BiH, Republic of Srpska and Brčko District BiH. The legal framework is absent, as is the strategic/systematic approach from higher government levels that would ensure its harmonisation with the priority areas.

A detailed overview of measures, activities and projects implemented in the area of heating and cooling in the previous period and/or currently being implemented is shown in the EEAPF 2016-2018 for the Federation BiH and in the Amendments to the EEAP RS 2018 for the Republic of Srpska.

Situation in the Brčko District BiH:

Brčko District currently does not have any district heating systems. The Brčko District SEAP indicated that the total annual energy consumption for heating in 2012 amounted to 19,694,391 kWh, with the following distribution by sectors: buildings of the Brčko District BiH Government and Assembly - 2,427,986 kWh, offices of local communities - 1,876,252 kWh, public companies - 723,000 kWh, preschool and schools - 8,967,320 kWh, healthcare - 3,000,523 kWh, culture - 722,310 kWh, sports - 635,000 kWh, and police, judiciary, etc. - 1,342,000 kWh. The predominant energy generation product is heavy fuel oil (75.43%), followed by electricity (20.67%), coal (3.17%) and wood (0.73%).

The *Brčko District SEAP* foresees a programme of substitution of existing energy products with new ones, which includes the following measures:

Measure 5: Gasification of the town of Brčko;

Measure 6: Construction of district heating (cogeneration plant) using an environmentally friendly fuel, with a total capacity of 32 MW of heat and 16 MW of electricity, and connection of some of the public administration buildings and commercial buildings to this system;

Measure 7: Creation of a district heating system to cover approximately 4,000 apartments (220,000 m2) and around 170,000 m2 of public and business buildings.

2.3.1.2 Measures planned for the coming period

In order to achieve the defined primary energy consumption target, in the coming period Bosnia and Herzegovina will implement priority measures in the electricity generation and heat generation sector, as shown in Table 17[41]. Some of these measures were transposed from the requirements of Directive 2012/27/EU (Article 14), while others were taken from existing strategic documents listed in section 2.2.

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
GH.1	Cost-benefit analysis (CBA), based on climate conditions, economic capabilities and technical parameters, aimed at determining the most cost-effective solutions to address heating and cooling needs in the entire territory of BiH. The cost-benefit analysis will be conducted in line with the requirements of Annex IX of the Directive 2012/27/EU and Chapter C of *EC Guidelines for Implementation of Article 14 of the Directive 2012/27/EU* (document number. SWD(2013) 449 final)	Directive 2012/27/EU: • Article 14(3) • Annex IX • SWD(2013)449 Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015[42]	MoFTER; FMoEMI; MoIEM; BD	2017-2018
GH.2	Comprehensive Assessment of potentials for use of high-efficiency cogeneration and efficient district heating and cooling in BiH, in accordance with the requirements of Annex VIII of the Directive 2012/27/EU and Chapter B of the *EC Guidelines for Implementation of Article 14 of the Directive 2012/27/EU* (document no. SWD(2013) 449 final), based on	Directive 2012/27/EU: • Article 14(1) • Annex VIII • SWD(2013)449 Decision of the Ministerial Council of the Energy	MoFTER; MoIEM; FMoEMI; BD	30.11.2018

[41] The listed measures also form an integral part of *EEAP FBiH 2016-2018* and *Amendments to EEAP RS 2018*

[42] https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3854291/227265DDEA7C1644E053C92FA8C02C2C.PDF

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
	the results of the cost-benefit analysis conducted in measure GH.1	Community no. D/2015/08/MC-EnC, dated 16 October 2015		
GH.3	Adoption and implementation of appropriate measures for development of energy efficient district heating and cooling infrastructure, high-efficiency cogeneration and heating on waste heat and RES (if the Comprehensive Assessment of Potentials in measure GH.2 returns positive results), in order to utilise the estimated potential. These measures must also include policy measures to stimulate utilisation of this potential at the local level, taking into account development potentials of the local and regional markets for heating energy.	Directive 2012/27/EU: • Article 14(4)	MoFTER; FMoEMI; MoIEM, MSPCEE; BD	2019 and onwards
GH.4	Introduction of a mandatory cost-benefit analysis when planning, after 15 October 2017: a. Construction of any new thermal power plant with installed capacity greater than 20 MW, in order to evaluate the costs and benefits of its operation as a high-efficiency cogeneration plant; b. Substantial reconstruction of any existing thermal power plant with installed power greater than 20 MW, in order to evaluate the costs and benefits of its transformation to a high-efficiency cogeneration plant; c. Construction of a new industrial plant, or substantial reconstruction of an existing industrial plant, with a total installed power greater than 20 MW generating waste heat at a useful temperature level, in order to evaluate the costs and benefits of utilisation of waste heat, including through cogeneration, to meet economically justified demand, and of connection of such plant to the district heating and cooling network. d. Construction of a new district heating system, or substantial reconstruction of an existing district heating system, with a total installed power capacity than 20 MW, in order to evaluate the costs and benefits of utilisation of waste heat from nearby industrial plants. The cost-benefit analysis in all above cases will be conducted in line with the requirements of Annex IX (Part 2) of the Directive 2012/27/EU and Chapter D of *EC Guidelines for Implementation of Article 14 of the Directive 2012/27/EU* (document no. SWD(2013) 449 final)	Directive 2012/27/EU: • Article 14(5) • Article 14(6) • Annex IX, Part II • SWD(2013)449 Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015	MoFTER, SERC; MoIEM, MSPCEE, RERS; FMoEMI; BD	15.10.2017
GH.5	Harmonisation of laws and by-laws in the electricity sector with the provisions of Articles 14(7) and 14(8) of the Directive 2012/27/EU, by introducing the obligation to include, in the procedure for issuance of construction permits	Directive 2012/27/EU: • Article 14(7) • Article 14(8) • SWD(2013)449	MoFTER, SERC; MoIEM, RERS; FMoEMI, FMSP; BD	For GH.5(a): 15.10.2017 For GH.5(b): 2019

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
	for new electricity generation plants and licences for operation of electricity generation plants, the following criteria: a. Cost-benefit analysis was carried out for the plant as part of the measure GH.4 (for electricity generation plants subject to this measure), and the results of this analysis were used to determine minimum technical, operating and other parameters for the plant. b. Results of the *Comprehensive Assessment of potentials for use of high-efficiency cogeneration and efficient district heating and cooling* for the plant, conducted as part of the measure GH.2 above, were taken into account; Harmonisation of the procedure and criteria must be done in accordance with the requirements of Chapter E of the *EC Guidelines for Implementation of Article 14 of the Directive 2012/27/EU* (document no. SWD(2013) 449 final)	Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015		
GH.6	Harmonisation of existing laws and by-laws in the renewable energy sources and efficient cogeneration sector with the provisions of Article 14(10) and 14(11) of Directive 2012/27/EU concerning guarantees of origin of electricity from high-efficiency cogeneration, and the requirements for provision of support to cogeneration and district heating systems	Directive 2012/27/EU: • Article 14(10); • Article 14(11); • Annex X Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015	MoFTER, SERC; MoIEM, RERS; FMoEMI, FERK, Operator for RES&EC; BD	15.10.2017
GH.7	Further improvement of the information system and energy efficiency reporting in the electricity generation and heating and cooling energy generation sector, inclusive of efficient cogeneration, and in reporting actual primary energy savings	Directive 2012/27/EU; Entity electricity laws and related reporting rulebooks; Entity laws on RES&EC	MoFTER, SERC; RS Fund, MoIEM; RERS, companies in the electricity/heat generation and similar lines of business FMoEMI, FERK, Operator for RES&EC; BD	Continuous
GH.8	Implementation of programmes, priority measures and activities in the electricity and heat generation sector, including the district heating sector and efficient cogeneration, planned in the existing strategic and planning documents of Bosnia and Herzegovina, Federation BiH, Republic of Srpska, Brčko District BiH and the relevant energy companies	Strategic and planning documents listed in Section 2.2 of this document; Relevant planning documents in energy companies	Owners of planning activities	According to planned timeframes

Table 17 - Summary overview of energy saving measures in heat and electricity generation

2.3.2 Measures on the energy transmission and distribution side

Technical and organisational infrastructure for transmission and distribution of electricity in BiH

According to the *Long-Term Transmission Grid Development Plan 2015-2024*, the transmission grid in BiH consists of 400 kV, 220 kV and 110 kV overhead lines and cables, with a total length of approximately 6235.7 km. Of the total length, 14% are 400 kV transmission lines, 24% are 220 kV lines and 62% are 110 kV lines. The transmission system comprises 151 substations: 9 SS 400/x kV, 9 SS 220/x kV, 128 SS 110/x kV, and 5 SS 35/x kV; 278 transformers – 7 TR 400/220 kV, 7 TR 400/110 kV, 13 TR 220/110 kV, 219 TR 110/x kV, 30 TR SN/SN kV and 1 220/115 kV; together with the appropriate protective, metering and telecommunications equipment.

The area of electricity transmission in Bosnia and Herzegovina is governed by state-level authorities of Bosnia and Herzegovina. The laws governing formation of regulatory bodies for electricity transmission and their scope of competence, including in the area of energy efficiency, are the following:

i. *Law on Transmission of Electric Power, Regulator and System Operator of BiH*[43] (Official Gazette of BiH, numbers 07/02, 13/03, 76/09 and 1/11);
ii. *Law Establishing the Company for the Transmission of Electricity in BiH*[44] (Official Gazette of BiH, no. 35/04, 76/09, 20/14);
iii. *Law Establishing an Independent System Operator for the Transmission System of BiH*[45] (Official Gazette of BiH, no. 35/04).

According to the *Law on Transmission of Electricity, Regulator and System Operator of BiH*, as well as entity laws governing electricity, the company responsible for transmission is ***"Elektroprenos - Elektroprijenos BiH" a.d. Banja Luka***[46]. This company is responsible for transmission, maintenance, construction, expansion and management of the electricity transmission network in Bosnia and Herzegovina.

The ***Independent System Operator of BiH (ISO BiH)*** [47]was established pursuant to the same law. It acts as the operator and dispatcher of the transmission network in Bosnia and Herzegovina and manages, plans and coordinates network maintenance, construction and expansion together with the company "Elektroprenos - Elektroprijenos BiH" a.d. Banja Luka.

"Elektroprenos - Elektroprijenos BiH" a.d. **Banja Luka**[48] is a company established in accordance with the *Law Establishing the Company for the Transmission of Electricity in BiH* through a transfer of assets, liabilities and ownership of assets required for transmission of electricity and other transmission-related business activities from electric utility companies in Bosnia and Herzegovina. Company operations, which include transmission, maintenance, construction, expansion and management of the electricity transmission network in Bosnia and Herzegovina, are regulated by the State Electricity Regulatory Commission in BiH (SERC). In the territorial and functional sense, this company covers four operating areas – Banja Luka, Mostar, Sarajevo and Tuzla.

Independent System Operator of BiH (ISO BiH)[49] - established in 2005 by the Parliamentary Assembly of Bosnia and Herzegovina pursuant to the *Law on Transmission of Electric Power, Regulator and System Operator of BiH.* The work of ISO BiH, a non-profit company owned by the entities (Republic of Srpska and Federation BiH) and operating on the entire territory of Bosnia and Herzegovina, is regulated by SERC. The key functions of ISO BiH are:

- *Maintaining system integrity. ISO operates as a system coordinator, providing security assessments and coordinating urgent and non-urgent operations to ensure system integrity;*
- *Management of energy flows through the system, maintaining the market for regulation of discrepancies and otherwise ensuring reliable and uninterrupted flow of electricity through the system;*
- *Provision of ancillary network services in order to ensure electricity supply and transmission at stable frequencies and voltages. Ancillary services include frequency regulation, operational reserves, voltage regulation and plant commissioning services;*

[43] http://www.derk.ba/ba/legislativa
[44] ibid
[45] ibid
[46] http://www.elprenos.ba
[47] http://www.nosbih.ba
[48] http://www.elprenos.ba
[49] http://www.nosbih.ba

- *Transmission thresholds management. ISO is responsible for identification, management and mitigation of transmission network overloads and coordination of dispatching with energy generators in order to mitigate and manage overloads;*
- *Providing information about the transmission system. ISO must provide timely and widely available information about transmission capacities, ancillary services and prices to all transmission users and the public, in order to establish an open and transparent transmission regime;*
- *Coordination with neighbouring regulatory territories. ISO develops mechanisms for coordination with neighbouring regulatory territories and for transits, imports and exports of electricity;*
- *Coordination of load management. ISO coordinates load management activities and is authorised to restrict consumption, manage loads and otherwise act to maintain system balance.*
- *Preparation of the Indicative Production Development Plan and reviewing, approving and direct reviewing of the Long-Term Transmission Network Development Plan.*

State Electricity Regulatory Commission of Bosnia and Herzegovina (SERC)[50], established by the Parliamentary Assembly of BiH, is responsible for regulation of electricity transmission. SERC is responsible and authorised for, inter alia:

- *Issuance, modification, suspension, termination, monitoring and control of adherence for transmission licenses and other licenses issued pursuant to provisions of Article 7.1;*
- *Approvals, monitoring and enforcement of tariffs and tariff methodologies for transmission, and regulation of ancillary services;*
- *In accordance with provisions of this law and the policy adopted by the Ministry, issuance of rules and regulations within its scope of competence, including review and adoption of market rules and network codes prepared by the Independent System Operator (ISO BiH) and the norms and conditions of network connection and access;*
- *Establishment, monitoring and enforcement of rules for fair and non-discriminatory third party access to the transmission network;*
- *Establishment, monitoring and implementation of quality standards for electricity transmission and ancillary services;*
- *Coordination and approval of electricity transmission company investment plans, including plans concerning the transmission network and quality of transmission services;*
- *Issuance of licenses and monitoring of ISO activities, inclusive of effectiveness of mechanisms and methods used for balancing electricity demand and supply in the system;*
- *Consumer protection, to ensure: (i) fair and equal treatment, (ii) high service quality, and (iii) competition and prevention of anti-competitive activities;*
- *Resolution of disputes between system users, as detailed in SERC rules and regulations and other legal acts, in accordance with its regulatory authority and relevant state laws;*
- *Creation and maintenance of competitive markets, where feasible, and prevention and sanctioning of opportunistic and anti-competitive behaviours;*
- *Approving mechanisms for addressing electricity transmission system capacity overloads;*
- *Regulation of service standards, codes of conduct and accounting requirements for license holders.*

Entities are responsible for distribution of electricity. *An overview of technical and organisational structure in this area is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.*

As for the Brčko District, according to **JP "Komunalno Brčko"**[51] (company licensed by SERC for electricity distribution in the Brčko District and for electricity trade and supply on the territory of Bosnia and Herzegovina), the total number of consumers in Brčko District is approximately 35,000 with total annual consumption of approx. 225-260 GWh of electricity. Its electricity distribution network consists of: 100 km of 35 kV transmission lines, 410 km of 10 kV transmission lines, 8 35/10 kV substation hubs and 476 10(20)/0.4 kV substations.

As stated in the justification of the *Decision on Tariffs for Electricity Distribution Services in Brčko District BiH*[52] (SERC, 29.12.2014), losses in the Brčko District distribution network in 2013 were 13.05%.

Entities are responsible for regulation of electricity distribution operators, however SERC is responsible for regulation in the Brčko District BiH.

Technical and organisational infrastructure for transmission and distribution of gas

[50] http://www.derk.ba/ba
[51] http://www.komunalno.ba
[52] http://www.derk.ba/DocumentsPDFs/Distribucija-OBR-Tarifa-Brcko-b.pdf

Bosnia and Herzegovina does not have its own sources of natural gas and all supply comes exclusively from imports. Gas is procured from Russia and transported across Ukraine, Hungary and Serbia via the Beregovo - Horgoš - Zvornik pipeline. Gas enters the transport system from Serbia, near Šepak, and is received at the inlet station Karakaj. Outlets from the transport system are located in: MMRS (main metering and regulation station) Karakaj, MRS (metering and regulation station) Alumina for the alumina factory "Alumina" d.o.o. Zvornik, MS Industrial Zone Zvornik for consumers in the Karakaj industrial zone, MMRS Zvornik for consumers in Zvornik and Mali Zvornik, and MS Kladanj in Starić, owned by the company "BH Gas" d.o.o. Sarajevo, for consumers in the Federation BiH and some consumers in the Republic of Srpska and East Sarajevo.

The gas sector in Bosnia and Herzegovina is not regulated. Bosnia and Herzegovina still does not have a law on gas, which was an obligation undertaken with the signing of the Energy Community Treaty. Consequently, there is no regulatory agency for gas in Bosnia and Herzegovina. The existing regulatory agency (SERC) is responsible only for the electricity sector.

Information about measures and activities in the gas sector is provided in EEAP FBiH 2016-2018 and Amendments to EEAP RS 2018.

Brčko District did not consume significant volumes of natural gas in the period to date (*Study of the Energy Sector in BiH / Module 10 - Natural Gas; Sustainable Development Action Plan for Brčko District BiH*).

2.3.2.1 Measures implemented in the previous period and measures currently under implementation

Transmission grid losses in Bosnia and Herzegovina in the period 2005-2015, relative to annual electricity consumption on the transmission grid[53], are shown in the following figure:

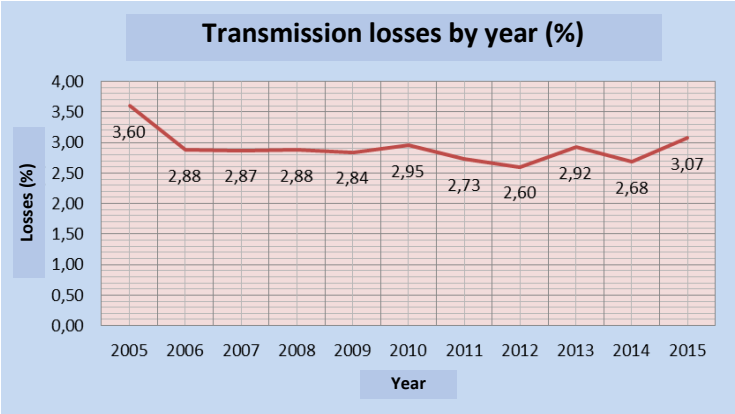

Figure 1 - Transmission grid losses in BiH for the period 2005-2015

State-level laws governing formation of regulatory bodies for electricity transmission and their scope of competences, including in the area of energy efficiency, are the following:

Law on Transmission of Electric Power, Regulator and System Operator of BiH[54] (Official Gazette of BiH, numbers 07/02, 13/03, 76/09 and 1/11);
Law Establishing the Company for the Transmission of Electricity in BiH[55] (Official Gazette of BiH, no. 35/04, 76/09, 20/14);
Law Establishing an Independent System Operator for the Transmission System of BiH[56] (Official Gazette of BiH, no. 35/04).

The energy sector in Brčko District, including formal competences in individual segments of the electricity sector (generation, transmission, distribution, supply) is regulated through the following laws:

Electricity sector:
I. *Law on Electricity*[57] (Official Gazette of Brčko District BiH, no. 36/04, 28/07, 61/10 and 4/13);

[53] Source: *Indicative Production Development Plan* 2017-2026 (ISO BiH, March 2016)
[54] http://www.derk.ba/ba/legislativa
[55] ibid
[56] ibid
[57] http://skupstinabd.ba/ba/zakon.html?lang=ba&id=/Zakon%20o%20elektric--noj%20energiji

II.	*Law on Amendments to the Law on Transmission of Electric Power, Regulator and System Operator of BiH*[58] (Official Gazette of BiH, no. 76/09, 28.9.2009) - prescribing SERC as the regulatory authority for electricity generation, distribution and supply in Brčko District BiH
Gas sector: N/a	

With regard to **distribution losses in the electricity sector**, according to the *FERK Operating Report for the Year 2015*, losses in the electricity distribution grid in the Federation BiH in 2015 were 8.66% for JP Elektroprivreda BiH and 11.09% for JP Elektroprivreda HZHB.

According to the *Operating Report of the Regulatory Commission for Energy of the Republic of Srpska for 2015*, total losses in the electricity distribution sector in the Republic of Srpska in 2015 were 11.89%.

According to these reports, in both entities there is an evident downward trend for losses in the electricity distribution network. According to the same report, in the previous period in the Republic of Srpska there was a marked trend of reduction of losses in distribution/transport of natural gas.

According to the justification of the *Decision on Tariffs for Electricity Distribution Services in Brčko District BiH*[59] (SERC, 29.12.2014), losses in the Brčko District distribution network in 2013 were 13.05%.

Overview of measures and activities in the Federation BiH and Republic of Srpska, primarily in terms of adoption of appropriate primary and secondary legislation impacting energy efficiency of the distribution network, is shown in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018 which form an integral part of this document.

2.3.2.1.1 Energy efficiency criteria in network tariffs and regulations

Progress to date on inclusion of the obligation to stimulate energy efficiency into the scope of competences of the Regulator and common regulatory activities (pursuant to Article 15(1), item 1 of the Directive 2012/27/EU)

The *Law on Transmission of Electric Power, Regulator and System Operator of BiH* stipulates that regulatory functions, required by EU legislation, are performed by the State Electricity Regulatory Commission (SERC). According to this law, SERC's scope of competence and authority includes, inter alia: approval, supervision and enforcement of tariffs and tariff methodologies for transmission and regulation of ancillary services; and coordination and approval of electricity transmission company's investment plans, including plans for the transmission network and quality of transmission services.

A significant package of legislative acts for the electricity sector was adopted at the level of Bosnia and Herzegovina in the previous period:

i.	*Law on Transmission of Electric Power, Regulator and System Operator of BiH* (Official Gazette of BiH, numbers 07/02, 76/09, 1/11 and 13/03);
ii.	*Network Code* (ISO BiH, approved by SERC on 11.5.2011);
iii.	*Rulebook on Tariff Proceedings*[60] (SERC, 21.5.2005)
iv.	*Decision on Forms for Data Submission in the Tariff Process*[61] (SERC, 7.6.2005, amended on 10.10.2012)
v.	*Tariff pricing methodology for services of electricity transmission, operation of independent system operator and ancillary services*[62] (SERC, 6.9.2011, amended on 16.7.2014);
vi.	*Current tariffs*[63]*:* *a. Decision on Transmission Tariffs* (SERC, 21.5.2015)*;* *b. Decision on Tariff for ISO Operation* (SERC, 29.12.2015)*;* *c. Decision on Tariffs for Ancillary and System Services* (SERC, 29.12.2015, amended on 28.6.2016); *d. Decision on Tariff for System Services for Transmission System Users in the Functional Testing and Commissioning Phase* (SERC, 29.12.2015, amended on 28.6.2016);
vii.	*Tariff items*[64]*:*

[58] http://www.derk.ba/DocumentsPDFs/Zakon%20o%20izmjenama%20i%20dopunama%20zakona%20o%20prijenosu,%20regulatoru%20i%20operateru%20sistema%20elektricne%20energije%20-%20b%2076_09.pdf

[59] http://www.derk.ba/DocumentsPDFs/Distribucija-OBR-Tarifa-Brcko-b.pdf

[60] http://www.derk.ba/ba/pravila-i-propisi-derk-a/tarifna-pravila

[61] ibid

[62] ibid

[63] http://www.derk.ba/ba/tarife/vaee-tarife

[64] ibid

a. *Tariff items for sale of electricity in the Federation BiH for EP BiH;*
b. *Tariff items for sale of electricity in the Federation BiH for EP HZHB;*
c. *Tariff items for sale of electricity in the Republic of Srpska*

The State Electricity Regulatory Commission (SERC) is responsible for network regulation and approval of network tariffs for Brčko District BiH. The relevant legal framework in Brčko District includes the following laws and bylaws:

i. *Law on Electricity* (Official Gazette of Brčko District BiH, no. 36/04, 28/07, 61/10 and 4/13);
ii. *General Terms of Supply of Electricity in the Brčko District BiH*[65] (UO JP "Komunalno Brčko" d.o.o, 15.12.2015);
iii. *Rulebook on Electricity Supply to Customers in the Brčko District BiH*[66] (SERC, 14.11.2013, amended on 6.11.2014 and 29.12.2015);
iv. *Distribution Network Rules in the Brčko District BiH*[67] (JP "Komunalno Brčko", 16.11.2011);
v. *Rulebook on Methodology for Determination of the Fee for Connection to the Distribution Network in the Brčko District BiH*[68] (JP "Komunalno Brčko" d.o.o, approved by SERC on 8.12.2011);
vi. *Tariff Pricing Methodology for Electricity Supply to Customers in the Brčko District BiH* (SERC, 26.10.2011[69], amended on 6.11.2014[70]);
vii. *Decision on Tariffs for Electricity Supply Within Universal Service in the Brčko District BiH*[71] (SERC, 6.11.2014);
viii. *Current tariffs:*
   a. *Decision on Tariffs for Electricity Distribution Services in the Brčko District of BiH*[72] (SERC, 29.12.2014);
   b. *Decision on Tariffs for Electricity Supply Within Universal Service in the Brčko District BiH*[73] (SERC, 29.12.2014);
   c. *Decision on Tariff Items for Sale of Electricity to Medium Voltage Customers and Public Lighting Customers*[74] (UO JP „Komunalno Brčko", 30.12.2014)

The Tariff pricing methodology for electricity transmission services, operation of the Independent System Operator and ancillary services prescribes that calculation of justifiable costs arising from electricity losses in the transmission grid must be based on the annual volume of transmitted energy. All parties responsible for balancing must provide coverage for transmission grid losses arising from their own consumption. Respective losses for all parties responsible for balancing are determined by ISO BiH based on data measured at the boundary between the transmission network and the generation facility/distribution network, taking cross-border energy exchanges into account.

Description of the situation in the Federation BiH and Republic of Srpska is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Completion of the implementation of this measure, i.e. insertion of clear and direct energy efficiency criteria into regulations on tariff methodology and tariff systems in electricity and gas transmission and distribution sectors, is planned for the next period (*section 2.3.2.2: Measures planned for the next period).*

Existing regulatory energy efficiency measures aimed at incentivisation of operators to implement and develop smart grids[75] as a prerequisite for uninterrupted use of the network by all users (obligation from Article 15(1), item 2 of the Directive 2012/27/EU)

[65] http://www.komunalno.ba/images/stories/JPK/Elektrodistribucija/Dokumenti/bos_opi%20uslovi%20za%20isporuku%20i%20snabdijevanje%20elektrinom%20energijom%20bd%20bih%20bos%20decembar%202015%20f.compressed.pdf
[66] http://www.derk.ba/DocumentsPDFs/Pravilnik-o-snabdijevanju-kupaca-u-Brcko-Distriktu-BiH-b.pdf
[67] http://www.komunalno.ba/images/stories/JPK/Elektrodistribucija/distributivna-pravila/distributivna_mrezna_pravila_bosanski_jezik.pdf
[68] http://www.komunalno.ba/images/stories/JPK/Elektrodistribucija/metologija/metodologija_za_utvrdjivanje_srpski.pdf
[69] http://www.derk.ba/ba/pravila-i-propisi-derk-a/tarifna-pravila
[70] http://www.derk.ba/DocumentsPDFs/Odluka-o-izmjenama-Tarifne-metodologije-za-distribuciju-Brcko-Distrikt-6Nov2014-b.pdf
[71] http://www.derk.ba/DocumentsPDFs/Metodologija-za-odredjivanje-tarifa-za-javnu-uslugu-Brcko-Distrikt-6Nov2014-b.pdf
[72] http://www.komunalno.ba/index.php?option=com_content&view=article&id=61%3Aelektrodistribucijadokumenti&catid=29%3Akorisnicki servis&Itemid=211&lang=sr
[73] ibid
[74] http://www.komunalno.ba/images/stories/JPK/Elektrodistribucija/Dokumenti/odluka-tarifni%20stavovi.pdf
[75] The concept of smart grids was developed in 2006 by the Smart Grid European Technology Platform (http://www.smartgrids.eu/). According to this concept, a smart grid is a network which uses innovative products and services coupled with intelligent supervision, control, communication and self-regulating technologies to: (i) Allow better connection and functioning of electricity producers of any size/capacity and with any type of technology; (ii) Allow consumers to participate in system optimisation; (iii) Provide consumers with better information and an option to choose; (iv) Significantly reduce the environmental impact of the entire electricity system; (iv) Achieve higher reliability and security of delivery. The purpose of smart grids is to intelligently integrate all network users (which are also market actors) - producers,

Attainment of EU goals related to substantial reduction of primary energy consumption and increased efficiency of power systems is possible only with efficient management of this system, which primarily implies:

i. Efficient integration into the power system of all sources of distributed/decentralised electricity generation, i.e. small energy sources located as close as possible to end consumers;
ii. Active participation of all demand response actors in the entire production and consumption chain.

There are two main challenges in terms of integration of distributed power generation which is mostly of variable character (wind power, photovoltaic solar):

- Their integration into the electricity network infrastructure, because integration of a large number of distributed producers increases the technical requirements for ancillary services; and
- Their integration into the electricity market, because with large volumes of variable production capacities it is much more difficult to balance supply and demand.

The necessary technical condition for implementation of this requirement is therefore the introduction of 'smart' grids[76], whose development should enable the electricity distribution sector to address all challenges presented by the liberalised electricity market. The purpose of smart grids is to intelligently integrate all network users (market actors) – energy generators, transmission and distribution network operators, technical management and measurement centres, suppliers and consumers, through real-time exchange of information, with the objective to ensure a sustainable, economically viable and reliable supply of electricity.

Adoption of previously mentioned legislation was a significant step forward in this aspect of electricity transmission.

Description of the situation in electricity distribution in the Republic of Srpska and Federation BiH is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.

Completion of the implementation of this measure, through introduction of clearly defined incentives for operators for introduction and development of smart grids, is planned for the next period (*Section 2.3.2.2: Measures planned for the next period).*

Existing regulatory measures for incentivisation of operators to improve efficiency through network design and functionality (obligation from Article 15(4) and Annex XIV (2.2) of the Directive 2012/27/EU)

Description of the situation in the Federation BiH and Republic of Srpska is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.

Completion of implementation of this measure is planned for the next period (*Section 2.3.2.2: Measures planned for the next period).*

Existing regulatory measures aimed at tariffs which would allow suppliers to increase consumer participation in energy system efficiency improvements, including demand response[77] (obligation from Article 15(4) and Annex XIV(2.2) of the Directive 2012/27/EU)

Current legislation of Bosnia and Herzegovina (*Tariff pricing methodology for services of electricity transmission, operation of Independent System Operator and ancillary services*) provides for differentiation of tariffs according to the following criteria: (i) seasonal tariff items; (ii) daily tariff items; (iii) tariff items for peak load periods; and (iv) tariff items for different consumption levels (block tariffs). These tariffs consist of the following tariff elements: peak power, active electricity fed into the transmission grid by connected producers, received active electricity, and received surplus reactive energy.

Description of the situation in the Federation BiH and Republic of Srpska is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.

Completion of implementation of this measure is planned for the next period (*Section 2.3.2.2: Measures planned for the next period).*

transmission and distribution network operators, technical management and measurement centres, suppliers and consumers, through real-time exchange of information, with the objective to ensure a sustainable, economically viable and reliable supply of electricity.

[76]The concept of smart grids was developed in 2006 by the Smart Grid European Technology Platform (http://www.smartgrids.eu/). According to this concept, a smart grid is a network which uses innovative products and services coupled with intelligent supervision, control, communication and self-regulating technologies to: (i) Allow better connection and functioning of electricity producers of any size/capacity and with any type of technology; (ii) Allow consumers to participate in system optimisation; (iii) Provide consumers with better information and an option to choose; (iv) Significantly reduce the environmental impact of the entire electricity system; (iv) Achieve higher reliability and security of delivery.

[77] The term "demand response" is defined as changes in normal consumption patterns in response to: (1) changes in the price of electricity over time, or to (2) incentive payments to consumers designed to induce lower electricity use at times of high wholesale energy prices or when system reliability is jeopardized.

Existing regulatory measures for development of demand response services through network tariffs (Annex XI.3 of the Directive 2012/27/EU)

The entire concept of demand response, inclusive of demand response services, is not fully transposed into the Rulebook on the Tariff Methodology and Tariff Procedure for Electricity and other laws and by-laws relevant for electricity. Completion of implementation of this measure is planned for the next period (*Section 2.3.2.2: Measures planned for the next period).*

2.3.2.1.2 Measures for enabling and promotion of demand response

Existing measures for enabling and development of demand response, including the measures related to introduction of dynamic pricing (Article 15(4), Article 15(8) and Annexes XI(3) and XIV(2.3.6) of the Directive 2012/27/EU)

The concept of demand response, as an important resource for energy efficiency improvements in the electricity system, is currently being incorporated into appropriate laws and by-laws at the level of Bosnia and Herzegovina. Existing legislation in Bosnia and Herzegovina relevant for regulation of market relations between ISO BiH and licensed electricity market participants and initial legislative stimulation of demand response was combined into a package of market rules and adopted by SERC. These rules, amongst other things, regulate the manner in which ISO BiH meets its obligations with regard to management and operation of balancing mechanisms, management of ancillary service agreements, billing of ancillary services and balancing, etc. These market rules comprise the following by-laws:

Decision on the Market Opening[78] (SERC, 8.6.2006, amended on 23.9.2009);
Rulebook on Electricity Supply to Customers in Brčko District BiH[79] (SERC, 14.11.2013, amended on 6.11.2014);
Rules on Third Party Access to the Transmission System[80] (SERC, 7.12.2006);
Market Rules[81] (ISO BiH, 24.4.2015);
Decision on Approval of the Market Rules [82] (SERC, 7.5.2015);

This also introduced the concept of ancillary balancing services in the electricity system. This area is regulated by the following by-laws:

Decision on a temporary regime for the provision of ancillary services and balancing of the power system in BiH[83] (SERC, 26.3.2014);
Concept of Ancillary Services for the balancing of the power system of BiH[84] (SERC, 26.3.2014);
Basis for development of procedures from the Concept of Ancillary Services for the balancing of the power system of BiH[85] (SERC, March 2014);
Conclusion on the adoption of the Activity Plan for Implementation of the Concept of Ancillary Services for the balancing of the power system of BiH, and the Activity Plan[86] (SERC, 26.3.2014);
Conclusion on the initiation of activities on adoption of new market rules[87] (SERC, 26.3.2014);
Decision on a temporary regime for the provision of ancillary services and balancing of the power system in BiH[88] (SERC, 18.11.2014);
Decision on a test period for application of implementing rules and procedures for provision of ancillary services and balancing of the power system in BiH[89] (SERC, 30.12.2014, amended on 21.5.2015);
Decision on Determination of Coefficients and Price Caps for Ancillary Services[90] (SERC, 7.5.2015, amended on 18.11.2015, 28.6.2016)

[78] http://www.derk.ba/ba/trziste
[79] ibid
[80] http://www.derk.ba/DocumentsPDFs/pravila%20o%20pristupu%20trece%20strane%20na%20prenosni%20sistem%2007-12-06%20BOS.pdf
[81] http://www.derk.ba/ba/trziste
[82] ibid
[83] http://www.derk.ba/ba/trziste
[84] ibid
[85] ibid
[86] ibid
[87] ibid
[88] ibid
[89] ibid
[90] ibid

Description of the situation in the Federation BiH and Republic of Srpska is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Implementation of this measure is planned for the next period (*Section 2.3.2.2: Measures planned for the next period).* It is important to note that development of smart grids is a necessary condition for adequate implementation of demand response measures.

2.3.2.1.3 Energy efficiency in network design and functionality

Activities to date on assessment of potentials for energy efficiency improvements in electricity and gas infrastructure in Bosnia and Herzegovina, particularly with regard to transmission, distribution, load management and interoperability, as well as connection of energy generation facilities inclusive of micro energy generators, and on determining appropriate investment programmes for improvement of energy efficiency of these systems (Article 15(2), Article 15(5) and Annex XIV(2.3.5) of the Directive 2012/27/EU)

Measures implemented in the previous period primarily concerned: (i) reduction of technical losses through traditional improvements of the technical infrastructure in the power system (transformer stations and lines); and (ii) provision of technical conditions for efficient grid management through efficient activation of demand response.

After several years of suspended operation of the company Elektroprijenos - Elektroprenos BiH, an investment cycle was finally initiated in the last period for technical and managerial improvement of the transmission system in Bosnia and Herzegovina. This process includes adoption of the necessary planning documents for this company and the start of their implementation. These documents are:

Plan of Investments for *2015*[91] (Elektroprenos – Elektroprijenos a.d. Banja Luka, December 2014);

Long-Term Transmission Network Development Plan 2014-2023[92] (Elektroprijenos, October 2014; approved by SERC on 4.11.2014);

Long-Term Transmission Network Development Plan 2015-2024[93] (Elektroprijenos, September 2015; approved by SERC on 3.3.2016);

Long-Term Transmission Network Development Plan 2016-2025[94] (Elektroprijenos, May 2016; approved by SERC on 30.8.2016);

These ten-year plans are adopted as part of Bosnia and Herzegovina's commitments to the European Network of Transmission System Operators for Electricity (ENTSO-E), in order to contribute to the development of the European Ten-Year Network Development Plan (TYNDP)[95]. These plans foresee substantial investments in the transmission network in the coming period (construction of new substations, power lines and fields; expansion and installation of the second transformer in substations, reconstruction and refurbishment of high voltage and medium voltage facilities and lines, as well as replacement of transformers). The main criterion in the planning and implementation of the electricity transmission network of Bosnia and Herzegovina is minimisation of total costs (investment and exploitation), coupled with system security requirements.

As for investment works, several contracts for refurbishment, reconstruction and construction of transmission lines and transformer stations have been executed or are currently in progress. According to the *SERC Operating Report for 2015*, in the year 2015 alone the total value of completed contracts was around 5.5 million BAM, and the value of construction and reconstruction investments completed and ongoing in the year 2016 was 17.9 million BAM. The most important projects are:

Refurbishment of the 400 kV transmission line Buk Bijela – Sarajevo; total value 1.5 million BAM;

Construction of the connecting 2x110 kV transmission line for TS Buna; total value 970 thousand BAM;

Construction of the 110 kV transmission line Kotor Varoš – Ukrina, Visoko – Fojnica;

Reconstruction of the transmission line Mostar 4 – Široki Brijeg – Grude;

Construction of new transformer stations 110/x kV Mostar 9 (Buna), Laktaši 2, Šipovo, Gradiška 2, Bužim, Fojnica, Čitluk 2;

Reconstruction and expansion of substations 110/x kV Zvornik, Cazin 1, Bihać 2, Tešanj;

[91] http://www.derk.ba/DocumentsPDFs/Plan-investicija-za-2015-DEC-2014.pdf
[92] http://www.nosbih.ba/bh/korporativneAktivnosti/plan-razvoja-prenosne-mreze/87
[93] ibid
[94] ibid
[95] The TYNDP, in accordance with the Regulation 714/2009/EC of the European Parliament and Council dated 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity, is created every two years.

Reconstruction of substations 110/x kV Mostar 6, Konjic, Bijeća, Mostar 2, Sarajevo 13, Tuzla 4.

A new investment was made in modernisation and automation of remote reading and processing of meter readings (AMR), which includes the procurement and installation of a replacement system for remote reading and processing of meter readings in the OP centre Tuzla. One of the significant aggregate effects of these investments is a gradual increase in efficiency of the transmission system. However, specific data for contribution of each individual investment to the overall increase in energy efficiency of the transmission network is not available.

Upon initiative of the ISO BiH, with the aim to ensure the necessary conditions for efficient integration of energy producers from variable renewable sources (wind power, solar power) into the power grid arising from the obligation to harmonise this area with the EU acquis, in the previous period ISO BiH, acting on instructions from SERC, initiated the following studies:

1. ***Starting generation units without an outside supply source (black start)*** - created by ISO BiH in 2009. The study reviews the potential for 'black start' - restoration of the power system after a total system failure, as a type of ancillary service offered in the power system in Bosnia and Herzegovina. The study reviewed the option and capability of generation units to provide a 'black start' service. The recommendation was to create and develop black start procedures in each generation unit, in order to efficiently restore the system.
2. ***Identification of prohibited voltages on the transmission network in Bosnia and Herzegovina*** - the goal of this paper prepared by ISO BiH in October 2010 was to, based on monitoring of voltage at specific points on the 400 kV and 220 kV power lines, assess their scope and duration in the past year, to identify sources of excessive voltage, conduct critical analyses of available dispatch responses and their efficiency, and to propose further activities to address this issue. The conclusion of this paper was that the measurements, analyses and experiences of operational staff indicate a need for a detailed technical and economic study of reactive voltage conditions in the power system of Bosnia and Herzegovina.
3. ***Technical and economic aspects of voltage regulation as an ancillary (system) service - identification and remediation of prohibited voltages on the transmission network in BiH***, prepared by EIHP. This study analysed the problem of occasional excessive voltages in the transmission network in Bosnia and Herzegovina within a comprehensive analysis of options for voltage and reactive power regulation, and proposed specific activities and measures to address this problem as soon as possible.
4. ***Integration of wind power plants into the power system and market rules*** (completed in late 2011), served as a basis for ISO BiH to prepare the ***Assessment of Integration of Wind Power Plants into the Power System in BiH***. Based on the findings of these studies and the schedule and assessment of WPPs to be connected to the transmission network, ISO BiH conducted an analysis of options for integration of WPPs by 2022 from the aspect of the necessary regulation power for installed WPP capacities, which indicated the following:
    - For installed capacities of approx. 160 MW, additional investments in secondary regulation and/or expansion of the transmission network are not necessary, except for construction of actual connections. The estimated period required for installation of this capacity was until 2016;
    - For installed capacity of approx. 350 MW, or around 8.5% of installed generation capacities currently connected to the transmission grid, additional secondary regulation power will be required. WPPs will mainly be connected to the 110 kV transmission lines. The estimated timeframe for installation of this capacity was until 2019;
    - Installed capacity of approx. 640 MW, or around 17% of installed generation capacities currently connected to the transmission grid, will require additional secondary regulation power from new generation capacities as well as additional investments in expansion of the transmission grid, depending on the concentration of WPPs. The estimated timeframe for installation of this WP capacity was until 2023.
5. ***Impact of solar power plants on the power system of BiH***[96], prepared in December 2014 by the company Parsons Brinckerhoff Ltd, branch office in Belgrade. The scope of this document was:
    i. Overview of solar technologies and comparative analysis of their characteristics;
    ii. Determination of potential locations and energy generation potentials;
    iii. Study and analysis of impacts on the power system;
    iv. Technical requirements for connection to the transmission network;
    v. Required regulatory reserves.

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The objective of this paper was to analyse the potential for connection of larger solar power plants, regardless of the capacity cap until 2020 for supported solar power plants, to the transmission network in Bosnia and Herzegovina without significant reinforcement of the transmission network. The most important conclusions of this study (which evaluated two scenarios: a combined scenario with 250 MW CSP and 315 MV PV plants, and a 565 MW photovoltaic scenario) are:

- Energy flow and security assessments have indicated that the level of integration of solar power plants of 565 MW by 2020 and 705 MW by 2025 do not, under both scenarios, create limitations in the transmission network of Bosnia and Herzegovina in terms of transmission capacity, nor limit the existing and planned generation capacities in terms of secure evacuation of generated energy;
- Simulations of three-phase short circuits have shown that the analysed system can handle all simulated disturbances and that none of these disturbances result in major changes in the operating status of the power system in Bosnia and Herzegovina;
- Results of simulated imbalances have shown that the power system of Bosnia and Herzegovina can easily sustain a simultaneous drop-out of all PV power plants;
- The proposed solar power plants do not create negative impacts on the stability of the power system.

Description of the situation in the Federation BiH and Republic of Srpska is provided in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.

A Comprehensive Assessment of potentials for energy efficiency improvements in the power and gas infrastructure, together with development of appropriate investment programmes based on the results of this assessment, was planned in the next period (*Section 2.3.2.2 Measures planned for the next period).*

2.3.2.2 Measures planned for the next period

In accordance with its strategic commitment and requirements of the Directive 2012/27/EU on energy efficiency in primary energy consumption by 2020, with a view to the current situation in this area described in previous sections, in the next period Bosnia and Herzegovina will implement priority measures listed in Table 18 below. Some of these measures address mandatory requirements of Directive 2012/27/EU, whereas others were taken directly from the existing strategic and planning documents.

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
	Transmission and distribution of electricity			
EPD.1	Conduct an assessment of potentials for energy efficiency improvements in the electrical energy infrastructure, with an emphasis on energy transformation, transmission, distribution, load management and interoperability, as well as connecting of power generation facilities inclusive of micro power generators. This assessment will focus on the following measures, which may result in a reduced need for investments in new infrastructure: (a) Optimal utilisation of existing electricity infrastructure; (b) Potential energy efficiency measures, including demand response; (c) Modernisation of infrastructure aimed at minimisation of technical and operating losses; *Guidelines for proper implementation of this assessment are provided in the document titled "Identifying energy efficiency improvements and saving potential in energy networks, including analysis of the value of demand response", dated 18 December*	Directive 2012/27/EU: • Article 15(2(a)); Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015	MoFTER, SERC; FMoEMI, FERK; MoIEM , RERS; BD	2017 – 2018

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
	2015[97], created for and commissioned by the European Commission			
EPD.2	Identification of specific measures and investments for introduction of cost-efficient energy efficiency improvements on the network infrastructure in the electricity sector in Bosnia and Herzegovina, with timeframes for completion and based on the assessment of potentials conducted as Measure EPD.1	Directive 2012/27/EU: • Article 15(2(b)); Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015	MoFTER, SERC; FMoEMI, FERK; MoIEM	15. 9. 2018
EPD.3	In the course of harmonisation of existing laws and by-laws governing the electricity sector with the provisions of Directive 2009/72/EC, take into account the provisions of Article 15 of the Directive 2012/27/EU, including criteria from Annex XI concerning **grid tariffs and regulations**	Directive 2009/72/EC Directive 2012/27/EU: • Article 15; • Annex XI	MoFTER, SERC; MoIEM, RERS; FMoEMI, FERK;	According to planning documents for implementation of Directive 2009/72/EC
EPD.4	In the course of harmonisation of existing laws and by-laws governing the electricity sector with the provisions of Directive 2009/72/EC, take into account the provisions of Article 15 of the Directive 2012/27/EU, including criteria from Annex XII concerning the requirements related to **promotion and enabling of demand response as a contribution to efficient grid management**	Directive 2009/72/EC Directive 2012/27/EU: • Article 15; • Annex XII	MoFTER, SERC; MoIEM, RERS; FMoEMI, FERK;	According to planning documents for implementation of Directive 2009/72/EC
EPD.5	In the course of harmonisation of existing laws and bylaws governing the electricity sector with the provisions of Directive 2009/72/EC, take into account the provisions of Article 15 of the Directive 2012/27/EU related to grid design and functionality	Directive 2009/72/EC Directive 2012/27/EU: • Article 15;	MoFTER, SERC; MoIEM, RERS; FMoEMI, FERK;	According to planning documents for implementation of Directive 2009/72/EC
EPD.6	Further improvement of the information system and energy efficiency reporting in the energy transformation sector, electricity transmission and distribution sector, and in reporting actual primary energy savings	Directive 2012/27/EU; Law on Electricity	MoFTER; SERC; MoIEM, RERS; FMoEMI, FERK;	Continuous
EPD.7	Implementation of programmes, priority measures and activities in the energy transformation sector, electricity transmission and distribution sector, planned in the existing strategic and planning documents and in relevant energy companies	Relevant strategic and planning documents	Relevant implementing bodies	In line with deadlines stated in the relevant strategic and planning documents
	Transport and distribution of gas			
GTD.1	Assessment of potentials for energy efficiency improvements in the gas infrastructure in Bosnia and Herzegovina, with an emphasis on transport, distribution, load management and interoperability, as well as connecting energy	Directive 2012/27/EU: • Article 15(2(a)); Decision of the Ministerial Council	MoFTER; MoIEM; FMoEMI	2017 – 2018

[97] https://ec.europa.eu/energy/sites/ener/files/documents/GRIDEE_4NT_364174_000_01_TOTALDOC%20-%2018-1-2016.pdf

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
	generation facilities inclusive of micro energy generators *Guidelines for proper execution of this assessment are provided in the document titled "Identifying energy efficiency improvements and saving potential in energy networks, including analysis of the value of demand response", dated 18 December 2015[98], commissioned by the European Commission*	of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015		
GTD.2	Identification of specific measures and investments for introduction of cost-efficient energy efficiency improvements on the network infrastructure in the gas sector, with deadlines for completion and based on the assessment of potentials conducted in Measure GTD.1	Directive 2012/27/EU: • Article 15(2(b)); Decision of the Ministerial Council of the Energy Community no. D/2015/08/MC-EnC, dated 16 October 2015	MoFTER; MoIEM; FMoEMI	15 October 2018
GTD.3	In the course of harmonisation of existing laws and bylaws with the provisions of Directive 2009/73/EC, take into account the provisions of Article 15 of the Directive 2012/27/EU	Directive 2009/73/EC Directive 2012/27/EU: • Article 15;	MoFTER; MoIEM; FMoEMI	According to planning documents for implementation of Directive 2009/73/EC
GTD.4	Further improvement of the information system and energy efficiency reporting in the natural gas transport and distribution sector, and in reporting actual primary energy savings	Directive 2012/27/EU;	MoFTER; MoIEM; FMoEMI	Continuous
GTD.5	Implementation of programmes, priority measures and activities in the gas sector, planned in the existing strategic and planning documents and plans of relevant energy companies	Relevant strategic and planning documents	Relevant implementing bodies	According to deadlines stated in the listed strategic documents

Table 18 - Overview of energy efficiency measures in transmission and distribution of electricity and gas in BiH

2.3.3 Other measures

Ser.	Measure title	Measure based on law/plan	Responsible body/institution	Completion timeframe; Implementation status
OM.1	At the end of this planning period, make a snapshot of the actual consumption of primary energy in comparison with the general primary energy savings target set in this EEAP BiH, make the necessary modifications and quantify the targets in existing strategic and planning documents that have an impact on primary energy savings, for the period until the end of 2020	Directive 2012/27/EU;	MoFTER, SERC MoIEM, RERS; FMoEMI, FERK	2018 – 2019

[98] ibid

Table 19 - Overview of other measures for improvement of energy efficiency in transmission and distribution of electricity and gas

3. SAVINGS IN FINAL ENERGY CONSUMPTION

3.1 Overview of final energy savings and actual results

3.1.1 Final energy savings targets and actual progress

Period	Indicative final energy savings target[99]		Actual and expected savings			
			Evaluation using TD approach		Evaluation based on implementation of measures	
	Absolute value (PJ)	% (of reference consumption ESD)	Absolute value (PJ)	% (of reference consumption ESD)	Absolute value (PJ)	% (of reference consumption ESD)
2012	0.67	0.49%	-	-	-	-
2015	4.63	3.24%	N/a	N/a	5.321	3.77%
2018	12.47	9.00%	N/a	N/a	12.47	9.00%

Table 20 - Overview of planned and actual primary and final energy savings in BiH

3.1.1.1 Progress towards achievement of the indicative final energy savings target for 2015

In the *Final Draft EEAP BiH 2010-2018*, the anticipated amount of final energy savings in 2015 was 4.63 PJ. As shown in Table 19 and described in detail in previous sections, actual savings for 2015 were calculated using the bottom-up approach (savings achieved through implementation of energy efficiency measures) and amount to 5.321 PJ, which is 15% more than the 4.63 PJ planned for 2015.

The *Final Draft EEAP BiH 2010-2018* does not state final energy savings targets for individual sectors for the year 2015, so a direct comparison of planned vs. actual savings by sectors for 2015 could not be made. However, by comparing actual energy savings by sector in 2015 with the planned sectoral targets for 2012 and 2018, as shown in Table 4 *(Section 1.3 Overview of targets and actual energy savings),* we can conclude the following:

- Residential sector: Actual energy savings of 2.107 PJ represent 40.13% of the target value for 2018 of 5.25 PJ, which is a solid result;
- Service sector: Actual energy savings of 2.50 PJ represent 154.32% of the target value for 2018 of 1.62 PJ, which is an excellent result, achieved primarily through active participation of numerous international agencies providing not only technical assistance but also substantial grant financing for energy renovation of buildings in the public sector;
- Industry sector: Actual energy savings of 0.442 PJ represent 9.23% of the target value for 2018 (4.79 PJ), which is a very poor result; and
- Transport sector: Actual energy savings of 0.272 PJ represent 33.58% of the target value for 2018 (0.81 PJ), which is a satisfactory result.

According to the above, the best results were made in the service sector, where savings in 2015 already exceeded the 2018 target by 54.32%. In the residential sector, and to some extent in the transport sector, the rate of achievement was close to planned values, while results in the industry sector were extremely poor.

3.1.1.2 Expected savings against the indicative target for 2018 set in the previous planning document

[99]The amounts shown were taken from the *Final Draft EEAP BiH 2010-2018.*

According to the *Final Draft EEAP BiH 2010-2018*, the indicative final energy saving target for 2018 in Bosnia and Herzegovina was 12.47 PJ, or 9% of base final energy consumption (consumption average for the period 2006-2010) which, according to available data and calculations, amounted to 138.56 PJ.

Based on good savings results in 2015, and taking into account all ongoing and planned activities, measures and programmes in individual final consumption sectors, we can realistically expect to reach this target in 2018 subject to more intensive implementation of measures in the industry sector. As stated in Section 3.1.1 (Final energy savings calculation methodology), savings calculated for the year 2015 using the TD approach were negligible, mainly due to the lack of necessary statistical data. Since this action plan covers such a short period of time, it is likely that TD calculation of savings will also not be possible for the year 2018. At the same time, it is estimated that with the BU methodology, based on implementation of planned programmes and sectoral measures, this target will be met in the amount of 11.6 PJ, which is 93% of the total planned target.

3.1.2 Objectives for buildings with near-zero energy consumption

Construction of buildings with near-zero energy consumption is not discussed in this *EEAP BiH 2016-2018* because the necessary conditions for development of the relevant strategy and action plan are still not in place. This refers primarily to the availability of input data needed to perform the appropriate analyses. For this reason, targets for near-zero energy buildings were not set in the *Final Draft EEAP BiH 2010-2018* nor in this document.

3.1.3 Other final energy savings targets and forecasts and their rate of achievement

N/a

3.2 List of strategic and planning documents with an impact on final energy consumption

Table 21 below shows energy-related strategies and action plans adopted at the level of Bosnia and Herzegovina, inclusive of energy efficiency and use of renewable energy sources, in the chronological order of adoption (from the earliest to the most recent).

Title of the strategic document; **Legal status / publication**	**Target final energy consumption sectors** **Relevant targets, with emphasis on final energy savings and/or forecasts** **Assumptions (GDP growth, energy intensity, energy market, demographic changes)**
Climate Change Adaptation and Low Emissions Growth Strategy of BiH to 2025[100] *Adopted by the Council of Ministers on 8.10.2013*	Final consumption sectors: Buildings; Transport; Objectives in the chapter "Emissions Reduction Strategy": (1) Reduction of average heating demand in dwellings, from more than 200 kWh/m2 to 100 kWh/m2 by 2025; (2) Termination of use of heavy fuel oil and coal for heating of households and in district heating, and their replacement with more energy efficient systems, biomass, solar thermal and geothermal energy (with plants powered by electricity) by 2022; (3) Introduction of heat consumption metering for buildings and individual consumers in all district heating systems by 2020; (4) Reduction of transport emissions by 10% against the base scenario by 2025
National Economic Reform Programme for 2015[101] The document was adopted by the BiH Council of Ministers on 11.2.2015	Sector: Electricity generation; Relevant sectoral measures/reforms implemented and planned in order to achieve 2014-2017 economic policy objectives: Republic of Srpska: Within economic recovery measures: Investment activities in the energy sector (construction of new TPP, HPP and WP capacities); Federation BiH: Within economic recovery measures: Investment activities in the energy sector and transport infrastructure (construction of new TPP, HP and WPP capacities);
BiH Council of Ministers / Directorate for	Individual energy sectors are not specified; Relevant strategic objectives:

[100] http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Documents/Str%D0%B0t%D0%B5gi%D1%98%D0%B0%20pril%D0%B0g%D0%BEd%D0%B0v%D0%B0nj%D0%B0%20n%D0%B0%20klim%D0%B0tsk%D0%B5%20pr%D0%BEm%D1%98%D0%B5n%D0%B5%20i%20nisk%D0%BE%D0%B5misi%D0%BE.pdf

[101] http://www.dep.gov.ba/search/Default.aspx?q=nacionalni+program+ekonomskih+reformi+2015&searchDepth=0&selectedCategory=0&contentType=0&langTag=bs-BA&template_id=141&pageIndex=1

Title of the strategic document; **Legal status / publication**	**Target final energy consumption sectors** **Relevant targets, with emphasis on final energy savings and/or forecasts** **Assumptions (GDP growth, energy intensity, energy market, demographic changes)**
Economic Planning: Strategic Framework for BiH, August 2015[102] *Prepared in accordance with the Decision on the Mid-Term Planning, Monitoring and Reporting Procedure in Institutions of BiH (Official Gazette 62/14)*	5.2 Smart growth; 5.2.1 Development of human resources; 5.2.2 Increased industrial competitiveness (development of research, innovation and new technologies); 5.3 Sustainable growth; 5.3.2 Improved environmental management and development of environmental infrastructure with increased resilience to climate change; 5.3.4 Development of energy potentials, especially renewable energy sources and improvements in energy efficiency (Priorities: Harmonise the domestic energy market at all levels with the EU *acquis*, including entity-level and state-level legislation, with the third energy package and the obligations of BiH under the Energy Community Treaty); 5.4 Inclusive growth; 5.4.1 Increased employment opportunities
BiH Economic Reform Programme 2016-2018[103] *Adopted by the BiH Council of Ministers on 28.1.2016*	Sectors: Among others: Renewable energy sources; Structural reform priorities by sector: BiH: n/a Republic of Srpska: n/a Federation BiH: 4.2.2(4) Energy infrastructure improvements (through construction of WPP plants Podveležje and Mesihovina)
Renewable Energy Action Plan for Bosnia and Herzegovina[104] *Adopted by the Council of Ministers on 30.3.2016*	Sectors: Electricity; Heating and cooling; Transport; Overall target for share of energy from RES in gross final energy consumption in BiH in 2020: 40%; Forecasted final and primary energy consumption in 2020: 4,851.3 ktoe; Planned energy from RES corresponding to the target quantity in 2020: 1,940.5 ktoe
Independent System Operator in BiH (ISO BiH): Indicative Production Development Plan 2017-2026 *This document was approved on the SERC session held on 28.6.2016*	Sectors: Electricity (generation); RES – electricity generation; This plan contains, inter alia, the following data for all power generation capacities in the BiH power sector (including TPPs, HPPs, WPPs and SPPs): (a) Production capacity parameters; (b) Balancing performance in the transmission grid in the previous period; (c) Electricity generation and consumption in BiH in the previous period; (d) Electricity balance on the transmission grid for 2016; (e) Consumption forecast 2017-2026; (f) Integration of renewable energy sources; (g) Energy and power balance on the transmission grid 2017-2026; (h) ENTSO-E Ten-Year Transmission Grid Development Plan
Energy Efficient Development Action Plan (SEAP) for Brčko District[105] *Adopted by the Brčko District Government on 29.4.2015.*	Sectors: Buildings; Public lighting; Transport; Objective: Reduce CO2 emissions by 22.07% by 2020 in comparison to base year 2012; *Objectives stated in this document refer only to final energy consumption. Listed here because this is the only strategic document in this area for Brčko District BiH and because it contains important energy consumption data for this part of BiH*

Table 21 - Strategic and planning documents in BiH with an impact on final energy consumption

Please note:

Table 19 contains only strategic and planning documents adopted at the level of Bosnia and Herzegovina and Brčko District BiH. Corresponding documents adopted by the Federation BiH and Republic of Srpska are listed in the documents EEAPF BiH 2016 and Amendments to EEAP RS 2018, respectively.

[102] http://www.dep.gov.ba/naslovna/DEP%20Strateski%20okvir%20za%20BiH.pdf

[103] http://www.dep.gov.ba/search/Default.aspx?q=program+ekonomskih+reformi+2016+2018&searchDepth=0&selectedCategory=0&contentType=0&langTag=bs-BA&template_id=141&pageIndex=1

[104] http://www.mvteo.gov.ba/vijesti/saopstenja/default.aspx?id=7957&langTag=bs-BA

[105] http://www.bdcentral.net/index.php/hr/vijesti/3462-akcioni-plan-energetski-odrivog-razvoja-brko-distrikta-bih-

3.3 Measures and programmes aimed at savings in final energy consumption

3.3.1 Final energy savings calculation methodology

Table 22 provides an overview of TD indicators used for calculation of actual energy savings.

TD indicator	Sector	Can be calculated	Energy efficiency measures evaluated using TD indicators
P1	Residential	-	P1, P2, P3, P5
P2		-	
P3		-	
P4		√	
P5		-	
M1		-	
M2		-	
P6	Services	-	M3, M4
P7		-	
M3		-	
M4		-	
P8	Transport	-	P8, P9, P10, P11, P12, P13
A1 for P8		-	
P9		-	
A2 for P9		-	
P10		-	
P11		-	
P12		-	
P13		-	
M5		√	
M6		√	
M7		√	
P14	Industry	√	P14
A3 for P14		√	
M8		√	

Table 22 - Overview of TD indicators used for calculation and reporting of actual energy savings

Table 23 shows an overview of BU methodologies used to calculate actual energy savings.

BU method	Method recommended by the European Commission / Domestic method	ID of the energy efficiency measure evaluated using the BU approach[106]
BU methodology according to *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC, European Commission, Directorate-General for Energy*	Methodology recommended by the European Commission	C3
Market analysis (*Study of sales of EE materials and equipment in BiH 2011-2016*);	Market analysis based on the BU methodology, in accordance with the *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC, European Commission, Directorate-General for*	R1, R2, R3, R4, R6, C1, C2, C3

[106]The above IDs refer to measures from the *Final Draft EEAP BiH 2010-2018* (see Table 4 in this document)

BU method	Method recommended by the European Commission / Domestic method	ID of the energy efficiency measure evaluated using the BU approach[106]
	Energy, for verification of savings based on collected data	
Measured savings / verified by detailed energy audits	Methodology recommended by the European Commission	IN1, IN5
Measures calculated according to EN.13790	Methodology recommended by the European Commission	C4, C5, T3

Table 23 - Overview of BU methods used for calculation of actual energy savings and reporting

I. Top-down (TD) method of verification

Under this method, total energy savings for individual sectors, sub-sectors or specific uses are calculated as a difference in value of the appropriate indicator in the reference year and in the reporting year, multiplied by activity indicator or other factor related to impact on energy consumption in the reporting year. Savings verified in this manner are based on recommendations provided by the European Commission in the document *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC on Energy End-Use Efficiency and Energy Services*[107]. The top-down method of calculation/evaluation of energy savings is fully compliant with Directive 2006/32/EC on energy efficiency and energy services (ESD).

There are two types of TD indicators of energy efficiency:

- Preferred (P) indicators - recommended indicators for reporting of actual savings, subject to availability of data either from national statistics or from modelling exercises;
- Minimum (M) indicators - these indicators can be calculated from the data usually available from Eurostat and national statistics.

Indicators are calculated for four main direct energy consumption sectors: residential sector, service sector, industry and transport.

According to the data from the *Total Energy Balance of BiH for 2014*, published by the Agency for Statistics of BiH on 11 May 2016, final energy consumption in BiH in the households sector for the year 2014 is shown in Table 24.

2014 Balance	Coal	Crude oil	Oil derivatives	Natural gas	Hydro	Biomass	Electricity	Thermal	Total
	000 toe								
Households	62		85	30		1503	396	84	2195

Table 24 - Final energy consumption in the residential sector in BiH, 2014

1. *Indicator P1 - Energy consumption for space heating per unit of floor area, adjusted for climatic conditions (P1)*

Indicator P1 is the ratio between the climate corrected energy consumption of households for space heating and the total floor area of permanently occupied dwellings. It is expressed in toe/m2.

Actual energy consumption for space heating was 14.927 kWh/household, based on the share of energy used for heating in households (72%) and the total average consumption of a BiH household of 733 kWh. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Calculation of indicator P1 was carried out in accordance with the recommendations, however the number of degree days in the reference year was substantially higher and therefore savings could not be verified against the reference year 2010.*

2. *Indicator P2 - Energy consumption for space cooling per unit of floor area, adjusted for climatic conditions (P2)*

Indicator P2 is the ratio between the climate corrected energy consumption of households for space heating and the total floor area of permanently occupied dwellings. It is expressed in toe/m2.

[107] https://www.energy-community.org/pls/portal/docs/906182.PDF

Actual energy consumption for cooling: 414.66 kWh/a per household, based on total direct energy consumption in households of 20,733 kWh and the share of energy used for air conditioning of 2%. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Calculation of indicator P2 was carried out in accordance with the recommendations, however the number of degree days of cooling in the reference year was substantially higher and therefore savings could not be verified against the reference year 2010.*

3. Indicator P3 - Energy consumption for water heating per inhabitant (P3)

Indicator P3 is the ratio between the energy consumption for water heating in households and the total population. It is expressed in toe/inhabitant.

Energy consumption for water heating is 165.913 ktoe, based on total final energy consumption in households - 20733 kWh/year, with the share of energy for water heating of 8%. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

According to statistical data, the population of BiH increased between 2010 and 2015 but energy consumption remained the same. Therefore indicator P3 could not be used to register energy savings as its value effectively increased.

4. Indicator P4 - Specific household electricity consumption per appliance type (P4)

Indicator P4 is the annual unit electricity consumption across the existing stock of a given appliance. It is expressed in kWh/year.

Total consumption of appliances in households in 2014 was 1.227 GWh, while EIHP data for the period 2007-2011 shows that total consumption by appliances in households was 1.063-1.110 GWh. According to statistical data, the population of BiH increased between 2010 and 2015. At the same time, there was a reduction in unit consumption rates for observed appliances (freezers, refrigerators, washing machines, TVs and dryers), resulting in registered savings of:

BIH	0.003	PJ
FBiH:	0.0019	PJ
RS:	0.0011	PJ
Brčko District:	0.0000001	PJ

5. Indicator P5 - Electricity consumption for lighting per household (P5)

Indicator P5 is the ratio between the electricity consumption of households for lighting and the number of permanently occupied dwellings. It is expressed in kWh/dwelling.

Energy consumption for lighting is 64.3 ktoe, based on total final energy consumption in households - 20.733 kWh/year and the share of electricity used for lighting of 3.1%. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Taking all above data into account, no energy savings could be noted.*

6. Indicator M1 - Energy consumption (excluding electricity and solar) of households per dwelling, adjusted for climatic conditions (M1)

Indicator M1 is the ratio between the climate corrected energy consumption (excluding electricity and solar) of households and the number of permanently occupied dwellings. It is expressed in kWh/dwelling.

Calculation was made using the average annual final energy consumption in BiH households (20.733 kWh/year) and the electricity consumption of a BiH household of 4568.2 kWh. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Taking all above data into account, no energy savings could be noted in comparison to the reference year 2010.*

7. Indicator M2 - Electricity consumption per household (M2)

Indicator M2 is the ratio between the electricity consumption of households and the number of permanently occupied dwellings. It is expressed in toe/dwelling.

Please note: *Taking all above data into account, no energy savings could be noted in comparison to the reference year 2010.*

8. Indicator P6 - Non-electricity consumption in sub-sector per indicator of activity (P6)

Indicator P6 is the ratio between the climate corrected non-electricity energy consumption of a sub-sector and an indicator of activity of that sub-sector. It is expressed in toe/indicator of activity.

Please note: *Indicator P6 could not be determined with the available statistical data because non-electricity consumption data could not be divided by sub-sectors. This indicator was also not determined in the EIHP study for the period 2007-2011.*

9. Indicator P7 - Electricity consumption in sub-sector per indicator of activity in sub-sector (P7)

Indicator P7 is the ratio between the electricity consumption of a sub-sector and an indicator of activity in that sub-sector. It is expressed in kWh/indicator of activity. *(Data source: Survey of energy consumption in BiH households, 2015; Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Indicator P7 could not be determined with the available statistical data because electricity consumption data could not be divided by sub-sectors. This indicator was also not determined in the EIHP study for the period 2007-2011.*

10. Indicator M3 - Non-electricity energy consumption of the service sector per employee, adjusted for climatic conditions

Indicator M3 is the ratio between the climate corrected non-electricity energy consumption of the service sector and the number of full-time employees in the service sector. Alternatively, total usable floor area (m2) can be used as a substitute for the number of full-time equivalent employees. It is expressed in toe/employee or toe/m2.

The calculated consumption is 221 ktoe (including oil derivatives), or 174 ktoe (excluding oil derivatives). *(Data source: Energy statistics, Total Energy Balance of BiH, BHAS, 2015)*

Please note: *Taking all above data into account, no energy savings could be noted in comparison to the reference year 2010.*

11. Indicator M4 - Electricity consumption of the service sector per employee in full time equivalent or floor area

Indicator M4 is the ratio between electricity consumption of the service sector and the number of full-time equivalent employees in the service sector. Alternatively, total usable floor area (m2) can be used as a substitute for the number of full-time equivalent employees. It is expressed in kWh/employee or kWh/m2.

Electricity consumption in the service sector is 167 ktoe. *(Data source: Energy statistics, Total Energy Balance of BiH, BHAS, 2015)* The number of full-time employees in service sectors foreseen by Eurostat is 476,815 (see indicator M3). *(Data source: BHAS - Number of employees by type of business activity, December 2015)*

Please note: *Taking all above data into account, no energy savings could be noted in comparison to the reference year 2010.*

12. Indicator P8 - Energy consumption of cars per passenger-km (P8)

Indicator P8 is the ratio of total annual fuel consumption of cars and the distance travelled in passenger-km. It is expressed in goe/pkm. The following data is necessary to calculate indicator P8:

- Energy consumption of cars (ktoe); and
- Passenger traffic (Gpkm).

Please note: *With the available statistical data, no energy savings could be noted in comparison to the reference year 2010.*

13. Indicator A1 for P8 - Specific energy consumption of passenger cars (A1 for P8)

Indicator A1 is the specific consumption of cars. It is expressed in l/100 km. The following data is necessary to calculate indicator A1:

- Energy consumption of cars (see indicator P8) (ktoe);
- Stock of cars;
- Average distance travelled by year by car (km/car year);
- Conversion coefficient from litre to toe for motor fuels (gasoline, diesel, biofuels, LPG).

Stock of cars: 801,387 *(Data source: Information on motor vehicles registered in BiH, December 2014, BIHAMK).*
Average distance travelled by car in a year: 11,500 km/year *(Source: Survey of energy consumption in households, 2015, BHAS)*

A1 for P8 = 6.8 l / 100 km

Please note: *The total stock of cars was 682,900 in 2010, and according to official statistics in 2015 it was 801,387 with an average distance travelled of 11,500 km, resulting in a saving of 4.7 PJ in 2015 (in comparison to 2010). However, savings calculated in this manner are not included in total savings.*

14. Indicator P9 - Energy consumption of trucks and light vehicles per tonne-km (P9)

Indicator P9 is the ratio of energy consumption of trucks and light vehicles in road cargo traffic expressed in tonne-km. It is expressed in goe/tkm.

Please note: *This indicator (P9) could not be calculated due to the absence of statistical data on energy consumption for trucks and light vehicles.*

15. Indicator A2 for P9 - Energy consumption of trucks and light vehicles per vehicle (A2 for P9)

Indicator A2 is the ratio of annual energy (motor fuel) consumption of trucks and light vehicles and the stock of trucks and light vehicles. It is expressed in goe/vehicle.

Please note: *This indicator (A2 for P9) could not be calculated due to the absence of statistics on energy consumption for trucks and light vehicles.*

16. Indicator P10 - Energy consumption of passenger rail transport per passenger-km (P10)

Indicator P10 is the ratio of energy consumption of passenger trains and the passenger traffic, measured in passenger-km. It is expressed in goe/pkm.

Please note: *This indicator (P10) could not be calculated due to absence of statistical data on energy consumption for rail transport of passengers only.*

17. Indicator P11 - Energy consumption of freight rail transport per gross tonne-km (P11)

Indicator P11 is calculated as a ratio of energy consumption of freight trains and the rail transport of freight measured in tonne-km. It is expressed in goe/tkm.

Please note: *This indicator could not be calculated due to the absence of statistics on energy consumption specifically for rail transport of freight .*

18. Indicator P12 - Share of public transport in total land passenger transport (P12)

The unit energy consumption of public transport expressed in goe/pkm is the ratio between the energy consumption of all modes of public transport and the passenger traffic by public transport in passenger-km. The share of public transport in passenger transport is stated in percentage terms and is calculated as the ratio of public passenger transport and total passenger transport.

Please note: *This indicator (P12) could not be calculated due to the absence of statistics for public transport.*

19. Indicator P13 - Share of rail and inland waterways freight transport in total freight transport (P13)

The unit energy consumption of rail and inland water transport is the ratio, expressed in goe/tkm, between the energy consumption of rail and inland water transport and the total traffic of goods (in tonne-km) by these forms of transport. The share of rail and inland water transport in freight transport is stated in percentage terms and is calculated as the ratio of rail and inland water transport and the total traffic of goods.

Please note: *This indicator (P13) could not be calculated due to the absence of statistics for inland water transport.*

20. Indicator M5 - Energy consumption of road vehicles per car equivalent (M5)

Indicator M5 replaces indicators P8 and P9 if they cannot be calculated because of a lack of data on the breakdown of the energy consumption of road transport by type of vehicle. Indicator M5 relates the total consumption of road transport to a fictitious stock of all road vehicles, measured in terms of a number of equivalent cars. It is expressed in goe/car equiv.

Please note: *The calculated indicator for 2015 was the same as for 2010, therefore no savings were recorded.*

21. Indicator M6 - Energy consumption of rail transport per tonne-km (M6)

Indicator M6 is calculated as the ratio between the energy consumption of rail transport and the total traffic, measured in gross tonne-km. It is expressed in goe/gtkm. The following data is necessary to calculate indicator M6:

- Energy consumption of rail transport (ktoe);
- Total rail transport (Gtkm).

Please note: *The calculated indicator for 2015 was the same as for 2010, therefore no savings were recorded.*

22. Indicator M7 - Energy consumption of inland waterways transport per tonne-km (M7)

Indicator M7 is calculated as the ratio between the energy consumption of inland waterways transport and the inland waterways traffic, measured in tonne-km. It is expressed in kgoe/tkm.

Please note: *This indicator could not be calculated due to the absence of statistics for inland water transport.*

23. Indicator P14 - Energy consumption of industrial sub-sectors per unit of production (P14)

Indicator P14 is the ratio between the final energy consumption of the sub-sector and the production index of the sub-sector. It is expressed in toe/index.

Please note: *Indicator P14 could not be calculated with the available statistics and information, because the available statistics for final energy consumption of industrial sub-sectors do not match the statistics required to calculate this indicator. This indicator was also not determined by EIHP for the period 2007-2011.*

24. Indicator M8 - Energy consumption of industrial sub-sectors per value added (M8)

Indicator M8 is the ratio between the final energy consumption of the sub-sector and the production index of the sub-sector. Direct energy consumption excludes the consumption of plants which will join the GHG emissions trading scheme (explanation is provided with the indicator P14).

Please note: *Indicator M8 could not be calculated with the available statistics and information, because the available statistics for final energy consumption in industrial sub-sectors do not match the statistics required to calculate this indicator. This indicator was also not determined by EIHP for the period 2007-2011.*

II. Bottom-up (BU) savings verification method

The methodology used for calculation of savings and savings forecasts is based on the methodology for monitoring, measurement and verification of energy savings in direct consumption in accordance with the international EMEEES[108] guidelines and the IPMVP[109] international protocol.

The bottom-up (BU) methodology comprises formulas for calculation of unit energy savings (UFES) expressed in relevant units for the given energy efficiency measure. Total energy savings in direct consumption (FES) are calculated by multiplying the UFES with the relevant impact factor in the observed period, and adding all individual results (projects) completed within a certain measure. Calculation of UFES is based on the difference in specific energy consumption before and after implementation of an energy efficiency measure. The MVP platform used for verification of savings uses these formulas. Table 25 shows an example for building renovation projects.

UFES	Definitions	Reference values	Recommended values - life cycle
$UFES = \frac{SHD_{init}}{\eta_{init}} - \frac{SHD_{nes}}{\eta_{new}}$	η_{init}= efficiency of the old heating system before EE measure; η_{new}= efficiency of the new heating system after EE measure; SHDinit = specific heating demand of the building before EE measure (kWh/m2/year); SHDnew = specific heating demand of the building after EE measure (kWh/m2/year)	Average heating system efficiency before and after EE measure; Average heating needs of the building at the time of construction	20 years for households; 25 years for services

[108] EMEEES: Evaluation and Monitoring for the EU Directive on Energy End-Use Efficiency and Energy Services; http://www.evaluate-energy-savings.eu/emeees/en/the_project/project_description.php

[109] IPMVP: The International Performance Measurement and Verification Protocol http://www.nrel.gov/docs/fy02osti/31505.pdf

Table 25 - Recommended formula for calculation of unit energy savings achieved through improved thermal insulation and replacement of technical heating systems in residential sector and service sector buildings

Recommendations of the European Commission provide a formula for evaluation of annual energy savings resulting from renovation of existing residential and non-residential buildings. Renovations must result in improved energy efficiency. The formula is used for complex projects which improve both the building envelope and its heating system, as well as other energy systems in the building.

Unit energy savings in direct consumption (UFES) are expressed in kWh/m2/year, and are calculated as the difference between the ratio of specific heating demands of the building (SHD, in kWh/m2) and the heating system efficiency coefficient (η) before and after implementation of EE measures.

Recommendations for reference heating system efficiency values in buildings before and after replacement are provided in the EMEEES project, and are applicable to Bosnia and Herzegovina.

As for building renovation programmes, these programmes deal with complex projects which improve both the building envelope and its heating system, as well as other energy systems in the building.

Unit energy savings in direct consumption are calculated as the difference between the ratio of specific heating demand of the building and the heating system efficiency, before and after implementation of the energy efficiency measure.

The 'before' situation is defined by the parameters for each building or, alternatively, appropriate reference values may be used depending on the time of construction and the building regulations prevailing at the time. The value of specific heating demand of buildings should be corrected for the number of degree-days of heating. The value of total final energy savings for a building is determined by multiplying unit energy savings with the usable floor area of the building.

Thermal insulation of individual parts of the building envelope includes walls, windows and ceilings (roofs). Unit energy savings in direct consumption are calculated as the difference between the heat transmission coefficient of building components before and after implementation of the energy efficiency measure. The 'before' situation is defined by parameters of each building or, alternatively, appropriate reference values may be used depending on the time of construction and the building regulations prevailing at the time. Heat transmission coefficients for construction components should be adjusted for the number of degree-days of heating, and, if possible, for the efficiency and intermittency of the heating system. Total final energy savings in the given building are determined by multiplying unit energy savings with the surface of the renovated building envelope.

As for measures involving new installations or replacement of heating and water heating systems in residential sector and service sector buildings, the value of unit annual energy savings in direct consumption is calculated by multiplying the difference of heating system efficiency before and after the energy efficiency measure, specific heating demand and the heated floor area. Total annual energy savings are calculated by adding all unit annual energy savings resulting from each individual project.

Water heating systems are mostly integrated into the space heating system in the building, especially in central heating and independent heating systems. Heating systems mainly consist of the heat generation sub-system (source of heat), distribution sub-system (distribution) and the emission sub-system (delivery) for heat delivery to the space (heating elements). The heat produced in the heat generation sub-system is distributed via the distribution sub-system to the final sub-system, i.e. heating elements. Each of these heating sub-systems has heat losses, including losses due to regulation, which must be taken into account in the calculation of final heating demand. Annual final heating demand represents the required useful heat plus heat losses, inclusive of regulation losses.

When replacing existing heating and water heating systems (at the end of equipment life cycle), energy savings are achieved through replacement of existing equipment in the heating and water heating system with more efficient equipment. Calculation of all energy savings relies on reference values for the current state, and the calculation of additional savings uses reference values for equipment of average efficiency in the market.

When replacing existing heating and water heating systems (before the end of equipment life cycle), energy savings are achieved through replacement of existing equipment in the heating and water heating system, before the end if its life cycle, with energy efficient equipment. Until expiry of the life cycle of existing equipment, calculation of energy savings relies on reference values for the current state, and after the end of life cycle the calculation of additional savings uses reference values for equipment of average efficiency available on the market.

Formulas for calculation of savings achieved through energy efficiency measures in residential buildings and service sector buildings were used in accordance with the document *Recommendations on Measurement and*

Verification Methods in the Framework of Directive 2006/32/EC on Energy End-Use Efficiency and Energy Services, which formed the basis for development of the MVP platform used for monitoring and verification of savings in the Federation BiH and Republic of Srpska, and therefore also Bosnia and Herzegovina. Some of the renovated buildings in the Brčko District and buildings directly owned by the state will be entered in the MVP, because such buildings were not registered at the time of writing of this document. Since the results of market analysis are compatible with the data required for verification of savings in the MVP, the same platform was used for assessment of savings on the basis of results of the market analysis (of distributed materials and energy efficient equipment).

3.3.2 Overview of individual energy efficiency measures

Tables 26-30 present all horizontal and sectoral measures for energy efficiency improvements in final energy consumption, in all final consumption sectors. The description of each measure lists the responsibilities of all levels of government, including the authorities at the level of Bosnia and Herzegovina and Brčko District BiH.

3.3.2.1 Overview of individual horizontal and cross-sectoral measures

Index	Measure title	Measure description	Target energy consumption	Duration of measure	Savings achieved in 2015 (PJ)
H.1	Development and application of the legislative and regulatory framework for energy efficiency in final energy consumption	The objective of this measure is further development of the legislative and regulatory framework in order to create important preconditions necessary to meet the set energy savings targets. The measure includes the following activities: 1. Finalisation of transposition of Directive 2012/27/EU on energy efficiency, Directive 2010/31/EU on energy performance of buildings and Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy, into the legislation of BiH, RS, FBiH, cantons and Brčko District BiH;. 2. Drafting of regulations to embed energy efficiency considerations in the transport sector; 3. Adoption of laws and by-laws to establish horizontal and vertical coordination mechanisms for implementation of EEAP BiH	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.2	Drafting and adoption of strategic and planning documents on energy efficiency	The measure includes the following activities: 1. Adoption of: EEAP BiH inclusive of BD, RS and FBiH; Operating plans for EE improvements in the institutions of BiH, RS, BD, and FBiH and its cantons; Municipal EEAPs, cantonal EEAPs and energy efficiency plans and programmes for LSGUs and major energy consumers; 2. Drafting and adoption of the following strategic and planning documents: a. Building Renovation Strategy for BiH, FBiH, RS and BD BiH; b. Strategy for EE information, professional development and education in BiH, RS, FBiH and BD BiH;	Final energy consumption in all sectors	2010-2018 Existing measure	N/a

		c. Assessment of potentials for EE improvements in the transport sector			
H.3	Establishment, application and development of the energy efficiency information system in all final energy consumption sectors	The objective of this measure is to ensure adequate and reliable data required for efficient energy management, development of strategic and planning documents, and monitoring of their implementation. The main activities are: 1. Establishment and operation of the common information system for energy management, a database of relevant data from all final energy consumption sectors; 2. Harmonisation of statistical chapters, areas and modules and the methodology for collection and processing of statistical EE data with EUROSTAT and Energy Community requirements; 3. Improvement of the format of action plans in the segment of reporting of actual energy savings, in order to harmonise them with the indicative targets defined in EEAP BiH; 4. Ensuring the use of the MVP platform by all institutions responsible for reporting of actual energy efficiency improvement results; 5. Establishment of an efficient system in all public institutions and companies for EE communication and coordination with the relevant horizontal and vertical levels of government	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.4	Public energy efficiency information and motivation campaigns	The objective of this measure is to raise the awareness and provide basic information about the importance of EE to target groups in all final energy consumption sectors, to motivate them to implement EE measures and achieve savings. The measure includes campaigns with different topics related to all final consumption sectors. Potential tools for communication with target groups are: (a) Radio, television, web portals, printed media; (b) Websites of institutions responsible for implementation of individual EEAP measures, and/or dedicated EE websites/FB pages; (c) Workshops, conferences and similar events for target group representatives from various sectors; (d) Public events as part of Energy Days, usually organised by LSGUs in the course of implementation of EEAP/SEAP; etc.	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.5	Development and implementation of a system for education, training and professional development in the area of energy efficiency	The objective of this measure is to gain new and increase existing professional knowledge, skills and competences of the implementers of sectoral measures, required for adequate and timely completion of assigned tasks in order to achieve sectoral final energy savings targets set in this EEAP BiH. This measure makes a qualitative leap away from information and motivation campaigns which provide only introductory information on individual areas and topics related to energy efficiency.	Final energy consumption in all sectors	2016-2018 New measure	N/a

H.6	Inclusion of energy efficiency topics into the general education system	The objective of this measure is to increase the level of knowledge of new generations about the necessity of rational energy management for environmental protection, energy security and sustainable growth, and the use of EE as an efficient mechanism for attainment of these goals. The main activities are: 1. Development of priority EE topics defined in the *strategies for energy efficiency communication, professional development and education* for all education levels, and their inclusion in the curricula; 2. Training of teachers at all levels of education for adequate teaching about EE; 3. Equipping schools with appropriate literature about EE-related topics and other teaching aids;	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.7	Establishment of a training and certification system for licensed energy auditors for buildings, public utility service systems, industrial plants and technological processes, and for issuing energy certificates	The objective of this measure is to create key conditions for adequate collection of information needed for efficient energy management and EE improvements, as follows: (a) Current energy consumption (in buildings, utility systems, industrial plants and technological processes); (b) EE measures; and (c) Viability of investments (cost-benefit analysis and ranking of measures by financial viability). The main activities are: 1. Establishment and implementation of the training, qualification and certification system for licenced energy auditors; 2. Determination of the energy audit methodology, required content of energy audit reports, and the procedure for energy audits of buildings, utility services systems, industrial plants and technological processes; 3. Implementation of independent controls of issued energy certificates in order to ensure the required quality of the overall process and the results of energy audits and certificates. *Please note: Energy audits, energy audit reports and energy certification of buildings, utility services systems and industrial processes form an integral part of measure H.9*	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.8	Metering and informative billing of energy consumption to end consumers	The objective of this measure is to motivate electricity, heat and natural gas consumers to use energy rationally and to undertake appropriate EE measures. The measure includes the following main activities: 1. Development of sustainable tariff models for billing of heating according to actual consumption, in the form of recommendations for consideration/adoption by heating suppliers; 2. Installation of individual meters to measure actual consumption of electricity, natural gas, district heating and hot water by end-users, in accordance with EU directives;	Final energy consumption in sectors: residential, public and commercial services, industry	2010-2018 Existing measure	N/a

		3. Provision of information to consumers (e.g. on the energy bill), as required by EU directives			
H.9	Introduction and implementation of energy management	The objective of this measure is to establish a systemic process for continuous reduction of energy consumption. The measure applies to: (1) Service and industry sector buildings; (2) Utility services (public lighting, water supply and waste water treatment, district heating systems); (3) Industrial processes and plants. Each of the above segments/actors subject to measures includes the following activities: 1. Adoption of a decision on introduction of energy management; Appointment of the responsible person/team; 2. Creation of an internal organisational structure for EE in public institutions and companies, and in companies operating in the commercial services and/or industry sector 3. Securing the financing required for introduction of energy management; 4. Collection of data on past energy consumption and identification of areas (buildings, systems, processes, equipment, etc.) which substantial consumption of energy; 5. Development and operation of the database (structurally harmonised with the Energy Management Information System in measure H.3 (activity 1); 6. Development of an energy management/energy efficiency plan; 7. Energy auditing and energy certification of buildings, utility service systems, industrial plants and technological processes; 8. Implementation of planned measures, monitoring results, reporting; 9. Regular measurement, recording and analysis of energy consumption, with corresponding revision of the EEAP	Final energy consumption in the public and commercial services and industry sector	2010-2018 Existing measure	N/a
H.10	Strengthening of capacities in institutions responsible for energy efficiency	The objective of this measure is to establish and develop efficient financing, implementation and monitoring mechanisms for EE measures in final energy consumption. The measure includes institutional strengthening of the funds/agencies, their employees and tangible/technical resources, further development of mechanisms for securing the funding required for performance of activities within their legally prescribed scope of competence in the area of EE	Final energy consumption in all sectors	2010-2018 Existing measure	N/a
H.11	Strengthening of existing institutional capacities for systemic energy management	The objective of this measure is to enable local self-governance units, cantons and authorities at entity and state level to properly perform their tasks in the capacity of: (a) energy consumers, service providers and EE leaders; (b) planners and implementers of sustainable development, and regulators; (c) energy producers and energy suppliers. The measure includes the following activities:	Final energy consumption in all sectors	2010-2018 Existing measure	N/a

		1. Raising the awareness of all levels of government of the importance and effects of energy management at the local and cantonal level, and of the importance of the EEAP (implemented as part of activities in H.4); 2. Training of public administration employees at all levels of government about: (a) Key steps in the process of introduction and implementation of energy management institutions at all levels of government; (b) Creation of EEAPs/SEAPs in accordance with the law and best practices; (c) Implementation of EE measures; (d) Regular measurement and analysis of energy consumption, reporting and reviewing of EEAPs/SEAPs;			
H.12	Use of energy efficiency criteria in the public procurement system	The objective of this measure is to reduce total energy consumption by means of procurement of energy efficient goods, services and works financed from public budgets. The measure includes the following activities: 1. Creation and publishing of clear instructions and illustrative examples of documents forming a part of tender documentation (selection criteria, technical specifications, etc.) related to introduction of EE criteria; 2. Introduction and implementation of the control system to ensure that the prescribed use of energy efficiency criteria in public procurement is duly respected. *Please note: Harmonisation of existing regulations in order to commit the public sector and other users of public budgets to procure EE goods, services and buildings is addressed in measure H.1. Training of target groups for application of EE criteria in public procurement is addressed in measure H.5*	Final energy consumption in sectors: public and commercial services, industry, transport	2010-2018 Existing measure	N/a
H.13	Introduction and application of a financial framework for improvement of EE in final energy consumption	The objective of this measure is to create financial, fiscal, executive and institutional mechanisms necessary for adequate implementation of EE measures and attainment of planned energy savings targets. These mechanisms are described in more detail in section 5 of this document.	Final energy consumption in all sectors	2010-2018 Existing measure	N/a

Table 26 - Overview of horizontal and cross-sectoral energy efficiency measures in final energy consumption sectors

3.3.2.2 Overview of existing measures in the residential sector

Index	Measure title	Measure description	Target energy consumption	Duration of measure	Savings achieved in 2015 (PJ)
R.1	Renovation of the envelope of existing residential buildings and family houses in order to improve their	The objective of this measure is to reduce the total energy consumption in the residential sector through improvement of thermal insulation characteristics of residential buildings and houses. The measure may include the following activities individually or in appropriate combinations):	Final consumption of energy and fuels (electricity and heat, gas, coal, oil derivatives, wood) depending on	2010-2018 Existing measure	0.986

	energy efficiency	1. Procurement and installation of thermal insulation for exterior walls; 2. Procurement and installation of thermal insulation for roofs, ceilings and floors; 3. Replacement of existing windows, doors and other glazed surfaces with high energy performance windows and doors	the type and quality of building materials used in the building		
R.2	Energy performance improvements of existing systems and installation of new, energy efficient technical systems in residential buildings and family houses	The objective of this measure is to reduce energy consumption of technical systems in residential buildings and houses. With regard to heating, this measure applies only to individual heating of rooms and central heating, while measures for EE improvements in district heating systems are addressed in Section 2 of this EEAP BiH. The measure applies to the following technical systems in residential buildings and houses: (a) Thermal technical systems/installations; (b) Heating, cooling, air-conditioning plant and equipment and water heating systems; (c) Residential lighting equipment; and (d) Ancillary systems (electricity powered technical equipment associated with thermal technical systems for buildings/houses). The measure includes the following activities (individually or in appropriate combinations) aimed at improvement of energy characteristics of existing systems and/or procurement of new technical systems: 1. Energy efficiency improvements in heat generation units and change of fuel, such as: (a) Replacement of old fossil fuel/electrical boilers with high-efficiency biomass boilers; (b) Replacement of individual heat sources with high efficiency central heating systems, etc.; (c) Connection of residential buildings and family houses to existing district heating systems using renewable energy sources and/or cogeneration; 2. Optimisation of the distribution pipeline network, pumping systems, safety and regulation equipment, such as: (a) Replacement of central heating pumps with new, electronically regulated pumps; (b) Improvement of regulation and system management equipment; (c) Installation of low temperature heating systems and high temperature cooling systems (floor heating and ceiling cooling, combination with ventilation systems, passive cooling systems and induction equipment) 3. Installation of energy efficient HVAC systems for heating, ventilation and air-conditioning; 4. Optimisation of air conditioning systems operation (circulation pumps and variable speed ventilators; use of waste air heat (recuperative and regenerative heat exchangers) and waste heat from	Final energy consumption and fuel consumption for space heating, cooling, air conditioning and lighting in buildings and houses	2010-2016 Existing measure	1.109

		condensation in cooling equipment; use of night time ventilation of buildings, etc.); 5. EE improvements in interior lighting, such as: (a) Replacement of existing light bulbs with energy efficient technologies; (b) Optimisation of lighting control and management (installation of lighting regulators, sensors, lighting management systems, etc.).			
R.3	Energy generation from RES in households	The objective of this measure is to reduce consumption of electricity and heat produced from conventional sources by covering household energy needs with energy produced in the household. The measure includes generation of electricity and/or heat from solar and geothermal sources and use of air, earth or subterranean water heat pumps. The measure may include the following activities, individually or in combination: (a) Procurement and installation of solar systems for production of heat for space heating and/or water heating; (b) Procurement and installation of solar photovoltaic systems for electricity generation; (c) Replacement of existing and installation of new thermal technical systems with air, earth, subterranean water or geothermal heat pumps. *Please note:* *a. Use of biomass (for heating) is addressed in measure R.2;* b. *This measure primarily applies to the use of produced energy for electricity producer's own needs (household, groups of owners in multi-apartment buildings). Promotion of production of electricity and other types of energy for feeding into the grid, as well as creation of technical feed-in preconditions, are subject to regulations discussed in Section 2.*	Final consumption of energy and fuels (electricity, gas, coal, oil derivatives, wood) in residential buildings and houses	2010-2018 Existing measure	0.012
R.4	Construction of new residential buildings and family houses with prescribed energy performance characteristics	The objective of this measure is to reduce total energy consumption in the residential sector, in relation to average consumption to date, through construction of new residential buildings and houses with prescribed energy performance. *Please note: This measure covers all activities mentioned in measures R.1 (envelope) and R.2 (technical systems) and option R.3 (production and use of energy from RES);*	Final consumption of all fuels in newly constructed buildings and houses	2010-2018 Existing measure	0,000
R.5	Procurement and use of energy efficient electrical household appliances	The objective of this measure is to reduce electricity consumption in households through replacement of existing, non-energy efficient appliances with new, high energy performance electric appliances. The measure includes procurement and use of the following appliances: a. Cooling appliances (refrigerators and freezers, also combined);	Final consumption of electricity required to power electric household appliances	2010-2018 Existing measure	0.00000011

		b. Laundry washing machines, dryers, combined washer/dryers; c. Dishwashers; electric stoves, microwave ovens, ventilation hoods; d. Electric water heaters; e. TVs, radios, etc.; *f.* Small household appliances (vacuum cleaners, irons, hair dryers, mixers, etc.); *Please note: Procurement and use of lighting and electric equipment as part of thermal technical systems and ancillary systems (also subject to Directive 2010/30/EU on labelling of products) is addressed in measure R.2*			

Table 27 - Overview of energy efficiency measures in the residential sector

3.3.2.3 Overview of individual measures in the public and commercial services sector

Index	Measure title	Measure description	Target energy consumption	Duration of measure	Savings achieved in 2015 (PJ)
U.1	Energy renovation of the envelope of existing buildings in the public and commercial sector	The objective of this measure is to reduce total energy consumption in the residential sector through improvement of thermal insulation characteristics of residential buildings in this sector. The measure may include the following activities individually or in appropriate combinations): 1. Procurement and installation of thermal insulation for exterior walls; 2. Procurement and installation of thermal insulation for roofs, ceilings and floors; 3. Replacement of existing windows, doors and other glazed surfaces with high energy performance windows and doors	Final energy (electricity, heat, gas, coal, oil derivatives, wood) depending on the type and quality of building materials	2010-2018 Existing measure	1.074
U.2	Improvement of energy performance of existing systems and installation of new, energy efficient technical systems in buildings	The objective of this measure is to reduce energy consumption of technical systems in residential buildings in this sector. It applies to individual heating of rooms and central heating, while measures for EE improvements in district heating systems are addressed in Section 2 of this EEAP BiH. The measure applies to the following technical systems in buildings: (a) Thermal technical systems/installations; (b) Heating, cooling, air-conditioning plant and equipment and water heating systems; (c) Ancillary systems (electricity powered technical equipment associated with thermal technical systems in buildings). The measure includes the following activities (individually or in appropriate combinations): 1. Energy efficiency improvements in heat generation units and change of fuel, such as: (a) Replacement of old fossil fuel/electrical boilers with high-efficiency biomass boilers; (b) Replacement of individual heat sources with high efficiency central heating systems, etc.; (c) Connection of residential buildings and family houses to existing district heating systems using renewable energy sources and/or cogeneration; 2. Optimisation of the distribution pipeline network, pumping systems, safety and regulation equipment, such as: (a) Replacement of central heating pumps with new, electronically regulated pumps; (b) Improvement of regulation and system management equipment; (c) Installation of low temperature heating systems and high temperature cooling systems (floor heating and ceiling cooling, combination with ventilation systems, passive cooling systems and induction equipment) 3. Installation of energy efficient HVAC systems for heating, ventilation and air-conditioning; 4. Optimisation of air conditioning systems operation (circulation pumps and variable speed ventilators; use of waste air heat (recuperative and regenerative heat exchangers) and waste heat from condensation in cooling equipment; use of night time ventilation of buildings, etc.);	Final energy consumption and fuel consumption for space heating, cooling and air conditioning in buildings	2010-2018 Existing measure	1.070
U.3	Energy generation from RES in the public and commercial sector	The objective of this measure is to reduce consumption of electricity and heat from conventional sources by meeting the energy needs of the sector with energy produced in the institutions and companies within the sector. The measure includes generation of electricity and/or heat from solar and geothermal sources and use of air, earth or subterranean water heat pumps. The measure includes the following activities (individually or in appropriate combinations):	Final consumption of energy and fuels (electricity, gas, coal, oil derivatives, wood) in existing buildings	2010-2018 Existing measure	0.356

		1. Installation of solar systems for generation of heat for space and/or water heating; 2. Procurement and installation of solar photovoltaic systems for electricity generation; 3. Replacement of existing or installation of new thermal technical systems with air, earth, subterranean water or geothermal heat pumps. *Please note: (1) Use of biomass is addressed in measure U.2; (2) This measure primarily implies the use of produced energy to meet the needs of the producing institution or company, although produced energy may also be fed into the grid. Promotion of delivery (feed-in) of produced energy into the grid is addressed in Section of this EEAP BiH; (3) Energy generation from RES for water supply, waste water treatment and public lighting systems is addressed in measure U.6/U.7*	in the public and commercial service sector		
U.4	Construction of new buildings with prescribed energy performance characteristics in the public and commercial sector	The objective of this measure is to reduce total energy consumption in the service sector, in comparison with average consumption to date, through construction of new buildings with prescribed energy performance. The measure includes all elements individually described in measures U.1 (building envelope), U.2 (technical systems in buildings and interior lighting) and U.3 (generation and use of energy from RES)	Final consumption of all forms of energy for all building energy needs	2010-2018 Existing measure	0,000
U.5	Procurement and use of energy efficient electrical equipment and lighting in the public and commercial sector	The objective of this measure is to reduce electricity consumption in the public and commercial service sector through replacement of existing non-energy efficient equipment or purchase of new electric equipment and lighting with high energy performance characteristics. The measure includes procurement and use of the following types of equipment: (a) Office equipment (computers, photocopiers, printers, scanners, fax machines, etc.); and (b) Other functional equipment (electric stoves, microwave ovens, ventilation hoods, refrigerators and freezers and combinations thereof; laundry washing machines and dryers, dishwashers; TVs and radios; etc.); and (c) EE improvements in interior lighting, such as: (i) Replacement of existing light bulbs with energy efficient technologies; (ii) Optimisation of lighting control and management (installation of lighting regulators, sensors, lighting management systems, etc.). *Please note: Procurement and use of lights (lamps and bulbs) and electrical equipment required for operation of thermal technical systems and ancillary systems is addressed in measure U.2*	Final consumption of electricity required to power the listed electrical equipment and lighting in the public and commercial service sector	2010-2018 Existing measure	0,000
U.6	Energy efficiency improvements in the water supply and waste water treatment system	The objective of this measure is to reduce final energy consumption in water supply and waste water treatment systems through EE improvements in these systems. Includes the following activities (individually or in appropriate combinations): 1. Optimisation of energy performance of equipment (filtering stations, motors, pumps, plant, etc.); 2. Reduction of water losses in the network (reconstruction of the network; regulation of water pressure in the system); 3. Rationalisation of water consumption through reduction of losses in the distribution network and house installations, and through modernisation of the monitoring system in water supply systems; 4. Optimisation of processes in overall system operation;	Electricity for water supply and waste water treatment systems	2010-2018 Existing measure	0,000

		5. On-site energy generation from RES (solar photovoltaic systems, wind turbines, etc.) to supply electricity to pumping stations, filtration stations, etc.			
U.7	Improvement of energy efficiency of the public lighting system	The objective of this measure is to reduce electricity consumption of street lighting through EE improvements in these systems. Includes the following activities (individually or in appropriate combinations): 1. Replacement of existing and installation of new EE public lighting systems (EE lamps, etc.); 2. Introduction of efficient lighting management systems (installation of lighting regulators, etc.); 3. Energy supply for the public lighting system from solar energy generated on-site	Electricity for the public lighting system	2010-2018 Existing measure	0.0065

Table 28 - Overview of energy efficiency measures in the public and commercial service sector

3.3.2.4 Overview of individual measures in the industry sector

Index	Measure title	Measure description	Target energy consumption	Duration of measure	Savings achieved in 2015 (PJ)
I.1	Energy efficiency improvements in industrial processes	The objective of this measure is to reduce energy consumption of industrial processes through EE improvements in these processes or their individual phases. The measure primarily applies to reduction of heat[110] and electricity[111] consumption. Examples of possible activities (individually and/or in combination): 1. Replacement of existing equipment (boilers, burners, etc.) with EE installations; 2. Rationalisation of water use for technological purposes (through use of advanced technologies requiring less water); 3. Reconstruction of the steam supply system; 4. Reconstruction of the compressed air supply system; 5. Reconstruction of the energy supply system (replacement of old, over capacitated transformers, etc.); 6. Energy optimisation of new plants; 7. Installation of equipment which allows utilisation of waste heat from production processes; 8. Installation of absorption cooling equipment; 9. Optimisation of production processes (installation of integrated production monitoring systems; installation of intelligent motor speed regulators; etc.); 10. Optimisation of fuel combustion efficiency; etc. *Please note: (1) Introduction of cogeneration to industrial processes as one potential activity aimed at energy savings in industrial processes, is addressed in measure I.3; (2) Change of fuels and transition to internally generated energy from RES to power industrial process is addressed in measure I.4*	Final consumption of all forms of energy and fuels needed to sustain industrial processes in target companies	2010-2018 Existing measure	0.178
I.2	Improvement of energy performance of buildings in the industry sector	The objective of this measure is to reduce total energy consumption in the industry sector and it applies to administrative and other industrial non-residential buildings. The measure may include the following activities (individually or in combination): 1. Renovation of building envelope: (a) installation of heat insulation for exterior walls; (b) installation of heat insulation in roofs, ceilings and floors; (c) replacement of existing windows, doors and other glazed surfaces with high energy performance windows and doors; 2. Improvement of EE in technical systems in buildings, such as: (i) Thermal technical systems, with all required installations, plant and equipment for heating, cooling and air-conditioning, and water heating systems; (ii) Technical lighting equipment; and (iii) Ancillary systems, including technical	Energy for heating, cooling and air conditioning, water heating, interior lighting and operation of equipment and devices	2010-2018 Existing measure	0,000

[110] According to the Study of energy efficiency and energy savings potentials in the industry sector, and potential policy mechanisms produced by IFC International for the EC Directorate-General for Energy (https://ec.europa.eu/energy/sites/ener/files/documents/151201%20DG%20ENER%20Industrial%20EE%20study%20-%20final%20report_clean_stc.pdf), heat accounts for 66% of the total energy consumption in the 8 most energy-intensive industry sub-sectors. The study covered paper production, iron and steel production, non-metallic mineral products, chemical and pharmaceutical industry, production of coke and refined oil products, food industry and machining industry.

[111] According to the same study, electricity consumption represents 26% of the total energy consumption in these 8 sub-sectors.

		equipment and devices used in thermal technical systems in buildings and powered by electricity. This may include: 1. Energy efficiency improvements in heat generation units and change of fuel (replacement of old fossil fuel/electrical boilers with high EE biomass boilers; replacement of individual heat sources with EE central heating systems; connection of buildings and family houses to existing district heating systems using RES and/or cogeneration; etc.); 2. Optimisation of the distribution pipeline network, pumping systems, safety and regulation equipment (replacement of central heating pumps with new, electronically regulated pumps; improvement of regulation and system management equipment; installation of low temperature heating systems and high temperature cooling systems (floor heating and ceiling cooling, combination with ventilation systems, passive cooling systems and induction equipment); 3. Installation of energy efficient HVAC systems for heating, ventilation and air-conditioning; 4. Optimisation of operation and energy efficiency improvements in air conditioning systems (use of circulation pumps and variable speed ventilators; use of waste air heat - recuperative and regenerative heat exchangers; use of waste heat from condensation in cooling equipment; use of night time ventilation of buildings, etc.); 5. EE improvements in interior lighting (replacement of existing light bulbs with energy efficient technologies; optimisation of lighting control and management - installation of lighting regulators, motion sensors, lighting management systems, etc.).			
I.3	Use of cogeneration and trigeneration in industry	The objective of this measure is to reduce energy consumption in the industry sector through use of cogeneration and trigeneration plants. Cogeneration means simultaneous production of two useful forms of energy from one primary energy source, i.e. combined production of electricity and heat in a single plant. Trigeneration involves also the production of energy for cooling. This measure applies to industrial cogeneration, where heat and electricity are used primarily for technological processes in the company, and only temporary energy surplus is fed to the grid. The measure encompasses investments in different types of technologies, most appropriate for specific types of industrial processes in individual industry sub-sectors.	All forms of energy required for individual phases of industrial processes	2010-2018 Existing measure	0.112
I.4	Energy generation from RES in the industry sector	The objective of this measure is to reduce consumption of electricity and heat generated from conventional sources through own energy generation from RES and its use for industrial process needs. The measure includes generation of electricity and heat from solar and geothermal sources and use of air, earth, subterranean water, etc. heat pumps. May include the following types of investments (individually or in combination): 1. Replacement of existing fossil fuel boilers with biomass boilers; 2. Installation of solar systems for generation of heat; 3. Installation of solar photovoltaic systems and wind turbines for generation of electricity; 4. Installation of air, earth, subterranean water or geothermal heat pumps	Final consumption of all forms of energy required for individual phases of industrial processes in target industrial companies	2010-2018 Existing measure	0.152

		Please note: The measure implies that the produced energy will be used primarily to power industrial processes in the company that produced the energy. Stimulation of production of electricity and other types of energy for delivery (feed-in) into the grid is discussed in Section 2 of this EEAP BiH			

Table 29 - Overview of energy efficiency measures in the industry sector

3.3.2.5 Overview of individual measures in the transport sector

Index	Measure title	Measure description	Target energy consumption	Duration of measure	Savings achieved in 2015 (PJ)
S.1	Use of energy efficient vehicles in road and urban transport	The objective of this measure is to reduce energy consumption in the transport sector through replacement of existing (mainly old, environmentally unacceptable and non-energy efficient) motor vehicles and procurement of new, environmentally friendly and EE vehicles. The measure applies to procurement of environmentally friendly and energy efficient (a) motorcycles, tricycles and quads; (b) passenger cars, (c) buses, and (d) cargo vehicles.	Consumption of fuels for transport of passengers and goods in road transport	2010-2018 Existing measure	0,000
S.2	Infrastructural measures on the road network which provide energy saving effects	The objective of the measure is to reduce consumption of fuels in road and urban transport through road infrastructure improvements. The measure applies to all categories of public roads: motorways, express roads, trunk roads, regional roads, local roads and streets in urban settlements. In the context of this measure, the term 'public road' comprises bottom and top layer of the road, road components, connections, pavements, pedestrian and bicycle paths on the alignment, road belt, road facilities (including bus stops, parking lots, etc.), traffic signs, and road equipment. The measure includes construction of new or reconstruction of existing road infrastructure that: 1. Increases the efficiency of vehicle use, especially in urban areas, for example: (a) Construction of bypasses around city centres and other populated places; (b) Construction of roundabouts; (c) Improvement of traffic signs and signals; (d) Reconstruction of roads (widening, additional lanes, tunnels, etc.); etc. 2. Creates the necessary technical preconditions for more energy efficient behaviour of participants in traffic (walking, use of public transport or bicycles instead of private cars, etc.), such as: (a) Construction of bicycle lanes and bicycle parking areas; (b) Construction of parking lots; (c) Construction of pedestrian paths; (d) Improvement of technical infrastructure for use of public (urban and local) passenger transport (bus stations, etc.);	Consumption of fuels for transport of passengers and goods in road transport	2010-2018 Existing measure	0.272

Table 30 - Overview of energy efficiency measures in the transport sector

3.3.3 Programmes aimed at achievement of planned savings in final energy consumption

Table 31 provides a summary overview of all programmes for energy efficiency improvement and final energy savings planned in this document. The table includes programmes to be implemented at all relevant levels in Bosnia and Herzegovina: Bosnia and Herzegovina, Brčko District BiH, Federation BiH and Republic of Srpska.

No.	Programme owner	Programme title	EE measures in the programme	Financing sources	Financing methods	Target final energy consumption sectors
Programmes at the level of Bosnia and Herzegovina						
01	MoFTER	Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina.	U1, U2, U5; H2, H3, H4, H5, H7, H9, H12, H13	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Public services
02	MoFTER	Programme for coordination of energy efficiency in Bosnia and Herzegovina	H1, H3	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors
Programmes at the level of Brčko District BiH						
01	BD	Energy efficiency programme in the Brčko District BiH	R1, R2, R3, R4, R5; U1, U2, U3, U5, U6, U7; I1, I2, I3, I4; H1, H2, H3, H4, H5, H6, H7, H8, H9, H12, H13	Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnership (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Residential; Public and commercial services; Industry
Programmes at the level of Federation BiH						
01	FMoEMI	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Federation BiH	H1, H2, H3, H12, H13	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors
02	FMoEMI	Programme for energy efficiency information, professional development and education in the Federation BiH	H2, H4, H5, H6, H7, H10, H11, H13	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors
03	FERK	Programme of energy efficiency obligation schemes in the Federation BiH through electricity distributors	R1, R2, R3; H1, H3, H4, H.5, H9, H13	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants;	Residential
04	FMoEMI	Programme for energy efficiency obligation schemes in the Federation BiH through	R1, R2; H1, H3, H4, H5, H8, H9, H13	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants;	Residential

No.	Programme owner	Programme title	EE measures in the programme	Financing sources	Financing methods	Target final energy consumption sectors
		heating energy distributors				
05	FMPP	Programme for energy efficiency improvements in the public service sector buildings in the Federation BiH	U1, U2, U3; H2, H3, H4, H5, H7, H8, H9, H11, H12, H13	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Public services
06	Cantons	Cantonal energy efficiency programmes for residential and public service sector buildings	R4, U1, U2, U3, U4, U5; H2, H3, H4, H5, H7, H8, H9, H11, H12, H13	Energy tax; CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Public services
07	FMoEMI	Programme for energy efficiency improvements in public utility systems	U6, U7; H3, H4, H5, H7, H9, H11, H12, H13	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds;	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Income tax incentives (investment-based tax deductions)	Public services
08	FMoEMI	Programme for energy efficiency improvements in the industry and commercial service sector	I1, I2, I3, I4; U.1, U.2, U.3, U.5; H3, H4, H5, H7, H9, H13	CO_2 tax; Air quality tax; International financial institutions' funds (IFIs); UN funds; EU funds;	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Income tax incentives (investment-based tax deductions)	Industry; Commercial services
09	FMoEMI	Programme for promotion of sustainable road and urban transport in the Federation BiH	S.1, S.2; H2, H3, H4, H12, H13;	CO2 tax; Air protection tax; Public budgets; Technical assistance	Preferential loans; Regular budget lines; Grants	Transport
Programmes at the level of Republic of Srpska						
01	MoIEM	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Republic of Srpska	H1, H2, H3, H12, H13	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors
02	MoIEM RS Fund	Programme for energy efficiency information, professional development and education in the Republic of Srpska	H2, H4, H5, H6, H7, H10, H11, H13	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors

No.	Programme owner	Programme title	EE measures in the programme	Financing sources	Financing methods	Target final energy consumption sectors
03	MoIEM RERS	Programme for energy efficiency obligation schemes in the Republic of Srpska through electricity distributors	D1, D2, D3; H1, H3, H4, H.5, H9, H13	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants	Residential
04	MoIEM MSPCEE	Programme for energy efficiency obligation schemes in the Republic of Srpska through heating energy distributors	D1, D2; H1, H3, H4, H5, H8, H9, H13	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants	Residential
05	MSPCEE	RS programme for energy efficiency improvements in buildings in the residential sector and public services sector	D4, U1, U2, U3; U5, H2, H3, H4, H5, H7, H9, H11, H12, H13	CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Residential; Public services
06	MoIEM MSPCEE	Programme for energy efficiency improvements in public utility systems	U6, U7; H3, H4, H5, H7, H9, H11, H12, H13	CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Public services
07	MoIEM	Programme for energy efficiency improvements in the industry sector and the commercial services sector	I1, I2, I3, I4; U.1, U.2, U.3, H3, H4, H5, H7, H9, H13	CO_2 tax; Air quality tax; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP)	Industry; Commercial services
08	MoIEM MTC	Programme for promotion of sustainable road and urban transport in the Republic of Srpska	H2, H3, H4, H12, H13; S.1, S.2	CO_2 tax; Air quality tax; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP);	Transport

Table 31 - Summary overview of all programmes for savings in final energy consumption in the territory of BiH

Table 32 provides a separate overview of all energy efficiency programmes in final consumption sectors at the level of BiH, with a list of horizontal and sectoral measures included in each programme, financial framework instruments required for implementation of these programmes, as well as final energy consumption sectors covered by these measures.

With regard to the financing required for implementation of these programmes, tables provided in Appendix 6.2 of this document show a detailed breakdown of the structure of financing, as shown in summary form in Table 10 for all programmes at the level of Bosnia and Herzegovina and Brčko District BiH, and provide the following information:

a. Financing required for implementation of individual measures within the scope of each programme, i.e. financing required to achieve the planned savings for the given programme (shown in Appendix 6.1 of this document); and

b. The total amount of financing required for implementation of the given sectoral measure across all programmes, i.e. financing required to achieve final energy savings planned for the measure across all programmes.

Additionally, these tables also show the following information for each sectoral measure:

c. Total financing required for implementation of that measure through market forces and use of target groups' own funds and to achieve planned savings shown in Appendix 6.1 of this document; and
d. The total amount of financing required to achieve the expected savings in 2018 through implementation of the measure, which is a sum of financing required to achieve savings through implementation of the measure within the planned programmes and the savings resulting from market forces and use of own funds.

Please note:

1. *In the prescribed formats, used below for detailed breakdown of planned programmes, only the total amount of required financing is shown in the appropriate field. A detailed breakdown of the total financing required for each measure is presented in Appendix 6.2.*
2. *Programmes planned in the Federation BiH and Republic of Srpska are shown, respectively, in corresponding tables in Appendix 6.2 of EEAPF 2016-2018 and Amendments to EEAP RS 2018, and form an integral part of this document.*

Same as tables included in Appendices 6.1 and 6.2, the table in Appendix 6.3 of this document (for programmes at the level of Bosnia and Herzegovina and Brčko District BiH) provides a detailed breakdown of target indicator values for individual sectoral measures that will contribute to final energy savings within the scope of planned programmes, as follows:

a. Target indicators are shown for individual measures (contained in each programme) contributing to achievement of planned savings from the programme; and
b. The total value of indicators achieved through implementation of the given measure across all planned programmes.

Additionally, these tables also show the following information for each sectoral measure:

c. The total value of the indicator required to achieve the planned final energy savings resulting from market forces and use of target groups' own funds; and
d. The total value of the indicator, which is a sum of indicator values achieved through implementation of the measure within planned programmes and those resulting from market forces and use of own funds.

Please note:

Programmes planned in the Federation BiH and Republic of Srpska are shown, respectively, in corresponding tables in Appendix 6.3 of EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.

No.	**Programme owner**	**Programme title**	**EE measures in the programme**	**Financing sources**	**Financing methods**	**Target final energy consumption sectors**
01	MoFTER	Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina.	U1, U2, U5; H1, H2, H3, H4, H5, H9, H12, H13	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; PPP; Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Public services
02	MoFTER	Programme for coordination of energy efficiency in Bosnia and Herzegovina	H1, H3, H4	Public budgets; Technical assistance	Regular budget lines; Grants	All sectors

Table 32 - Overview of planned final energy savings programmes implemented at the state level

Table 33 provides an overview of all energy efficiency programmes in final consumption sectors at the level of Brčko District BiH, with a list of horizontal and sectoral measures included in each project, financial framework instruments required for implementation of these programmes, as well as final energy consumption sectors covered by these measures.

No.	Programme owner	Programme title	EE measures in the programme	Financing sources	Financing methods	Target final energy consumption sectors
01	BD	Energy efficiency programme in the Brčko District BiH	R1, R2, R3, R5; U1, U2, U3, U5, U6, U7; I1, I2, I3, I4; H1, H2, H3, H4, H5, H6, H7, H8, H9, H12, H13	Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnership (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)	Residential; Public and commercial services; Industry

Table 33 - Overview of planned final energy savings programmes implemented at the level of Brčko District BiH

Tables 34, 35 and 36 provide detailed information of programmes implemented at the level of Bosnia and Herzegovina and Brčko District BiH. Other programmes listed in the previous table, implemented at entity level, are described in detail in *EEAPF 2016-2018 and Amendments to EEAP RS 2018*, respectively.

Programmes implemented at the level of Bosnia and Herzegovina

Programme title	**Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina**
ID	PRG.01 BiH
Programme description	
Category	1. Regulations, 2. Information and mandatory information measures; 3. Financial instruments
Timeframe	2017-2018 and onwards
Objective / Short description	The objective of this programme is to reduce total energy consumption in residential and public sector buildings owned by authorities at the level of Bosnia and Herzegovina through improved energy performance of the envelope, technical systems and equipment in buildings, as well as reduced consumption of energy from network systems. The programme includes the following measures: **U.1 Energy renovation of the envelope of existing buildings in the public and commercial service sector:** Technical description of the measure: according to description of measure U.1 in Table 28; however this programme covers only renovation of buildings in the public sector; **U.2 Improvement of energy performance of existing systems and installation of new EE technical systems in buildings:** Technical description of the measure: according to description of measure U.2 in Table 28, however this programme covers only renovation of buildings in the public sector; **U.5 Procurement and use of energy efficient electric equipment in the public and commercial sector** Technical description of the measure: according to description of measure U.5 in Table 28, however this programme covers only use of EE equipment in the public sector; *The programme also includes the following horizontal measures at the level of the state, as well as any elements of such horizontal measures relevant in the context of this programme:* **H.1 Development and application of the legislative and regulatory framework for EE in final energy consumption**, as follows: (a) Activities on embedding mandatory procurement of energy efficient goods, services and buildings in the existing public procurement legislation, and establishment of an implementation monitoring system for this requirement *(further details are provided in Section 4 of this document - Roadmap)*; and (b) Creation of legal conditions for introduction and implementation of components of the financial, regulatory, executive and institutional framework for EE in final consumption (financial framework mechanisms described in measures H.13) at the level of Bosnia and Herzegovina; **H.2 Drafting and adoption of strategic and planning documents on energy efficiency** Within the scope of this programme, this measure primarily concerns the development of the *Building Renovation Strategy of BiH;*

	H.3 Introduction, use and development of the EE information system in all final consumption sectors Within the scope of this programme, the measure includes all activities described for measure H.3 in Table 26 in the context of implementation of this programme; **H.4 Public energy efficiency information and motivation campaigns** Within the scope of this programme the measure includes topics relevant to other topics in this programme (U1, U.2, U.3, U5, H.9, H.12, H.13); **H.5 Introduction and implementation of the system of EE education, training and professional development** Within the scope of this programme the measure includes topics relevant to other topics in this programme (U1, U.2, U.3, U5, H.9, H.12); **H.9 Introduction and implementation of energy management**, aimed at placing renovation of buildings taking place within this programme in the wider context of sustainable energy management. Within the scope of this programme, the measure includes all activities described for measure H.9 in Table 26, in the context of implementation of this programme; **H.11 Institutional strengthening of all levels of government for systemic energy management**, according to description of measure H.7 in Table 26 and for authorities at the level of Bosnia and Herzegovina; **H.12 Introduction and application of energy efficiency criteria in the public procurement system** Measure description: according to description of measure H.12 in Table 26; **H.13 Introduction of the financial framework for improvement of EE in final energy consumption:** The measure covers only the introduction of financial and executive mechanisms required for implementation of this programme
Target final consumption	Final consumption of energy and fuels (electricity, heat, gas, coal, oil derivatives, biomass) in existing public sector buildings owned or operated by authorities of Bosnia and Herzegovina, for all functions of the building (heating, cooling, air conditioning, powering of electric devices)
Target groups	Owners of public sector buildings (public administration[112] and other service sector institutions at the level of Bosnia and Herzegovina)
Application:	Bosnia and Herzegovina
Information on programme implementation	
Programme implementation activities to date	n/a – new programme
Financial framework	3,503,252 BAM, of which: For U.1: 2,906,162 BAM; For U.2: 591,829 BAM; For U.3: 5,261 BAM; *This amount refers only to financing of sectoral measures within the programme and includes funds from all listed sources and methods of financing. The structure of the financing required for implementation of the planned programme, i.e. contribution of funds required for implementation of individual sectoral measures within the planned programme, is shown in Appendix 6.2 of this document.* Financing sources: CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds; Financing methods: Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing); *Please note: A detailed description of existing and planned financing sources and methods is provided in Section 5.*
Executive authority	Ministry of Foreign Trade and Economic Relations
Monitoring authority	Ministry of Foreign Trade and Economic Relations

Energy savings		
Savings in 2015 compared to Final Draft EEAP BiH 2010-2016 (PJ)	**Expected energy savings in 2018 (PJ)**	**Expected impact on energy savings in 2020 (PJ)**

[112]In this context, public administration is seen only as an owner of residential space (social housing and similar) and potential investor in energy efficiency measures. Energy renovation of buildings used (owned or leased) by public administration and other organisations and companies in the service sector is addressed within the service sector.

Planned / Expected		Actual		
n/a (new programme)		n/a (new programme)	0.0249	0.0304
Method of monitoring/ measurement of energy savings	• BU methodology, in accordance with the *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC*, *European Commission, Directorate-General for Energy;* • Analysis of the EE materials and equipment market; • Information system (EMIS, MVP)			
Assumptions	Due to the fact that this programme contains several sectoral measures, the detailed assumptions for this programme, particularly with regard to energy savings targets, indicators and required financing, are provided in Appendices 6.1.1, 6.2.1, 6.3.1 and 6.4 of this document, as follows: 1. The structure of expected savings of 0.00249 PJ achieved through this programme: from U.1 = 0.01245 PJ, from U.2 = 0.0124 PJ, from U.5 = 0.00005 PJ *(see table in Appendix 6.1.1);* 2. Units of measurement and the value of energy savings indicators for 2018 for each sectoral measure within this programme are shown in Appendix 6.3 to this document; 3. Financing required for each sectoral measure within this programme to achieve the expected energy savings and therefore reach the planned energy savings indicators for 2018 are shown in Appendix 6.2 to this document; 4. Assumptions and input data for calculation of target values for final energy savings indicators in 2018, as well as the total amount of required financing for each sectoral measure within this programme are shown in Appendix 6.4 to this document.			
Overlaps, multipliers and synergies	/			

Table 34 - Detailed description of Programme PRG.01 for final energy savings

Programme title	**Programme for coordination of energy efficiency in Bosnia and Herzegovina**
ID	PRG.02 BiH
Programme description	
Category	1: Regulations, 2. Information and mandatory information measures
Timeframe	2017-2018 and onwards
Objective / Short description	The objective of this programme is to establish an efficient system for two-way communication about energy efficiency between MoFTER and: (a) all other competent institutions at all levels of public administration (Bosnia and Herzegovina, Republic of Srpska, Federation BiH, Brčko District) responsible for EEAP implementation within their respective domain; and (b) Energy Community Secretariat and all other relevant international institutions. This coordination system applies to all aspects of this EEAP BiH and must ensure: (a) Efficient coordination of all activities in the course of implementation of the EEAP BiH at different levels, for the purpose of adequate integration of all activities; and (b) Effective reporting to the Energy Community Secretariat (in accordance with the obligations of signatory countries) on progress, measures and activities planned in this EEAP and the rate of achievement of planned energy savings targets. The above are necessary conditions required to meet energy savings targets and ensure availability of accurate and reliable data from all areas of final consumption necessary for planning, implementation and verification of actual savings, impact analysis and reporting. The programme includes the following horizontal measures, i.e. the components of these measures relevant in the context of this programme: **H1. Development and application of the legislative and regulatory framework for EE in final energy consumption**, in the area of: a. Drafting of laws and by-laws required to establish the coordination mechanism which lies at the core of this programme; a. Inclusion of mandatory procurement of energy efficient goods, services and buildings into existing public procurement legislation; establishment of a system for control of implementation of this requirement; and harmonisation of existing regulations in order to enforce procurement of EE goods, services and works by the institutions and authorities at the level of BiH; **H2. Drafting and adoption of strategic and planning documents on energy efficiency**, in the domain of activities listed in the description of measure H.2 in Table 26, and in the context of this programme: a. Adoption of future EEAPs for BiH within the planned timeframe;

	b. Drafting and adoption of new strategic and planning documents needed for implementation of EEAP BiH, such as: i. Building Renovation Strategy; ii. Strategy for EE information, professional development and education, to address the following segments: (a) Public EE information and motivation campaigns (Measure H.4); (b) Introduction and implementation of an EE education, training and professional development system (Measure H.5) **H3. Establishment, application and development of the energy efficiency information system in all final energy consumption sectors**, in the domain of all activities listed in the description of measure H.3 in Table 26 and in the context of this programme: a. Establishment of an efficient system in all public institutions and companies for EE communication and coordination with the relevant horizontal and vertical levels of government; b. Establishment of a single information system (i.e. an efficient coordination system for use of existing information systems at the level of the entities and the future information system in Brčko District BiH) for energy management, a database of relevant data from all final energy consumption sectors; c. Harmonisation of statistical chapters, areas and modules and the methodology for collection and processing of statistical EE data with EUROSTAT and Energy Community requirements, to ensure comparability and completeness of energy and EE statistical data; d. Improvement of EEAP formats with regard to reporting of actual energy savings, in order to harmonise quantitative indicators of actual savings with the quantitative indicators for indicative targets and sub-targets set in the EEAP BiH; e. Use of the MVP platform for calculation of savings achieved through implementation of EE measures in all institutions required to participate in the reporting of actual results of these measures **H.10 Strengthening of capacities in institutions responsible for EE**, for competent authorities at the level of Bosnia and Herzegovina, with the goal of strengthening their capacities for successful implementation of this programme; **H.13 Introduction of the financial framework for improvement of EE in final energy consumption:** The measure covers only the introduction of financial and executive mechanisms required for implementation of this programme
Target final consumption	All types of energy and fuels in all final consumption sectors in Bosnia and Herzegovina
Target groups	1. Institutions responsible for drafting and adoption of legislative and strategic documents; 2. Administrative authorities at the level of BiH, Brčko District, entities, cantons and LSGUs, as well as major energy consumers, as creators and implementers of EEAPs within their respective domain; 3. Institutions, organisations and companies from all final consumption sectors, which provide data to the Agency for statistics of BiH, RS Institute for Statistics, Federal Office of Statistics, and the energy efficiency information system
Scope of application	Bosnia and Herzegovina
Information on programme implementation	
Programme implementation activities to date	n/a – new programme
Financial framework:	*As stated in the introductory section, in Table 10, financing requirements were calculated only for programmes which contain sectoral measures* Financing sources: Public budgets; Technical assistance Financing methods: Regular budget lines; Grants *Please note: A detailed description of existing and planned financing sources and methods is provided in Section 5.*
Executive authority	Ministry of Foreign Trade and Economic Relations
Monitoring authority	Ministry of Foreign Trade and Economic Relations

Table 35 - Detailed description of the Programme PRG.02 BiH for final energy savings

Programmes implemented at the level of Brčko District BiH

Programme title	**Energy efficiency programme in the Brčko District BiH**
ID	PRG.01 BD
Programme description	
Category	1. Regulations, 2. Communication and mandatory communication measures; 3. Financial instruments, 4. Voluntary contracts and cooperation instruments, 5. Energy services aimed at savings, and 6. Energy efficiency improvement mechanisms and other combinations of different (sub)categories
Timeframe	2017-2018 and onwards
Objective / Short description	The objective of this programme is to reduce total energy consumption in the following final energy consumption sectors in Brčko District: residential, public and commercial services, and industry; through: (a) Improved energy performance of the building envelope and of technical systems and electric equipment used in buildings, as well as reduced consumption of energy from network systems; (b) Energy efficiency improvements in utility service systems; and (c) Energy efficiency improvements in industrial and commercial/business processes; This programme includes the following sub-programmes: ***PRG.01-01 BD: Sub-programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in final energy consumption in the Brčko District BiH*** **H1. Development and application of the legislative and regulatory framework for EE in final energy consumption**, in accordance with the description of measure H.1 in Table 26, within the area of responsibility of Brčko District BiH; **H2. Drafting and adoption of strategic and planning documents on energy efficiency**, according to description of measure H.2 in Table 26, within the area of responsibility of Brčko District BiH; **H3. Establishment, application and development of the energy efficiency information system in all final energy consumption sectors**, according to description of measure H.3 in Table 26, within the area of responsibility of Brčko District BiH; **H.12 Introduction and application of energy efficiency criteria in the public procurement system**, according to description of measure H.3 in Table 26, within the area of responsibility of Brčko District BiH; Adoption of legislation for EE in public procurement (in terms of modification of existing legislation) is addressed in measure H.1 **H.13 Establishment of the financial framework for EE in final energy consumption** (measure covers only the introduction of financial framework mechanisms required for implementation of this programme) ***PRG.01-02 BD: Sub-programme for energy efficiency information, professional development and education in the Brčko District BiH*** The objective of the programme is systemic raising of awareness, knowledge, professional competence and skills of all target groups for rational energy management and EE through integration of this topic in all forms of formal and informal education. The programme includes the following measures: **H.2 Drafting and adoption of strategic and planning documents on energy efficiency**, where, in the context of this sub-programme, the measure primarily relates to the *Strategy of EE information, training and education* **H.4 Public energy efficiency information and motivation campaigns**, intended to raise awareness and provide basic information about the importance of EE to target groups in all final energy consumption sectors, in order to motivate them to implement EE measures and achieve savings. The most important topics are, for example: (a) Effects, technical possibilities and financing of energy renovation of buildings and houses (envelope, EE heating, cooling, air conditioning and lighting; energy generation from RES, EE equipment); (b) Purpose of energy audits and certification and availability of these services; (c) Effects of EE improvements in water supply and public lighting systems; (d) Effects of use of EE vehicles and EE transport (urban public transport, rail transport, electric cars, bicycles) and organisation of promotional events such as the Day Without Cars, etc.; (e) Types and importance of infrastructural measures on the road network for EE improvements in the transport sector, etc. These campaigns will target individual groups or all target groups in one or more sectors. Potential communication channels: (a) Radio, television, web portals, printed media; (b) Websites of institutions responsible for EE and/or dedicated EE websites/Facebook pages; (c) Conferences and workshops for target groups; (d) Public events as part of Energy Days, usually organised by LSGUs in the course of implementation of EEAP/SEAP; etc. **H.5 Introduction and implementation of the system of EE education, training and professional development**

	This measure makes a qualitative leap away from the campaigns in measure H.4, which provide only introductory information on individual areas and topics related to energy efficiency. Examples of priority topics for training and professional development are: (a) Energy performance of buildings and best technologies for EE improvement of exterior building envelope; heating, cooling and air conditioning; water supply and public lighting systems; efficient cogeneration and trigeneration; industrial processes; (b) Production and use of energy from RES in different final consumption sectors; (c) Introduction and implementation of energy management in public and commercial buildings, in utility service systems, industrial plants and technological processes; (d) Energy efficiency economics: cost-benefit analysis of EE measures; (e) EE measures in transport - most cost-effective measures and best international practices; (f) Urban planning for EE transport; (g) Purpose and use of data from the newly established EE information system; (h) Energy and EE statistics - new requirements and opportunities; (i) New monitoring and verification platform for energy savings (MVP); (j) EE criteria in public procurement - legal requirements and best practice; etc. **H.6 Introduction of energy efficiency topics in the regular education system**, according to description of measure H.6 in Table 26, within the area of responsibility of Brčko District BiH; **H.7 Establishment of a system for training and certification of licensed professionals for energy audits of buildings, public utility service systems, industrial plants and technological processes, and for issuing energy certificates**: according to the description of measure H.7 provided in Table 26; **H.10 Strengthening of capacities in institutions responsible for energy efficiency** Within the scope of this programme, the measure foresees the establishment of an EE Fund at the level of Brčko District; **H.11 Institutional strengthening of all levels of government for systemic energy management**, according to description of measure H.7 in Table 26, specifically for the institutions of Brčko District BiH; **H.13 Establishment of the financial framework for EE in final energy consumption**, here the measure applies only to the introduction of financial and executive mechanisms required for implementation of this sub-programme. *Key elements of all measures included in this sub-programme will be defined by the Strategy for EE information, professional development and education, created through the PRG.01.02 programme (measure H.2).* ***PRG.01-03 BD: Sub-programme for energy efficiency improvements in buildings in the residential sector and the public services sector in Brčko District BiH*** **R.1 Energy renovation of the envelope of existing residential buildings** Measure description: according to description of measure R.1 in Table 27; **R.2 Energy performance improvements of existing systems and installation of new, energy efficient technical systems in residential buildings and family houses** Measure description: according to description of measure R.2 in Table 27; **R.3 Energy generation from renewable sources in households** Measure description: according to description of measure R.3 in Table 27; **R.5 Procurement and use of energy efficient electrical household appliances** Measure description: according to description of measure R.5 in Table 27; **U.1 Energy renovation of the envelope of existing buildings in the public and commercial service sector:** Technical description of the measure: according to description of measure U.1 in Table 28; however the programme covers only buildings in the public services sector; **U.2 Improvement of energy performance of existing systems and installation of new EE technical systems in buildings:** Technical description of the measure: according to description of measure U.2 in Table 28; **U.3 Energy generation from RES in the public and commercial sector** Technical description of the measure: according to description of measure U.3 in Table 28; **U.5 Procurement and use of energy efficient electric equipment in the public and commercial sector** Technical description of the measure: according to description of measure U.5 in Table 28; *This sub-programme includes the following horizontal measures, most of which are also included in sub-programmes PRG.01-01 and PRG.01-02 which must be implemented in close coordination with this programme, in the domain of horizontal measures listed here:* **H.2 Drafting and adoption of strategic and planning documents on energy efficiency** The measure is included in the programme PRG.2, here it concerns only the *Buildings Renovation Strategy;* **H.3 Introduction, use and development of the EE information system in all final consumption sectors** Establishment of the system is subject to programme PRG.01-01; here it applies only to its use and development within the scope of this programme;

	H.4 Public energy efficiency information and motivation campaigns The overall measure is subject to programme PRG.2, within the scope of this programme it covers only topics relevant to the measures contained in this programme (R1, R2, R3, R5, U.1, U.2, U.3, U5); **H.5 Introduction and implementation of the system of EE education, training and professional development** The overall measure is subject to programme PRG.01-02, within the scope of this sub-programme it covers only topics relevant to the measures contained in this programme (R1, R2, R3, R5, U.1, U.2, U.3, H.9, H.12); **H.7 Establishment of a training and certification system for licensed energy auditors for buildings, public utility systems, industrial plants and technological processes, and for issuing energy certificates** This measure is implemented as part of PRG.01-02, with a contribution from this programme for buildings in the public services sector; **H.9 Introduction and implementation of energy management**, aimed at placing renovation of buildings in the wider context of sustainable energy management; **H.11 Strengthening existing institutional capacities at all levels for systemic energy management** Measure description: according to description of measure H.11 in Table 26; **H.12 Introduction and application of energy efficiency criteria in the public procurement system** Measure description: according to description of measure H.12 in Table 26; applied to the scope of responsibility of Brčko District BiH; **H.13 Establishment of the financial framework for EE in final energy consumption**, here the measure applies only to the introduction of financial and executive mechanisms required for implementation of this sub-programme ***PRG.01-04 Sub-programme for energy efficiency improvements in the utility services system in Brčko District BiH*** **U.6 Improvement of energy efficiency of the water supply and waste water treatment system** Technical description of the measure: according to description of measure U.6 in Table 28; **U.7 Energy efficiency improvements in the public lighting system** Technical description of the measure: according to description of measure U.7 in Table 28; *This sub-programme includes the following horizontal measures, most of which are also included in sub-programmes PRG.01-01 and PRG.01-02 which must be implemented in close coordination with this programme in the domain of horizontal measures listed here:* **H.3 Introduction, use and development of the EE information system in all final consumption sectors** Establishment of the system is subject to programme PRG.01-01; here it applies only to its use and development within the scope of this programme; **H.4 Public energy efficiency information and motivation campaigns:** The overall measure is subject to sub-programme PRG.01-02, within the scope of this programme it covers only topics relevant to the measures contained in this programme (U.6, U.7, H.7, H.9, H.12, H.13); **H.5 Introduction and implementation of the system of EE education, training and professional development** The overall measure is subject to sub-programme PRG.01-02, within the scope of this programme it covers only topics relevant to the measures contained in this programme (U.6, U.7, H.7, H.9, H.12); **H.7 Establishment of a training and certification system for licensed energy auditors for buildings, public utility systems, industrial plants and technological processes, and for issuing energy certificates** This measure is implemented as part of the sub-programme PRG.01-02, with a contribution from this programme in the segment of utility services; **H.9 Introduction and implementation of energy management**, aimed at placing renovation of utility services in the wider context of sustainable energy management; **H.11 Strengthening existing institutional capacities at all levels for systemic energy management** Measure description: according to description of measure H.11 in Table 26, however, within the scope of this programme the measure covers only topics relevant for sectoral measures within the scope of this programme (U.6, U.7); **H.12 Introduction and application of energy efficiency criteria in the public procurement system** Measure description: according to description of measure H.12 in Table 26; here implemented within the scope of this programme; **H.13 Introduction of the financial framework for improvement of EE in final energy consumption:** The measure covers only the introduction of financial and executive mechanisms required for implementation of this programme ***PRG.01-05 BD: Energy efficiency programme in the industry and commercial services sector in Brčko District BiH***

	I.1 Energy efficiency improvements in industrial processes Technical description of the measure: according to description of measure I.1 in Table 29; **I.2 Improvement of energy performance of buildings in the industry sector** Technical description of the measure: according to description of measure I.2 in Table 29; **I.3 Use of cogeneration and trigeneration in industry** Technical description of the measure: according to description of measure I.3 in Table 29; **I.4 Energy generation from RES in industry** Technical description of the measure: according to description of measure I.4 in Table 29; **U.1 Energy renovation of the envelope of existing buildings in the public and commercial service sector:** Technical description of the measure: according to description of measure U.1 in Table 28; however this sub-programme covers only renovation of buildings in the commercial services sector; **U.2 Improvement of energy performance of existing systems and installation of new EE technical systems in buildings:** Technical description of the measure: according to description of measure U.2 in Table 28; however this programme covers only renovation of buildings in the commercial services sector; **U.3 Energy generation from RES in the public and commercial sector** Technical description of the measure: according to description of measure U.3 in Table 28; however this programme covers energy generation from RES only in the commercial services sector. *This sub-programme includes the following horizontal measures, most of which are also included in sub-programmes PRG.01-01 and PRG.01-02 which must be implemented in close coordination with this programme in the domain of horizontal measures listed here:* **H.3 Introduction, use and development of the EE information system in all final consumption sectors** Establishment of the system is subject to programme PRG.01-01; here it applies only to its use and development within the scope of this programme; **H.4 Public energy efficiency information and motivation campaigns** The overall measure is subject to programme PRG.01-02, within the scope of this programme it covers only topics relevant to the measures contained in this sub-programme (I.1, I.2, I.3, I.4, U.1, U.2, U.3, H7, H9, H13); **H.5 Introduction and implementation of the system of EE education, training and professional development** The overall measure is subject to sub-programme PRG.01-02, within the scope of this programme it covers only topics relevant to the measures contained in this programme (I.1, I.2, I.3, I.4, U.1, U.2, U.3, H.7, H.9); **H.7 Establishment of a training and certification system for licensed energy auditors for buildings, public utility systems, industrial plants and technological processes, and for issuing energy certificates** This measure is implemented as part of the sub-programme PRG.01-02, with a contribution from this sub-programme in the industry and commercial services segment; **H.9 Introduction and implementation of energy management**, aimed at placing energy renovation of industrial processes and business processes in the commercial services sector, as well as buildings in the industry and commercial services sectors, in the wider context of sustainable energy management; **H.13 Introduction of the financial framework for improvement of EE in final energy consumption:** The measure covers only the introduction of financial and executive mechanisms required for implementation of this sub-programme
Target final consumption	Final consumption of energy and fuels (electricity, heat, gas, coal, oil derivatives, wood) in existing buildings in the residential sector, public and commercial service sector and industry sector
Target groups	***PRG.01-02 BD*** 1. Final energy users/customers in all sectors (as potential investors in EE measures): (a) Residential: apartment/house owners (households, groups of apartment owners); (b) Services: institutions and companies in BD as owners/users of buildings; (c) Industry: industrial companies in the capacity of owners of buildings, technical systems and industrial processes; (d) Transport: all participants in transport, companies responsible for road infrastructure; 2. Construction and fitting sectors (design, construction and fitting companies, equipment manufacturers/suppliers, companies licenced for residential building maintenance); 3. Energy and other resource suppliers (utility and energy companies); 4. Students in primary and secondary schools and university students; Teachers and faculty; Employees in BD institutions; Interested parties and professionals ***PRG.01-03 BD:***

	Owners of residential buildings and houses (households, groups of apartment owners, public administration[113] and other service sector institutions, etc.) as (potential) investors in EE measures; ***PRG.01-04 BD:*** 1. Public utility companies for water supply and waste water treatment (as suppliers, planners and organizers of reconstruction works); 2. Construction sector (designers, construction companies, equipment manufacturers/suppliers); 3. Water and public lighting consumers/users (as parties responsible for rational use and partial financing of EE improvements in these systems) ***PRG.01-05 BD*** 1. Industrial companies (small, medium and large); 2. Small, medium and large companies in the commercial services sector
Application:	Brčko District BiH
Information on programme implementation	
Programme implementation activities to date	n/a – new programme
Financial framework	Total programme PRG.01 BD: 33,135,471 BAM, of which: i. For PRG.01-03 BD: 21,965,520 BAM; ii. For PRG.01-04 BD: 214,934 BAM; iii. For PRG.01-05 BD: 10,955,016 *These amounts refer only to financing of sectoral measures within the relevant programme and its component sub-programmes, and include funds from all listed sources and methods of financing. The structure of the financing required for implementation of the planned programme and its sub-programmes, i.e. contribution of funds required for implementation of individual sectoral measures within the planned programme and its sub-programmes, is shown in Appendix 6.2.1 of this document.* Financing sources: Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds Financing methods: Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnership (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing) Please note: A detailed description of existing and planned financing sources and methods is provided in Section 5.
Executive authority	Government of the Brčko District of BiH; Department of Spatial Planning and Property Affairs; Department of Utilities;
Savings monitoring authority	Government of the Brčko District of BiH

Energy savings			
Savings in 2015 compared to Final Draft EEAP BiH 2010-2016 (PJ)		**Expected energy savings in 2018 (PJ)**	**Expected impact on energy savings in 2020 (PJ)**
Planned / Expected	**Actual**		
n/a (new programme)	n/a (new programme)	0.1378	0.1684

Method of monitoring/ measurement of energy savings	• BU methodology, according to *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC*, *European Commission, Directorate-General for Energy* • Market analysis (study of sales of EE materials and equipment); • TD methodology;
Assumptions	Due to the fact that this programme contains five sub-programmes (three of which contain sectoral measures) and each sub-programme comprises several sectoral measures, the detailed assumptions for this programme and its sub-programmes, particularly with regard to energy savings targets,

[113]In this context, public administration is seen only as an owner of residential space (social housing and similar) and potential investor in energy efficiency measures. Energy renovation of buildings used (owned or leased) by public administration and other organisations and companies in the service sector is addressed within the service sector.

	performance indicators and required financing, are provided in Appendices 6.1.2, 6.2.2, 6.3.2 and 6.4 of this document, as follows: *1.* The structure of expected savings of 0.1378 PJ achieved through this programme: From PRG.01-03 BD = 0.1258 PJ; PRG.01-04 = 0.0009 PJ; PRG-01-05 = 0.0734 PJ (*for contributions from individual measures comprised in these sub-programmes please see the table provided in Appendix 6.1.2);* 2. Units of measurement and the value of energy savings indicators for 2018, for each sectoral measure within this programme, are shown in Appendix 6.3.2 to this document; 3. Financing required for each sectoral measure within this programme to achieve the expected energy savings, and therefore meet the energy savings indicators for 2018, are shown in Appendix 6.2.2 to this document; 4. Assumptions and input data for calculation of target values for final energy savings indicators in 2018, as well as the total amount of required financing for each sectoral measure within this programme are shown in Appendix 6.4 to this document.
Overlaps, multipliers and synergies	/

Table 36 - Detailed description of Programme PRG.01 BD for final energy savings

3.3.4 Summary overview of final energy savings

Considering the problems encountered during data collection in the Federation BiH and Republic of Srpska based on calculated TD indicators, it was decided to conduct a market analysis (*Study of Sales of EE Materials and Equipment in Bosnia and Herzegovina 2011-2016*). This market analysis was based on the BU methodology, in accordance with the *Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC*, *European Commission, Directorate-General for Energy*, for verification of savings based on collected data.

The study was conducted in the period March-September 2016 by a group of engineers and experts from the Association of Thermal Engineers of Bosnia and Herzegovina. All collected data was processed in the MVP savings verification platform for the period 2011-2015. The total number of BiH distributors of materials and equipment covered by this market survey was:

Distributors of low-U windows	9
Thermal insulation of walls (EPS, XPS, mineral wool)	12
Heat pumps	7
Solar hot water systems	9
Boilers	7
Household appliances	8
Split air conditioning systems	6
Lighting (LED)	5
TOTAL	***63***

Table 37 shows a summary overview of actual and planned final energy savings in Bosnia and Herzegovina, with an overview of methodologies used for calculation of savings in individual sectors.

Final energy consumption sector	**Included individual EE measures (according to Section 3.3.2).**	**Final energy savings calculation methodology**	**Actual savings in 2015[114] (PJ)**	**Expected energy savings in 2018[115] (PJ)**	**Savings forecast for 2020[116] (PJ)**
Residential sector	Measures R1-R5	BU market analysis based on distributed equipment and	2.1122	5.1910	6.3446

[114] The stated amounts of savings in 2015 were calculated as a sum of savings in the Federation BiH (taken from the *EEAPF 2016-2018*) and the Republic of Srpska (taken from the *Amendments to EEAP RS 2018*), without the share of those parts of listed sectors which are under direct competence of Bosnia and Herzegovina and Brčko District BiH (for which savings in 2015 were not calculated)

[115] The values shown include the savings from parts of sectors under direct competence of Bosnia and Herzegovina, Brčko District BiH, Federation BiH and Republic of Srpska

[116] Ibid.

Final energy consumption sector	Included individual EE measures (according to Section 3.3.2).	Final energy savings calculation methodology	Actual savings in 2015[114] (PJ)	Expected energy savings in 2018[115] (PJ)	Savings forecast for 2020[116] (PJ)
		materials by year, 2010-2015			
Public and commercial service sector	Measures U1-U7	BU MVP + analysis of the equipment market	2.5073	4.6189	5.6453
Industry sector	Measures I1-I4	Credit programmes with verified measures and analysis of installed HVAC equipment in BiH	0.3437	1.8690	2.2843
Transport sector	Measures S1-S2	Specific transport-related measures implemented in municipalities which have SEAPs	0.2715	0.7900	0.9656
Horizontal measures	Measures H1-H13	No reliable verification method for these measures	-	-	--
TOTAL			**5.2347**	**12.4689**	**15.2400**
ESD energy savings			**5.2347**	**12.4689**	**15.2400**
Non-ESD energy savings			**-**	**-**	**-**

Table 37 - Summary overview of planned savings for individual final energy savings measures in BiH

3.4 Public sector

3.4.1 Public sector as the leading example

The public sector in Bosnia and Herzegovina was chosen to be the leading example of implementation of planned energy efficiency targets. The role of the public sector, as envisioned in energy efficiency policies and measures, is to achieve sustainable energy development through:

a. Reduction of negative impacts on the environment;
b. Increasing energy security;
c. Meeting the energy needs of all consumers;
d. Reducing emissions of greenhouse gases;
e. Promoting responsible use of energy;
f. Reducing exploitation of fossil fuels;
g. Rationalising energy consumption;
h. Increasing the competitiveness of the national economy;
i. Elimination of energy poverty; and
j. Full implementation of obligations arising from international treaties, agreements and conventions.

The leading role in the implementation of energy efficiency criteria in all sectors was assigned to public institutions. The lead institution in this process at the level of Bosnia and Herzegovina is the Ministry of Foreign Trade and Economic Relations, in cooperation with entity ministries and Environmental Protection Funds. Activities of the public sector in Bosnia and Herzegovina in the period to date were conducted individually by investing efforts in establishment of the strategic, legislative and regulatory framework for energy efficiency, and through implementation of energy renovation projects in public sector buildings. On the other hand, the leading role in the promotion of energy efficiency and implementation of measures for reduction of energy consumption is assigned to cities, municipalities and FBiH cantons which focus on establishment of local energy efficiency systems.

In the next period, starting from 2017 (as defined in this Energy Efficiency Action Plan), implementation of energy efficiency criteria will include energy efficiency programmes that will be implemented by the public sector

institutions. As stated in previous sections of this document, at the level of Bosnia and Herzegovina these programmes are:

- Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina; and
- Programme for coordination of energy efficiency in Bosnia and Herzegovina.

The following programme was planned in the Brčko District:

- Energy efficiency programme in the Brčko District BiH, comprising the following components/sub-programmes:
    1. Establishment of the strategic, legislative and regulatory framework for energy efficiency in final energy consumption in the Brčko District BiH;
    2. Energy efficiency information, professional development and education in the Brčko District BiH;
    3. Energy efficiency improvement of buildings in the residential sector and the public services sector in Brčko District BiH;
    4. Energy efficiency improvements in the utility services system in the Brčko District BiH; and
    5. Energy efficiency improvements in the industry and commercial services sector in Brčko District BiH.

The public sector is committed to implementation of energy efficiency measures based on cost-optimisation criteria. In Bosnia and Herzegovina these criteria are still not developed, however, according to the Roadmap which forms an integral part of this Action Plan, their introduction is scheduled for 2017.

3.4.2 Leading role of the public sector in the implementation of Directive 2010/31/EU on energy performance of buildings

The public sector in the Federation BiH and Republic of Srpska has the leading role in implementation of energy efficiency improvements related to the implementation of the EPBD. *Detailed information about the implementation of this directive at the entity level is presented in documents EEAP FBiH 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP.*

3.4.3 Special measures in the public procurement sector

This EEAP foresees some amendments to the *Public Procurement Law of BiH* in order to define the criteria for application of energy efficiency requirements in public procurements. According to these provisions, users of financing from the budgets of Bosnia and Herzegovina, entities, Brčko District BiH, cantons and local self-governance units will, in the course of public procurement procedures, evaluate energy efficiency of goods and services together with other relevant criteria and give priority, if all other considerations are equal, to equipment and services with a higher energy efficiency rating. Also, energy efficiency criteria will be taken into account in public tenders published for purchase or lease of buildings/parts of buildings, reconstruction of buildings/parts of buildings, and design of buildings/parts of buildings for the public sector.

3.5 Programmes for informing of energy consumers and training

This action plan foresees the establishment of an energy efficiency information system. In order to ensure maximum availability of information in accordance with this law, the Ministry of Foreign Trade and Economic Relations coordinates and uses the data from the information system (submitted by relevant entity ministries) to ensure the flow of information and to create the database required for Bosnia and Herzegovina's reporting to the Energy Community.

Additional information about the information system at the entity level, its prescribed structure and its owners is presented in documents EEAP FBiH 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP BiH 2016-2018.

3.6 Energy companies' obligations with regard to promotion of reduced energy consumption by end-users

Entity laws on energy efficiency prescribe the obligation of distribution system operators, energy distributors and suppliers to encourage lower energy consumption by their end users. According to these provisions, distribution

system operators, energy distributors and energy suppliers must conduct their operations in a manner that will not be detrimental to provision of energy services and development of the market for energy services and other energy efficiency measures. Furthermore, they must offer energy services to their customers at competitive prices, directly or via other energy service providers. Parties operating as part of vertically or horizontally integrated energy companies may arrange for provision of energy services within the mother energy company, provided that these services are billed separately, or through an independent energy service provider. It should be noted that these obligations do not apply to small distribution system operators, small energy distributors and small energy suppliers.

3.7 Energy services market in Bosnia and Herzegovina

Entity energy efficiency laws define energy services as instruments for implementation of energy efficiency measures and programmes by means of obligating suppliers and distributors of energy-using products to organise energy services and energy performance contracts.

Energy services, in the context of this law, include the activities and actions which lead to measurable/estimable energy efficiency improvements in buildings and other facilities, technical systems and production processes, or financially quantifiable energy savings arising from use of energy efficient technologies and energy-saving processes. Energy services are provided by energy service companies (ESCOs) or other legal entities/energy service providers, based on an energy service contract. Energy services include energy audits, design, construction, reconstruction, energy renovation, maintenance, consulting, management and supervision of energy use. To perform building energy audit, design, construction and reconstruction services, energy service providers must comply with the requirements prescribed in building regulations. Energy service providers independently offer and deliver energy services at competitive prices. Distribution system operators and energy suppliers operating as part of a vertically/horizontally integrated energy company may organise provision of energy services within the integrated energy company. The offer for provision of energy services must contain details of the energy service provider, energy efficiency measures, prices, financing mechanisms, model contract and other information.

Bosnia and Herzegovina is committed to the introduction of a systemic approach to development of the energy services market. During its implementation in practice it is necessary to ensure that all market participants have equal access and are subject to same market rules, all the while ensuring high quality of provided services. The energy services market in the Bosnia and Herzegovina must provide consumers with the following services as a minimum:

- Energy certification of buildings and consulting on energy performance improvements in buildings;
- Energy audits for heating and air conditioning systems and consulting on improvement of energy performance of these systems;
- Energy management consulting services for city and municipal administrations;
- Energy audits in small and medium enterprises and energy management consulting;
- Energy audits for large consumers and consulting services for development and implementation of energy efficiency programmes in large energy consumers;
- Energy performance contracting (ESCOs);
- Monitoring and verification of energy performance.

The next period will be dedicated to systematic development of the energy services market in Bosnia and Herzegovina, in order to ensure high quality of services.

The situation at the entity level is described in more detail in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP.

3.8 Cost-optimal levels of implementation of energy efficiency programmes and measures in the building sector

With regard to integration and introduction of cost-optimal levels of implementation of energy efficiency programmes and measures in the building sector in Bosnia and Herzegovina, the Roadmap for transposition of the EED foresees an introduction of cost-optimal levels into practice in 2017. It is necessary to carry out an economic assessment of different options for renovation of each building type identified in the Typology of Buildings. This assessment should consist of identification of most cost-effective options, as well as quantification of costs, energy savings, CO2 emissions and other non-energy benefits, and the proposed optimal package of renovation measures with an implementation schedule for each building type.

The situation at entity level is described in more detail in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP.

3.9 Strategy for increasing the number of buildings with near-zero energy consumption

Construction of buildings with near-zero energy consumption is not discussed in this *EEAP BiH 2016-2018* because the necessary conditions for development of the relevant strategy and action plan are still not in place. This refers primarily to the availability of input data needed to perform the appropriate analyses. Creation of the inventory of buildings in Bosnia and Herzegovina and the framework for energy certification of buildings is the first step in the development of this strategy.

3.10 Regular energy auditing of HVAC systems

In Bosnia and Herzegovina, this particular requirement of the EPBD is transposed into energy efficiency laws at entity level, where the process of conducting regular energy audits is prescribed as a part of energy auditing in the building sector. However, due to specific implementing procedures in this process, these regulations must be made more detailed. The next step in the introduction of the audit system is to adopt these rulebooks and create the institutional framework for implementation of this obligation. The priority is to create and operationalise the system of education and licensing of persons and companies for energy auditing of HVAC systems.

The situation at entity level is described in more detail in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP.

4. ROADMAP FOR IMPLEMENTATION OF EED REQUIREMENTS

On 18 December 2009, Ministerial Council of the Energy Community adopted Decision no. 2009/05/MC-EnC to include Directive 2006/32/EC on energy end-use efficiency and energy services, Directive 2002/91/EC on energy performance of buildings, Directive 92/75/EEC on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances, together with eight implementing directives, into the Energy Community acquis.

Subsequently, on 24 September 2010, the Ministerial Council of the Energy Community adopted Decision no. 2010/02/MC-EnC amending Decision 2009/05/MC-EnC dated 18 December 2009 on implementation of energy efficiency directives. According to this decision, Directive 2010/31/EU of the European Parliament and Council on energy performance of buildings replaces and repeals Directive 2002/91/EC, while Directive 2010/30/EU of the European Parliament and Council on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances redefines and repeals Directive 92/75/EEC.

Directive 2012/27/EU of the European Parliament and Council on energy efficiency, dated 25 October 2012, amending Directive 2009/125/EC and Directive 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, was published in the Official Journal of the European Union no. L315/1 on 14 November 2012. Directive 2012/27/EU establishes the common framework for energy efficiency measures in order to ensure achievement of the EU's ultimate goal of 20% increase in energy efficiency by 2020, and to create the path for subsequent further improvements in energy efficiency. On 24 October 2013, Ministerial Council of the Energy Community adopted Recommendation R/2013/01/MC-EnC on energy efficiency. According to this Recommendation, Energy Community must harmonise its *acquis* with the recent changes in the EU legislation, taking into account its own institutional framework and the specific circumstances in individual Energy Community Treaty signatory countries. Furthermore, in October 2014 the Council of Europe declared that the indicative energy efficiency improvement target for European Union is minimum 27% of the forecasted energy consumption by 2030. Evaluation of progress towards meeting this target will be done by 2020. This proposal was discussed at the meeting of the Permanent High-Level Group (PHLG) held on 24 June 2015.

For the reasons stated above, Bosnia and Herzegovina, as a signatory to the Energy Community Treaty, must ensure full transposition of the requirements of Directive 2012/27/EU. This implies the following:

- **Setting of the indicative target:** This target must correspond to the target for the Energy Community as a whole, as defined in Article 3 of the Directive 2012/27/EU. The process of identification of the indicative target may include the following steps: (a) Calculation of the growth of primary or final energy demand, with 2007 as the baseline year, using the available primary/final energy consumption forecasting models; (b) Review of the share of Bosnia and Herzegovina in the Energy Community baseline data, followed by the calculation of

its proportional share of primary/final energy consumption in the Energy Community in 2020, amounting to a total of 187 Mtoe of primary and 133 Mtoe of final energy;

- Creation of the **Roadmap for Bosnia and Herzegovina:** It is necessary to create a roadmap to guide the transposition of EED requirements into domestic legislation.
- **Identification of EED influence on macroeconomic trends in Bosnia and Herzegovina:** It is necessary to review the full impact of EED/EEAP processes on overall socioeconomic trends in order to create a foundation for introduction of energy efficiency criteria into overall economic development;
- **Transposition of EED requirements into the legislation of Bosnia and Herzegovina and its entities:** Coordination is necessary in the process of transposing EED requirements into domestic legislation; and
- **Adaptation of the EEAP process to EED requirements:** During adoption of the EEAP for BiH, it is necessary to pay attention to specific new EED requirements and to harmonise sectoral and programme objectives accordingly.

4.1 Legislative measures and reporting on 2020 targets

4.1.1 EED transposition timeframe

Transposition of Directive 2012/27/EU became mandatory for Energy Community member countries with the decision of the Ministerial Council (D/2015/08/MCEnC). The timeframe for its implementation, by individual articles, is shown in Figures 2 and 3 below, and the corresponding explanations and comments were taken from the document titled "*Policy measures implementing EED*"[117]. The target date for full implementation of the EED for all Energy Community members is October 2017. The Directive imposes a number of obligations which should be included in the next EEAP cycle based on EED principles, due for submission to the Energy Community Secretariat by the end of April 2019.

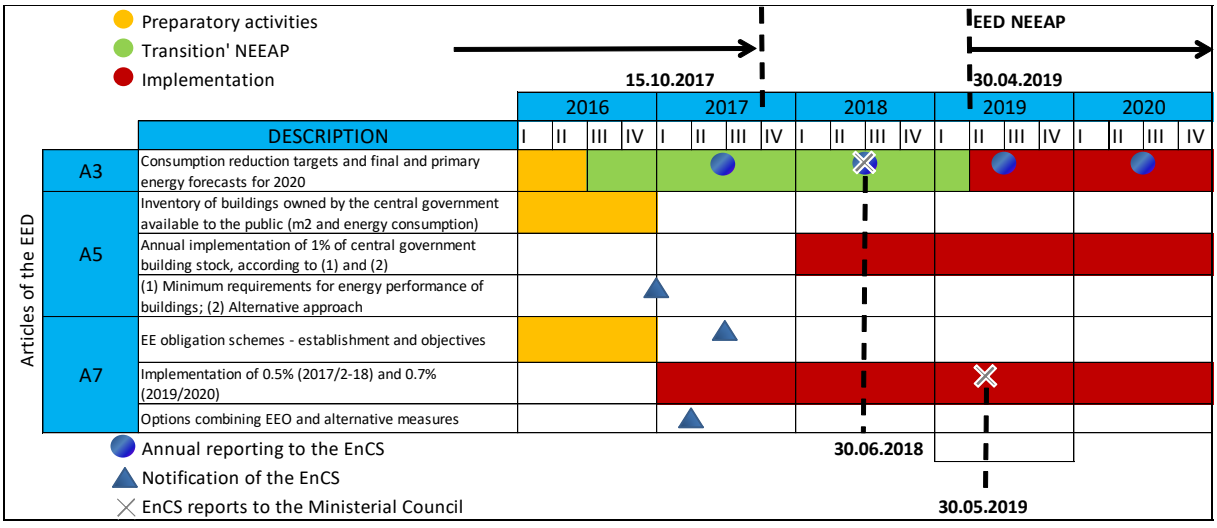

Figure 2 - EED transposition timeframe (Articles 3, 5 and 7)

It can be seen that Article 3, referring to total energy savings targets for Bosnia and Herzegovina, covers the transitional period from June 2016 through to the end of April 2018. In this period the transitional EEAP should remain in force, until the next cycle which begins in 2019 and demands full transposition of EED requirements. Full transposition of EED requirements is expected by the end of October 2017 and includes amendments to entity energy efficiency laws and drafting of by-laws in the form of rulebooks and regulations.

However, Article 7 of the EED concerning energy efficiency obligations on the energy distribution and supply side through obligation schemes (EEO), needs to be transposed by the beginning of 2017. Considering that none of the parties in the Energy Community has already introduced EEO schemes, this poses the question of the legal basis that could be used to impose this obligation on energy distributors/suppliers? The problem is compounded by the fact that Article 7 is an objective, irrespective of the instrument (obligation schemes or alternative measures)

[117] Policy measures implementing EED - Handbook for implementation of EED with EU examples, supported by the project "Strengthening capacities for implementing the NEEAP cycle" (PN : 2012.2483.1- 011.00) implemented by GIZ Open Regional Fund for South East Europe-Energy Efficiency (GIZ ORF EE), April 2016

employed to achieve cumulative savings, and that any delays in its implementation would result in failure to reach 2020 targets.

With regard to Article 5 on annual renovation of buildings owned and/or used by central authorities, the situation appears to be somewhat more favourable. Namely, the implementation of this article is scheduled to start in 2018, after the expiry of the deadline for full transposition of the EED.

It is important to note that implementation timeframes for individual articles of the EED for Energy Community contracting parties are generally offset by 3 years from the timeframes applicable to EU member states. This means that substantial efforts will have to be invested in its transposition and implementation, since the implementation period is more demanding than for EU member states. On the other hand, Energy Community countries can learn from experiences of EU member states and use their positive and negative experiences as guidelines in the course of implementation.

Figure 3 presents the implementation timeframe for other articles of the EED, including timeframes for notifications and submission of regular reports on different articles to the Energy Community Secretariat. Full transposition, within the above timeframes, requires amendments to entity laws on energy efficiency, as well as drafting and adoption of by-laws in the form of rulebooks and guidelines. Entity laws on energy efficiency must primarily secure the basis for transposition of requirements from Articles 3 (Objectives), 6 (Public Procurement), 8 (Energy audits and Energy Management), 9-11 (Metering and Billing), 12 and 17 (Information and Training), and 18 (Energy Services).

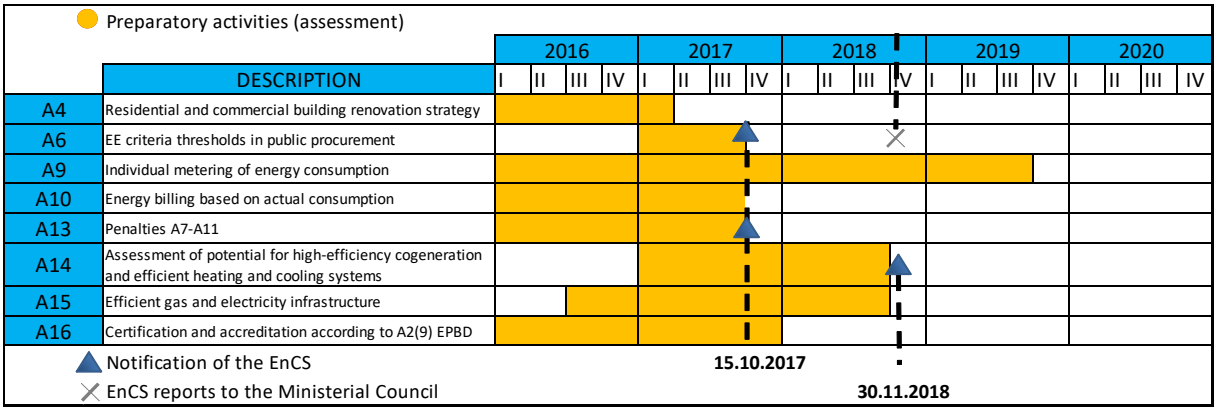

Figure 3 - EED transposition timeframe (Articles 4, 6, 9, 10, 13, 14, 15 and 16)

Figure 4[118] presents EED requirements grouped by blocks. Blue blocks signify targets for mandatory savings in final energy consumption arising from Article 3 and Article 7. Red blocks define the elements which support implementation and achievement of overall targets by 2020. Orange blocks represent elements which should contribute and drive the accomplishment of targets. It is also important to emphasise the role of reporting and monitoring, marked in dark grey, as an inseparable element in the overall process of implementation of EED requirements.

[118] This figure was taken from the document *EU Energy Efficiency Directive (2012/27/EU) – Guidebook for Strong Implementation*; http://bpie.eu/wp-content/uploads/2015/10/Guidebook-for-strong-implementation.pdf

Figure 4 - Block diagram of EED requirements

4.1.2 Amendments to primary legislation

The situation at the level of Federation BiH and Republic of Srpska is described in more detail in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this EEAP.

In the Brčko District BiH, full transposition of EED requirements implies:

- Amendments to the *Law on Electricity of the Brčko District BiH* (Official Gazette of Brčko District BiH, no. 36/04, 28/07, 61/10 and 4/13);
- Amendments to the *Law on Construction and Spatial Planning of the Brčko District BiH* (Official Gazette of Brčko District BiH, no. 17/08);
- Adoption of a law on energy efficiency for Brčko District BiH;
- Adoption of a law on renewable energy sources and efficient cogeneration of the Brčko District BiH; and
- Adoption of a law on gas for the Brčko District BiH, or a regulation on natural gas supply and distribution in the Brčko District BiH (due to the small size of the territory to which such a law would apply).

4.1.3 Secondary legislative package

At the level of authorities of Bosnia and Herzegovina, full transposition of EED provisions will require amendments to the following regulatory framework in Bosnia and Herzegovina:

- Amendments to existing by-laws in the electricity and gas sector to embed the provisions of Directive 2009/72/EC, Directive 2009/73/EC and Articles 14 and 15 of Directive 2012/27/EU;
- Methodology and guidelines for development of strategic and planning documents in the power and gas sector to include the provisions of Directive 2009/72/EC, Directive 2009/73/EC and Article 14 and Article 15 of Directive 2012/27/EU.

The description of activities in the Federation BiH and Republic of Srpska is provided in documents EEAPF 2016-2018 and Amendments to EEAP RS 2018.

Full transposition of EED provisions in the Brčko District requires adoption and/or amendments to the following regulatory framework:

- Building Renovation Strategy of the Brčko District BiH;
- Operational Plan for renovation of public buildings owned and/or used by the institutions of Brčko District BiH;
- Methodology for calculation of savings targets for energy efficiency obligation schemes;
- Implementing regulation/by-law for energy efficiency obligation schemes;
- Methodology for calculation of fees in energy efficiency obligation schemes;

- Implementing regulation for energy efficiency obligation schemes;
- Rulebook on energy auditing;
- Rulebook on the methodology for energy auditing of large consumers;
- Rulebook for metering of actual consumption in district heating, cooling and hot water supply systems;
- Criteria and procedures for approval of new production capacities pursuant to Article 7 of Directive 2009/72/EU on electricity and Article 14(5) of Directive 2012/72/EU;
- Amendments to secondary regulations aimed at enabling priority access and adoption of dispatch rules for high-efficiency cogeneration and full compliance with provisions of Directive 2012/27/EU;
- Amendments to existing by-laws in the electricity and gas sector to embed the provisions of Directive 2009/72/EC, Directive 2009/73/EC and Articles 14 and 15 of Directive 2012/27/EU;
- Methodology and guidelines for development of strategic and planning documents in the power and gas sector to include the provisions of Directive 2009/72/EC, Directive 2009/73/EC and Article 14 and Article 15 of Directive 2012/27/EU.

4.2 Building Renovation Strategy (Article 4 of the EED)

4.2.1 Purpose of the Building Renovation Strategy

Directive 2012/27/EU (EED) replaces two earlier directives on energy services and cogeneration. The EED contains a set of measures designed to achieve energy savings in all sectors, starting from identification of overall national energy efficiency targets, through to delegation of tasks to energy distributors and suppliers aimed at reaching the defined energy savings targets. In addition to the EED, Directive 2010/31/EU on energy performance of buildings (EPBD) defines a number of requirements, including energy certification of buildings, inspections of operating regimes for boilers and air conditioning plants, as well as requirements for new buildings with near-zero energy consumption. The EPBD sets minimum standards for energy performance of buildings subject to energy renovation. Together, EED and EPBD create a framework for energy savings in buildings, thus ensuring a wide range of economic, environmental, social and energy benefits. Article 4 of the EED on renovation of buildings requires states to establish a long-term strategy for mobilisation of investments in renovation of the national residential and commercial building stock, both public and private. This strategy would support and reinforce many of the EED and EPBD requirements.

4.2.2 Measures for development and adoption of the Building Renovation Strategy of Bosnia and Herzegovina

The structure of the Building Renovation Strategy of Bosnia and Herzegovina comprises the following sections:

a. Building Renovation Strategy for buildings owned by state authorities at the level of Bosnia and Herzegovina;
b. Building Renovation Strategy of the Brčko District BiH;
c. Building Renovation Strategy of the Republic of Srpska;
d. Building Renovation Strategy of the Federation BiH.

Measures related to drafting and adoption of the Building Renovation Strategy of the Republic of Srpska and the Building Renovation Strategy of the Federation BiH are described in detail in documents Amendments to EEAP RS 2018 and EEAPF 2016-2018, which form an integral part of this document. Measures described below apply to the part of the strategy applicable to buildings owned by state-level authorities of Bosnia and Herzegovina and buildings in Brčko District BiH.

To ensure successful transposition and implementation of Article 4 of the EED, the Roadmap foresees the following programmes and activities:

Programme 1: Identification of the typological framework and financial feasibility of implementation of measures planned in the Building Renovation Strategy

It is necessary to establish a framework for energy efficiency improvements and reduction of energy consumption in the building sector. This would imply development of a typological framework for the building stock and introduction of cost-optimal criteria for implementation of measures in this sector. It is first necessary to develop the Typology of Residential and Public Buildings in Bosnia and Herzegovina, while the introduction of this typology into the framework for energy performance of buildings should be done by the competent ministries. Cost-

effectiveness criteria must also be applied to Strategy implementation, in accordance with the existing competences.

Activity 1.1: **Development of the *Typology of Residential Buildings***

Planned activities: Initiate and carry out a research project titled "Typology of Residential Buildings" to develop the typology of buildings in the residential sector. The project should include preparation of working methodology, comprehensive field research to first create a list of buildings with the help of the relevant institute/agency for statistics and to propose representative building types, and, secondly, to select typical buildings, perform energy audits of selected buildings, calculate the energy required for heating, typical building construction for typical buildings, typical space and water heating systems, and proposed measures for improvement of architectural and constructive parts of buildings and space and water heating systems. The typology should be prepared in accordance with the European TABULA[119] project, with classification of typologies and evaluation of energy efficiency measures in residential buildings. Project results should be presented in the form of a book and on the website of EPISCOPE[120], the follow-up project after TABULA.

Current status:	Typology of Residential Buildings in BiH is developed[121]
Deadline:	December 2016
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 1.2: **Creation of the Typology of Public Buildings**

Planned activities: Initiate and carry out a research project titled "Typology of Public Buildings", to develop the typology of buildings in the public sector. The project should include preparation of working methodology, comprehensive field research to first create a list of buildings with the help of the relevant institute/agency for statistics and to propose representative building types, and, secondly, to select typical buildings, perform energy audits of selected buildings, calculate the energy required for heating, typical building construction for typical buildings, typical space and water heating systems, and proposed measures for improvement of architectural and constructive parts of buildings and space and water heating systems.

Current status:	In progress, publication expected in April 2017
Deadline:	April 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 1.3: **Determination of cost-optimal levels of implementation for measures in the building sector**

Planned activities: An economic evaluation is required of different options for renovation of each type of building identified in the typology of buildings, including identification of most cost-effective options and quantification of costs, energy savings, CO2 emissions and other non-energy benefits, and the proposed optimal package of renovation measures with an implementation timeframe for each building type. This economic evaluation should include the following steps:

1. Identification of possible expansion of energy efficiency measures for all building types;
2. Identification of possible expansion of measures in the RES segment;
3. Identification of options for connection of buildings to district heating systems;
4. Identification of packages of measures which will achieve at least 60% of energy savings, or meet the prescribed minimum requirements for energy performance of buildings of the given type;
5. Creation of a schedule for deep renovation of buildings (determine if this will be done through a single package of measures or gradually in stages during a specified period of time);
6. Determination of feasibility of different measure packages using the cost-optimisation approach;
7. Identification of priority renovation packages for each building type and timeframes for their implementation.

Current status:	N/a
Deadline:	1 September 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Programme 2: Creation of the Building Renovation Strategy in Bosnia and Herzegovina

The renovation strategy must be developed through the following steps: (1) Identify key stakeholders and data sources; (2) Technical and economic assessment; (3) Establish policies for strategy implementation; (4) Prepare

[119] http://episcope.eu/iee-project/tabula/
[120] http:\\episcope.eu
[121] Typology of Residential Buildings in Bosnia and Herzegovina

the Strategy; (5) Publish the Strategy and disseminate it to all participants in the process. According to BPIE[122] recommendations, the timeframe for development of the Strategy is as in the figure below:

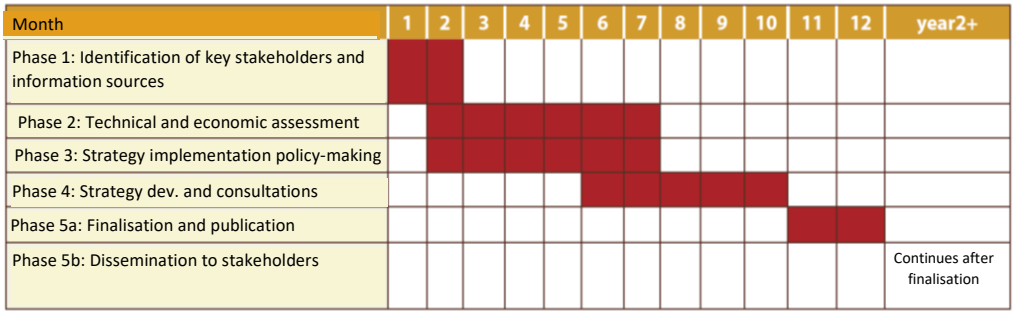

Figure 5- Timeframe for development of the Building Renovation Strategy in Bosnia and Herzegovina

A long-term strategy for mobilisation of investments in renovation of the building stock, both public and private, represents a strong foundation that would allow Bosnia and Herzegovina to reap multiple benefits. The requirement from Article 4 of the EED is both: (a) timely, in the sense that renovations in the building sector are the key to a wide range of benefits, and (b) necessary, in the sense that existing drivers are insufficient for full utilisation of potentials. In any case, Bosnia and Herzegovina should scale the Building Renovation Strategy to a level of ambition that will ensure the following:

- Creation of the long-term framework for 2050 for renovation of the building stock to a very high level of energy efficiency;
- Mobilisation of building owners (individuals, legal persons and the public sector) to undertake deep renovation measures on their buildings;
- Mobilisation of the supply chain, from manufacturers and fitters to professional service providers, to increase their investments in equipment, services and adequately qualified workforce necessary for provision of quality renovation services;
- Mobilisation of the investor community to invest in development of financial products and financing models for building renovation programmes.;
- Promotion of research and development of techniques and technologies which provide higher energy savings at a lower cost and offer attractive solutions for building owners;
- Energy savings and reduction of CO2 emissions in accordance with the EU Low Carbon Roadmap 2050, as a key contribution to the BiH policy for attainment of EU goals and other international goals;
- Fostering other benefits for the economic, social and energy system;
- Continuous monitoring of implementation with regular reporting and updates (every three years);
- Meeting the requirements of Article 4 of the EED.

Activity 2.1: Identification of key stakeholders and data sources

Planned activities: The key to successful development of the Building Renovation Strategy is preparation, planning and management. Considering that this strategy will impact the overall economy in the decades to come, this document should be developed in cooperation with all relevant stakeholders. In addition to formation of the project team, the preparation phase should include collection of data that will be needed in the next stage:

- Data sources for buildings grouped by type, energy use and current level of energy efficiency;
- Desk study - identify known information about obstacles; overview of efficiency of existing and/or past initiatives for introduction of sustainable mechanisms for energy use in buildings;
- Identification of relevant stakeholders

Current status: N/a
Deadline: 1 March 2018
Responsible institutions: Ministry of Foreign Trade and Economic Relations

Activity 2.2: Technical and economic assessment

Planned activities: In this phase, the technical potential for energy efficiency improvements in buildings has been identified and the range of renovation options has been evaluated and calculated. The starting point for this activity is accurate information about the number of buildings, obtained using the BU approach to aggregate data

[122] „A guide to developing strategies for building energy renovation“, Published in February 2013 by Buildings Performance Institute Europe (BPIE), ISBN: 9789491143076

for different construction types and styles, age of buildings, climatic zones, occupancy rates, and similar. The typology of buildings and cost-optimal levels of implementation of energy efficiency measures may be used as a foundation for the technical and economic assessment. The technical and economic assessment consists of the following steps: (1) analysis of the residential and public building stock; (2) economic assessment and renovation options; (3) valuation of energy savings potential; (4) development of the long-term investment programme; and (5) valuation of benefits.

Current status:	N/a
Deadline:	1 July 2018
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 2.3: Development of the Strategy implementation policy

Planned activities: The purpose of this policy is to first assess the current policy environment relevant to renovation of buildings, and to identify the changes that will have to be made to the existing policy as well as additional policies that must be adopted in order to actuate the building renovation market. The following issues need to be addressed:

Strategic:

- Creating full political support to deep building renovation;
- Establishing an independent committee to monitor and report on the long-term progress of the Strategy and provide recommendations for its improvement and periodic modifications;
- Conducting a system-wide assessment of obstacles to renovation, for each market segment;
- Setting the objective for poverty reduction through energy efficiency improvements in the residential housing stock;
- Holistically developing and achieving inter-policy objectives in related areas, such as sustainable development and urban development, efficient use of resources, sustainable construction, etc.;
- Creating a wide network of stakeholders as a forum for consultations, policy formulation and feedback on practical matters and challenges;
- Demonstrating leadership through expedited deep renovation of public buildings, thus developing the supply chain and creating a knowledge base for commercial activities in the renovation process.

Legislative/regulatory framework:

- Identifying milestones and creating regulations that can be used to promote or mandate energy efficiency measures;
- Introducing energy efficiency obligation schemes to actuate the building renovation process;
- Providing incentives to social categories for improvement of energy performance of residential buildings;
- Addressing practices which limit the use of low carbon technologies in order to ensure a favourable environment for buildings with integrated RES;
- Implementing measures to overcome restrictive policies in the residential sector which effectively prevent improvement of energy performance of buildings;
- Imposing mandatory energy efficiency improvements for lowest-efficiency buildings, e.g. through imposing limitations on sale and/or leasing of buildings in the lowest energy performance categories.

Technical:

- Developing appropriate standards to efficiently address new challenges, based on experience and new technologies;
- Analysing the potential of district heating systems for efficient production of low carbon energy;
- Ensuring adequate monitoring and implementation in accordance with building regulations;
- Developing measure packages that can be easily replicated in similar types of buildings;
- Introducing quality standards and certification systems for fitters and products.

Fiscal and financial framework:

- Establishing secure financing sources, including those stated in Article 20 of the EED, as well as financing from EU sources and other international sources, and developing mechanisms for efficient use of private capital;
- Identifying factors which translate savings in public budgets to indirect benefits (e.g. healthcare, employment);
- Developing financing models adapted to specific market segments, one-stop-shop solutions and commercially attractive financing sources for building renovation projects;
- Developing mechanisms to promote building renovation through third party financing, e.g. ESCOs and EPCs;
- Eliminating incentives for use of fossil fuels to remove unwanted effects which could discourage investors;

- Considering potential introduction of bonus/malus mechanisms, such as tax incentives (tax deductions for owners of high energy performance buildings) and harmonisation of energy prices with energy performance.

Communication and strengthening of capacities:

- Creating publicly accessible databases to demonstrate energy performance of renovated buildings and provide information on how to undertake renovations;
- Developing skills and programmes for key occupations and disciplines;
- Creating networks for exchange of knowledge and experience with neighbouring regions and countries;
- Promoting growth of local industries and supply chains in order to create macroeconomic benefits and reduce CO2 emissions;
- Developing promotional activities to provide building owners with better quality and content of information about the effects of building renovations;
- Establishing regular communication with the public about the progress of the renovation strategy.

Research and development framework:

- Supporting research, development and demonstration projects for new and improved technologies and techniques that can be used in renovation of buildings, including best practices.

Current status:	N/a
Deadline:	1 July 2018
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 2.4: Strategy development

Planned activities: This activity combines the technical and economic assessment from Activity 2.2 with the review of policy options (Activity 2.3) in order to develop a set of potential scenarios/roadmaps for long-term renovation of the building stock. Depending on the timing and strength of different policy elements, it is possible to model different rates of renovation. Required investments need to be quantified and their benefits evaluated.

Current status:	N/a
Deadline:	1 October 2018
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 2.5: Strategy publication and dissemination to all stakeholders

Planned activities: It would be risky to assume that the Strategy development process will be completed at this time. In reality, this period should be used to mobilise the resources necessary for its implementation. At the government level, the start of strategy development should mark the beginning of the process of policy review which could, depending on specific legal mechanisms, last several months or even years before all required measures are introduced and/or all restrictive provisions eliminated. Regardless of the time required for adoption of new regulations, the government must clearly state its intent and demonstrate its commitment to the development and implementation of the renovation strategy, and make a contribution to the promotion of renovation of public property.

Current status:	N/a
Deadline:	30 November 2018
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

4.3 Central authorities' buildings as a role model (Article 5 of the EED)

4.3.1 The purpose of renovation of central authorities' buildings

In EU member states and Energy Community countries, buildings owned or managed by central authorities represent only a minor part of the national building stock. Implementation of energy efficiency measures in this segment of the building stock would make a relatively low contribution to energy savings. Still, it is important to start implementing energy efficiency measures in these buildings because the public sector should become a role model for other sectors. On the supply side, this will create construction opportunities, expedite development of companies dealing in heating, air conditioning and cooling technologies, and boost overall development of the energy services market.

4.3.2 Measures for establishment of the process of renovation of central authorities' buildings in Bosnia and Herzegovina

To ensure successful transposition and implementation of Article 5 of the EED, the Roadmap foresees the following programmes:

Programme 3: Renovation of central authorities' buildings

Article 5 of the EED, with modified requirements for EnCT signatory countries, stipulates that central authorities must renovate 1% of the total usable floor area of owned and operated buildings which do not meet energy efficiency requirements stated in the Energy Performance of Buildings Directive 2010/31/EC, to a minimum performance level stipulated in the Directive. Bosnia and Herzegovina, same as other EnCT signatory countries, has until 1 December 2017 to identify and publish a list of all relevant buildings in this category and to start the process of renovation of 1% of these buildings per year. The rate of 1% is calculated against the total usable floor area of buildings larger than 500 m^2 owned and/or operated by state authorities. This threshold will be reduced to 250 m^2 as of 1 January 2019.

From the administrative perspective, the annual goal of 1% of the total usable floor area for Bosnia and Herzegovina should be identified by combining the targets for the following administrative units:

- 1% of the total usable floor area of buildings renovated annually – owned/operated by authorities/institutions of Bosnia and Herzegovina;
- 1% of the total usable floor area of buildings renovated annually – owned/operated by authorities of the Federation BiH;
- 1% of the total usable floor area of buildings renovated annually – owned/operated by authorities of the Republic of Srpska;
- 1% of the total usable floor area of buildings renovated annually – owned/operated by authorities of the Brčko District BiH

Measures aimed at renovation of central authority buildings in the Republic of Srpska and Federation BiH are described in detail in documents Amendments to EEAP RS 2018 and EEAPF 2016-2018, which form an integral part of this EEAP BiH 2016-2018. Activities described below refer to renovation of buildings owned by administrative authorities of Bosnia and Herzegovina and Brčko District BiH.

Activity 3.1: Identification of base for calculation of targets

Planned activities: According to Article 5 of the EED, Bosnia and Herzegovina can choose between two target calculation methodologies in the implementation of Article 5 of this Directive. The first methodology is described in Article 5(1) and represents the main obligation. This methodology implies preparation of a complete inventory of buildings, which would then be used for methodological identification of annual renovation targets for buildings in this category. On the other hand, there is also an option to use the alternative approach described in Article 5(6), which allows for use of standard specific energy consumption values for typical building types and would alleviate the need for a complete inventory of the public building stock. Detailed instructions and descriptions of available methodologies are provided in the EC Guidance Note[123] and the guide[124] adapted for Energy Community countries. Responsible authorities must adopt one of the proposed methodologies, collect the necessary data and set annual renovation targets for public buildings owned and/or operated by authorities at all levels.

Current status:	N/a
Deadline:	1 April 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

Activity 3.2: Development of operating plans for renovation of buildings owned by central authorities

Planned activities: Authorities responsible for implementation of Article 5 of the EED will prepare operating plans for renovation of buildings in this category for a period of 5 years, taking into account the targets specified in the previous activity. Development of these operating plans will require the following: (1) identification of savings potentials for energy use in public buildings; (2) conducting a CBA for EE programmes in public buildings; (3) determining financial instruments to be used to finance the implementation of measures; (4) creating programmes for priority measures.

Current status:	N/a
Deadline:	15 October 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations

[123] COMMISSION STAFF WORKING DOCUMENT Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC, Article 5: Exemplary role of public bodies' buildings

[124] „A guide to developing strategies for building energy renovation", Published in February 2013 by Buildings Performance Institute Europe (BPIE), ISBN: 9789491143076

4.4 Public procurement and energy efficiency (Article 6. of the EED)

4.4.1 The purpose of introduction of energy efficiency criteria into the public procurement system

The Public Procurement Directive 2004/18/EC established the procurement framework to ensure principles such as fair market competition and obtaining best value for the taxpayers' money. All specifications of items to be procured are deferred to special legislation, such as the EED. Article 6 of the EED stipulates that, under certain conditions, central authorities procure products, services and buildings with high energy characteristics specified in EU legislative acts such as the Energy Labelling Directive 2010/30/EU and related implementing regulations, Eco Design Directive 2009/125/EC and related implementing regulations, Energy Performance in Buildings Directive 2010/31/EU, or the Energy Star programme. Public procurement is subject to elements such as cost efficiency, technical compliance and broad sustainability. The Commission Staff Working Document[125] describes the relevant requirements, such as the difference between life cycle cost efficiency and commercial feasibility, and in which circumstances these should be applied by the member states. It also includes potential criteria for determination of parties subject to public procurement requirements by the states.

4.4.2 Measures aimed at introduction of EE criteria into public procurement

To ensure successful transposition and implementation of Article 6 of the EED, the Roadmap foresees the following programmes:

Programme 4: Energy efficiency in public procurement

The EED modified for Energy Community countries states that each state must ensure that its central authorities procure only high energy performance products, services and buildings, subject to feasibility, commercial viability, broad sustainability, technical compliance and sufficient market competition. This obligation applies to purchasing contracts for products, services and buildings by public bodies to the extent that such contracts are of value greater or equal to legislative thresholds.

Bosnia and Herzegovina must submit its national thresholds for energy efficiency criteria in public procurement to the Energy Community Secretariat by the 15th of October 2017. Implementation of these obligations requires amendments to the *Public Procurement Law of BiH* (Official Gazette of BiH, 19.5.2014)[126] in accordance with the principles stated in Article 6 of the EED. Entity laws, i.e. secondary energy efficiency legislation at entity level, must provide general instructions for application of energy efficiency criteria in the public procurement process, and these need to be further detailed through adoption of a regulation on application of energy efficiency criteria in public procurement. Institutions in Bosnia and Herzegovina should develop, make available and use the Guide for application of energy efficiency criteria in public procurement, as defined by the relevant decision of the Council of Ministers.

Activity 4.1: Development of the Guide for application of energy efficiency criteria in public procurement

Planned activities: The Guide for Application of Energy Efficiency Criteria in Public Procurement needs to be developed, to be used by public institutions in publishing calls for proposals and by bidders in preparation of their bids. Basic energy efficiency requirements stated in this Guide and prescribed as mandatory must be applied to technical specifications for individual items to be procured. All bids must meet the stated requirement. The bidder must submit with their bid: technical documentation (e.g. ENERGY STAR, energy efficiency label, centrifugal efficiency label, drying efficiency label, manufacturer's technical documentation, technical specifications, etc.) or other appropriate evidence that the product meets the required standard. In the case that the product does not meet the technical standard, it will be declared technically non-compliant and removed from subsequent stages of the procurement process. The guide must, as a minimum, include the following equipment and service categories in public procurement:

- Office IT equipment (personal computers; laptops; screens/monitors; photocopiers, printers, scanners, fax machines, multifunctional devices);
- Household appliances (refrigerators, freezers and combinations thereof; washing machines; dishwashing machines; air conditioners: (a) mono-split channel air conditioners (one internal and one external unit); (b) multi-split channel air conditioners (two internal and one external unit); (c) air conditioners - standard mono-split system (one internal and one external unit); TVs; electric lights (directional/non-directional);

[125] Commission Staff Working Document: Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC, Article 6: Purchasing by public bodies

[126] https://www.javnenabavke.gov.ba/legislativa/zakoni/Novi_ZJN_BiH.pdf

- Road vehicles (passenger cars, light cargo vehicles, heavy cargo vehicles, buses);
- Exterior lighting (exterior lights, lamps);
- Leased buildings (lease of existing buildings, facilities or parts of buildings);
- Non-consulting services.

Current status: N/a
Deadline: 15 October 2017
Responsible institutions: Ministry of Foreign Trade and Economic Relations

Activity 4.2: Adoption of the regulation on application of energy efficiency criteria in public procurement

Planned activities: The legal framework for energy efficiency needs to prescribe mandatory use of energy efficiency criteria in public procurement. In Bosnia and Herzegovina this obligation needs to be introduced at several levels, as follows:

- Institutions at the level of Bosnia and Herzegovina: adopt a decision on application of energy efficiency criteria in public procurement;
- Entities: amend energy efficiency laws and adopt a regulation on application of energy efficiency criteria in public procurement;
- Brčko District BiH: adopt a decision on application of energy efficiency criteria in public procurement;

This regulation/decision must prescribe the methodology for determining the appropriate level of energy efficiency of goods and services and official buildings and/or parts of buildings used for official purposes prior to their purchase and/or lease through a public procurement procedure.

Current status: N/a
Deadline: 15 October 2017
Responsible institutions: Ministry of Foreign Trade and Economic Relations; Ministry of Industry, Energy and Mining of RS, Ministry of Energy, Mining and Industry of FBiH, BD Government

4.5 Energy efficiency obligations and alternatives (Article 7 of the EED)

Detailed description of measures and activities in this area in the Federation BiH and Republic of Srpska is provided in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Activities of the relevant institutions of Brčko District BiH are similar to the activities described in entity EEAPs. Relevant state-level institutions have a coordinating role in this process.

4.6 Energy audits and energy management systems (Article 8 of the EED)

Detailed description of measures and activities in this area in the Federation BiH and Republic of Srpska is provided in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Activities of the relevant institutions of Brčko District BiH are similar to the activities described in entity EEAPs. The relevant state-level institutions play a coordinating role in this process.

4.7 Metering and detailed energy billing (Articles 9-11 of the EED)

Detailed description of measures and activities in this area in the Federation BiH and Republic of Srpska is provided in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Activities of the relevant institutions of Brčko District BiH are similar to the activities described in entity EEAPs. The relevant state-level institutions play a coordinating role in this process.

4.8 Promotion of efficient heating and cooling (Article 14)

Detailed description of measures and activities in this area in the Federation BiH and Republic of Srpska is provided in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, respectively.

Activities of the relevant institutions of Brčko District BiH are similar to the activities described in entity EEAPs. The relevant state-level institutions play a coordinating role in this process.

4.9 Energy transmission and distribution (Article 15 of the EED)

4.9.1 Obligations on the energy transmission and distribution side

Please note:

As previously stated in Section 2, electricity transmission in Bosnia and Herzegovina is regulated by state-level authorities of Bosnia and Herzegovina and the entities are responsible for the distribution sector. Entity obligations in the distribution sector are described in the EEAPF 2016-2018 and Amendments to EEAP RS 2018.

Article 15 of the EED concerning energy transformation, transmission and distribution, as well as Annexes XI and XII, commit Bosnia and Herzegovina to maximisation of efficiency of gas and electricity grids and infrastructure, as well as promotion of demand response, with 30 November 2018 as the deadline for implementation of these obligations. According to Article 15, the main obligations of Energy Community countries, including Bosnia and Herzegovina, are:

Grid regulation and grid tariffs:

a. States must ensure that, in performing their usual regulatory functions, regulatory bodies consider energy efficiency of electricity and gas systems;
b. Through development of grid regulations and grid tariffs within the scope of Directive 2009/72/EC on electricity, taking into account the benefits of each measure, states must provide incentives for network operators to make system services available to users and thereby facilitate their implementation of energy efficiency measures in the context of continued introduction of smart grids;
c. Mandatory elimination of transmission and distribution tariff items which are detrimental to the efficiency of the power system, or those which could hinder the effects of demand response in the balancing and ancillary services market;
d. Tariffs must allow suppliers to increase consumer's contribution, including through demand response, to improvements in system efficiency;
e. Electricity grid regulations and grid tariffs must meet energy efficiency criteria stated in Annex XI of Directive 2012/27/EU;

Demand response:

f. Energy regulatory bodies must stimulate demand-side resources, such as demand response, to participate in energy wholesale and retail markets together with supply-side actors such as electricity producers;
g. It is necessary to promote access and participation of demand response actors in the balancing market, reserves market and other ancillary service markets, where the appropriate technical and contractual modes of their participation - including participation of aggregators - must be defined;
h. High-efficiency cogeneration operators must be able to offer balancing services and other ancillary services, subject to technical and economic feasibility, and provided that this does not interfere with the security and reliability of the system;
i. In meeting the requirements for balancing and ancillary services, transmission and distribution system operators must treat demand response actors, including aggregators, in a non-discriminatory manner.

Grid design and operation:

j. According to Directive 2009/72/EC, taking account of the cost-benefit ratio of each measure, regulatory bodies of member states provide incentives to grid operators for energy efficiency improvements in the power system;
k. Access and dispatch prioritisation rules, if priorities of this kind have been assigned within the system, are clearly explained and published;
l. The current status of energy efficiency must be assessed and improvements introduced in both design and operation of electricity and gas infrastructure.[127]

4.9.2 Measures on the energy transmission and distribution side

To ensure successful transposition and implementation of Article 15 of the EED, the following programmes were planned for implementation of priority measures:

Programme 5: Promotion of efficient electricity and gas infrastructure

This requires a Comprehensive Assessment of potentials for energy efficiency improvements in the power and gas infrastructure, including specific measures and investments for cost-effective introduction of optimised energy efficiency improvements to the grid infrastructure. There is also a need to ensure compliance of grid regulations and grid tariffs with the criteria from Annex XI of the EED, in line with the guidelines and codes developed based

[127] Commission Staff Working Document Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC Article 15: Energy transformation, transmission and distribution

on the Regulation (EC) 714/2009, as well as harmonisation of existing laws and bylaws of Bosnia and Herzegovina and both entities with the Directive 2009/72/EC, Directive 2009/73/EC, and Article 15 of the Directive 2012/27/EU concerning grid regulation and grid tariffs, as well as measures that will enable and develop demand response and improve energy efficiency in the design and operation of the grid. Relevant entity ministries will perform this assessment, each within its respective scope of competence, and the final assessment will be prepared by the responsible state-level ministry on the basis of entity assessments. Detailed guidelines for implementation of this requirement of the EED are provided in the Commission Staff Working Document.

Activity 5.1: Assessment of potentials for energy efficiency improvements in the power and gas infrastructure

Planned activities: Conduct an assessment of potentials for energy efficiency improvements in the electricity infrastructure in Bosnia and Herzegovina, with an emphasis on transmission, distribution, load management and interoperability, as well as options for connection to the grid of power generation facilities, inclusive of micro power generators. This assessment must focus on the following measures, which may result in a reduced need for investments in new infrastructure:

- Optimal utilisation of existing electricity infrastructure;
- Potential energy efficiency measures, including demand response;
- Modernisation of infrastructure aimed at minimisation of technical and operating losses;
- Assessment of potentials for energy efficiency improvements in the gas infrastructure in BiH, with an emphasis on transport, distribution, load management and interoperability, as well as connecting power generation facilities inclusive of micro power generators.

Current status:	N/a
Deadline:	15 October 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations; Ministry of Energy, Mining and Industry of FBiH; Ministry of Industry, Energy and Mining of RS; BD Government;

Activity 5.2: Identification of cost-optimal energy efficiency improvements in electricity and gas network infrastructure

Planned activities: Based on the assessment of potentials for energy efficiency improvements in electricity and gas infrastructure, it is necessary to identify specific measures and investments for cost-effective energy efficiency improvements in the power and gas sector infrastructure in Bosnia and Herzegovina, and set timeframes for their implementation.

Current status:	N/a
Deadline:	15 October 2017
Responsible institutions:	Ministry of Foreign Trade and Economic Relations; Ministry of Energy, Mining and Industry of FBiH; Ministry of Industry, Energy and Mining of RS; BD Government;

Activity 5.3: Amendments to existing regulations in the electricity and gas sector to include provisions of Directive 2009/72/EC, Directive 2009/73/EC and Article 15 of Directive 2012/27/EU

Planned activities: Finalise the harmonisation of existing BiH laws and by-laws in the electricity and gas sector with the provisions of Directive 2009/72/EC and Article 15 of the Directive 2012/27/EU, including criteria from Annex XI and Annex XII, concerning the requirements related to grid tariffs and grid regulation, demand response, grid design and operation. Harmonisation will also include elimination of any existing incentives in transmission and distribution tariffs which are (i) detrimental to efficiency of generation, transmission, distribution and supply of electricity due to creating unnecessarily high volumes of distributed and transmitted energy; and/or those incentives which (ii) may disrupt or prevent participation of demand response in the balancing and/or support services market. Amendments related to promotion and facilitation of active participation of demand response in efficient grid management need to include the following:

a. Harmonisation of existing regulations in order to commit operators of the transmission and distribution system to do the following within their area of responsibility for energy dispatch from generation facilities:
    - Guaranteed transmission and distribution of energy from high-efficiency cogeneration;
    - Ensure priority or guaranteed grid access to energy from high-efficiency cogeneration;
    - In dispatching electricity from generation facilities, ensure priority dispatching of energy from high-efficiency cogeneration to the extent permissible in terms of safe operation of the electricity system;
    - Establish and publish standard rules for covering and allocation of technical adaptation costs (such as grid connections and grid reinforcements, improvements to grid operation, and non-

discriminatory application of the grid code) necessary for integration of new energy producers which deliver energy from high efficiency cogeneration to an interconnected grid;
- Provide comprehensive and relevant information to each new producer of energy from high efficiency cogeneration that wishes to connect to the grid;
- Ensure standardised and simplified procedures for connecting producers of energy from high efficiency cogeneration to the grid, in order to facilitate their connection to the grid;

b. Harmonise the existing regulations in order to commit energy regulatory bodies to stimulate supply-side resources, such as demand response, to participate in wholesale and retail markets together with supply actors. Where:
- Demand response actors must be treated in a non-discriminatory manner and in accordance with their technical capacities;
- Technical modalities for participation of these actors in wholesale and retail markets must be defined in accordance with technical market requirements and the capacities of these actors.

Current status:	N/a
Deadline:	15 October 2017
Responsible institutions:	Legislative bodies of Bosnia and Herzegovina, Republic of Srpska and Federation BiH; Ministry of Foreign Trade and Economic Relations; Ministry of Energy, Mining and Industry of FBiH; Ministry of Industry, Energy and Mining of RS; BD Government;

Activity 5.4: Review, harmonisation and adoption of methodologies and guidelines for development of strategic and planning documents in the electricity and gas sector for the purposes of transposition of Directive 2009/72/EC, Directive 2009/73/EC and Article 15 of Directive 2012/27/EU

Planned activities: It is necessary to revise, internally harmonise and adopt methodologies and guidelines (including mandatory forms for presentation of appropriate technical and other data) for development of all relevant strategic and planning documents and reports by national and entity regulatory bodies, system operators and market participants, in order to:
- Harmonise the content of these documents with the requirements of Directives 2009/72/EC, 2009/73/EC and 2012/27/EU;
- Enable quantification of the contribution of objectives, programmes and measures planned/described in these documents to established national/entity primary energy savings targets in the power and gas sector.

After these methodologies and guidelines are developed and harmonised, the next step is to harmonise all relevant existing strategic and planning documents and reports adopted by national and entity regulatory bodies by the 31st of December 2018.

Current status:	N/a
Deadline:	15 March 2018
Responsible institutions:	Ministry of Foreign Trade and Economic Relations; Ministry of Energy, Mining and Industry of FBiH; Ministry of Industry, Energy and Mining of RS; BD Government

5. INSTITUTIONAL AND FINANCIAL FRAMEWORKS FOR IMPLEMENTATION OF ENERGY EFFICIENCY POLICY IN BiH

With the signing of the Energy Community Treaty, Bosnia and Herzegovina created an institutional framework responsible for control and supervision over the established framework for indicative energy savings targets. This also implies verification of energy savings resulting from energy services and other energy efficiency measures, as well as accountability for progress reporting. The Energy Efficiency Action Plan of Bosnia and Herzegovina therefore relies on a legally established institutional framework with clearly defined roles and responsibilities of competent authorities.

5.1 Institutional framework for implementation of the Energy Efficiency Action Plan in Bosnia and Herzegovina

5.1.1 Implementing structure

The complete institutional framework for implementation of the EEAP BiH is based on existing mechanisms which are already providing a contribution to these targets, as well as potential mechanisms that are yet to be established and operationalised.

An efficient framework for implementation of energy efficiency measures in Bosnia and Herzegovina requires participation of all primary and final consumption sectors in the mechanisms for implementation of the EEAP BiH, with the aim to meet the targets defined in EEAP BiH and the obligations of Bosnia and Herzegovina in the process of accession to the European Union. On the other hand, an efficient financial framework for EEAP implementation requires a clear structure that will promote comprehension, cooperation, monitoring and implementation of the EEAP.

5.1.2 Implementing authorities

The key authority for implementation of the energy efficiency legal framework in Bosnia and Herzegovina is the **Ministry of Foreign Trade and Economic Relations**, competent for: foreign trade policy and customs tariff policy of BiH; preparation of contracts, agreements and other acts in the domain of trade and economic relations with other countries; preparation of bilateral and multilateral agreements and other acts related to renovation and reconstruction in BiH; relations with international organisations and institutions in the domain of foreign trade and economic relations; preparation and creation of macroeconomic strategy documents in the domain of economic relations; business environment, single economic space; development and promotion of entrepreneurship; control of exports and imports of special regime goods and services; consumer protection; competition; coordination of international economic aid to BiH, except EU aid; and veterinary affairs.

The Ministry is responsible for state-level functions and tasks related to policy-making, stipulation of basic principles, coordination of activities and harmonisation of entity authorities' and institutions' plans on an international level in the domain of, inter alia: agriculture, energy, environment, development and utilisation of natural resources, and tourism.

In the implementation of the Energy Efficiency Action Plan in Bosnia and Herzegovina 2016-2018, the Ministry of Foreign Trade and Economic Relations (a) coordinates implementation of all segments of this EEAP with the relevant bodies in the Republic of Srpska, Federation BiH and Brčko District; and, in parallel (b) implements energy efficiency programmes which are under direct competence of state-level authorities of Bosnia and Herzegovina.

Key authorities responsible for implementation of energy efficiency laws in the Federation BiH are:

- Federal Ministry of Energy, Mining and Industry;
- Federal Ministry of Physical Planning;
- Environmental Fund of the Federation BiH.

These bodies must ensure smooth coordination and participation of the following departments and institutions:

- Federal Ministry of Finance;
- Federal Ministry of Transport and Communications;
- Regulatory Commission for Energy in the Federation BiH;
- Development Bank of the Federation BiH;
- Cantonal ministries of education, health, finance, spatial planning, environment and energy;
- Cities and municipalities in the Federation BiH;

Key authorities responsible for implementation of energy efficiency laws in the Republic of Srpska are:

- Ministry of Industry, Energy and Mining;
- Ministry of Spatial Planning, Civil Engineering and Ecology;
- Environmental Protection and Energy Efficiency Fund.

These bodies must ensure smooth coordination and participation of the following departments and institutions:

- Ministry of Industry, Energy and Mining;
- Ministry of Spatial Planning, Civil Engineering and Ecology;
- Ministry of Finance;
- Ministry of Transport and Communications;
- Regulatory Commission for Energy of the Republic of Srpska;
- Environmental Protection and Energy Efficiency Fund;
- Investment and Development Bank of the Republic of Srpska;
- cities and municipalities.

The institutional framework for implementation of EEAP FBiH and EEAP RS as integral parts of EEAP BiH (i.e. implementing structure and responsible bodies) in the Federation BiH and Republic of Srpska are described in documents EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018.

Brčko District Government is responsible for implementation of the EEAP in Brčko District and:

a. Implements the District policy and executes laws, other regulations and general acts in accordance with the District Statute;
b. Approves draft laws and regulations proposed by the Mayor for adoption by the Assembly;
c. Adopts the proposed budget;
d. Adopts acts to regulate the criteria and award of grants;
e. Provides its opinion on draft laws, regulations and general acts proposed by other parties for adoption by the Assembly;
f. Adopts legal acts required for implementation of laws;
g. Approves operating reports and programmes of the Government;
h. Forms working bodies within its scope of competence;
i. Performs other tasks in accordance with the Statute and the law.

The District Government consists of the Mayor, Deputy Mayor, Chief Coordinator, and Heads of Departments. Bodies responsible for implementation of the EEAP in Brčko District BiH are the Department of Spatial Planning and Property-Legal Affairs and the Department of Utilities.

Figure 6 shows the proposed institutional structure in Bosnia and Herzegovina for implementation of the EEAP BiH.

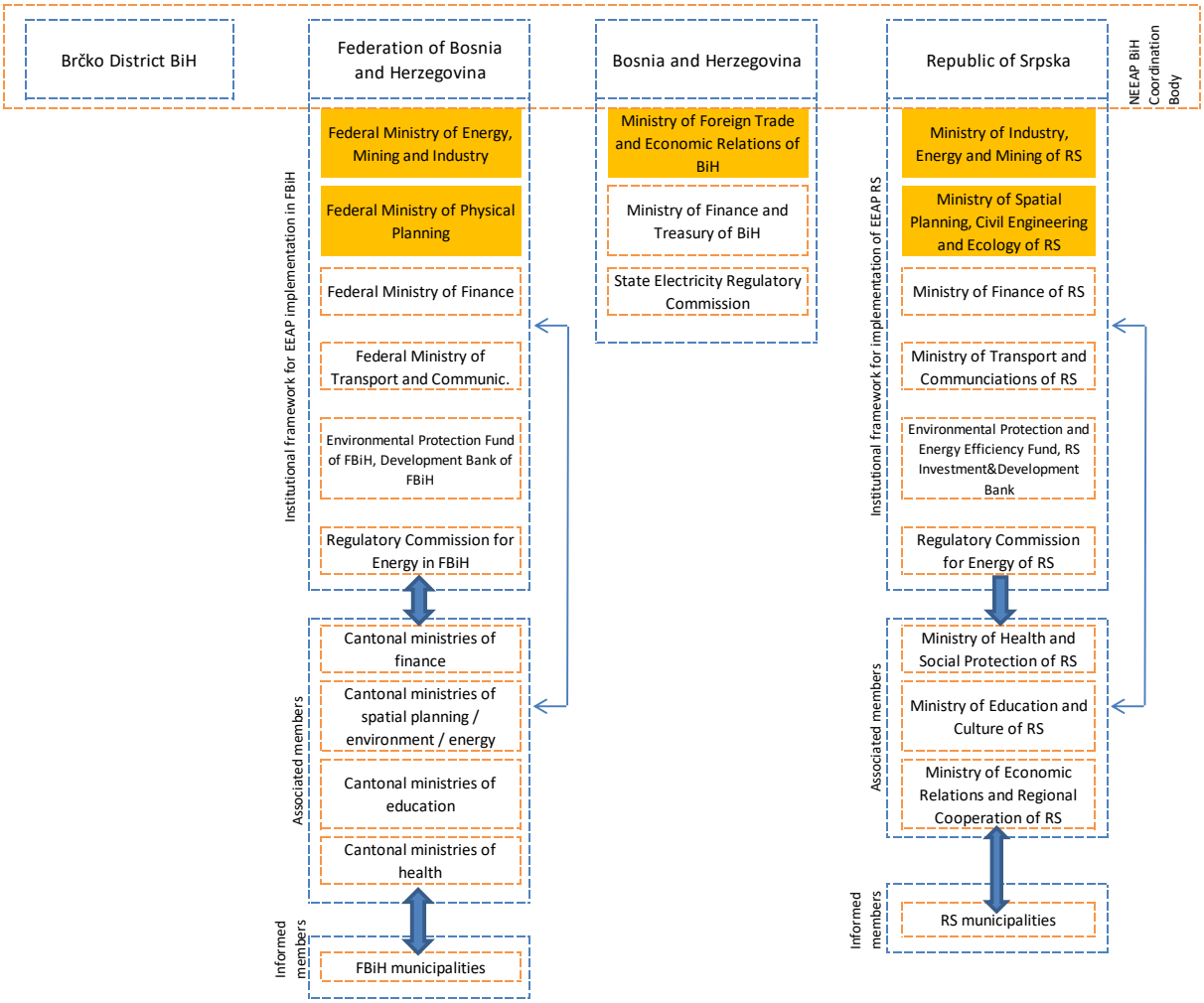

Figure 6 - Proposed institutional structure in Bosnia and Herzegovina for implementation of the EEAP BiH.

5.1.3 EEAP BiH monitoring and verification platform - Integrated energy efficiency information system (EEIS)

In order to provide a mechanism for monitoring and verification of EEAP BiH, Bosnia and Herzegovina is introducing an integrated energy efficiency information system (EEIS). The content and structure of the EEIS and responsibilities for data submission and processing will be defined in the Rulebook on the Information System, in accordance with the legal frameworks of Bosnia and Herzegovina, Federation BiH, Republic of Srpska and Brčko District BiH.

The roles of individual bodies and institutions at the entity level are described in detail in *EEAPF 2016-2018* and *Amendments to EEAP RS 2018*.

The structure of the EEIS is complex and comprises the following minimum components:

a. Energy efficiency action plans:
   - Register of energy efficiency action plans for Bosnia and Herzegovina, Federation BiH, Republic of Srpska, Brčko District BiH;
   - Register of cantonal EEAPs in the Federation BiH;
   - Register of municipal EEAPs;
   - Register of EEAPs for large consumers;
   - Database of details from EEAPs for Bosnia and Herzegovina, Federation BiH, Republic of Srpska, Brčko District BiH;
   - Database of details from cantonal EEAPs;
   - Database of details from municipal EEAPs;
   - Database of details from large consumer EEAPs.

b. Energy savings:
   - Register of EEAP implementation reports for Bosnia and Herzegovina, Federation BiH, Republic of Srpska, Brčko District BiH;
   - Register of EEAP implementation reports for cantons in the Federation BiH;
   - Register of implementation reports for municipal EEAPs ;
   - Register of implementation reports for large consumer EEAPs;
   - Database of energy savings from energy efficiency projects (MVP);
   - Reports on energy savings based on the top-down approach;
   - Reports on energy savings based on the bottom-up approach;
   - Reports on energy savings based on reviews of the energy efficiency equipment market;
   - Catalogue of energy efficiency measures;
   - List of TD indicators of energy consumption;
   - Methodology for calculation of savings based on the TD approach;
   - Methodology for calculation of savings based on the BU approach;
   - Methodology for analysis of the energy efficiency equipment market.

c. Energy consumption:
   - Register of electricity consumers;
   - Register of consumers of heat from district heating systems;
   - Register of natural gas consumers;
   - Register of industrial consumers;
   - Register of public and service sector buildings;
   - Unified codes for consumers;
   - Energy consumption database;
   - Annual energy consumption reports.

d. Energy certificates for buildings:
   - Register of energy audit reports for buildings;
   - Register of energy certificates for buildings;
   - Database of details from energy certificates for buildings:
   - Register of licensed companies;
   - Register of licensed engineers;
   - Annual report on energy certificates for buildings.

e. Technical systems in buildings:
   - Register of energy audit reports for heating systems;
   - Register of energy audit reports for air conditioning systems;
   - Database of heating systems in buildings;
   - Database of air conditioning systems in buildings;

- Register of companies licensed for energy auditing of HVAC systems;
- Register of engineers licensed for energy auditing of HVAC systems;
- Annual report on energy audits of HVAC systems.

Submission of data to the EEIS is the responsibility of: Bosnia and Herzegovina, Federation BiH, Republic of Srpska, Brčko District BiH, cantons, local self-governance units, large consumers, entity bodies, public companies, distribution system operators, energy distributors, energy suppliers and licensed companies. These parties regularly submit data (in a clearly defined structure, format and schedule) for entry into EEIS.

The monitoring mechanism uses three methods to monitor savings arising from implementation of programmes and measures defined in this EEAP, as follows:

- Bottom-up calculation of savings based on the data from implemented projects;
- Top-down calculation of savings;
- Monitoring savings on the basis of reviews of the energy efficiency equipment market.

Competences and responsibilities for monitoring of savings are defined in the Rulebook on the Information System.

5.2 Financial framework

5.2.1 Overview of current financing options for implementation of the energy efficiency policy in Bosnia and Herzegovina, with recommendations for their improvement

A review of the situation in Bosnia and Herzegovina identified the main sources and methods of financing which currently play an important role in the implementation of energy efficiency measures, as shown in Table 38 below. In order to secure the funding required to achieve indicative goals and successfully implement the energy efficiency policy described in this EEAP, the plan is to introduce additional financial options to ensure implementation of measures planned in this EEAP, both within programmes and as individual measures. The main financial options that are currently available, their planned improvements and the roadmap for introduction of new financial mechanisms are described below.

The main sources of financing currently present in Bosnia and Herzegovina are: public budgets, environmental and other fees, international financial institutions' funds, foreign funds (e.g. GCF, IPA and other EU funds, and similar). On the other hand, the most important currently available methods of financing are: international loans, subsidies and grants. It is important to note that funding obtained from a single source may be allocated using various distribution methods. For example, budget funds may be allocated in a number of different ways, such as e.g. loans, grants, subsidies and similar. Along the same lines, environmental fees as a source of financing, i.e. the existing fiscal mechanisms, may be used as a financial instrument (or method of allocation of funds) in the form of loans, grants or other forms of financing (e.g. funds collected from registration of motor vehicles are allocated through both grants and loans).

Financing source	Status of the financing source	Financing method	Status of the financing method
Energy taxes	*N/a*	**Preferential loans**	*Available (further development needed)*
CO_2 taxes	*N/a*	**Grants**	*Available (downward trend)*
Air protection fees	*Available*	**Subsidies**	*Available (further development needed)*
Other environmental fees	*Available*	**Foreign (preferential) loans**	*Available*
Public budgets	*Available*	**Regular budget lines**	*Available*
International financial institutions' funds (IFI)	*Available*	**Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)**	*N/a*

UN funds and bilateral cooperation	*Available*	**Energy efficiency obligation schemes / alternative measures**	*N/a*
EU funds	*Available (further development needed)*	**Income tax incentives (investment-based tax deductions)**	*N/a*
Private financing	*Available (further development needed)*	**ESCO**	*N/a*
		Public-Private Partnership (PPP)	*Available (further development needed)*
		Commercial loans	*Available*
		Technical assistance	*Available*

Table 38- Financing options for implementation of energy efficiency policy in Bosnia and Herzegovina

5.2.1.1 Financing sources

5.2.1.1.1 FS1: Energy taxes

Current status:

Bosnia and Herzegovina currently does not have energy taxes that could be used to finance and support investments in energy efficiency measures. From the energy efficiency perspective, and considering the current economic situation in Bosnia and Herzegovina, energy taxation would provide numerous advantages:

- Collection of fees via energy pricing creates a direct incentive for energy savings. The impact on households is minor because energy costs are a minor part of overall household expenditures, however in large industrial consumers where energy costs represent a major share of total operating costs the impact would be very high;
- Income from energy fees may contribute to financing of energy efficiency measures via entity environmental/energy efficiency funds. For example, the new *Law on the Environmental Protection and Energy Efficiency Fund* foresees that the Fund collects fees pursuant to the *Law on Energy Efficiency in the Federation BiH.*
- Introduction of energy fees, due to their clear environmental protection and energy saving potential, may be politically more acceptable than additional increases of the VAT or income tax rate.

Planned improvements:

- **FS1.1**: Introduction of fees for electricity consumption in households, combined with support to socially vulnerable population categories;
- **FS1.2**: Introduction of fees for electricity consumption in SMEs and industry, provided that this will not impact their export competitiveness;
- **FS1.3**: Introduction of fees for electricity generation from oil derivatives (particularly 'dirty' fuels such as heavy fuel oil and bunker fuels) and coal;
- **FS1.4**: Introduction of fees for consumption of heat from district heating systems, subject to the type of energy product used for heat generation;
- **FS1.5**: Introduction of energy fees in real estate property transactions, depending on the energy class of the property.

Note: Republic of Srpska did not plan to introduce these fees (FS1.1, FS1.2, FS1.3, FS1.4 and FS1.5) in the period covered by the current EEAP (until the end of 2018).

Overview of planned improvements in the Federation BiH and Republic of Srpska is provided, respectively, in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.

5.2.1.1.2 FS2: CO_2 taxes

Current status:

Bosnia and Herzegovina currently does not have CO2 taxes that could be used to finance and support investments in energy efficiency measures.

Planned improvements:

- **FS2.1**: Introduction of CO_2 tax for large industrial energy consumers, according to prescribed CO_2 emissions criteria. Voluntary agreements may be reached with industrial companies to reduce this tax burden through investments in energy efficiency measures;
- **FS2.2**: Introduction of CO_2 tax for registration of motor vehicles according to CO_2 emission levels.

Overview of planned improvements in the Federation BiH and Republic of Srpska is provided, respectively, in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.

5.2.1.1.3 FS3: Air protection fees

Current status:

Federation BiH and Republic of Srpska currently collect air pollution fees from polluters (for air emissions of SO_2, NO_2 and solid particles). These fees are collected by entity Environmental Funds and then channelled to environmental and energy efficiency projects.

5.2.1.1.4 FS4: Environmental fees

Current status:

Both Federation BiH and Republic of Srpska currently collect a special environmental fee with each registration of motor vehicles. These fees are collected by entity Environmental/Energy Efficiency Funds and channelled to appropriate projects. According to the *Law on the Environmental Protection Fund of FBiH*, the funds are automatically distributed as follows: 70% to the cantonal account and 30% to the Fund. The Fund's available funds are then channelled to environmental and energy efficiency projects.

Other environmental fees collected by the Funds (in the Federation: fee for plastic bags, fee for packaging and packaging waste management, fee for electronic waste management, and the fee based on the Law on Water; in the Republic of Srpska: polluter fee, waste management fee, and the fee based on the Law on Water) cannot be used to finance energy efficiency measures.

5.2.1.1.5 FS5: Public budgets

Current status:

The public sector in Bosnia and Herzegovina currently finances most energy efficiency measures through regular budget lines, as part of regular maintenance of buildings and equipment. Additional mechanisms required for sustainable financing from public budgets and long-term planning of energy efficiency investments, as well as financing from actual savings, is still not in place. To address this issue, the following instruments are planned:

Planned improvements:

- **FS5.1**: Introduction of multi-year budgeting, in order to allow implementation of multi-year energy performance contracts;
- **FS5.2**: Introduction of the budget capturing mechanism, which captures actual energy savings at book value and provides a clear method for financing measures from savings.

Overview of planned improvements in the Federation BiH and Republic of Srpska is provided, respectively, in EEAPF BiH 2016-2018 and Amendments to EEAP RS 2018, which form an integral part of this document.

5.2.1.1.6 FS6: International financial institutions' funds (IFI)

Current status:

Bosnia and Herzegovina currently has access to funding from international financial institutions for energy efficiency measures. This primarily refers to WB, EBRD and KfW funding - detailed description is provided in Section 5.2.1.2.3 (in the paragraph on FN3).

5.2.1.1.7 FS7: UN funds and bilateral cooperation

Current status:

Various agencies operate in Bosnia and Herzegovina and implement funding provided by developed countries for third country development. In the domain of energy efficiency, the most active are the United Nations Development Program (UNDP), agencies providing assistance based on bilateral agreements such as GIZ (German technical assistance), USAID (US cooperation), DEZA (Swiss cooperation), etc. This funding is mainly used for technical assistance in the domain of energy efficiency and for grants for energy efficiency pilot projects.

5.2.1.1.8 FS8: EU funds

Current status:

Participation of Western Balkan countries in EU programmes is regulated by framework agreements on the general principles of a state's participation in EU programmes. By coming into force of the *Framework Agreement on the general principles for the participation of Bosnia and Herzegovina in Community programmes* in January 2007, Bosnia and Herzegovina gained access to individual programmes. For the period 2014-2020, Bosnia and Herzegovina was granted access to the following programmes:

- Framework programme for research and innovation - Horizon 2020, Science and innovation - 77 billion EUR;
- Programme for the competitiveness of enterprises and small and medium-sized enterprises - COSME, Competitiveness and entrepreneurship - 2.2 billion EUR;
- Programme for the environment and climate action - LIFE, Environmental protection - 3.4 billion EUR (access not granted).

On the other hand, the European Commission introduced a revision of the previous Instrument for Pre-Accession Assistance (IPA) and created IPA II for the period 2014-2020. The new IPA II Regulation cancels the former five components and introduces policy areas as the basis for different interventions. Financial assistance will be available in all policy areas, regardless of whether a country holds the status of candidate or potential candidate. According to the new regulation, policy areas are designated as follows:

a. Reforms in preparation for Union membership and related institution- and capacity-building;
b. Socio-economic and regional development;
c. Employment, social policies, education, promotion of gender equality, and human resources development;
d. Agriculture and rural development;
e. Regional and territorial cooperation.

It was particularly emphasised that IPA II will use indicators to measure progress towards achievement of individual objectives and, depending on the progress, re-allocate financial support between programmes as well as between beneficiary states.

5.2.1.1.9 FS9: Private financing

Current status:

Private financing is currently the predominant form of financing of energy efficiency measures in Bosnia and Herzegovina, especially in the residential sector and SMEs. Combining this financing method with other financing sources should improve the feasibility of investments in energy efficiency measures and contribute to increased economic viability of projects.

5.2.1.2 Financing methods

5.2.1.2.1 FN1: Preferential loans from domestic sources

This financing option includes loans with terms more favourable than those prevailing in the market (low interest rates, favourable grace period and repayment period), with institutions at all levels in BiH as the source of financing.

Current status:

Republic of Srpska currently does not have examples of functional preferential credit lines.

Federation BiH does have such loans for, inter alia, energy efficiency improvements. The prominent role is played by the **Revolving Fund operated by the Environmental Fund of the Federation of BiH.** Loans are placed via public calls and are available to natural and legal persons. This is the first true revolving fund in Bosnia and Herzegovina and financing is allocated under very favourable terms (interest rate 0-4%, grace period up to 12 months, repayment period up to 7 years). In addition to the Fund, the Government of the Federation BiH established the Development Bank of the Federation BiH which offers preferential long-term loans with interest rate of 3-4% and repayment period of up to 8 years (grace period is 12 months). These loans are not explicitly intended for energy efficiency measures but potential investors can use them for this purpose by applying for loans in the programme for financing of fixed assets and similar programmes offered by this institution. In 2014 the **Federal Ministry of Energy, Mining and Industry** initiated a **Permanent Revolving Fund for Industry in the Federation BiH**. This fund

offers extremely favourable loans at 0.9% interest. Maximum repayment period is 5 years, with a 12 month grace period which does not count towards the repayment period. We should also mention the credit line operated by the **Federal Ministry of Development, Entrepreneurship and Crafts** which, same as the revolving fund of the Federal Ministry of Energy, Mining and Industry, is not intended specifically for energy efficiency but can still be used for this purpose.

Planned improvements:

- Creation of a revolving fund at the Environmental Protection and Energy Efficiency Fund, to support financing of energy efficiency programmes;
- In both entities:
  - Generation of larger inflows of currently limited funds into the revolving fund
    - Potential allocations from CO_2 taxes, energy and environmental fees and energy efficiency obligation schemes for energy distributors/suppliers (EEO) into this mechanism in order to channel these funds to sectors covered by the EEAPF/EEAP RS;
    - Potential expansion of the volume of these funds through investments and association with the commercial financial sector.
  - Providing access to financing to all categories of energy consumers and thereby strategically steering and tailoring financial modalities to specific user groups and individual target groups specified in the EEAPF/EEAP RS;
  - Creating programmes for targeted investments in all sectors covered by this EEAP;
  - Securing technical assistance for establishment of the strategic framework and its adaptation to different user groups and sub-sectors covered by the EEAP.

5.2.1.2.2 FN2: Subsidies and non-refundable financing

Financing of subsidies is sourced from domestic funds as well as externally.

Current status:

Federation BiH:

The Government of the Federation BiH currently provides subsidies and incentives in the form of non-refundable financing from the following sources:

Budget spending programme with allocation criteria "Current transfers to other levels of government and Funds - for the project of thermal insulation of buildings aimed at energy savings" defined in the Budget of the Federation of Bosnia and Herzegovina and financed by the **Federal Ministry of Physical Planning**. Funds are allocated to selected programmes/projects for thermal insulation of buildings aimed at energy savings, proposed by cantonal and municipal authorities in the Federation BiH.

Since 2013 the **Environmental Protection Fund of the Federation BiH** allocated a total of 9.1 million BAM for energy efficiency projects. The Fund secures more funds each year for energy efficiency project loans and grants and its name will soon be changed to "Environmental Protection and Energy Efficiency Fund of the Federation BiH".

In addition to the above, there is also the **Green Economic Development 2014-2018 (GED) programme** which is not implemented by the Government and relevant ministries. This programme provides grant co-financing for energy efficiency projects. The end user must contribute at least 50% of the project value. Funds are allocated to buildings owned by the public sector. Cooperation is focused on cantonal and entity governments and relevant ministries. The programme is implemented by UNDP BiH and entity Environmental Funds. The main goals of this project are reduction of public expenditure for energy and water consumption (through increased energy efficiency and use of renewable energy sources) and creation of a favourable environment for investments in infrastructural energy efficiency measures, with parallel creation of 'green jobs'. The project is implemented in five components: (i) Strengthening institutional capacities; (ii) Institutionalisation of energy management; (iii) Establishment of the legal framework; (iv) Implementation of infrastructural measures; (v) Raising public awareness of energy efficiency.

Republic of Srpska:

Financing of subsidies is sourced from own funds as well as externally. By creating a mechanism for distribution of subsidies and incentives by the ministries/Government of the Republic of Srpska, it would be possible to ensure their strategic alignment and to adjust award criteria to fit specific user groups and/or specific programmes in the EEAP RS. Currently, the ministries/Government of the Republic of Srpska distribute subsidies and incentives in the form of non-refundable grants from the following sources:

The **Environmental Protection and Energy Efficiency Fund** was founded by the Republic of Srpska and ownership and management rights rest with the Government of the Republic of Srpska. The rights, obligations and responsibilities of the Fund are defined in the 2011 *Law on the Fund and Financing of Environmental Protection of the Republic of Srpska*, its Statute and other legal acts. The Fund is responsible for fundraising activities and for financing preparations, implementation and development of programmes, projects and similar activities in the area of conservation, sustainable use, protection and improvement of the environment, as well as energy efficiency and use of renewable energy sources. According to the planned allocation of grants for 2015, the Fund financed projects in the total amount of 1,350,000 BAM, of which 1,200,000 BAM was used to finance several projects for management of packaging waste and 150,000 BAM for projects aimed at protection of water springs, river basins and coastal areas. Therefore, in 2015 the Fund did not finance any energy efficiency projects. The Fund operates limited funds intended specifically for energy efficiency purposes. A part of the solution would certainly be to institute new fees for which legal grounds exist, however the matter of social security is of great importance in the Republic of Srpska and introduction of any new burdens must be considered with care.

Planned improvements:

- Creation of the mechanism for distribution of subsidies and support by the Government of the Federation BiH to ensure their strategic alignment and to adjust award criteria to fit specific user groups and/or specific final energy consumption sectors in this EEAP.

5.2.1.2.3 FN3: Foreign (preferential) credit lines

These are international financial institutions' lines of credit for energy efficiency measures.

Current status:

Existing loan products available on the market in Bosnia and Herzegovina, usually placed through local banks and microcredit foundations, offer end users a somewhat more favourable option than standard commercial loans with regard to interest rates and other terms. Certain banks participating in these credit lines offer loans under standard interest rates but with other advantages not offered to clients in standard commercial loans (e.g. conditional partial loan write-off, free preparation of documentation, and similar). Some of the relevant products currently available on the market are:

- **EBRD** (Regional Energy Efficiency Programme - WEBSEFF 2) credit line: Raiffeisen Bank and UniCredit Bank Mostar are the partners in this project. Loans are available to both public and private sector. Interest rates are equivalent to commercial interest rates and potentially negotiable. The programme offers incentive bonuses of 10% of the loan value for achieved energy savings, as well as free technical assistance.
- **KfW** credit line: Raiffeisen Bank is the project partner and operates a 1,000,000 EUR credit line for energy efficiency projects. Loans are approved for a maximum period of 7 years, including a grace period of up to 3 years. The additional advantage for clients (investors) is that the cost of preparation of project documentation is included in the cost of the loan.

Foreign preferential credit lines allow for placement of foreign financing sources for energy efficiency programmes in Bosnia and Herzegovina, using the public institutional system as the framework for placement of funds and project implementation. One such credit line is currently being implemented in Bosnia and Herzegovina:

- The **Bosnia Energy Efficiency Project (BEEP)** is the largest energy efficiency project in Bosnia and Herzegovina, with total planned investments over the next three years of 19 million USD in the Federation BiH and 13 million USD in the Republic of Srpska. The Federal Ministry of Physical Planning and the Ministry of Spatial Planning, Civil Engineering and Ecology of the Republic of Srpska are responsible for project preparation, coordination, management and implementation at the entity level. Funds are awarded to local institutions in the form of grants, and the credit liability to the **World Bank** rests with Bosnia and Herzegovina. The funds were sourced from the World Bank and are earmarked for energy efficiency improvements in public buildings in the healthcare and education sector. The annual interest rate for this loan is 1.25%.

Needed improvements:

- Improved terms for investors, considering that the terms of current loan products are still unacceptable to a large number of potential investors;
- Favourable financial modalities that would allow the Federation BiH and Republic of Srpska to borrow funds to finance implementation of EEAPF/EEAP RS objectives in specific sectors/sub-sectors; low interest rate and favourable grace period.

5.2.1.2.4 FN4: Public budgets / Regular budget lines / Multi-year budgets

Current status:

Public budgets are adopted according to the relevant laws at every level of government, for a period of one fiscal year. A portion of public budget funding is already being invested in different direct and indirect energy efficiency programmes and measures at all levels of government in Bosnia and Herzegovina. Increased investments from public budgets are necessary to ensure implementation of programmes planned in this EEAP.

Needed improvements:

- Introduction of a multi-year budget that would allow public budget users (institutions) to implement energy efficiency measures with a shorter payback period without major investments and efforts in terms of procurement, supply and maintenance of heating systems, and would form the foundation for creation and development of the ESCO market;
- This would also create the necessary conditions for budget financing with repayment of investments through reduction of future budget expenditure (budget capturing) and secure the funding for future investments in energy efficiency measures from the existing budget lines.

5.2.1.2.5 FN5: Energy efficiency obligation schemes (EEO) for energy suppliers/distributors

Current status:

EEO schemes are policy instruments which impose an obligation on obligated parties (energy distributors/suppliers) to achieve certain energy savings through their customers. These schemes provide a substantial portion of financing required for creation of a broader financial framework for implementation of the EEAP, and may function in parallel with other financial mechanisms because EEO schemes provide financing for their users. Implementation of the EEO mechanism is under way with the assistance of USAID (EIA programme). The model framework is defined and coordinated with the competent state and entity institutions participating in the EEO model working group.

Planned improvements:

- **FN5.1**: Introduction of the energy efficiency obligation scheme and/or alternative energy efficiency measures for electricity suppliers/distributors;
- **FN5.2**: Introduction of the energy efficiency obligation scheme and/or alternative energy efficiency measures for heat suppliers/distributors;

5.2.1.2.6 FN6: Income tax incentives (investment-based tax deductions)

Current status:

Bosnia and Herzegovina currently does not have investment-based tax deductions or incentives for investments in energy efficiency measures applicable to all four sectors covered by this EEAP. Introduction of tax incentives stimulates the use of materials and technologies which increase energy efficiency, motivates companies to contribute to the objectives of this EEAP BiH through energy savings, and provides a foundation for introduction of energy efficiency criteria into the public procurement system in Bosnia and Herzegovina.

Planned improvements:

- Introduction of the following form of investment-based incentives:
    - Investment-based reduction of the tax base or investment-based deduction;
    - Investment-based tax deduction or investment-based tax credit.

However, Republic of Srpska does not plan to introduce investment-based tax incentives in the next period. The Income Tax Law foresees a tax incentive for investments in production. Additional incentives are not justifiable nor planned. The Income Tax Law prescribes higher equipment depreciation rates, effectively serving as a tax incentive and is also applicable to energy efficiency. Furthermore, such or similar deductions would first have to be included in the main strategic documents of the Republic of Srpska before they can be planned in a document of this kind. The economic reform programme does not foresee additional income tax deductions, other than those already available.

5.2.1.2.7 FN7: ESCO market and PPP

Current status:

Bosnia and Herzegovina presently does not have the conditions in place for the creation of an ESCO market (Energy Service Company) and energy performance contracting. Considering the numerous benefits offered by this method

of financing, which avoids public debt, ensures a budget-neutral approach for the public sector and secures project financing from the private sector, the first step is to make the necessary modifications to the legal framework in order to enable implementation of the ESCO model and open up the energy services market in Bosnia and Herzegovina. Such measures would contribute to implementation of more energy efficiency projects in public sector buildings, as well as better market efficiency and efficacy. It is also necessary to address the matter of practical implementation of public-private partnerships (PPP) as an instrument for implementation of ESCO projects.

Needed improvements:

- Introduction of multi-year budgeting and forfeiting into the relevant legal framework;
- Amendment of the Law on Public-Private Partnership to ensure its implementation in practice (energy performance contracting within the legal framework of the Law on PPP).

5.2.1.2.8 FN8: Technical assistance in project identification and preparation of loans and/or public procurements

Although this is not an option for direct financing of energy efficiency measures, technical assistance is an important aspect of strengthening of professional, human and technical capacities of institutions in Bosnia and Herzegovina, as well as of informing end users and strengthening their capacities for absorption of EEAP BiH implementing mechanisms and implementation of energy efficiency measures. Technical assistance is usually provided through allocation of grant funds, i.e. without borrowing on the part of Bosnia and Herzegovina and its entities. There are currently several technical assistance programmes in Bosnia and Herzegovina:

GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit), in the following programmes:

i. **Open Regional Fund for South-East Europe – Energy Efficiency (ORF-EE)**, which promotes regional cooperation between owners of reform processes in the energy sector, with the goal to achieve national objectives defined in the action plan;
ii. **Promotion of Energy Efficiency in Bosnia and Herzegovina**, with the goal to strengthen the role of local communities as drivers of energy efficiency measures. The main project partner is the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina and its implementing partners are selected municipalities in both entities, municipal associations, entity ministries of energy and civil engineering and other institutions relevant for the energy sector. The project "Promotion of Energy Efficiency in Bosnia and Herzegovina" provides technical assistance to competent ministries at state and entity level in order to meet the obligations arising from the Energy Community Treaty.

USAID (United States Agency for International Development), within the **Energy Investment Activity (EIA)** programme: The project aims to improve energy efficiency of distribution system operators and suppliers with the goal to reduce CO_2 emissions and energy costs. The EIA project provides active technical assistance to address the legal obligation to establish the energy efficiency obligation scheme.

UNDP (United Nations Development Program) implements projects aimed at policy development and infrastructural improvements through strengthening and development of human and financial capacities of local, entity and state authorities, in order to create a favourable environment for activities in the fields of energy and environment. UNDP also supports Bosnia and Herzegovina in meeting its obligations arising from the United Nations Framework Convention on Climate Change (UNFCCC). Various projects support local development through utilization of energy potentials (use of biomass and transition to other fuels, energy efficiency and RES infrastructure projects, development of energy consumption monitoring and reporting mechanisms through vertical integration of the local, cantonal, entity and state authorities) and protection of the environment (inclusion of biodiversity in spatial planning, reduction of GHG emissions, meeting Bosnia and Herzegovina's obligations arising from multilateral agreements, development of local environmental action plans, creation of environmental funds), thereby creating opportunities for 'green jobs' and economic gains for citizens from biodiversity and natural resources.

EU (European Union), within the **EU project in the IPA cross-border programme** which promotes nature conservation, energy efficiency and renewable energy sources. Activities are focused on the organisation of workshops for public administration employees.

Potential improvements:

- Option to allocate targeted technical assistance to a specific sector or EEAPF programme during the initial negotiations and in preparation of project proposals with donors, IFIs and other agencies and institutions;
- Strengthening end-users' capacities for use of EEAPF implementation mechanisms.

Table 39 presents a matrix of recommended financial framework mechanisms for support to implementation of planned programmes.

FIN. SOURCE / FIN. METHOD	ENERGY TAX	CO_2 TAX	AIR PROTECTION TAX	ENVIRONMENTAL FEES	PUBLIC BUDGETS	IFI FUNDS	UN FUNDS	EU FUNDS	PRIVATE FINANCING
PREFERENTIAL LOANS	X	X	X	X					
GRANTS					X		X	X	
SUBSIDIES	X	X	X			X	X		
FOREIGN LOANS						X		X	
REGULR BUDGET LINES					X				
BUDGET CAPTURING	X	X	X	X	X	X			X
EEO / AM	X								X
TAX INCENTIVES					X				
ESCO / JPP					X				X
COMMERCIAL LOANS						X			

Table 39 - Potential relationships between sources and methods of financing needed for implementation of the energy efficiency policy in BiH

Table 40 presents a matrix of financing mechanisms (sources and methods of financing) planned for implementation of individual energy efficiency programmes.

ID	Programme title	Responsible authority	Financing sources	Financing methods
Programmes at the level of Bosnia and Herzegovina:				
PRG.01 BiH	Programme for energy efficiency improvements in buildings in the public services sector at the level of Bosnia and Herzegovina.	MoFTER	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)

ID	Programme title	Responsible authority	Financing sources	Financing methods
PRG.02 BiH	Programme for coordination of energy efficiency in Bosnia and Herzegovina	MoFTER	Public budgets; Technical assistance	Regular budget lines; Grants
Programmes at the level of Brčko District BiH:				
PRG.01 BD	Energy efficiency programme in the Brčko District BiH	BD Government	Public budgets; Technical assistance; Energy taxes; CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Regular budget lines; Grants; Energy efficiency obligation schemes / alternative measures; Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnership (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
Programmes at the level of the Federation BiH:				
PRG.01	Programme for establishment of the strategic, legislative and regulatory framework for energy efficiency in the Federation BiH	FMoEMI FMPP FMET FMTC	Public budgets, Technical assistance	Regular budget lines, Grants
PRG.02	Programme for energy efficiency information, professional development and education in the Federation BiH	FMoEMI FMPP FMET FMTC Cantons	Public budgets, Technical assistance	Regular budget lines, Grants
PRG.03	Programme for energy efficiency obligation schemes in the Federation BiH through electricity distributors	FMoEMI FERK	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures, Grants
PRG.04	Programme for energy efficiency obligation schemes in the Federation BiH through heating energy distributors	FMoEMI Cantons	Energy taxes; Technical assistance	Energy efficiency obligation schemes / alternative measures, Grants
PRG.05	Programme for energy efficiency improvements in the public service sector buildings in the Federation BiH	FMPP FMoEMI	CO2 tax; Air protection tax; Public budgets; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
PRG.06	Cantonal energy efficiency programmes for residential and public service sector buildings	Cantons	Energy taxes, CO2 taxes, Air protection taxes, Public budgets, International financial institutions' funds (IFIs), UN funds, EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnership (PPP); Regular budget lines; Income tax incentives (investment-based tax deductions); Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
PRG.07	Programme for energy efficiency improvements in public utility systems	FMoEMI Cantons	CO2 tax; Air protection tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Income tax incentives (investment-based tax deductions)
PRG.08	Programme for energy efficiency improvements in the industry and commercial service sector	FMoEMI Cantons	CO_2 tax; Air protection tax; International financial institutions' funds (IFIs); UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-Private Partnership (PPP); Income tax incentives (investment-based tax deductions)
PRG.09	Programme for promotion of sustainable road and urban transport in the Federation BiH	FMoEMI FMTC	CO2 tax; Air protection tax; Public budgets; Technical assistance	Preferential loans; Regular budget lines; Grants
Programmes at the level of Republic of Srpska				

ID	Programme title	Responsible authority	Financing sources	Financing methods
PRG.01	Programme of establishment of strategic, legislative and regulatory framework for energy efficiency in RS	MoIEM	Public budgets; Technical assistance	Regular budget lines; Grants
PRG.02	Programme for energy efficiency information, professional development and education in RS	MoIEM Fund	Public budgets; Technical assistance	Regular budget lines; Grants
PRG.03	Programme of energy efficiency obligation schemes in RS through electricity distributors	MoIEM RERS	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
PRG.04	Programme of energy efficiency obligation schemes in RS through heating energy distributors;	MoIEM MSPCEE	Technical assistance	Energy efficiency obligation schemes / alternative measures; Grants
PRG.05	RS programme for energy efficiency improvements in buildings in the public services sector	MSPCEE	CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
PRG.06	Programme for energy efficiency improvements in public utility systems	MoIEM MSPCEE	CO_2 tax; Air protection tax; Public budgets; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP); Regular budget lines; Budget financing with repayment of investments through reduction of future budget expenditure (budget capturing)
PRG.07	Programme for energy efficiency improvements in the industry sector and the commercial services sector	MoIEM	CO_2 tax; Air quality tax; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP)
PRG.08	Programme for promotion of sustainable road and urban transport in RS	MoIEM MTC	CO_2 tax; Air quality tax; International financial institution (IFI) funds; UN funds; EU funds	Preferential loans; Foreign loans; Commercial loans; Subsidies; ESCO; Public-private partnerships (PPP);

Table 40 - Matrix of planned financial framework mechanisms for savings in final energy consumption

5.2.2 Roadmap for improvement of the financial framework for EEAP BiH implementation

The responsible bodies will invest efforts to establish new financing sources and methods for implementation of the EEAP BiH, inclusive of EEAPF, in accordance with the Roadmap presented below and in Tables 41 and 42. Due to certain differences between individual sources and methods of financing, this Roadmap does not cover the *Amendments to the Energy Efficiency Action Plan of the Republic of Srpska until 2018.*

Table 41 shows the planned schedule of introduction of new financing sources and methods for implementation of EEAP BiH

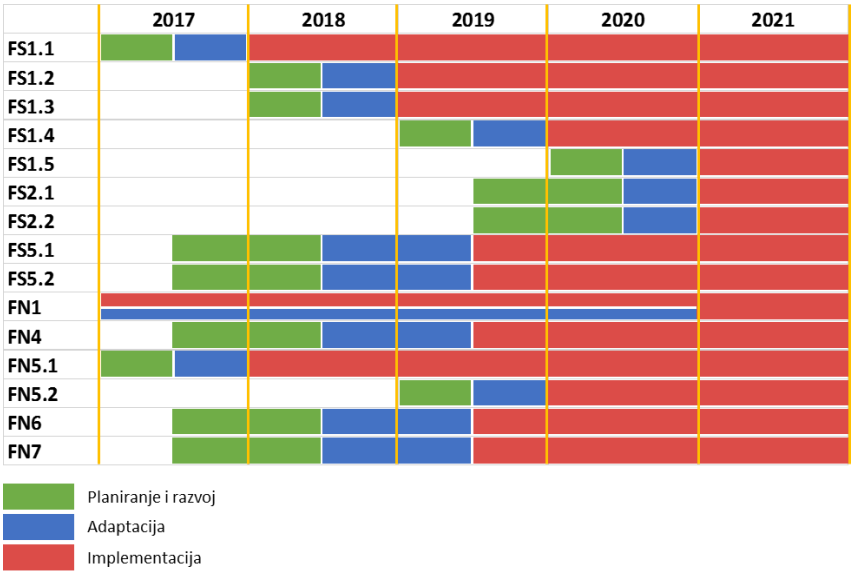

Table 41 - Planned schedule of introduction of new financial framework mechanisms

Table 42 presents an overview of the degree of coverage of individual sectors with potential EEAP implementation mechanisms. This overview shows that introduction of proposed mechanisms would cover all four final consumption sectors included in this EEAP with financial mechanisms that would ensure implementation of energy efficiency measures and achievement of EEAP objectives.

	2017	2018	2019	2020	2021
Households	FN2	FN2, FN5	FN2, FN5	FN2, FN5, FN6	FN2, FN5, FN6
Commercial sector and services	FN1, FN2, FN3	FN1, FN2, FN3	FN1, FN2, FN3, FN4	FN1, FN2, FN3, FN4, FN7	FN1, FN2, FN3, FN4, FN7
Industry	FN1, FN3 FN2	FN1, FN3 FN2	FN1, FN2, FN3	FN1, FN2, FN3, FN6, FN7	FN1, FN2, FN3, FN6, FN7
Transport	FN3	FN3	FN3	FN1, FN3	FN1, FN3

Table 42 - Overview of coverage of final energy consumption sectors with the planned financing methods

Considering the existing practice in the implementation of energy efficiency programmes in Bosnia and Herzegovina, it is apparent that some of the listed financing sources and methods are already in use and that this practice should be continued in the next period This concerns mainly mechanisms created via the entity Environmental Funds (FN1, FN2), entity ministries of spatial planning (FN2), Federal Ministry of Energy, Mining and Industry (FN1) and the Development Bank of FBiH (FN1). Existing financing methods also include foreign credit lines (FN3), which are expected to remain in use.

On the other hand, full implementation of the EEAP BiH also requires reliance on other sources and methods of financing. EEAP BiH foresees introduction of new sources and methods of financing, as presented above (Table 41 -).

In the first year, the plan is to introduce electricity consumption fees for households, in combination with support to socially vulnerable categories (FS1.1). Development and adoption are planned until the end of the year, and implementation would commence at the beginning of the following year. It is therefore necessary to develop and adopt energy efficiency obligation schemes for energy suppliers/distributors (FN5). The plan also foresees the commencement of planning and development activities related to introduction of multi-year budget planning in order to enable multi-year energy performance contracting (FS5.1) and the budget capturing mechanism (FS5.2). Development of financing methods directly dependent on FS5.1 and FS5.2 starts in parallel to this, specifically for financing from public budgets (FN4) and ESCO market and public-private partnerships (FN7). Furthermore, in the first year it is necessary to start the planning and development of tax incentive mechanisms based on investments in energy efficiency measures (FN6). With regard to domestic preferential loans, existing mechanisms need to be further developed and perfected in order to create financing opportunities for energy efficiency measures in all sectors.

In the second year it will be necessary to create an income stream for further development and introduction of mechanisms, as well as for allocation of funds to end users of programmes in the four sectors defined in this EEAP BiH. The first requirement is to proceed with the introduction of energy taxes. The plan is to create, develop and formally adopt electricity consumption fees for SMEs and industry (FS1.2) and fees for electricity generation from oil derivatives and coal (FS1.3), which will become a direct source of additional financing for obligation schemes (FN5) and alternative programmes FN1 and FN2.

In the third year, the plan is to continue with the introduction of special energy taxes.

In the fourth year, the proposition is to introduce credit lines for SMEs and ESCO markets, in combination with the expansion of previously introduced mechanisms. In addition to the legal obligation imposed on electricity suppliers/distributors, in the fourth year from the outset of introduction of EEAP BiH implementing mechanisms, the proposition is to impose mandatory energy efficiency improvements on heat distributors (in accordance with the Directive 2012/27/EU). The first proposed step is to quantify the heating savings target, followed by the decision on application of Directive 2012/27/EU on the heating supply sector and district heating systems, and adoption of legislation to provide a clear framework for legal obligations of public utility companies and heat distributors.

Credit lines for households are planned for adoption **in the fifth year**, as a compensatory mechanism for energy/carbon fees and energy efficiency obligation schemes for energy suppliers/distributors.

6. APPENDICES

6.1 Structure of expected final energy savings in 2018

6.1.1 Structure of expected final energy savings in 2018 for energy efficiency programmes under direct competence of Bosnia and Herzegovina

Measure ID	Planned energy efficiency programmes under direct competence of BiH		Expected energy savings in 2018 (PJ)		
	PRG.01 BiH	PRG.02 BiH	Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
Horizontal and cross-sectoral measures - expected final energy savings by programme					
H.1	N/a	N/a			
H.2	N/a	N/a			
H.3	N/a	N/a			
H.4	N/a	N/a			
H.5	N/a	N/a			
H.6	N/a	N/a			
H.7	N/a	N/a			
H.8	N/a	N/a			
H.9	N/a	N/a			
H.10	N/a	N/a			
H.11	N/a	N/a			
H.12	N/a	N/a			
H.13	N/a	N/a			
Energy efficiency measures in the residential sector - expected final energy savings by programme					
R1	-	-	-	-	-
R2	-	-	-	-	-
R3	-	-	-	-	-
R4	-	-	-	-	-
R5	-	-	-	-	-
		Total residential sector:	**-**	**-**	**-**
Energy efficiency measures in the public and commercial service sector - expected final energy savings by programme					
U1	0.01245	-	0.01245	-	0.01245
U2	0.01240	-	0.01240	-	0.01240
U3	-	-	-	-	-
U4	-	-	-	-	-
U5	0.00005	-	0.00005	-	0.00005
U6	-	-	**-**	**-**	**-**
U7	-	-	**-**	**-**	**-**

Measure ID	Planned energy efficiency programmes under direct competence of BiH		Expected energy savings in 2018 (PJ)		
	PRG.01 BiH	PRG.02 BiH	Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
Total public and commercial service sector:			**0.02490**	**-**	**0.02490**
Energy efficiency measures in the industry sector - expected final energy savings by programme					
I1	-	-	-	-	-
I2	-	-	-	-	-
I3	-	-	-	-	-
I4	-	-	-	-	-
Total industry sector:			-	-	-
Energy efficiency measures in the transport sector - expected final energy savings by programme					
S1	-	-	-	-	-
S2	-	-	-	-	-
Total transport sector:			-	-	-
Total under BiH competence:	***0.0249***	**-**	***0.0249***	**-**	***0.0249***

6.1.2 Structure of expected final energy savings in 2018 for energy efficiency programmes in Brčko District BiH

Measure ID	Planned energy efficiency programmes in the Brčko District BiH					Expected energy savings in 2018 (PJ)		
	PRG.01-01 BD	PRG.01-02 BD	PRG.01-03 BD	PRG.01-04.BD	PRG.01-05.BD	Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
Horizontal and cross-sectoral measures - expected final energy savings by programme								
H.1	N/a	N/a	N/a	N/a	N/a			
H.2	N/a	N/a	N/a	N/a	N/a			
H.3	N/a	N/a	N/a	N/a	N/a			
H.4	N/a	N/a	N/a	N/a	N/a			
H.5	N/a	N/a	N/a	N/a	N/a			
H.6	N/a	N/a	N/a	N/a	N/a			
H.7	N/a	N/a	N/a	N/a	N/a			
H.8	N/a	N/a	N/a	N/a	N/a			
H.9	N/a	N/a	N/a	N/a	N/a			
H.10	N/a	N/a	N/a	N/a	N/a			
H.11	N/a	N/a	N/a	N/a	N/a			
H.12	N/a	N/a	N/a	N/a	N/a			
H.13	N/a	N/a	N/a	N/a	N/a			
Energy efficiency measures in the residential sector - expected final energy savings by programme								

Measure ID	Planned energy efficiency programmes in the Brčko District BiH					Expected energy savings in 2018 (PJ)		
	PRG.01-01 BD	PRG.01-02 BD	PRG.01-03 BD	PRG.01-04.BD	PRG.01-05.BD	Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
R1	-	-	0.0101			0.0101	0.0196	0.0297
R2	-	-	0.0065			0.0065	0.0291	0.0356
R3	-	-	0.0001			0.0001	0.0002	0.0003
R4	-	-	0.0001			0.0001	0.0002	0.0003
R5			*Promotion*			-	0.0001	0.0001
Total residential sector:						**0.0168**	**0.0492**	**0.0660**
Energy efficiency measures in the public and commercial service sector - expected final energy savings by programme								
U1	-	-	0.0688	-	0.0295	0.0983	-	0.0983
U2	-	-	0.0382	-	0.0382	0.0764	-	0.0764
U3	-	-	0.0016	-	0.0038	0.0055	-	0.0055
U4	-	-	*Promotion*	-	*Promotion*	-	0.0006	0.0006
U5	-	-	0.0004	-	-	0.0004	-	0.0004
U6	-	-	-	0.0002	-	0.0002	-	0.0002
U7	-	-	-	0.0007	-	0.0007	-	0.0007
Total public and commercial service sector:						**0.1815**	**0.0006**	**0.1820**
Energy efficiency measures in the industry sector - expected final energy savings by programme								
I1	-	-	-	-	0.0005	0.0005	0.0057	0.0063
I2	-	-	-	-	*Promotion*	-	0.0003	0.0003
I3	-	-	-	-	0.0004	0.0004	0.0056	0.0060
I4	-	-	-	-	0.0010	0.0010	0.0115	0.0125
Total industry sector:						**0.0019**	**0.0231**	**0.0250**
Energy efficiency measures in the transport sector - expected final energy savings by programme								
S1	-	-	-	-	*Promotion*	-	-	-
S2	-	-	-	-	*Promotion*	-	-	-
Total transport sector:						-	-	-
Total BD:	***-***	***-***	***0.1258***	***0.0009***	***0.0734***	***0.2001***	***0.0729***	***0.2730***

6.2 Financing required to achieve expected final energy savings in 2018

6.2.1 Financing required to achieve expected final energy savings in 2018, under direct competence of Bosnia and Herzegovina

Measure ID	Planned energy efficiency programmes under direct competence of BiH		Financing required to achieve expected energy savings in 2018 (BAM)		
	PRG.01 BiH	PRG.02 BiH	For savings resulting from implemented programmes	For savings resulting from market forces	For total expected savings
Energy efficiency measures in the residential sector - financing required to achieve expected final energy savings by programme					
R1	-	-	-	-	-
R2	-	-	-	-	-
R3	-	-	-	-	-
R4	-	-	-	-	-
R5	-	-	-	-	-
Total residential sector (BAM):			**-**	**-**	**-**
Energy efficiency measures in the public and commercial service sector - financing required to achieve planned savings by programme					
U1	2,906,162	-	2,906,162	-	2,906,162
U2	591,829	-	591,829	-	591,829
U3	-	-	-	-	-
U4	-	-	-	-	-
U5	5,261	-	5,261	-	5,261
U6	-	-	-	-	-
U7	-	-	-	-	-
Total public and commercial service sector (BAM):			**3,503,252**	**-**	**3,503,252**
Energy efficiency measures in the industry sector - financing required to achieve planned savings by programme					
I1	-	-	-	-	-
I2	-	-	-	-	-
I3	-	-	-	-	-
I4	-	-	-	-	-
Total industry sector (BAM):			**-**	**-**	**-**
Energy efficiency measures in the transport sector - financing required to achieve expected savings by programme					
S1	-	-	-	-	-
S2	-	-	-	-	-
Total transport sector (BAM):			**-**	**-**	**-**
Total under the competence of BiH (BAM):	***3,503,252***	***-***	***3,503,252***	***-***	***3,503,252***

6.2.2 Financing required to achieve expected final energy savings in 2018 in Brčko District BiH

Measure ID	Planned energy efficiency programmes in the Brčko District BiH					Financing required to achieve expected energy savings in 2018 (BAM)		
	PRG.01-01 BD	PRG.01-02 BD	PRG.01-03 BD	PRG.01-04.BD	PRG.01-05.BD	For savings resulting from implemented programmes	For savings resulting from market forces	For total expected savings
Energy efficiency measures in the residential sector - financing required to achieve expected final energy savings by programme								
R1	-	-	2,544,136	-	-	2,544,136	4,955,864	7,500,000
R2	-	-	785,273	-	-	785,273	3,519,074	4,304,348
R3	-	-	47,743	-	-	47,743	115,947	163,690
R4	-	-	17,496	-	-	17,496	38,491	55,986
R5	-	-	*Promotion*	-	-	-	60,764	60,764
					Total residential sector (BAM):	**3,394,648**	**8,690,140**	**12,084,788**
Energy efficiency measures in the public and commercial service sector - financing required to achieve planned savings by programme								
U1	-	-	16,058,824	-	6,882,353	22,941,176	-	22,941,176
U2	-	-	1,824,170	-	1,824,170	3,648,339	-	3,648,339
U3	-	-	650,000	-	1,516,667	2,166,667	-	2,166,667
U4	-	-	*Promotion*	-	*Promotion*	-	128,385	128,385
U5	-	-	37,879	-	-	37,879	-	37,879
U6	-	-	-	14,164	-	14,164	-	14,164
U7	-	-	-	200,770	-	200,770	-	200,770
					Total public and commercial service sector (BAM):	**29,008,995**	**128,385**	**29,137,380**
Energy efficiency measures in the industry sector - financing required to achieve expected final energy savings by programme								
I1	-	-	-	-	103,156	103,156	1,173,397	1,276,552
I2	-	-	-	-	*Promotion*	-	58,357	58,357
I3	-	-	-	-	233,427	233,427	3,734,827	3,968,254
I4	-	-	-	-	395,244	395,244	4,565,073	4,960,317
					Total industry sector (BAM):	**731,827**	**9,531,654**	**10,263,480**
Energy efficiency measures in the transport sector - financing required to achieve expected final energy savings by programme								
S1	-	-	-	-	-	-	-	-
S2	-	-	-	-	-	-	-	-
					Total transport sector (BAM):	**-**	**-**	**-**

Measure ID	Planned energy efficiency programmes in the Brčko District BiH					Financing required to achieve expected energy savings in 2018 (BAM)		
	PRG.01-01 BD	PRG.01-02 BD	PRG.01-03 BD	PRG.01-04.BD	PRG.01-05.BD	For savings resulting from implemented programmes	For savings resulting from market forces	For total expected savings
Total BD (BAM):	-	-	*21,965,520*	*214,934*	*10,955,016*	*33,135,471*	*18,350,178*	*51,485,649*

6.3 Target indicator values required to achieve expected final energy savings in 2018

6.3.1 Target indicator values required to achieve expected final energy savings in 2018, under direct competence of Bosnia and Herzegovina

Measure ID	Planned energy efficiency programmes under direct competence of BiH		Indicator unit	Indicator value for expected energy savings in 2018		
	PRG.01	PRG.02		Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
Energy efficiency measures in the residential sector - indicator values for expected final energy savings by programme						
R1	-	-	Number of average size housing units	-	-	-
R2	-	-	Number of housing units with installed EE system	-	-	-
R3	-	-	Installed solar panels (m2)	-	-	-
R4	-	-	Number of average size housing units	-	-	-
R5	-	-	Number of purchased EE devices	-	-	-
Energy efficiency measures in the public and commercial service sector - indicator values for expected savings by programme						
U1	43,938	-	m2 of heated space with renovated exterior envelope	43,938	-	43,938
U2	12	-	Number of installed EE heating systems	12	-	12
U3	-	-	Installed solar panels (m2)	-	-	-
U4	-	-	m2 of constructed heated space	-	-	-
U5	2,646	-	m2 of heated space with improved lighting	2,646	-	2,646
U6	-	-	Installed capacity of variable-frequency motors (kW)	-	-	-
U7	-	-	Number of lights replaced with LED lights	-	-	-
Energy efficiency measures in the industry sector - indicator values for expected final energy savings by programme						
I1	-	-	Savings (PJ)	-	-	-
I2	-	-	Savings (PJ)	-	-	-
I3	-	-	Savings (PJ)	-	-	-

Measure ID	Planned energy efficiency programmes under direct competence of BiH		Indicator unit	Indicator value for expected energy savings in 2018		
	PRG.01	PRG.02		Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
I4	-	-	Savings (PJ)	-	-	-
Energy efficiency measures in the transport sector - indicator values for expected final energy savings by programme						
S1	-	-	Savings (PJ)	-	-	-
S2	-	-	Savings (PJ)	-	-	-

6.3.2 Target indicator values required to achieve expected final energy savings in 2018 in Brčko District BiH

Measure ID	Planned energy efficiency programmes in the Brčko District BiH					Indicator unit	Indicator value for expected energy savings in 2018		
	PRG.01	PRG.02	PRG.07	PRG.08	PRG.09		Actual savings from implementation of planned programmes	Actual savings resulting from market forces	Total expected savings
Energy efficiency measures in the residential sector - indicator values for expected final energy savings by programme									
R1	-	-	707	-	-	Number of average size housing units	707	1,377	2,084
R2	-	-	215	-	-	Number of housing units with installed EE system	215	963	1,177
R3	-	-	38	-	-	Installed solar panels (m2)	38	93	131
R4	-	-	18	-	-	Number of average size housing units	-	18	18
R5	-	-	Promotion	-	-	Number of purchased EE devices	-	61	61
Energy efficiency measures in the public and commercial service sector - indicator values for expected final energy savings by programme									
U1	-	-	242,790	-	104,053	m2 of heated space with renovated exterior envelope	346,843	-	346,843
U2	-	-	38	-	38	Number of installed EE heating systems	77	-	77
U3	-	-	651	-	1,518	Installed solar panels (m2)	2,169	-	2,169
U4	-	-	Promotion	-	Promotion	m2 of constructed heated space	-	1,941	1,941
U5	-	-	19,048	-	-	m2 of heated space with improved lighting	19,048	-	19,048
U6	-	-		50	-	Installed capacity of variable-frequency motors (kW)	50	-	50
U7	-	-		727	-	Number of lights replaced with LED lights	727	-	727
Energy efficiency measures in the industry sector - indicator values for expected final energy savings by programme									

I1	-	-	-	-	0.0005	Savings (PJ)	0.0005	0.0057	0.0063
I2	-	-	-	-	Promotion	Savings (PJ)	-	0.0003	0.0003
I3	-	-	-	-	0.0004	Savings (PJ)	0.0004	0.0056	0.0060
I4	-	-	-	-	0.0010	Savings (PJ)	0.0010	0.0115	0.0125
Energy efficiency measures in the transport sector - indicator values for expected final energy savings by programme									
S1	-	-	-	-	-	Savings (PJ)	-	-	-
S2	-	-	-	-	-	Savings (PJ)	-	-	-

6.4 Assumptions and input data for calculation of target indicator values for final energy consumption and required financing

6.4.1 Assumptions and input data for calculation of target indicator values for final energy consumption and required financing, under direct competence of Bosnia and Herzegovina

Measure ID	**Indicator unit**	**Indicator value for total expected savings[128]**	**Assumptions and input data for calculations[129]:** **(a) Target indicator values required to achieve expected final energy savings in 2018** **(b) Total financing required**
			Please note: *1. The stated assumptions refer to overall target values of respective indicators and total required financing for each observed measure. The figures for indicators and required financing for the contribution of a measure to the given programme, total contribution of each measure across all programmes, and the contribution of each measure to savings targets related to market forces (outside of programmes) are calculated proportionally to the relevant expected energy savings.* *Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document* ***"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period 2010-2018"*** *(hereinafter:* ***"Feasibility Assessment"****), produced in January 2016 for GIZ BiH (other than the data taken from the Survey of Energy Consumption in Households in BiH, 2015).*
Public and commercial service sector			
U.1	m2 of heated space with renovated exterior envelope	43,938	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 324 **Coefficient KWh/BAM of investment:** 1.19

[128]These values are shown in the column "Indicator values for expected energy savings in 2018/Total expected savings" in the table in Appendix 6.3

[129]Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period *2010-2018"*** produced in January 2016 for GIZ BiH (other than the data taken from the *Survey of Energy Consumption in Households in BiH, 2015*).

Measure ID	Indicator unit	Indicator value for total expected savings[128]	Assumptions and input data for calculations[129]: (a) Target indicator values required to achieve expected final energy savings in 2018 (b) Total financing required
			Total financing required: Expected savings / 1.19
U.2	Number of installed EE heating systems	12	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the required energy for heating was 567,908,913 kWh. Average heating demand per building is 372,643.64 KWh; Average required installed capacity of pellet boiler: 243.56 KW; Average required installed capacity of coal boiler: 435.84; Total annual savings from replacement of coal with pellet boilers: 276,887 KWh; Indicator value: Expected savings / 276,887 **Coefficient KWh/BAM of investment:** 5.82 Total financing required: Expected savings / 5.82
U.5	m2 of heated space with improved lighting	2,646	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogeneity of this sector (which includes replacement of various electric equipment and lighting systems), assumptions were not based on appliances and instead focused only on replacement of lighting systems* According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046.40 m2, the total investment in improvement of lighting in these buildings was 5,402,934.57 BAM, and the energy savings were 14,267,752.58 kWh, resulting in an average ratio of 5.25 KWh/m2. This measure comprises replacement of existing light sources with more energy efficient light sources which provide approximately equal amount of light (replacement of conventional bulbs with more energy efficient FLUOCOMPACT lamps; replacement of traditional fluorescent tubes with long-life HE or LUMILUX fluorescent tubes or tubes with approximately same energy consumption but significantly higher luminosity - HO or LUMILUX FQ). Indicator value: Expected savings / 5.25 **Coefficient KWh/BAM of investment:** 2.64 Total financing required: Expected savings / 2.64

6.4.2 Assumptions and input data for calculation of target indicator values for final energy consumption and required financing in Brčko District BiH

Measure ID	Indicator unit	Indicator value for total expected savings[130]	Assumptions and input data for calculations[131]: (c) Target indicator values required to achieve expected final energy savings in 2018 (d) Total financing required
			Please note:

[130]These values are shown in the column "Indicator values for expected energy savings in 2018/Total expected savings" in the table in Appendix 6.3

[131]Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period *2010-2018"*** produced in January 2016 for GIZ BiH (other than the data taken from the *Survey of Energy Consumption in Households in BiH, 2015*).

Measure ID	Indicator unit	Indicator value for total expected savings[130]	Assumptions and input data for calculations[131]: (c) Target indicator values required to achieve expected final energy savings in 2018 (d) Total financing required
			2. *The stated assumptions refer to overall target values of respective indicators and total required financing for each observed measure. The figures for indicators and required financing for the contribution of a measure to the given programme, total contribution of each measure across all programmes, and the contribution of each measure to savings targets related to market forces (outside of programmes) are calculated proportionally to the relevant expected energy savings.* 3. *Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period 2010-2018"** (hereinafter: **"Feasibility Assessment"**), produced in January 2016 for GIZ BiH (other than the data taken from the Survey of Energy Consumption in Households in BiH, 2015).*
Residential sector			
R.1	Number of average size housing units *(number of housing units with average-size heated area after implementation of measure R.1)*	2,084	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings)[132] *commissioned by UNDP BiH in the period 2013-2015, the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average of 78.71 KWh/m2.* According to the ***Survey of Energy Consumption in Households in BiH, 2015***[133] produced by the Agency for Statistics of BiH, the average floor area of a heated housing unit in the Federation BiH was 55.8 m2 Indicator value: (Anticipated savings /78.71 kWh/m2)/55.8 m2 According to the data from previously mentioned energy efficiency studies, the **coefficient KWh/BAM of investment** is 1.10 Total financing required: Expected savings / 1.10
R.2	Number of housing units with installed EE system *(number of housing units with average-size heated area after installation of heating systems with boilers using pellet)*	1,117	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Federation BiH: 721,199; Average size of heated housing unit in FBiH: 55.8 m2; Average required final energy for heating per m2 per year: 180 KWh; Total annual specific heating demand per household: 10,044 KWh; Average efficiency coefficient for solid fuel systems: 0.475; Average efficiency coefficient for pellet heating systems: 0.85; Required installed capacity of solid fuel boiler: 14.68 KW; Required installed capacity of pellet boiler: 8.21 KW; Average hours of operation on maximum regime: 1440; Indicator value: Savings /(14.68 – 8.21)/1440 **Coefficient KWh/BAM of investment:** 2.30 Total financing required: Savings / 2.30
R.3	Installed solar panels (m2)	131	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):***

[132] This number includes studies of energy efficiency in public buildings for: (a) Una-Sana Canton (205 buildings), (b) Tuzla Canton (378 buildings), (c) Central Bosnia Canton (217 buildings), (d) West Herzegovina Canton (119 buildings), (e) Livno Canton (105 buildings), and (f) Federation BiH (500 buildings).

[133] http://www.bhas.ba/tematskibilteni/PotrosnjaEnergijeFinalBS.pdf

Measure ID	Indicator unit	Indicator value for total expected savings[130]	Assumptions and input data for calculations[131]: (c) Target indicator values required to achieve expected final energy savings in 2018 (d) Total financing required
	(refers to water heating systems)		Total number of households in the Federation BiH: 721,199; Average size of heated housing unit in FBiH: 55.8 m2; Average annual energy requirement for water heating per m2 of housing: 12.5 KWh; Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Anticipated savings /0.00143 **Coefficient KWh/BAM of investment:** 0.56 Total financing required: Expected savings / 0.56
R.4	Number of average size housing units *(number of housing units with average-size heated area after implementation of measure R.1 - renovation of building envelope)*	18	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Average size of heated housing unit in Brčko District BiH: 50.3 m2; Indicator value: (Anticipated savings/78.71)/50.3 **Coefficient KWh/BAM of investment:** 1.29 Total financing required: Expected savings / 1.29 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
R.5	Number of purchased EE devices	61	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Brčko District BiH: 26,771; Percentage of households with:[134] • Refrigerator: 68.5%; • Refrigerator with freezer: 44.2%; • Freezer: 75.3%; • Washing machine: 92.1%; • Dishwasher: 14.7% Average annual savings (KWh) from replacement with new A++ or A+++ appliances: Refrigerator: 211 (366-155); Refrigerator with freezer: 480 (700-220); Freezer: 500 (700-500); Washing machine: 185 (395-210); Dishwasher: 250 (500-250); Average annual savings per average appliance: 324 KWh (= total potential savings for all appliances /total number of appliances); Indicator value: Expected savings / 324 **Coefficient KWh/BAM of investment:** 0.32 Total financing required: Expected savings / 0.32
Public and commercial service sector			
U.1	m2 of heated space with renovated exterior envelope	346,843	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 324

[134] Data from the *Survey of Energy Consumption in Households in BiH, 2015*; Agency for Statistics of BiH, 2015

Measure ID	Indicator unit	Indicator value for total expected savings[130]	Assumptions and input data for calculations[131]: (c) Target indicator values required to achieve expected final energy savings in 2018 (d) Total financing required
			Coefficient KWh/BAM of investment: 1.19 Total financing required: Expected savings / 1.19
U.2	Number of installed EE heating systems	77	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the required energy for heating was 567,908,913 kWh. Average heating demand per building is 372,643.64 KWh; Average required installed capacity of pellet boiler: 243.56 KW; Average required installed capacity of coal boiler: 435.84; Total annual savings from replacement of coal with pellet boilers: 276,887 KWh; Indicator value: Expected savings / 276,887 **Coefficient KWh/BAM of investment:** 5.82 Total financing required: Expected savings / 5.82
U.3	Installed solar panels (m2) *(refers to water heating systems)*	2,169	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Expected savings / 0.00143 **Coefficient KWh/BAM of investment:** 0.70 Total financing required: Expected savings / 0.70
U.4	m2 of constructed heated space *(refers to m2 of space after implementation of measure U.1 - renovation of building envelope)*	1271	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 78.71 **Coefficient KWh/BAM of investment:** 1.19 Total financing required: Expected savings / 1.19 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
U.5	m2 of heated space with improved lighting	19,048	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogeneity of this sector (which includes replacement of various electric equipment and lighting systems), assumptions were not based on appliances and instead focused only on replacement of lighting systems* According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046.40 m2, the total investment in improvement of lighting in these buildings was 5,402,934.57 BAM, and the energy savings were 14,267,752.58 kWh, resulting in an average ratio of 5.25 KWh/m2. This measure comprises replacement of existing light sources with more energy efficient light sources which provide approximately equal amount of light (replacement of conventional bulbs with more energy efficient FLUOCOMPACT lamps; replacement of traditional fluorescent tubes with long-life HE or LUMILUX

<table>
<tr><th>Measure ID</th><th>Indicator unit</th><th>Indicator value for total expected savings[130]</th><th>Assumptions and input data for calculations[131]:
(c) Target indicator values required to achieve expected final energy savings in 2018
(d) Total financing required</th></tr>
<tr><td></td><td></td><td></td><td>fluorescent tubes or tubes with approximately same energy consumption but significantly higher luminosity - HO or LUMILUX FQ).
Indicator value: Expected savings / 5.25
Coefficient KWh/BAM of investment: 2.64
Total financing required: Expected savings / 2.64</td></tr>
<tr><td>U.6</td><td>Installed capacity of variable-frequency motors (kW) (replacement of existing motors with new, variable-frequency motors)</td><td>50</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Average annual energy consumption of a 250 KW motor (based on 5000 hours of operation):
• Current (existing motors): 1,250,000 KWh;
• After replacement (new motors): 1,000,000 KWh;
• Savings: 250,000 KWh;
Average annual energy consumption of a 75 KW motor (based on 5000 hours of operation):
• Current (existing motors): 375,000 KWh;
• After replacement (new motors): 300,000 KWh;
• Savings: 75,000 KWh;
Average annual energy consumption of a 11 KW motor (based on 5000 hours of operation):
• Current (existing motors): 55,000 KWh;
• After replacement (new motors): 44,000 KWh;
• Savings: 11,000 KWh;
Average annual savings per motor: 1000 KWh;
Indicator value: Expected savings / 1000
Coefficient KWh/BAM of investment: 3.53
Total financing required: Expected savings / 3.53</td></tr>
<tr><td>U.7</td><td>Number of lights replaced with LED lights</td><td>727</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
According to data from UNDP BiH projects (parts of municipalities of Teslić, Odžak, Žepče, and the city of Tuzla) and MOFTER (Bosanski Petrovac municipality, as part of the EU Alter Energy project):
<table>
<tr><th>Reference data</th><th>No. Lamps (pcs)</th><th>Investment (BAM)</th><th>Savings (kWh)</th><th>Savings (%)</th><th>Spec. savings (kWh/BAM)</th></tr>
<tr><td>B. Petrovac</td><td>108</td><td>66,371.25</td><td>88,394.24</td><td>70.28%</td><td>1.332</td></tr>
<tr><td>Teslić</td><td>65</td><td>55,310.00</td><td>69,636.16</td><td>72.16%</td><td>1.259</td></tr>
<tr><td>Odžak</td><td>67</td><td>63,880.00</td><td>50,661.27</td><td>65.55%</td><td>0.793</td></tr>
<tr><td>Žepče</td><td>77</td><td>64,508.00</td><td>40,162.05</td><td>57.92%</td><td>0.623</td></tr>
<tr><td>City of Tuzla</td><td>17,900</td><td>4,589,175.94</td><td>4,833,540.74</td><td>63.76%</td><td>1.053</td></tr>
</table>
Annual savings per lamp: 279 KWh;
Average spec. savings: 1.012 KWh/BAM
Indicator value: Expected savings / 279
Coefficient KWh/BAM of investment: 3.53
Total financing required: Expected savings / 1.012</td></tr>
<tr><td colspan="4">Industry sector</td></tr>
<tr><td>I.1</td><td>Savings (PJ)</td><td>0.0063</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
</table>

Measure ID	Indicator unit	Indicator value for total expected savings[130]	Assumptions and input data for calculations[131]: (c) Target indicator values required to achieve expected final energy savings in 2018 (d) Total financing required
I.2	Savings (PJ)	0.0003	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure*
I.3	Savings (PJ)	0.0060	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure*
I.4	Savings (PJ)	0.0125	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure*

6.4.3 Assumptions and input data for calculation of target indicator values for final energy consumption and required financing in the Federation BiH

Measure ID	Indicator unit	Indicator value for total expected savings[135]	Assumptions and input data for calculations[136]: (e) Target indicator values required to achieve expected final energy savings in 2018 (f) Total financing required
			Please note: *4. The stated assumptions refer to overall target values of respective indicators and total required financing for each observed measure. The figures for indicators and required financing for the contribution of a measure to the given programme, total contribution of each measure across all programmes, and the contribution of each measure to savings targets related to market forces (outside of programmes) are calculated proportionally to the relevant expected energy savings.* *5. Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period 2010-2018"** (hereinafter: **"Feasibility Assessment"**), produced in January 2016 for GIZ BiH (other than the data taken from the Survey of Energy Consumption in Households in BiH, 2015).*
Residential sector			
R.1	Number of average size housing units	100,688	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):***

[135]These values are shown in the column "Indicator values for expected energy savings in 2018/Total expected savings" in the table in Appendix 6.3

[136]Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period *2010-2018"*** produced in January 2016 for GIZ BiH (other than the data taken from the *Survey of Energy Consumption in Households in BiH, 2015*).

Measure ID	Indicator unit	Indicator value for total expected savings[135]	Assumptions and input data for calculations[136]: (e) Target indicator values required to achieve expected final energy savings in 2018 (f) Total financing required
	(number of housing units with average-size heated area after implementation of measure R.1)		According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings)[137] *commissioned by UNDP BiH in the period 2013-2015, the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average of 78.71 KWh/m2.* According to the ***Survey of Energy Consumption in Households in BiH, 2015***[138] produced by the Agency for Statistics of BiH, the average floor area of a heated housing unit in the Federation BiH was 55.8 m2 Indicator value: (Anticipated savings /78.71 kWh/m2)/55.8 m2 According to the data from previously mentioned energy efficiency studies, the **coefficient KWh/BAM of investment** is 1.10 Total financing required: Expected savings / 1.10
R.2	Number of housing units with installed EE system *(number of housing units with average-size heated area after installation of heating systems with boilers using pellet)*	56,901	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Federation BiH: 721,199; Average size of heated housing unit in FBiH: 55.8 m2; Average required final energy for heating per m2 per year: 180 KWh; Total annual specific heating demand per household: 10,044 KWh; Average efficiency coefficient for solid fuel systems: 0.475; Average efficiency coefficient for pellet heating systems: 0.85; Required installed capacity of solid fuel boiler: 14.68 KW; Required installed capacity of pellet boiler: 8.21 KW; Average hours of operation on maximum regime: 1440; Indicator value: Savings /(14.68 – 8.21)/1440 **Coefficient KWh/BAM of investment:** 2.30 Total financing required: Savings / 2.30
R.3	Installed solar panels (m2) *(refers to water heating systems)*	7,150	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Federation BiH: 721,199; Average size of heated housing unit in FBiH: 55.8 m2; Average annual energy requirement for water heating per m2 of housing: 12.5 KWh; Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Anticipated savings /0.00143 **Coefficient KWh/BAM of investment:** 0.56 Total financing required: Expected savings / 0.56
R.4	Number of average size housing units *(number of housing units with average-size heated area after implementation*	885	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Average size of heated housing unit in FBiH: 55.8 m2; Indicator value: (Expected savings/78.71)/55.8

[137] This number includes studies of energy efficiency in public buildings for: (a) Una-Sana Canton (205 buildings), (b) Tuzla Canton (378 buildings), (c) Central Bosnia Canton (217 buildings), (d) West Herzegovina Canton (119 buildings), (e) Livno Canton (105 buildings), and (f) Federation BiH (500 buildings).

[138] http://www.bhas.ba/tematskibilteni/PotrosnjaEnergijeFinalBS.pdf

Measure ID	Indicator unit	Indicator value for total expected savings[135]	Assumptions and input data for calculations[136]: (e) Target indicator values required to achieve expected final energy savings in 2018 (f) Total financing required
	of measure R.1 - renovation of building envelope)		**Coefficient KWh/BAM of investment:** 1.29 Total financing required: Expected savings / 1.29 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
R.5	Number of purchased EE devices	3,429	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Federation BiH: 721,199; Percentage of households with:[139] • Refrigerator: 35.7% • Refrigerator with freezer: 68.2%; • Freezer: 44.4%; • Washing machine: 95.3%; • Dishwasher: 23.6% Average annual savings (KWh) from replacement with new A++ or A+++ appliances: Refrigerator: 211 (366-155); Refrigerator with freezer: 480 (700-220); Freezer: 500 (700-500); Washing machine: 185 (395-210); Dishwasher: 250 (500-250); Average annual savings per average appliance: 324 KWh (= total potential savings for all appliances /total number of appliances); Indicator value: Expected savings / 324 **Coefficient KWh/BAM of investment:** 0.32 Total financing required: Expected savings / 0.32
Public and commercial service sector			
U.1	m2 of heated space with renovated exterior envelope	5,374,864	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 324 **Coefficient KWh/BAM of investment:** 1.19 Total financing required: Expected savings / 1.19
U.2	Number of installed EE heating systems	1,223	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the required energy for heating was 567,908,913 kWh. Average heating demand per building is 372,643.64 KWh; Average required installed capacity of pellet boiler: 243.56 KW; Average required installed capacity of coal boiler: 435.84; Total annual savings from replacement of coal with pellet boilers: 276,887 KWh; Indicator value: Expected savings / 276,887 **Coefficient KWh/BAM of investment:** 5.82 Total financing required: Expected savings / 5.82

[139] Data from the *Survey of Energy Consumption in Households in BiH, 2015*; Agency for Statistics of BiH, 2015

Measure ID	Indicator unit	Indicator value for total expected savings[135]	Assumptions and input data for calculations[136]: (e) Target indicator values required to achieve expected final energy savings in 2018 (f) Total financing required
U.3	Installed solar panels (m2) *(refers to water heating systems)*	30,189	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Expected savings / 0.00143 **Coefficient KWh/BAM of investment:** 0.70 Total financing required: Expected savings / 0.70
U.4	m2 of constructed heated space *(refers to m2 of space after implementation of measure U.1 - renovation of building envelope)*	21,175	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 78.71 **Coefficient KWh/BAM of investment:** 1.19 Total financing required: Expected savings / 1.19 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
U.5	m2 of heated space with improved lighting	317,460	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogeneity of this sector (which includes replacement of various electric equipment and lighting systems), assumptions were not based on appliances and instead focused only on replacement of lighting systems* According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046.40 m2, the total investment in improvement of lighting in these buildings was 5,402,934.57 BAM, and the energy savings were 14,267,752.58 kWh, resulting in an average ratio of 5.25 KWh/m2. This measure comprises replacement of existing light sources with more energy efficient light sources which provide approximately equal amount of light (replacement of conventional bulbs with more energy efficient FLUOCOMPACT lamps; replacement of traditional fluorescent tubes with long-life HE or LUMILUX fluorescent tubes or tubes with approximately same energy consumption but significantly higher luminosity - HO or LUMILUX FQ). Indicator value: Expected savings / 5.25 **Coefficient KWh/BAM of investment:** 2.64 Total financing required: Expected savings / 2.64
U.6	Installed capacity of variable-frequency motors (kW) *(replacement of existing motors with new, variable-frequency motors)*	42,222	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Average annual energy consumption of a 250 KW motor (based on 5000 hours of operation): • Current (existing motors): 1,250,000 KWh; • After replacement (new motors): 1,000,000 KWh; • Savings: 250,000 KWh; Average annual energy consumption of a 75 KW motor (based on 5000 hours of operation): • Current (existing motors): 375,000 KWh; • After replacement (new motors): 300,000 KWh; • Savings: 75,000 KWh; Average annual energy consumption of a 11 KW motor (based on 5000 hours of operation):

<table>
<tr><th>Measure ID</th><th>Indicator unit</th><th>Indicator value for total expected savings[135]</th><th>Assumptions and input data for calculations[136]:
(e) Target indicator values required to achieve expected final energy savings in 2018
(f) Total financing required</th></tr>
<tr><td></td><td></td><td></td><td>• Current (existing motors): 55,000 KWh;
• After replacement (new motors): 44,000 KWh;
• Savings: 11,000 KWh;
Average annual savings per motor: 1000 KWh;
Indicator value: Expected savings / 1000
Coefficient KWh/BAM of investment: 3.53
Total financing required: Expected savings / 3.53</td></tr>
<tr><td>U.7</td><td>Number of lights replaced with LED lights</td><td>63,720</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
According to data from UNDP BiH projects (parts of municipalities of Teslić, Odžak, Žepče, and the city of Tuzla) and MOFTER (Bosanski Petrovac municipality, as part of the EU Alter Energy project):
<table>
<tr><th>Reference data</th><th>No. Lamps (pcs)</th><th>Investment (BAM)</th><th>Savings (kWh)</th><th>Savings (%)</th><th>Spec. savings (kWh/BAM)</th></tr>
<tr><td>B. Petrovac</td><td>108</td><td>66,371.25</td><td>88,394.24</td><td>70.28%</td><td>1.332</td></tr>
<tr><td>Teslić</td><td>65</td><td>55,310.00</td><td>69,636.16</td><td>72.16%</td><td>1.259</td></tr>
<tr><td>Odžak</td><td>67</td><td>63,880.00</td><td>50,661.27</td><td>65.55%</td><td>0.793</td></tr>
<tr><td>Žepče</td><td>77</td><td>64,508.00</td><td>40,162.05</td><td>57.92%</td><td>0.623</td></tr>
<tr><td>City of Tuzla</td><td>17,900</td><td>4,589,175.94</td><td>4,833,540.74</td><td>63.76%</td><td>1.053</td></tr>
</table>
Annual savings per lamp: 279 KWh;
Average spec. savings: 1.012 KWh/BAM
Indicator value: Expected savings / 279
Coefficient KWh/BAM of investment: 3.53
Total financing required: Expected savings / 1.012</td></tr>
<tr><td colspan="4">Industry sector</td></tr>
<tr><td>I.1</td><td>Savings (PJ)</td><td>0.6620</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.2</td><td>Savings (PJ)</td><td>0.0130</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.3</td><td>Savings (PJ)</td><td>0.0380</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.4</td><td>Savings (PJ)</td><td>0.5600</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td colspan="4">Transport sector</td></tr>
<tr><td>S.1</td><td>Savings (PJ)</td><td>0.0270</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u></td></tr>
</table>

Measure ID	Indicator unit	Indicator value for total expected savings[135]	Assumptions and input data for calculations[136]: (e) Target indicator values required to achieve expected final energy savings in 2018 (f) Total financing required
			Please note: *Due to unavailability of statistical data on the age of vehicles specifically in the public and commercial service sector, indicator value equals the expected final energy savings resulting from the measure*
S.2	Savings (PJ)	0.5190	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Due to unavailability of statistical data on the impacts of infrastructural measures of this kind on energy savings, indicator value equals the expected final energy savings resulting from the measure*

6.4.4 Assumptions and input data for calculation of target indicator values for final energy consumption and required financing in the Republic of Srpska

Measure ID	Indicator unit	Indicator value for total expected savings[140]	Assumptions and input data for calculation[141]: (g) Target indicator values required to achieve expected final energy savings in 2018 (h) Total financing required
			Please note: *6. The stated assumptions refer to overall target values of respective indicators and total required financing for each observed measure. The figures for indicators and required financing for the contribution of a measure to the given programme, total contribution of each measure across all programmes, and the contribution of each measure to savings targets related to market forces (outside of programmes) are calculated proportionally to the relevant expected energy savings.* *7. Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period 2010-2018"** (hereinafter: **"Feasibility Assessment"**), produced in January 2016 for GIZ BiH (other than the data taken from the Survey of Energy Consumption in Households in BiH, 2015).*
Residential sector			
D.1	Number of average size housing units *(number of housing units with average-size heated area after implementation of measure R.1 -*	65,235	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings)[142] *commissioned by UNDP BiH in the period 2013-2015, the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average of 78.71 KWh/m2.*

[140]These values are shown in the column "Indicator values for expected energy savings in 2018/Total expected savings" in the table in Appendix 6.3

[141]Most of the listed assumptions and input data for calculation of target indicator values for expected final energy savings in 2018, as well as for calculation of total required financing, is taken from the document **"Assessment of the feasibility of objectives of the final draft of the First Energy Efficiency Action Plan of the Federation BiH for the period *2010-2018"*** produced in January 2016 for GIZ BiH (other than the data taken from the *Survey of Energy Consumption in Households in BiH, 2015*).

[142] This number includes studies of energy efficiency in public buildings for: (a) Una-Sana Canton (205 buildings), (b) Tuzla Canton (378 buildings), (c) Central Bosnia Canton (217 buildings), (d) West Herzegovina Canton (119 buildings), (e) Livno Canton (105 buildings), and (f) Federation BiH (500 buildings).

Measure ID	Indicator unit	Indicator value for total expected savings[140]	Assumptions and input data for calculation[141]: (g) Target indicator values required to achieve expected final energy savings in 2018 (h) Total financing required
	renovation of envelope)		According to the ***Survey of Energy Consumption in Households in BiH, 2015***[143] produced by the Agency for Statistics of BiH, the average floor area of a heated housing unit in the Republic of Srpska was 42.9 m2 Indicator value: (Expected savings /78.71 kWh/m2) / 42.9 m2 According to the data from previously mentioned energy efficiency studies, the **coefficient KWh/BAM of investment** is 1.10 Total financing required: Expected savings / 1.10
D.2	Number of housing units with installed EE system *(number of housing units with average-size heated area after installation of heating systems with boilers using pellet)*	28,854	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Republic of Srpska: 413,226; Average size of heated housing unit in RS: 42.9 m2; Average required final energy for heating per m2 per year: 180 KWh; Total annual specific heating demand per household: 10,044 KWh; Average efficiency coefficient for solid fuel systems: 0.475; Average efficiency coefficient for pellet heating systems: 0.85; Required installed capacity of solid fuel boiler: 14.68 KW; Required installed capacity of pellet boiler: 8.21 KW; Average hours of operation on maximum regime: 1440; Indicator value: Savings /(14.68 – 8.21)/1440 **Coefficient KWh/BAM of investment:** 2.30 Total financing required: Expected savings / 2.30
D.3	Installed solar panels (m2) *(refers to water heating systems)*	9,533	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Republic of Srpska: 413,226; Average size of heated housing unit in RS: 42.9 m2; Average annual energy requirement for water heating per m2 of housing: 12.5 KWh; Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Expected savings / 0.00143 **Coefficient KWh/BAM of investment:** 0.56 Total financing required: Expected savings / 0.56
D.4	Number of average size housing units *(number of housing units with average-size heated area after implementation of measure R.1 - renovation of building envelope)*	1,316	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average of 78.71 KWh/m2. Average size of heated housing unit in RS: 42.9 m2; Indicator value: (Expected savings /78.71)/42.9 **Coefficient KWh/BAM of investment:** 1.29 Total financing required: Expected savings / 1.29 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
R.5	Number of purchased EE devices	7077	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Total number of households in the Republic of Srpska: 413,226;

[143] http://www.bhas.ba/tematskibilteni/PotrosnjaEnergijeFinalBS.pdf

Measure ID	Indicator unit	Indicator value for total expected savings[140]	Assumptions and input data for calculation[141]: (g) Target indicator values required to achieve expected final energy savings in 2018 (h) Total financing required
			Percentage of households with[144]: • Refrigerator: 67.7% • Refrigerator with freezer: 36.7% • Freezer: 75.2% • Washing machine: 89.0% • Dishwasher: 13.0% Average annual savings (KWh) from replacement with new A++ or A+++ appliances: Refrigerator: 211 (366-155); Refrigerator with freezer: 480 (700-220); Freezer: 500 (700-500); Washing machine: 185 (395-210); Dishwasher: 250 (500-250); Average annual savings per average appliance: 314 KWh (= total potential savings for all appliances /total number of appliances); Indicator value: Expected savings / 314 **Coefficient KWh/BAM of investment:** 0.32 Total financing required: Expected savings / 0.32
Public and commercial service sector			
U.1	m2 of heated space with renovated exterior envelope	2,410,395	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average of 78.71 KWh/m2. Indicator value: Expected savings / 324 **Coefficient KWh/BAM of investment:** 1.19 Total financing required: Expected savings / 1.19
U.2	Number of installed EE heating systems	548	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the required energy for heating was 567,908,913 kWh. Average heating demand per building is 372,643.64 KWh; Average required installed capacity of pellet boiler: 243.56 KW; Average required installed capacity of coal boiler: 435.84; Total annual savings from replacement of coal with pellet boilers: 276,887 KWh; Indicator value: Expected savings / 276,887 **Coefficient KWh/BAM of investment:** 5.82 Total financing required: Expected savings / 5.82
U.3	Installed solar panels (m2) *(refers to water heating systems)*	13,506	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Required solar panel area per KWh per year: 0.00143 m2; Indicator value: Expected savings / 0.00143 **Coefficient KWh/BAM of investment:** 0.70 Total financing required: Expected savings / 0.70
U.4	m2 of constructed heated space	14,117	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):***

[144] Data from the *Survey of Energy Consumption in Households in BiH, 2015*; Agency for Statistics of BiH, 2015

Measure ID	Indicator unit	Indicator value for total expected savings[140]	Assumptions and input data for calculation[141]: (g) Target indicator values required to achieve expected final energy savings in 2018 (h) Total financing required
	(refers to m2 of space after measure U.1 - renovation of building envelope)		According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046 m2, the total investment in renovation of exterior envelopes of these buildings was 165,919,968 BAM, and the energy savings were 213,947,277 kWh, resulting in an average ratio of 78.71 KWh/m2. Indicator value: Expected savings / 78.71 **Coefficient KWh/BAM of investment:** 1.19 Total financing required: Expected savings / 1.19 *Please note: These indicators and required financing refer only to energy efficiency improvements in new buildings in relation to the average state of the existing building stock*
U.5	m2 of heated space with improved lighting	158,730	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** *Please note:* *Due to the heterogeneity of this sector (which includes replacement of various electric equipment and the lighting system), assumptions were not based on appliances and instead focused only on replacement of lighting systems* According to data from **6 studies of energy efficiency in public buildings** (which included a total of 1524 buildings), the total heated area of these buildings was 2,718,046.40 m2, the total investment in improvement of lighting in these buildings was 5,402,934.57 BAM, and the energy savings were 14,267,752.58 kWh, resulting in an average ratio of 5.25 KWh/m2. This measure comprises replacement of existing light sources with more energy efficient light sources which provide approximately equal amount of light (replacement of conventional bulbs with more energy efficient FLUOCOMPACT lamps; replacement of traditional fluorescent tubes with long-life HE or LUMILUX fluorescent tubes or tubes with approximately same energy consumption but significantly higher luminosity - HO or LUMILUX FQ). Indicator value: Expected savings / 5.25 **Coefficient KWh/BAM of investment:** 2.64 Total financing required: Expected savings / 2.64
U.6	Installed capacity of variable-frequency motors (kW) *(replacement of existing motors with new, variable-frequency motors)*	15,278	***Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):*** Average annual energy consumption of a 250 KW motor (based on 5000 hours of operation): • Current (existing motors): 1,250,000 KWh; • After replacement (new motors): 1,000,000 KWh; • Savings: 250,000 KWh; Average annual energy consumption of a 75 KW motor (based on 5000 hours of operation): • Current (existing motors): 375,000 KWh; • After replacement (new motors): 300,000 KWh; • Savings: 75,000 KWh; Average annual energy consumption of a 11 KW motor (based on 5000 hours of operation): • Current (existing motors): 55,000 KWh; • After replacement (new motors): 44,000 KWh; • Savings: 11,000 KWh; Average annual savings per motor: 1000 KWh; Indicator value: Expected savings / 1000 **Coefficient KWh/BAM of investment:** 3.53 Total financing required: Expected savings / 3.53

<table>
<tr><th>Measure ID</th><th>Indicator unit</th><th>Indicator value for total expected savings[140]</th><th>Assumptions and input data for calculation[141]:
(g) Target indicator values required to achieve expected final energy savings in 2018
(h) Total financing required</th></tr>
<tr><td>U.7</td><td>Number of lights replaced with LED lights</td><td>40,820</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
According to data from UNDP BiH projects (parts of municipalities of Teslić, Odžak, Žepče, and the city of Tuzla) and MOFTER (Bosanski Petrovac municipality in the EU Alter Energy project):
<table>
<tr><th>Reference data</th><th>No. Lamps (pcs)</th><th>Investment (BAM)</th><th>Savings (kWh)</th><th>Savings (%)</th><th>Spec. savings (kWh/BAM)</th></tr>
<tr><td>B. Petrovac</td><td>108</td><td>66,371.25</td><td>88,394.24</td><td>70.28%</td><td>1.332</td></tr>
<tr><td>Teslić</td><td>65</td><td>55,310.00</td><td>69,636.16</td><td>72.16%</td><td>1.259</td></tr>
<tr><td>Odžak</td><td>67</td><td>63,880.00</td><td>50,661.27</td><td>65.55%</td><td>0.793</td></tr>
<tr><td>Žepče</td><td>77</td><td>64,508.00</td><td>40,162.05</td><td>57.92%</td><td>0.623</td></tr>
<tr><td>City of Tuzla</td><td>17,900</td><td>4,589,175.94</td><td>4,833,540.74</td><td>63.76%</td><td>1.053</td></tr>
</table>
Average annual savings per lamp: 279 KWh;
Average spec. savings: 1.012 KWh/BAM
Indicator value: Expected savings / 279
Coefficient KWh/BAM of investment: 3.53
Total financing required: Expected savings / 1.012</td></tr>
<tr><td colspan="4">Industry sector</td></tr>
<tr><td>I.1</td><td>Savings (PJ)</td><td>0.2970</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.2</td><td>Savings (PJ)</td><td>0.0060</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.3</td><td>Savings (PJ)</td><td>0.0170</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>I.4</td><td>Savings (PJ)</td><td>0.2510</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to the heterogenous nature of industrial companies, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td colspan="4">Transport sector</td></tr>
<tr><td>S.1</td><td>Savings (PJ)</td><td>0.0120</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u>
Please note:
Due to unavailability of statistical data on the age of vehicles specifically in the public and commercial service sector, indicator value equals the expected final energy savings resulting from the measure</td></tr>
<tr><td>S.2</td><td>Savings (PJ)</td><td>0.2320</td><td><u>Assumptions used in calculation of indicators and required financing (used in the Feasibility Assessment):</u></td></tr>
</table>

Measure ID	Indicator unit	Indicator value for total expected savings[140]	Assumptions and input data for calculation[141]: (g) Target indicator values required to achieve expected final energy savings in 2018 (h) Total financing required
			Due to unavailability of statistical data on the impacts of infrastructural measures of this kind on energy savings, indicator value equals the expected final energy savings resulting from the measure

7. ENTITY ENERGY EFFICIENCY ACTION PLANS INCLUDED IN THE EEAP BiH

7.1 Energy Efficiency Action Plan of the Federation of Bosnia and Herzegovina 2016-2018 (EEAPF 2016-2018);

7.2 Amendments to the Energy Efficiency Action Plan of the Republic of Srpska for the period to 2018 (Amendments to EEAP RS 2018)