

Smarter Stoves Partnership

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Assessment of Financing Options for Replacement of Inefficient Household Heating Devices in the Western Balkans

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Executive Summary

WB6 countries differ in the quality of their market and the support frameworks, including the primary types of energy within an economy. Renewable energy and energy efficiency are both in their infancy in the region, and air pollution is one of the region's major environmental issues, with PM2.5 levels two to three times higher than the World Health Organisation's maximum guidelines.

Domestic and international (bilateral, multilateral) efforts have been focused primarily on the public sector: improvement of policy framework, state-owned power plants, energy sector regulators, district heating companies, public buildings, and in recent years setting the policy framework for multi-apartment buildings. **Individual households, and especially vulnerable consumers living in individual households, have had less attention drawn.** However, impact of energy consumption (primarily in the form of biomass-based heating) of this part of energy sector is significant, both in terms of significant energy losses and higher costs of living, and in terms of air pollution it causes, leading to significant number of premature deaths in the region and higher health-related costs.

Improving energy performance of individual households, primarily through improvement of the heating, is one of the keys in improving overall energy sustainability of the WB6 region, reducing the costs in the energy sector, significantly improving the health of the population, and decreasing health-related costs.

Only 10% of households in the region are connected to district heating, making the rest of 90% of the households in Western Balkans the single largest heating consumer group in the region. There are 5.3 million dwellings with heating in use in WB6, of which 3.3 million (61%) in stand-alone houses and 2.1 million (39%) in multi-apartment buildings (MABs). Heating (space heating, water heating, cooking) makes up 84.05% of total energy consumption in WB6 households. In addition to the widespread use of coal, renewables and wastes (primarily biomass) are the most important heating source in WB6, with the share of 49.7% of the energy required for heating. Up to 50% of biomass used in households in WB6 is unregistered in the official consumption. Most of these households that use decentralised heating systems are using (inefficient) heating systems, such as stoves, ovens and heat only boilers (66.3%). There are over 1.8 million stoves and over 1.7 million heat-only boilers in heating use in WB6 countries' dwellings.

Inefficient heating devices are the primary source of PM2.5 emissions. The total number of premature deaths in the region attributable to PM2.5 emissions from WB6 households is estimated at 24,756 premature annual deaths; total annual costs of inefficient and inadequate household heating in WB6 are estimated at 1.17 billion €. The investment needed for the replacement of inefficient heating devices is estimated at 1.4 billion € at lower end, to 2.4 billion € at upper end.

High rates of energy poverty in the region prove that market mechanisms (retail finances) are not sufficient to improve overall energy efficiency. Financial schemes in the sector, focused on the needs of the most vulnerable groups, need to be devised and implemented. Only two national-level programmes for replacement of inefficient heating devices in households exist currently in WB6 (North Macedonia, Serbia), reaching approximately 22,000 households. None of the national programs targets vulnerable groups. Most of the public financing efforts are performed through local self-government units (cities and municipalities), but they often lack resources to tackle the issue on their own. With the current potential funds available in the public sector, it would take WB6 almost 40 years to replace all of its inefficient heating devices in households.

Limited number of banks provide financing for household energy efficiency without an incentive. The only blended financing mechanisms on the market are supported by EBRD and Kfw, reimbursing up to 20% of the investment. Retail financing, blended or not, does not target vulnerable groups, nor does it make access to finance easier for these groups. Apart from blended schemes by EBRD and Kfw, development assistance institutions do not provide funding for the replacement of inefficient household heating devices, with the single exception being Millennium Kosovo* Foundation, providing 100% subsidies to vulnerable groups.

Current financial schemes in the region are not sufficient to eliminate the problem on their own. Existing public financial schemes need to be improved, their scope widened, their targets more focused, and their funds more accessible. The same goes for retail financing schemes, but these will most likely be market driven. Even if that is the case, banks can use some incentive, and development assistance institutions need to assist local authorities in providing that incentive.

New financing schemes need to be introduced, with more focus on citizen activism, transparency and participation in decision making. Solutions must encompass all important aspects of the actions. Proposals for new schemes have been offered, with the basic outline for each proposed scheme.

1. The current status of Energy Consumption and Energy Efficiency in Individual Households in Western Balkans

The energy sector in the WB6 is at a turning point: transition from state-controlled sector to free competitive markets, as well as transition towards decarbonisation. This transition is in line with WB6 commitments to implement EU energy regulatory framework - participation in the Energy Community Treaty, which intends to extend EU internal energy market laws to WB6 and beyond, offers a clear policy framework, but the path to full implementation and improvement of regulatory framework in WB6 is still challenging.

WB6 countries, similar to other transition countries in the EU, have been characterized by low energy productivity. Even though some progress has been made in the recent decade, the gap is still moderate compared to transition countries in the EU, and energy productivity remains around half of the EU average. The rate of progress varies among WB6 countries, with Montenegro and North Macedonia improving fastest, Serbia and Kosovo* matching average EU progress, Albania moderately lagging behind, while Bosnia and Herzegovina shows no significant improvement.¹ Energy consumption has shifted from being dominated by industries, to the services and residential sectors. However, even with this shift and improvement in energy intensity of WB6, it is still almost three times higher than in EU member states.²

The energy sector in the WB6 is outlined by limited market mechanisms, low private sector participation, deteriorated infrastructure, high share of fossil fuels in the supply mix, limited adoption of renewable energy sources, lacking energy efficiency and productivity, high levels of energy subsidies, and high rates of energy poverty. Even though the energy consumption per capita is significantly lower than in EU (at 50% of EU values), future economic development will lead to the increase in per capita consumption, putting additional pressure on the already heavily strained energy sector, which could in turn lead to further negative impacts on the quality of life in the region. This trend makes the decarbonisation process in the region a top priority, as the increase in environmentally unfriendly energy production could have devastating effects on the environment and health of the region's population.

Most countries in the region heavily rely on low-grade lignite coal in power generation (with 8 out of 10 most polluting power plants in Europe located in the region), which negatively affects air quality, leading to higher health costs and shorter life expectancy. Contributing to pollution is also the transport sector, where aged vehicle fleet contributes to air pollution.

All these characteristics of the energy sector in WB6 have led to negative impact on national economies (higher costs, lower productivity, etc.), population health, wellbeing and quality of life.

¹ Investing in Clean Energy in the Western Balkans, WBIF, 2019.

² Western Balkans: Directions for the Energy Sector, World Bank, 2018.

1.1. Overview of Energy Sector in Western Balkans 6

1.1.1. Regulatory Framework, Trends and Developments

The WB6 are members of the Energy Community, which requires the translation and implementation of a vast body of energy-related directives and regulations, including three related to Energy Efficiency and one to Renewable Energy. In addition, two recommendations on Climate Action are in place.

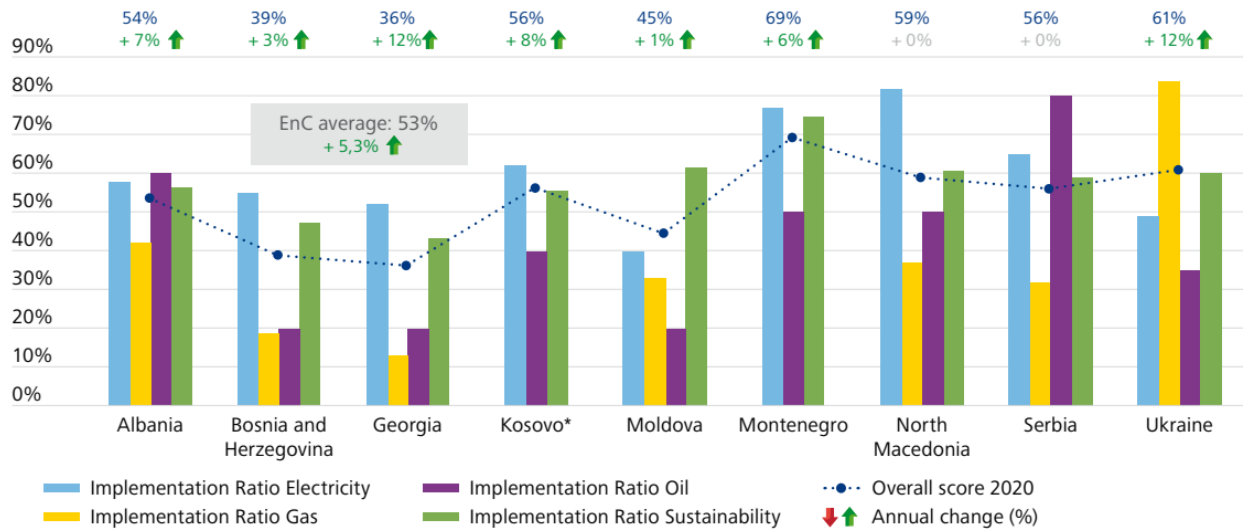
In 2019 the EU overhauled its energy policy framework to help us move away from fossil fuels towards cleaner energy - and, more specifically, to deliver on the EU's Paris Agreement commitments for reducing greenhouse gas emissions. The agreement on this new energy rulebook – called the *Clean energy for all Europeans package* – marked a significant step towards implementing the energy union strategy, published in 2015³. The acquis on Renewable Energy and Energy Efficiency consists of Directive 2009/28/EC on the promotion of the use of energy from renewable sources, the Directive on Energy Efficiency (EED-2012/27/EU), the Directive on Energy Performance of Buildings (EPBD-2010/31/EU), as well as the Regulation on Energy Efficient Products Labelling (REEPL). These regulations set the binding national targets for the use of renewable energy, and seek to reduce energy consumption, while implementing measures to improve efforts to use energy more efficiently at all stages of the energy chain.

Even though the transposition of this regulatory framework is largely completed in WB6, implementation still lacks behind. The Energy Community has assessed implementation status in both Renewable Energy and Energy Efficiency mostly as moderately advanced, except in Montenegro where implementation in both areas has been deemed as well advanced. National Renewable Energy Action Plans and national Energy Efficiency Action Plans are in place in all the Western Balkans, but few are on track to reach their set targets in full.⁴ As in 2019, the report underscores that all Contracting Parties which have coal in their energy mix are struggling to comply with the emission ceilings established under their National Emission Reduction Plans (NERPs) for at least one of the three pollutants (nitrogen oxides, sulphur dioxide and dust) covered by the Large Combustion Plants Directive. Only Montenegro has revised their legislation in line with the amending Environmental Impact Assessment (EIA) Directive 2014/52/EU, which introduces better quality control of EIA reports and decisions and legally binding timeframes and penalties, by the 1 January 2019 deadline.

³ https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en

⁴ Annual Implementation Report 2020, Energy Community Secretariat, 2020

Figure 1: Overview of Implementation Performance by Contracting Parties in the Energy Community, 2020



Source: Energy Community Secretariat, Annual Implementation Report 2020

Even though legislation is in place, WB6 countries fail to implement it. Kosovo* has failed to harmonize the directives relating to large combustion plants, whereas Serbia has only recently adopted the NERP. The process itself has been criticized for violating environmental legislation, as the environmental assessment was not undertaken in accordance with the Strategic Environmental Assessment Directive and Serbian legislation⁵. There is also a great concern, expressed in the 2020 Energy Community Annual Implementation Report, that Serbia lacks the adequate institutional support for monitoring and enforcing the NERP.

Decarbonisation initiatives are connected with the process of developing National Energy and Climate Plans (NECPs). Despite the fact that the NECPs are not legally obligatory, all WB6 countries plan to prepare them in accordance with the Energy Secretariat's instructions. North Macedonia is considered to lead the energy transition, with its 2040 Energy Strategy aiming to phase out coal by 2030, making it the first country in the Western Balkans to do so. In addition, the country is the first in the region to have an official NECP draft submitted and reviewed⁶. According to the review, North Macedonia still has to improve their coal phase out action plan and implementation. The plan is currently pending its final draft and Secretariat's assessment. In other WB6 countries, the process of developing NECPs has just started, or has not started at all⁷.

⁵ <https://caneurope.org/energy-transition-western-balkans-2020-missed-opportunities/>

⁶ <https://www.energy-community.org/news/Energy-Community-News/2020/11/24.html>

⁷ <https://www.energy-community.org/regionalinitiatives/NECP.html>

Table 1: Overview of recent regulatory framework development in WB6

Sector / Country	Albania	Bosnia and Herzegovina	Kosovo*	North Macedonia	Montenegro	Serbia
Electricity	<ul style="list-style-type: none"> Albanian Parliament adopted amendments to the Power Sector Law of 2015, which improve its compliance with the electricity acquis (May 2020) Government of Albania adopts a decision to establish a power exchange, with day-ahead and intraday markets (May 2019) 	<ul style="list-style-type: none"> Republika Srpska submitted a new draft Electricity Law for adoption by the entity Parliament. The Law transposes unbundling provisions in compliance with the Third Package (July 2019) SERC adopted rules on the Connection Network Codes implementing conditions for derogations and exemptions for emerging technologies (February 2019) The regulator adopts Rules on wholesale electricity market integrity and transparency (May 2020) 	<ul style="list-style-type: none"> The regulator amended a Guideline on liberalisation of the electricity market in Kosovo* in order to prolong regulation of supply prices (March 2019) The transmission system operator of Kosovo* was certified by the regulator (February 2019) A MoU on day-ahead market coupling between the transmission system operators and national regulatory authorities of Albania and Kosovo* was signed (August 2018) The regulator adopts Rules on wholesale electricity market integrity and 	<ul style="list-style-type: none"> Government's decree on operation of the organized market operator, including the necessary technical, staffing and financial conditions, was adopted (October 2019) The Macedonian Electricity Market Operator (MEMO), established in October 2018, obtained the license and became operational (October 2019) The retail market is fully liberalized, following adoption of the necessary implementing acts of the new Energy Law that grant the eligibility right to all customers, repealing the possibility to deny any customer the 	<ul style="list-style-type: none"> The Government adopted two Decrees ensuring transposition of Connection Network Codes (Regulation (EU) 2016/1388 and Regulation (EU) 2016/1447) (May 2019) 	<ul style="list-style-type: none"> AERS adopts Rules on publication of key market data (July 2019) The Government adopts amendments to the Rules for vulnerable customer in energy sector (May 2019) A project for market coupling of Bulgaria, Croatia and Serbia was initiated (February 2019)

			transparency (June 2020)	right to choose their supplier (July 2019)		
Gas	<ul style="list-style-type: none"> • With its Decision No. 97, Energy Regulatory Authority approves the TAP network code (June 2020) • With its Decision No 65, the national regulatory authority approves the ALBGAZ network code (April 2020) • Council of Ministers of the Republic of Albania adopted the Natural Gas Market Model (October 2018) 	<ul style="list-style-type: none"> • Republika Srpska regulator adopted the Rulebook on supplier switching, defining the rights and obligations of different entities (April 2019) • Republika Srpska successfully transposed the unbundling and certification requirements in line with the gas acquis on its territory by the adoption of a primary energy law and a Rulebook on certification (March 2019) 	<ul style="list-style-type: none"> • The feasibility study for ALKOGAP was finalized. This interconnector with Albania is the most advanced PEI project that could allow gas to reach Kosovo* (December 2018) 	<ul style="list-style-type: none"> • Energy Regulatory Commission adopted Supply Rules for Natural Gas and Rulebook on granting status of Closed Distribution System for Natural Gas and Combined Operator for Transmission and Distribution of Natural Gas (March 2019) 	<ul style="list-style-type: none"> • Energy Regulatory Agency adopts the General conditions for gas supply (January 2020) 	<ul style="list-style-type: none"> • The government adopts Preventive Action Plan for Security of Gas Supply and Contingency Plan for ensuring the Safety of Natural Gas supply (December 2018) • Serbian Parliament approved the deletion of the destination clause, thus removing a barrier to energy competition and trade in the region (September 2018)
Oil	-	-	<ul style="list-style-type: none"> • Government of Kosovo* adopts Administrative Instruction (MTI) on the Control and Quality of Petroleum Derived Liquid Fuels (November 2020) 	-		<ul style="list-style-type: none"> • Serbia's new Rulebook on technical and other requirements for liquid fuels of petroleum origin enters into force. (December 2020) • Decree on Defining the Programme of Measures when the

						Energy Security of Supply is Endangered entered into force (September 2019)
Renewable Energy	<ul style="list-style-type: none"> Albania successfully completes the first-ever renewable energy support auction in the Energy Community (November 2018) 	-	<ul style="list-style-type: none"> The Ministry of Trade and Industry finalised the draft Law on Trade in Petroleum Products and Renewable Fuels and the Administrative Instruction on Biofuels (June 2018) 	-	<ul style="list-style-type: none"> With its decree to revise incentive fee applied to end-customers to compensate for the cost of the promotion of electricity from renewable sources, the Government set the incentive for 2019 at a value of 0,9439 c€/kWh. This doubles the 2018 value (January 2019) 	<ul style="list-style-type: none"> Serbian Parliament ratifies a new Law on the Use of Renewable Energy Sources (May 2021)
Environment	<ul style="list-style-type: none"> Decision of the Council of Ministers “On the quality of certain liquid fuels used for thermal, civil, industrial and sea transport” was adopted, transposing the relevant provisions of the Sulphur in Fuels Directive (June 2019) 	-	<ul style="list-style-type: none"> An Administrative Instruction (MTI) on the technical requirements for import, storage, wholesale, and retail sale of petroleum fuels and cleaning of tanks was adopted (July 2019) The revised NERP was adopted by the 	<ul style="list-style-type: none"> North Macedonia complies with its reporting obligations on pollutants under the scope of the Large Combustion Plants Directive by submitting the relevant information to the European 	<ul style="list-style-type: none"> Fourteen environmental impact assessments were completed for different projects: seven for energy infrastructure, three for surface storage of natural gas, three for hydro power plants and one for a wind park (October 2019) 	<ul style="list-style-type: none"> Government of Serbia adopted the National Emission Reduction Plan (January 2020)

			Government of Kosovo* (May 2018)	Environment Agency (April 2019)		
Energy Efficiency	<ul style="list-style-type: none"> Albanian parliament amends the Law on energy efficiency and sets mandatory targets for the public, private sector, and large consumers (February 2021) The government adopted two decisions with procedures for the energy performance certification of buildings in Albania, including registration, verification and supervision of EPCs (November 2020) 	<ul style="list-style-type: none"> Rulebook on minimum requirements for energy performance of buildings was adopted in Federation of Bosnia and Herzegovina (November 2019) At the level of the state of Bosnia and Herzegovina, a decision on the establishment of an energy management system and an information system on energy efficiency was adopted by the Council for Ministers (June 2019) 	<ul style="list-style-type: none"> The institutional framework was strengthened with the establishment of a new energy efficiency fund as an independent entity. (January 2019) The Ministry adopts three technical regulations to implement the Law on Energy Performance of Building (December 2018) Law on Energy Efficiency transposing Directive 2012/27/EU on energy efficiency was adopted (November 2018) 	<ul style="list-style-type: none"> The Parliament of North Macedonia adopts a comprehensive Law on Energy Efficiency, transposing the EU Energy Efficiency Directive, Energy Performance of Buildings Directive, Regulation on Labelling of energy related products, and Directive on Eco-design of energy related products (February 2020) 	<ul style="list-style-type: none"> The Law on Amendments to the Law on Efficient Use of Energy, adopted by the Parliament of Montenegro in April 2019, enters into force (May 2019) 	<ul style="list-style-type: none"> The state financing for energy efficiency has been improved and extended with the adoption of a new energy efficiency fee under the general Law on Fees for the Use of Public Goods (December 2018)
Climate	<ul style="list-style-type: none"> The Albanian Parliament approves a new Law on Climate Change (December 2020) 	<ul style="list-style-type: none"> Bosnia and Herzegovina officially launched a national working group to work on its NECP (February 2019) 	<ul style="list-style-type: none"> The Administrative Instruction on capture and deposition of carbon dioxide in suitable geological formations was approved by the 	<p>North Macedonia officially launched a national working group to work on the integrated National Energy and Climate Plans (NECPs) (March 2019)</p>	<ul style="list-style-type: none"> Government of Montenegro adopted the Law on Protection from the Negative Impact of Climate Change (October 2019) 	<ul style="list-style-type: none"> The National Assembly of Serbia adopted the Law on Climate Change, laying the foundation for the establishment of a system for limiting greenhouse

			Government of Kosovo* (December 2018)		<ul style="list-style-type: none">• A national working group to work on the NECPs was officially set up (November 2018)	gas emissions (March 2021)
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Source: <https://www.energy-community.org/implementation/> , accessed July 2021

Albania Key Energy Sector Developments⁸:

- The players on the electricity market are all state-owned, with the exception of traders and a number of independent hydropower producers.
- Excessive public service responsibilities in the wholesale market restrict the development of competition.
- Albania submitted its NREAP. With a share of 34.86% of renewable energy in its energy mix in 2018, Albania is slightly below the set targets of 35.6% for 2017 - 2018.
- Albania's renewable energy support scheme is based on administratively determined feed-in tariffs and contracts for difference, which have yet to be implemented upon the formation of a day ahead market, as required by law.
- Albania has held two solar PV auctions so far. Power purchase agreements are yet to be signed for those auctions.
- Renewable energy producers in Albania have priority access to the grid.
- Provisions related to the sustainability of biofuels are still not transposed, and the legal framework in Albania remains completely non-compliant with Directive 2009/28/EC.
- The 2016 Law on Energy Performance of Buildings remains unimplementable, since two key by-laws (on establishing minimal energy performance criteria and building certification) have yet to be adopted.
- There is no financing framework (fund) for energy efficiency.
- Several international programmes (EU, EBRD/ GEFF, GGF, KfW) support energy efficiency improvements, especially in the area of improving energy efficiency of buildings.
- There are no district heating or cooling systems in Albania.
- The administration's ability to implement nature protection regulations is limited by a lack of appropriate capacities and adequate funding tools.
- Albania submitted draft chapters of the National Energy and Climate Plan (NECP) to the Energy Community Secretariat for informal review in early June 2020.

Bosnia and Herzegovina Key Energy Sector Developments⁹:

- The wholesale electricity market is deregulated, except in the Republika Srpska, where electricity generation prices are still regulated. The establishment of a day-ahead market is subject to new laws being passed at the state level.
- The retail electricity market is generally open, and universal service supply applies only to small consumers and households. Market dominance of the incumbent power companies, in their respective regions, still hinders the development of competition.
- There are two parallel gas markets in Bosnia and Herzegovina. The gas market in Republika Srpska is deregulated, although there is no virtual trading point. The market is restricted in the Federation. Customers in the Federation entity still remain captive. Only a tiny fraction of the retail market in Republika Srpska is supplied under regulated tariffs.
- The NEEAP for 2019-2021 period is still not adopted.

⁸ <https://www.energy-community.org/implementation/Albania.html>

⁹ https://www.energy-community.org/implementation/Bosnia_Herzegovina.html

- Long-term building renovation strategies, as well as essential amendments to primary laws, have been developed at the state and entity levels (currently only adopted in Republika Srpska). With the adoption of rulebooks for energy performance requirements of buildings and regular inspections of heating and air conditioning systems in November 2019, there is an improvement in policy framework in the Federation of Bosnia and Herzegovina.
- Each entity has established an energy efficiency and environmental fund, which includes implementation monitoring and reporting on savings.
- In 2018, Bosnia and Herzegovina had 32 district heating systems, which accounted for around 8% of total heat demand. Local self-governments control them, and the majority charge lump sum per square meter of heated area (instead of accurate consumption-based billing).
- Modernization of district heating systems is underway, including several EBRD-supported biomass-based district heating projects.
- Bosnia and Herzegovina still has to establish the system for collecting and processing GHG emission data, as well as quality assurance and input data control.
- Bosnia and Herzegovina's NECP is currently being drafted. There has been no submission of a draft.

Kosovo* Key Energy Sector Developments¹⁰:

- The wholesale electricity market has been deregulated, but no balancing market has been formed.
- The retail electricity sector is still heavily regulated. On the open market, only industrial consumers with 220kV and 110kV connections are supplied.
- Kosovo* does not have a gas network, no gas market, as well as no market rules in the gas sector.
- Kosovo* has submitted its NREAP and recorded a 24,9% share of electricity from renewable sources in 2018, putting it back on track to meet its 25% objective in 2020.
- The renewable energy support scheme is presently based on administratively defined feed-in tariffs. A market-based support control scheme is being developed. Renewable energy producers that have been accepted into the scheme, are permitted to sell their power output to the market operator.
- Energy Community Secretariat approved (October 2019) the National Energy Efficiency Action Plan (NEEAP) for 2019-2021 period, which defines the implementing policy measures. However, its approval is still pending.
- The Energy Efficiency Fund is in place, with secured financing until 2022. In July 2020, the Fund and the Energy Efficiency Agency signed an agreement to support a revolving financial mechanism for the renovation of public (and later residential) buildings.
- Kosovo* has district heating systems in four municipalities, which predominantly rely on coal (94%) and petroleum products (6%). There is a dual model of billing, metered and unmetered, with the unmetered model prevailing at the moment.
- Although compilation of a GHG inventory is progressing, legislation defining national systems for policies, measures and projections has not been adopted yet.

¹⁰ https://www.energy-community.org/implementation/Kosovo*.html

- Drafting of the National Energy and Climate Plan (NECP) has commenced, while setting targets and the scenarios development are still missing.

Montenegro Key Energy Sector Developments¹¹:

- The wholesale electricity market is liberal, including the balancing market, except for the balancing reserve. Market concentration is very high.
- Although the retail electricity market is formally deregulated, only the incumbent is supplying end-customers and performs the public service obligation to supply small customers and households.
- Montenegro does not have a gas market, nor market rules.
- Montenegro exceeded its overall and sectorial 2020 renewables target for electricity and heating and cooling. The share of renewables in transport still remains low.
- Based on the Energy Law, administratively set feed-in tariffs are applicable for projects up to 1 MW, while support schemes for larger projects have to be awarded in a competitive process. Secondary legislation, which would provide clarity and predictability for the implementation of auctions, is lacking.
- The 2019 - 2021 NEEAP, which includes the overall 2020 target and a 1% annual target for central government buildings, was adopted in 2019.
- A law transposing the Buildings Directive and implementing rulebooks were adopted in 2015. Work on the development of a cost-optimality software and calculations is ongoing. Montenegro continued implementing several successful building rehabilitation programmes, even though a long-term strategy is still missing.
- The Eco Fund for financing energy efficiency is operational.
- Montenegro does not have district heating, and the majority of buildings use individual heating systems, supplied by either biomass or electricity. The 2030 Energy Strategy envisages the development of biomass-based district heating systems.
- National System for Monitoring, Reporting and Verification of Greenhouse Gases is yet to be set up.
- The drafting of the NECP and underlying analytical work have started, but no chapters have been completed and submitted for review so far.

North Macedonia Key Energy Sector Developments¹²:

- The (bilateral) wholesale electricity market is open and competitive and a balancing market is operational. Market concentration is moderate.
- The retail electricity market is open for competition and small customers and households are entitled to universal service at regulated prices. Supplier switching is facilitated by a web-based comparison tool.

¹¹ <https://www.energy-community.org/implementation/Montenegro.html>

¹² https://www.energy-community.org/implementation/North_Macedonia.html

- Wholesale gas prices are fully deregulated. The gas market remains illiquid, without a virtual trading point.
- North Macedonia submitted its NREAP. With 18.12% of renewable energy sources, North Macedonia is far from its indicative trajectory of 22.3% in 2018.
- According to the Energy Law, two types of support measures are applied: the administratively set feed-in tariff (FiT) and the feed-in premium (FiP) granted on a competitive basis.
- The first auctions under the FiP scheme were conducted in 2019, followed by signature of the first contracts in 2020.
- The adopted Energy Efficiency Law transposed the Energy Performance of Buildings Directive. Nevertheless, implementation is still lagging behind as key by-laws are either missing or are not updated.
- In August 2020, the first five municipalities implemented energy savings performance contracts on street lighting. No energy efficiency fund exists yet, but it is planned with World Bank support.
- The share of district heating in total heat supply in 2018 was 10% and entirely produced by gas, of which 56% in co-generation units. 32% of heating and cooling is generated from renewables, but efficiency is low as the majority of biomass-based boilers and stoves use old technologies.
- Law on climate action, which will set grounds for institutionalisation of the national GHG emissions inventory system, is in the drafting phase.
- North Macedonia was the first Contracting Party to submit its draft NECP with all the required chapters for review. After the formal review of the draft by the Energy Community Secretariat, the final NECP is expected to be adopted in Q1 2021.

Serbia Key Energy Sector Developments¹³:

- The wholesale electricity market is formally deregulated. Competition on the day-ahead market is growing. The transmission system operator is procuring losses in the free market. The balancing energy market is operational, whereas prices of balancing reserves continue to be regulated.
- The retail market is formally liberalised, but dominated by the incumbent supplier EPS, which is also the universal supplier of small customers and households. Prices of universal supply continue to be regulated at a level which does not incentivize the development of competition.
- The wholesale gas market is monopolized by Gazprom and Srbijagas. No liquidity measures were adopted. A virtual trading point exists in theory but is not operational.
- The vast majority of the retail gas market is supplied at non-regulated prices. All customers are eligible, yet the retail market is dominated by Srbijagas.
- Serbia submitted its NREAP as well as all three Progress Reports on implementation of the Renewables Directive to the Secretariat by the required deadlines. With 20.32% of renewables in its energy mix, Serbia is far from its indicative trajectory of 24.3% in 2018.
- At the moment, the only existing support mechanism for renewable energy consists of administratively set feed-in tariffs (FiT). A market-based support scheme is still not applied.
- The share of renewable energy sources in transport remains low (1.16% in 2018 while the target for 2020 is 10%).

¹³ <https://www.energy-community.org/implementation/Serbia.html>

- While the drafting of the long-term building renovation strategy is ongoing, little progress has been achieved regarding the adoption of an updated regulation implementing Directive 2010/31/EU.
- For 2020, EUR 4,25 mil. have been dedicated for energy efficiency projects to be financed by the state budgetary fund for energy efficiency. An enabling legal framework for energy performance contracting is in place and Energy Service Company (ESCO) projects in buildings, public lighting and district heating are being implemented.
- With 58 operational systems, Serbia has the largest district heating system in the Western Balkans, but renewables make up only 1% of the input fuel. Modernization projects to increase the use of renewables are being implemented. Fifteen district heating companies introduced billing based on the consumption of individual units. Serbia has not yet assessed its potential for high efficiency cogeneration and efficient district heating and cooling, as required by the Energy Efficiency Directive.
- Recently adopted Climate Change Law is in line with the Monitoring Mechanism Regulation, as it contains specific provisions on setting up a greenhouse gas (GHG) emission inventory, low carbon development strategies as well as policies, measures and GHG projections.
- Serbia has not set up a national working group to prepare the NECPs, but the drafting and analytical work on the NECPs was announced.

1.1.2. Energy Profile of WB6

1.1.2.1. Supply Side

A common feature of the WB6 is the high share of fossil fuels in the **energy supply mix** (coal in particular) and the high import dependency on oil, petroleum products, and natural gas. In 2018, coal (mostly domestic lignite) accounted for 43.7% of total primary energy supply, followed by oil (25.6%), natural gas (13%), biofuels and waste (9.8%), hydro (7.7%) and other renewables (wind, solar, etc. - 0.2%).

Three of the WB6 countries, Kosovo*, Serbia and Bosnia and Herzegovina, primarily rely on coal in their supply mix, with higher-than-average WB6 share of coal in TPES. In Montenegro and North Macedonia, shares of coal and oil in TPES are on similar levels, being the two leading energy supply sources in these countries. Albania is the only country where oil is the primary source of TPES, followed by hydro. Albania has the highest share of hydro in TPES in WB6 (30.45%) followed by Montenegro, with significantly lower share of hydro in TPES (16.95%). Renewables are represented by large hydro power plants and traditional use of biofuels and waste inefficient domestic devices. The share of modern renewables is below 1% in all WB6 countries except Montenegro (1.12%).

Table 2: Structure of Total Primary Energy Supply in the WB6 countries, in ktoe, 2018

	Coal	Natural Gas	Hydro	Biofuels and Waste	Oil	Wind, Solar, etc.	Total
Albania	223 (9.24%)	32 (1.33%)	735 (30.45%)	271 (11.23%)	1,139 (47.18%)	14 (0.58%)	2,414 (100%)
Bosnia and Herzegovina	4,230 (43.77%)	1,999 (20.68%)	552 (5.71%)	1,192 (12.33%)	1,681 (17.39%)	11 (0.11%)	9,665 (100%)
Kosovo*	1,434 (55.78%)	0 (0%)	23 (0.89%)	377 (14.66%)	737 (28.67%)	0 (0%)	2,571 (100%)
Montenegro	361 (33.61%)	0 (0%)	182 (16.95%)	151 (14.06%)	368 (34.26%)	12 (1.12%)	1,074 (100%)
North Macedonia	861 (35.67%)	209 (8.66%)	154 (6.38%)	211 (8.74%)	963 (39.89%)	16 (0.66%)	2,414 (100%)
Serbia	7,523 (49.04%)	2,132 (13.9%)	915 (5.96%)	1,087 (7.09%)	3,664 (23.89%)	19 (0.12%)	15,340 (100%)
Total	14,632 (43.71%)	4,372 (13.06%)	2,561 (7.65%)	3,289 (9.82%)	8,552 (25.55%)	72 (0.22%)	33,478 (100%)

Source: Compiled from the International Energy Agency data, 2018, <https://www.iea.org/countries>

In the electricity sector, coal accounts for 62.8% of total power generation in WB6, followed by hydro (32.61%). Coal and hydro make up 95.41% of generated electricity in WB6, produced in coal thermal power plants and large hydropower plants. Coal is leading the charts in Kosovo* (94.95%), Serbia (68.97%), Bosnia and Herzegovina (62.07%) and North Macedonia (60%). Montenegro also heavily relies on coal for production of electricity (40.8%), even though its primary electricity source is hydro (55.44%). Albania almost exclusively produces electricity from hydro (99.58%). However, due to seasonality of water supply, Albania often ends up importing electricity (mostly from coal) from neighbouring countries. Electricity production averages in WB6 are heavily impacted by the generation-mix of two largest

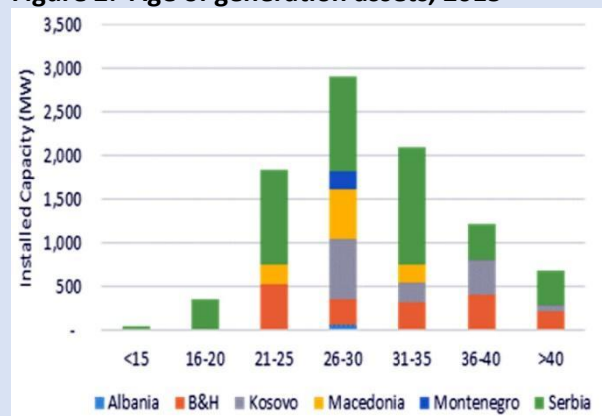
electricity producers in the region, Serbia (50% of total production) and Bosnia and Herzegovina (22.2%). No other WB6 country has a share over 10% in total region's electricity generation.

Table 3: Structure of Electricity Generation, by source, in WB6 countries, in GWh

	Coal	Oil	Natural Gas	Hydro	Biofuels	Solar PV	Wind	Total
Albania	0 (0%)	0 (0%)	0 (0%)	5,206 (99.58%)	0 (0%)	22 (0.42%)	0 (0%)	5,228 (100%)
Bosnia and Herzegovina	10,544 (62.07%)	44 (0.26%)	25 (0.15%)	6,081 (35.8%)	9 (0.05%)	30 (0.18%)	254 (1.50%)	16,987 (100%)
Kosovo*	6,037 (94.95%)	10 (0.16%)	0 (0%)	210 (3.3%)	0 (0%)	10 (0.16%)	91 (1.43%)	6,358 (100%)
Montenegro	1,555 (40.8%)	0 (0%)	0 (0%)	2,113 (55.44%)	0 (0%)	0 (0%)	143 (3.75%)	3,811 (100%)
North Macedonia	3,508 (60%)	61 (1.04%)	957 (16.37%)	1,164 (19.91%)	55 (0.94%)	0 (0%)	102 (1.74%)	5,847 (100%)
Serbia	26,390 (68.97%)	89 (0.23%)	633 (1.65%)	10,172 (26.59%)	116 (0.30%)	14 (0.04%)	848 (2.22%)	38,262 (100%)
Total	48,034 (62.8%)	204 (0.27%)	1,615 (2.11%)	24,946 (32.61%)	180 (0.24%)	76 (0.1%)	1,438 (1.88%)	76,493 (100%)

Source: Compiled from the International Energy Agency data, 2019 except Montenegro (2018), <https://www.iea.org/countries>

Figure 2: Age of generation assets, 2015



Source: Western Balkans: Directions for the Energy Sector, World Bank, 2018

The security of energy production and supply is threatened by deteriorating energy infrastructure. When entering the transition, WB6 countries' infrastructure was fully functional and at the peak of its production capacities. However, during the transition period many of the countries faced various challenges that led to lower maintenance levels of the infrastructure and equipment. Paired with no new significant capacity development, and severed energy connections to neighbouring countries, security of energy supply has been severely endangered. The result is ageing infrastructure, with over half of the installed electricity generation aged 31 years or more (Figure 1). As time went by, the negative impact of deteriorating infrastructure has increased, presenting a serious threat to the security of energy supply in WB6.

1.1.2.2. Demand Side

On the **demand** side, the share of oil and petroleum products in final energy consumption has also been growing rapidly in the last 20 years due to increased demand in the transport sector, while the domestic availability of these resources is fairly limited. Oil has the highest share in total final energy consumption with 39.74% in WB6 region, and in all of the countries individually. It is followed by electricity (25.75%) and biofuels and waste (16.07%). Modern renewable energy sources have a neglectable share in the energy consumption.

Even though Serbia is the single largest oil consumer in WB6, totalling almost double of all the other WB6 combined, it has the lowest share of oil (34.96) in the final energy consumption. In Albania, Kosovo*, Montenegro and North Macedonia, oil has a share of around 50% in total energy consumption. With Albania and Serbia being the only WB6 countries having significant local oil and gas production, relative to their local markets, other countries rely on oil import to satisfy the existing demand. Serbia is also the largest natural gas consumer. Small-sized markets exist and North Macedonia and Bosnia and Herzegovina, share of natural gas final consumption in Albania is negligible, while Kosovo* and Montenegro currently have no access to gas. The region has used biofuels and waste in 16.07% of total final energy consumption, mostly in the residential sector.

Table 4: Structure of Total Final Energy Consumption by source in WB6 countries, in ktoe.

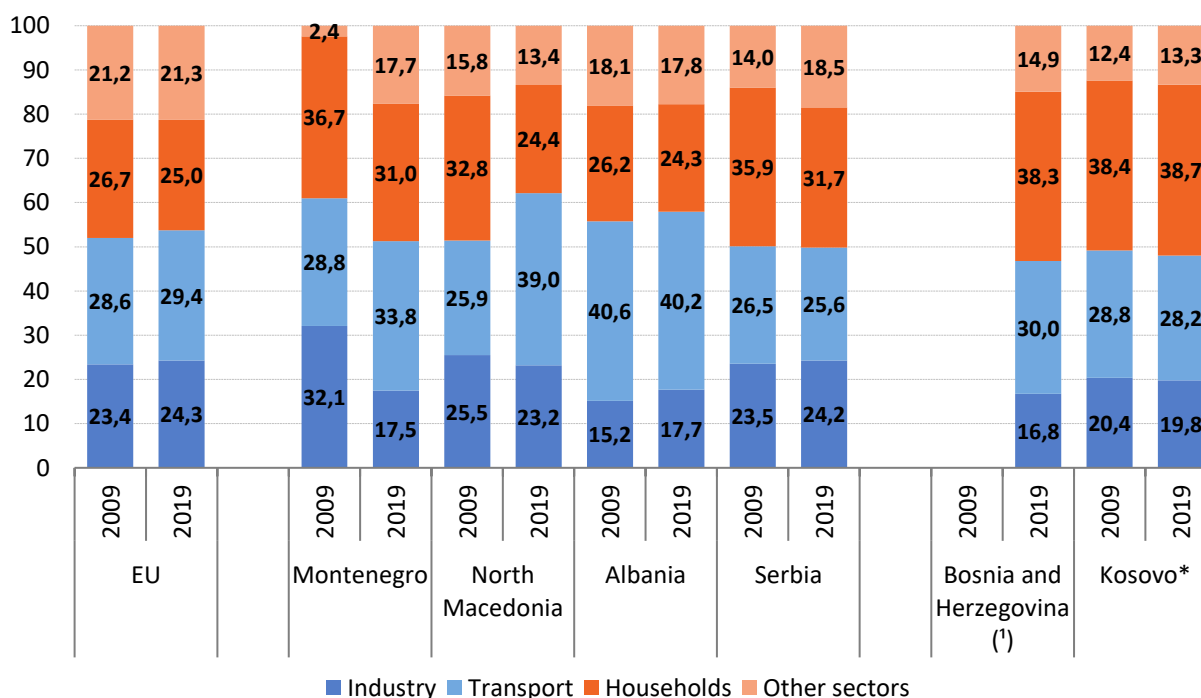
	Coal	Oil*	Natural Gas	Wind, Solar, etc	Biofuels and Waste	Electricity	Heat	Total
Albania	223 (10.65%)	1,058 (50.55%)	7 (0.33%)	13 (0.62%)	269 (12.85%)	523 (24.99%)	0 (0%)	2,093 (100%)
Bosnia and Herzegovina	389 (9.04%)	1,527 (35.49%)	148 (3.44%)	0 (0%)	1,127 (26.19%)	985 (22.89%)	127 (2.95%)	4,303 (100%)
Kosovo*	18 (1.18%)	732 (48.16%)	0 (0%)	0 (0%)	377 (24.8%)	378 (24.87%)	15 (0.99%)	1,520 (100%)
Montenegro	7 (0.91%)	367 (47.72%)	0 (0%)	0 (0%)	150 (19.51%)	245 (31.86%)	0 (0%)	769 (100%)
North Macedonia	114 (6.08%)	948 (50.59%)	43 (2.29%)	5 (0.27%)	192 (10.25%)	525 (28.01%)	47 (2.51%)	1,874 (100%)
Serbia	536 (5.87%)	3,190 (34.96%)	1,195 (13.1%)	5 (0.05%)	1,049 (11.5%)	2,412 (26.43%)	738 (8.09%)	9,125 (100%)
Total	1,287 (6.54%)	7,822 (39.74%)	1,393 (7.08%)	23 (0.12%)	3,164 (16.07%)	5,068 (25.75%)	927 (4.71%)	19,684 (100%)

Source: Compiled from the International Energy Agency data, 2018, <https://www.iea.org/countries>

*Category "Oil" also includes "Crude Oils" which are registered only in Montenegro, and contribute with 4 ktoe

As a result of the structure of energy consumption mix and accessibility of locally available energy source, the overall energy import dependency in WB6 countries is lower than in the EU¹⁴. However, it is still relatively high for oil and natural gas.

Figure 3: Analysis of final energy consumption, by sector, 2009 and 2019 (% of total energy consumption)



(¹) 2009: not available.

Source: Eurostat (online data code: nrg_bal_s)

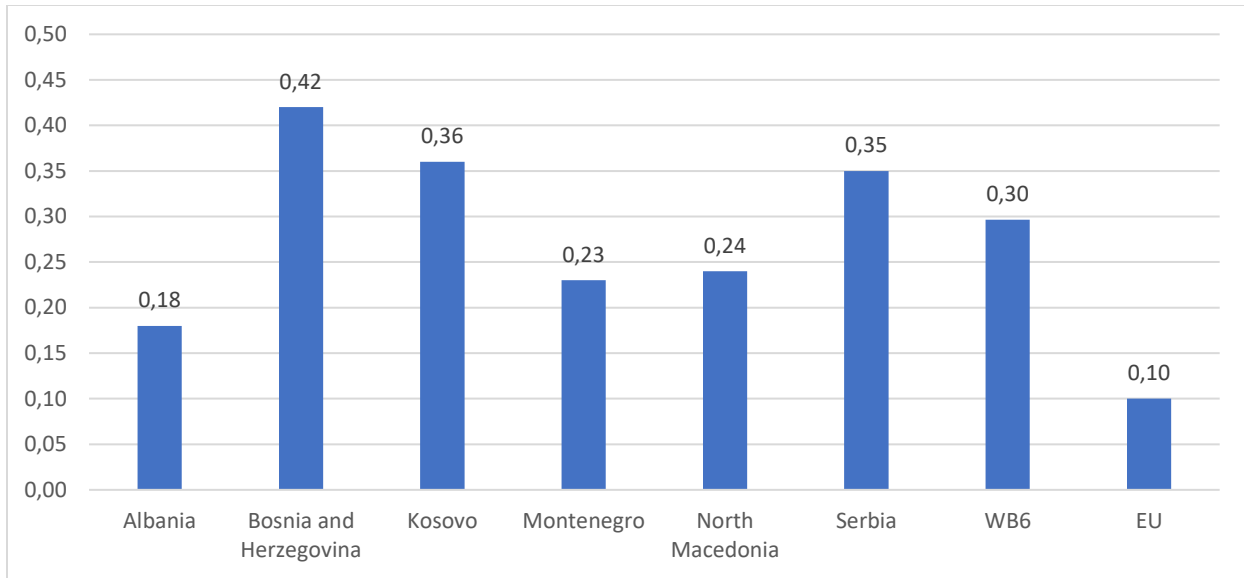
The residential sector has the largest share in the final energy consumption in WB6 countries in total, followed by the transport and industry sectors. However, in Albania, North Macedonia and Montenegro, transport has the largest share in the final energy consumption.

Energy intensity¹⁵ in WB6 remains significantly higher (three times) than in the EU. Convergence in energy intensity levels between the WB6 and the EU is projected to rise, while the gap is projected to persist in the decades to come.

Figure 4: Energy Intensity in WB6, 2018

¹⁴ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Enlargement_countries_-_energy_statistics#Energy_trade

¹⁵ Energy intensity is a measure of the efficiency with which an economy consumes energy to produce output, with gross domestic product (GDP) being used as the measure of overall output: it is expressed as units of energy consumed per unit of GDP (Eurostat)



Source: Compiled from the International Energy Agency data, 2018, <https://www.iea.org/data-and-statistics>

Among WB6 countries, Bosnia and Herzegovina records the highest energy intensity (0.42), while Albania has the lowest (0.2) energy intensity. Having in mind the planned development and structural changes in the energy sector (production, transportation, private consumption), leading to increased efficiency, energy intensity is expected to decrease in WB6. World Bank, in its 2018 paper “Western Balkans: Directions for the Energy Sector”, projected that by 2030 the WB6’s energy intensity will still be over twice as high as that of the EU. The energy intensity of Bosnia and Herzegovina will still be three times higher.

In the same report, World Bank estimates that the energy demand will continue to grow at a moderate rate, driven by the transport, residential and services sectors.

1.1.2.3. Cross-Cutting Issue: Air Pollution

In addition to high energy intensity, carbon intensity of the region is also comparatively high in comparison with the EU and the World average values. The region's high carbon intensity is attributed to low efficiency in energy transformation and reliance on lignite power generation.

WB6 countries are also facing adverse environmental and social consequences of its energy sector. Due to a lack of funding and overall insufficient environmental procedures in coal mining operations, there are significant concerns such as hazardous sites, tailings ponds and hazardous waste dumps. The absence of mine development planning resulted in frequent delays in the relocation process, which had a negative impact on residents living in the mine regions.

Electricity generation from thermal power plants (mostly using lignite) produces significant amounts of sulphur dioxide (SO₂), nitrogen oxides (NO_x), and dust (or particulate matter, PM), which has a negative impact on air quality, not just in the region, but also in neighbouring countries, resulting in lower life expectancy and higher health-care expenses. NO_x is contributing indirectly to the formation of ozone, but the most worrying for health are fine particulate matter and ozone. Heavy metals, such as mercury, and persistent organic pollutants (POPs), such as dioxins and polycyclic aromatic compounds, are other harmful substances emitted from coal power plants. These can be inhaled or absorbed indirectly through food and water¹⁶.

The region is home to eight of the ten most polluting plants in Europe. Lignite power plants in Bosnia and Herzegovina, Northern Macedonia, and Serbia are major sources of SO₂, while high concentrations of particulate matter are attributed to plants in Serbia, Kosovo* and Northern Macedonia. These inefficient plants running on lignite are also the largest contributors of greenhouse gases in these countries. Regarding particulate matter, however, the majority of its production comes from individual households relying on wood and coal stoves for heating.

Table 5: Total emissions of main pollutants by coal power plants in Western Balkans and in EU-28

Region	SO ₂ (t/year)	NO _x (t/year)	PM _{2.5} (t/year)
EU-28	992,248	795,358	11,946
Western Balkan 5*	750,893	120,012	20,188

The data doesn't include Albania, which does not have coal powered plants.

Source: HEAL (2016): *THE UNPAID HEALTH BILL - How coal power plants in the WESTERN BALKANS make us sick*; and Europe Beyond Coal data¹⁷

According to HEAL's *Unpaid Health Bill - Western Balkans*, about 60% of pollutants produced by WB-6 coal power plants ends up in Europe, while 40% remains in the Balkans. This means that decreasing pollution in EU-neighbouring regions will benefit both Western Balkan and EU nations by improving health, saving lives, and lowering health-care expenditures.

¹⁶ PERSPECTIVES – Political analysis and commentary, Issue 2, June 2018, *Southeastern Europe - Still Stuck in the Past: How Addressing Energy and Climate Change can Advance Development*, Heinrich Böll Stiftung

¹⁷ http://beyond-coal.eu/wp-content/uploads/2017/11/2017-11-01_Europe_Beyond_Coal-European_Coal_Database_hc.xlsx

If WB6 power plants had been subjected to a carbon pricing policy, average wholesale prices in the region would have been higher, but the funds generated could have been utilized to benefit coal regions in transition and vulnerable consumers. However, the costs of CO₂ emissions are currently recognized only in Montenegro.

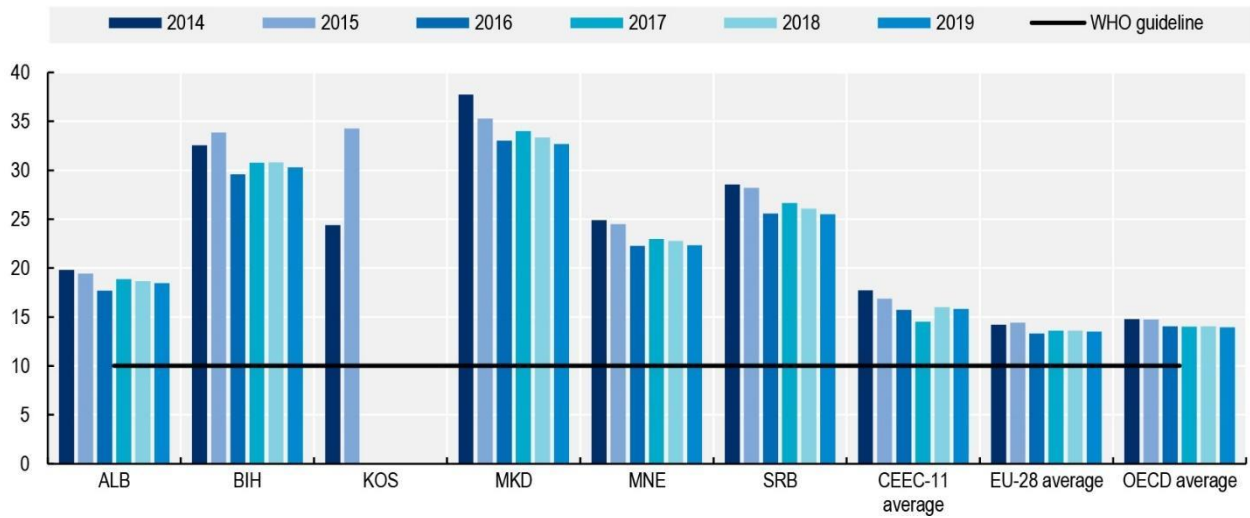
According to Energy Community Secretariat's *WB6 Energy Transition Tracker* (June 2021)¹⁸:

- The breach of the SO₂ emission ceiling happened again in 2020 and, with the exception of North Macedonia, increased in the WB6 parties implementing NERPs. Bosnia and Herzegovina surpass the ceilings by nearly tenfold. Serbia and North Macedonia exceeded the ceiling by almost 500%. The negative trend in comparison to 2019 is due to the high utilization ratio of the plants in 2020, which is fuelled by export.
- Bosnia and Herzegovina and Kosovo* did not comply with their ceilings for NO_x emissions. NO_x ceilings were planned to decrease gradually by approximately 50% between 2018 and 2023, but the fact that reported emissions are even further away from compliance than in 2019 confirms that this will become increasingly challenging in the future.
- The violation of the dust (PM) ceiling limits happened again in all three parties involved (Bosnia and Herzegovina, Kosovo* and North Macedonia). North Macedonia exceeded the maximum limit by more than double, while Bosnia and Herzegovina and Kosovo* both exceeded it by around 70%. Serbia complied with the ceiling in 2020.

The exposure of the WB6 populations to fine particulate matter is two to three times higher than the World Health Organization's (WHO) recommended highest levels of 10 µg/m³. Air pollution levels are particularly high in the winter months, when pollution from ageing vehicles and other sources is compounded by pollution from residential heating, often sourced from burning wood or coal.

¹⁸ <https://www.energy-community.org/regionalinitiatives/WB6/Tracker.html>

Figure 5: Annual mean population exposure to PM_{2.5} air pollution (2014-19)



Data for Kosovo* only available until 2015. CEEC-11=Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia.

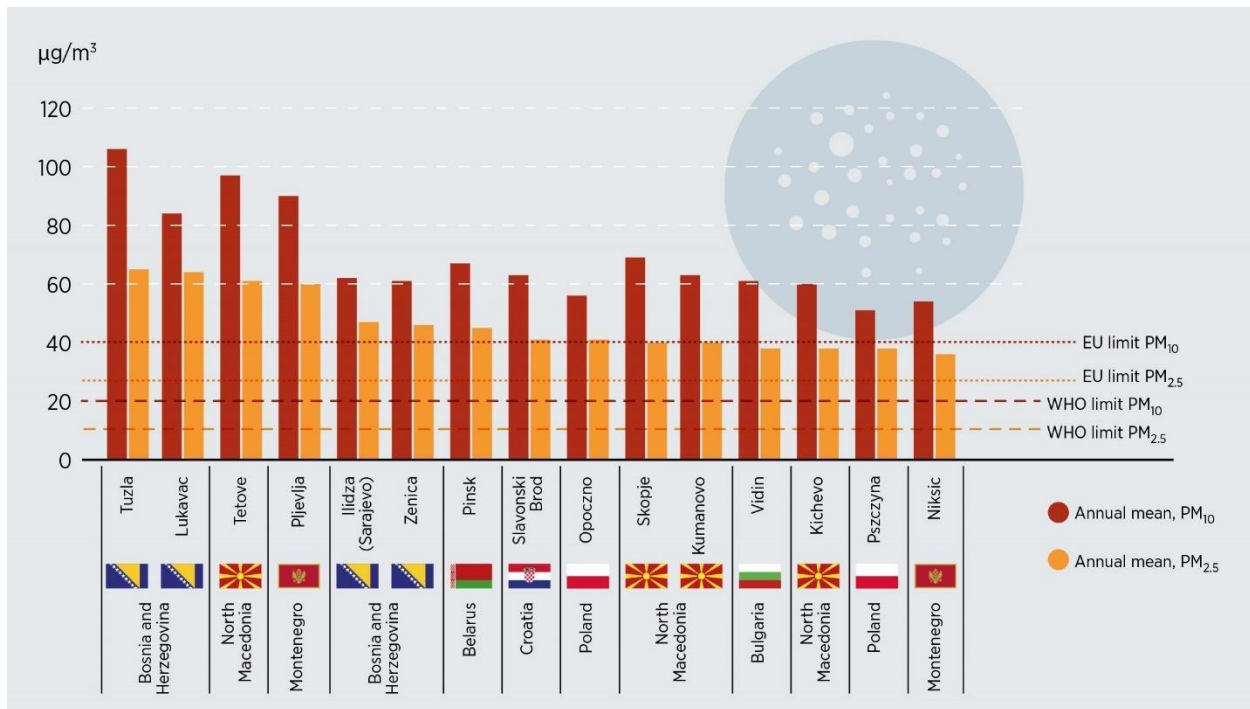
Source: OECD, Competitiveness in South East Europe 2021 A POLICY OUTLOOK

Since 2014 PM_{2.5} levels have been slowly decreasing in all economies in the region, but are still 2 and more times over the WHO guideline.

According to The International Renewable Energy Agency (IRENA)¹⁹, 10 out of top 15 cities by level of PM_{2.5} pollution in Europe (2017) were found in WB6 region.

¹⁹ Renewable Energy Market Analysis - Southeast Europe, 2019, IRENA

Figure 6: Top 15 cities by level of PM_{2.5}, Europe, 2017



The report states, in case studies of Tuzla, Lukavac, Tetovo and Pljevlja, that the main sources of PM pollution are:

- proximity of cities to lignite power plants,
- extraction, handling and transport of solid fuels,
- inadequate urban development, with a high population density,
- heavy traffic,
- unregulated individual domestic heating,
- construction activities.

According to preliminary findings from UN Environment study “Air Pollution and Human Health: The Case of the Western Balkans”²⁰, air pollution causes around 5,000 premature deaths each year in the cities studied, with the actual number of deaths estimated to be much higher. In seven of the studied cities air pollution is responsible for at least 15% of premature deaths, while this figure rises to as high as 19% in Tetovo in North Macedonia. Deaths attributable to air pollution varied between 150 and 250 per 100,000 inhabitants in most of the cities. In all cities surveyed, nearly 130,000 years of potential life are lost over a 10-year period due to premature deaths attributable to air pollution exposure. On average, 20% of the years of life lost occurs due to death at age below 65 years. The majority of these deaths (approx. 75%) are attributable to exposure to fine particulate matter. Air pollution reduces life expectancy in WB6 from 0.4 up to 1.3 years, study concludes.

²⁰ https://www.developmentaid.org/api/frontend/cms/uploadedImages/2019/06/Air-Quality-and-Human-Health-Report_Case-of-Western-Balkans_preliminary_results.pdf

The study also found that particulate matter levels – which are closely associated with cardiovascular illness – in the WB6 region can be more than five times higher than WHO standards. Particulate matter emissions are mostly caused by outdated coal power plants and household heating.

WHO (2016), European Environment Agency (2012), HEAL (2017) estimate total number of premature deaths caused by air pollution in the region to be between 6,460 (Heal), 16,000 (approx. WHO) and 22,670 (EEA) each year. All reports agree that the majority of these deaths are caused by emission of particulate matter.

Urgent action is needed to protect the health of the population in the WB6 region, and EU. Low-end estimates²¹ predict that the emission reductions that need to be achieved in WB6 could result in 6,460 saved lives each year, as well as saved health costs of up to 2.7 billion EUR. Yearly, estimated health costs could drop down from 8.6 billion EUR to 767 million EUR. The implementation of new and advanced policies and actions could result in reducing the number of deaths each year from 7,206 to 745. Other sources estimated that coal-fired power plants in the Western Balkans alone incur economic costs in the form of healthcare expenses ranging from €1.2 to €3.4 billion every year²².

People with lower socio-economic status are typically more exposed to air pollution, because they reside in high-traffic areas and near pollution sources, such as power plants and industrial sites. Furthermore, most impoverished individuals work “dirty” jobs that require professional exposure to fumes, particulate matter, gases, and heavy metals.

1.1.3. Renewable Energy Potential

Renewables have become the most cost-effective source of new power generation in many regions of the world, with solar and wind technologies continuing to fall in cost. In WB6, however, the market remains very undeveloped. Between 2011 and 2014, the deployment of modern technologies (wind, solar) was increasing faster than the more mature hydropower technology. Following this bright start, however, project progress stalled, with the scope of deployment substantially decreasing between 2015 and 2018.

WB6 has abundant renewable energy resources, with their use already part of many inhabitants’ daily lives. Thanks to considerable installed hydropower capacity and the extensive use of biomass in residential heating, the WB6 economies use a higher proportion of renewable energy than the EU average.

Historically, the region’s power generation profile has been significantly shaped by large hydropower plants, while heating needs have mainly been covered by the large biomass usage. However, the overall estimated unexploited potential for renewable energy is still substantial.

²¹<https://www.env-health.org/wp-content/uploads/2018/06/Boosting-health-by-improving-air-quality-in-the-Balkans.pdf>

²² <https://www.balkanfund.org/general-news/what-is-polluted-air-doing-to-us-in-the-western-balkans>

The WB6 countries have a large technical potential for renewable energy, estimated to be 100 GW, mostly for electricity generation. Wind has the largest technical potential (60 GW), followed by Hydro (19GW) and solar (15GW)²³.

Even though the current power generation situation appears to be positive, with hydropower accounting for roughly half of the region's current capacity, it is the rest of that capacity, almost entirely coal (and often lignite) fired plants, that delivers the majority of the electricity produced due to its high-capacity factor. Albania is an exception, as it is completely dependent on hydro, although it must rely on imports of high carbon content power from the neighbouring countries, when natural water supply is unfavourable.

Despite having a large installed hydroelectric capacity, the region still has the largest untapped hydropower potential in Europe, since its river catchments have mostly remained underdeveloped. The technical potential of hydropower is estimated to be 246 PJ per year.

Table 6: Technical potential in the WB6 region for utility-scale solar PV, wind and hydropower in the power sector (TJ)

	Utility-scale solar PV	Onshore wind	Hydropower
Albania	13,342	49,154	56,059
Bosnia and Herzegovina	14,886	94,810	88,193
Kosovo*	3,006	13,860	4,853
Montenegro	3,874	23,332	18,079
North Macedonia	8,014	27,558	14,421
Serbia	33,509	188,590	64,800
WB6 Total	76,631	397,304	246,405

Source: Renewable Energy Market Analysis - Southeast Europe, 2019, IRENA

Majority of the existing hydropower plants in the region were constructed between 1955 and 1990. The average age of these plants in use points out the need for refurbishment and revitalization of the existing facilities. Age of hydropower plants in the region also shows that the sector has been largely underdeveloped in the last 30 years, even though there is substantial potential, know-how, and industrial capacity available in WB6.

All WB6 countries are suitable for the production of photovoltaic energy throughout the whole year. Key parameters in **solar PV installation** are scored better in the southern part of the region, while solar resources in the northern part are more modest, but in line with or better than other European countries with large PV deployment. The utility-scale solar technical potential of the WB6 region is estimated at around 76 PJ. A 2017 IRENA study from IRENA has estimated Albania to have up to 1.9 GW potential from solar PV; Bosnia and Herzegovina up to 1 GW; Kosovo* with 436 MW; Macedonia with 1.2 GW; Montenegro with 300 MW; and Serbia with 6.9 GW by 2030.

WB6 region is endowed with good **wind resources**. The mountainous and coastal landscape increases the variation in wind resource across the region, with higher average wind speeds in coastal areas and at high altitudes. The Adriatic coast (Albania, Bosnia and Herzegovina, Montenegro) enjoys favourable wind

²³ IRENA, Cost-Competitive Renewable Power Generation: Potential Across South East Europe, 2017

speeds, but this area is also regularly hit by high-speed winds, which adds additional stress on wind turbines. Wind energy is not harvested at its full potential, however, as in nearby countries with similar wind resources, with the exception of harvesting in the EU member states of the region. The technical potential of WB6's wind energy currently is estimated at 397 PJ. The IRENA study estimates the energy potential from wind in Albania at 153 MW; 2.5-5.9 GW in Bosnia, 1.7 GW in Montenegro and 5.6 GW in Serbia.

In the Western Balkans, **biomass** plays a major role in the heating sector. Biomass (firewood in the residential sector) is believed to satisfy around 42% of yearly heat demand in the Western Balkans, although being understated in official figures. Unfortunately, due to obsolete equipment and a lack of wood-drying before use, a substantial portion of it is used inefficiently²⁴. Sustainable use of biomass and improvement in the efficiency of heating appliances, including development of biomass use in district heating, can contribute to cost-effective exploitation of local energy resources, and meeting their respective renewable energy targets. Biomass for heating is estimated to be more cost-effective than electricity, heavy/light fuel oil, and, to a lesser extent, coal. End-user expenses can be reduced by 45% to 70% by replacing a current electric heating system with biomass-based technology.

In 2016, The European Commission (DG NEAR) financed a project to collect relevant data in order to provide in-depth analysis of a techno-economic options analysis in the WB6 partners. First observations derived from the interim results of this study conclude²⁵:

- Until 2030, the highest growth in renewables is expected to be in Serbia and Bosnia and Herzegovina, although the highest relative growth can be expected in Kosovo* and Bosnia and Herzegovina.
- An increased uptake of renewable energies is aggravated by regulated electricity prices for final consumers, which are substantially lower than current costs of electricity generation. This aspect plays a strong role for both conventional generation and renewable energies.
- Energy poverty and the widespread use of inefficient individual biomass installations for residential heating represents key barriers for increasing the efficiency of biomass usage in the heating sector. Throughout the region, more than 50% of current biomass use takes place in the building sector, often using traditional stoves. The transition to district heating plants or efficient biomass boilers in the buildings sector could lead to major savings, but still hampered by energy poverty and a limited availability of district heating in most countries.
- The renewable energy share in the transport sector in the Western Balkans Six is still rather small at present. With mobility expected to grow by 30%, biofuels and electrification options provide a cost-effective option to expand renewable energy use to more than 10% of total energy consumption in the transport sector by 2030.

²⁴ Western Balkans: Directions for the Energy Sector, World Bank, 2018

²⁵

https://ec.europa.eu/energy/sites/ener/files/documents/renewable_energy_in_the_western_balkans_6_ipf_interim_observations.pdf

1.1.4. Implementation Mechanisms

Implementation mechanisms in the energy sector are complex in any given country in the world, and WB6 is no different. Various institutions and processes shape the energy sector in Western Balkans, including but not limited to:

- international integration processes and energy initiatives;
- bilateral and multilateral financing, development and support institutions;
- national, regional and local authorities;
- energy regulators and market operators;
- retail financing institutions.

Target stakeholders of these processes are regulatory bodies, market operators, national and local institutions, power plants, district heating companies, public and residential buildings, firms, individual households, while the results of the processes impact the whole WB6 population, and beyond.

Several **processes, forums, and initiatives** are working towards integration of the WB6 and the EU with the goal of building closer ties and advancing energy transition in the region:

- **The EU accession process**²⁶ serves as a geostrategic investment in peace, stability, security, and prosperity in Europe. Candidate countries must implement complex reforms in many areas, including the energy sector and climate policy.
- In May 2018, the EU Western Balkan Summit participants concluded in the **Sofia Declaration**²⁷ their ambition to heighten regional co-operation for a peaceful future. A core means to this end is to enhance all types of connectivity: transport, energy, digital, economic, and cultural.
- **The Energy Community (EnC)**²⁸ was established to extend the EU internal energy market to South-eastern and Eastern Europe. The EU body of energy law and obligations are incorporated with the EnC's acquis to which all of the WB6 must harmonise their legislation.
- The European Commission proposed a **Green Agenda for the Western Balkans**²⁹ as part of its EGD. The specific inclusion of the WB6 in the EU's central policy to achieve carbon emission neutrality by 2050 aims to strengthen climate diplomacy in the region.
- **The Berlin Process**³⁰ was launched in 2014. Its purpose was to consolidate and maintain the dynamics of the EU accession of the WB6 by promoting regional co-operation and revitalising multilateral ties with selected EU member states.
- **The Regional Cooperation Council**³¹ is a framework for countries in South Eastern Europe. It aims to improve the region's living conditions and overall economic development.

²⁶ https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/eu-accession-process_en.pdf

²⁷ <https://berlinprocess.info/wp-content/uploads/2021/02/Leaders-Declaration-on-the-Green-Agenda-for-the-WB.pdf>

²⁸ <https://www.energy-community.org/>

²⁹ https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/green_agenda_for_the_western_balkans_en.pdf

³⁰ <https://berlinprocess.info/>

³¹ <https://www.rcc.int/>

Several European actors and initiatives are working to **bilaterally and multilaterally** provide financial, technical and development support for the energy transition in the WB6. Detailed assessment of international bilateral and multilateral development support, focusing on individuals and households, will be provided in more detail in the Chapter 3.3.

On **national** levels, ministries in charge of energy and environment sectors are involved the most in macro-level initiatives. However, significant number of projects and activities on the local **level** are performed through local self-government units – cities and municipalities.

Regional level actors (i.e., regional development agencies, chambers of commerce) mostly have limited influence, carrying out “soft” activities (public awareness raising and communication campaigns).

Apart from regulatory bodies, financing mechanisms in energy efficiency sector exist in WB6 countries:

- In Bosnia and Herzegovina, Energy Efficiency Project awards funds (sourced from World Bank) to local institutions in the form of grants, aiming primarily at energy efficiency improvements in public buildings in the education and healthcare sectors. Funds for Environmental Protection, in both entities in Bosnia and Herzegovina, provide support for energy efficiency in public and private (in FBiH) buildings.
- In Kosovo*, Energy Efficiency Fund (Funded by EU, World Bank and Government of Kosovo*) focuses on improving energy efficiency in schools, hospitals and other public municipality buildings.
- In Montenegro, Energy Efficiency Home programme provides loans to the residential sector, via its partner commercial banks. Environmental Protection Fund provides a mix of direct loans, grants and subsidised loans stretching across environmental issues including EE, for all sectors.
- In North Macedonia, Energy Efficiency Project provides direct loans (80%) and grants (20%) to the public sector, to which Energy Efficiency Fund provides a mix of direct loans and on-bill financing.
- In Serbia, Budget Fund for Energy Efficiency has been founded (2014) to support the implementation of EE measures in the public sector. Expansion of the programme to the private sector is expected to happen soon.

A number of institutions in the regulatory and operations sector are also active in the region. Overview of the most important bodies is provided in table 7.

Table 7: Institutions of the energy sector in SEE

	Power market operator	Energy regulator	Renewable energy agency	Energy efficiency agency	Transmission System Operator (TSO)
Albania	Transmission System Operator - OST	Energy Regulatory Authority (ERE)	No	Energy Efficiency Agency	OST
Bosnia and Herzegovina	Independent System Operator (NOS BiH)	State level: Electricity Regulatory Commission (SERC)	State level: No Federation of Bosnia and	No	Elektroprenos BiH

		Entities level: Regulatory Commission for Energy in Federation of Bosnia and Herzegovina (FERC) Regulatory Commission for Energy of Republika Srpska (RERS)	Herzegovina: The operator for renewable energy sources and efficient cogeneration Republika Srpska: Elektroprivreda Republike Srpske		
Kosovo*	Transmission, System and Market Operator (KOSTT) (TSO)	Energy Regulatory Office (ERO)	No	Kosovo* Agency for Energy Efficiency	Transmission, System and Market Operator (KOSTT)
North Macedonia	Electricity Transmission System Operator of Macedonia (MEPSO) (TSO)	Energy Regulatory Commission of the Republic of North Macedonia (ERC)	Energy Agency of the Republic of North Macedonia		Electricity Transmission System Operator of Macedonia (MEPSO)
Montenegro	Montenegro Electricity Market Operator (COTEE) (TSO)	Energy Regulatory Authority (RAE)	No	No	Montenegrin Electricity Transmission System (CGES)
Serbia	Elektromreža Srbije (EMS) (TSO)	Energy Agency of the Republic of Serbia (AERS)	No	No	Elektromreža Srbije (EMS)

A significant number of retail financing institutions is active in the energy sector, targeting both public and private sectors (commercial, residential, individual).

Commercial financing options are widely available in the region, provided by over 95 retail banks. This has led a significant number of analyses to conclude that the commercial financing options are sufficient for the market needs. However, a more thorough analysis is needed in order to assess the suitability of the available commercial financing options for the improvement of energy sector performance in WB6, and its overall development needs. Chapter 2 will delve deeper into the energy (and other cross-cutting) needs of individuals and households, while Chapter 3.2 will provide the assessment of the available retail financial products available.

1.1.5. Key Findings and Challenges for Energy Sector in WB6

Limited market mechanisms, low private sector participation, deteriorated infrastructure, a high share of fossil fuels in the supply mix, limited adoption of renewable energy sources, a lack of energy efficiency and productivity, high levels of energy subsidies, and high rates of energy poverty characterize the WB6 energy sector. However, certain advances have been made.

Key Findings

- The WB6 countries have advanced legislative frameworks that implement a substantial portion of the EU's Third Energy Package. These frameworks are reinforced by a plethora of policies that adhere to worldwide best practices. However, there is still a lot of potential for improvement in terms of execution, and key policy papers need to be upgraded. This problem is currently being addressed, to a large extent.
- There has been significant progress in establishing EU-style regulated energy markets.
- WB6 countries differ in the quality of their market and the support frameworks, including the primary types of energy within an economy. Some WB6 economies still lack some of the fundamentals of competitive energy markets. These include the unbundling of major natural monopolies – namely, transmission and distribution system operators – as well as a lack of third-party access to key energy assets.
- Renewable energy and energy efficiency are both in their infancy in the WB6 region. Aside from hydropower generation, renewable energy's proportion in energy generation remains low, and the approaches of the WB6 economies in subsidizing and awarding new renewable energy projects need to be improved.
- Regional market integration and market linkage remains largely lacking among the WB6 countries and their EU neighbours.
- Human resources in key public bodies involved in energy market regulation often lack technical capacity and know-how, especially in the field of energy efficiency and modern renewables.
- Subsidies continue to skew WB6 energy markets. Continued subsidies to fossil fuels are especially harmful to economies' aims of decreasing greenhouse gas emissions and governments' financial support for renewable energy and energy efficiency.
- Air pollution is one of the region's major environmental issues, with PM2.5 levels two to three times higher than the World Health Organization's maximum guidelines. However, some progress has been made as a result of reasonably well-developed legal frameworks, municipal air quality plans, updated monitoring systems, and public awareness campaigns.
- As building standards are implemented across the WB6, energy efficiency is gradually improving. However, financing is limited and sometimes restricted to public sector/buildings only. Residential buildings have limited access to finance, while individual households rely on retail financing products.

Domestic market challenges in the WB6 have been a hindrance in achieving market integration. Due to various societal factors, below-cost pricing, particularly for residential consumers, has constrained competition in domestic markets. Under-pricing, in combination with relatively high losses and poor

collections, resulted in considerable revenue gaps, mainly in some state-owned enterprises in the electricity, gas, and district heating sectors. Overstaffing and political meddling are additional issues that SOEs confront, necessitating corporate governance reform in order to improve their performance. Tariff changes have frequently been hampered by affordability concerns. The share of energy expenditures is between 7% and 12% in WB6 countries, but still, they are failing to establish social protection mechanisms for vulnerable consumers.

Key Challenges

- Completion of the transposition and implementation of the Third Energy Package.
- Strengthening of the regulators, including their independence, their powers and their resources
- Invest further across the entire WB6 region to achieve replacement of ageing infrastructure, diversify supply and supply sources, increase interconnections among WB6 and with EU, and strengthen climate resilience.
- Modernize national and regional energy infrastructure. Reduce energy distribution losses. Increase the stability of energy supply.
- Increased renewable generation as the primary source of supply growth.
- Increase energy efficiency, through policy improvements, human resources capacities increase, increase in availability and coverage of energy efficiency funding, and public awareness campaigns.
- Continue the liberalisation and price-deregulation of the wholesale and retail market, and unbundling of key natural monopolies. Decentralise energy systems and remove links between politics and business.
- Enhance regional co-operation and move towards eventual market integration and coupling.
- Eliminate the subsidisation of fossil fuels, in particular coal and coal-fired generation, and perform information campaigns with emphasis on the need to reduce subsidies. Introduce incentives that support renewable integration, with a goal of decarbonising the energy sector.
- Improve air quality by decreasing dependence on fossil fuels in the energy mix, upgrading household heating systems, reducing transport emissions, and decreasing emissions from industry.
- Widespread use of inefficient individual biomass heating devices for residential heating, coupled with energy poverty, represents key barrier for increasing the efficiency of biomass usage in the heating sector.
- Limited access to financing schemes to vulnerable consumers.

Domestic and international (bilateral, multilateral) efforts have been focused primarily on the public sector: improvement of policy framework, state-owned power plants, energy sector regulators, district heating companies, public buildings, and in recent years setting the policy framework for multi-apartment buildings. **Individual households, and especially vulnerable consumers living in individual households, have had less attention drawn.** However, impact of energy consumption (primarily in the form of biomass-based heating) of this part of energy sector is significant, both in terms of significant energy losses and higher costs of living, and in terms of air pollution it causes, leading to significant number of premature deaths in the region and higher health-related costs.

Improving energy performance of individual households, primarily through improvement of the heating, is one of the keys in improving overall energy sustainability of the WB6 region, reducing the costs in the energy sector, significantly improving the health of the population, and decreasing health-related costs.

In order to shed some light on the issue, the following chapters of this report aim to:

- provide the data on contribution of heating in individual households to the negative performance and increased operating costs of energy sector in WB6,
- to identify the scope of the problem and its consequences,
- to provide the data on impact of heating in individual households on the health of WB6 population,
- to identify population groups which are most adversely impacted by heating in individual households,
- to identify costs related to the target groups,
- to assess available financial schemes for mitigating the issue,
- to provide the gap analysis between target group needs and available support, and
- to provide recommendations on how to tackle the issue in the future.

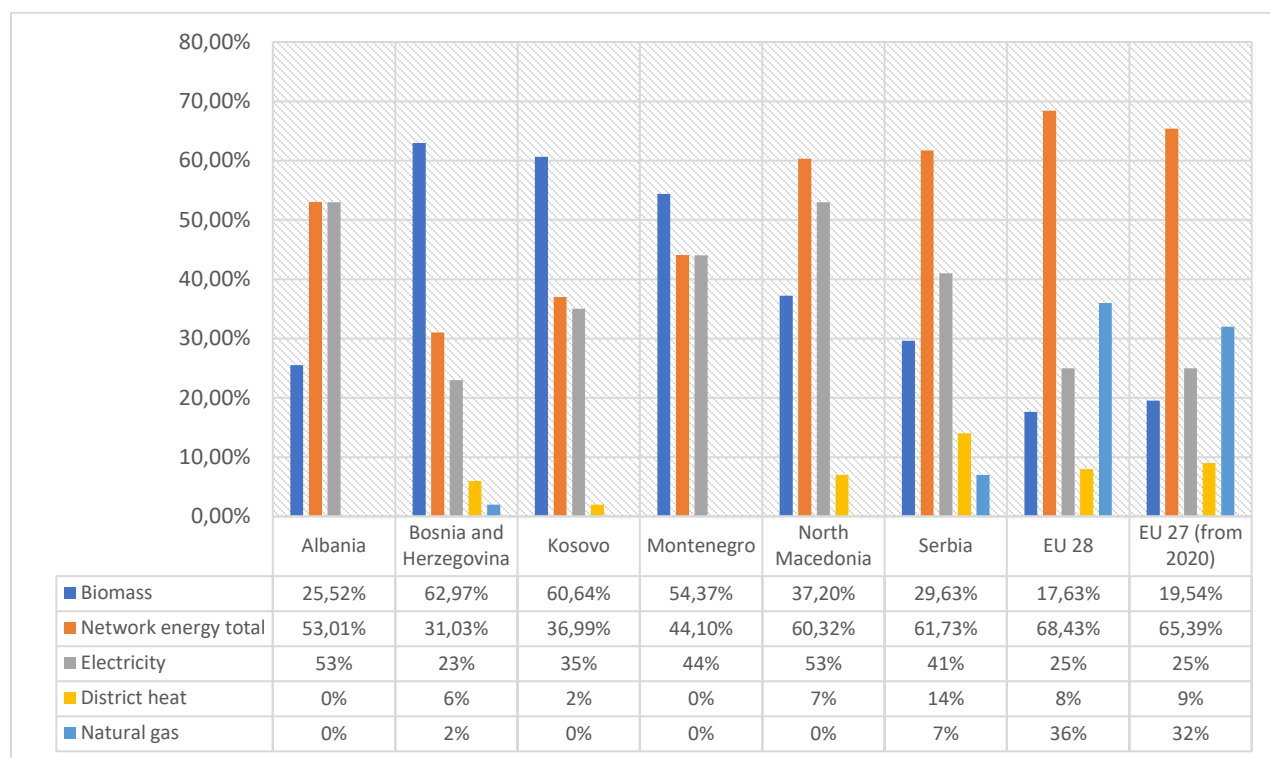
2. Heating in Individual Households in WB6

2.1. Energy Consumption in Households in WB6

As we have seen in the chapter 1.1.2.2., the residential sector has the largest share in the final energy consumption in WB6 countries. By improving the efficiency of energy consumption in its largest consumer sector, WB6 countries will significantly improve the overall performance of its energy sectors.

According to Eurostat³² and International Energy Agency³³, with slight discrepancies between sources. Eurostat states that biomass in WB6 countries has significantly larger share of total household energy consumption compared to the EU. In the EU-28, biomass accounts for 17.63% of total household energy consumption, while in the WB6 it totals 42.5%. Bosnia and Herzegovina (62.97%), as well as Kosovo* (60.64%) are leading the region in the share of biomass use in final household consumption. Montenegro is also having a larger share of biomass in end household use (54.37%) than any other source.

Figure 7: Share of network energy and biomass household energy consumption in WB6 countries, 2017



Source: Eurostat, Energy consumption in households.

The share of network energy consumption (electricity, district heat and natural gas) in the total household energy consumption is much larger in the EU-28 (70%) than in the WB6 (50%). Discrepancy between EU-28 and WB6 lies in the lack of utilisation of natural gas by the households in the WB6 region. Natural gas

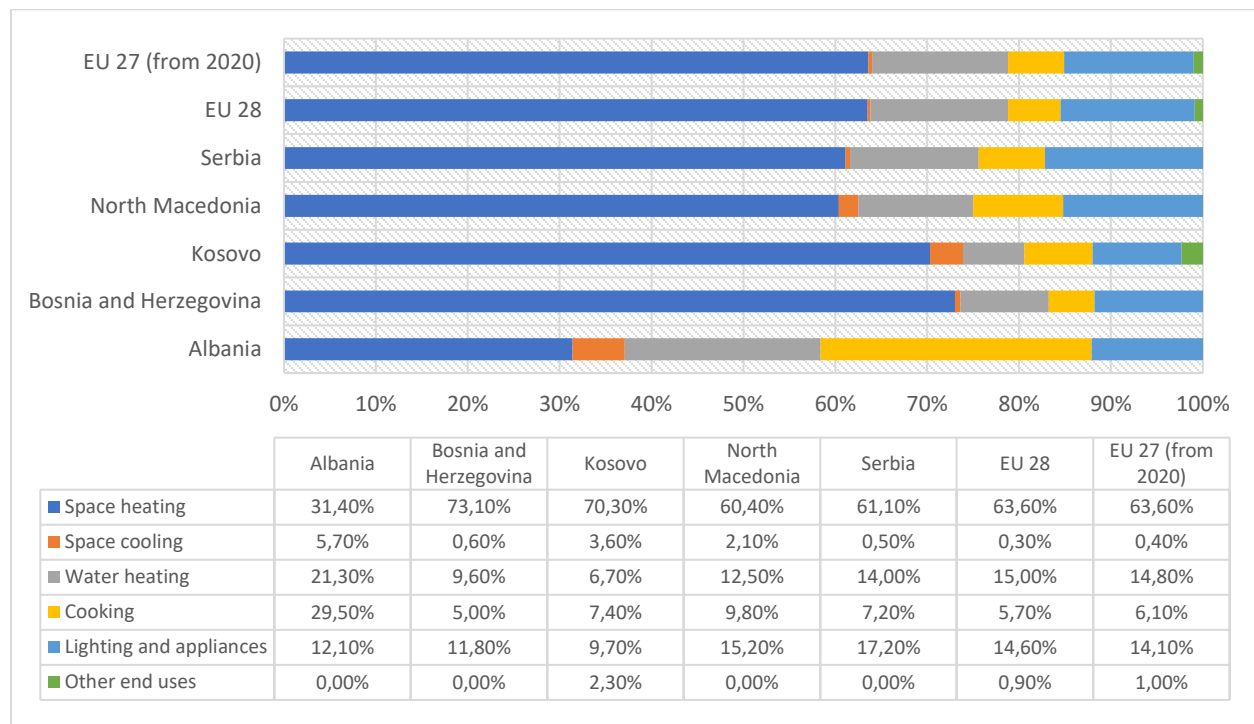
³² https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households

³³ <https://www.iea.org/countries>

constitutes only a fraction of energy consumption of households in Western Balkans (4%) in comparison to the EU-28 (37%). Exceptions are Serbia and Bosnia and Herzegovina, while Albania, Kosovo*, Montenegro and parts of North Macedonia and Bosnia-Herzegovina don't have gas pipeline networks, and none of these countries produce significant amounts of gas. Electricity consumption is much higher in the WB6 region in comparison to the EU-28, mostly due to consumption of electricity for heating. Electricity accounts for 53% of total household energy consumption in North Macedonia and Albania, leading the region. Significant share of electricity use is also recorded in Montenegro (44.1%) and Serbia (41%).

Eurostat also collects data on the type of end-use of energy in households. The data is available for all the countries in the region, with the exception of Montenegro. The structure of energy use is similar to the EU: most of the region countries use energy primarily for heating (space, water), followed by lighting and appliances. An exception is Albania, which uses significantly less energy on space heating, in comparison to the rest of WB6 and the EU. In Albania, relatively more energy is used on cooking and water heating. However, this is to be expected, as Albania has much milder winters than the rest of the region.

Figure 8: Share of final energy consumption by the type of end-use in households in WB6 countries, 2017



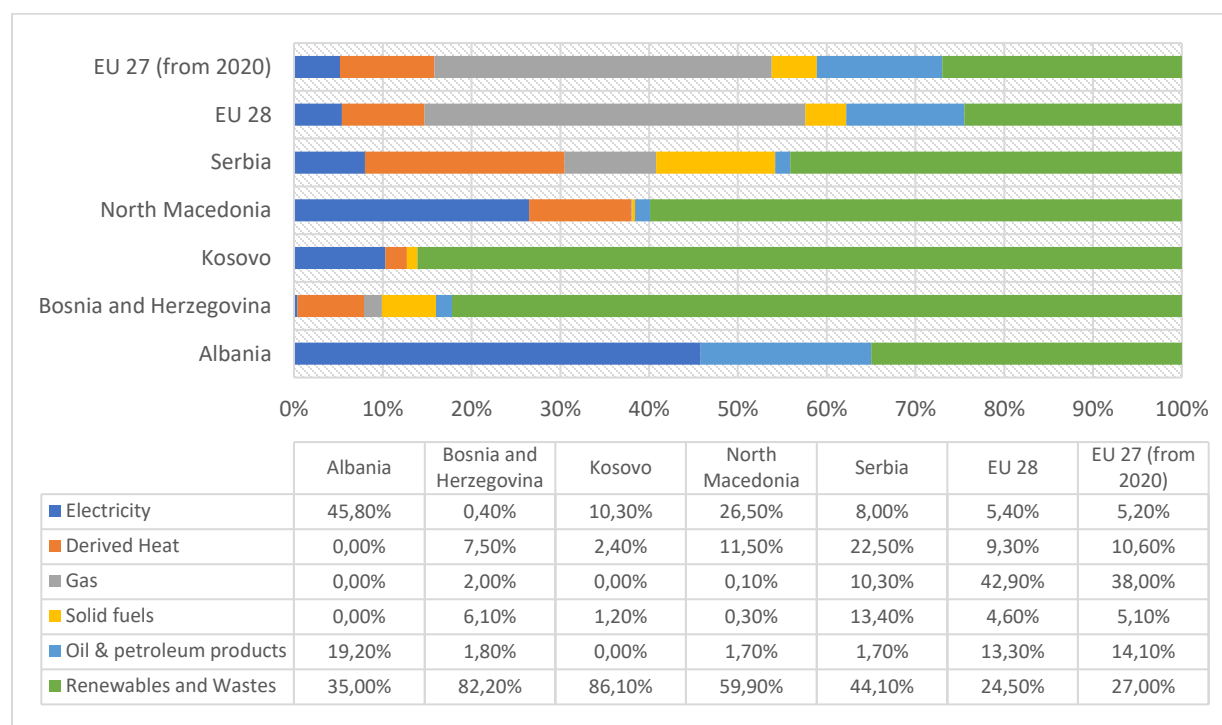
Source: Eurostat, Energy consumption in households. Data for Montenegro is not available.

2.2. Heating in Households in WB6

Almost two-thirds of annual heat demand in the Western Balkans is satisfied by firewood (42%) and electricity (21%), with other fuels accounting for the remaining 37%. The region's total annual heat demand is estimated to be 6.4 Mtoe (74 TWh). The residential sector accounts for around 70% of the total, followed by the commercial (20%) and public (10%) sectors.³⁴

Most of the heating energy is consumed on space heating. Renewables and wastes (mainly firewood) are frequently utilized in the residential sector for space heating, with a share ranging from 86.1% in Kosovo* and 82.2% in Bosnia and Herzegovina, to 35% in Albania. Only in Albania is electricity used as a prevalent source. Electricity for heating is mostly used by households in urban areas (multifamily and stand-alone buildings) as the main heating source, or to complement wood stoves in rural areas. Significant difference compared to the EU is the use of gas (38%), which is almost not used in the region, with the exception of Serbia (10.3%).

Figure 9: Share of fuels in the final energy consumption in households for space heating³⁵



Source: Eurostat, Energy consumption in households. Data for Montenegro is not available.

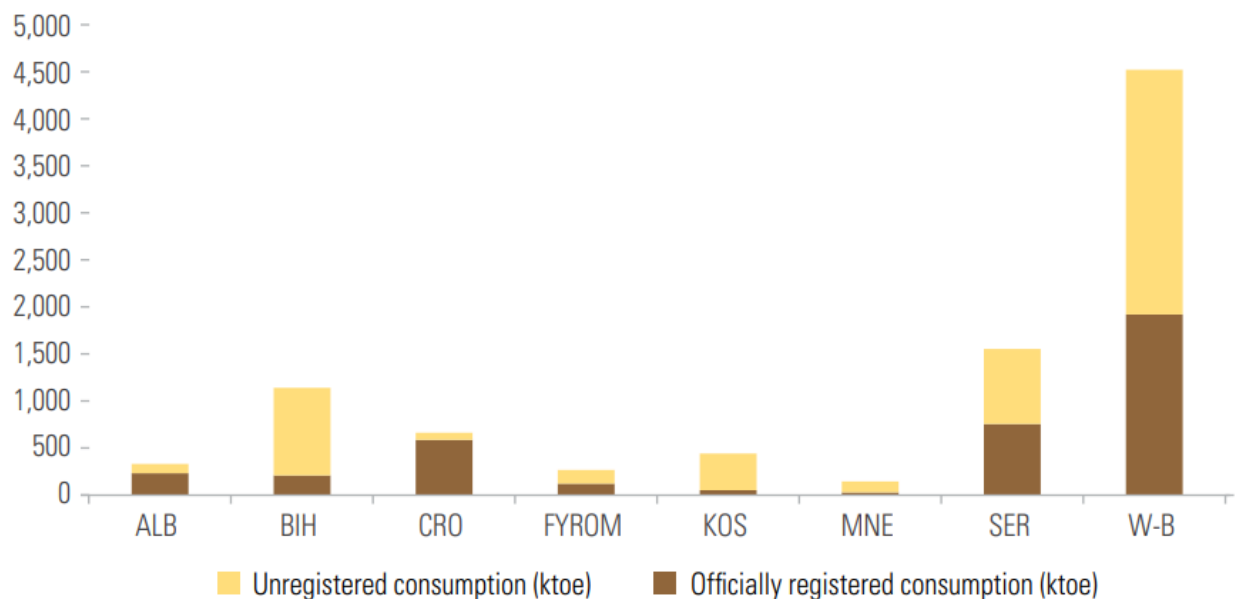
However, actual share of renewables and waste consumption in household space heating is much higher than reported, due to unregistered use of woody biomass. In 2013, the Western Balkan area reported 1,922 ktoe of woody biomass for energy usage (including Croatia). In comparison, the actual estimated total for the same year was 4,525 ktoe, suggesting that more than 58 percent of the total originated from

³⁴ Biomass-Based Heating in the Western Balkans – A Roadmap for Sustainable Development, World Bank, 2017

³⁵ The category “derived heat” relates to district heating. Category “solid fuels” is related mostly to coal, while “renewables and waste” refers primarily to biomass.

unregistered sources³⁶. There is insufficient information available on the structure of the unregistered usage. However, a significant share takes the unregistered gathering of woody biomass for heating by local populations surrounding forest areas and by private forest owners. This use of biomass is not registered in statistics offices', as they collect and publish data solely on official biomass trade. Unregistered firewood collecting for personal consumption is generally associated with poor income and high unemployment rates, which are especially prominent in rural and mountainous locations. This is exacerbated by the lax enforcement of regulations that is common for rural communities near forests.

Figure 10: Estimated Actual Woody Biomass Consumption (ktoe)



Source: Biomass-Based Heating in the Western Balkans – A Roadmap for Sustainable Development, World Bank, 2017

Decentralized heating systems are widely used in the region. According to the World bank 2017 report³⁷, approximately 88% of buildings in the WB6 region use decentralized heating systems, such as small heat-only boilers, stoves, ovens and electric devices, while only 12% use district heating. Small heat-only boilers are the most common individual heating systems (47%), followed by electric appliances (21%) and stoves (19%). Stoves are used in more than half of stand-alone buildings, small heat-only boilers in 25%, and electric appliances in 24%.

District heating is an important heating source, primarily in urban areas. There are about 100 District Heating companies throughout the region, with an installed capacity of about 9,200 MWth. As mentioned above, DH accounts for about 12% of heat demand but there are significant differences among countries. The market share of DH in Serbia is close to 20%, while it is only 3% on Kosovo* (three DH companies). There are five DH systems in North Macedonia (all in Skopje); there are no DH systems in Albania and only one small DH system in Montenegro. The sector is also characterized by a high degree of consolidation;

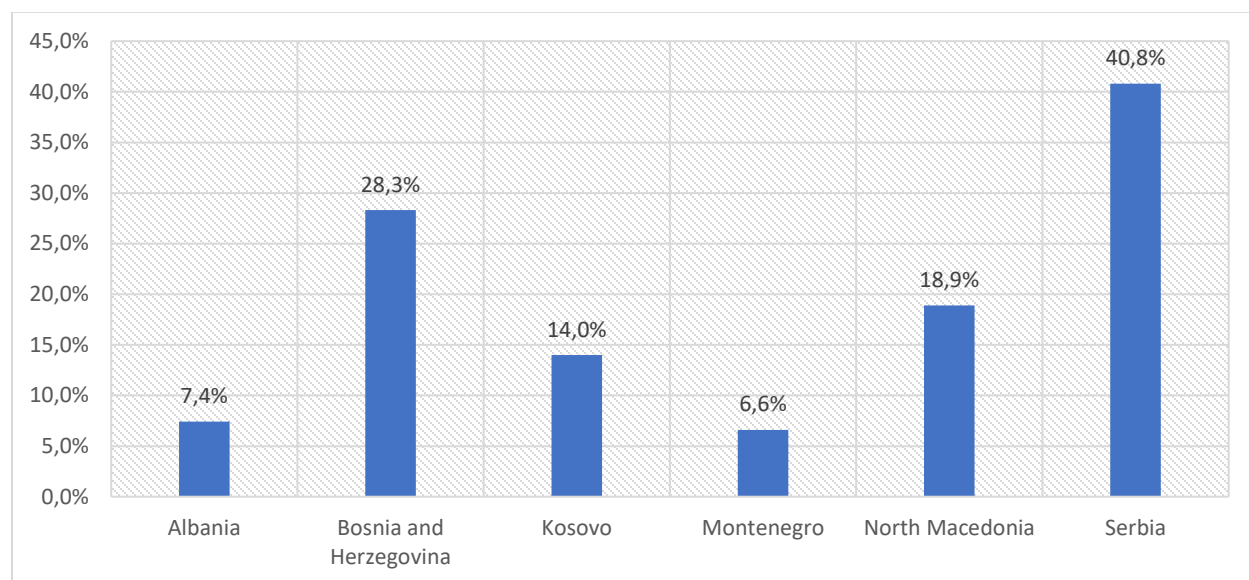
³⁶ Study on the Biomass Consumption for Energy Purposes in the Energy Community (Energy Community Secretariat, 2012)

³⁷ Biomass-Based Heating in the Western Balkans – A Roadmap for Sustainable Development, World Bank, 2017

the two largest DH systems in Bosnia and Herzegovina (out of total 22) and the four largest DH systems in Serbia (out of total 58) account for 75% and 60% of installed capacity, respectively.

In terms of space heating infrastructure, a large portion of the households in the WB6 do not have central heating systems (installed radiators used for heating). Among the WB6 countries Montenegro has the lowest rate of households with such installations.

Figure 11: Share of households with installed central heating systems



Source: Households Budgetary Surveys from Bosnia and Herzegovina (2015), Kosovo* (2017), North Macedonia (2017) and Serbia (2019), as well as national Census from Montenegro (2011) and Albania (2011).

These numbers are in correlation to the estimated number of individual households with district heating or small heat-only boilers, usually used in conjunction with household central heating systems. Available data provide us with the household structure by the dominant heating type in WB6 countries. This data will be used as one of the inputs for further calculations.

Table 8: Structure of households by the dominant type of heating

	Electricity	District Heating	Natural Gas	Solid Fuels	Liquid Fuels	Combined
Albania	27.22%	0.00%	15.88%	56.90%	0.00%	0.00%
Bosnia and Herzegovina	5.00%	9.70%	2.20%	83.10%	0.00%	0.00%
Kosovo*	7.80%	4.40%	0.00%	86.60%	0.00%	1.20%
Montenegro	33.10%	0.00%	0.00%	66.10%	0.80%	0.00%
North Macedonia	6.50%	6.70%	0.00%	85.00%	1.00%	0.80%
Serbia	11.00%	20.60%	6.30%	55.90%	0.40%	5.80%

Source: Households Budgetary Surveys from Bosnia and Herzegovina (2015), North Macedonia (2017) and Serbia (2019), national Census from Albania (2011) Montenegro (2011), and estimates from a research report for Kosovo* (2013)³⁸

It is important to note one significant difference between dominant type of heating and total end use of energy for space heating:

- Heating based on solid fuels has larger share compared to electricity in total heating types, than renewables & wastes compared to electricity in terms of energy used, in all WB6 countries;
- It would seem that wider use of solid fuels resulted in relatively smaller consumption share, while the more limited use of electricity or district heating resulted in higher energy consumption;
- One of the reasons behind this lies in the total % of living space heated, which is usually associated with higher shares in case of district heating or electricity use, as larger heating spaces is being heated;
- Other important reason lies in the inefficiency of burning stoves and other heating devices in use.

Based on the data gathered and expert estimates where data was scarce, we have compiled key heat energy information for Western Balkan countries. Key findings are:

- Total Final Energy Consumption (TFEC) was adjusted to account for the unregistered use of biomass. The total unregistered biomass use in WB6 is estimated at 1,200 ktoe (approximately 6.5 million m³ of firewood). TFEC is estimated at 20,941 ktoe;
- Total energy consumption in residential sector is estimated at 7,553 ktoe (36.07% of TFEC);
- Total heat demand in the residential sector is estimated at 6,349 ktoe (84% of total residential energy consumption). This includes heat used for space heating, water heating and heat-cooking;
- Heat supplied to stand-alone buildings (47.1%) and multi-storey buildings (52.9%) is almost evenly split, even though dwellings in stand-alone buildings make up 61% of total dwellings in WB6. This is in line with previous conclusion of higher energy use in case of electricity and district heating, but also inefficiency of heating devices in use in stand-alone buildings;
- The most of the heating consumption needs in the region is provided by renewables and waste (49.69%), followed by electricity (26.54%), derived (district) heat (10.02%) and solid fuels (6.08%). The rest consists of natural gas (4.24%) and oil and petroleum products (3.42%).
- Space heating is estimated at 4,733 ktoe, or 74.55% of total heat energy consumption, followed by water heating (955 ktoe, 15.03%) and cooking (661 ktoe, 10.42%).

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https://www.rit.edu/research/cenr/sites/rit.edu.research.cenr/files/2013_03_01_cenr_Kosovo*_household_energy_consumption.pdf

Table 9: Overview of key residential heating information in WB6 countries

	Albania		Bosnia and Herzegovina		Kosovo*		Montenegro		North Macedonia		Serbia		WB6	
HEAT ENERGY CONSUMPTION														
TFEC (ktoe)	2,075		4,403		1,518		786		1,950		9,010		19,741	
Unregistered residential biomass use	104		423		61		37		109		466		1,200	
TFEC (ktoe) - Adjusted	2,179		4,826		1,579		823		2,059		9,476		20,941	
Residential Energy Consumption (ktoe)	608	27.92%	2,109	43.71%	649	41.08%	281	34.10%	584	28.39%	3,322	35.06%	7,553	36.07%
Heat Consumption in residential sector (ktoe, % of total)	500	82.20%	1,850	87.70%	548	84.40%	234	83.30%	483	82.70%	2,734	82.30%	6,349	84.05%
Heat supplied to stand-alone buildings (ktoe, % of total)	331	66.23%	831	44.91%	350	63.96%	139	59.39%	259	53.67%	1,080	39.50%	2,991	47.11%
Heat supplied to multi-storey buildings (ktoe, % of total)	168	33.64%	1,019	55.09%	197	36.04%	95	40.61%	225	46.48%	1,654	60.50%	3,358	52.90%
Space Heating	191	38.20%	1,542	83.35%	456	83.29%	161	68.79%	353	73.04%	2,030	74.24%	4,733	74.55%
Water Heating	130	25.91%	202	10.95%	43	7.94%	41	17.53%	73	15.11%	465	17.01%	955	15.03%
Cooking	179	35.89%	105	5.70%	48	8.77%	32	13.69%	57	11.85%	239	8.75%	661	10.42%
Heat produced by DH systems (ktoe, % of total)	0	0.00%	116	6.25%	11	2.00%	0	0.00%	41	8.40%	469	17.15%	636	10.02%
MAIN FUELS IN HEAT CONSUMPTION														
Electricity	216	43.17%	234	12.64%	138	25.29%	141	60.24%	210	43.55%	746	27.28%	1,685	26.54%
Derived Heat	0	0.00%	116	6.25%	11	2.00%	0	0.00%	41	8.40%	469	17.15%	636	10.02%
Gas	0	0.00%	44	2.38%	0	0.00%	0	0.00%	0	0.07%	225	8.22%	269	4.24%
Solid fuels	0	0.00%	95	5.12%	5	1.00%	7	2.96%	1	0.22%	278	10.17%	386	6.08%
Oil & petroleum products	125	25.02%	32	1.73%	0	0.00%	2	0.89%	13	2.78%	45	1.63%	217	3.42%
Renewables and Wastes	159	31.81%	1,330	71.87%	393	71.72%	84	35.91%	217	44.98%	972	35.56%	3,155	49.69%

In the residential sector (dwellings³⁹), there are 5.3 million dwellings with heating in use in WB6, of which 3.3 million (61%) in stand-alone houses and 2.1 million (39%) in multi-apartment buildings (MABs). Primary sources of heating are stoves (34.14%) and small heat-only boilers (HOB, 32.91%). Electric appliances are a primary heating source for 23.7% of dwellings, while district heating is at 9.78% of dwellings (25.1% of all MABs dwellings).

In MABs in WB6, primary heating sources are small heating-only boilers (35.28%), followed by electric appliances (26.17%) and district heating (25.1%). In standalone houses in WB6 primary heating sources are stoves (53.3%), followed by small heating-only boilers (31.4%) and electric appliances (21.3%). There are over 1.8 million stoves and over 1.7 million heat-only boilers in heating use in WB6 countries' dwellings, as well as over 1.2 million electric appliances.

Table 10: Dwellings with heating in use and heating source in WB6

	Albania	Bosnia and Herzegovina	Kosovo*	Montenegro	North Macedonia	Serbia	WB6
Total Net Dwellings	722,262	1,222,339	212,903	192,242	564,296	2,423,208	5,337,250
Dwellings in Stand-Alone Buildings	411,689	660,063	163,935	117,268	327,292	1,768,942	3,255,723
Dwellings in Multi-Apartment Buildings	310,573	562,276	48,968	74,974	237,004	654,266	2,081,528
% of Dwellings in Individual Houses	57.00%	54.00%	77.00%	61.00%	58.00%	73.00%	61.00%
% of Dwellings in Multi- Apartment Buildings	43.00%	46.00%	23.00%	39.00%	42.00%	27.00%	39.00%
Total Dwellings in Stand-Alone Buildings with District Heating	0	0	0	0	0	0	0
Total Dwellings in Multi- Apartment Buildings with District Heating	0	114,142	8,765	0	37,210	361,809	521,926
Total District Heating	0	114,142	8,765	0	37,210	361,809	521,926
% District Heating in Stand-Alone Buildings	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
% District Heating in Multi- Apartment Buildings	0.00%	20.30%	17.90%	0.00%	15.70%	55.30%	25.07%
% District Heating in Total	0.00%	9.34%	4.12%	0.00%	6.59%	14.93%	9.78%
Total Dwellings in Stand-Alone Buildings with Small HOB Heating	92,218	205,940	43,443	16,652	92,624	571,368	1,022,245
Total Dwellings in Multi- Apartment Buildings with Small HOB Heating	109,011	295,195	22,672	25,266	100,253	181,886	734,283
Total Small HOB Heating	201,229	501,135	66,115	41,918	192,876	753,254	1,756,528
% Small HOB in Stand-Alone Buildings	22.40%	31.20%	26.50%	14.20%	28.30%	32.30%	31.40%
% Small HOB in Multi- Apartment Buildings	35.10%	52.50%	46.30%	33.70%	42.30%	27.80%	35.28%
% Small HOB in Total	27.86%	41.00%	31.05%	21.81%	34.18%	31.09%	32.91%
Total Dwellings in Stand-Alone Buildings with Electric Appliances Heating	146,150	62,706	24,262	46,907	56,621	355,557	692,204

³⁹ Dwelling – a house, an apartment, or other place of individual/family living

Total Dwellings in Multi- Apartment Buildings with Electric Appliances Heating	191,002	108,519	14,445	44,835	85,796	100,103	544,700
Total Electric Appliances Heating	337,152	171,225	38,708	91,742	142,417	455,660	1,236,904
% Electric Appliances in Stand-Alone Buildings	35.50%	9.50%	14.80%	40.00%	17.30%	20.10%	21.26%
% Electric Appliances in Multi-Apartment Buildings	61.50%	19.30%	29.50%	59.80%	36.20%	15.30%	26.17%
% Electric Appliances Heating in Total	46.68%	14.01%	18.18%	47.72%	25.24%	18.80%	23.17%
Total Dwellings in Stand-Alone Buildings with Stoves Heating	173,321	391,417	96,230	53,709	178,047	842,016	1,734,740
Total Dwellings in Multi- Apartment Buildings with Stoves Heating	10,559	44,420	3,085	4,873	13,746	10,468	87,152
Total Stoves Heating	183,881	435,837	99,315	58,582	191,793	852,485	1,821,892
% Stoves in Stand-Alone Buildings	42.10%	59.30%	58.70%	45.80%	54.40%	47.60%	53.28%
% Stoves in Multi- Apartment Buildings	3.40%	7.90%	6.30%	6.50%	5.80%	1.60%	4.19%
% Stoves in Total	25.46%	35.66%	46.65%	30.47%	33.99%	35.18%	34.14%

Source: Expert estimate based on the available statistical data

Biomass heating has received insufficient attention from national policymakers, with the exception of municipal initiatives that have not resulted in major investments. This situation may be explained by the high transaction costs associated with many end-use segments, the vast diversity of technologies, and the absence of comprehensive data. However, a recent study *Biomass-Based Heating in the Western Balkans* shows that biomass can be competitive for a wide range of heating applications.

2.3. Heating, Housing and Energy Efficiency

Residential sector has a significant impact on heating and energy consumption, which instigated EU to initiate the Renovation Wave, as announced in the Economic and Investment Plan for the Western Balkans (2020)⁴⁰:

“The Commission proposes to expand the “EU renovation wave” to the Western Balkans. The building sector accounts for over 40% of total energy consumption in the Western Balkans. Renovating public and private buildings to meet minimal energy performance standards can make a very significant contribution to the reduction of greenhouse gas emissions, improve the living standards of citizens, as well as their health. A building renovation wave implemented with the help of the Energy Community will assist the Western Balkans in decarbonisation of public and private building stock, with a strong emphasis on digitalisation and taking into account energy poverty. The EU together with international financing institutions, will support the efforts of the

⁴⁰https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/communication_on_wb_economic_and_investment_plan_october_2020_en.pdf

Western Balkans partners to triple the current renovation rate and energy savings in existing buildings and achieve nearly-zero energy and emission standard in new buildings.”

The potential energy savings in the building sector are projected to be greater than 50% of total consumption. Despite low per capita energy consumption, average energy usage per square meter varies between nations, ranging from under 100 kWh/m² in Montenegro to more than 200 kWh/m² in Bosnia and Herzegovina.⁴¹

The potential for EE savings is substantial and varies greatly per end-use industry. The residential and transportation sectors account for the majority of TFEC, accounting for 50% to 70% of the total. In Serbia, Montenegro, and North Macedonia, industry is also a big consumer. According to various IEA and World Bank estimates, the WB6 may save up to 10% in the transportation sector, 10-35% in the home sector, 35-40% in the public sector, 10-30% in services, and 5-25% in industry and commerce.

Existing building stock has significant energy-saving potential. Buildings now absorb almost half of the energy in the Western Balkans. Estimated energy savings in buildings range between 20% and 40%, with the public sector (35–40%) having the largest potential, followed by the residential sector (10–35%). According to the Energy Community, savings from public buildings and homes alone may total €805 million by 2020.

The energy retrofitting of buildings is the untapped source of energy savings potential. Buildings in the WB6 countries are responsible for a major part of final energy consumption, ranging from 30% in Bosnia and Herzegovina to almost 50% in FYR Macedonia.

The World Bank has developed an assessment framework based on the five major building blocks deemed necessary for the development of an efficient building stock: (i) legislation, (ii) policies and regulations, (iii) market characteristics, (iv) financing and implementation, and (v) capacity building and awareness.

As with heating devices in individual households, there seems to be consensus among international development bodies that “financing energy efficiency (EE) in buildings varies considerably across different sectors. The private sector (individuals, households, and businesses) appears to have well-functioning markets, where consumers can easily borrow funds for EE and other investments.”⁴² Private sector is again marked as having well-functioning markets. However, high rates of energy poverty in the region might prove that those market mechanisms are not sufficient to improve overall energy efficiency in WB6.

2.4. Heating Devices and Energy Poverty

People with lower socio-economic status are typically more exposed to air pollution, because they reside in high-traffic areas and near pollution sources, such as power plants and industrial sites. Furthermore, most impoverished individuals work “dirty” jobs that require professional exposure to fumes, particulate matter, gases, and heavy metals.

⁴¹ Western Balkans: Directions for the Energy Sector, World Bank, 2018

⁴² DISCUSSION PAPER by the Energy Community Secretariat on Riding the Renovation wave in the Western Balkans Proposal for boosting energy efficiency in the residential building sector, 2021

Energy prices in the Western world have always had a genuine economic value, which was not the case in the former Eastern bloc nations. As a result, during the last fifteen years, prices in this region have steadily risen to a realistic market level, trapping far too many people in poverty. Because of the historically cheap energy prices, construction and heating technologies in the past period did not prioritize energy conservation. Families which live in aged buildings spend a lot of money on heating – up to 30-40% during the winters. Low-income households suffer a disproportionate share of the burden of wasteful energy consumption. As the majority of low-income households already struggle to pay their expenses, they are forced to choose between “eating or heating.”⁴³

Low thermal efficiency in dwellings, especially when paired with a lack of social support, has a negative impact on health and quality of life. Households that cannot afford appropriate levels of energy use (often for heat and hot water) either fall into energy debt and risk being disconnected by the utility supplier, or drastically cut their consumption. Either option involves difficulty, exposure to health hazards, and feelings of social alienation - all of which exacerbate the vicious spiral of social isolation.

In addition, several of WB6 countries have some of the harshest winters in the area, with heating seasons extending up to seven months. The extent of fuel poverty is exacerbated even more, since many inhabitants have resorted to using “dirty” fuels and inexpensive stoves, which are polluting, and have a detrimental impact, on indoor air quality and health. Wet and cold dwellings can put residents at risk of respiratory, cardiovascular, allergy-related, and infectious conditions, as well as psychological stress and even cold-related fatalities.

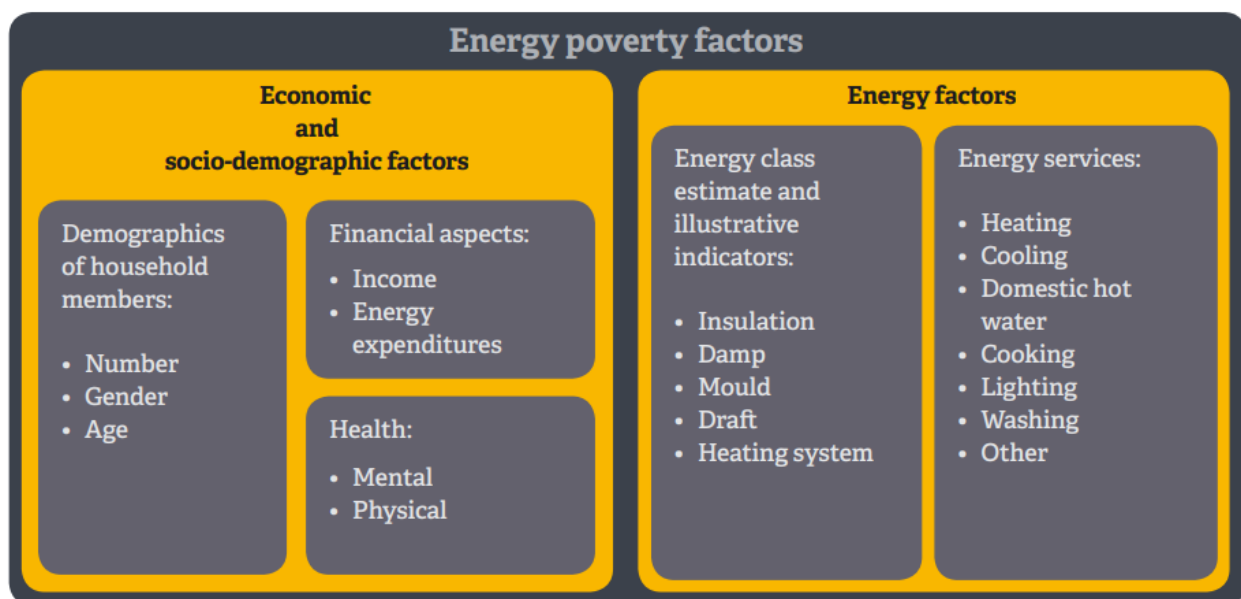
The European Commission estimates that in Western Balkans at least 50 % of the population spends more than 10% of their net income on energy – thus falling within the standard definition of fuel poverty⁴⁴. Energy poverty is the inability of a household to “secure adequate amounts of energy in the home, allowing it to keep living spaces adequately warm and well lit, to have access to a needed range of energy services, and to be able to afford a sufficient amount of energy for everyday requirements”⁴⁵. Energy poverty is a complex issue with many factors determining whether a family will be facing adverse impacts or not (Figure 12).

Figure 12: Factors describing energy poverty

⁴³ <https://getwarmhomes.org/energy-efficiency/battling-energy-poverty/>

⁴⁴ https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/financial_assistance/ipa/2016/ipa_ii_2016_037-900.10_mc_reep_plus.pdf

⁴⁵



Source: Energy Poverty in SEE: Surviving the Cold, 2016

Energy tariff changes and hikes, on the other hand, are a very sensitive subject for the public, particularly for vulnerable social groups. The average proportion of family income spent on energy by the region's lowest income decile was around 14%, over double the global average of 4–8%, making them especially sensitive to energy price increases. Rises in energy prices have the potential to exacerbate energy poverty in the region, and as such, they should be paired with targeted social support and compensation measures for economically vulnerable socioeconomic groups.⁴⁶

A 2019 ECS study⁴⁷ of direct and indirect subsidies to coal-based electricity generation in the Western Balkans found out that total direct and indirect subsidies totaled to €150 million annually and €336 million annually, respectively, on average over the 2015-2017 period.

Table 9: subsidies to coal-based electricity generation in WB5, 2015-2017

Country	2015-2017 Total	2015-2017 Average
Bosnia and Herzegovina	99.04	33.01
Kosovo*	47.16	17.72
North Macedonia	2.74	0.91
Montenegro	11.03	3.68
Serbia	287.1	95.7
Total	447.07	149.02

Source: Energy Community Secretariat

Apart from indirect subsidies through coal-based electricity production, WB6 countries provide incentives or rebates for final energy consumption of energy vulnerable customers. Even though EU countries have

⁴⁶ Sustainable Energy and Human Development in Europe and the CIS, UNDP, 2014

⁴⁷ Rocking the Boat: What is Keeping the Energy Community's Coal Sector Afloat?, Energy Community Secretariat September, 2019

started abolishing regulated prices for end-users⁴⁸, WB6 countries still have a financial support system within the energy sector, providing discounts on the network tariff, social tariffs, or rebates. **Table X** provides an overview of direct electricity subsidies to households in WB6 countries.

Table 10: Direct electricity subsidies to households in WB6 countries

	Number of users	Total Funds	Annually per user
Albania	213,000	14,313,600 €	67.20 €
Bosnia and Herzegovina	35,000	4,300,000 €	122.86 €
Kosovo*	21,000	4,500,000 €	214.29 €
Montenegro	20,318	3,310,000 €	162.91 €
North Macedonia	20,000	1,309,620 €	65.48 €
Serbia	75,000	11,100,000 €	148 €
WB6	384,318	38,833,220 €	101.04 €

Source: Compiled by the author based on the best-available public data and estimates

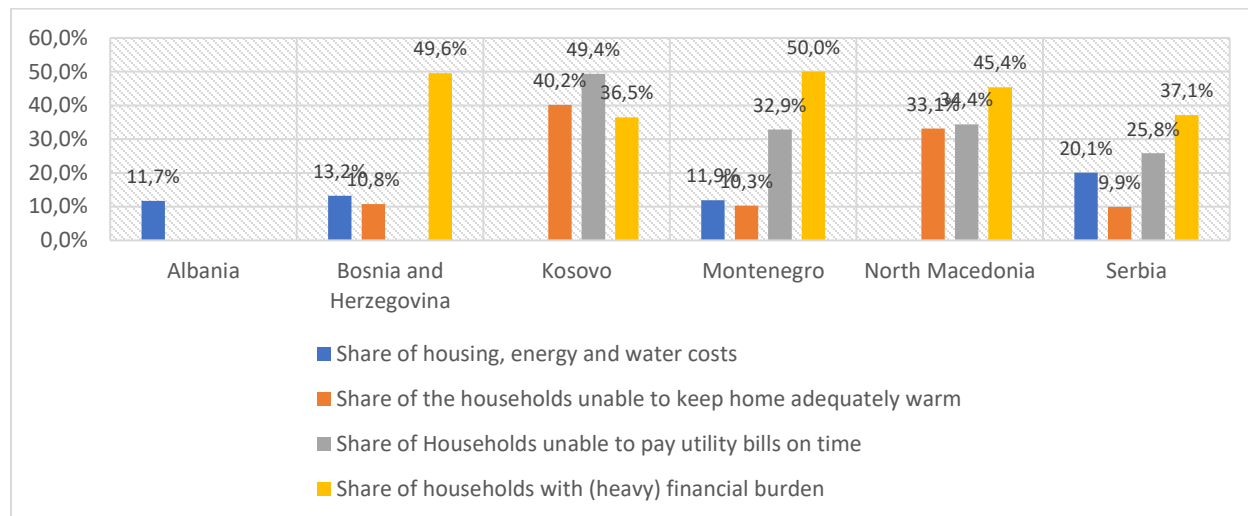
Direct electricity subsidies are provided to over 380 thousand households in WB6, with the total amount of subsidies provided annually estimated at 38.8 million €. Removing these subsidies, as expected in the future, will inevitably increase final energy prices, putting even more cost pressure on vulnerable groups.

Vulnerable groups are those who, according to the economic and socio-demographic and energy indicators linked to their households, have a higher probability of becoming energy poor than the general population. Available statistical data show that the share of vulnerable households varies from 10% to 40% of total households in WB6 countries. There are several statistics and indicators that can aid researches in assessing the share of vulnerable groups, such as share of housing costs, ability to keep house warm, significance of financial burden, ability to pay utility bills on time, unemployment rate, access to clean cooking, share of population below national poverty line, or at risk of poverty and social exclusion.

Households unable to pay utility bills (heating, electricity, gas, water, etc.) on time, due to financial difficulties are far more frequent in the WB6 region than in the EU. This is visible the most in Bosnia and Herzegovina, Montenegro, and Kosovo*, where almost half of the households are unable to pay their utility bills on time. This issue will continue to have a significant impact, as the end-use energy prices in the region continue to grow, due to removal of market-distorting policies (such as subsidized prices) for energy products. The share ranges from 25% in Serbia, to 49.4% in Kosovo*.

⁴⁸<https://olc.worldbank.org/system/files/123444-ESM-P158779-PUBLIC-ESMAPEnergySubsidyReformCountryBriefSerbia-1.pdf>

Figure 13: Share of housing energy and water costs, and households that are unable to keep home warm, WB6

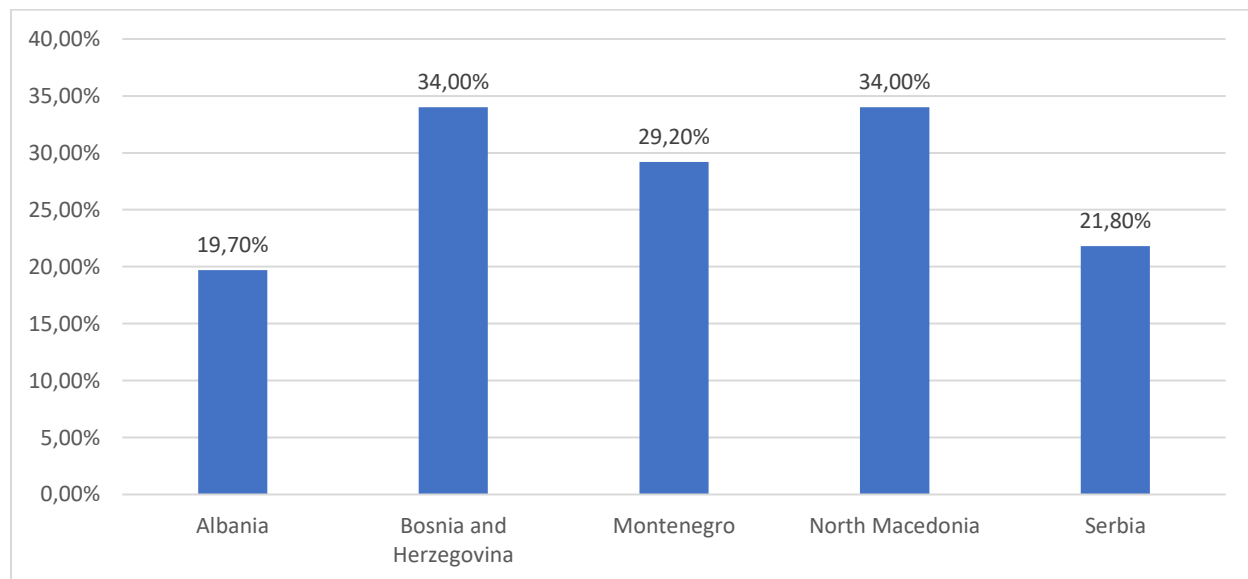


Source: Eurostat. Latest available data used for compiling

In Bosnia and Herzegovina, Kosovo* and Serbia, share of population which is unable to keep home adequately warm is at 10% level, while it is significantly higher in North Macedonia (33%) and Kosovo* (40.2%). In all WB6 countries, for which the data available, the share of households with financial or heavy financial burden is above 35%, rising to 50% in Montenegro and Bosnia and Herzegovina.

Access to clean cooking, usually related to use of inefficient firewood stoves, is still an issue for 20% to 35% of households in WB6. This share can also indicate the number of inefficient stoves in use in WB6.

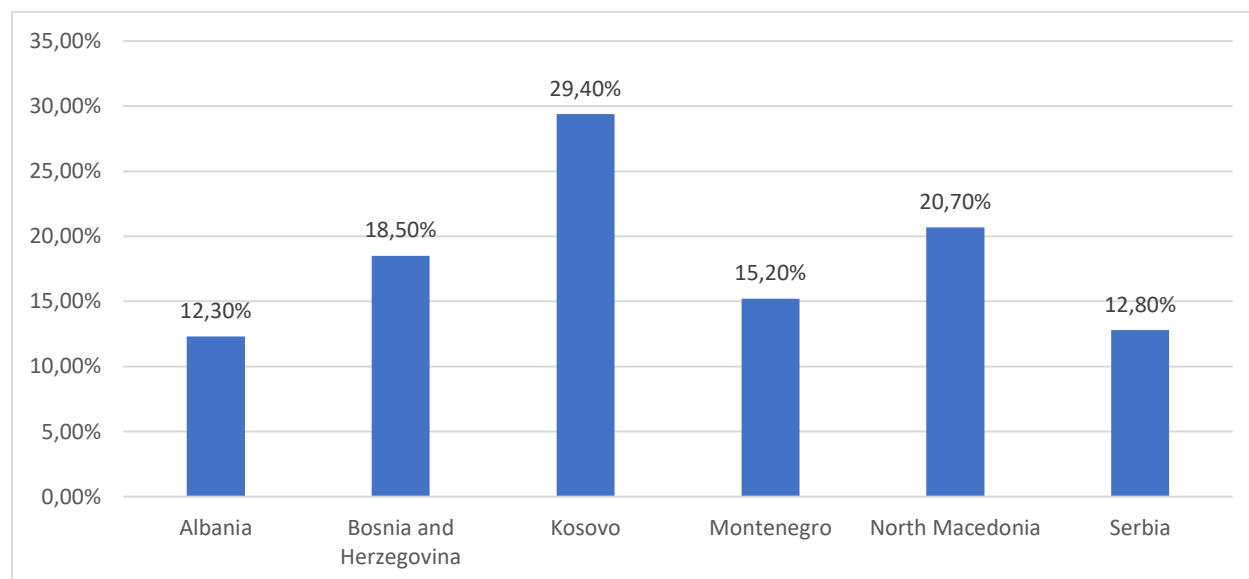
Figure 14: SDG 7.1. Proportion of population without access to clean cooking, 2018



Source: <https://www.iea.org/countries>; Montenegro 2016, data World Bank. No data available for Kosovo*.

There are no data available for Kosovo* in terms of clean cooking available. However, it is safe to assume that the share of population without access is higher than in most, if not all, WB6 countries. Paired with record unemployment rates (29.4%) it represents a big obstacle in improving household heating and living conditions of vulnerable groups in Kosovo*. Lowest recorded unemployment rate in 2018 was recorded in Albania (12.3%). It is important to note that Covid-19 impact on regional economies has placed a further stress on employment, especially in Montenegro, where official unemployment estimates are expected to spike due to sharp downfall of the tourism sector.

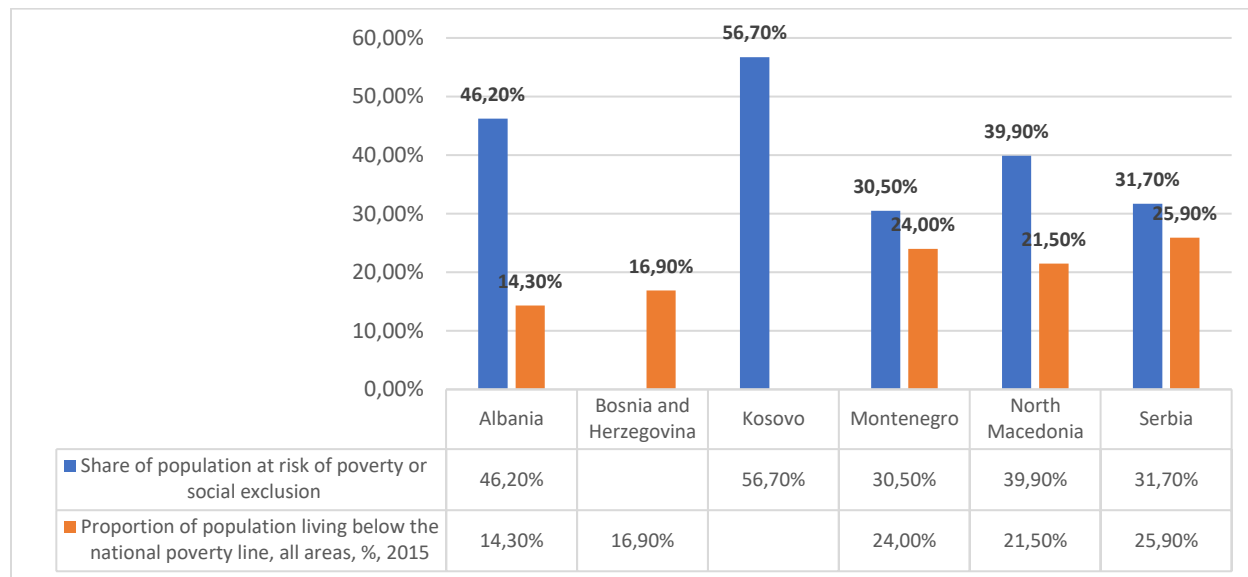
Table 11: Unemployment rates (persons aged 15-74 years), 2018



Source: Eurostat (online data codes: ifsa_ergan and une_rt_a)

National and Eurostat data indicate that the share of population living below the national poverty line ranges from 14.3% in Albania to 25.9% in Serbia (2015 data). Eurostat’s composite indicator, showing the share of population at risk of poverty or social exclusion, estimates vulnerable groups in WB6 at 30.5% to 56.7% of total population.

Figure 15: Share of population at risk of poverty or social exclusion, Proportion of population living below the national poverty line



Source: Risk of poverty: Eurostat 2018, except Kosovo* (2017); Poverty line: UNSD 2015, except Albania (2012)

With over 40% of WB6 population financially incapable of improving their own energy efficiency position (deteriorating houses, inefficient heating and cooking devices, inefficient fuel use), significant efforts need to be invested by national and international institutions, especially in terms of providing (grant) finances and technical support.

2.5. Heating Devices and Air Pollution

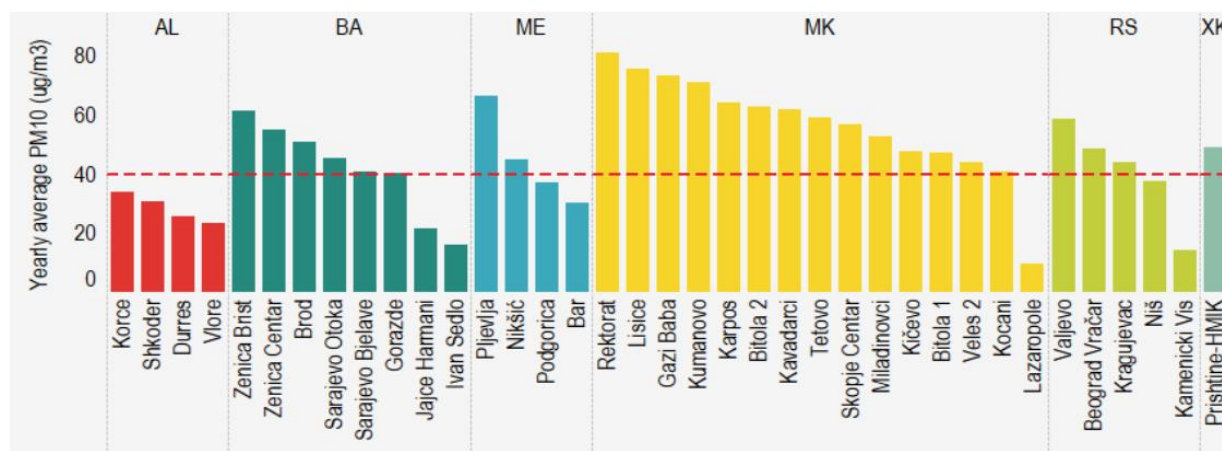
The overall efficiency and quality of decentralized heating services is low and results in high indoor emissions. Despite their wide use for heating and cooking, firewood stoves are inefficient and produce high levels of smoke and indoor pollution. Stoves are produced domestically in Bosnia and Herzegovina, North Macedonia, and Serbia. These stoves generally do not comply with EU certification standards. The widespread use of firewood (usually harvested in the months preceding winter) with little or no drying results in the loss of 40% to 50% of the energy content. Emissions of particulate matter (PM) from leaky and inefficient firewood stoves are high in comparison to modern efficient stoves. This leads to negative health consequences for households, and contributes to air pollution in urban areas. Poor air quality is already an important concern in urban areas across the region, especially in large cities such as Belgrade, Pristina, Sarajevo, Skopje, and Užice.

Decades old coal-fired thermal power plants are responsible for the large majority of the SO₂ and NO_x pollution, as well as particulate pollution to some extent. However, the majority of the particulate pollution comes from private households in the region which rely on firewood or coal stoves and ovens as the main heating source. Most of the devices in use, even when new, are inefficient, consume disproportionately high amounts of fuel, and emit large quantities of polluting substances.

Residential sector contributes to air pollution in several ways. Since 1990, residential sector has decreased in total CO₂ emissions, from 13.2% to 5.9% of total CO₂ emissions from fossil fuel combustion and processes in the WB6 region⁴⁹. According to the JRC report and the data available from the air quality monitoring stations in WB countries, the annual PM₁₀ level is above the limits set in the legislation in almost all WB countries except Albania. The highest concentrations and the largest number of stations with values above the limits are found in North Macedonia, especially in Skopje, Lisice and Kumanovo sites, as can be seen from the data available (Figure 16).

⁴⁹ Status of air pollutants and greenhouse gases in the Western Balkans, Joint Research Center (JRC), 2020

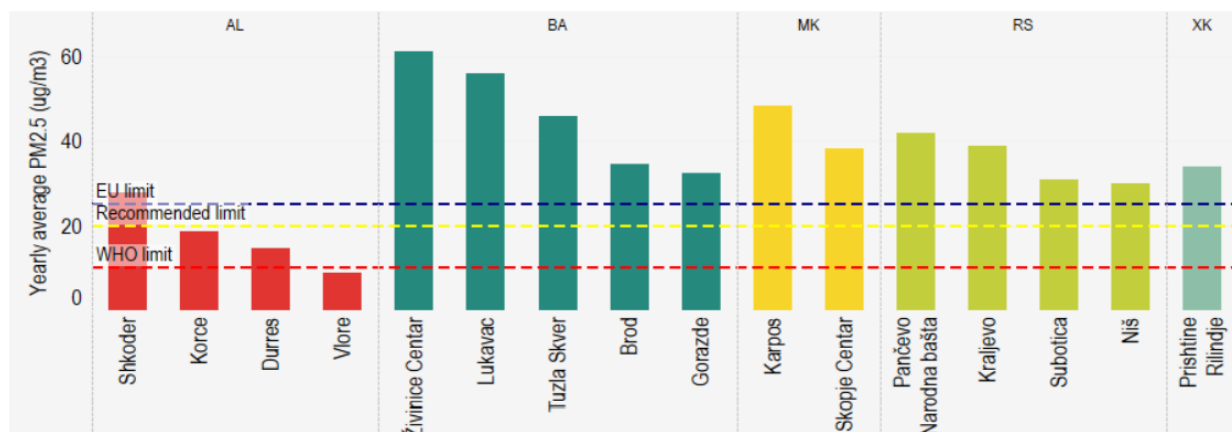
Figure 16: Yearly average PM10 concentration (aerosol) in the WB region, 2017



Source: Joint Research Center (JRC), 2020

The PM2.5 annual average is above the limit of 25 µg/m³ in the majority of the WB6 air quality stations reporting to Eionet for 2017. The highest 2017 average yearly level of PM2.5 was reported for Živinice Centar (BA) station, 61.3 µg/m³ (Fig 17). Moreover, concentrations are above the WHO annual limit of 10 µg/m³ in all stations except Vlora (AL) station.

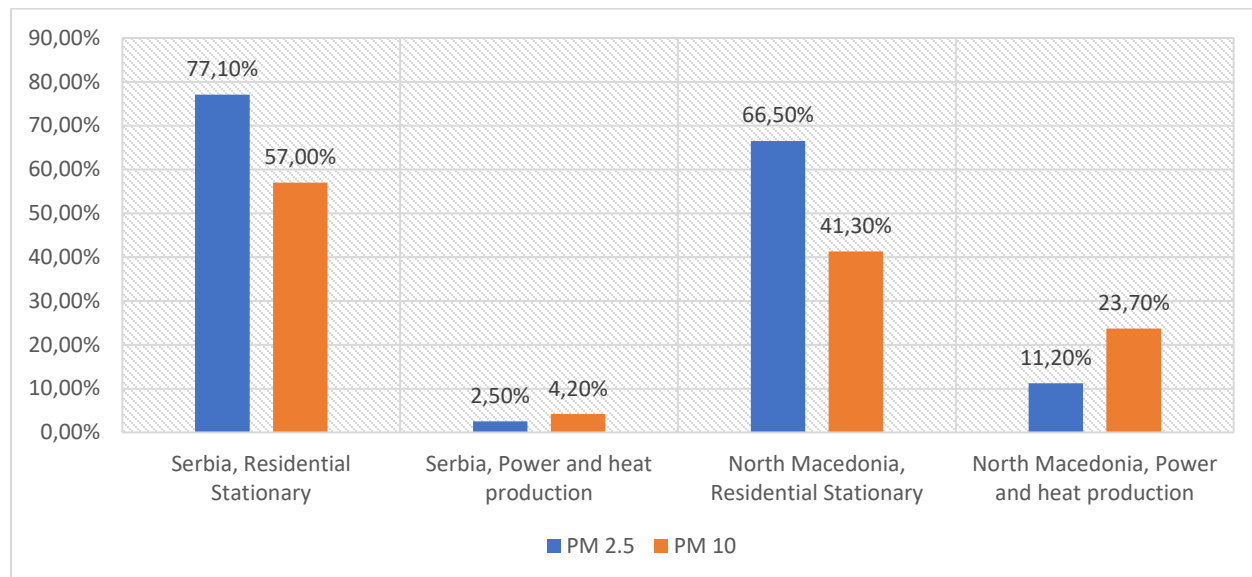
Figure 17. Yearly average PM2.5 concentration (aerosol) in the WB region, 2017



Source: Joint Research Center (JRC), 2020

Complete and accurate data on air pollutant emissions are still missing for the entire WB region. So far, Serbia and North Macedonia are the only nations in the region that have provided estimates of particle pollution and its sources. Their findings back up the assertion pointing to the residential sector as the primary source of particle pollution. The data has been made public in their national report submissions National report submissions under the Convention on Long-Range Transboundary Air Pollution.

Figure 18: Share of particulate pollution caused by residential and power sectors in Serbia and North Macedonia in the total particulate pollution



Source: National report submissions under the Convention on Long-Range Transboundary Air Pollution in 2020 by Serbia and North Macedonia

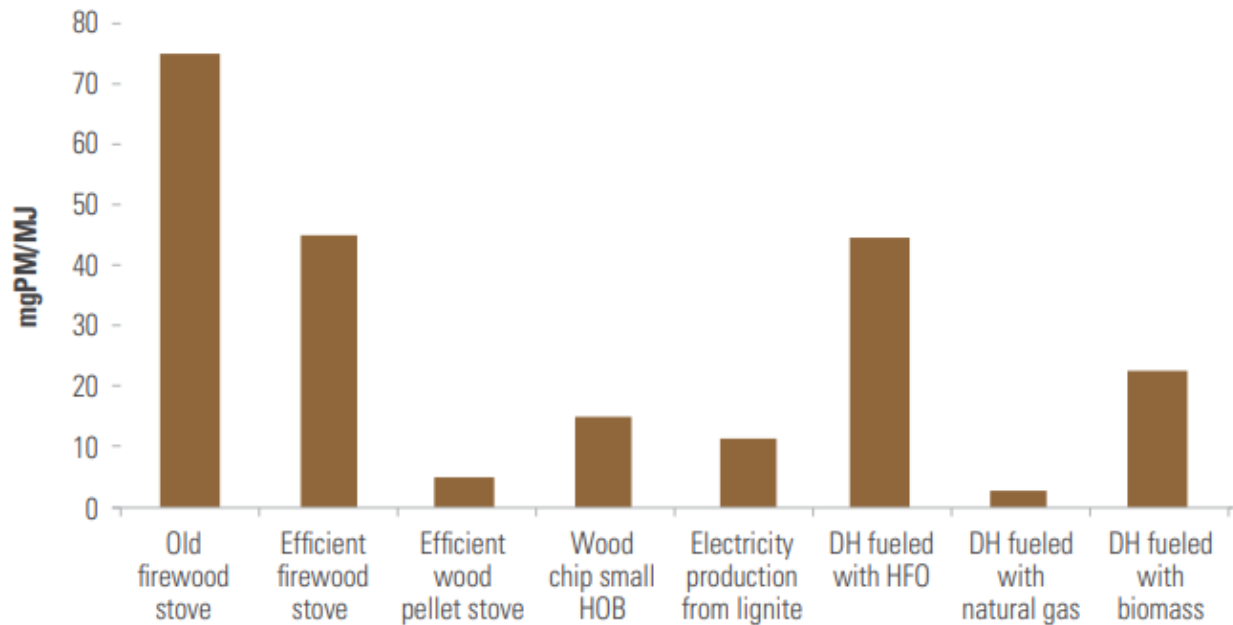
Residential sector in Serbia was source 77.1% (29.72kt) of PM 2.5 and 57% (29.72kt) of PM 10 emissions, while in North Macedonia reported share of residential sector had less influence, but still significant: 66.5% (29.72kt) of PM 2.5 and 41.3% (29.72kt) of PM 10 emissions. Power and heat production had more significant impact on PM emissions in North Macedonia. The rest of the PM emissions can mostly be attributed to transport emissions, tyre and road use, and agriculture emissions.

Burning fuels in small-scale heat appliances leads inevitably to PM emission. However, emissions largely vary between various small scale heat appliances. World Bank 2017 report estimates annual emissions of PM, from different heating appliances and heating fuels (Figure 18). The report concludes that even though (energy) efficiency of the appliance is an important factor of the system, the primary source of PM emissions is the fuel in use for combustion⁵⁰. The replacement of inefficient wood stoves with efficient wood stoves or pellet stoves in stand-alone dwellings reduces PM emissions significantly, report estimates. Similar case is with dwellings in multi-apartment buildings, which are not connected to district heating: the use of pellet stoves would reduce PM emissions compared to heat-only boilers that combust fossil fuels.

In most situations, however, replacing electric heating equipment with efficient wood and pellet stoves or biomass HOBs will result in greater PM emissions. Aside from comparisons to the most relevant alternatives in each use case, it is also essential to note that in an economic analysis, the effects of greater PM emissions in specific biomass use cases are countered by lower CO₂ emissions.

⁵⁰

Figure 19: Specific Emissions of Particulate Matter from Different Heating Appliances and Fuels



Source: Biomass-Based Heating in the Western Balkans – A Roadmap for Sustainable Development, World Bank, 2017

Factors for biomass-heating appliances in the report were adopted from “Analysis and Action Plan for Education on Optimal Combustion in Residential Heating”, Government of Macedonia, 2014, as follows: traditional wood stoves—75 mg/MJ, efficient wood stoves—45 mg/MJ, efficient pellet stoves—5 mg/ MJ, modern wood chip boiler—15 mg/MJ; adopted emission factors for fossil fuels DH combustion: lignite— 11.1 mg/MJ, HFO—44.5 mg/MJ, natural gas—2.89 mg/MJ.

Residential heating with wood is a sector in which PM2.5 emissions can potentially be reduced with greater cost– effectiveness than many other emission reduction options.

2.6. Cost of Status Quo

Having performed analyses presented in previous chapters, we have identified or estimated all relevant elements of the energy sector that contribute and influence heating in individual dwellings, and the impact that energy consumption (primarily heat) of individual dwellings has on the energy sector. This includes:

- Policy and implementation framework in place;
- Structure and values of energy supply and demand;
- Impact of energy sector on air pollution and related health costs;
- Renewable energy potential;
- Structure and values of energy consumption in dwellings in WB6, with estimates for each country;
- Structure and total number of heating devices/solutions and sources in use;
- Status of vulnerable groups in energy sector;
- State of the energy efficiency in the WB6 building;
- Contribution of subsidies in the energy consumption;
- Impact of heating devices on air pollution.

The information collected and estimated is used in this chapter to estimate the total costs to WB6 nations which are created through heat consumption in the residential sector. Costs can be valued from two perspectives: costs for the economy, and costs facing end-users. These costs, which have been directly evaluated in current research, include:

- Cost of subsidies to energy production (primarily coal-based);
- Cost of energy resources used (excess energy spent, excess resources used);
- Cost of air pollution (premature deaths, health-related costs – hospital costs).

There are also other related costs which are harder to estimate, but to which the current heat consumption in WB6 contributes, such as mental health of the population (anxiety, depression), nutrition, environmental protection, social incentives, etc. These costs are not evaluated in this study.

Having in mind all of the above elements influencing, and being influenced by, heating in dwellings in WB6, assessment of available financing options for improving heating in households must take all of these elements into account, without focusing only on one specific element (i.e., heating devices) of the finance support.

Chapter 3 will provide the assessment of available financing options and their focus, having in mind identified elements of household heating.

Chapter 5 will provide the roadmap for using resources more efficiently in order to reduce these costs, utilise existing funds and resources more effectively, and recommending alternative forms of financing.

Cost-impact attributable to the inefficient heating in households in WB6 is summarised in Table 11. Key findings show:

- Total number of premature deaths in the region attributable to PM2.5 emissions from WB6 households is estimated at 24,756 premature deaths;

- Even though it is hard to put a price on a human life, statistical and economical valuations are available. Estimations based on WHO report lead to total of 26,8 billion € costs (value of statistical life) of premature deaths caused by PM2.5 from WB6 households;
- Annual excess energy costs, which could be saved if the efficiency of heating devices was in line with EU regulations, are estimated at 688.5 million €;
- Annual Excess GHG Emissions Costs are estimated at 2.9 million €;
- Wood is being used inefficiently in household heating in WB6 due to poor efficiency of heating devices. Annual savings in wood, if more efficient devices were in use, would result in lower wood costs by 112.8 million € in the region;
- Health (hospital) costs due to household PM2.5 emissions, when monetized, are estimated to be at 368.1 million € annually in WB6;
- Direct energy subsidies consumed in households (through coal-produced electricity, and provided directly to vulnerable groups) amount to 178.3 million € in WB6;
- Total annual costs of inefficient and inadequate household heating in WB6 are estimated at 1.17 billion €, in addition to the estimated total statistical value of life of premature deaths;
- The total cost estimated is undervalued, as not all costs related to inadequate household heating were included in the analysis.

Table 11: Costs attributable to the inefficient heating in households in WB6

	Albania	Bosnia and Herzegovina	Kosovo*	Montenegro	North Macedonia	Serbia	WB6
Number of premature deaths attributable to households PM2 emissions ⁵¹	2,998	5,279	2,276	537	2,528	11,138	24,756
Cost of mortality - Value of Statistical Life ⁵²	2,551,726,860 €	4,322,079,223 €	1,855,991,855 €	597,936,515 €	2,449,607,130 €	15,027,264,342 €	26,804,605,924 €
Total annual costs attributable to inefficient and inadequate household heating							
Annual Excess Energy Cost ⁵³	40,000,000 €	202,800,000 €	170,000,000 €	36,100,000 €	107,800,000 €	131,800,000 €	688,500,000 €
Annual Excess GHG Emissions Costs ⁵³	280,000 €	783,000 €	712,000 €	142,000 €	422,800 €	556,000 €	2,895,800 €
Annual Saved Wood ⁵³	12,800,000 €	35,800,000 €	13,000,000 €	6,500,000 €	19,300,000 €	25,400,000 €	112,800,000 €
Annual PM2.5 Annual Damage from Households - Monetization of health impacts (costs) ⁵⁴	6,400,000 €	37,300,000 €	114,400,000 €	7,000,000 €	46,700,000 €	156,300,000 €	368,100,000 €
Annual Total	59.480.000 €	276.683.000 €	298.112.000 €	49.742.000 €	174.222.800 €	314.056.000 €	1.172.295.800 €

⁵¹ Current (2021) estimates by the author, based on the data by WHO study “Economic cost of the health impact of air pollution in Europe”, 2015.

⁵² Value of Statistical Life (VLS) is the tradeoff rate between fatality risk and money. It is the value placed on changes in the likelihood of death, or simply the opportunity cost of life prematurely lost. Based on the WHO data, VLS for WB6 countries have been estimated, and then multiplied by annual premature deaths estimates. Estimated VLS for WB6 countries are: Albania - \$1.106.486; Bosnia and Herzegovina - \$1.064.350; Kosovo - \$1.060.000; Montenegro - \$1.448.193; North Macedonia - \$1.259.936; Serbia - \$1.753.906.

⁵³ Biomass-Based Heating in the Western Balkans – A Roadmap for Sustainable Development, World Bank, 2017

⁵⁴ Estimates based on the data from 2016 HEAL technical report “Health Impacts of Coal Fired Power Stations in the Western Balkans”

In contemporary studies, reports, policy paper and recommendations analysed so far, the emphasis on the road to solution of the issues analysed in this report (air pollution, energy poverty, energy efficiency, etc) has primarily been on the introduction or improvement of network energy systems (district heating, gas supply, etc). However, these solutions have so far failed in providing significant improvement to eliminating energy poverty, and health consequences of inadequate heating in the region. Even though these solutions have long-term viability and could impact large groups of population, they require significant investments and long implementation periods. Until such, or more advanced, solutions are in place, people living in WB6 will still breathe polluted air and continue to suffer tremendous costs.

Solution that seems obvious, but has not been in the policy-makers focus so far, is the replacement of inefficient heating devices in individual households (dwellings) in WB6 countries. The replacement of inefficient heating devices requires low-level investments in the replacement of the device, which makes individual replacements more feasible. Having in mind that most of PM2.5 attributed premature deaths and health costs come from indoor pollution, replacing individual heating devices would lead to significant improvement to the quality of life of people living in those households.

One of the primary reasons that this problem was, presumably, not tackled enough so far lies in the effort needed to replace all of the inefficient heating devices. Conservative estimates show that there are over **1.7 million inefficient stoves, furnaces and heat-only boilers in WB6** that need to be replaced with more efficient and health-friendly devices, or with heating devices which use a different fuel. The **investment needed is estimated at 1.4 billion €**, including the installation costs where needed. Upper end estimates are **2.4 million** inefficient heating devices, and 2 billion € of investments needed.

Comparing the investment needed (1.4bn €) to the annual costs incurred by inadequate household heating (1.17bn €), it is clear that it results in **positive return on investment almost within a single year**, without including the estimated costs of premature deaths.

With the monetary resources for the replacement seemingly insufficient, this report aims to:

- evaluate the finance sources and mechanisms already available for the replacement of inefficient heating devices;
- evaluate the finance schemes readily available, but not eligible to be used for the replacement of heating devices;
- estimate effectiveness and efficiency of existing finance mechanisms and subsidies;
- estimate the value of total monetary funds currently available, but not eligible for heating-devices-replacement;
- provide alternative solutions, suggestions for improvement of existing mechanisms, and best-case examples;
- provide recommendations for support activities;
- estimate impacts of the proposed replacement scenarios.

Finance schemes are analysed on three levels, based on the origins of finance: public (national, regional, local), retail, and development support (international donor activities).

Fulfilling the aims of the report will provide policy makers with cost and impact estimates of their potential actions, as well as recommendations on how to achieve the goal of more efficient energy consumption and better living conditions for the population of WB6.

2.7. Key Findings

- Only 12% of households in the region (including Croatia) are connected to district heating, making the rest of 88% of the households in Western Balkans the single largest heating consumer group in the region⁵⁵. With Croatia excluded, share of households with district heating drops below 10%;
- There are 5.3 million dwellings with heating in use in WB6, of which 3.3 million (61%) in stand-alone houses and 2.1 million (39%) in multi-apartment buildings (MABs).
- Most of these households that use decentralised heating systems are using (inefficient) heating systems, such as stoves, furnaces and heat only boilers (66.3%);
- There are over 1.8 million stoves and over 1.7 million heat-only boilers in heating use in WB6 countries dwellings;
- Heating (space heating, water heating, cooking) makes up 84.05% of total energy consumption in WB6 households (6,349 ktoe). Space heating is estimated at 4,733 ktoe, or 74.55% of total heat energy consumption, followed by water heating (955 ktoe, 15.03%) and cooking (661 ktoe, 10.42%);
- In addition to the widespread use of coal, renewables and wastes (primarily biomass) are the most important heating source in WB6, with the share of 49.7% of the energy required for heating;
- Up to 50% of biomass used in households in WB6 is unregistered in the official consumption;
- Biomass is used inefficiently, due to outdated heating equipment and lack of wood drying prior to use, which results in high particulate matter emissions;
- The share of annual household expenditure on heating and electricity is very high, with most of the WB6 exceeding the energy poverty line;
- Over 40% of WB6 population financially incapable of improving their own energy efficiency position;
- Particulate matter is the primary source of premature deaths caused by air pollution worldwide, and the case of WB6 is even more striking;
- The annual PM levels are above the limits set in the legislation in almost all WB6 countries except Albania;
- Total number of premature deaths in the region attributable to PM2.5 emissions from WB6 households is estimated at 24,756 premature annual deaths; total annual costs of inefficient and inadequate household heating in WB6 are estimated at 1.17 billion €;
- There are over 1.7 (up to 2.4) million inefficient stoves, ovens and heat-only boilers in WB6 that need to be replaced with more efficient and health-friendly devices;
- The investment needed for the replacement of inefficient heating devices is estimated at 1.4 billion € at lower end, to 2.4 billion € at upper end;
- Residential heating with wood is a sector in which PM2.5 emissions can potentially be reduced with greater cost– effectiveness than other emission reduction options;
- Inadequate household heating and its consequences have not received enough attention from policy makers and regulators;

⁵⁵ https://www.developmentaid.org/api/frontend/cms/uploadedImages/2019/06/Air-Quality-and-Human-Health-Report_Case-of-Western-Balkans_preliminary_results.pdf

- High rates of energy poverty in the region prove that market mechanisms (retail finances) are not sufficient to improve overall energy efficiency;
- Financial schemes in the sector, focused on the needs of the most vulnerable groups, need to be devised and implemented.

3. Assessment of Financing Options for Replacement of Inefficient Household Heating Devices in WB6

Financing energy efficiency, decrease in energy poverty and air quality is still a major challenge for all WB6 countries. Despite the residential sector being the largest energy consumer in all of the countries in WB6, and the proven positive effects that investment in the sector provide, a significant share of improvement potential in the residential sector is still not being realised. Financial resources for the replacement of inefficient heating devices seems scarce in the public sector, not adjusted to the needs of households, in the retail sector, and not in the primary focus of international development support.

Most of the experience with building energy efficiency has been limited to donor-led projects in the public sector, with limited scale. These projects have demonstrated cost savings of 30% to 45% building, with payback periods of 6 to 8 years⁵⁶. However, these and other projects have suffered from several limitations, primarily limited replication of pilot and demonstration programs and lack of sustainability of project implementation models. Some credit lines have also been initiated for residential sector EE with some success among wealthier households. Public financing options for the residential sector have mostly been implemented on the local level.

To identify financing options for replacement of inefficient household heating devices in WB6, following research activities were performed:

- Existing studies and reports on the topics were analysed;
- Web-sites of international, national and regional institutions were analysed;
- Websites of all municipalities in WB6 region (492) were visited, data was collected and structured;
- Information on public funding options was double checked, to avoid duplicity/repeated actions, and only energy-efficiency and heating-devices related schemes were left to be analysed;
- Websites of all retail banks and leasing companies in the region were visited and analysed;
- Search-engine research was performed, based on 14 fundamental phrases, with adjustment of each phrase to the search focus (national, regional level, or the addition of the municipality name to the search terms).

3.1. Public Financing Options (National-Regional-Local)

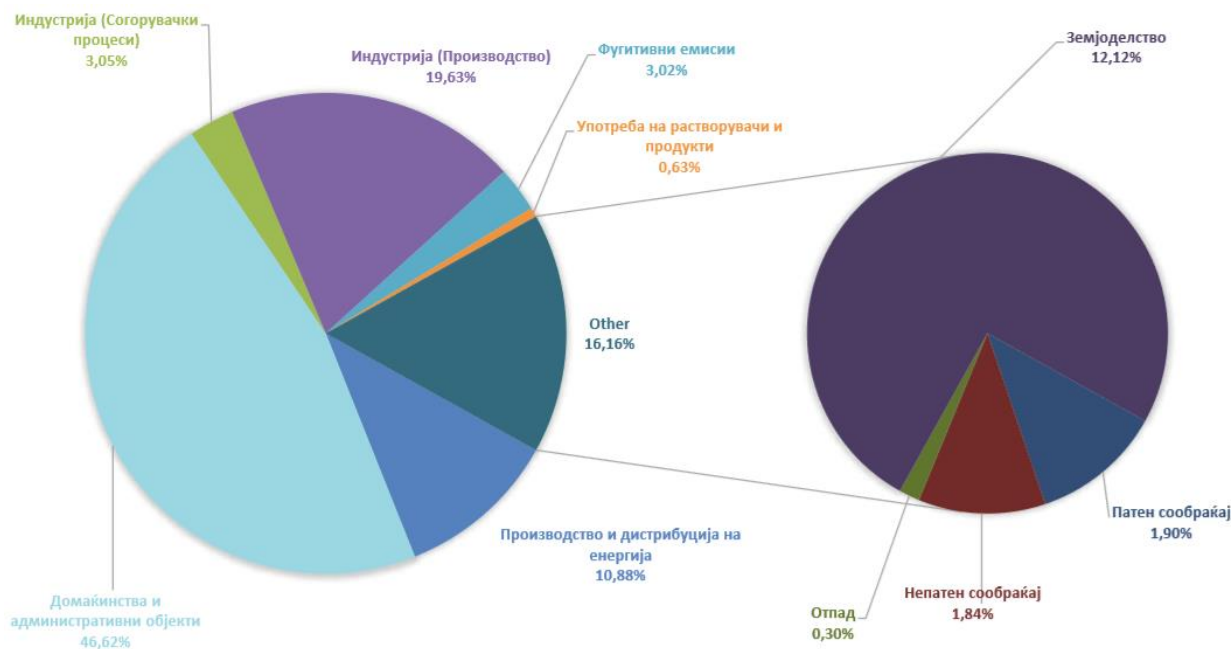
Some of the WB6 countries have established national-level institutions and tools to foster the energy transition and energy efficiency. However, most of the focus of these institutions (Energy Efficiency Revolving Fund in Kosovo*, both funds in Bosnia and Herzegovina, Energy Efficiency Agency in Albania, Montenegro EE project, SEIES project in Serbia, etc.) has been on public buildings retrofits, while improvements in the residential sector were mostly due to efforts of the local authorities.

⁵⁶ Western Balkans: Directions for the Energy Sector, World Bank, 2018

On the **national level**, only North Macedonia and Serbia have national programmes supporting replacement of inefficient household heating devices, with the Serbian programme just started in 2021. However, both programmes are implemented through local self-government units (municipalities, cities).

The Government of **North Macedonia** has performed thorough analysis before starting its support program, with air pollution being the primary reason behind the initiation of the programme. The first step towards solving the pollution problem was determining the sources of pollution. For that purpose, the Ministry of Environment and Physical Planning, the City of Skopje and other relevant institutions, have made a series of analyses and studies. According to these studies it is estimated that around 90% of the total emissions of PM particles come from heating (firewood). This is illustrated in the next graph for PM2.5 particles⁵⁷:

Figure 20: PM10 emissions in 2016 by sectors, North Macedonia



Source: Environmental quality in the Republic of Macedonia - Annual report for 2017

Although these studies show the concentrations of pollutants and indicate which are the sources that pollute the most, they were not sufficient for proper planning and realization of successful activities at the micro level, because they did not contain data on the causes of pollution. Further surveys were done to identify primary causes of pollution, with one of the most influential being residential heating. These findings paved the road for set-up of the national Program for Reduction of Air Pollution, with 9 priority areas. One of the priority areas is **the reduction of emissions of polluting substances from household warming**. As it was identified as the largest source of pollution, most activities are implemented in this sector. The activities aimed to achieve several goals, of which following focus on heating devices:

- 10,000 households connected to the existing heat exchanger (BEG). The hot water network is expanded;

⁵⁷ <https://vlada.mk/node/15965?ln=en-gb>

- **20,000 households will change old non-ecological wood stoves with more efficient wood stoves;**
- **20,000 households will purchase inverter air conditioners for heating;**
- 10,000 households will improve the energy efficiency of homes;
- About 3,000 households will join the gas;
- 2,000 households from socially vulnerable categories were subsidized to change the way of heating, through a specially designed support mechanism.

The total funds available for the replacement of the heating devices is estimated at **10 million EUR** in subsidies. This programme will later be reflected in the funds available at the local level. Subsidies for the procurement of high-efficiency inverter air conditioners were handed to 5,200 households in Skopje, 2,500 households in Bitola, 1,500 households in Tetovo, and 800 households in Kičevo. Recent reports show that the results are visible – Skopje has in 2020 reported the cleanest air in the last seven winter seasons. The programme has also helped pave the road for other municipalities in North Macedonia, but also in other WB6 countries, to follow.

In **Serbia**, until 2021, several municipalities (i.e., Užice, Priboj) have utilized the national public calls for funding, managed by the Ministry of Environmental Protection of the Republic of Serbia, to implement actions for decrease of air pollution coming from individual households. However, it is only in 2021 that the national-level programme was established, through “Public call for allocation of funds for financing the Program of energy rehabilitation of residential buildings, family houses and apartments implemented by local self-government units”⁵⁸. The call focuses on three areas: insulation of buildings (i); heating technologies (ii); solar collectors for water heating (iii). Initially, the allocated funds (450,000 EUR) were marked as “not enough” by local experts, followed by the fear that the public expectations might have risen high but that the funds are not enough to satisfy the needs and growing public expectations. With a projected 1.000 EUR investment per recipient, it would (only) target 450 beneficiaries. Over 80 local self-governments applied, leading the Ministry to accept all eligible applications (67 in total) and increase the total available funds to 1,9 million EUR. Having in mind that our estimates showed that Serbia needs over 1 million heating devices being replaced, 1.900 doesn’t seem like much to start with, but it is certainly a positive trend forward. Additionally, if the effects of the action prove visible, it will almost certainly lead to additional investments in the future. Increased funds might instigate the largest cities in Serbia, Belgrade and Novi Sad, to also apply for funding. The announcements are encouraging: 100 million EUR for 2022⁵⁹. Having in mind the limited funds per local self-government (83.000 EUR), it is recommended that city-municipalities, a lower level of administration within cities in Serbia, to also be eligible for funding. This would also reduce the friction needed to implement the program on a 2-million population scale, with a single administration unit behind it. North Macedonia focused most of its efforts on its highest polluted city – Skopje. Serbia’s highest polluted city did not receive funding this year.

Another big difference in comparison to the programme in North Macedonia is the cost-sharing of the action between the national funds and households. While in North Macedonia Government provided 100% of the funds for the replacement of heating devices (with inverters), in Serbia Government and local

⁵⁸ <https://www.mre.gov.rs/lat/aktuelnosti/javni-pozivi/javni-poziv-za-dodelu-sredstava-za-finansiranje-programa-energetske-sanacije-stambenih-zgrada--porodicnih-kuca-i-stanova-koji-sprovode-jedinice-lokalne-samouprave--jp-2-21>

⁵⁹<https://balkangreenenergynews.com/rs/objavljen-spisak-opstina-i-gradova-u-kojima-ce-gradani-dobijati-subvencije-za-energetsku-efikasnost/>

self-government units provide 50% of individual investment – the rest is provided by the citizens/households. Having in mind the high share of vulnerable groups in total population, the reach of the programme is limited to households that can afford participating in it. There is still a large portion of the population which would not be able to afford 50% of the total costs, and this share of population is arguably the share that needs the funding the most. Positive feature of the programme is that it offers a systemic solution – it offers improvement in both building energy efficiency, and the heating source efficiency and emissions-reduction. Heating boilers are eligible only if the heat fuel is wood biomass, natural gas, or liquid oil gas.

Several of the municipalities have already published the calls for citizens, which will be reflected in the analysis of the funds on the local level, but most are expected to be published during the August of 2021. If this study was to be done the following year, the results of the public financing available on the local level would be much different.

Even though some financing schemes for the replacement of heating devices have already existed on the municipal level, it was needed for national authorities to provide fundings and support to tackle this issue in a way that can provide country-wide positive impacts. This is as expected, as most of the local municipalities have limited funds available, and a large portion being already significantly indebted.

Table 12: Highlights of national heat-devices replacement schemes in North Macedonia and Serbia

	North Macedonia	Serbia
Positive highlights	<ul style="list-style-type: none"> ● Pioneer in the region; ● 100% subsidized replacement; ● Highest polluted areas targeted; ● Considerable funds for the pilot action; 	<ul style="list-style-type: none"> ● Systemic solution, including other energy efficiency tools; ● Increase in funds available due to significant demand; ● Announcements for 2022 funds
Areas to Improve	<ul style="list-style-type: none"> ● Offer other heating solutions, apart electricity-based ones (with most of electricity production being coal-based) ● Focus on vulnerable groups 	<ul style="list-style-type: none"> ● Focus on vulnerable groups; ● Increase share subsidized by public funds, especially for vulnerable groups; ● Focus on most polluted areas.

On the **regional level within a country**, only in **Bosnia and Herzegovina** have there been some financing schemes available provided by regional (cantonal) authorities. Other countries do not have regional level public financial schemes in place, apart from the regional authorities participating (occasionally) in awareness raising activities. Four Cantons in Bosnia and Herzegovina have provided funding schemes which can be used for improving energy efficiency. Only one of those is focused primarily on the replacement of inefficient household heating devices. These cantons and financing schemes are presented in the table 13:

Table 13: Cantonal energy and environmental funding schemes aimed at households

Canton	Funding Scheme
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Tuzla Canton	<p>Public call for co-financing of measures to decrease air pollution in Tuzla canton, aimed at natural persons/households</p> <ul style="list-style-type: none"> ● 250,000 EUR available; 1,000 EUR per applicant ● 50% subsidy; ● Doesn't target vulnerable groups; ● Focuses solely on replacement of inefficient heating devices; ● Pellet heat boilers are the single subsidized option.
Sarajevo Canton	<p>Model for improving Energy Efficiency in Sarajevo Canton, for stand-alone and multi-apartment households</p> <ul style="list-style-type: none"> ● Free-of-charge energy audit and project documentation for beneficiaries; ● Option for commercial funding with partner banks, in which case 3% of annual interest rate is subsidized; ● Energy efficiency measures, but can include heating solutions; ● 45% subsidy; ● No focus on vulnerable groups.
Hercegovina-Neretva Canton	<p>Housing, construction, renovation of individual houses</p> <ul style="list-style-type: none"> ● War veterans and their families are the beneficiaries; ● Focused on basic living conditions in households; ● Energy efficiency and replacing or procuring heating devices are not envisaged, but are eligible; ● 150,000 EUR available.
Posavska Canton	<p>Environmental Protection Projects</p> <ul style="list-style-type: none"> ● Heating devices not eligible; ● Not focused on households – public institutions and CSOs; ● 137,500 EUR available

On the **local (municipal) level**, there has been a significantly higher activity level in the field of residential energy efficiency and heating. As previously stated, national programmes in North Macedonia and Serbia have had significant influence on the image painted at the local level – these countries have the most of the region's heating-devices local replacement schemes in place (table 14). Funding schemes focused solely on replacement of heating devices, or on the improvement of energy efficiency, are not the only locally available funding schemes which are available to households.

Poor financial capacity is a significant hurdle for many local governments, whose budgets are too small to undertake substantial investment initiatives, due to limited territory or a low population. On the other hand, tight regulations for public budgeting limit municipalities' and local governments' borrowing capacity.

As we have already identified the energy subsidies to vulnerable consumers in WB6 (chapter 2.4), we will not include them in the current analysis of financial schemes. Our focus is primarily on the financing options that can, or could, be used for the replacement of heating devices.

Over 800 financing schemes (relevant to energy efficiency, air pollution, vulnerable groups, heating) were identified at the municipal level in WB6 countries. After the screening of the schemes was performed, the list was cut down to 380 financing schemes in place. Detailed overview for each WB6 country is presented in the [table 14](#).

Table 14: Overview of potential financing sources for the replacement of heating devices, municipal level

	Housing, Construction, Adaptation	EE in Households, without Heating Device eligibility	EE in Households, with Heating Device eligibility	MABs Facades & Roofs	MABs Adaptation and EE	Fuels for Heating	Heating Devices only	Other
Albania	13	3		1				2
Bosnia and Herzegovina	22	4	1	11		4	1	3
Kosovo*	9	2	2			3		2
Montenegro			1	3		1		1
North Macedonia			2	2	2	1	16	1
Serbia	190	1	8	5	4	28	4	1
WB6	234	10	14	22	6	37	21	10

Apart from local financing schemes targeting only the replacement or procurement of the heating devices, of which most are located in North Macedonia and Serbia due to impact of national-level programmes, some other financing schemes were identified: Housing, Energy efficiency (with or without eligibility of heating devices), multi-apartment buildings (total energy efficiency treatment, or focus on facades and roofs), and procurement of fuel for heating of households.

Housing, including construction of new housing units, procurement of housing units, or their renovation, are the most common finance schemes in the region. This is the most influenced by Serbia (190 local public calls or schemes), followed by 22 schemes in Bosnia and Herzegovina. Housing schemes are focused on vulnerable groups (refugees, internally displaced persons, single mothers, war veterans and their families, Roma population, and others). They usually provide only basic financial support for establishing basic living conditions in the household. None of these schemes include energy efficiency or heating systems in their descriptions. Even though individual funds awarded to households are limited (1,000-15,000 EUR range), their scope and availability makes them an ideal tool for reaching wide range of vulnerable groups. However, since local administrations have limited budgets, additional financing should be provided, accompanied with technical assistance to municipalities. Including energy efficiency, heating and air pollution measures in these schemes could significantly contribute to reduced air pollution and better living conditions of vulnerable groups in the region.

Energy efficiency schemes for multi-apartment buildings (MABs) are also provided by municipalities (38 in total). However, these schemes focus primarily on insulation of the buildings and repair of the roofs (22) in which heating devices are not among eligible actions. There are also energy efficiency actions for MABs that are not limited only to facades/insulation and roofs. Most of these schemes are found in Serbia

(4) and North Macedonia (2). There are no available schemes for MABs in Kosovo*, with only three in Montenegro and one in Albania. These schemes are attractive solutions for reducing air pollution and improving energy efficiency/heating in individual households, as they can target multiple households with a single heating solution provided for the building. Total available funds in this category range from 10,000.00 EUR to 330,000.00 EUR, with individual funds awarded ranging from 2,500 EUR to 16,500 EUR per MBA.

Heating fuel subsidies are the most common in Serbia (28 out of 37 total), and to some extent in Bosnia and Herzegovina (4) and Kosovo* (3). Most of these subsidies are provided to vulnerable groups, usually through social service institutions. With few occurrences of gas subsidies, all of these heat-fuel subsidies are related to firewood. As an existing tool in place, it could potentially be used to provide the heat fuel to groups which replaced their heating devices from firewood to other heating sources (pellet, wood chops, etc). With many WB6 families, especially in rural areas, using freely collected wood, or using wood from their own forests, it will be a difficult process of transferring to an alternative fuel. Heating fuel subsidies can help during the transition period.

There are 24 financial schemes, on the municipal level in the region, which support **energy efficiency in individual houses (stand-alone buildings)**. These schemes can be found in all WB6 countries. However, out of these, only 14 schemes provide the eligibility for heating devices. Overview of EE financial schemes that can be used for procuring/replacing/upgrading heating devices is provided in **Table 15**.

Table 15: Overview of EE financial schemes for stand-alone buildings, with heating devices eligibility

Country	Municipality/Town	Type	Minimum own contribution	Total Available funds	Individual Funds
BIH Federacija	Centar, Sarajevo	Subsidy	50.00%	50,000.00 €	n/a
Serbia	Mali Zvornik	Subsidy	50.00%	n/a	n/a
Montenegro	Pljevlja	Subsidy	n/a	500,000.00 €	n/a
North Macedonia	Bogovinje	Subsidy	50.00%	100,000.00 €	1,000.00 €
North Macedonia	Tearce	Subsidy	50.00%	100,000.00 €	1,000.00 €
Serbia	Sremska Mitrovica	Subsidy	50.00%	n/a	n/a
Serbia	Užice	Subsidy	50.00%	450,000.00 €	1,000.00 €
Serbia	Gornji Milanovac	Subsidy	50.00%	33,000.00 €	1,000.00 €
Serbia	Kula	Subsidy	50.00%	n/a	n/a
Serbia	Nova Varoš	Subsidy	50.00%	16,500.00 €	n/a
Serbia	Dimitrovgrad	Subsidy	30.00%	71,500.00 €	3,300.00 €
Serbia	Dimitrovgrad	Subsidy	50.00%	n/a	n/a
Kosovo*	Pristina	Subsidy	n/a	n/a	n/a
Kosovo*	Pristina	Subsidy	n/a	n/a	n/a

In Serbia, most of the subsidies are related to the national heat-devices replacement scheme, meaning that the 50% of total funds is provided by the Government of Serbia. In Montenegro, the project in Pljevlja is supported by UNDP. In North Macedonia, both finance schemes in this category are supported jointly by UNDP and SDC.

There are 21 financial schemes, identified on the municipal level in the region, with the **sole focus on the procurement or the replacement of inefficient heating devices in individual households in stand-alone buildings**. Most of these schemes are found in North Macedonia (16) as a result of the national heating-devices replacement scheme, implemented through municipalities. The overview of these financial schemes is provided in Table 16.

Table 16: Overview of EE financial schemes for stand-alone buildings, with primary focus on inefficient heating devices

Country	Municipality/Town	Type	Minimum own contribution	Total Available funds	Individual Funds
BIH Federacija	Tuzla	Subsidy	50.00%	250,000.00 €	2,500.00 €
North Macedonia	Bitola	Subsidy	70.00%	41,500.00 €	330.00 €
North Macedonia	Gostivar	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Kavadarci	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Kičevo	Subsidy	0.00%	826,000.00 €	1,000.00 €
North Macedonia	Kočani	Subsidy	0.00%	10,000.00 €	166.67 €
North Macedonia	Ohrid	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Prilep	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Probištip	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Skopje - Aerodrom	Subsidy	50.00%	n/a	250.00 €
North Macedonia	Skopje - Butel	Subsidy	0.00%	1,800,000.00 €	1,000.00 €
North Macedonia	Skopje - Gazi Baba	Subsidy	30.00%	25,000.00 €	500.00 €
North Macedonia	Skopje - Šuto Orizari	Subsidy	70.00%	n/a	416.67 €
North Macedonia	Skopje - Šuto Orizari	Subsidy	0.00%	n/a	1,000.00 €
North Macedonia	Tetovo	Subsidy	0.00%	1,500,000.00 €	1,000.00 €
North Macedonia	Veles	Subsidy	70.00%	n/a	250.00 €
North Macedonia	Veles	Subsidy	30.00%	n/a	250.00 €
Serbia	Niš	Subsidy	50.00%	145,000.00 €	1,666.67 €
Serbia	Novi Pazar	Subsidy	50.00%	51,500.00 €	700.00 €
Serbia	Priboj	Subsidy	40.00%	41,500.00 €	600.00 €
Serbia	Trgovište*	Subsidy	0.00%	1,500.00 €	300.00 €

Almost all of these financial schemes are targeting the replacement or procurement of inefficient heating devices. The only exception is Trgoviste (image right) in Serbia, where five inefficient stoves are awarded to vulnerable families. Even though these families have certainly experienced the increase in living conditions, in comparison to before the award of the stoves, this cannot be considered a good practice, as these stoves will, as we have learned, lead to significant health consequences for these families.



Total funds which could potentially be used to replace inefficient heating devices are estimated at 45.7 million EUR (Table 17). However, in order for these funds to be utilized, improvements in local policies and procedures need to be done. The end goal is to make procurement of efficient heating devices an eligible cost in these schemes. Even then, we can only presume that only a share of these funds would be considered as a realistic existing potential for the procurement/replacement of heating devices in households. The estimates provided show us that 14.7 million EUR is being used in the public sector to finance procurement or replacement of heating devices, with additional 2.5 million EUR of potential resources in place, if the eligibility criteria would change.

Table 17: Potential financial resources for the replacement of heating devices in WB6

	Housing, Construction, Adaptation	EE in Households, without Heating Device	EE in Households, with Heating Devices	MABs Facades & Roofs	MABs Adaptation and EE	Fuels for Heating	Heating Devices only	Other
Albania	2,200,000 €	300,000 €	150,000 €	100,000 €	20,000 €	0 €	40,000 €	400,000 €
Bosnia and Herzegovina	3,200,000 €	300,000 €	450,000 €	600,000 €	80,000 €	50,000 €	350,000 €	650,000 €
Kosovo*	1,100,000 €	150,000 €	440,000 €	40,000 €	20,000 €	25,000 €	50,000 €	200,000 €
Montenegro	200,000 €	200,000 €	360,000 €	200,000 €	60,000 €	20,000 €	20,000 €	150,000 €
North Macedonia	200,000 €	50,000 €	500,000 €	160,000 €	200,000 €	20,000 €	12,000,000 €	400,000 €
Serbia	13,300,000 €	250,000 €	1,500,000 €	350,000 €	60,000 €	150,000 €	2,300,000 €	2,200,000 €
WB6 Total Potential in use	20,200,000 €	1,250,000 €	3,400,000 €	1,450,000 €	440,000 €	265,000 €	14,760,000 €	4,000,000 €
Realistic potential share	5.00%	10.00%	30.00%	5.00%	5.00%	0.00%	100.00%	5.00%
Realistic potential in use	1,010,000.00 €	125,000.00 €	1,020,000.00 €	72,500.00 €	22,000.00 €	0.00 €	14,760,000.00 €	200,000.00 €

Depending on the size of individual grants provided, heating system selected, and the co-financing share, the realistic potential resources in use can enable WB6 countries to replace heating devices in **26.000 to**

43.000 households in the region annually. If we compare this number to 1.7 million heating devices in need of replacement (low end estimate), it is clear that public financial schemes are not sufficient to solve the problem. **Even if we take low end estimate for the number of heating devices, and high-end estimate of current annual replacement, it would take almost 40 years for WB6 countries to replace all of the targeted heating devices.**

3.2. Retail Financing Schemes in WB6

WB6 countries have limited public finances and fiscal room to allow for adequate investments to improve heating in households. Thus, currently, the private sector is expected to play key role in the improvement of household heating in the WB6. Involvement of private sector could be a success factor that provides access to private sector management practices, capital markets, and more efficient technologies. Key challenge is in making such schemes affordable, accessible and appropriate to WB6 circumstances and people. Private sector participation may come in different forms, such as heat entrepreneurship, public-private partnerships, energy service companies (ESCOs), local energy communities, or through leasing arrangements. However, almost in its entirety, WB6 private financing sector is bank-dominated.

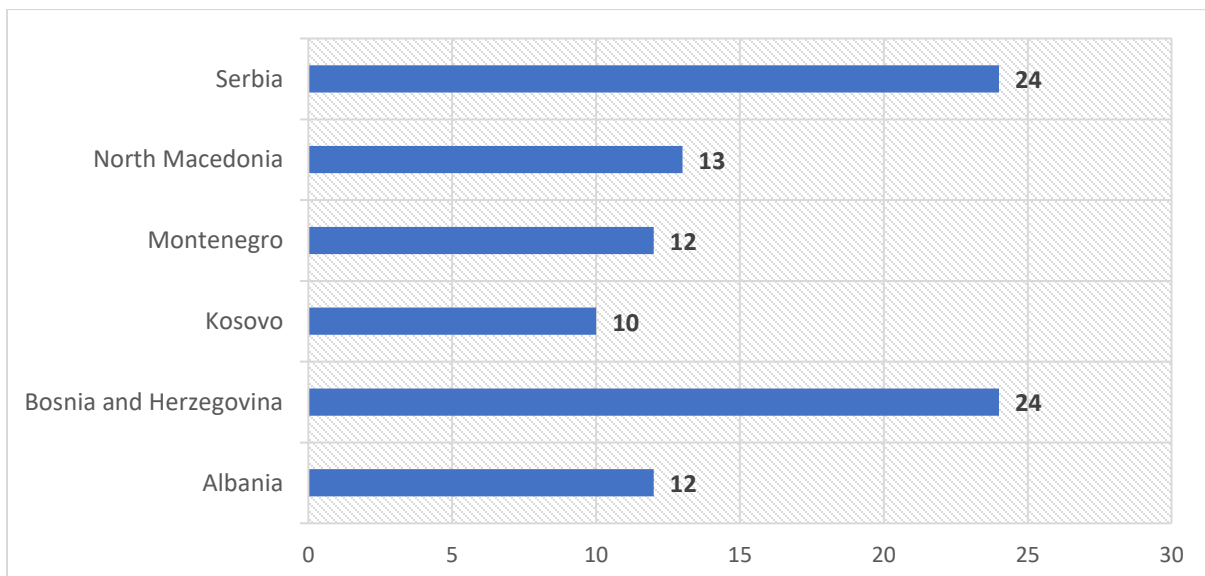
Donors and development institutions were essential in opening the market in recent years, through the provision of long-term funding, technical assistance, and incentives. They still provide most of the available funding to commercial banks. Some commercial banks fund their own energy efficiency initiatives, albeit in smaller volumes, and often after an initial learning phase using official funding and technical assistance. Most facilities rely on local implementing agencies or financial intermediaries to identify and implement projects using funds provided by the facilities.

In general, availability of financing is not considered to be the biggest impediment to increasing energy investments in the region. However, WB6 circumstances and significant share of vulnerable and energy poor groups in the region make these schemes inaccessible to nearly half of the population in WB6.

3.2.1. Overview of Retail Financing Schemes in WB6

Retail finance sector is a fast moving one, with constant changes, improvements, and new financial schemes in place.

Figure 21: Number of retail banks in WB6, 2021



This was also proven to be the case during the data collection for this report: we have started with the list of 106 retail banks in WB6 countries, but this number was shortened by 11 banks. Some of the banks have bankrupted, while some others merged. We have analysed 95 banks in total, with over 200 retail finance products/schemes, that can be used by eligible citizens to acquire a new heating device. These products reflect the state of the markets, and we have classified them into following groups, providing detailed information on each group (Table 18)⁶⁰:

- Cash loans, mostly available in Serbia, Bosnia and Herzegovina, and Montenegro;
- Non-purpose consumer loans, mostly available in Albania and North Macedonia;
- Renovation loans, often marketed jointly with the housing loans;
- Loans targeting vulnerable groups;
- Loans targeting energy efficiency and the replacement of heating devices.

Cash loans and consumer loans (table 19) are, in its essence, the same – they have no purpose specified, and the funds can be used freely by the customer. These are the most widely available type of loans, used for most of the purchases, and are provided by over 95% of analysed banks. The rest are the banks focusing on the commercial sector. The terms for lending are market driven, and reflect market trends in WB6 countries and in the region. Average nominal interest rates range from 4.19% (lowest 0%, for the purchase at partner companies) to 10.29% (highest 16,95% for short-term cash loan). Loans can go up to 32,000 EUR on average, with the highest ceilings being at 300,000 EUR (but in that case they require a collateral). These loans can last anywhere from 1 to 240 months.

Renovation loans (table 20) are focused on providing funds to renovate a living space, and in all cases the introduction of heating systems or devices is eligible for the costs. In terms of interest rates, they are more accessible than consumer/cash loans, and are usually associated with longer repayment periods. The terms for lending are market driven, and reflect market trends in WB6 countries and in the region. These loans are offered by 41.1% of banks in the WB6. They require mortgage insurance, and are thus not accessible to the large share of vulnerable groups, which are associated with higher risk, have low income, and mostly don't have a collateral to offer. However, if subsidized, these loans could contribute positively, as they have the potential to solve several customer issues at the same time (living conditions, energy efficiency, clean energy, etc). Consumers in most of the countries in the region have a wide selection of renovation loans to choose from, apart from North Macedonia where it is being offered as a scheme by only two retail banks. Average nominal interest rate ranges from 4.70% to 6.03%, with lowest and highest recorded being 1.9% and 15%.

Loans targeting vulnerable groups (Table 21) are, in fact, almost exclusively focused on pensioners. They rarely provide better terms than regular cash or consumer loans, since the target group is ageing population associated with higher risk, which often does not have access to other financial schemes. Some benefits these loans provide are life insurance, no administration fees, or rebates with bank partners. Having this in mind, these loans do not actually provide additional benefits or better lending terms for the vulnerable groups, they rather adjust the scheme to the higher risk associated with this group. In case of other vulnerable groups, the banks are mostly acting as intermediaries between consumers and public institutions providing soft loans (with lower interest rates). Pensioner loans have usually fixed interest rates, averaging 9.13% to 10.12%, with lowest rate at 4.7%, and highest at 16%.

⁶⁰ Nominal interest rates are used for comparison, since Effective interest rates are not provided in some cases.

Loans targeting energy efficiency and/or replacement of heating devices are almost exclusively supported or initiated by international finance partners to local banks, the leading one being EBRD GEF which supported all but three out of 16 loans in this group. One was supported by KfW, while two were self-initiated market loans provided by the banks. Nominal interest rate ranges, on average, from 4.68% to 6.29%, with the lowest being at 3.3%, and highest at 13.95%. Commercially offered loans have higher interest rates than the ones supported by GEF or KfW, which are usually set at 4.4%-4.9%, with some deviations among banks. These loans are financially on the same level of accessibility to end consumers as cash/consumer and renovation loans. However, loans supported by GEF and KfW provide up to 20% of the eligible costs, making them more accessible to vulnerable groups, and families with low income. Our estimate is that in reality, these blended finance schemes are still not accessible enough to vulnerable groups and that the higher share of total investment should be refunded, in order to target vulnerable groups. At its current state these schemes are attractive enough to sway consumers that would hesitate to invest, if it wasn't for the subsidy, but have already considered investing in energy efficiency and heating improvements. This group most likely has the financial resources to enter into loan arrangement with positive return on investment, but the subsidy part makes the decision-making process easier.

Table 18: Overview of the retail finance sector in WB6; financial products feasible for replacement of heating devices

Country	No. Banks	Cash Loan	%	Consumer Loan	%	Renovation Loan	%	Targeting Vulnerable Consumers	%	Targeting EE and HD	%	Good Practice	%
Albania	12		0.00%	11	91.67%	9	75.00%	1	8.33%	2	16.67%	1	8.33%
Bosnia and Herzegovina	24	19	79.17%	9	37.50%	7	29.17%	14	58.33%	4	16.67%	4	16.67%
Kosovo*	10	3	30.00%	6	60.00%	5	50.00%	2	20.00%	2	20.00%	1	10.00%
Montenegro	12	12	100.00%	3	25.00%	5	41.67%	8	66.67%	2	16.67%	1	8.33%
Northern Macedonia	13	1	7.69%	11	84.62%	2	15.38%	6	46.15%	4	30.77%	3	23.08%
Serbia	24	22	91.67%	4	16.67%	10	41.67%	11	45.83%	2	8.33%	2	8.33%
Grand Total	95	57	60.00%	44	46.32%	38	40.00%	42	44.21%	16	16.84%	12	12.63%

Table 19: Overview of cash loans for replacement of heating devices in WB6

Country	No. Of Banks	Average Min Duration	Average Max Duration	Average low Nominal Interest %	Average upper Nominal Interest %	Average Min Amount	Average Max Amount
Albania	-	-	-	-	-	-	-
Bosnia and Herzegovina	19	6.43	132.63	3.85%	7.92%	490.00 €	24,722.22 €
Kosovo*	3	13.00	95.50	5.95%	10.95%	0.00 €	17,500.00 €
Montenegro	12	4.43	90.00	6.81%	10.49%	808.33 €	22,454.55 €
Northern Macedonia	1			8.33%			1,000.00 €
Serbia	22	8.48	67.36	7.66%	12.05%	725.66 €	47,079.37 €
Grand Total	57	7.42	95.87	6.12%	10.29%	680.24 €	32,389.94 €

Table 20: Overview of consumers loans for replacement of heating devices in WB6

Countries	No of Banks	Average Min Duration	Average Max Duration	Average low Nominal Interest %	Average upper Nominal Interest %	Average Min Amount	Average Max Amount
Albania	11	6.00	91.64	4.36%	11.58%	1,256.20 €	17,920.74 €
Bosnia and Herzegovina	9	1.00	70.67	4.55%	6.92%	300.00 €	16,285.71 €
Kosovo*	6		100.80			500.00 €	22,500.00 €
Montenegro	3	6.50	28.00	0.00%	0.00%	100.00 €	4,333.33 €
Northern Macedonia	11	7.20	98.82	3.85%	7.93%	262.50 €	23,636.36 €
Serbia	4	7.50	56.75	8.41%	11.59%	122.22 €	11,111.11 €
Grand Total	44	6.44	82.47	4.19%	9.00%	527.65 €	18,140.04 €

Table 21: Overview of renovation loans for replacement of heating devices in WB6

Countries	No of Banks	Average Min Own Contribution	Average Min Duration	Average Max Duration	Average low Nominal Interest %	Average upper Nominal Interest %	Average Min Amount	Average Max Amount
Albania	9	22.50%		200.00	4.01%	5.84%	4,400.00 €	127,516.07 €
Bosnia and Herzegovina	7			162.86	4.34%	6.00%	6,250.00 €	142,142.86 €
Kosovo*	5	20.00%		120.00	6.00%		10,000.00 €	66,000.00 €
Montenegro	5		9.00	192.00	6.15%	7.48%	5,500.00 €	116,000.00 €
Northern Macedonia	2			120.00	8.50%		10,000.00 €	30,000.00 €
Serbia	10	12.00%	16.20	288.00	3.77%	5.87%	5,000.00 €	264,285.71 €
Grand Total	38	15.33%	13.80	200.53	4.70%	6.03%	6,294.44 €	141,789.85 €

Table 22: Overview of loans for replacement of heating devices in WB6, targeting vulnerable groups

Countries	No. of Banks	Average Min Own Contribution	Average low Nominal Interest %	Average upper Nominal Interest %	Average Min Amount	Average Max Amount	Average Min Duration	Average Max Duration
Mothers	1		4.90%	9.25%	500 €	10,000 €	6.00	72.00
Pensioners	36	0.00%	9.13%	10.12%	381 €	13,945 €	8.79	81.36
Pensioners; Parents with child social subsidy	1	0.00%	0.00%	5.25%	83 €	1,250 €	1.00	24.00
Refugees and war veterans	1				2,500 €	7,500 €	12.00	60.00
Socially Vulnerable Groups	3		3.00%	4.20%	5,000 €	75,000 €		300.00
Grand Total	42	0.00%	8.33%	9.31%	989 €	17,757 €	8.45	94.88

Table 23: Overview of loans for Energy Efficiency and the replacement of heating devices in WB6

Countries	No. of Banks	Average Min Own Contribution	Average low Nominal Interest %	Average upper Nominal Interest %	Average Min Duration	Average Max Duration	Average Min Amount	Average Max Amount
Albania	2	80.00%	3.40%	9.00%	6	102		50,000.00 €
Bosnia and Herzegovina	4	80.00%	4.87%	4.87%		120		29,750.00 €
Kosovo*	2	80.00%				120		
Montenegro	2	80.00%				120		50,000.00 €
Northern Macedonia	4	80.00%	4.83%	4.93%	6	156	200.00 €	36,666.67 €
Serbia	2	80.00%	5.29%	9.83%	6.5	83	416.67 €	29,166.67 €
Grand Total	16	80.00%	4.68%	6.29%	6.25	122.43	308.33 €	37,106.06 €

3.2.2. Retail Financing Products for EE and Heating Devices

With 11 banks in the region providing EBRD GEFF supported loans, EBRD is a key development partner in supporting retail financing of energy efficiency in Western Balkans. All of the banks implementing the programme are receiving funding from EBRD, and are also supported with the increase in technical and human capacities.

Table 22: Banks in WB6 providing finance schemes for Energy efficiency and heating devices

Country	Bank	Type	Grant	N. Interest % Low	N. Interest % High	Amount Max	Duration Max	Partner
Albania	BKT	Loan	0%	3.30%	N/A	50,000.00 €	84	-
Albania	OTB Bank Albania	Blended (grant&loan)	20%	3.50%	9.00%	50,000.00 €	120	EBRD GEFF
Bosnia and Herzegovina	Raiffeisen Bank	Blended (grant&loan)	20%	4.49%	4.49%	20,000.00 €	120	KfW
Bosnia and Herzegovina	Sparkasse Bank	Blended (grant&loan)	20%	4.99%	4.99%	49,000.00 €	120	EBRD GEFF
Bosnia and Herzegovina	UniCredit Bank Banja Luka	Blended (grant&loan)	20%	4.99%	4.99%	25,000.00 €	120	EBRD GEFF
Bosnia and Herzegovina	UniCredit Bank FBiH	Blended (grant&loan)	20%	4.99%	4.99%	25,000.00 €	120	EBRD GEFF
Kosovo*	NLB Banka	Loan	n/a	n/a	n/a	n/a	n/a	n/a
Kosovo*	TEB SH.A.	Blended (grant&loan)	20%	n/a	n/a	n/a	120	EBRD GEFF
Montenegro	Crnogorska komercijalna banka AD - OTP Bank group	Blended (grant&loan)	20%	4.40%	4.90%	50,000.00 €	120	EBRD GEFF
Montenegro	NLB Banka	Blended (grant&loan)*	20%	4.40%	4.90%	50,000.00 €	120	EBRD GEFF
Northern Macedonia	Silk Road Bank AD Skopje	Loan	0%	4.40%	4.90%	10,000.00 €	84	-
Northern Macedonia	Komercijalna Banka AD Skopje	Blended (grant&loan)	20%	4.40%	4.90%	50,000.00 €	240	EBRD GEFF
Northern Macedonia	NLB Tutunska banka AD Skopje	Blended (grant&loan)	20%	4.50%	5.00%	50,000.00 €	240	EBRD GEFF
Northern Macedonia	Procredit Bank AD Skopje	Blended (grant&loan)	20%	6.00%	n/a	n/a	60	EBRD GEFF
Serbia	Erste Bank	Blended (grant&loan)	20%	6.87%	13.95%	29,166.67 €	95	EBRD GEFF
Serbia	Halkbank	Loan	0%	3.70%	5.70%	Credit rating	71	-

*Not available anymore

Being incentivised, banks are eager to promote the scheme, which led to some of the schemes not being available anymore, as the bank has used all of its allocated funds. All of the implemented projects, successfully verified, and classified as eligible for the grant, if they include the following categories:

- 15% of eligible costs for a project within an individual house, or a house that includes a single technology category selected by the GEF Technology Selector
- 20% of eligible costs for a project within an individual house or a house that includes packages with more than one category from the technologies selected by the GEF Technology Selector.

GEFF has also provided consumers with the technological overview matrix, showing categories and amounts eligible for investment incentive.

Figure 22: GEF technology categories for investment incentives

Technology categories for investment incentive	1	Windows, doors, glazing	15%	20%	20%	20%	20%	20%	20%	20%	20%	20%	15%	20%	20%	
	2	Insulation of roof	20%	15%	15%	15%	15%	20%	20%	20%	20%	20%	20%	15%	20%	20%
		Insulation of outside walls	20%	15%	15%	15%	15%	20%	20%	20%	20%	20%	20%	15%	20%	20%
		Insulation of ground floor	20%	15%	15%	15%	15%	20%	20%	20%	20%	20%	20%	15%	20%	20%
		Insulation of partition walls	20%	15%	15%	15%	15%	20%	20%	20%	20%	20%	20%	15%	20%	20%
	3	Biomass boilers	20%	20%	20%	20%	20%	15%	15%	20%	20%	20%	20%	15%	20%	15%
		Gas boilers	20%	20%	20%	20%	20%	15%	15%	20%	20%	20%	20%	15%	20%	15%
	4	Solar water heaters	20%	20%	20%	20%	20%	20%	20%	15%	20%	20%	20%	15%	20%	15%
		Photovoltaic systems	20%	20%	20%	20%	20%	20%	20%	20%	15%	20%	20%	15%	20%	20%
	5	Heat pumps	20%	20%	20%	20%	20%	20%	20%	20%	20%	15%	15%	20%	20%	15%
	6	Lighting	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
	7	Balanced mechanical ventilation	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	15%	15%	20%
	8	Hot water storage tanks	20%	20%	20%	20%	20%	15%	15%	15%	20%	15%	15%	20%	20%	15%
			Windows, doors, glazing	Insulation of roof	Insulation of outside walls	Insulation of ground floor	Insulation of partition walls	Biomass boilers	Gas boilers	Solar water heaters	Photovoltaic systems	Heat pumps	Lighting	Balanced mechanical ventilation	Hot water storage tanks	
			1	2				3	4	5	6	7	8			

Technology categories applicable for investment incentive

Some of the banks are using already existing financial products to apply the GEF scheme, while other introduce it as a new financial product.

Samples of green loans promotion efforts by banks'

ДВОЈНО ИСПЛАТЛИВА ИНВЕСТИЦИЈА

Поврат до **20%** од кредитот во вид на грант
Намалени трошоци за енергија



ЗЕЛЕН КРЕДИТ ЗА ЕНЕРГЕТСКО ЕФИКАСЕН ДОМ!



- 6% ФИКСНА КАМАТА
- РОК НА ОТПЛАТА – ДО 5 ГОДИНИ
- 2% ПРОВИЗИЈА ПРИ ИСПЛАТА
- БЕЗ СОПСТВЕНО УЧЕСТВО
- БЕЗ ОБЕЗБЕДУВАЊЕ

АПЛИЦИРАЈ ЗА КРЕДИТ

3.3. Official Development Assistance: Country Analysis Reports

Several European actors and initiatives are working to **bilaterally and multilaterally** provide financial, technical and development support for the energy transition in the WB6:

- **The European Investment Bank (EIB)⁶¹**, and **European Bank for Reconstruction and Development (EBRD)⁶²** provide multilateral financing for large projects in the power and transport sector, bilaterally or through framework programmes, and accompanied by technical assistance. Alongside lending facilities for small-scale energy efficiency measures in the private sector, both banks are involved in the **Western Balkans Investment Framework⁶³**, which merges public loans and grants with private investments to expand transport and energy connectivity, provide support for the environment, the social economy, the digital agenda and a new Green Agenda for the WB.
- **Germany's technical cooperation agency GIZ⁶⁴** supports development of national renewable energy markets and promotes energy efficiency in the region.
- The **Open Regional Fund for South-East Europe⁶⁵** has been supporting energy sector reform and energy efficiency in the WB6 since 2008, building capacities with regard to the EU Energy Strategy 2030, the UN Sustainable Development Goals, and responsibilities under the Paris Agreement.
- The **EU's External Investment Plan⁶⁶** allocates a budget for guarantees under the multiannual financial framework to be granted by the EIB. During the 2014–2020, thematic objectives were local private sector support, social and economic infrastructure development, and climate change mitigation.
- The EU's **Instrument for Pre-Accession Assistance⁶⁷** is its primary vehicle for financial support of candidate and potential candidate countries. In 2014–2020, it comprised 12 programmes with a total allocation of €11.7 billion.
- **The Green for Growth Fund (GGF)⁶⁸** is an investment fund created in 2009, which focuses on energy efficiency and renewable energy in the Balkans, Turkey and the Eastern and Southern Neighbourhood regions. GGF provides direct financing to projects as well as refinancing and technical assistance to financial intermediaries active in the sector. It raises funds from donors, IFIs and private sector investors.
- **The Regional Energy Efficiency Programme (REEP and REEP Plus)⁶⁹** is a 2013 initiative managed by the EBRD and blending policy support to Western Balkan governments with loans, technical assistance and incentives to support energy efficiency and renewable energy projects in the public and private sectors.

⁶¹ <https://www.eib.org/en/index.htm>

⁶² <https://www.ebrd.com/>

⁶³ <https://www.wbif.eu/>

⁶⁴ <https://www.giz.de/en/>

⁶⁵ <https://www.giz.de/en/worldwide/31746.html>

⁶⁶ https://ec.europa.eu/eu-external-investment-plan/home_en

⁶⁷ https://ec.europa.eu/neighbourhood-enlargement/instruments/overview_en

⁶⁸ <https://www.ggf.lu/>

⁶⁹ <http://www.wb-reep.org/>

- On behalf of the German Federal Government, **KfW**⁷⁰ supports the drive of countries in South Eastern Europe for social and economic change. Energy efficiency and renewable energy are important components of KfW's programmes in its partner countries in the region. KfW seeks to tap into the region's considerable renewable and efficiency potential by targeting public buildings, district heating facilities, renewable energy and the private sector (commercial and residential).
- **The World Bank**⁷¹ is providing investment and technical assistance support to help scale-up energy efficiency investments throughout the Western Balkan region. The World Bank is also providing technical assistance to help scale-up energy efficiency investments throughout the Western Balkan region. Current efforts focus on developing and operationalizing sustainable EE financing mechanisms for the public buildings sector
- **UNDP**⁷² promotes investment in energy efficiency, renewable energy, and sustainable transport by reducing policy, regulatory, legal and financing barriers; raising awareness; promoting energy efficiency in public and residential buildings, energy efficient lighting, and energy-efficient standards and labels; and developing and supporting new financing mechanisms and structures.
- In the energy field, **USAID**⁷³ aims at expanding access to modern energy services and it supports policy, legal, regulatory and commercial reforms in the region
- **Green Economy Financing Facility (GEFF)**⁷⁴ supports businesses and homeowners wishing to invest in green technologies.

Of all of the development assistance institutions present in WB6, only EBRD/GEFF and KfW are actively supporting the replacement of inefficient heating devices in individual households. Apart from these institutions, available in all of the WB6 countries, we have also identified several initiatives active in the energy efficiency and heating devices replacement in the residential sector.

French Embassy in Bosnia and Herzegovina supports CSOs⁷⁵ in activities related to climate change and sustainable development (green economy, awareness raising in air pollution and environmental protection sectors).

Millennium Kosovo Foundation is aiming at accelerating Kosovo*'s transition to energy independence and good governance. The foundation supports introduction of consumption-based billing in DH, supports transparent and accountable governance, and supports women in the energy sector. In the terms of this report, the most important activity is implementation of the SEEK project (Subsidies for Energy Efficiency in Kosovo*)⁷⁶ provides incentives for residential consumers to invest in efficiency retrofits to reduce household energy consumption. The project enables investments in basic weatherization measures — especially by low-income or vulnerable households — with income-differentiated levels of incentives and rebates. Two primary components of SEEK are the Apartment Building Efficiency Retrofits (AER) and the Household Efficiency Retrofits (HER). Through SEEK, the foundation will invest \$20.6 million in making

⁷⁰ <https://www.kfw.de/>

⁷¹ <https://www.worldbank.org/>

⁷² <https://www.undp.org/>

⁷³ <https://www.usaid.gov/>

⁷⁴ <https://ebrdgeff.com/>

⁷⁵ <https://ba.ambafrance.org/Poziv-za-projekte-civilnog-drustva-2019>

⁷⁶ https://millenniumKosovo*.org/seek/

over 2,000 homes more energy efficient and provide grants for women entrepreneurs to grow their businesses.

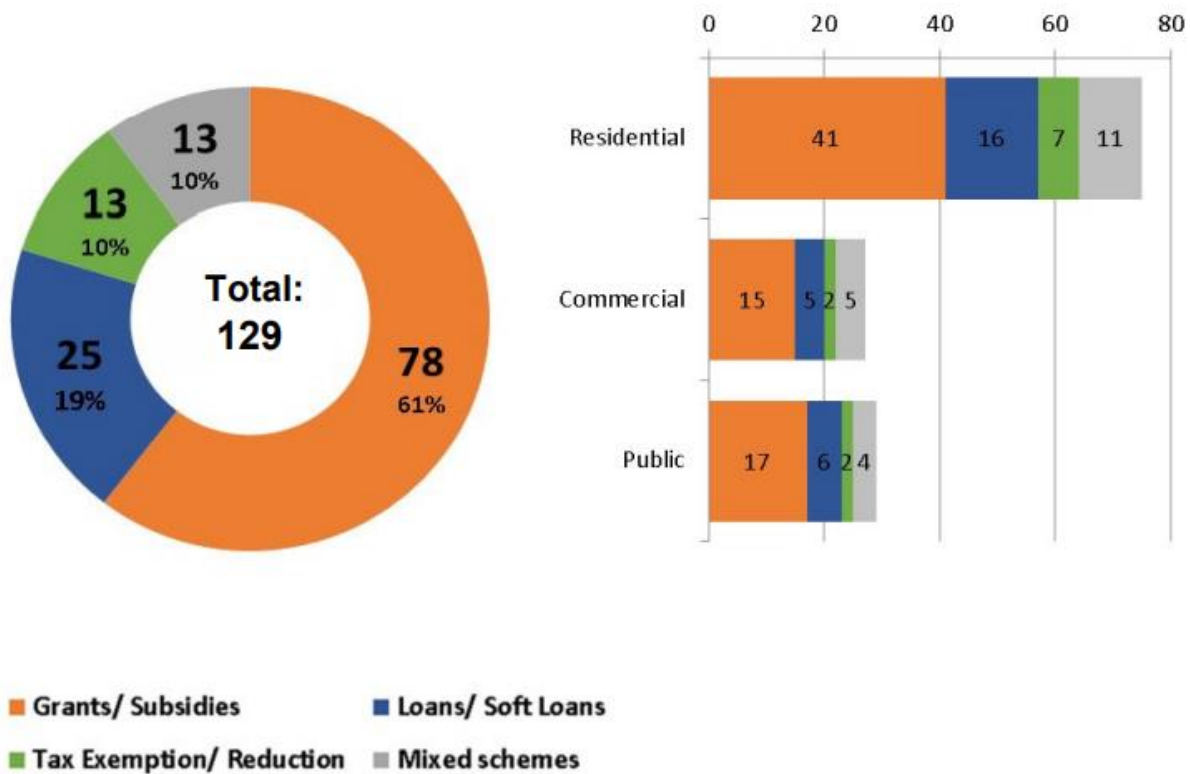
Caritas in Bosnia and Herzegovina supported Tuzla and Gračanica⁷⁷ in the series of energy efficiency activities, mostly focused in the awareness raising and capacity building areas.

⁷⁷ <https://gracanica.gov.ba/gracanica-u-projektu-o-energetskoj-efikasnosti-i-obnovljivim-izvorima-energije/>

3.4. Financing Mechanisms in EU

In contrast to the Western Balkan countries, the EU has already acquired extensive experience in implementing EE financial and fiscal instruments for supporting building renovations in general. These instruments have different sources of finance, delivery mechanisms and approaches, and are available to more sectors, including residential, commercial, and SME. The EU experience is presented below, based on the Study “Accelerating energy renovation investments in buildings”⁷⁸.

Figure 23: Summary of the use of financial and fiscal instruments in EU



Source: DISCUSSION PAPER by the Energy Community Secretariat on Riding the Renovation wave in the Western Balkans Proposal for boosting energy efficiency in the residential building sector

In the EU, only in the last four years, the Joint Research Centre identified a total of 129 ongoing public financial and fiscal schemes supporting energy renovations of which around 61% are in the form of grants and subsidies, 19% are soft loans, 10% are tax incentives and the remaining 10% are a combination of the above. The same study showed that around EUR 15 billion are being spent annually across the EU for EE in public and non-public buildings. The majority of the instruments applied in the residential sector in the EU Member States (MS) are based on grants and subsidies (25 MS), traditional loans and soft loans (18 MS) and fiscal incentives (10 MS). Despite the many instruments at hand, the renovation of buildings in the EU has proved to be very difficult and quite slow, compared to the expectations. Presently only 1% of

⁷⁸ Joint Research Centre, Accelerating energy renovation investments in buildings – Financial and fiscal instruments across Europe, 2019.

buildings undergo energy efficient renovation every year, while currently, roughly 75% of the building stock is energy inefficient. In the WB6, the renovation process is far from being at EU level.

The European Structural and Investment Funds are the largest source of public funding dedicated to energy efficiency in the EU. Most of these funds are awarded as non-repayable grants, although financial instruments – such as guarantees for loans - are gaining ground. The lion's share of the funds target projects developed for the public sector, followed by refurbishing projects for the residential sector. Although each country has enough leeway to adapt its European funded program to its own context, all of the operational programs must comply with expenditure and project eligibility rules established by European legislation. In most cases, the projects selected for funding are traditional refurbishment projects, based on proven technology, with little room for more innovative approaches.

WB6, as EU Candidate Countries, can access European funding through territorial cooperation programs, which often fund small trans-border cooperation programs between an EU member state and a non-EU member state. The projects selected are generally small sized, demonstrative projects. Large refurbishment projects are generally not eligible for funding in WB6.

3.4.1. Overview of Existing Mechanisms & Eligibility of WB Countries

Horizon 2020

Horizon 2020 is the EU's main funding program for research and innovation, also for research projects related to energy efficiency. With a budget of over 80 billion EUR for the period 2014-2020, it offers funding to the most innovative initiatives aiming to solve challenges in the eligible sectors, including energy efficiency. The programme will be continued as Horizon Europe, in the coming programming cycle. Some of the calls for projects in energy sector in previous years were:

- Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for building renovation;
- Integrated home renovation services;
- Upgrading smartness of existing buildings through innovations for old equipment;
- Innovative financing for energy efficiency;
- Innovative financing for energy efficiency;
- Innovative financing for energy efficiency;
- Supporting public authorities to implement the Energy Union.

Even though the programme itself is highly innovative, requires high knowledge levels and usually includes education and innovation organisations, local governments can acquire funding for the replacement of heating devices, or similar actions, if they serve as the test ground (pilot) for the project activities.

European Fund for Strategic Investment

EFSI (better known as the “Juncker Plan”) is an initiative launched jointly by the EIB Group and the European Commission to help overcome investment gaps in the EU. Leveraging its initial budget of 16 billion EUR as well as the additional 5 billion EUR allocation from the EIB, the EFSI aims to support investments worth 315 billion EUR. It focuses on sectors of key importance for the European economy, including:

- Strategic infrastructure including digital, transport and energy
- Education, research, development and innovation
- Renewable energy and resource efficiency
- Support for small and mid-sized businesses.

WB6 countries are not eligible for using this fund.

JASPERS

JASPERS is a technical assistance partnership between the EIB and the European Commission. It focuses on large projects with total costs exceeding 50 million EUR for environmental projects. JASPERS is available to EU Member States, as well as to all WB6 countries.

INNOVFIN

InnovFin – EU Finance for Innovators - is a joint initiative launched by the European Investment Bank Group (EIB and EIF) in cooperation with the European Commission under the Horizon 2020 Program. InnovFin aims to facilitate and accelerate access to finance for innovative businesses and other innovative entities in Europe. Eligible sectors encompass all Horizon 2020 sectors (including energy efficiency), and all WB6 countries are eligible to apply.

Smart Finance for Smart Buildings

The initiative aims to offer a model of guarantee facilities that can combine different public funding streams, including the European Structural and Investment Funds and the European Fund for Strategic Investments. The goal is to encourage commercial banks to develop financial products that target the energy efficiency refurbishment of buildings. The initiative is not available for WB6 countries.

Private Finance for Energy Efficiency (PF4EE)

The instrument is designed to cover the existing gap in commercial financing for energy efficiency investments. Jointly designed by the EIB and the European Commission, the instrument targets projects which support the implementation of National Energy Efficiency Action Plans or other energy efficiency programs of EU Member States. The initiative is not available for WB6 countries.

Interreg Programmes (Cross-Border cooperation programmes, Adriatic-Ionian Transnational Programme, Danube Transnational Programme)

As EU Candidate Countries, WB6 have access to EU funding through the Instrument for Pre-Accession and the territorial cooperation programs, implemented in cooperation with neighboring EU Member States and Candidate Countries. The projects selected are generally small sized, demonstrative projects.

3.4.2. Good Practices

Country (Scheme)	Implementation
Denmark (Incentive to scrap pre-1980 wood boilers)	Grant of <€530 for households replacing old wood boilers with new boilers meeting an emissions limit (2008–2009). 3,500 wood boilers have been replaced – about twice what would have been expected without the grant.
Germany (Market incentive programme)	Subsidy for installation of pellet boilers (over 150 kW) of >€2000 or €2500 when combined with solar panels The programme is more than a decade old; designated funding has been adjusted downwards in some years.
Norway (Ban on electrical and oil heating in new buildings)	40% of heat demand in new buildings must be supplied by non-grid electricity or non-fossil fuel energy. Subsidies of 20% for purchase of a new pellet stove (<€490) or new pellet boiler (<€1225) The fund from which these subsidies come totalled €4.3 billion in 2013 and was managed in part by Enova SF, a state-run company.
United Kingdom (2014 Domestic Renewable Heat Incentive)	Household tariff from government of 12.2p (€0.15) per kW hour of energy generated when biomass boilers and pellet stoves used to heat home As of August 2014 >1600 household biomass-fuelled home heating systems had been approved to participate in this programme.
Lithuania (2009 Jessica Holding Fund)	In 2009, the Lithuanian government and the European Investment Bank (EIB) established the Lithuanian JESSICA Holding Fund for multi-family building renovation, with an initial investment of €227 million – €127 million from the European Regional Development Fund and €100 million in national funding. The Fund offers long-term loans with a fixed interest rate (3%) for the improvement of energy efficiency in multi-family buildings, and for low-income families the loan can be converted into a grant. Until 2015, renovation of some 1,055 buildings had been financed under the JESSICA Holding Fund, totalling around 29,500 apartments. Since May 2015, through JESSICA II, 3,300 apartments in 133 different buildings have been renovated, with another 9,300 apartments already undergoing renovation.
IRELAND (Warmer Homes Scheme)	The Irish Warmer Homes Scheme targets vulnerable and energy poor homes providing advice and funds for energy efficiency measures. From 2000 to 2013 over €82 million was distributed through the scheme and more than 95,000 homes were supported. The energy efficiency

	<p>interventions include measures such as: attic insulation, draught proofing, efficient lighting and cavity wall insulation. In 2010, the implemented measures saved 25 GWh and many beneficiaries were lifted out of energy poverty:</p> <ul style="list-style-type: none"> ● The number of beneficiaries who found it difficult or impossible to pay utility bills on time decreased from 48% to 28%. ● The number of families with children that could keep a comfortable temperature at home increased considerably from only 27% to 71%. ● The number of beneficiaries who suffered from long-term illness or disorders decreased by a massive 88%. Recipients showed significant improvements in other health problems including heart attacks, high blood pressure/hypertension, circulatory problems, problems with joints/ arthritis, headaches, and physical and mental disability.
<p>HARP project (H2020, Heating Appliances Retrofit Planning)</p>	<p>The HARP project has the ultimate goal to raise consumer awareness about new heating solutions, accelerating the replacement rate of this type of equipment and significantly reducing the energy consumption in existing buildings by exploiting the developed energy label. Through a dedicated application, the HARP project will enable individuals to get an indication of the labelling classification of their heating system. The application will also provide an estimation of the costs associated with it related to, for instance, energy consumption or maintenance.</p>
<p>REPLACE (H2020 - Making heating and cooling for European consumers efficient, economically resilient, clean and climate-friendly)</p>	<p>The EU Horizon 2020 project REPLACE aims to support the European 2030 and 2050 energy, climate, environmental, economic and societal targets by boosting the phase-out of inefficient and old heating and cooling (HC) systems for renewable systems in the HC sector. Specifically, the project targets consumers, investors/owners as well as intermediaries (installers, chimney sweepers and consultants) and helps them to make well-informed decisions. The project has also provided its own Best Practices collection in target region⁷⁹.</p>
<p>REELIH (regional conference organized by Habitat for Humanity International and USAID)</p>	<p>The conference aims to continue discussion on scaling up financing for retrofitting of multi-apartment buildings. It aims to bring together a network of practitioners from public, private, and NGO sectors to discuss energy poverty, EU policies and their implementation at national level, community mobilization, scaling up the financing for renovation of multi-apartment buildings, and managing the “ecosystem of residential energy efficiency”.</p>
<p>Finland (Energy Subsidy for Households)</p>	<p>The project supports low income houses by providing grants and tax credits for renovation measures increasing the efficiency measure of the building and for the replacement of the heating system with a renewable one. The grant covers up to 25 % of the costs and maximum</p>

⁷⁹ http://replace-project.eu/wp-content/uploads/2021/03/EN_REPLACE_T4.6_Best-practice-examples.pdf

	tax credit per year is 2000 euro. The energy savings are expected to reach 1.321 GWh annually by 2020.
France ("Living better" programme)	The Habiter Mieux programme aims to provide financial support to renovate dwellings of low-income households to improve energy efficiency. It includes different types of grants and loans financed by different parts of the government, including the National Housing Agency (Anah), the General Commissariat for Investment, as well as regional and local governments.
Croatia (Subsidy for heating system replacement in family houses)	The measure is to provide financial support for investments in replacing heating systems with new, more energy efficient. The measure is part of the Program of energy renovation of family homes. Yearly energy savings are expected to be around 27 GWh. Yearly avoided CO2 emissions are expected to be around 6,443 ton.
Estonia (Support for renovation of heating systems for small houses)	Financial support is provided for the replacement of liquid fuel boilers with heating equipment using renewable energy sources.

Extensive list of projects dealing with energy poverty and replacing heating devices can also be found at Energy Poverty policy measures database⁸⁰, filtered by country, organisation type, measure type, target social and housing groups, energy carriers, and funding methods.

3.5. Key Findings

- Only two national-level programmes for replacement of inefficient heating devices in households exist currently in WB6 (North Macedonia, Serbia), reaching approximately 22,000 households;
- None of the national programs targets vulnerable groups;
- Serbian national programme is not accessible to people living below the national poverty line;
- Most of the public financing efforts are performed through local self-government units (cities and municipalities);
- Most of the public financing efforts (in terms of number financing schemes) is done indirectly, through related subsidy programmes; Highest impact (in terms of funds) have dedicated national-level initiatives;
- Local-self governments do not have enough resources to tackle the issue on their own;
- With the current potential funds available in the public sector, it would take WB6 almost 40 years to replace all of its inefficient heating devices in households;
- Availability of retail financing is not an obstacle to increasing energy investments in the region. However, WB6 circumstances and significant share of vulnerable and energy poor groups in the region make these schemes inaccessible to nearly half of the population in WB6;
- Retail financing is mostly available under market conditions, within the existing banking products (cash, consumer and renovation loans);

⁸⁰ <https://www.energypoverty.eu/policies-measures>

- Limited number of banks provide financing for household energy efficiency without an incentive;
- The only blended financing mechanisms on the market are supported by EBRD and Kfw, reimbursing up to 20% of the investment;
- Retail financing, blended or not, does not target vulnerable groups, nor does it make access to finance easier for these groups;
- Banks are reluctant to provide loans to vulnerable groups, associating them often with high risk of non-payment;
- International development assistance, apart from EBRD and Kfw, does not provide funding for the replacement of inefficient household heating devices; The exception is Millennium Kosovo Foundation, providing 100% subsidies to vulnerable groups on Kosovo*;
- Public institutions from the region have participated in only a handful of energy efficiency projects financed through competitive or territorial EU programmes.

4. Roadmap to Establishing Sustainable and Zero/Neutral Household Heating

In order to achieve the goal of carbon-neutral household heating, all the relevant stakeholders in the process need to be identified, with their fears and hopes analysed and tackled. There are several key stakeholders that we have identified:

Stakeholder	Challenge	Roles and Activities
Public institutions and regulatory bodies	<ul style="list-style-type: none"> ● Lack of regulatory and policy framework; emission standards for heating devices are non-existent, not being regulated, not being controlled, or are insufficient; ● Lack of incentives for the use of “healthy” heating devices; ● Insufficient incentives for the use of modern renewable energy sources; ● High level of incentives to the coal-based electricity production, making the price of electricity lower than the real market value, ending in higher coal-based electricity use; ● Human Resources Capacities need an upgrade; ● Low awareness level across regulatory stakeholders; ● Lack of regulation and enforcing of regulation in the field of unregistered or illegal biomass collection and consumption; ● Better market supply infrastructure is needed to support more efficient and healthier consumption. The current market supply would not be sufficient to respond to the increased market needs for wood-alternatives (pellet, wood chips, etc.); ● Lack of regional market structures and practices; ● The investment needed for the replacement of inefficient heating devices is estimated at 1.4 billion € at lower end, to 2.4 billion € at upper end; ● None of the national programs targets vulnerable groups; ● Public institutions from the region have participated in only a handful of energy efficiency projects financed through competitive or territorial EU programmes. 	<ul style="list-style-type: none"> ● Advocacy ● Awareness raising ● Improvement of policy framework ● Introduction or improvement of energy efficiency incentives ● Capacity Building ● Innovative Financing Mechanisms ● More focus on vulnerable groups ● Dedicate more funds, with higher subsidy share

Local Self-Government Units	<ul style="list-style-type: none"> ● Lack of regulatory and policy framework; emission standards for heating devices are non-existent, not being regulated, not being controlled, or are insufficient; ● Lack of incentives for the use of “healthy” heating devices ● Insufficient incentives for the use of modern renewable energy sources; ● Human Resources Capacities need an upgrade; ● Local-self-governments do not have enough resources to tackle the issue on their own; ● Public institutions from the region have participated in only a handful of energy efficiency projects financed through competitive or territorial EU programmes. 	<ul style="list-style-type: none"> ● Advocacy ● Awareness raising ● Improvement of policy framework ● Introduction or improvement of energy efficiency incentives ● Capacity Building ● Innovative Financing Mechanisms ● More focus on vulnerable groups
Development assistance institutions	<ul style="list-style-type: none"> ● Financial schemes in the sector, focused on the needs of the most vulnerable groups, need to be devised and implemented ● International development assistance, apart from EBRD and Kfw, does not provide funding for the replacement of inefficient household heating devices; 	<ul style="list-style-type: none"> ● Provide Advocacy ● Provide Awareness raising ● Provide Capacity Building ● Propose and provide Innovative Financing Mechanisms ● Place more focus on vulnerable groups ● Dedicate more funds, with higher subsidy share
Retail financing – Banks	<ul style="list-style-type: none"> ● Lack of financial products aimed at multi-apartment buildings; ● Vulnerable groups are associated with higher credit risk, making the access to finance even more scarce; ● High rates of energy poverty in the region prove that market mechanisms (retail finances) are not sufficient to improve overall energy efficiency; ● Financial schemes in the sector, focused on the needs of the most vulnerable groups, need to be devised and implemented ● WB6 circumstances and significant share of vulnerable and energy poor groups in the region make these schemes inaccessible to nearly half of the population in WB6; ● The only blended financing mechanisms on the market are supported by EBRD and Kfw, reimbursing up to 20% of the investment; 	<ul style="list-style-type: none"> ● Introduce accessible guarantee measures; ● Remove administrative costs for energy efficiency investments ● Propose and provide Innovative Financing Mechanisms

	<ul style="list-style-type: none"> ● Retail financing, blended or not, does not target vulnerable groups, nor does it make access to finance easier for these groups; 	
Vulnerable groups - Energy poor	<ul style="list-style-type: none"> ● Lack of private investment capital needed. Over 40% of population is living under financially unstable conditions, making them more prone (or simply lacking resources) to avoid investments in energy efficiency, including switching heat-fuels and heat devices; ● Vulnerable groups are associated with higher credit risk, making the access to finance even more scarce; ● High cost of capital; ● Financial schemes in the sector, focused on the needs of the most vulnerable groups, need to be devised and implemented 	<ul style="list-style-type: none"> ● Education and awareness raising ● Innovative financing schemes
Owners of inefficient stoves and heat-only boilers	<ul style="list-style-type: none"> ● Personal (emotional) connection to with the use of traditional heating devices; Inertia to change; Decision-making based on the limited or incorrect information; ● Lack of information on the performance and impact of different heating devices and fuels in use; ● Lack of incentives for the use of “healthy” heating devices; ● Limited availability of affordable high-efficiency stoves and equipment in the local market; ● Limited energy efficiency impact of heating-devices replacement, if building conditions are left the same; ● There are over 1.7 (up to 2.4) million inefficient stoves, ovens and heat-only boilers in WB6 that need to be replaced with more efficient and health-friendly devices; 	<ul style="list-style-type: none"> ● Education and awareness raising ● Innovative financing schemes
MABs and their associations	<ul style="list-style-type: none"> ● Lack of financial products aimed at multi-apartment buildings; ● Homeowners’ associations are still not eligible for credit financing in WB6 	<ul style="list-style-type: none"> ● Education and awareness raising ● Innovative financing schemes ● Advocacy ● Improvement of the policy framework
General Public	<ul style="list-style-type: none"> ● Low Public Awareness and Low Public Engagement; ● Low level of care for the environmental impact; 	<ul style="list-style-type: none"> ● Awareness raising ● Education ● Active participation – citizens’ activism

- | | | |
|--|--|--|
| | <ul style="list-style-type: none">● Lack of information on the performance and impact of different heating devices and fuels in use. | |
|--|--|--|

Key drivers in the replacement of heating devices in households are:

- Reduction in total number of premature deaths;
- Reduction in total monetary resources spent;
- Improvement of individual health and living conditions;
- Energy security and diversification;
- Reduced personal energy costs.

4.1. Assessment of Models for Replacement of Inefficient Heating Devices in Households

Existing financing schemes in the market have shown ups and downs, in terms of fulfilling the goal of replacing inefficient heating devices. Each financing scheme has its strengths and weaknesses. Future financial schemes should learn from the previous experiences and create schemes tailored for individual target groups and their needs. Loans, as the basic market financing schemes, will be the foundation of the market-driven replacement schemes. However, as we have learned, in WB6 market mechanisms are not enough: they do not target vulnerable groups, and a significant share of the population still can't afford them. Grant schemes and blended financial schemes need to be the foundation of the public-sourced support, while other innovative models need to be explored in order to provide tailor-made solutions.

4.1.1. Grant Programs

Grant programs offering investment subsidies are one of the most common financing tools for EE. However, in WB6 they need to focus on specific target groups, including vulnerable population. This tool needs to provide funds for the population which is unable to provide it for itself. Current grant schemes do not provide that. Suggestions for improving current grant schemes are:

- Introduce vulnerable consumers in grant schemes – target primarily households with low-income and poor living conditions;
- Limit grants to certain technologies; Give more emphasis on modern renewables;
- However, offer multiple heating solutions, apart from electricity-based ones (with most of electricity production in the region being coal-based)
- Provide additional benefits for projects with better EE and environmental impact;
- Expand existing grant schemes to include replacement of heating devices as an eligible cost;
- Increase the total amount of funds available, on all administrative levels (national, regional, local).

4.1.2. Blended Finance Mechanisms

There are currently just two blended finance mechanisms for the replacement of heating devices on the market, supported by EBRD and Kfw, and implemented by the local banks. The foundation of the blended mechanism is in line with best practises. Current schemes are focused on the consumers that are close to decision-making in terms of replacing the heating device, and the reimbursement provided in the scheme serves as a turning point for the consumer, making it (from personal perspective) cost-effective to apply for funding. In that sense, the current schemes serve their purpose – they motivate consumers to make the decision and replace the inefficient heating device. However, the schemes also lack in many areas. Firstly, they are not accessible to the population that needs funds the most – vulnerable groups and poor households. Secondly, banks are not inclined to provide loans to high-risk groups. And lastly, there is no segmentation among the consumer groups.

To avoid these obstacles, several blended schemes could be introduced (or upgraded) in the market:

- Introduce state-funded blended schemes, where national authorities provide the grant-part of the finance, incentive for retail banks to include the product in the portfolio, and additional guarantees or incentives for providing the funds to vulnerable groups;
- The role of retail banks could be taken over by some of national financing institutions (revolving funds, energy efficiency funds, development funds, etc);
- “Staging” could be introduced in blended mechanisms, with the grant amount varying among different (income, social, vulnerable) groups. The purpose of such scheme would be to provide a needs-based approach and solution, tailor made for the financial and social status of beneficiaries.
- As a first stage in the staging process, a soft loans scheme could be introduced, with only interest rate being subsidised below the market value. It represents an incentive to carry out energy efficient renovation works. In some cases, public administration would need to provide a guarantee fund and cover operational costs of banks, in addition to the subsidized interest rate.
- A soft loan financing scheme should be part of a global energy retrofit programme, ideally offered in a one-stop-shop for energy efficiency;
- A clear division of roles is needed – private partners (banks) should provide financial services and advice, while public partners should provide technical support, education and awareness raising.

4.1.3. Energy Communities

Vulnerable groups in the region, more often than not, live in the neighbourhoods or settlements with people in the same social group as themselves. This allows for territorial solutions, which would target multiple vulnerable households at the same time. Central heating production could be established for the entire settlement or neighbourhood, with heat sources based on renewables. Investment and management models need to be developed for these groups, as the knowledge level to manage energy communities is almost certainly non-existent.

Solutions such as small solar plants, providing free energy to vulnerable population, would not only solve the issue of air pollution and energy efficiency, but would introduce showcase examples for commercial

off-the-grid projects, leading to more independent and self-sufficient local energy markets. The most important barriers to the introduction of the model are:

- Legal preconditions and recognition of energy communities in the legal framework (some WB6 countries have already achieved it);
- Securing the funds for the investment;
- Securing (sustainable) management model.

Local administration will have a key role in this process, as it is connected the most to local communities, and it responds the fastest to their needs. If in place, local Energy Efficiency Agencies, or other expert bodies, could play the management role in the process; at least until capacities of the beneficiaries are built enough to make their own informed decisions in managing the plant.

4.1.4. Crowdfunding

In addition to the above, crowdfunding from the private sector to finance renewable energies is an interesting possibility. Crowdfunding approach is an alternative method, completely different to the common typical business process, used to raise capital through small collective efforts (amounts of money) of a large number of people, friends, family members, customers and individual investors, and finance a project. This alternative financing scheme takes place through internet channels and social-media platforms that allow to share project ideas and keep in touch with project developments.

The scheme seems perfect for tackling societal challenges that impact large populations, and air pollution from heating devices in individual households impacts all WB6 countries, and beyond. This fact alone could motivate enough people to participate in the heating devices replacement campaign. If we use the small-solar-plant example above, aiming at a vulnerable group in the local community, various social groups might be inclined to support that kind of a project, achieving several personal goals along the way:

- Reducing the impact of air pollution for the whole population, themselves included;
- Improve living conditions of families in need; Give them a kick-start in moving away from poverty, by removing one of the most significant costs they have (heating);
- Personal satisfaction, being purely egoistic, or belief-based.

An example of available supporting tools to find the necessary funding is the CrowdFundRES⁸¹ European project, which contributes to the acceleration of renewable energy growth in Europe by promoting crowdfunding for financing renewable energy projects.

⁸¹ <http://www.crowdfundres.eu/>

4.1.5. On-Tax Financing

On-Tax Financing, or the tax equity investment, describes transactions that pair the tax credits or other tax benefits generated by a qualifying physical investment, with the capital financing associated with that investment. In terms of replacement of heating devices or energy efficiency in general, local taxes can be used to recover payments from citizens & companies for energy efficiency measures financed by private investors. These investors lend the money for retrofits up-front and then get repaid over a timescale of up to 20 years through an additional charge on a property-related tax bill.

In the US, the 'PACE scheme' can pay for energy efficiency, renewable energy, and water conservation upgrades to homes and buildings, covering up to 100% of the project's costs. In Europe an equivalent scheme, EuroPACE⁸², is currently under development and will be launched in a few leading cities.

However, further analysis is needed, as the scheme is not viable everywhere. Through the research in preparation for the EuroPACE project, it became clear that the fiscal differences between European countries will not allow this scheme to be developed equally. Also, investors need to be sure that the local authority will have the capacity to regularly collect the taxes in question. This is not always the case in WB6, where local tax collection is often irregular or not effectively enforced.

A variation of this scheme is Pay-as-you-Save scheme of the UK government. It is a financial mechanism that allows a utility to pay for the upfront cost of a distributed energy solution and to recover its cost on the monthly bill with a charge that is less than the estimated savings. Householders would be able to get finance at term such that householders will be able to cover the cost of the installation out of bill savings, and usually with a further monthly surplus as well. The finance itself would come from the private sector, as banks and others provide funding for the eco-upgrade, secured against future savings on bills.

4.1.6. Third-party Investment

Third-party investment is a scheme where the investment on the renovation of a building is not paid by the homeowner but by a third-party investor. Thus, the homeowner does not take on a debt but pays a service fee to the investor instead. The investment can be done via an Energy Performance Contract⁸³. In this case the costs are repaid through the guaranteed energy savings.

The city of Stuttgart developed a 'carefree energy renovation package' for homeowners. The package includes: planning, building and construction, operation and maintenance, financing, guarantee and risk assumption. Homeowners do not need to secure upfront financing for the replacement of the heating

⁸² <https://cordis.europa.eu/project/id/785057>

⁸³ Energy performance contracting (EPC) is a mechanism for organising the energy efficiency financing. The EPC involves an Energy Service Company (ESCO) which provides various services, such as finances and guaranteed energy savings. The remuneration of the ESCO depends on the achievement of the guaranteed savings. - https://ec.europa.eu/energy/content/energy-performance-contracting_en

system. This is financed by a municipal ESCO to whom the homeowners pay a monthly service fee through energy supply contracting⁸⁴.

4.1.7. Revolving Fund

A revolving fund is a reserve of money used to finance a particular set of activities by lending to one or more borrowers. Over a given period of time, the borrower is expected to repay the original sum that restocks the fund. Usually, an interest is charged to the borrower as a fee for administrative costs but also to protect the fund from being depleted.

Revolving fund should not be the main actor on the market, it should act as an additionality, satisfying the needs of consumer groups that are considered too risky or too small to be targeted by retail financing.

Funding alone is not enough, but should be accompanied with technical support and capacity building. EU instruments support (co-fund) such financial schemes.

4.1.8. One-stop shop for EE

Establishing a single point where beneficiaries could get all the needed information and assess their options, would be of utmost importance. Limited information and information bias can be detrimental to all of the efforts invested by stakeholders in the process. One-stop shop could be an entire institution, or just an office in the local municipality – it is a purpose that matters, not the outline.

⁸⁴ https://energy-cities.eu/best-practice/_trashed-4/

5. Conclusions

WB6 countries differ in the quality of their market and the support frameworks, including the primary types of energy within an economy. Renewable energy and energy efficiency are both in their infancy in the region, and air pollution is one of the region's major environmental issues, with PM2.5 levels two to three times higher than the World Health Organization's maximum guidelines. Residential inefficient heating is a main contributor to the effects and costs related to PM2.5 emissions, while the energy used on the heating in households has the largest share in total household consumption. By introducing more efficient heating devices we contribute to the solution of several important problems: energy inefficiency, air pollution and related health consequences, and energy poverty.

Current financial schemes in the region are not sufficient to eliminate the problem on their own. Existing public financial schemes need to be improved, their scope widened, their targets more focused, and their funds more accessible. The same goes for retail financing schemes, but these will most likely be market driven. Even if that is the case, banks can use some incentive, and development assistance institutions need to assist local authorities in providing that incentive.

New financing schemes need to be introduced, with more focus on citizen engagement, transparency and participation in decision making. Solutions must encompass all important aspects of the actions. Only then will WB6 countries achieve their goal of becoming a fully inclusive society with a healthy environment to live in.