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Ministria e Ekonomisë - Ministarstvo Ekonomije - Ministry of Economy

# Energy Strategy of the Republic of Kosovo 2022-2031





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## ABBREVIATIONS

AI	Administrative Instruction
CO <sub>2</sub> eq	Carbon Dioxide Equivalent
DH	District Heating
DSO	Distribution System Operator
EC	European Commission
ECS	Energy Community Secretariat
ECT	Energy Community Treaty
EE	Energy Efficiency
ENTSO_E	European Network of Transmission System Operators for Electricity
ERO	Energy Regulator Office
ETS	Emissions Trading System
EU	European Union
FS	Feasibility Study
GWh	Gigawatt Hour
ICMM	Independent Commission for Mines and Minerals
KEDS	Kosovo Electricity Distribution Company
KEEA	Kosovo Energy Efficiency Agency
KEEAP	Kosovo Energy Efficiency Action Plan
KEK	Kosovo Energy Corporation - Public Electricity Generator
KESCO	Kosovo Electricity Supply Company
KOSTT	Kosovo Transmission System and Market Operator
KREAP	Kosovo Renewable Energy Sources Action Plan
Ktoe	Kiloton of Oil Equivalent
LNG	Liquified Natural Gas
LPG	Liquefied Petroleum Gas
LULUCF	Land use, land-use change and forestry
MW <sub>el</sub>	Megawatts (electric)
MWh	Megawatt Hour
MW <sub>th</sub>	Megawatts (thermal)
NERP	National Emissions Reduction Plan
NO <sub>x</sub>	Nitrogen Oxides
PMO	Prime Minister's Office
RES	Renewable Energy Sources
SAA	Stabilization and Association Agreement
Sox	Sulphur Oxides
TAP	Trans Adriatic Pipeline
TSO	Transmission System Operator
UNFCCC	United Nations Framework Convention on Climate Change
USS	Universal Service Supplier



## 1 EXECUTIVE SUMMARY

Providing reliable, affordable, and clean energy is essential to Kosovo's economic development and the social well-being of its citizens.

The Government of the Republic of Kosovo is committed to applying a new planning approach to address the current challenges and to lay the foundation for the future of the country's energy sector which will increasingly provide security of electricity supply, clean energy, energy efficiency, and active citizen participation and support for vulnerable groups.

Kosovo's power system will be integrated into the regional and pan-European market, while its independence will be progressively ensured through renewable energy sources (RES). Market integration with the Republic of Albania is a high priority and especially important for our country. The most important first step in this direction will be the full operation of the Albanian Power Exchange (ALPEX), which is expected in 2023, followed with further integration into the regional and pan-European market by 2030.

The Government of the Republic of Kosovo is also committed to increase joint system energy planning with the Republic of Albania. (Co)-investment in natural gas power plants in order to meet the basic demand and/or system flexibility with Albania, North Macedonia and Greece will be considered for the purpose of implementation of this strategy within the timelines.

Finally, and equally important, the Government of the Republic of Kosovo is committed to making this transformation of the energy sector by ensuring social justice. Citizens will be at the heart of the country's energy future by ensuring that they have access to affordable energy, are empowered to participate actively in the sector, including production and self-consumption, and ensuring that the most vulnerable groups in society benefit from schemes dedicated to supporting them (for instance house insulation, installation of solar panels, purchase of efficient household appliances, efficient heating systems, etc.)

Due to the lack of an adequate approach to developing professional capacities and appropriate investments over the last decades, Kosovo's energy sector now faces major challenges, including:

- Dependence on old lignite-based electricity generation capacities, which provide inadequate reliability and flexibility, and are a major source of greenhouse gas (GHG) emissions and local pollution. Currently, the share of renewable energy sources (RES) in the electricity sector is only 6.3%, with RES in the energy sector dominated by biomass-based sources used in heating.
- High energy consumption (and therefore, energy-related expenditure) relative to both the GDP and the population, due a range of factors, including: high network losses and use of inefficient buildings and outdated technologies in both residential and commercial sectors (including for space and water heating).
- High reliance on individual household heating systems based on electricity or inefficient coal- or wood-burning equipment gives rise to both significant increases in the need for electricity imports and high GHG emissions and air pollution during the cold months.
- High market concentration at both the wholesale and retail levels.

The weakness of high reliance of the system on imports during the heating season has been particularly stressed since the post-pandemic energy crisis of 2021, amplified with the effects of the war in Ukraine from 2022, which have given rise to extremely high gas and electricity market prices and volatility, and resulted in Kosovo having to pay very high prices for the electricity imports. The energy crisis is mainly driven by the cuts in Russian gas deliveries to Europe due to the war between Ukraine and Russia which resulted in wholesale power market prices above 200 €/MWh, and in some extreme weeks, exceeding 800 €/MWh. Price volatility has also increased, and future prices indicate the possibility of longer-term



impacts. Although the European Commission and the EU member states have introduced several measures to mitigate the price impacts on consumers, the current projections do not exclude the possibilities of extreme price developments on the power and natural gas markets.

This energy crisis proved that Kosovo's energy system needs to undergo a profound transformation to become more resilient, independent and flexible. The Energy Strategy 2022-2031 is led by the following **vision**:

*A sustainable energy sector integrated into the Pan-European market, ensuring energy security and affordability for citizens*

With the clarity of this long-term vision and considering the current situation and challenges, five strategic objectives along with their respective specific objectives make up the core of our Energy Strategy.

### ***Strategic objective 1: Improving system resilience***

Security of supply will be ensured by guaranteeing the unified functioning of the electricity system. This requires adequately sized capacities for supply and reserves, reliability, flexibility, and efficiency of generation units, network elements and integrated markets.

This strategic objective is addressed by the following **four specific objectives**:

1. Enhancing system flexibility
2. Modernization of networks and reduction of network losses
3. Rehabilitation of existing electricity production capacities and investments in new capacities, and
4. Ensuring cybersecurity of the energy sector.

The **main targets** for this strategic objective are to:

- Improve quality of supply indicators: System Average Interruption Duration Index (SAIDI) by 35% and System Average Interruption Frequency Index (SAIFI) by 30% by 2031,
- launch market-based reserve services and reach at least 170 MW of flexible regulation capacity by 2031,
- decrease the transmission losses to current EU technical loss ratios by 2031, and decrease distribution losses to the levels of technical losses of 9% by 2031,
- refurbish two Kosovo B power plant units and at least one Kosovo A power plant unit to ensure at least 540 MW capacity for baseload and 360 MW capacity as strategic reserve by 2030;.

### ***Strategic objective 2: Decarbonization and promoting renewable energy***

The path of reducing CO<sub>2</sub> emissions of the sector will be accompanied by the development of large-scale RES capacities, based on their technical and economic potential<sup>1</sup>. The reduction of lignite-based electricity generation contributes to reducing pollution and GHG emissions, but its effects on security of supply and generation adequacy are offset by relying increasingly on domestic clean sources of

<sup>1</sup> <https://akee.rks.gov.net/wp-content/uploads/2021/02/REPORT-PDF-1.pdf>



energy. Moreover, considering that renewable technologies have reached market parity with traditional energy sources, their utilization will lead to lower energy costs over the long term.

New RES capacities, with existing and innovative technologies, will gradually replace the use of coal, achieving coal phase-out by 2050 at the latest.

This strategic objective is addressed by **3 specific objectives**:

1. Gradual implementation of carbon pricing,
2. Promoting renewable energy sources in the electricity generation mix,
3. Promoting the use of renewable energy in heating.

The **main targets** for this objective are to:

- Complete all preparations for implementing a carbon pricing system by 2025, enabling the introduction of a carbon price which will gradually increase until Kosovo's integration in the pan-European market and the EU's Emissions Trading System (ETS),
- Reduce GHG emissions in the power sector by at least 32% by 2031,
- Cover at least 35% of electricity consumption by RES by 2031,
- Develop new RES capacities (600 MW wind, 600 MW solar PV, 20 MW biomass & at least 100 MW of prosumer capacity), to reach a total installed RES capacity of 1600<sup>2</sup> MW by 2031.

### ***Strategic objective 3: Increasing energy efficiency***

A more energy-efficient development pathway will be followed, leading to a less energy-intensive economy. This has multiple benefits, including the contribution to reduction of energy supply needs (and thus costly investments and the GHG emissions and pollution they entail), decrease in import dependency, and reduction of the financial burden on citizens and businesses.

This strategic objective is addressed by **2 specific objectives**:

1. Improving the energy efficiency of buildings
2. Promotion of efficient cogeneration and efficient district heating systems.

The **main targets** for this objective are to:

- Limit the final energy consumption in Kosovo to the level of 1877 ktoe in 2031,
- Achieve cumulative energy savings of 266.4 ktoe in buildings including public, private, and commercial by 2031,
- Certification of 150 Near Zero Energy Buildings by 2031.

### ***Strategic objective 4: Strengthening regional cooperation and market functioning***

Kosovo is committed to the implementation of all obligations of the Energy Community Treaty for the creation of a free, integrated and competitive electricity market. This contributes to the security of supply through wider regional market integration, while also supporting the goals of affordability and competitiveness by optimizing the wholesale and reserve markets and making them more efficient.

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<sup>2</sup> The target of 1600 MW includes both the new planned RES capacities of 1320 MW and the existing 279 MW installed RES capacities. Due to environmental aspects, the Energy Strategy does not promote the construction of hydropower plants.





Market integration with Albania is particularly important, starting with the full functioning of ALPEX both on the day-ahead and intraday electricity markets.

The functioning of the market and the overall energy sector will also be supported by investing in the skills of Kosovar men and women in line with the requirements of a dynamically evolving sector, and ensuring that they have access to jobs in the sector.

This strategic objective is addressed by **3 specific objectives**:

1. Strengthening regional cooperation
2. Removing the barriers to effective market-functioning
3. Training in energy-related fields and women's inclusion.

The **main targets** for this strategic objective are to:

- Achieve market integration with Albania in 2023
- Join the pan-European market area by 2030
- Gradually phase out the Bulk Supply Agreement, starting from 2025 at the latest
- Increase the number of graduates in energy-related fields and ensure that at least 25% of employees in the sector are women, by 2031.

### ***Strategic objective 5: Protecting and empowering consumers***

The Energy Strategy places citizens in its focus by supporting affordability of energy bills for vulnerable consumers, and investing in energy efficiency (of buildings and household appliances) and heating solutions, empowering them to actively participate in the liberalized energy market, and reducing their exposure to environmental pollution.

This strategic objective is addressed by **3 specific objectives**:

1. Protecting vulnerable consumers
2. Empowering all consumers
3. Preserving human health and environment.

The **main targets** for this strategic objective are to:

- Revise the current price-support scheme for new vulnerable consumers program by 2024, and further advance it to a means-tested scheme linked to the reformed social assistance scheme,
- Introduce at least two new energy-related schemes for vulnerable consumers (e.g. energy efficiency, heating solutions, solar panels, etc.) by 2024, and develop four new schemes by 2031,
- Introduce more than two programs supporting community projects in energy efficiency and self-consumption by 2024, and more than five by 2031,
- Implement at least 9 energy-related awareness and information campaigns annually,
- Develop a fully functioning Price Comparison Tool by 2024 to ensure diversity and comparability of services offered to consumers.



## 2 INTRODUCTION

The Energy Strategy of the Republic of Kosovo 2022-2031 (hereinafter the “Energy Strategy”) is a fundamental document establishing the directions and key actions for the energy sector’s development over the next 10 years. The role, content and procedures used in developing this document are based on the Law on Energy and the Administrative Instruction (GRK) NO. 07/2018 on planning and drafting strategic documents and action plans. It replaces the previous Energy Strategy of 2017-2026, which has become outdated due to fundamental requirements to restructure the energy sector in Kosovo with the aim to address the recent developments in Kosovo, the wider region and Europe.

As a member of the Energy Community, Kosovo is required to transpose core EU climate, energy and environmental legislation. The required legal and regulatory framework will be reformed to facilitate the implementation of the Energy Strategy, including acts such as, but not limited to: Clean Energy Package, Governance Regulation, Electricity Directive and Risk Preparedness Regulation, Energy Efficiency Directive and Climate Law.

Certain aspects that are linked to other sectors and overall targets, such as climate, transport, agriculture, construction standards, etc., will be considered under the framework of an integrated plan such as the National Energy and Climate Plan.

Kosovo also signed the Sofia Declaration on the Green Agenda for the Western Balkans in 2020,<sup>3</sup> committing to achieve net-zero emissions by 2050. In the Declaration, Kosovo pledged to transpose and implement EU legislation related to the EU Emissions Trading Scheme and gradually phase out coal subsidies<sup>4</sup>.

The EU is planning to introduce a Carbon Border Adjustment Mechanism (CBAM), under which an import levy would be imposed on the electricity exported to the territory of the Union. Energy Community countries will be subject to this mechanism, but introducing a carbon pricing system with prices reaching the level of EU emission allowance prices by 2030 can ensure exemption from the CBAM payments. The conditions for this include the implementation of market coupling with the electricity market of the EU, development of a roadmap to implement a carbon pricing mechanism, and a pledge to achieve carbon neutrality by 2050.<sup>5</sup> A decarbonization roadmap has already been drafted by the Energy Community for its participant countries proposing deadlines that would allow meeting these conditions, but details are open for further discussions.

The present energy crisis resulting in unprecedented price increase in the gas and power markets of Europe has a significant impact on the Kosovo power system as well. The crisis is mainly driven by the cuts in Russian gas deliveries to Europe due to the war between Ukraine and Russia and resulted in wholesale power market prices above 200 €/MWh, and in some extreme weeks, above 800 €/MWh. Price volatility has also increased, and future prices indicate the possibility of longer-term impacts. Although the European Commission and the EU member states have introduced several measures to mitigate the price impacts on consumers, the current projections do not exclude the possibilities of extreme price developments on the power and natural gas markets.

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<sup>3</sup> Sofia Declaration on the Green Agenda For the Western Balkans, <https://www.rcc.int/download/docs/Leaders%20Declaration%20on%20the%20Green%20Agenda%20for%20the%20WB.pdf/196c92cf0534f629d43c460079809b20.pdf>

<sup>4</sup> Kosovo is not a signatory to the Paris Agreement, because it has not yet achieved full member status in the United Nations. Therefore, it has not yet submitted a Nationally Determined Contribution (NDC) nor made emission reduction commitments to the United Nations Framework Convention on Climate Change (UNFCCC).

<sup>5</sup> Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a carbon border adjustment mechanism, COM/2021/564 final



This will be an important consideration in determining the timing of the refurbishments of the existing lignite units of Kosovo A and B which might have to deviate from the already planned schedules analyzed in this Energy Strategy.

The energy market crisis showed that Kosovo's energy system needs to undergo a profound transformation to become more resilient, flexible and diversified so that it can integrate with neighboring systems.

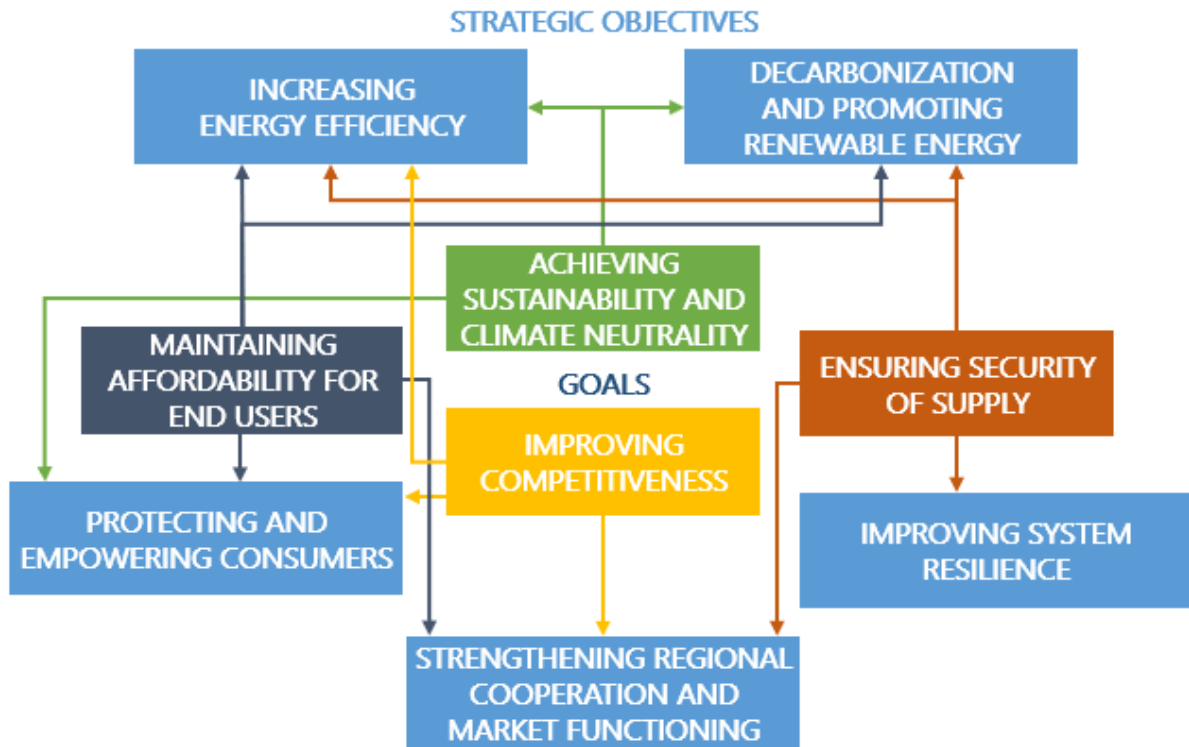
Investments in renewable energy sources will begin immediately, as these are tangible domestic resources, with less price volatility and decreasing investment costs. This Strategy envisages a dynamic increase of renewable energy sources, mainly in wind and photovoltaic technologies supported by renewable auctions, public investment and active participation of prosumers in this process. It foresees environmental measures at the Kosovo B power plant and the phasing out of one or two Kosovo A units. Investments in baseload capacities are needed to increase the reliability of lignite-based production, and reduce import exposure in the most critical years of renewable capacity development. New RES capacities, with existing and innovative technologies, will gradually replace the use of coal, achieving coal phase-out by 2050 at the latest.

Market integration with Albania is a top priority. As of December 2020, operation as an independent Regulatory Area within Continental Europe within the Albania-Kosovo (AK) block has started. The next milestones in this respect include the operationalization of the joint Albanian Power Exchange (ALPEX) and enhancing joint system planning. In addition, market trends and technological developments, such as (green) hydrogen, geothermal energy, small modular nuclear reactors, waste-to-energy plants etc., will be closely monitored, and once these technologies have proven to be commercially and economically viable, they will be considered.

The vision of the Government of the Republic of Kosovo is to develop a sustainable energy sector integrated into the pan-European market, ensuring energy security and affordability for citizens. This vision reflects the goals of the Program of the Government of Kosovo for the years 2021-2025 related to the energy sector, which aims to achieve sustainable and affordable energy supply by increasing energy efficiency and diversification of energy sources.

Based on this vision, four main goals are defined with five strategic objectives (main policy directions) that ensure the achievement of these goals (see Figure 1). These strategic objectives are further divided into specific objectives that provide directions for concrete actions. In line with the Administrative Instruction, the Energy Strategy also defines a corresponding Action Plan and measurable short-term (2025) and long-term (2031) targets.

Figure 1: Main goals of the Kosovo Energy Strategy (2022 – 2031)



### 3 METHODOLOGY

The elaboration of the Energy Strategy consisted of three main elements. The first was the continuous support from an established Working Group with representatives of the responsible ministries and other sectoral stakeholders, which provided and verified all the available information required for the quantitative assessments.

The second element was a detailed scenario-based modeling assessment of the power sector. The scenario design on the future of power sector capacities was carried out by a group of ministry experts supplemented by experts from the Energy Regulatory Office, participants from the sector (KEK, KESCO, KEDS) as well as the transmission system operator (KOSTT). These experts designed the scenarios and gave input to the model on the main input elements—lignite prices, capacity deployment, retrofitting plans of lignite units, cost of these retrofits and the demand forecast for electricity consumption. Five scenarios were defined and assessed in detail, two focused on various lignite-based future developments, two focused on natural gas developments (domestic infrastructure and outside collaboration) and one scenario focused on higher RES deployment and lower fossil capacities. The modeling work was carried out by an independent consultant (Regional Centre for Energy Policy Research, REKK), which ensured an unbiased assessment of the elaborated scenarios. The applied modeling tool was the European Power Market Model, covering the whole ENTSO-E system, so the scenarios were modeled in the European context, not only in the context of Kosovo's power sector. This ensured that the international context, trade relations and the impacts of carbon pricing schemes were analyzed in a comprehensive manner. The modeling was carried out through 2031, with an outlook to 2040 to capture the long-term effects and commitments. Due to price escalations at the end of 2021, the scenarios were re-modeled in February 2022 to reflect the present high-price environment.

The third element of the process focused on the review of existing analytical documents on the power sector as well as on various other energy sectors (e.g., natural gas, district heating) and cross-sectoral assessments (e.g., energy efficiency in buildings, heating sector, climate and environmental protection, vulnerable consumer groups assessments). The policy documents and analyses covering the other sectors were needed to determine policy objectives, directions and actions in these sectors. Relying on existing literature was necessary, as there was no quantitative assessment tool for these sectors in Kosovo. This means that the primary quantitative assessment was carried out for the power sector, but the rest of the sectors were analyzed based on existing literature.

Besides the responsible ministries, the Prime Minister's Office (PMO), Association of Municipalities, ERO, KOSTT, the Kosovo Energy Efficiency Fund, KEK, KESCO, KEDS and the district heating companies were involved in the elaboration of the Energy Strategy through the working group.

Before and during the drafting process of the Strategy, roundtables were held with stakeholders - with members of the Assembly of the Republic of Kosovo, civil society organizations, academia and development partners during which the vision, methodology, objectives and goals of the Energy Strategy were discussed.

During the public consultation phase, public debates were held in seven Municipalities of Kosovo and roundtables were organized with stakeholders attended by representatives from businesses, civil society organizations and development partners.

This Energy Strategy is based on power sector modelling applying the international fuel markets (gas, coal and oil), ETS price forecasts and national capacity and consumption data.

In addition, due to the lack of reliable price signals in the forward markets in the last year, it is very hard to produce reliable price forecasts for the mid-term. This means it is difficult to predict if the high



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price environment will last for 1, 2 or 3 years, as it is not driven by market fundamentals, but by Russia's strategic behaviour towards the European gas supply and Europe's political reaction and its effect on gas markets. However, there is a broader expert consensus, that after a period of 0.5-3 years, wholesale prices in the European electricity sector will normalize and settle in the modelled range of €80-100/MWh, depending on the EU ETS price level.

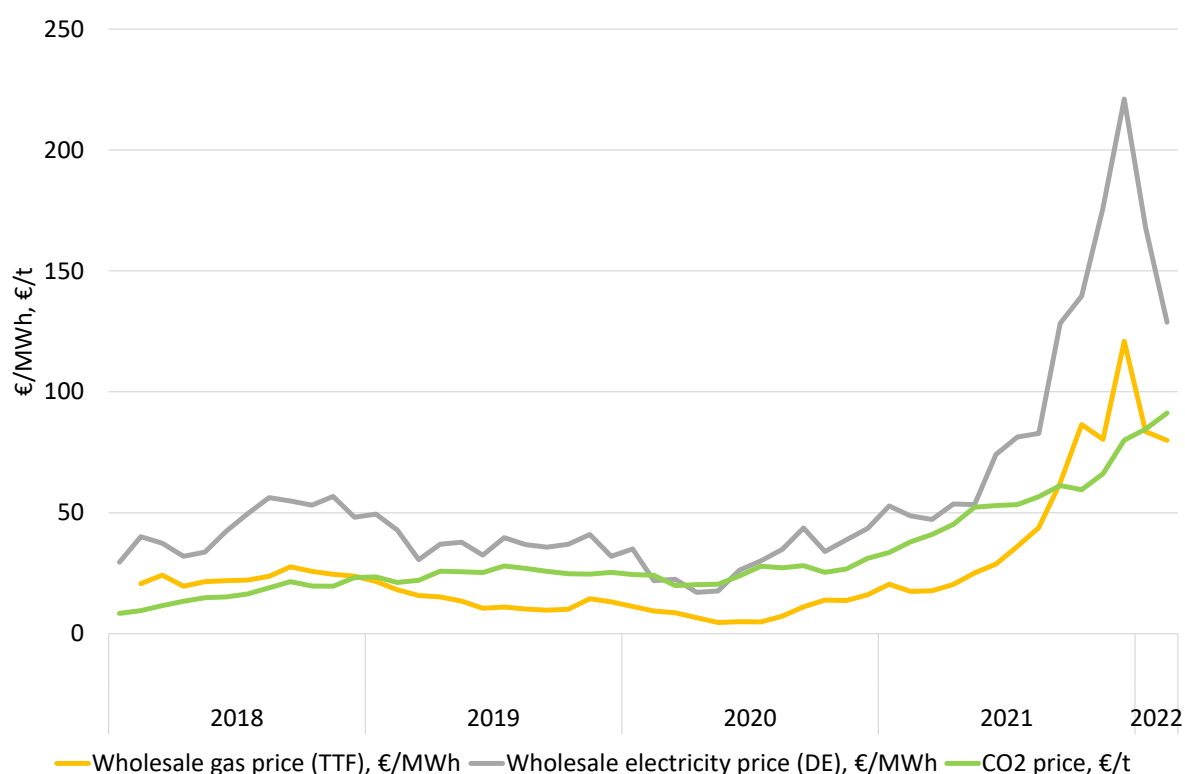
## 4 BACKGROUND

### 4.1 KEY EUROPEAN ENERGY MARKET TRENDS

Although the Energy Strategy reflects both the internal and external factors influencing the future energy markets of Kosovo, many of them are either difficult to predict or exogenous factors to the country.

International energy prices, both power and natural gas, are exogenous factors to Kosovo; however, both have and will continue to have an impact on the Kosovo energy system. Although Kosovo has no natural gas imports, the price increase of gas has impacted Kosovo through its effect on power prices. Figure 2 illustrates the European energy market price evolution over the last four years.

**Figure 2: Wholesale electricity (DE) and natural gas (TTF) spot prices, €/MWh**



Source: ENTSO-E and EEX

The next key external factor is the carbon price level of the EU ETS and the overall climate policy of the EU. Although Kosovo is not yet a participant in the ETS scheme, the ETS price will be one of the most influential factors on the mid- and longer-term energy market developments within the country. In the mid-term, the ETS price will influence import prices. Over the long term, Kosovo is committed to introducing a carbon pricing system and harmonize it with the EU ETS price levels by 2030, by virtue of having signed the Sofia Declaration on the Green Agenda for the Western Balkans<sup>6</sup>.

<sup>6</sup> If Kosovo decides to stay out of the ETS harmonization process, or fails to join it, the new Carbon Border Adjustment Mechanism (CBAM) of the EU would be still imposed on it from 2026 onward. The GHG reporting system is mandated by the current draft legislation to be in place starting in 2023. This instrument will impact the exports of energy-intensive sectors, including iron and steel, cement, fertilizer, aluminum and electricity generation.

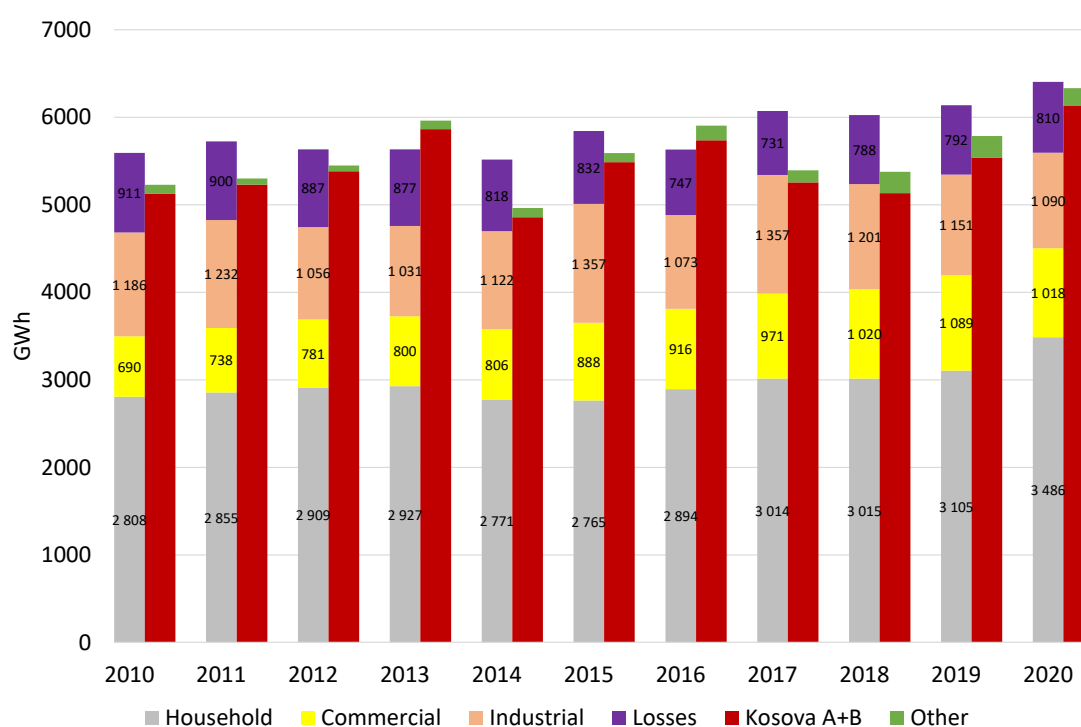


In addition to European energy market developments, an important exogenous factor is the natural gas market development in Southeastern Europe. Kosovo has the option to join the future regional gas network or to (co-)invest in gas-based generating capacities. The realization of the REPowerEU<sup>7</sup> plan to reduce Russian gas imports to the EU, and the exact timing of it, the construction of liquified natural gas (LNG) terminals and the possible pipeline developments in the region (EASTMED, IAP, TAP extension) will be followed closely.

## 4.2 POWER SECTOR

Electricity consumption in Kosovo has increased significantly in the last 10 years. The yearly average growth rate in total electricity consumption was 1.4%, mainly driven by growth in the household sector. In the industrial sector, electricity use stagnated in the last decade. Although distribution losses have decreased in both absolute and relative terms, they are still extremely high (technical loss ~12.5%) compared to the EU average (6%–8%<sup>8</sup>).

**Figure 3: Elements of electricity demand and supply, 2010-2020, GWh**



Source: KOSTT, ERO

While new renewable capacities have been commissioned in the last few years, especially wind and hydro generators, most of the electricity consumption has been satisfied by lignite-based power generation. In the last decade, 85% to 95% of the total supply has come from these power plants. Between 2010 and 2020, the net import positions varied between -9% and +10 %.

The total installed capacity in Kosovo is 1,568 MW, of which 82% is lignite based. The three Kosovo A power plant units that are still in operation are at the end of their technical lifetimes — two of the units were commissioned more than 50 years ago. This results in a higher probability and greater frequency of unplanned outages. Both Kosovo A and B units need to be refurbished to meet the required emission standards.

<sup>7</sup> REPowerEU is the latest EU joint energy action plan, which aims to make Europe independent from Russian gas deliveries.

<sup>8</sup> <https://www.ceer.eu/documents/104400/-/-/fd4178b4-ed00-6d06-5f4b-8b87d630b060>

Until 2021, 137 MW of wind generator units were commissioned in Kosovo, resulting in a wind share of 9% of the installed capacity. Hydro is also an important element of the electricity system with ~ 8.4% share of total installed capacity.

**Table 1: Capacity mix in Kosovo, 2021**

Fuel	Name	Year of commissioning	Installed capacity, MW	Available capacity, MW
Lignite	Kosovo A3	1970	200	135
	Kosovo A4	1971	200	135
	Kosovo A5	1975	210	135
	Kosovo B1	1983	339	260
	Kosovo B2	1984	339	260
Wind		-	137	-
Hydro		-	110-132	-
PV		-	10	-
Biomass		-	1.2	-
Total		-	1546 - 1568	-

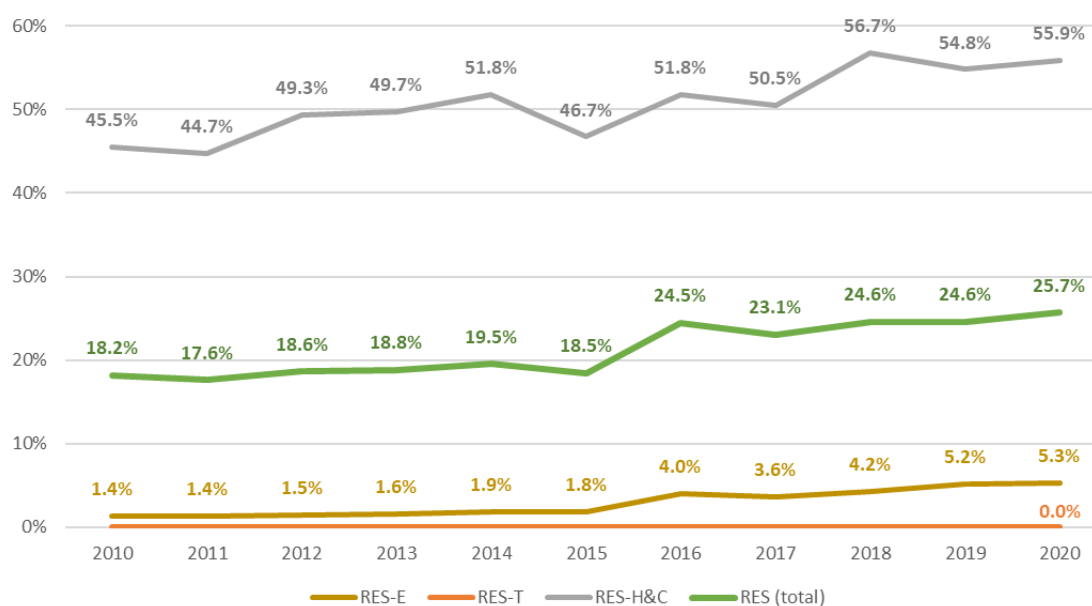
To allow an increasing share of renewable capacities, flexibility is a key issue in the electricity sector. At present, only the Frequency Containment Reserve (FCR, primary reserve of 5 MW) capacities are ensured by the power plants in Kosovo. Other ancillary services (+/-25 MW aFRR and +143/-90 MW mFRR) are provided by the Albanian power system.

The interconnectivity of Kosovo with its neighbors is one of the strongest in Europe. In the four countries bordering Kosovo (Albania, Montenegro, North Macedonia and Serbia), the total net import transfer capacity (NTC) was 1,316 MW; the total export NTC was 1,175 MW. Comparing these figures with the total net installed generation capacities, the interconnectivity ratio is above 78%. The EU requirement is 10% for 2020 and 15% by 2030, which means Kosovo has already met the 2030 targets. However, deepening the cooperation with neighbors, especially with Albania, is fundamental in order to ensure efficient and market-based operation of these interconnections.

### 4.3 RENEWABLE ENERGY

The share of RES in Kosovo's energy mix has increased moderately in the past years. The national RES target in Kosovo was set by the Ministerial Council of the Energy Community in 2012, and confirmed through the adoption of secondary legislation by the Ministry of Economy. In 2020, Kosovo surpassed its 25% RES share target. However, the representation of different RES technologies is unbalanced, and there are significant differences in the sectoral RES shares. In the heating sector biomass provides around half of the required energy, while the electricity sector only has a 6.3% RES-E share, provided by hydro sources, wind and to a minor extent by solar. The share of RES in transport is insignificant for several reasons: provisions related to sustainability of biofuels have not been transposed in the legal framework and consequently do not comply with Directive 2009/28/EC and Directive 2018/2001. Thus, biofuel blending has not been introduced yet. The share of electric vehicles is very low (0.05%), as only 157 electric and hybrid vehicles were imported until 2021 compared to approximately 333,000 cars that use diesel or petrol as fuels. There is no electrified railway line in the country. The graph below depicts the share of renewable energy in the electricity sector (RES-E), transportation (RES-T), heating and cooling (RES-H&C), and total RES share.

**Figure 4: Share of renewable energy**



Source: SHARES database

Until 2020, the feed-in tariff was used to incentivize RES capacity development, primarily in the electricity sector. The feed-in tariff was suspended by ERO in 2020 as competitive support mechanisms became more cost-efficient to increase the deployment of clean technologies, whereas the legal framework is currently being developed with the view of introducing competitive, cost-effective and transparent support schemes such as auctions in the future.

#### 4.4 NATURAL GAS

Presently Kosovo has no gas transmission network, and a single operating connection to the natural gas transmission systems, either the Trans-Adriatic Pipeline (TAP) or liquefied natural gas (LNG) terminals in the Aegean or Ionian seas, i.e. through North Macedonia or Albania would require a minimum of 7-9 years. If an interconnection is built, it would enable the operation of gas-based power generation, and potentially the utilization of natural gas in industry. The options of building a natural gas-based system in Kosovo are analyzed in the ongoing Gas Master Plan.

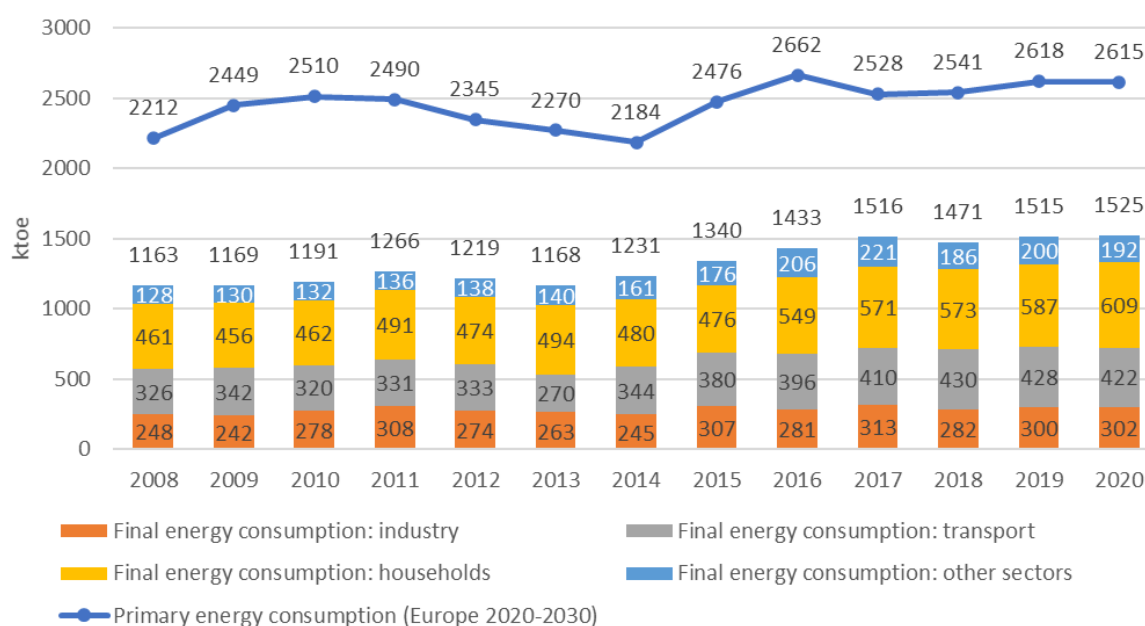
Kosovo has also the option of utilizing the gas infrastructure planned in Albania (connection to TAP or access to the LNG terminal in Vlora). Gas infrastructure in these countries and Greece offer opportunities for (co-)investment in electricity generating capacities.

#### 4.5 ENERGY CONSUMPTION AND ENERGY EFFICIENCY

Primary energy consumption has increased with a yearly average of 1.4% between 2008 and 2020 although showed significant fluctuations.<sup>9</sup> The increase rate was moderate at the end of the decade but affected also by short-term effect (COVID-19 pandemic), thus a rapidly increasing consumption trend is expected for the following years. Final energy consumption followed a similar trend in this period with an average yearly growth rate of 2.3%, reaching 1525 kiloton of oil equivalent (ktoe) by 2020.

<sup>9</sup> Primary energy consumption is the total energy consumption in a country, without undergoing any transformation or losses. Final energy is the energy delivered to consumers for end – consumption

**Figure 5: Primary and final energy consumption in Kosovo**



Source: Eurostat

Within the final energy consumption, the largest share belongs to households, accounting for 40% of the total use in 2020. The energy demand of this sector has increased the most since 2008, by 148 ktoe. This segment of consumption is addressed in this strategy through measures in energy efficiency and heating.

The second largest energy-consuming sector is transport, where energy consumption increased by about 100 ktoe to 422 ktoe. The industrial sector used 302 ktoe in 2020.

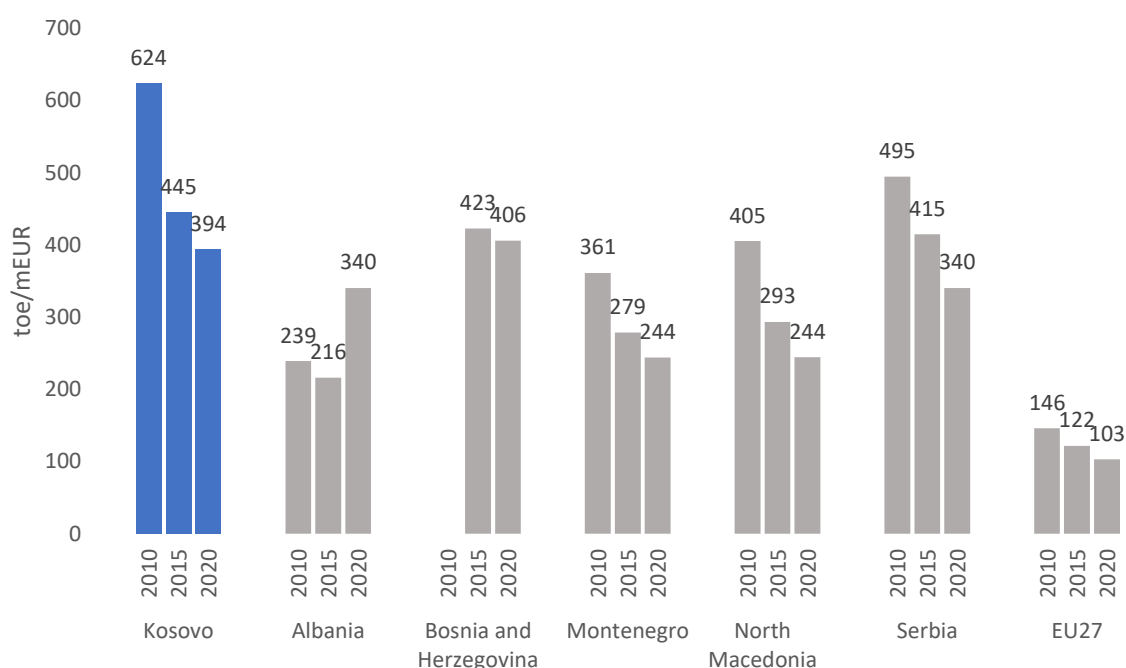
In order to achieve the goals set out in the Green Agenda for the Western Balkans, it is necessary that transport also becomes more sustainable. In line with the objectives of the Transport Strategy, which envisages the promotion of sustainable transport and the promotion of cleaner vehicles, especially alternative fuel vehicles, the Energy Strategy takes into account the gradual electrification of the transport sector when forecasting electricity consumption. Measures to achieve this goal are set out in the transport strategy by creating the legal basis through the adoption of Directive 2014/94/EU and defining the national policy framework for the development of a network of alternative fuel infrastructure (e.g. charging stations for electric vehicles) and promoting the purchase of zero-emission vehicles. Similarly, measures for energy efficiency in industry will be addressed in the Industry Strategy.

Although Kosovo's energy intensity<sup>10</sup> has improved significantly since 2008, it is still outstandingly high compared to the EU-27 average but also significantly higher than the regional average. Over the last five years a 10% energy intensity (ktoe/GDP) improvement was observable, but 2020 showed a slight deterioration in this indicator due to a 4% drop in GDP. Over a longer, 10-year period, energy intensity improved by close to 40%, one of the highest rates in the region. Even with this improvement, energy

<sup>10</sup> Energy intensity measures the energy efficiency of the whole economy by showing how much energy is used to produce one unit of GDP. High energy intensity means inefficient technologies are used in the country and leads to high energy consumption and therefore high energy related expenditures.

intensity in Kosovo is high, exceeding the average energy intensity of the Western Balkans by 25% and of the EU by almost 3 times.

**Figure 6: Energy intensity in the region and in the EU**



Source: Eurostat

The energy efficiency sector in Kosovo faces many challenges. Among the challenges is the limited number of qualified individuals, including in the public sector, for monitoring the implementation of activities. Currently, the Kosovo Energy Efficiency Fund has a limited scope of work including only investment in public buildings. Furthermore, the legal and regulatory framework needs to be reevaluated and redesigned, giving more opportunities for the take-off of the private sector, including Energy Service Companies (ESCO) markets.

#### 4.6 HEATING SECTOR

The heating sector consumes more energy than any other segment of Kosovo's energy system, similarly to most continental European countries. The main sources for heating are biomass (mainly firewood) and electricity, while coal, liquefied petroleum gas (LPG) and fuel oil are used to a smaller extent.

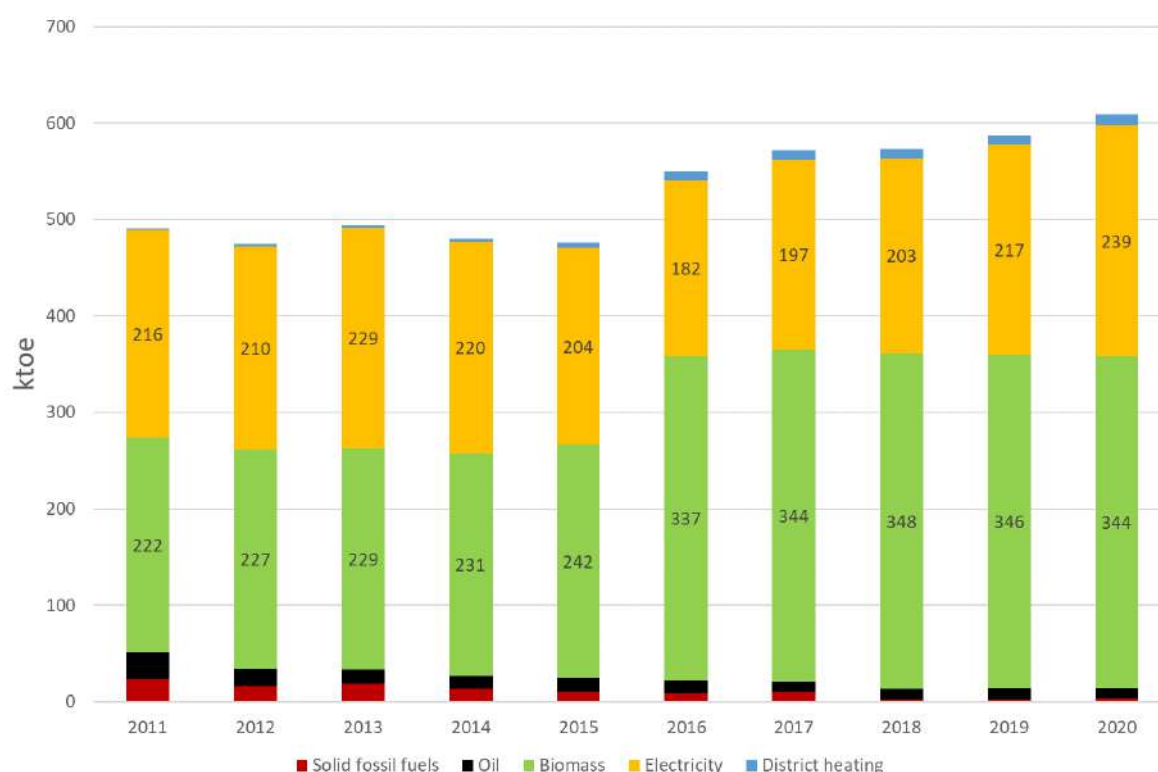
Internal heating systems in residential sector buildings in Kosovo use wood, electricity and liquefied petroleum gas (LPG), while the services sector uses light fuel oil and coal as well as wood, LPG and electricity.

The high consumption of firewood results in deforestation, giving rise to adverse climate, environmental, economic and health impacts. About 57% of households use wood as a heating source, about 39% use only electricity as a source of heat, 0.5% use coal as a source of heat, 2% consume district heat, and 2% use other alternatives.

In Kosovo, demand for electricity varies by month, and in several categories this difference is quite significant. Household consumption is highest during the winter season, largely due to use of electricity for space heating. Recently, the Kosovo power system has faced significant pressure due to the increase in electricity demand resulting in the need for expensive imports of electricity, especially

during the heating season (October-March), when many household customers switched to heating their homes with electricity, instead of using the more expensive wood pellets.

**Figure 7: Energy consumption in the household sector, ktoe**



Source: Eurostat

The district heating sector in Kosovo consists of four systems: DH Termokos - Prishtina, DH Gjakova - Gjakova, DH Termomit - Mitrovica, and Zveqan with an installed generation capacity estimated to be around 298 megawatts thermal (MW<sub>th</sub>). This sector has a very limited coverage in the country, covering approximately 3% to 5% of the total heat demand in Kosovo according to ERO's annual report.

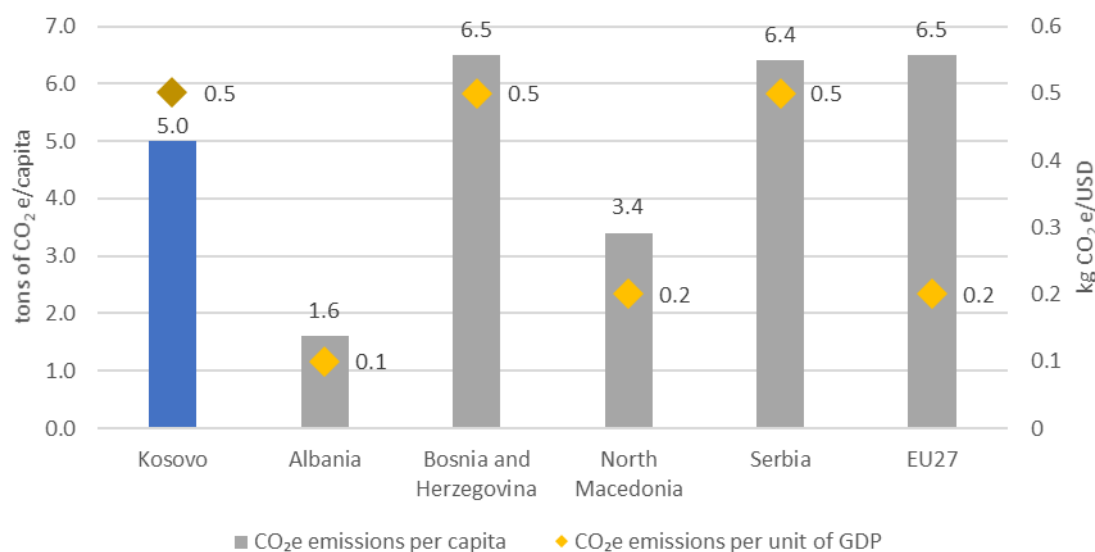
## 4.7 CLIMATE AND ENVIRONMENT

### Decarbonization

According to the latest greenhouse gas (GHG) inventory of Kosovo, annual emissions amounted to 9.613 million tons CO<sub>2</sub>eq in 2019. The share of fuel combustion was 86%, to which the power and heating sectors contributed with 66% (6.316 million CO<sub>2</sub>eq). Whereas pollution from transport and heating is distributed across the country, the power sector's impact is concentrated in one area (in and around the capital, Prishtina).

The overall emission trend shows some fluctuation, but the level has not changed significantly over the years for which data are available, ranging between 8.8 and 10.5 million tons CO<sub>2</sub>eq. As was shown in Figure 8, the per capita emissions were below the EU average in 2019, but the GHG emission intensity of the economy is more than twice as much as the EU average.

**Figure 8: GHG intensity and GHG emissions per capita in the region**



Source: Kosovo Environment 2020 Report of environmental indicators

According to the Climate Change Strategy 2019-2028 of Kosovo,<sup>11</sup> climate variability has already increased, and exposure of Kosovo to heat waves, droughts, floods, and forest fires will become more likely.

#### Environment pollution

With regards to other pollutants, progress with the implementation of the Large Combustion Plant Directive (LCPD) has been made with the adoption and revision of the Kosovo National Emissions Reduction Plan (NERP), including maximum emission limits for nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>) and dust (PM). However, air pollution is still a serious problem in Kosovo, partly resulting from non-compliance of the lignite-fired power plants with the limits set in the NERP. According to the Energy Community's implementation report of 2021, the actual values of emissions in Kosovo compared to the limits were 197% in the case of the SO<sub>x</sub>, 223% for NO<sub>x</sub>, and 177% for dust.<sup>12</sup> Certain provisions of the Industrial Emissions Directive (2010/75/EU) are also applicable from January 1, 2017, for new plants in contracting parties of the Energy Community. Existing plants are also expected to implement the provisions of Chapter III and Annex V, in particular in the case of retrofits. Kosovo has prepared but not yet adopted the legal basis to comply with these provisions.

Household heating with firewood and coal in old stoves in Kosovo also contribute to air pollution problems. Monitoring stations in 2020 detected a high number of cases when PM<sub>10</sub> exceeded the allowed maximum limit, and in some areas the average annual concentration of PM<sub>2.5</sub> was also higher than the standard, mostly during the autumn-winter season, as a result of burning fuels for heating purposes.<sup>13</sup>

The directives on Environmental Impact Assessment (2014/52/EU) and the Strategic Environmental Assessment (2001/42/EC) have been adopted by Kosovo, but some provisions are yet to be aligned with the EU legislation. However, the procedures and administrative capacity required to ensure

<sup>11</sup> [https://konsultimet.rks-gov.net/Storage/Consultations/14-13-59-04102018/Climate%20Change%20Strategy%20and%20Action%20Plan\\_sep\\_2018.pdf](https://konsultimet.rks-gov.net/Storage/Consultations/14-13-59-04102018/Climate%20Change%20Strategy%20and%20Action%20Plan_sep_2018.pdf)

<sup>12</sup> Energy Community Implementation Report on Kosovo, 2021. [https://www.energy-community.org/dam/jcr:db6d342-ea7d-4677-9a9b-e18f22a1cfad/IR2021\\_Kosovo.pdf](https://www.energy-community.org/dam/jcr:db6d342-ea7d-4677-9a9b-e18f22a1cfad/IR2021_Kosovo.pdf)

<sup>13</sup> Annual report on the state of the environment, 2020, Kosovo Environmental Protection Agency, AMMK, Prishtina, August 2021, [https://www.ammk-rks.net/assets/cms/uploads/files/Publikime-raporte/ANG\\_Web.pdf](https://www.ammk-rks.net/assets/cms/uploads/files/Publikime-raporte/ANG_Web.pdf)



effective enforcement of regulations against illegal activities and environmental degradation must be improved. Deeper involvement of the public and civil society organizations in decision-making, and programs aimed at raising public awareness of environmental protection will be ensured to facilitate the acceptance and support of clean technologies by the people of Kosovo.

## 4.8 INTERNATIONAL COOPERATION

### *Interconnectivity and market integration*

Market integration with Albania is a top priority and particularly important for Kosovo. The energy systems of Kosovo and Albania are complementary, thermal in Kosovo and hydro in Albania. Kosovo does not have flexible and rapid response generating units to serve as a system backup capacity, while Albania has many such units. Therefore, it is mutually beneficial to use the available cross-border transmission capacities for the exchange of reserve capacities of the energy system. With the start of operation as an independent Regulatory Area within Continental Europe, Kosovo is recognized as a trading area, where the balancing of the system will be the full responsibility of KOSTT, which means covering all deviations from the Kosovo system. KOSTT has started allocating cross-border capacities and managing congestion, and accordingly collecting revenues from trade.

### *Cooperation under the Energy Community Treaty*

As a party to the Energy Community, Kosovo's long term strategic and policy direction on energy and climate are more and more closely aligned with the objectives of the Energy Community and ultimately the European Union. Cooperation with the Energy Community focuses on three main streams: (i) policy and strategic direction, (ii) legal and regulatory developments and (iii) implementation.

The key objective of the Energy Community Treaty is to integrate contracting parties into the EU electricity and gas markets, including environmental commitments and actions against climate change. This requires specific legislation to be adopted by the Energy Community and implemented at national and regional level. Kosovo, in cooperation with other contracting parties, has begun to draft a legal framework that enables further regional integration and participation in pan-European market platforms. Thus, Kosovo coordinates its agenda and strategic direction with the Energy Community.

Another important policy objective is reaching carbon-neutrality by 2050, a political commitment which Kosovo, along with the other Western Balkan 6 countries made in 2020 by signing the Sofa Declaration on Green Agenda for the Western Balkans.

## 4.9 REGULATORY FRAMEWORK

To ensure a well-functioning energy market, Kosovo adopted legislation aiming to increase market competition at wholesale and retail level, integrate its market with regional and EU markets, strengthen the role and participation of consumers and protect vulnerable consumers from free market dynamics. However, this process has stopped in recent years due to international and domestic energy market developments.

### *Market liberalization and strengthening the role of consumers*

Market concentration at both the wholesale and retail levels is very high in Kosovo. Currently only five<sup>14</sup> consumers are supplied in the liberalized retail market, and the implementation of the liberalization guideline is yet to be implemented. Moreover, some of the other obstacles that hinder market liberalization are also the lack of load profiles and the lack of consumer awareness.<sup>15</sup>

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<sup>14</sup> Including wind farms that buy electricity with at unregulated prices for own consumption.

<sup>15</sup> As the market is liberalized, it will become important that customers have information on supply options and prices in an easily comparable manner, thus increasing the ability and confidence of customers to become active and switch suppliers.



However, a first step that Kosovo has taken towards market liberalization is the participation in the ALPEX energy exchange, in the day-ahead and intraday market.

#### *Protecting vulnerable consumers*

The latest European energy crisis highlighted the need for a comprehensive vulnerable consumer protection scheme. The existing scheme provides direct financial support (electricity bill reduction) to two relatively small categories of citizens which are identified as vulnerable electricity consumers, namely Social Assistance Scheme recipients and recipients of war-related benefits. However, when using these restrictive beneficiary selection criteria, many citizens who may be at risk of energy poverty remain unprotected.<sup>16</sup>

The need for financial support to alleviate energy poverty historically has exceeded the available funds. In the absence of a comprehensive register of vulnerable customers, the subsidy offered by the Government of Kosovo to decrease the impact of the tariff increase was applied as a blanket subsidy to all customers through electricity tariffs.

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<sup>16</sup> According to the Kosovo Household Budget Survey, 2017 and World Bank (2021) study: Program for protection of electricity vulnerable consumers in Kosovo, in 2017 SAS only covered 7% of the population, while 15.8% was classified as energy poor. Some income groups in need are highly underrepresented in SAS support, e.g. 26 % of the poorest quintile and only 1.4% of the single elderly households. The current protection scheme is only partially consistent with the Law on Electricity and with obligations arising from membership in the Energy Community Treaty with respect to protection of electricity vulnerable customers.

## 5 VISION AND GOALS

The Energy Strategy for the period of 2022-2031 reflects the need for rigorous developments of the energy sector, as envisaged in Kosovo's vision and in line with EU goals.

### Vision:

*A sustainable energy sector integrated into the pan-European market, ensuring energy security and affordability for citizens.*

Based on the vision and the analyses conducted for the energy sector, four main goals and five strategic objectives (main policy directions) are defined that ensure the achievement of this vision.

Goals:	Strategic objectives:
I. Ensuring security of supply	1. Improving system resilience
II. Achieving sustainability and climate neutrality	2. Decarbonization and promoting renewable energy
III. Improving competitiveness	3. Increasing energy efficiency
IV. Maintaining affordability	4. Strengthening regional cooperation and market functioning
	5. Protecting and empowering consumers, and workforce development

The accomplishment of the goals is interrelated as attaining a strategic objective contributes to achieving several goals at the same time:

### I. Ensuring security of supply relies on:

- improving **system resilience** such as enhancing system flexibility, modernization of networks, rehabilitation of existing power plants and cybersecurity
- increasing **energy efficiency** to reduce demand
- supporting decarbonization and promotion of **renewable energy** as it decreases import dependency and
- strengthening **regional cooperation and market functioning** as it allows access to diversified energy sources and network services in a cost-efficient manner.

### II. Achieving sustainability and climate neutrality requires:

- increasing **energy efficiency** to lower energy consumption and therefore GHG emissions, air pollution and waste generation;
- **decarbonization and promotion of renewable energy** to decrease the GHG emissions and air pollution of the energy sector; and
- **protecting and empowering consumers** by limiting the negative impact of the energy sector on human health and the environment.

### III. Improving competitiveness is based on:

- strengthening **regional cooperation and market functioning** by reducing energy prices through connected and competitive markets; and
- **protecting and empowering consumers** to create demand-side incentives for better functioning markets.

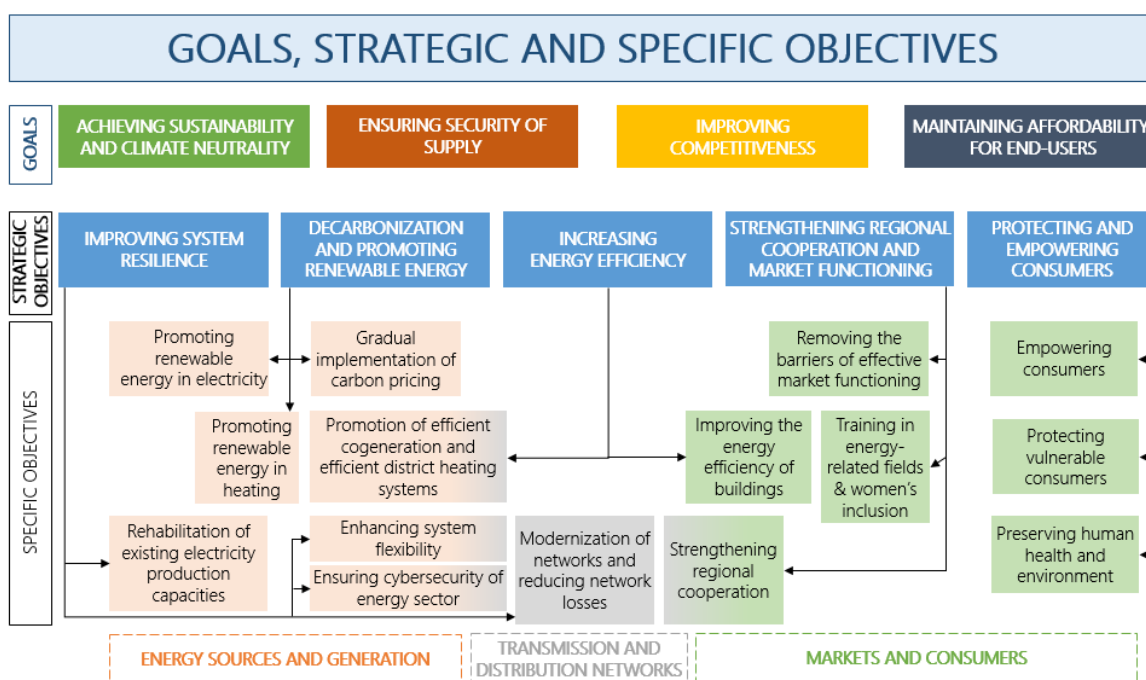
### IV. Maintaining affordability can be reached by:

- increasing **energy efficiency** by reducing the consumption that must be paid by consumers;
- supporting decarbonization and promotion of **renewable energy** that can cover self-consumption;
- strengthening **regional cooperation and market functioning** by reducing energy prices through connected and competitive markets; and
- **protecting and empowering consumers** by providing choices to consumers and protecting vulnerable consumers, and developing the necessary skills for women and men in line with the needs of the dynamic energy sector.

The above-mentioned relationships across the goals and the strategic objectives of the Energy Strategy are depicted in Figure 9.

**Figure 9: Goals and strategic objectives of the Energy Strategy of Kosovo**

The five strategic objectives are divided into 15 specific objectives aimed at more concrete results.



The Energy Strategy has been developed in compliance with the Framework for Strategic Planning and Management, which clearly defines the breakdown from top to bottom of the objectives of the highest level to those of the lowest level, which are concretized with a sectoral strategic document. The National Development Strategy 2030 (NDS 2030), as the main long-term strategic document, serves as a mechanism for the implementation of Kosovo’s vision, through development priorities and goals, strategic objectives and impact indicators.

In this regards, the National Development Strategy has also defined development goals that are directly related to the Energy Strategy.

**Table 2: Linkage of the strategic objectives of the National Development Strategy and the Energy Strategy**

Development Goals (NDS 2030)	Strategic Objectives (NDS 2030)	Strategic Objectives (Energy Strategy 2022-2031)
High-quality, reliable, and integrated infrastructure	Improving energy supply security, sustainability and affordability	Improving system resilience Protecting and empowering consumers
	Integration into regional and pan-European energy markets	Strengthening regional cooperation and market functioning
Clean environment and better use of natural resources	Increasing the share of renewable sources in the energy mix	Decarbonization and promoting renewable energy
	Improving energy efficiency	Increasing energy efficiency

## 6 OBJECTIVES

### 6.1 STRATEGIC OBJECTIVE 1: IMPROVING SYSTEM RESILIENCE

Improving system resilience includes all activities that ensure security of supply by guaranteeing the seamless functioning of the energy system. This requires adequately sized capacities, reliability, flexibility, and efficiency in relation to generation units, network elements and the connected markets. These wide range of areas are captured by the following four specific objectives: (i) enhancing system flexibility, (ii) modernization of networks and reducing network losses, (iii) rehabilitation of existing electricity production capacities, and (iv) ensuring cybersecurity of the energy sector.

The main indicators and targets of the strategic objective are the following:

Indicators : Strategic Objective 1			Baseline	Target for 2024	Target for 2031
System Average Interruption Duration Index (SAIDI)			SAIDI: 80.83 hours/year	SAIDI:68.9 hours/year	SAIDI: 51.84 hours/year
System Average Interruption Frequency Index (SAIFI)			SAIFI: 58.27	SAIFI: 49	SAIFI: 40.86

#### *Specific objective 1.1: Enhancing system flexibility*

A flexible system is becoming increasingly important as Kosovo pursues ambitious renewable development. **Reserve requirements need to be met.** For this objective, **a well-functioning flexibility market will be set** and different flexibility options will be incentivized.

Kosovo will install at least 170 MW of battery storage capacity<sup>17</sup> in its power system by 2031. Investing in energy storage will not only improve system flexibility and integrate variable renewable electricity generation, but would also be needed to fulfill ENTSO-E energy reserve requirements, and to some extent helps to reduce electricity imports. Other innovative technologies, including seasonal storage will be explored and may be installed by 2031 depending on their economic viability.

Kosovo has no gas infrastructure or related qualified workforce. Achieving coverage of the (areas of) the country with a distribution network (e.g. for heating, cooking, industry) would take decades to build. Considering this, and the extremely high prices and the economic and geopolitical uncertainties over gas supply in the Europe aftermath of the war in Ukraine, domestic gas network development would be highly risky and costly as means of ensuring diversity of energy sources or system flexibility. Nevertheless, developments in the region and globally will be followed closely, and (co-)investment in gas power plants for baseload and/or system flexibility in Albania, North Macedonia and Greece will be explored with the intention of implementation by 2031.

The current Kosovo-Albania cooperation on ancillary services will be continued and strengthened. Over the mid-term, once ALPEX is fully functional, flexibility providers will be integrated into the system and in the longer-term Kosovo will join the common EU balancing platforms (MARI, PICASSO and IGCC). Separate markets will be set up for ancillary services, enabling the participation of aggregators, energy storage and RES technologies. Access to these markets ensures a higher level of competition, and therefore contributes to affordability of these services.

Dynamic pricing elements for commercial and household customers will be applied, thereby enhancing consumers' role in system balancing through the optimization of electricity consumption depending on the variability of electricity supply. This will also help consumers to reduce energy bills and improve

<sup>17</sup> Battery storage is foreseen, however a different storage technology with the same technical specifications and performance may be installed if such a technology is more cost-effective at the time of purchase.



the quality of electricity supply. The installation of a number of smart meters at the customer level will be considered, to the extent that the benefit in terms of marginal increase in system flexibility justifies their financial cost.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 1.1	Baseline	Target for 2024	Target for 2031
Level of flexible regulation capacity	5 MW	5 MW	170 MW <sup>18</sup>

### *Specific objective 1.2: Modernization of networks and reducing network losses*

**Modernization of the electrical grid** at the transmission and distribution levels will be accelerated to accommodate large variable generation capacities, and **reduce** the high level of network **losses** and consequently reduce gross electricity demand.

Renewable integration is only possible if adequate transmission and distribution infrastructure is in place. Handling a significant amount of variable renewable generation requires flexible grids, modern network equipment and smart grid control solutions. With network modernization system flexibility will be enhanced, but also technical losses on the transmission and distribution grid will be reduced. Network investments also provide better integration possibilities for prosumers.

New interconnector lines will be built by the end of the decade between Kosovo and Albania to allow for more trading in the region.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 1.2	Baseline	Target for 2024	Target for 2031
Distribution losses*	18.48%, of which 15.1% allowed and 3.38% not allowed [2021]	14.5%	9%
Amount of vRES capacity that the network is able to handle/integrate	147 MW [2021]	500 MW	2000 MW

\*The baseline value includes 6.02 % commercial losses. For 2024 and 2031, 0 commercial losses are targeted.

### *Specific objective 1.3: Rehabilitation of existing electricity production capacities*

**Investment in existing lignite capacities is needed to guarantee system resilience and to meet the required emission standards.** The power plant units of “Kosovo B1 and B2” will be refurbished to maintain the security of supply and decrease emissions. The refurbishment of the Kosovo B1 and B2 units will be carried out in two stages, and by the end of 2025, and respectively 2026, both units will operate in a more efficient, reliable mode, meeting mandatory emission standards of the Industrial Emission Directive. One of the Kosovo A units will be refurbished by the end of 2024, while the decision to refurbish or phase out the second unit will be made in 2024 at the latest.

The refurbished A unit(s) would operate in a strategic reserve mode from 2028, meaning these unit(s) would be available in the crucial higher demand heating season, or during extraordinary occasions such as the recent energy crisis. The third operating A unit will be **permanently closed** once the refurbishment of the other lignite unit(s) has been completed.<sup>19</sup>

In light of environmental and decarbonization goals, the technical specifications regarding the refurbishment of Kosovo A and B power plants will be detailed in the National Energy and Climate Plan.

<sup>18</sup> Includes secondary, tertiary reserves, and arbitrage

<sup>19</sup> The units currently not operational (A1 and A2) will be decommissioned.



Such plans will be subject to the strategic environmental assessment as required for the NECP in line with the Regulation on the governance of the energy union and climate action (EU12018/1999).

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 1.3	Baseline	Target for 2024	Target for 2031
Number of refurbished lignite units	0 [2021]	2	3 or 4
Number of phased out lignite units	0 [2021]	0	2 or 1

#### *Specific objective 1.4: Ensuring cybersecurity of energy sector*

**Cybersecurity** in the energy sector is **increasingly important** especially with the continuous development and digitalization of electricity systems.

As the electricity market is liberalized, the roles played by the system operator and other market participants (generators, suppliers and traders) will become increasingly important for a reliable market operation. Ensuring cybersecurity will require regular audits and assessments of the software platforms that maintain secure operation of the electricity market. A sectoral CERT (Computer Emergency Response Team) for energy will be established by 2025, and a cybersecurity energy risk management framework will be developed that will treat the cybersecurity threats in the energy sector.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 1.4	Baseline	Target for 2025	Target for 2031
Cyber response capabilities (identify, detect, respond, and recover) in the energy sector	Not in place	In place	In place

## 6.2 STRATEGIC OBJECTIVE 2: DECARBONIZATION AND PROMOTING RENEWABLE ENERGY

Kosovo's high carbon emissions will be significantly reduced through the gradual decarbonization of the energy sector, by implementing a carbon pricing system, transposing the EU regulation related to monitoring, reporting and verification of carbon emissions, and establishing institutional and technical infrastructure.

In the power sector, the most important instruments to diversify the generation mix will be investments in renewable energy sources and gradually phasing out lignite-based generation. New RES capacities, with existing and innovative technologies, will gradually replace the use of coal, achieving coal phase-out by 2050 at the latest.

Promoting sustainability through renewable energy in other sectors (e.g. heating) will also contribute to affordable electricity prices, security of supply and environmental protection.

The National Strategies on the transport and industrial sectors are currently being developed, therefore their long-term development plans will be covered there. The decarbonization of the Transport and Industry sector, together with the Energy Strategy will be integrated into the National Energy and Climate Plan 2025-2030.

The main indicators and targets of the strategic objective are the following:

Indicators: Strategic Objective 2	Baseline	Target for 2024	Target for 2031
GHG reduction in the power sector compared to 2019	0% [2019] (6316 ktCO <sub>2</sub> )	0%	-32%
Renewable share in the electricity sector consumption (RES-E share)	6.3% [2021]	Minimum 13%	Minimum 35%

#### *Specific objective 2.1: Gradual implementation of carbon pricing*

Kosovo intends to reduce carbon emissions. As a signatory of the Green Agenda for the Western Balkans and as an Energy Community Contracting Party, Kosovo rights but also obligations regarding carbon pricing.

A national emission trading scheme (ETS) will be introduced, with a gradual minimum price increase until integration in the pan-European market and the EU ETS. This serves to (gradually) internalize the cost of GHG emissions in the power sector and ensures that Kosovo gains exemption from EU's CBAM measures. Whereas the starting year and minimum level of carbon price that power producers have to pay will be subject to negotiation with the EU, preparations for the introduction of a carbon pricing system will be in place by 2025. Revenues collected from this system will be one of the sources of a Just Transition Fund, the uses of which will be determined, and may include promotion of RES, training and retraining of the workforce, energy-related projects for vulnerable consumers, etc.

This will be accompanied by the phasing out of subsidies for fossil fuels.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 2.1	Baseline	Target for 2025	Target for 2031
Gradual introduction of carbon pricing	Not introduced [2021]	Preparation for a carbon pricing system completed	Integration into the EU ETS

#### *Specific objective 2.2: Promoting renewable energy in electricity consumption*

Increasing the share of renewables in the electricity sector is fundamental to reach decarbonization targets and to ensure a just energy transition in Kosovo. Diversifying the energy mix is vital for Kosovo's decarbonization efforts and maintaining security of supply.

To create a stable regulatory and market framework capable of attracting investment in renewable energy sources the legal framework will be reviewed and the Law on Renewable Energy Sources (Law on RES) will be adopted.

One of the most important support instruments elaborated in the forthcoming Law of RES is the auction for renewable electricity capacities. Use of auction procedures represents one of the most economical and transparent approaches to increase the deployment of renewable energy capacities. The auction process will begin immediately, with the preparation of documentation for the first auction in 2022. Using the experience gained from the auction the Secondary Legislation on the Law on RES will be developed, and then further auction rounds will be organized in the following years for wind, PV and other renewable energy technologies.

An efficient national and regional renewable energy certification system will be established through mechanisms which will ensure that guarantees of origin certificates are issued, transferred and

canceled electronically and are accurate, reliable and fraud-resistant. The ERO rule on Certifications of Origin will be updated as well, and electronic mechanisms for their issuance will be established.

Another significant specific goal is to promote renewable self-consumers (prosumers) and renewable energy communities, whose deployment will be encouraged by improved legal and regulatory framework and administrative procedures, as well as the introduction of various support schemes. In addition to boosting the share of RES in final electricity consumption, this will help to reduce distribution network losses.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 2.2	Baseline	Target for 2025	Target for 2031
RES capacity in the electricity sector (including prosumers)	279 MW	490 MW	1600 MW
Prosumer capacity	2 MW [2021]	30 MW	Minimum 100 MW

### *Specific objective 2.3: Promoting the use of sustainable renewable energy in heating*

Efficient and clean(er) individual and/or district heating (DH) systems based on RES will be promoted. The ongoing feasibility study for DH systems in eight municipalities (in addition to Gjakova and Prishtina which have DH) will consider RES (e.g. biomass, geothermal, solar heat pump) as the main alternatives.<sup>20</sup> The magnitude and mix of these technologies by 2031 will be informed by the study, and the decision to develop such technologies will be determined through the revision of the Energy Strategy's 3- Year Action Plan and its incorporation into the National Energy and Climate Plan. The existing DH system of Prishtina will diversify its technology to include at least 50 MW<sub>th</sub> of solar-based heating by 2025.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 2.3	Baseline	Target for 2025	Target for 2031
Installed RES capacity in district heating systems	15 MW <sub>th</sub>	Minimum 65 MW <sub>th</sub>	To be determined by the Feasibility Study

## 6.3 STRATEGIC OBJECTIVE 3: INCREASING ENERGY EFFICIENCY

Increasing energy efficiency is crucial to achieving all four goals of the Energy Strategy: it eases the supply of energy needs and decreases import dependency (security of supply), reduces the burdens of the consumers (affordability) and reduces GHG emissions and air pollution (sustainability).

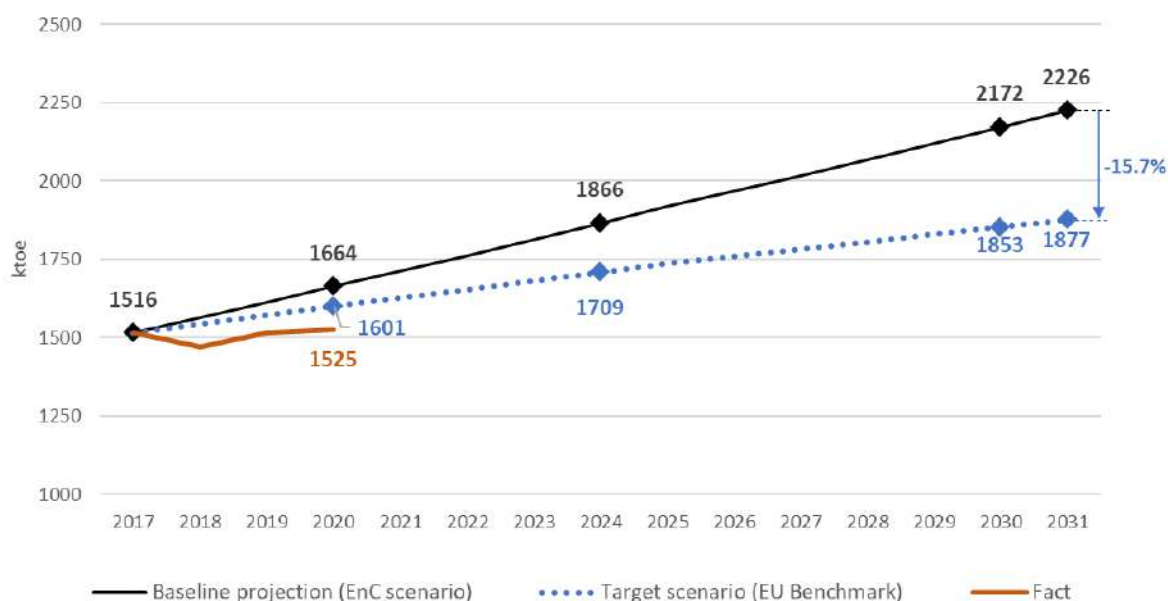
The strategy's goal is to move toward a more efficient energy consumption pathway that results in a less energy-intensive economy. According to EU Member State practice, Kosovo's energy efficiency target is defined as the difference (in percentage) between projected energy consumption with existing measures (baseline) and new measures (target). The baseline and target consumption pathways to 2031 are defined based on the "EnC scenario" of the study "Projections of energy consumption and energy savings potential in Kosovo to 2030" (referred to as "EU study" and "EnC scenario").<sup>21</sup>

<sup>20</sup> In a parallel process, the biomass source verification system will be improved to allow for more transparent usage of sustainable forestry and agriculture biomass products.

<sup>21</sup> N. Brizard (2019): Energy consumption forecast and energy saving potential in Kosovo by 2030, Final Report

The overall target for energy efficiency is to limit final energy consumption at the level of 1877 ktoe in 2031. Reaching this target value is equivalent with a 22.2% savings compared to 2007 PRIMES modeling projections which is used as a baseline projection in the EnC study<sup>22</sup>, or 15.7% savings compared to the EU study's baseline energy consumption projection (2226 ktoe).<sup>23</sup> Figure 10 depicts the baseline and the target consumption pathways together with the factual consumption until 2020. The figure also shows that the factual trend of the final energy consumption is below both pathways. This is partially due to short term effects (i.e., COVID-19 pandemic), therefore reaching the target requires substantial efforts specified further in the specific objectives below.

**Figure 10: Final energy consumption pathways and target for 2031**



For final electricity consumption, the target path “EU28 Benchmark” represents a cumulative savings of 976 GWh compared to the baseline (EnC) scenario by 2030. With this trend, a consumption of 6,051 GWh can be achieved in 2031 with a cumulative savings of 1,148 GWh (15.5%).

The strategic objective of increasing energy efficiency is divided into two specific objectives that cover the energy efficiency of buildings, and promotion of efficient cogeneration and efficient district heating systems. Improving the energy efficiency in the industrial and transport sectors is subject to other strategic documents currently elaborated.

The ongoing process for the development of the legal framework (e.g. revisions of laws on energy efficiency, energy performance of buildings) and regulatory framework (e.g. Building Code, regulation on labeling and eco-design, etc.) will provide a solid ground for achieving the objectives in relation to energy efficiency. The main indicators and targets of the strategic objective are the following:

<sup>22</sup> TU Wien, EEG, REKK (2019): Study on 2030 overall targets for the Energy Community - Energy efficiency, RES, GHG emissions reduction, Final Report

<sup>23</sup> This target is derived from the average energy efficiency gains achieved in the EU28 between 2005 and 2017 (referred as “EU28 Benchmark” in the EU study). The target is achievable with a maximum of 1.9% average yearly increase in final energy consumption over the next decade.

Indicators: Strategic Objective 3	Baseline	Target for 2024	Target for 2031
Final energy consumption level	1516 ktoe [2017]	1709 ktoe	1877 ktoe
Cumulative energy savings achieved in the building sector	2.7 ktoe [2021]	17.76 ktoe	266.4 ktoe

### *Specific objective 3.1: Improving the energy efficiency of buildings*

The most significant goal within energy efficiency is to improve energy efficiency in the building stock, as buildings account for more than 40% of annual national energy consumption. This objective will be achieved by setting minimum energy performance requirements for new buildings and those being renovated, and the implementation of EE measures in the existing building stock through different support schemes<sup>24</sup> (implementation of the Building Renovation Strategy), promoting Near Zero Energy Consumption Buildings, supporting highly efficient technology deployment (e.g. heat pump, solar thermal, etc.), introducing the Energy Performance Certification in buildings, energy auditing, and raising public awareness for EE measures.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 3.1	Baseline	Target for 2024	Target for 2031
Total cumulative energy savings of public buildings	2.6 ktoe [2021]	3.3 ktoe	33.9 ktoe
Total cumulative energy savings of residential & commercial buildings	0.1 ktoe [2021]	14.46 ktoe	232.5 ktoe
Number of near zero energy buildings	0	10	150

### *Specific objective 3.2: Promotion of efficient cogeneration and efficient district heating systems*

The existing district heating systems in Prishtina and Gjakova have a large potential for expansion which will be targeted by several actions. Aside from doubling the cogeneration capacity at Termokos and adding at least 50 MW<sub>th</sub> of RES capacity, the energy efficiency of the distribution network will be enhanced, and additional new consumers (public and private) will be connected to the DH network, contributing to lower electricity consumption and lower air pollution.

Development of DH systems in other municipalities (Gjilan, Ferizaj, Drenas Prizren, Obiliq, Peje, Mitrovicë and Zveqan) is being assessed. Heating solutions will be designed depending on the results of the study and the characteristics of the areas (e.g. population density). After finalization, it will be possible to estimate the contribution of these projects to energy savings. Centralized systems for heating have high efficiency and the connection of existing buildings to the district heating network should result in both – primary and final energy savings.

<sup>24</sup> Apart from continuing investment in EE in public buildings, future schemes will include investments in the residential and commercial sectors.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 3.2	Baseline	Target for 2024	Target for 2031
Increased capacity of cogeneration at Termokos (Prishtina)	140 MW <sub>th</sub>	140 MW <sub>th</sub>	280 MW <sub>th</sub>
Number of customers connected to the district heating systems (Prishtina & Gjakova)	17,791	24,560	38,240 in Prishtina and Gjakova For other municipalities, TBD based on feasibility study

#### 6.4 STRATEGIC OBJECTIVE 4: STRENGTHENING REGIONAL COOPERATION AND MARKET FUNCTIONING

Interconnectivity and market integration contributes to ensure security of supply by enhancing the resilience of the energy system, but at the same time it supports the goals of affordability and competitiveness as well as by making the wholesale and reserve markets more cost-efficient.

As a member of the Energy Community, Kosovo is committed to implement all obligations under the Treaty, which are crucial to integrate into the EU's internal energy markets and to achieve the strategic goals to create a free and competitive energy market. Cooperation with Albania will reach its next step in 2023 by establishing market coupling and the power exchange ALPEX, which will help ensure cost-effectiveness for implementing the RES targets and enhance system flexibility, whereas, by 2030, Kosovo aims to be integrated into the pan-European market.

The main indicators and targets of the strategic objective are the following:

Indicators: Strategic Objective 4	Baseline	Target for 2024	Target for 2031
Market integration with pan European electricity markets	Not in place	Market integration with Albania (2023)	Joining Pan-European Market area

##### *Specific objective 4.1: Strengthening regional cooperation*

The most important first step in the field of cooperation in the electricity market is the full functioning of a common power exchange with Albania (ALPEX) both on the day-ahead and intraday markets.

The longer-term target is to join the European couplings, the Single Day-Ahead Coupling (SDAC) and the Single Intraday Coupling (SIDC), by 2031 at the latest, which helps ensure economically optimal utilization of the cross-border grid capacity, and through that contributes to more effective market functioning. This will also enable lower energy prices to ensure affordability, and also provide a level playing field and correct market signals to investors, thus increasing the share of renewable energy sources in the system.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 4.1	Baseline	Target for 2024	Target for 2031*
Offered cross-border capacity/Nominal cross-border capacity	Export: 22-24%, Import: 24-26%	Minimum each direction 28-30%	Each direction 70%

\* Includes energy transit.

#### *Specific objective 4.2: Removing the barriers of effective market functioning*

As a signatory party to the Energy Community Treaty, Kosovo will transpose its legal and regulatory framework to the EU Acquis Communautaire, which will create a transparent and non-discriminatory energy market based on the principles of a free, open and competitive market. A sound regulatory framework in line with EU guidelines will contribute also to all strategic objectives.

Increasing competition in the energy wholesale and retail markets will improve the market functioning by creating a competitive and efficient market model which is persistent with the core principles of a free market. A prerequisite of all these is setting up a well-functioning domestic wholesale market and balancing market, which rules will be based on EU Network Codes. This will guarantee that international cooperation will be realized in an efficient way in the future, not only on the wholesale market but also on the ancillary services markets.

With the gradual phase-out of the BSA, the share of **non-household consumption to participate in the competitive market segment will increase**, as electricity prices will reflect market prices, thus incentivizing them to voluntarily leave the Universal Service Supplier (USS).

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 4.2	Baseline	Target for 2025	Target for 2031
Status of BSA phase-out	BSA in place	Gradual phase-out of BSA started	BSA Phased out
Number of offers available for non-household customers	1	6	> 6

#### *Specific objective 4.3: Training in energy-related fields and women's inclusion*

The energy transition to a free market with high penetration of renewable energy requires training of existing and new energy experts. The Government will work closely with academia, the industry and development partners organizations to develop and harmonize education and training programs with the needs of the energy sector. Trainings on integration of renewables, electricity markets, regional integration, energy trading and energy assessment of buildings are considered as key priorities. This cooperation will be carried out in such a way that it enables women's participation with equal opportunities in these education and training programs (including through scholarship schemes) and promoting inclusion of women in energy sector companies and institutions. The cooperation with



academia, industry and development partners will also help to boost Research and Development activities in the energy sector designed to the specific needs of Kosovo.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 4.3	Baseline	Target for 2024	Target for 2031
Annual number of new graduates obtaining academic degrees or professional qualifications in the field of energy and related fields	NA	TBD	TBD
Percentage of women employed in the energy sector	9% [2021]	11%	Minimum 25%

## 6.5 STRATEGIC OBJECTIVE 5: PROTECTING AND EMPOWERING CONSUMERS

The Energy Strategy places people in its focus and sets objectives in the following areas: the protection of vulnerable consumers<sup>25</sup> to guarantee affordability of the energy bills and investments in energy efficiency (of buildings and household equipment) and heating solutions; the empowerment of consumers by strengthening their ability to actively participate in the liberalized energy market; and the reduction of environmental pollution.

Moreover, with the aim of linking development with the energy sector and speeding up the energy transition, the Government will establish the legal basis for Citizens Energy Communities and Active Consumers in line with the *Acquis Communautaire* and best practices from EU member states. The regulatory framework will consider energy communities in consumption, generation (including microgeneration), storage, energy sharing/trading, aggregation and third-party services and similar.

The main indicators and targets of the strategic objective are the following:

Indicators: Strategic Objective 5	Baseline	Target for 2024	Target for 2031
Number of new schemes dedicated to vulnerable consumers	NA	2	4
Number of programs supporting community projects in efficiency and self-consumption	1	> 2	> 5

### *Specific objective 5.1: Protecting vulnerable consumers*

In addition to new energy-related schemes for vulnerable consumers, the price-support scheme will be improved in terms of targeting and it will aim to cover all individuals/households in (risk of) energy poverty.

A new and improved price-support scheme will be introduced by 2024, whereas by 2031 this will further be advanced into a means-tested scheme that will be linked to the overall reformed social assistance scheme.

The main indicators and targets of the specific objective are the following:

<sup>25</sup> Vulnerable consumers may include social assistance scheme beneficiaries and other low-income families, female-headed households, elderly households, etc.

Indicators: Specific Objective 5.1	Baseline	Target for 2024	Target for 2031
Price support scheme for vulnerable consumers	Existing support scheme (not well targeted) [2021]	New vulnerable consumers program in place established	Means-tested vulnerable consumers scheme linked to the reformed social assistance scheme

### *Specific objective 5.2: Empowering consumers*

Strengthening the role of the consumers in the energy market raises their ability to properly use their rights in a liberalized energy market, i.e., make informed decisions while choosing a supplier or a tariff plan, or to make choices on their energy consumption and energy efficiency investments (renovation, installation of solar panels, etc.). The objective covers the issue of enhanced consumer protection capacities and raising consumer awareness through information campaigns and establishing energy performance criteria for energy-related products. The active participation of well-informed consumers also enhances the development of retail markets that contributes to efficient market functioning (Strategic objective 4).

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 5.2	Baseline value	Target for 2024	Target for 2031 <sup>Awar</sup>
Energy-related awareness and information campaigns implemented	6 [2021]	9 annually	9 annually
Diversity and comparability of services offered to consumers	No offers available	Launch of the Price Comparison Tool	Alternative offers available for all consumers

### *Specific objective 5.3: Preserving human health and environment*

Minimizing the negative environmental impacts of the energy sector is essential for protecting the health of the citizens in Kosovo and saving its ecosystem. To reduce the release of harmful pollutants from large combustion plants into the environment, compliance with the limits set by the National Emission Reduction Plan will be enforced and the rules prescribed by the Industrial Emissions Directive of the EU will be transposed and implemented.

To ensure the proper implementation of environmental provisions in line with the Energy Community *acquis* and to prevent the breaching of legislation and non-compliance, institutional capacities of environmental authorities and inspectorates will be increased, and procedures improved. Information provision, awareness raising campaigns, and the involvement of population and civil organizations will contribute to the pro-environmental attitude of people. Full implementation and enforcement of the environmental EU legislation of the Clean Energy package incorporated into EnC *acquis* will be realized in the coming years, and with the adoption of the legislation under the Fit for 55 package by the Energy Community, the new rules will be adopted and implemented. This will include the adoption and implementation of the LULUCF regulation to ensure that wood and other biomass sources are used in a sustainable way and can be accounted as renewable energy source.

The main indicators and targets of the specific objective are the following:

Indicators: Specific Objective 5.3	Baseline	Target for 2024	Target for 2031
Emissions of dust, NO <sub>x</sub> and SO <sub>2</sub> of lignite power plants	<p><b>TPP Kosovo B:</b> Dust: over 300 mg/ Nm<sup>3</sup> NO<sub>x</sub>: over 500 mg/ Nm<sup>3</sup> SO<sub>2</sub>: over 600 mg/ Nm<sup>3</sup></p> <p><b>TPP Kosovo A:</b> Dust: over 50 mg/ Nm<sup>3</sup> NO<sub>x</sub>: over 600 mg/ Nm<sup>3</sup> SO<sub>2</sub>: over 600 mg/ Nm<sup>3</sup></p>	<p><b>TPP Kosovo B2:</b> Dust: 20 mg/ Nm<sup>3</sup> NO<sub>x</sub>: 200 mg/ Nm<sup>3</sup> SO<sub>2</sub>: 600 mg/ Nm<sup>3</sup></p> <p><b>TPP Kosovo B1:</b> Dust: over 300 mg/ Nm<sup>3</sup>, NO<sub>x</sub>: over 500 mg/ Nm<sup>3</sup> SO<sub>2</sub>: over 600 mg/ Nm<sup>3</sup></p> <p><b>TPP Kosovo A3:</b> Dust: 20 mg/ Nm<sup>3</sup> NO<sub>x</sub>: over 200 mg/ Nm<sup>3</sup> SO<sub>2</sub>: over 200 mg/ Nm<sup>3</sup></p> <p><b>TPP Kosovo A4 &amp; A5:</b> Dust: over 50 mg/Nm<sup>3</sup>, NO<sub>x</sub>: over 600 mg/Nm<sup>3</sup>, SO<sub>2</sub>: over 600 mg/Nm<sup>3</sup></p>	<p><b>TPP Kosovo B:</b> Dust: 20 mg/ Nm<sup>3</sup> NO<sub>x</sub>: 200 mg/ Nm<sup>3</sup> SO<sub>2</sub>: 200 mg/ Nm<sup>3</sup></p> <p><b>TPP Kosova A:</b> Dust: 20 mg/ Nm<sup>3</sup> NO<sub>x</sub>: 200 mg/ Nm<sup>3</sup> SO<sub>2</sub>: 200 mg/ Nm<sup>3</sup></p>

## 7 IMPLEMENTATION, MONITORING AND REPORTING ARRANGEMENTS

The implementation, monitoring and reporting responsibilities are set in the Action Plan, where the responsible institution and the contributing partners are indicated. It also states the short term (end of 2025) and long-term targets and the measures which enables the clear monitoring of the actions.

### *Management structure*

The Ministry in charge of the energy sector is responsible for the implementation, monitoring and reporting activities related to the Energy Strategy. The Minister, through the Department of Energy, will coordinate these activities in close collaboration with other relevant ministries and government institutions through the establishment of the Implementation Committee of the Energy Strategy. These also include the institutions that participated in the working group elaborating the Energy Strategy and consisting of the following members:

**Table 3: Composition of the working group of the Energy Strategy**

	Institution	Role
1	Department of Energy / Ministry of Economy (ME)	Chair
2	Advisor from the ME cabinet	Member
3	Kosovo Energy Efficiency Agency	Member
4	Department of Finance and General Services	Member
5	European Integration department/ME	Member
6	Legal department/ME	Member
7	Strategic Planning office/PMO	Member
8	European Integration Office/PMO	Member
9	Legal Office/PMO	Member
10	Ministry of Finance, Labor and Transfer (MFLT)	Member
11	Ministry of Environment, Spatial Planning and Infrastructure	Member
12	Ministry of Local Government Administration	Member
13	Ministry of Industry, Entrepreneurship and Trade	Member
14	Ministry of Agriculture, Forestry and Rural Development	Member
15	Ministry of Education, Science, Technology and Innovation	Member
16	Kosovo Municipalities Association	Member
17	Energy Regulatory Office (ERO)	Member
18	Kosovo Transmission System and Market Operator (KOSTT)	Member
19	Kosovo Energy Efficiency Fund	Member
20	Kosovo Energy Corporation/KEK	Member
21	Kosovo Electricity Distribution Company/KEDS	Member
22	Representative of district heating companies	Member

The committee is led by the Ministry responsible for the energy sector, which organizes the functioning of the committee, sets its work plan, and calls the meetings of the committee. It can also organize sub-groups on specific tasks and has a reporting responsibility to the Prime Minister.



### *Monitoring procedures*

The Ministry responsible for the energy sector has the task to elaborate a yearly Progress Report. This Report has the objective to monitor the yearly achievements of the various actions, and the on-time performance of the targets. In elaborating the report, the Chair relies on the information received from the Committee Members. The report will be sent to the Prime Minister's Office by the end of the first quarter of the following year.

The monitoring report shall cover all strategic and specific objectives, with their indicators evaluated according to their timeline.

The executive summary of the yearly report with the key achievements shall be made public.

### *Mid Term Review of Action Plan and Final evaluation*

According to the Law on Energy a review of the Strategy will be carried out every three years, in order to review the target achievements and make the necessary adjustments. The review process will elaborate on areas where the Energy Strategy set the main direction, but a final target or action was not elaborated, as the necessary assessment or feasibility study was not finalized. This will be also followed by the evaluation of the Action plan.

The Midterm reviews shall evaluate all strategic and specific objectives, along with their indicators. Any derogation will be assessed, and corrected measures and actions defined in order to enable target achievement.

## 8 BUDGETARY IMPACT OF STRATEGY IMPLEMENTATION

Considering the lack of significant investments in the Kosovo energy sector for more than 40 years and the need to fundamentally transform the sector towards the improved energy supply and efficiency, increased system resilience and customer protection, the implementation of the Kosovo Energy Strategy will require a considerable budget. In addition to funding from public funds (whether from the Government budget, municipalities or public enterprises), the strategy implementation is expected to attract donors funds (especially in terms of RES development, heating and efficiency) and mobilize private investments (e.g. foreign and local investments in generating capacities, business family investments aiming to increase energy efficiency and self-consumption, etc.).

Table 4 summarizes a rough estimate for the key components of the Strategy (cost values) over its 10-year period.

**Table 4: Cost estimation for the implementation of the main Strategy components (2022-2031)**

Component	Cost (million €)	Funding sources
Rehabilitation and decrease of the environmental impact of existing generating capacities	390 <sup>26</sup>	Public <sup>27</sup>
New RES generating capacities	1,300	Private, public, grants
New (joint) capacities in neighboring countries	200	Public, grants
Storage (battery) capacities	200	Grants, public
Transmission network investments	90	Public, grants
Distribution network investments	230	Private
Energy efficiency investments	350	Public, private, grants
Heating system investments	100-200	Public, grants
Customer protection and supply with the focus on vulnerable customers	100-200	Public, grants

<sup>26</sup> Assuming the rehabilitation of one TPP Kosova A unit

<sup>27</sup> In addition to the investment in TPP Kosova B filters financed by the EU





Republika e Kosovës  
Republika Kosova - Republic of Kosovo  
*Qeveria - Vlada - Government*  
*Ministria e Ekonomisë - Ministarstvo Ekonomije - Ministry of Economy*

# Energy Strategy of the Republic of Kosovo 2022-2031

## ANNEX







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## A.1 MODEL DESCRIPTION – EPMM

The European Power Market Model (EPMM) is a unit commitment and economic dispatch model used during the optimization process to satisfy the electricity consumption needs in the modeled countries at minimum system costs, considering the different types of costs and capacity constraints of the available power plants and cross-border transmission capacities. The model minimizes the production costs of power plants to satisfy demand. These costs include start-up and shut-down costs of the power plants, the costs of production (mainly fuel and CO<sub>2</sub> costs) and the costs that occur to RES producers in the form of curtailment. The model simultaneously optimizes all 168 hours of a modeled week, and as a result, determines the hours of the week in which power plants operate and at what production level. The model is executed for each week of the given year, where all 8,760 hours could be modeled. EPMM endogenously models 41 electricity markets in 38 countries across the European electricity network. The model runs yield the optimal generation mixes and required number of power plant start-ups for the region.

Potentially missing production and the available upward and downward capacities for reserve services are also important outputs of the model. In the EPMM, each country represents one node, and network constraints inside the countries are not considered. Cross-border transmission capacities are represented by net transfer capacities values, which put an upper limit to cross-border electricity trading. Imports and exports take place to minimize system cost and maximize security of supply.

The model and its predecessor (EEMM) were used in many studies, e.g. in the SEERMAP project (in combination with TU Wien's Green-X model) (Szabó et al., 2019); the assessment of the European Commission project on the integration of Ukraine and Moldova to the European grid (Szabó et al., 2020); and the assessment of the TEN-E regulation (support to the evaluation of (EU) No 347/2013 on guidelines for trans-European energy infrastructure (DG ENER, 2021).

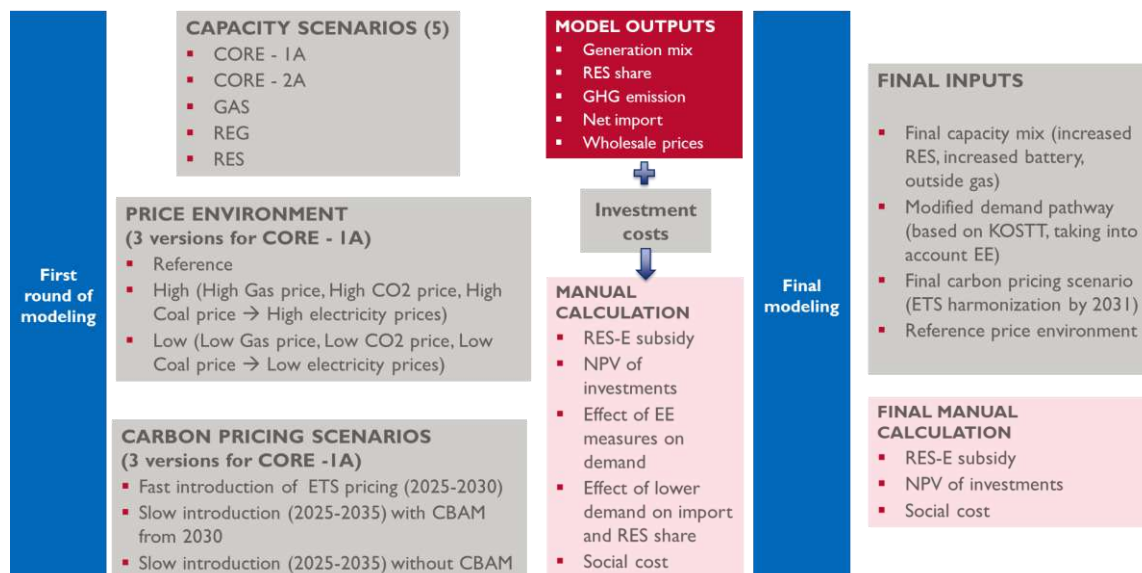
## A.2 MODELING ASSUMPTIONS AND RESULTS

### A.2.1 METHODOLOGY

The Energy Strategy is based on power sector modelling applying the international fuel markets (gas, coal and oil) and ETS price forecasts available as of November 2021 and on national capacity and consumption data as of February 2022. Due to the lack of reliable price signals in the forward markets in the last 6 months, it is very hard to produce reliable price forecasts for the mid-term. This means it is difficult to predict if the high price environment will last for 1, 2 or 3 years, as it is not driven by market fundamentals, but by Russia's strategic behavior towards the European gas supply and Europe's political reaction and its effect on gas markets. However, there is a broader expert consensus, that after a period of 0.5-3 years, wholesale prices in the European electricity sector will normalize and settle in the modelled range of €80-100/MWh, depending on the EU ETS price level.

Figure 1 illustrates the detailed scenario-based modelling assessment of the power sector, main inputs and outputs.

**Figure 1: Modeling methodology, main inputs, outputs and scenarios**



In the underlying electricity market modeling, a two-step approach was taken. First, several scenarios and sensitivity runs were modeled. Based on the results, a final set of inputs and assumptions were defined, and a final modeling was carried out.

The first round of modeling was based on the analyses of five capacity scenarios: (i) refurbishing three existing lignite units -CORE-1A scenario (two Kosovo B and one Kosovo A unit); (ii) refurbishing four existing lignite units - CORE-2A scenario (Two Kosovo B and two Kosovo A units); (iii) constructing one natural gas-fired power plant in Kosovo –the Gas scenario; (iv) Constructing a gas-fired power plant outside Kosovo with a neighboring country- the REG scenario, and (v) deploying significant amounts of renewables and lowering lignite-based generation- the RES scenario.

These five scenarios were defined and assessed in detail, assuming the gradual introduction of ETS between 2025 and 2030, as well as the reference price environment. Only two of the five scenarios mentioned above, CORE-1A and CORE-2A, have been further analyzed in terms of the effects of the various carbon pricing situations differing in scope and timing: gradual introduction of ETS between 2025 and 2030 and between 2025 and 2035 with and without the Carbon Border Adjustment

Mechanism in place. Finally, the price environment scenarios provided an analysis of the CORE-1A and CORE-2A scenarios in three states (reference, high and low international price environments), assuming ETS introduction by 2030.

Based on the outcomes of the modeling (and on updated information on future investments) the following inputs and assumptions were changed for the final modeling of the scenarios CORE-1A & CORE-2A:

- Installed capacity mix (based on the CORE scenarios, supplemented with outside gas capacities and with increased RES, accompanied with increased battery capacities to provide flexibility)
- Electricity demand pathway (based on latest data from KOSTT, taking into account energy efficiency measures)
- Carbon pricing pathway (introduction of carbon pricing gradually, reaching EU ETS levels by 2031)

The main outputs from the modeling in each analyzed case are electricity generation mix, share of renewable energy sources and greenhouse gas emission in the electricity sector, net import share and wholesale electricity prices. From all these and additional relevant information on investment costs several further important indicators are calculated, such as the level of renewable subsidies, net present value of the lignite refurbishments and differences between social costs of scenarios.

## A.2.2 SCENARIO DEFINITION, INPUTS AND ASSUMPTIONS

**Table 1: Main inputs of the different analyzed scenarios**

	Final scenarios		Power plant scenarios				
	CORE-1A	CORE-2A	CORE - 1A	CORE - 2A	GAS	REG	RES
Kosovo A5	Phase out in 2026	Phase out after the 2 units finished refurbishment, but latest at the end of 2026	Phase out in 2026	Phase out after the 2 units finished refurbishment, but latest at the end of 2026	Phase out in 2024		
Kosovo A4	Phase out in 2025	Refurbished in 2025, functioning in reserve mode after 2028 (available 3 months/year)	Phase out in 2024	Refurbished in 2025, functioning in reserve mode after 2028 (available 3 months/year)	Phase out in 2026		
Kosovo A3	Refurbished in 2024, functioning in reserve mode after 2028 (available 3 months/year)		Refurbished in 2023, functioning in reserve mode after 2028 (available 3 months/year)		Phase out in 2023		
Kosovo B1	Deep retrofit (to fulfil NOx and particulates requirements in 2023) and SOx requirements is completed by 2026		Deep retrofit (to fulfil NOx and particulates requirements in 2022) and SOx requirements is completed by 2025				
Kosovo B2	Deep retrofit (to fulfil NOx and particulates requirements in 2023) and SOx requirements is completed by 2025		Deep retrofit (to fulfil NOx and particulates requirements in 2022) and SOx requirements is completed by 2024				
Gas	Two generation units outside Kosovo, with a total installed capacity of 200 MW; 100 MW		No new Gas PP		Two generation units from	One generation unit from 2028	No new Gas PP

	commissioned in 2024, another 100 MW in 2025.		2028 in Kosovo (250+129 MW); one is only for reserve market (129 MW)	outside Kosovo (200 MW)	
PV	600 + 100 MW (prosumer) new capacity until 2031	Pathway extrapolated based on latest available data, and level to reach 2031 RES target			908 MW new capacity until 2031
Wind	600 MW new capacity until 2031	Pathway extrapolated based on latest available data, and level to reach 2031 RES target			859 MW new capacity until 2031
Hydro	132 MW	Based on KOSTT scenarios, max 135 MW (from 2026)			
Pumped storage	No pumped storage	No pumped storage			250 MW pumped storage
Battery	35 MW new battery in 2025, further additions to reach 170 MW by 2031	35 MW new battery in 2025, further additions to reach 100 MW	35 MW new battery in 2025	35 MW new battery in 2025, further additions to reach 100 MW	35 MW in 2025
Biomass	Small increase in all scenarios (20 MW by 2031)	Small increase in all scenarios (20 MW by 2031)			
Demand	Demand pathway based on updated data by KOSTT (EE taken into account)	Demand pathways based on KOSTT data			
Carbon pricing	Gradual pricing until 2031 (14% in 2025, then linear uptake), no CBAM is assumed	Three cases are assessed: Gradual pricing until 2030 (15% in 2025, then linear uptake), Gradual pricing until 2035 (15% in 2025, 35% in 2030, 100% in 2035) with CBAM and without CBAM	Gradual pricing until 2030 (15% in 2025, then linear uptake)		
Price environment	Reference price environment is assessed	Three cases are assessed: Reference, High and Low price environment	Reference price environment is assessed		

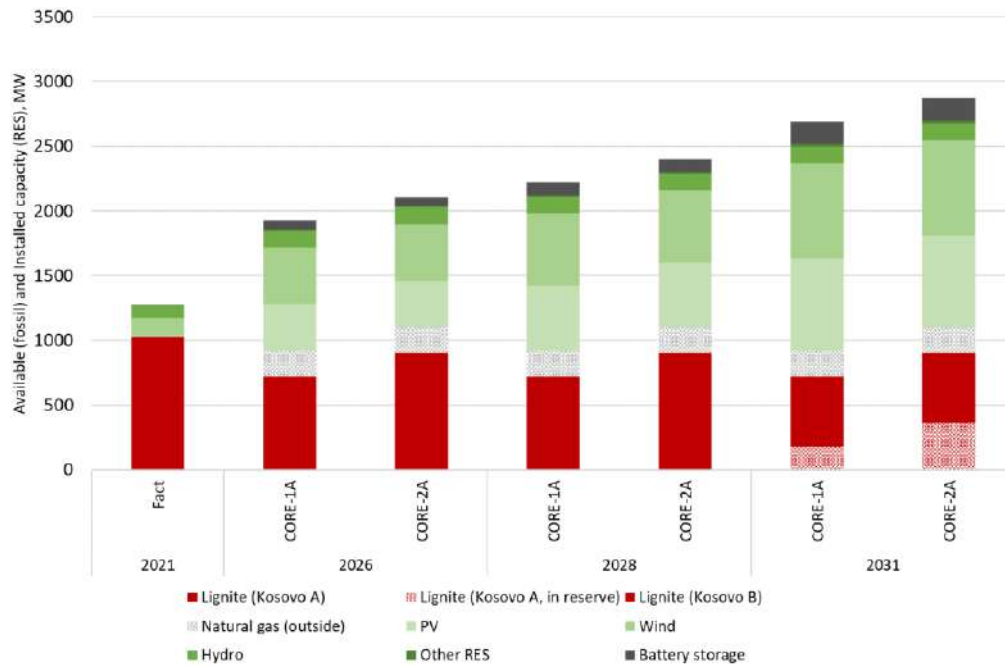
The two final capacity scenarios (summarized in figure 2) reflect the following assumptions:

- Continued operation of at least one Kosovo A unit
- The refurbished Kosovo A unit(s) stay in the system would only operate in a reserve mode after 2028 (meaning it would only be available in crucial high demand heating season or during extraordinary occasions such as the recent energy crisis)
- One Kosovo A unit is to be phased out
- The two Kosovo B units are refurbished and assumed to be fully available by 2025 and 2026 in all analyzed scenarios



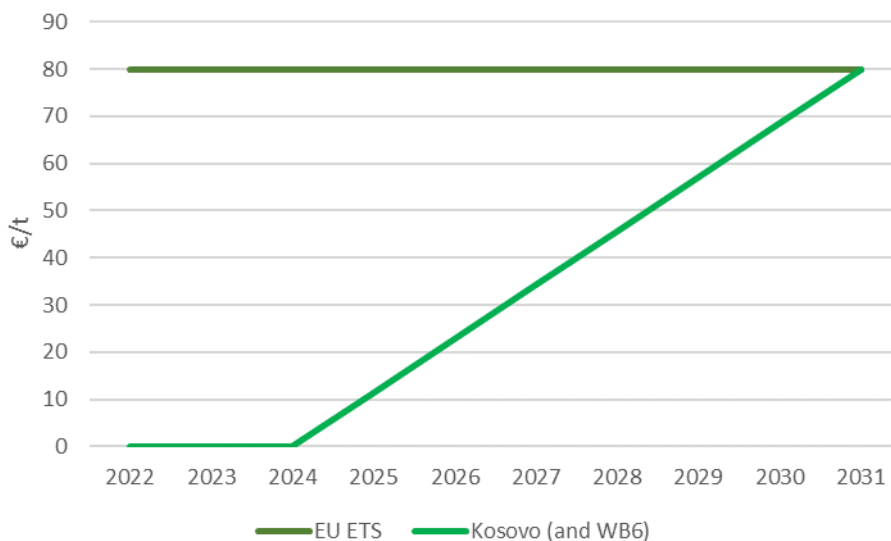
- Battery storage is assumed to come in from 2025 onward in all scenarios. This number grows further to 170 MW (170 MW X 2h) by 2031. It is assumed that the part of the balancing need that cannot be supplied from the domestic electricity market is purchased and provided from Albania (just like today).
- Ambitious targets on renewable energy sources, reaching a total of 1600 MW installed RES capacity by 2031

**Figure 2: Assumed installed capacity mix in the analyzed two scenarios in 2026, 2028 and 2031**



Fuel price and CO<sub>2</sub> price assumptions are based on the latest available information and best estimates from 2021 November, when the modeling started, and the model calibration was carried out. The gradual introduction of carbon pricing is assumed for the entire WB6 region (see figure 3).

**Figure 3: Assumed carbon price levels in the EU and in the WB6**



The main price assumptions are summarized in Table 2.

**Table 2: Main price assumptions in the modeling**

	2026	2028	2031
EU ETS price (€/t)	80	80	80
Gradual carbon price in Kosovo (€/t)	23	46	80
Lignite price in Kosovo (€/GJ)	1.37	1.37	1.37
ARA coal price (€/GJ)	2.2	2.2	2.2
TTF price (€/MWh)	20.7	18.9	18.0

### A.2.3 ELECTRICITY DEMAND FORECAST 2022-2031

Proper and accurate demand forecasting is essential in planning Kosovo's needs for developing new generation capacities as well as modernizing the transmission and distribution grid.

The analysis of electricity demand is based on the mathematical model of electricity demand forecast used since 2007 by KOSTT to design long-term electricity balances.

This mathematical model is based on: (i) the realization of electricity consumption in previous years; (ii) change of tariff structure in residential consumers (iii) indicators of economic development of the country; (iv) demand forecast in the distribution system; (v) development of cogeneration and thermal energy, and (vi) energy efficiency action plans.

The annual demand forecast was made separately for the following categories:

- Industrial demand (Industrial Consumption), includes the electricity demand of all current and prospective manufacturing industries;
- Household (residential) demand includes the electricity demand of all residential facilities.
- Commercial demand (services) includes the electricity demand of commercial, public and municipal facilities and public lighting.
- Transportation demand, which includes the planned development of electrification of the railways of the Republic of Kosovo, which is expected to occur in the following years. In the context of transport demand, the global trend of electro-mobility development has been taken into account, assuming that the number of electric vehicles will gradually increase in Kosovo, increasing the electricity demand. By 2031, it is assumed that the number of electric cars in Kosovo will reach around 15,000.

The forecast of economic growth known as the Gross Domestic Product (GDP) is an important factor for the forecast of electricity demand in Kosovo. The following table presents the indicators of development of GDP based on the Economic Reforms Program of the Government of the Republic of Kosovo.

**Table 3: Projections of economic growth according to the document**

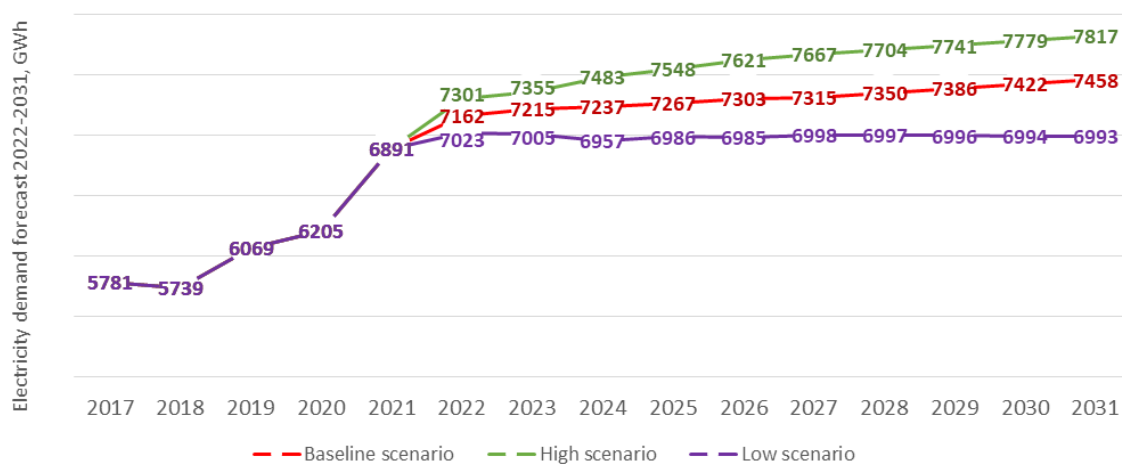
GDP real growth	2020-2028
Low scenario	2.2%
Baseline scenario	4.3%
High scenario	5.4%

*Source: The Economic Reforms Program*

The forecast scenarios for low, average and high gross electricity demand growth for the period 2022-2031, including the current year and the energy consumed in the past four years determined by the mathematical forecast model, are shown in Figure 4.

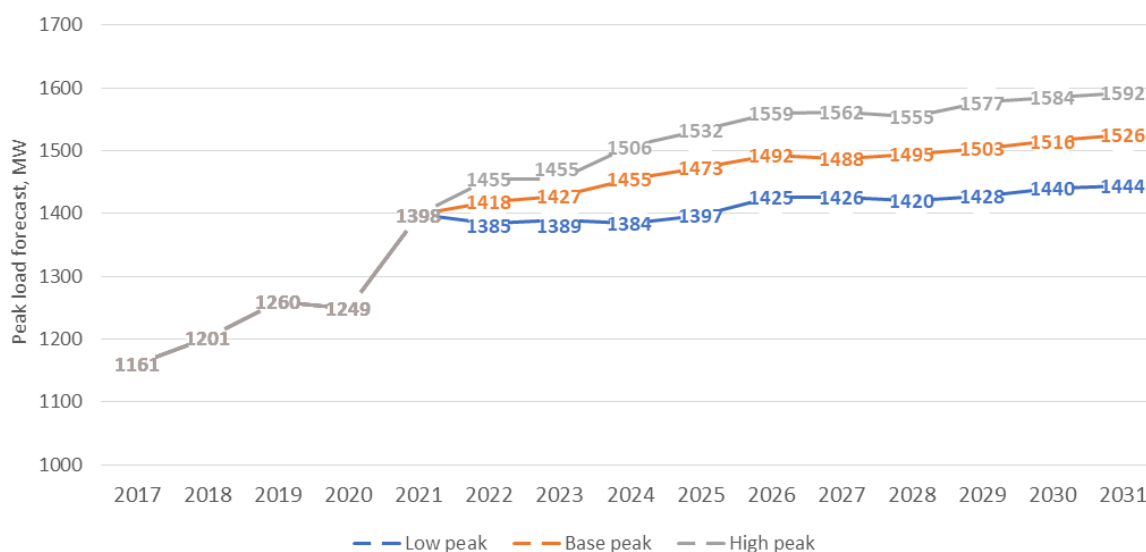
The baseline scenario is designed with an average (arithmetic) growth of 1.42%, the high scenario with an average growth of 1.81% and the low scenario with an average growth of about 0.93%. The high scenario has been considered in terms of the analysis of supply scenarios for the next ten years and with energy efficiency measures taken into account, the estimated gross consumption is assumed to go up to 7.7 TWh/y in 2031. Low growth and base growth scenarios are presented to forecast a broader spectrum of possible variations.

**Figure 4: Low, medium (baseline) and high growth scenario of gross electricity demand**



The projection of the three peak load scenarios is the result of the forecast of the annual load factor in relation to the energy demand which is shown in Figure 5.

**Figure 5: Scenarios of the maximum annual load in the next 10 years**



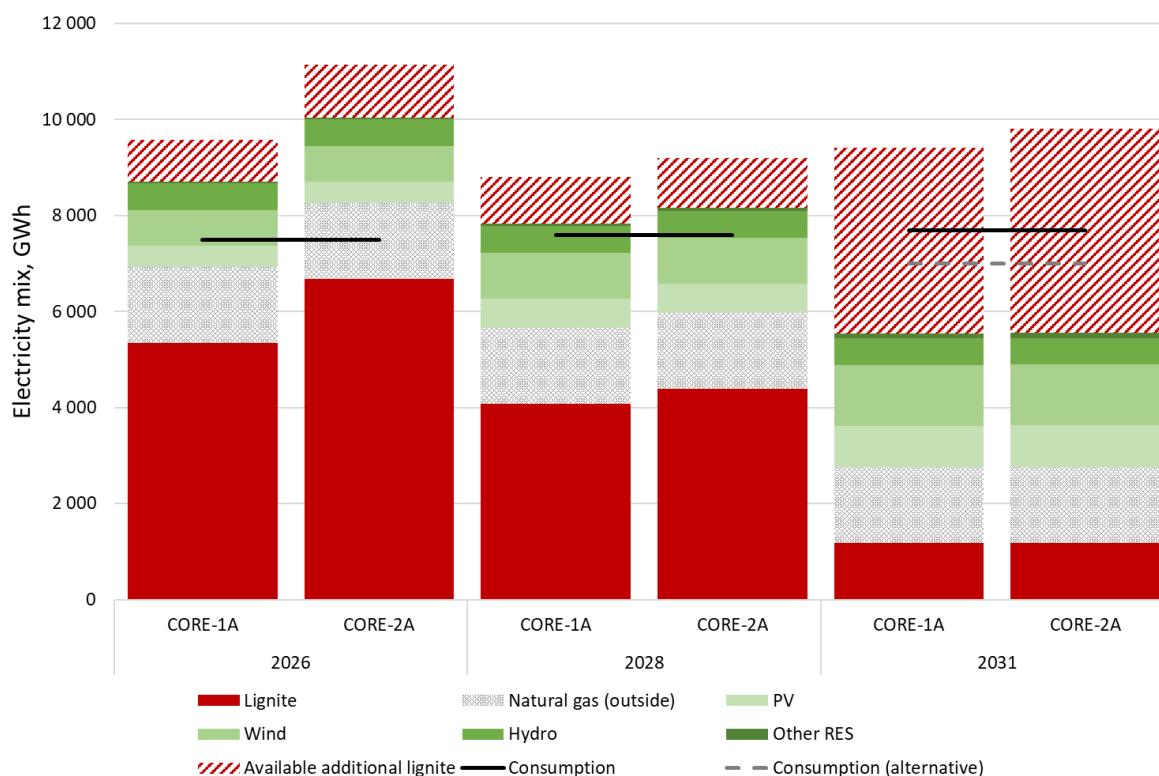
## A.2.4 RESULTS OF SCENARIO ASSESSMENT

### Electricity mix

The foreseen changes in the electricity mix provide the most important information regarding the future of Kosovo's electricity system (see Figure 6). While lignite-based capacities remain unchanged after 2028 in both analyzed scenarios, the level of lignite-based production changes significantly by 2031. This determines several other factors, such as the net import ratio and the CO<sub>2</sub> emission of the electricity sector. The utilization of the lignite plants primarily depends on the carbon price level: when the producers have to pay the same amount after their emissions as the European Union's generators, then domestic lignite-based production declines drastically.

While the share of domestic renewable energy sources in the power sector increases significantly as a result of the ambitious capacity developments whereby 2031, the total installed RES capacity reaches 1600 MW, and with the introduction of a carbon pricing system, the utilization of lignite power plants decreases significantly from around 85% in 2026 to around 19% in 2031. Even though the utilization rate of power plants decreases to 19%, it is important to note that the total 900<sup>28</sup> MW capacity of TPP Kosovo A & TPP Kosovo B units are still available (partly in reserve mode) in 2031, so technically, it would be possible to supply electricity demand without import (see the hatched brown columns). However, in a well-functioning wholesale market, demand is satisfied at the minimum cost, so import replaces lignite-based production. Like other members of the Energy Community Treaty, Kosovo pursues to join the European electricity market by 2031, which will result in cost-efficient wholesale and reserve markets.

**Figure 6: Electricity mix in the two installed capacity scenarios, assuming full ETS implementation by 2031**



<sup>28</sup> With two units of TPP Kosovo A & two units of TPP Kosovo B renovated

The generation of a natural gas power plant outside Kosovo, where power will be purchased under a long-term power purchase agreement and the already planned energy efficiency measures, will reduce the country's net imports.

Through the high integration of renewable energy sources, the domestic lignite-based generation lowers thus bringing several benefits. Overall CO<sub>2</sub> emissions may be reduced by more than 80% by 2031 compared to 2019. This also associated with significantly improved air quality, as air pollution caused by lignite plants decreases. Quantification of these costs is included in the subchapter A.2.6 on social cost calculation.

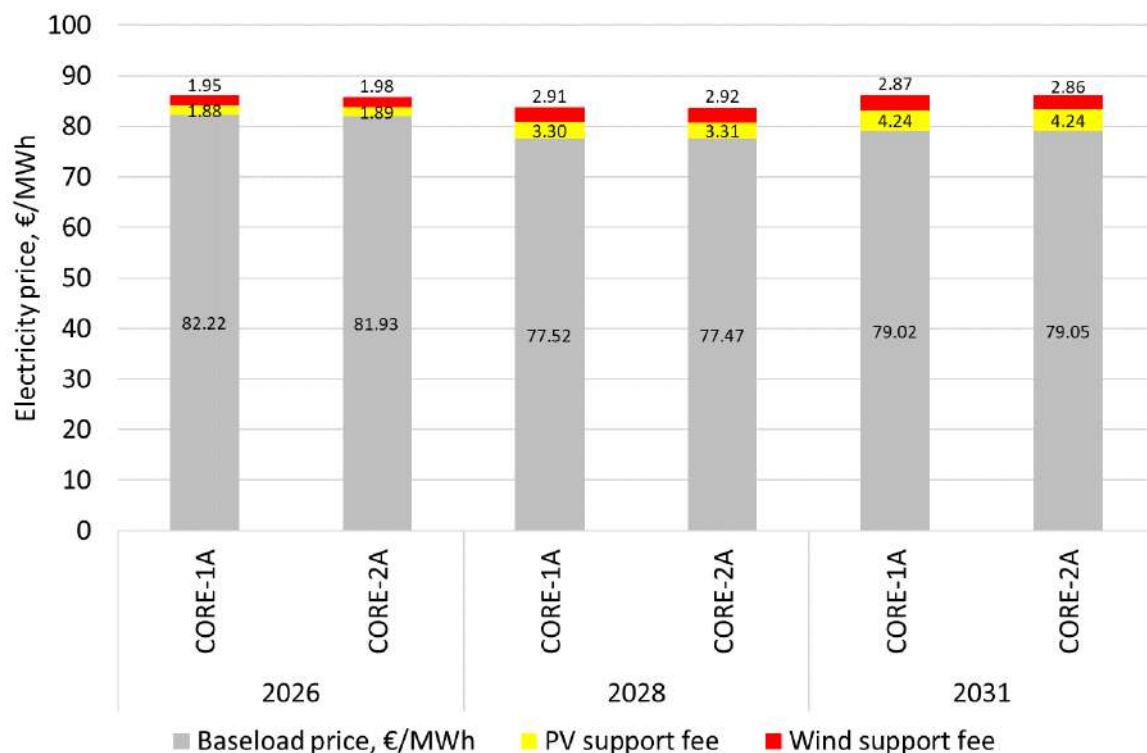
### *Wholesale prices and renewable energy support*

The modeling shows, that due to the high level of interconnectivity of Kosovo and the region, wholesale electricity prices are dependent rather on international developments than specific decisions and developments on the domestic market. As shown on Figure 7, around 79-82 €/MWh price levels are foreseen between 2026 and 2031. Increasing renewable penetration throughout Europe pushes down wholesale prices, while the introduction of carbon prices in the region slightly increases them, so as a result of these effects, prices are more or less foreseen to be stable in the next 10 years.

Renewable energy support for wind and PV plants is calculated based on the following assumptions:

- Present levelized costs of electricity (LCOE) for PV and wind are estimated
- Decreasing trend (learning curve): for PV year-on-year -6%, for wind -4%
- Support need for the entire fleet is calculated separately for the different years based on the composition of capacities (how much capacity was commissioned in which year)
- A premium type of support is assumed, thus the support need is calculated as follows:  
( $LCOE_i - market\ value_t$ ), where  $i$  is the year of commissioning,  $t$  is the year of support received  
(the market value is the production weighted wholesale price of electricity produced by the given technology)  
Total support is divided by total consumption, meaning all consumers pays equally  
Support is calculated as an extra €/MWh fee on top of electricity prices
- The RES support is around 2-3 €/MWh in the analyzed period. Support changes not only as a result of changing number of producers to be compensated, but also due to changing wholesale prices. The sum of wholesale prices and support is at a stable 83-86 €/MWh level throughout the next 10 years.

**Figure 7: Wholesale electricity price levels and renewable energy support elements in the two installed capacity scenarios, assuming full ETS implementation by 2031**



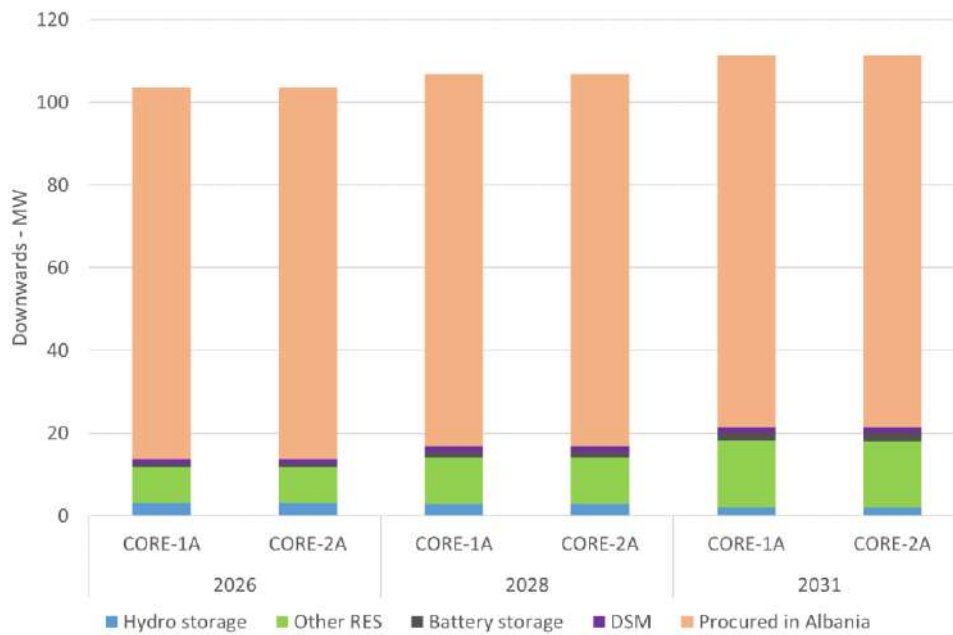
### *Reserve market and non-served energy*

The modeling also includes the analysis of the Automatic Frequency Restoration Reserve (aFRR) and Manual Frequency Restoration Reserve (mFRR) segments of the reserve market. This is particularly important, as at the moment Kosovo is not capable to provide the sufficient aFRR and mFRR reserve capacities from inland sources, they are provided from Albania. Reflecting that, the assumption is used, that the existing quantities offered by Albania will be provided in future years as well, additional services (due to increased load and variable RES penetration) is procured in Kosovo.

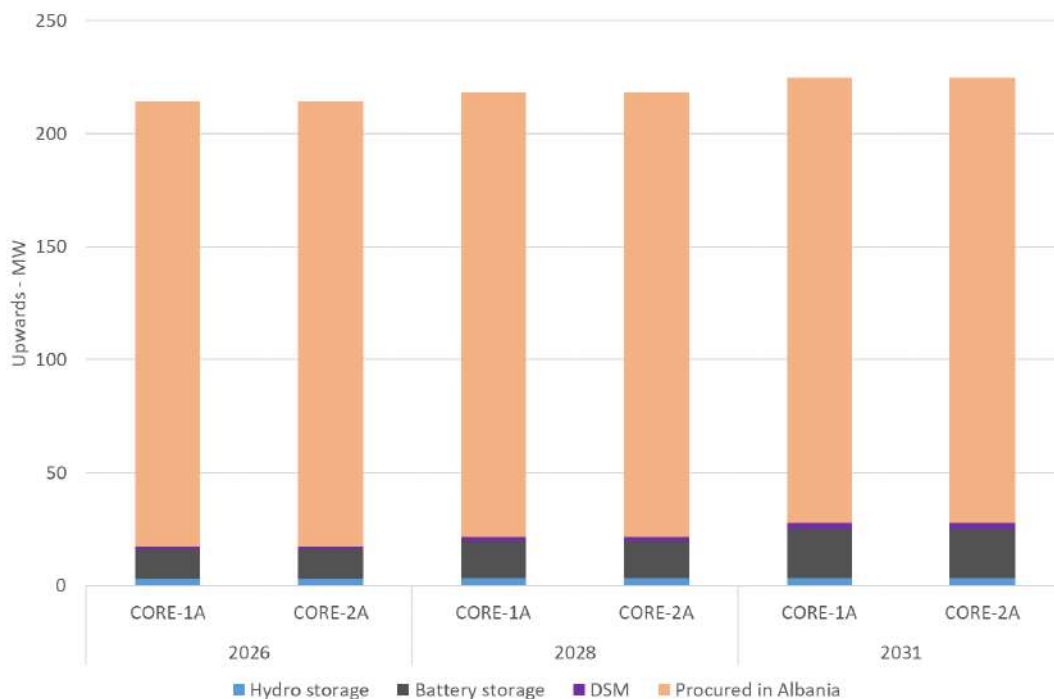
With the increasing share of variable RES capacities (wind and PV) and the growing electricity demand the total reserve requirements also increase, from 287 (197+90) MW to 336 (225+111) MW. This means that significant amount of capacity will continue to be procured from Albania in the future.

Based on the results, independence from Albanian reserve procurement can be increased through the utilization of flexible inland sources such as battery storage, Demand Side Management, and variable RES capacities in the downward market. In all the runs, under a different set of assumptions on capacities, carbon prices and international price environment no issues that would risk the security of supply were identified: non-served energy was 0 in all modelled scenarios.

**Figure 8: Downward reserve procurement in the two installed capacity scenarios, assuming full ETS implementation by 2031**



**Figure 9: Upward reserve procurement in the two installed capacity scenarios, assuming full ETS implementation by 2031**





## A.2.5 ECONOMIC VIABILITY OF REFURBISHMENT OF LIGNITE POWER PLANTS

### Methodology

The economic viability calculations are carried out for the Kosovo A4, A5, B1 and B2 units. In this assessment all the cash-flow elements are taken into account. The calculation includes the following elements:

- Investment cost
- Yearly fixed operation and maintenance (OPEX) cost
- Yearly revenue from the wholesale electricity market
- Yearly variable cost including fuel cost, variable OPEX and CO<sub>2</sub> cost
- No reserve market revenue is assumed
- No local environmental air pollution damage is included in the calculations

All the cash-flow elements are discounted to 2025 value, and three different indicators are calculated:

- Net present value (NPV): Three different discount rates are applied: 3%, 5% and 8 % real discount rate.
- Internal Rate of Return (IRR): With what discount rate the project is feasible from a financial point of view.
- Profitability Index: The future cash-flow elements compared to the investment cost. If the Profitability Index is higher than 1, then investments are returned, otherwise the financial viability of the project is questionable.

### Input data

The following table summarizes the main input assumptions for the profitability calculations, including the investment cost, fixed cost, and investment year in the difference scenarios. The expected lifetime of the investments is 20 years. The profitability of TPP Kosovo B units investments is calculated in two ways: i) taking into consideration the grant, which decreases the total investment cost, or ii) the full cost of refurbishment is considered.

**Table 4: Main inputs for the economic assessment**

	Investment cost, m€			Fix cost, €/kW	Capacity, MW	Investment year	
	Grant	Own source	Total			CORE - 1A	CORE - 2A
Kosovo A4	0	120	120	10	180	-	2026
Kosovo A5	0	120	120	10	180	2025	2025
Kosovo B1	38.5	96.95	135.45	10	270	2026	2026
Kosovo B2	38.5	96.95	135.45	10	270	2025	2025

## Results

All the indicators show that:

- Refurbishment of Kosovo B units are financially viable projects, even if the grant is not considered. It is assumed that the power plants sell their produced electricity on a competitive market price, and the (low-price level) long-term contract is not considered in the calculations. It is important to note that despite the fact that after the year of 2031 the utilization rate may drop to 15-19%, and despite having a low utilization rate the Kosovo B units are still profitable.
- Regarding the refurbishment of Kosovo A blocks the closer the refurbishment is, the higher the profitability that the refurbishment of the Kosovo A unit(s) are financially viable, that is why the Kosovo A5 block has a higher rate of return than Kosovo A4 block.

**Table 5: Profitability Index, IRR and NPV with different discount rates of the lignite refurbishments in the two capacity scenarios**

		Profitability Index		IRR		NPV (3%)		NPV (5%)		NPV (8%)	
		CORE-1A	CORE-2A	CORE-1A	CORE-2A	CORE-1A	CORE-2A	CORE-1A	CORE-2A	CORE-1A	CORE-2A
Kosovo A4			0.4		N		-77		-75		-73
Kosovo A5		0.9	0.9	N	N	-9	-10	-10	-10	-11	-12
Total investment cost	Kosovo B1	1.2	1.2	22%	22%	21	21	22	22	21	20
	Kosovo B2	1.9	1.9	52%	52%	127	127	123	122	113	113
Investment cost without grant	Kosovo B1	1.6	1.6	50%	50%	60	59	61	60	59	59
	Kosovo B2	2.7	2.7	87%	86%	166	165	161	160	152	151

### A.2.6 SOCIAL COST CALCULATION

#### Methodology

The European Power Market Model minimizes the cost of satisfying the assumed electricity demand each year for all modeled countries considering the constraints in generation (available capacity) and in trade (net transfer capacity), taking into account the minimum reserve capacity needs. It means that the model does not minimize the social cost of electricity for Kosovo in the long run, but by using the outputs of the modeling and applying some further calculations, we can monetize the total social costs of satisfying electricity demand. The aim of the social cost calculation is to compare the assessed scenarios with each other, not to consider all the cost elements. Those cost elements, which are assumed to be equal across all scenarios, are not part of the calculation (e.g., network cost, taxes).

The following elements are considered in the social cost calculation. The positive sign (+) means that the given element increases the social cost, while the negative sign (-) means it decreases it.

1. Energy part of the electricity cost (+):
  - The hourly modeled wholesale price multiplied by the consumption
2. Investment cost of fossil generators (+):

- Refurbishment costs of Kosovo power plants
- 3. Short-term profit of lignite power plants (-):
  - Yearly aggregated short-term profits of fossil-based power generation. It includes the total revenue in the competitive wholesale market decreased by fuel cost, variable and fixed operation and maintenance costs, and CO<sub>2</sub> costs.
- 4. RES support fee (+):
  - Additional subsidy needed for new RES-E generators
- 5. External cost of air pollution (+):
  - Based on the World Bank Least Cost Renewable Energy Mix Final Report (2020), the external cost of air pollution is €26.07/MWh after the refurbishment of Kosovo power plant is realized.

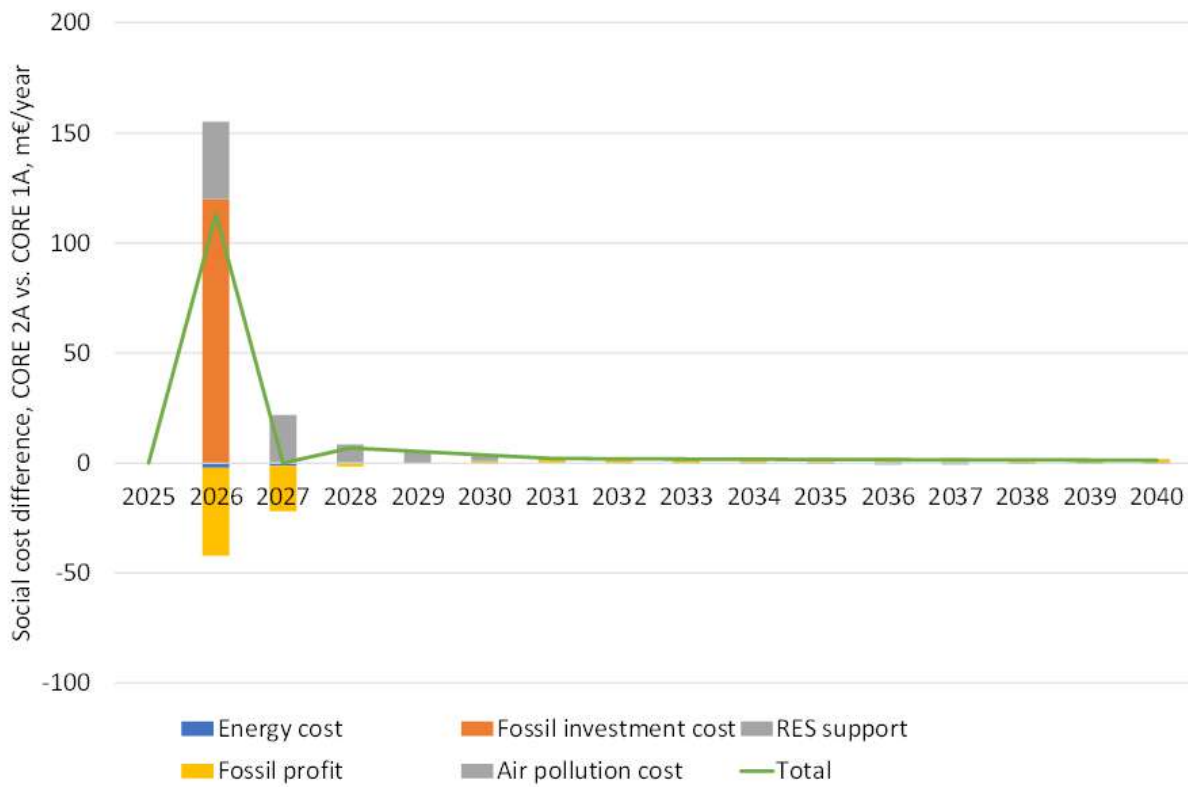
The assessed period is between 2025 and 2040, and all the cost elements are discounted to 2025 values using three different discount rates.

### Results

According to the results, there are no significant differences in total social cost between the two scenarios. The cheaper option is the CORE-1A scenario, but the CORE-2A scenario has only a 1.5% higher social cost. When we translate these differences to one MWh of electricity consumption, we get a difference of less than €1.3/MWh, which is quite negligible compared to the total cost. The impact of discount rates is also considered. Most of the difference in the social cost between the two scenarios is at the beginning of the period, implying that discount rates have little impact on the social cost differences.

The following figure depicts the differences in social costs between the two scenarios. The higher social cost in the CORE-2A scenario comes from the higher investment cost and the higher air pollution cost (due to increased lignite-based production), but the profit of the fossil generator is higher in this case, which reduces the social cost slightly. Most differences in social costs occur during the first two years.

**Figure 10: Elements of social cost of electricity in the two assessed scenarios, 2025-2040, m€, non-discounted**



## A.3 MODELING INPUT AND RESULTS TABLES

Table 6: Main input assumptions and results in the analyzed scenarios, for 2026, 2028 and 2031

2040		2026		2028		2031	
		CORE-1A	CORE-2A	CORE-1A	CORE-2A	CORE-1A	CORE-2A
Baseload price, €/MWh		82.22	81.93	77.52	77.47	79.02	79.05
PV support fee		1.88	1.89	3.30	3.31	4.24	4.24
Wind support fee		1.95	1.98	2.91	2.92	2.87	2.86
Capacity mix, MW	Lignite	720	900	720	900	720	900
	Natural gas (outside)	200	200	200	200	200	200
	Nuclear	0	0	0	0	0	0
	PV	360	360	500	500	710	710
	Wind	437	437	557	557	737	737
	Hydro	132	132	132	132	132	132
	Other RES	5	5	12	12	20	20
	Battery storage	70	70	100	100	170	170
Electricity mix, GWh	DSM	40	40	55	55	79	79
	Lignite	5345	6684	4076	4392	1180	1185
	Natural gas (outside)	1577	1577	1577	1577	1577	1577
	Nuclear	0	0	0	0	0	0
	PV	440	439	609	610	865	866
	Wind	750	750	956	956	1264	1265
	Hydro	557	557	557	557	557	557
	Other RES	26	26	63	63	105	105
	Pumped/battery storage	-19	-19	-32	-32	-66	-66
	Missing production	0	0	0	0	0	0
	Net import	-1178	-2516	-210	-528	2229	2222
	Consumption	7498	7499	7590	7590	7698	7698
	Net import ratio	-16%	-34%	-3%	-7%	29%	29%
CO <sub>2</sub> emission, kt	5505	7184	4022	4418	1140	1145	
RES share (%)	24%	24%	29%	29%	36%	36%	

## A.4 ENERGY EFFICIENCY

### A.4.1 NATIONAL TARGETS AND OBLIGATIONS REGARDING ENERGY EFFICIENCY DIRECTIVE

Targets and goals in the field of energy efficiency were set primarily according to the expected development of the energy sector in Kosovo and obligations which were imposed with the Directive 2012/27/EU (EED) and its recast as amended by directive (EU) 2018/2002. Latest recast of the EED is adopted by the Ministerial Council of the Energy Community and new obligations will go into force starting from January 1st 2024.

#### *Article 3 – Energy Efficiency targets*

Energy efficiency targets for the Energy Community member states for the period until 2020 were set on the principle that overall Final Energy Consumption (FEC) should be less than 133 Mtoe and primary energy consumption below 187 Mtoe. It is important to emphasize that no individual targets were set for countries and the Energy Community Secretariat was in charge to analyze individual targets and to monitor the primary and final energy consumption in contracting parties. New official targets for contracting parties were not given in explicit way for 2030.

The energy efficiency target of the Energy Strategy was defined based on the study “Projections of energy consumption and energy savings potential in Kosovo to 2030” (referred to as “EU study” and “EnC scenario”)<sup>29</sup>. The overall target for energy efficiency is to limit final energy consumption at the level of 1877 ktoe in 2031. Reaching this target value is equivalent with a 22.2% savings compared to 2007 PRIMES modeling projections which is used as a baseline projection in the EnC study,<sup>30</sup> or 15.7% savings compared to the EU study’s baseline energy consumption projection (2226 ktoe). This target is derived from the average energy efficiency gains achieved in the EU28 between 2005 and 2017 (referred as “EU28 Benchmark” in the EU study). The target is achievable with a maximum of 1.9% average yearly increase in final energy consumption over the next decade.

Therefore, an acceptable and previously communicated increase of final energy consumption projection is used here, which ends in estimated final energy consumption of 1877 ktoe. This target corresponds with the 15.7% savings compared to the business-as-usual extrapolation of final energy consumption of 2226 ktoe.

#### *Article 4 – Long term strategy for building renovation*

Article 4 of the EED covers the long-term strategy for building renovation. This article was not changed in the recast of the EED. For the Energy Strategy of the Republic of Kosovo a comprehensive assessment and results presented in the draft of Building Renovation Strategy were used. The long- term strategy targeted the following buildings:

- Residential sector buildings
- Commercial buildings
- Public buildings

<sup>29</sup> N. Brizard (2019): Energy consumption forecast and energy saving potential in Kosovo by 2030, Final Report

<sup>30</sup> TU Wien, EEG, REKK (2019): Study on 2030 overall targets for the Energy Community - Energy efficiency, RES, GHG emissions reduction, Final Report

For the residential buildings the baseline calculation was performed within TABULA project in Kosovo (Categorization of residential Buildings in Kosovo -2021) in which the total residential building sector was divided into five main categories with five construction periods. This provided an excellent database which included high level of details such as the U values of the envelope components, typical systems for heating and domestic hot water for every characteristic building.

#### *Article 5 old and new approach*

In this part obligations according to the previous and new version of the Article 5 are explained and the existing materials developed by different stakeholders in the Republic of Kosovo were used for estimations of energy efficiency targets. Previous approach stated that target was 1% renovation of the total floor of the buildings owned and occupied by the Central government with the threshold on buildings with 500 m<sup>2</sup> and more. New approach increased the target on 3% of the floor and decreased the threshold on 250 m<sup>2</sup>.

For the calculation of expected energy savings in the Republic of Kosovo the Action Plan for renovation of Central Government buildings 2019 – 2021 prepared by Kosovo Energy Efficiency Agency (KEEA) and a comprehensive study Kosovo Building Renovation Strategy prepared as a draft in the scope of Western Balkans REEP+ program, window Policy dialogue.

Based on the calculations conducted in these two studies, annual target for years 2022 and 2023 were set to 0.119 ktoe and for the period 2024 – 2032 on annual targets 0.356 ktoe. It can be seen that since the target increased from 1% (period up to 2024) to 3% in the period 2024 onwards, an energy savings target tripled as well.

#### *Article 7 calculation Kosovo (according to old approach)*

According to previous EED version, obligations for Kosovo as well as for other EnC countries were based on obligatory average energy savings of 0.5 % for years 2017 and 2018, and 0.7 % for years 2019 and 2020. These percentages were calculated based on the average final energy consumption in Kosovo for years 2012, 2013 and 2014. Out of total final energy consumption the Transport sector was excluded as well as the non-energy use. The baseline was calculated as follows.

**Table 7: Final energy consumption in Kosovo, based on IEA energy balances**

<b>IEA BALANCES (Kosovo)</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Total Final Energy Consumption [ktoe]	1,268	1,281	1,325
Transport [ktoe]	343	329	332
Non energy use [ktoe]	42	42	46
<b>Final energy consumption - relevant [ktoe]</b>	<b>884</b>	<b>910</b>	<b>947</b>

*Source: Energy Community Secretariat report*

Based on the numbers from Table 8, the proposed obligatory annual energy savings for Kosovo was set to be 4.6 ktoe for years 2017 and 2018, while the target for years 2019 and 2020 was 6.4 ktoe.



**Table 8: Determination of annual energy savings according to the Article 7 of EED**

KOSOVO	Baseline FEC - transp [ktoe]	913	NATIONAL BALANCES 2010-2012		
Savings per year [ktoe]	0.50%	0.50%	0.70%	0.70%	TOTAL
2017	4.6				4.6
2018	4.6	4.6			9.1
2019	4.6	4.6	6.4		15.5
2020	4.6	4.6	6.4	6.4	21.9
CUMULATIVE [ktoe]					51.2
ANNUAL AV. [ktoe]					5.5

Source: Energy Community Secretariat report

Table 8 illustrates how the obligatory annual energy savings for Kosovo were calculated and determined. These numbers were used in 4th National Energy Efficiency Action Plan (NEEAP) of the Republic of Kosovo, covers period 2019 – 2021 and officially published on 31.10.2019.

#### *Article 7 calculation KOSOVO (new scheme)*

According to the latest Ministerial council decision, new targets were proposed for EnC countries which also affects the Republic of Kosovo. This new scheme and obligatory targets should be valid from 2024 onwards with the time shift of 5 years compared to the EU member states. However, the new approach introduces the same level of ambitions valid for EnC countries as are valid for EU member states. As a baseline for calculations of obligatory targets for Republic of Kosovo the final energy consumption in the latest three years is used as a baseline. Average value of FEC in latest three years is calculated and then the annual target is expressed as 0.8% out of this average FEC value. In this case, the target is based on total final energy consumption (including transport) and it is expected that the new obligatory savings targets will be significantly higher. One reason is that the baseline will be higher since energy consumption increases and the second reason that the transport cannot be excluded and transport sector contributes with approximately 25% to 28% in overall FEC.

The table below shows the energy consumption in the years 2018-2020, based on the Annual Report of Kosovo.

**Table 9: Energy consumption in Kosovo**

TARGETS	2016	2017	2018	2019	2020
EED ARTICLE 3 [ktoe]			91.89		113.09
EED ARTICLE 5 [ktoe]			0.12*	2.474 <sup>1*</sup>	1.35 <sup>1**</sup>
EED ARTICLE 7 [ktoe]		4.6	9.1	0.00	21.9
PEC [ktoe]			2719 <sup>**</sup>	2707.11 <sup>2*</sup>	2734 <sup>** 3*</sup>
FEC [ktoe]			1486	1507.51 <sup>2*</sup>	1543 <sup>3*</sup>
FEC - BUILDINGS [ktoe]			685	575.38 <sup>2*</sup>	628.09 <sup>3*</sup>
FEC - INDUSTRY [ktoe]			401	319.81 <sup>2*</sup>	319.92 <sup>3*</sup>
FEC - TRANSPORT [ktoe]			365	422.58 <sup>2*</sup>	412.46 <sup>3*</sup>
FEC – OTHERS [ktoe]			35	189.74 <sup>2*</sup>	225.23 <sup>3*</sup>

Source: 5th Annual report under the EED, Kosovo Energy Efficiency Agency

The new approach offers possibility to take into account early action measures. These early actions or the implemented savings in the period of 2021 – 2024 can decrease an obligatory savings on annual basis, while the cumulative savings in 2030 has to be identical.

**Table 10: Kosovo cumulative targets with early action measures implemented from 2021**

KOSOVO	Baseline FEC [ktoe]	1,512	NATIONAL BALANCES 2018-2020	0.80%								
Savings per year [ktoe]	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	TOTAL
2021				4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	35.5
2022				4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	35.5
2023				4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	35.5
2024				4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	35.5
2025					4.44	4.44	4.44	4.44	4.44	4.44	4.44	31.1
2026						4.44	4.44	4.44	4.44	4.44	4.44	26.6
2027							4.44	4.44	4.44	4.44	4.44	22.2
2028								4.44	4.44	4.44	4.44	17.8
2029									4.44	4.44	4.44	13.3
2030										4.44	4.44	8.9
2031											4.44	4.4
CUMULATIVE [ktoe]												266.4
ANNUAL AV. [ktoe]												4.44

Table 10 presents the numbers for the period of obligation 2024 – 2030 for the Article 7 by taking into consideration early action measures, implemented in years 2021, 2022 and 2023. These early action measures are marked in orange color. It is important to note that measures are implemented in years 2021, 2022 and 2023 but are calculated from the 2024 onwards.

The cumulative savings will be identical for this period and is 266.4 ktoe. But the obligatory annual energy savings will decrease dramatically.

## Article 14 and 15 – Measures at transformation, transmission and distribution of energy and efficient district heating systems

Analysis was conducted to the energy transformation by taking into consideration thermal power plant blocks renovation in order to increase overall efficiency of the block/plant. Current efficiencies of the TPP Kosova A and TPP Kosova B were taken into account as the basis for calculation. Transmission and distribution losses were also analyzed and the benchmark was provided.

Efficient district heating systems were not taken into account in terms of the energy savings. After the feasibility studies for 8 municipalities in Kosovo is finalized, an estimation of energy savings will be available as well. Namely, the District heating system should replace individual furnaces in most cases which have very low efficiency. After the results are available and if projects are implemented these energy savings will be taken into account during the monitoring of the progress of the Energy Strategy implementation.

### A.4.2 ESTIMATED ENERGY SAVINGS IN THE BUILDINGS SECTOR

Based on existing materials targeting Central Government buildings and prepared draft of the Building Renovation Strategy (2020), the bottom-up approach was used to estimate the potential savings in energy units and required investments to achieve these savings. In this context, the methodology and targets are calculated having in mind obligatory targets defined in the Article 7 (see Article 7 calculation Kosovo – new scheme).

#### Central Government Buildings

Existing report which combines results of implementation and experience from the field together with estimation of central government buildings provided the following implementation schedule according to the Article 5 of EED requirements.

**Table 11: Estimated energy savings for Central Government Buildings according to Article 5 of EED**

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Perc (%)	1.0%	1.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Area (m <sup>2</sup> )	8,816.9	8,816.9	26,450.8	26,450.8	26,450.8	26,450.8	26,450.8	26,450.8	26,450.8	26,450.8
EN sav (MWh)	1,381.3	1,381.3	4,143.8	4,143.8	4,143.8	4,143.8	4,143.8	4,143.8	4,143.8	4,143.8
EN sav (ktoe)	0.119	0.119	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356

It can be seen from Table 11 that according to the existing version of the EED valid until 1st of January 2024 1% of floor area should be refurbished on annual basis. Starting from 2024 a 3% target should be met, which in numbers provides 0.119 ktoe in the period 2022 – 2024 and 0.356 ktoe in the period 2024 – 2031 on annual basis.

#### Public buildings

For the public buildings an estimated energy savings for 2040 according to energy efficient scenario were used (Building Renovation Strategy). According to this scenario 95 GWh savings are expected by the end of the period (2040). It is estimated that the half of the overall target will be reached by 2030. With this estimation overall energy savings by 2040 will be more than 8 ktoe, while it has been estimated that by 2030, 3.9 ktoe will be reached. This approach leads to the annual energy savings which is equal to 0.39 ktoe.

### *Commercial buildings*

For the estimation of energy savings in the commercial buildings the Building Renovation Strategy was used, slightly adopted to provide reasonable potential energy savings. Annual target for the commercial sector was estimated at the level of 0,578 ktoe having in mind the results of the audits and high potential of final energy savings starting from the 100 kWh/m<sup>2</sup> for offices towards very high potential in the restaurants in which unitary final energy savings reached 220 kWh/m<sup>2</sup>. Methodology which was used here was a combination of estimated full potential of savings in 2040 according to the Strategy and bottom-up calculations based on the unit savings.

### *Residential buildings*

Strategy and TABULA project outcomes were used to estimate the potential of energy savings in the residential buildings. Estimated unit savings for Single Family Houses (SFH) with the potential of more than 155 kWh/m<sup>2</sup>. Also, Terraced Houses (TH) were taken into account with the potential of unitary final energy savings of 85 kWh/m<sup>2</sup> and at the end the Multi-Family Houses (MFH) with the potential of 25 kWh/m<sup>2</sup>. Calculations resulted in expected annual energy savings of 3.46 ktoe.

### *Energy Performance certificates*

It is estimated that the energy performance certificates will introduce the energy savings at the order of 3 ktoe for the ten-year period, and the annual expected savings are at the level of 0.3 ktoe.

### *Promotion of the solar rooftop for water heating*

This measure was introduced based on the existing program for the promotion of the solar thermal collectors for domestic hot water preparation. According to the available reference values for global solar irradiation at the order of 650 kWh/m<sup>2</sup> and having in mind the reference system efficiency of 80% (based on Methodology for calculation of energy savings in the Republic of Kosovo), a unit savings of 812.5 kWh/m<sup>2</sup> of the final energy is expected. Estimation is based on the average collector area per house of 10 m<sup>2</sup> and this measure assumes the installation of solar collectors on 3500 roofs like this representative one. The measure will be implemented within ten years with the overall expected energy savings 2.45 ktoe or the expected savings on the annual basis of 0.245 ktoe.

All these assumption in different categories of buildings resulted in the annual energy savings of 5.329 ktoe on the annual basis. Also, it is expected that the energy savings from the development of the ESCO market (estimated as 0.05 ktoe annually) and the energy savings from the industry sector (estimated as 0.05 ktoe annually) will result in overall final energy savings of more than 5.4 ktoe annually, which means that the obligated energy savings will be reached.



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