

NATIONAL ENERGY AND CLIMATE PLAN OF MONTENEGRO

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LIST OF ABBREVIATIONS AND ACRONYMS

APEE	Energy Efficiency Action Plan
BDP	Gross Domestic Product (GDP)
BISI	Balkan Institute for Science and Innovation
COST	European Cooperation in Science and Technology
EDIH	European Digital Innovation Hub
EDP	Entrepreneurial Discovery Process
EIT	European Institute of Innovation and Technology
ERA	European Research Area
ESIA	Environmental and Social Impact Assessment
ETF	European Training Foundation
ETS	Emissions Trading System
EU	European Union
EUREKA	European Network for Market-Oriented Research
EV	Electric Vehicle
FEC	Final Energy Consumption
FiT	Feed-in Tariff
FN	Solar Photovoltaic Energy
FZI CG	Innovation Fund of Montenegro
GACMO	Greenhouse Gas Abatement Cost Model
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
ha	Hectare
HDD	Heating Degree Days
HE	Hydropower Plant
HFC	Hydrofluorocarbons (HFCs)
HORIZONT EVROPA	Horizon Europe, EU Framework Programme for Research and Innovation
IAP	Adriatic-Ionian Oil Pipeline
IEE	Industrial Energy Efficiency
INDC	Intended Nationally Determined Contributions
IPA	Instrument for Pre-Accession Assistance
IPC Tehnopolis	Innovation and Entrepreneurship Centre "Tehnopolis" Nikšić
IPPU	Industrial Processes and Product Use
IR	Research and Development (R&D)
IS/IP	Intellectual Property
ITS	Intelligent Transport Systems
LULUCF	Land Use, Land-Use Change and Forestry (LULUCF)
MER	Ministry of Economic Development
mHE	Small Hydropower Plant
MMR	Monitoring Mechanism Regulation
MMSP	Micro, Small and Medium-Sized Enterprises (MSMEs)
MN	Ministry of Science
MNTR	Ministry of Science and Technological Development
MPNI	Ministry of Education, Science and Innovation

MRVA	Monitoring, Reporting, Verification and Accreditation
MSP	Small and Medium-Sized Enterprises (SMEs)
MVP	Monitoring and Verification Programme
MW	Megawatt
N ₂ O	Nitrous Oxide
NDC	Nationally Determined Contributions
NEKP	National Energy and Climate Plan
NE _x	Nitrogen Oxides (NO _x)
NPA	National Adaptation Plan
NTP CG	Science and Technology Park of Montenegro
NUTS	Nomenclature of Territorial Units for Statistics
nZEB	Nearly Zero-Energy Building
OIE	Renewable Energy Sources (RES)
OPS	Transmission System Operator (TSO)
PDV	Value Added Tax (VAT)
PHEV	Plug-in Hybrid Electric Vehicle
PM _{2.5}	Particulate Matter (PM _{2.5})
PoM	Policy and Measure
QA/QC	Quality Assurance / Quality Control
RIA	Regulatory Impact Assessment Report
S3	Smart Specialisation Strategy
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SEAP	Sustainable Energy Action Plan
SEE CAO	Coordinated Auction Office for Southeast Europe (Montenegro)
SET-plan	Strategic Energy Technology Plan
SNUR	Low-Carbon Development Strategy
SO ₂	Sulphur Dioxide
TAP	Trans Adriatic Pipeline
TASR	Technical Analysis Summary Report
TE	Thermal Power Plant
TEFC	Total Final Energy Consumption
TEN-E	Trans-European Energy Networks
TEN-T	Trans-European Transport Networks
TNG	Liquefied Petroleum Gas (LPG)
toe	Tonne of Oil Equivalent
TPES	Total Primary Energy Supply
TPG	Liquefied Natural Gas (LNG)
TRG	Technical Working Group
TTO	Technology Transfer Office
UCA	Côte d'Azur University
UCG	University of Montenegro
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WAM	With Additional Measures

WB
WBIF
WEM
ZB
ZB6

World Bank
Western Balkans Investment Framework
With Existing Measures
Western Balkans
Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro,

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INTRODUCTION

In the Strategy for the European Energy Union published by the European Commission in February 2015, it has been emphasized that integrated management is needed to ensure that all energy-related activities at EU level and at national, regional and local level contribute to the objectives of the Energy Union. By 2030, the scope will expand beyond the framework of climate and energy policy to include all five key areas of the Energy Union: 1. Energy security, 2. Internal energy market, 3. Energy efficiency, 4. Decarbonization, and 5. Research, innovation, and competitiveness. The NECPs should cover the period from 2021 to 2030, laying down the pathway to achieve the agreed 2030 targets, build upon what each Contracting Party should deliver in relation to their policies for 2020 (as a baseline), and include a perspective until 2050 in order to ensure consistency with long-term relevant policy objectives at EU, UNFCCC and Energy Community level.

Montenegro, as a member of the UN, by ratifying the Paris Agreement, pledged to join the international community with the objective to reduce greenhouse gas emissions. In addition, as a member of the Energy Community and a candidate for EU membership, Montenegro pledged to meet the goals of the Energy Community and the European Union in the fields of renewable energy, energy efficiency and greenhouse gas emission reduction. In order to fulfill these obligations and to achieve set goals, Montenegro must harmonize and coordinate its energy and climate policies. Integrating environmental and climate change issues into ambitious development and energy policies and strategies is one of country's greatest challenges in joining the European Union.

The development of this plan is in accordance with Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action¹ (hereafter referred to as Governance Regulation). The Policy Guidelines PG 03/2018 of June 2018 on the development of National Energy and Climate Plans under Recommendation 2018/01/MC-EnC² provides a good overview of the scope, required content and the timeline of the NECP process for the Contracting Parties of the Energy Community. The objective is to align the Montenegrin NECP with the new goals of 2030 set by the Energy Community Ministerial Council based on the Decision of the Ministerial Council of the Energy Community No 2022/02/MC-EnC³, of 15 December 2022, regarding the reduction of greenhouse gases (GHG), the share of renewable energies and energy efficiency, respectively for final energy consumption and primary energy consumption.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1999&from=EN> (last access 25.11.2024)

² https://www.energy-community.org/dam/jcr:c9886332-a1f5-43ee-b46c-31c637aedfa6/PC_03_2018_ECS_NECP.pdf (last access 25.11.2024)

³ https://www.energy-community.org/dam/jcr:421f0dca-1b16-4bb5-af86-067bc35fe073/Decision_02-2022-MC_CEP_2030targets_15122022.pdf (last access 25.11.2024)



This document has been developed from the NECP draft template based on the requirement of the Governance Regulation, which was made available to the Energy Community Contracting Parties to support the national NECP development processes. It is noted that the NECP is an endeavour of continuous improvement and that the current version has been produced as good as possible and with great effort.

The development of the NECP has been supported by the following projects:

- “Capacity Development for Climate Policy in Southeast, Eastern Europe, South Caucasus and Central Asia, Phase III (CDCPIII)”, which is part of the International Climate Initiative (IKI) and implemented by GIZ GmbH. IKI is supported by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Foreign Office, in accordance with a decision of the German Bundestag.
- “EU4Energy Transition – Covenant of Mayors in the Western Balkans and Türkiye”, jointly funded by the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ), and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The content of this document is the sole responsibility of the Ministry of Energy and Mining of Montenegro and does not necessarily reflect the views of the EU, BMZ, BMWK, or the German Federal Foreign Office.

SECTION A: NATIONAL PLAN

1 OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1 Executive Summary

i. Political, economic, environmental, and social context of the plan

By signing the Treaty establishing the Energy Community (EnC Treaty) in 2005 and adopting the Law on the Ratification of the Treaty between the European Community and the Republic of Montenegro on the Establishment of the Energy Community in 2006, Montenegro became a full member of the Energy Community. The main objective of this membership is to align national legislation with the EU *acquis communautaire* in the fields of electricity, gas, environmental protection, competition, renewable energy sources, and energy efficiency.

Montenegro became a member of the United Nations Framework Convention on Climate Change (UNFCCC) through succession in 2006 and, on January 27, 2007, became a non-Annex I Party to the Convention. In line with its international obligations under the UNFCCC, Montenegro regularly submits greenhouse gas inventory reports as well as national communications to the Convention Secretariat. The Kyoto Protocol was ratified on March 27, 2007, and Montenegro became a non-Annex B Party to the Protocol on September 27, 2007. On October 11, 2017, the Parliament of Montenegro adopted the Law on the Ratification of the Paris Agreement, thereby making Montenegro a Party that has ratified the Paris Agreement and committed to contributing to the reduction of global GHG emissions. The national entity responsible for environmental protection and climate change policy, as well as the national focal point for the UNFCCC, GCF, and GEF, is the Ministry of Ecology, Sustainable Development and Northern Region Development.

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The Fourth National Communication (4NC) and the First Biennial Transparency Report (FBTR) were submitted to the UNFCCC Secretariat in February 2025⁴, following their official adoption earlier that month. Montenegro continues to fulfil its international obligations, reaffirming its commitment to reducing greenhouse gas (GHG) emissions and addressing the challenges of climate change. The report includes updated GHG inventory data for period 1990-2022, as well as an overview of measures formulated, adopted, and implemented to reduce emissions. In addition, it provides a comprehensive overview of Montenegro's climate profile, identifying sectors and regions most vulnerable to the impacts of climate change, and includes an analysis of potential adaptation measures. The report also contains key information on capacity building at the national level, promotion of investments and financial mechanisms, and an overview of other relevant topics.

⁴ <https://unfccc.int/documents/645835>

Furthermore, Montenegro has adopted its updated Nationally Determined Contribution (NDC) for 2030 and 2035. The updated NDC sets an ambitious GHG emission reduction target of 55% by 2030 and 60% by 2035, marking a significant step forward compared to the previous NDC, which envisaged a 35% reduction. The document was adopted in February 2025. The updated NDC covers all sectors, including land use, land-use change, and forestry (LULUCF), and aims to reduce emissions by 55% by 2030 and 60% by 2035. Accordingly, Montenegro will implement measures in the energy, industry, agriculture, and transport sectors, with a special focus on forest ecosystems as key carbon sinks. As part of the “Climate Promise” initiative, supported by the UNDP and implemented in 2024, the groundwork was laid for an accurate assessment of feasible GHG reduction targets compared to 1990 levels. The process applied an appropriate methodology supported by emission projections, assessment of mitigation measures, and synergies between climate policies and domestic legislation, with the involvement of key stakeholders. The updated NDC foresees two implementation periods: 2025–2030, with a 55% emission reduction target, and 2031–2035, with a 60% reduction target. This approach encompasses the entire economy, including the LULUCF sector, thereby creating a comprehensive framework for achieving sustainable climate goals. Through this process, Montenegro also strengthens its alignment with EU climate policy and the European Green Deal, particularly in light of its EU candidate status and the obligation to achieve climate neutrality by 2050. The target values of the NDC proposed in this report are based on existing domestic measures that offer realistic implementation potential and the ability to achieve expected impacts. The NDC target is not designed as a long-term goal in itself, but it recognizes the need for low-carbon development, which is crucial for supporting the Paris Agreement and aligning future ambitions Montenegro seeks to achieve both nationally and internationally.

The European integration has been at the top of Government’s agenda ever since the country independence, and the membership of the European Union remains a strategic goal of the country. In the context of the EU accession process, the country also initiated harmonization of its EU and UNFCCC commitments. The EU integration agenda has generated momentum for political, economic and social reforms and contributed to consensus building on cross-sectoral policy. While EU accession poses great challenges in terms of human and financial capacity at the national and local levels, it also provides opportunities for the creation of more integrated, crosscutting policies and better utilization of available resources.

Montenegro is implementing several international obligations to move towards a low-carbon economy, including the establishment of goals for increasing the share of renewable energy by gross final energy demand, improving energy efficiency, and reducing greenhouse gases (GHG) emissions.

On its path towards accession to EU, Montenegro has opened Negotiation Chapter 27 covering Environment and Climate Change. It will have to integrate into domestic legal framework numerous requirements of the EU climate policy and to align with climate acquis. According to the Progress Report from November 2025, it was noted that in June 2025 the Government adopted the eighth semi-annual report on the implementation of the Action Plan for meeting the closing benchmarks under Chapter 27. The report showed that out of a total of 281 planned activities, 109 (38%) had been implemented.

In the areas of environment and climate change, Montenegro must urgently strengthen its administrative capacities at both the central and local levels by hiring additional staff and addressing the issue of the insufficient number of inspection services at both levels. Montenegro needs to ensure that there is an institutional infrastructure for conducting coordinated, strategic planning for sustainable investments in the fields of environment and climate, including quality preparation, adequate public consultations, and implementation of investments.

In April 2025, Montenegro fully joined the EU LIFE Programme for the environment and climate action, marking a significant milestone that provides access to European Union funds to support initiatives targeting key areas such as pollution reduction, improved waste management, and climate action.

The EU 2024 Montenegro Progress Report, under Chapter 15 on Energy, states: “During the reporting period, limited progress was achieved, notably through the drafting of the National Energy and Climate Plan and the implementation of renewable energy projects. It was noted that Montenegro is significantly delayed in finalizing and adopting the National Energy and Climate Plan, as well as in aligning with the requirements on establishing strategic oil reserves and compliance with the Energy Package. Montenegro needs to complete and start implementing the National Energy and Climate Plan in line with the Energy Community’s energy and climate objectives. In addition, it should transpose the Electricity Integration Package and accelerate alignment with the Energy Performance of Buildings Directive.

The largest CO₂ emitter in the country, the Pljevlja Thermal Power Plant (hereinafter: TPP Pljevlja), which uses lignite from the nearby coal mine, is undergoing an environmental modernization process that began in early 2025. This process includes the installation of flue gas desulphurization and denitrification systems, the modernization of electrostatic filters, the construction of a wastewater treatment facility, and the reconstruction of the internal ash and slag transport system. These measures will significantly reduce emissions of air pollutants (SO₂, NO_x, and PM_{2.5}), but they will not have a substantial impact on reducing GHG emissions. The TPP Pljevlja is also foreseen as a potential heat source for the town of Pljevlja, with plans for the installation of a heat extraction system from the turbine, heat exchangers, a pumping station, and an auxiliary boiler plant, which will serve as a backup energy source.

According to the 2023 census, the population of Montenegro was 623,633 and thus slightly higher than the population according to census 2011 (620,029 inhabitants). The population density is approximately 50 inhabitants per square km. Between 2003 and 2011, the annual population growth was slightly negative; statistics show a negative growth rate of about 0.02%. Of the total population, 306,807 are male and 316,826 are female in 2023. The most recent statistics show the composition of Montenegro’s population:

- 18 % Children 0–14 years
- 65 % People aged 15–64 years
- 17 % People aged 65 or over

Life expectancy at birth in 2018 was 77 years.

There are about 1,256 settlements in the country, of which 40 settlements are of a city type, where about 62% of the population lives, while the rest of the population live in rural

settlements. Out of the total number of females, 65.5% live in urban areas, while for males this percentage is 63.2%. In 2017, the migration rate was 8.4%, continuing the upward trend in population movements. Migration is mainly related to the movement of population from rural to urban settlements, and the negative consequences are twofold. On one hand, there is increasing pressure on resources in urban regions, and on the other hand, rural areas are being left without a population, especially in the mountainous parts – pastures are overgrown, land is left uncultivated, and is overgrown with weeds and forest vegetation. This further leads to a decrease in investment in uninhabited areas and less development of these parts of Montenegro.

The Montenegrin gross domestic product (GDP) in 2018 was EUR 4,663 million, while for 2017 it was EUR 4,299 million, and in 2021 it was EUR 4,731 . GDP per capita in 2018 was EUR 7,495 while in 2017 it was EUR 6,908. Table 1 shows an overview of the important economic and social indicators in Montenegro for several years. Figure 1 shows a disaggregation of Montenegro's GDP for 2018. (MONSTAT, 2018; MONSTAT 2022⁵).

	2017	2018	2019	2020	2021
Gross domestic product at current prices, EUR million	4,299	4,663	4,951	4,186	4,955
Population (in thousands)	622.4	622.2			
Gross domestic product per capita in EUR (3 = (1/2))	6,908	7,495			
Gross domestic product at constant prices (prices of previous year), EUR million	4,141	4,517	4,853	4,193	4,731
Real growth rate of GDP (%) ((GDP at constant prices in current year/GDP at current prices in previous year) × 100) – 100	4.7	5.1			

Table 1-1: Overview of economic and social indicators

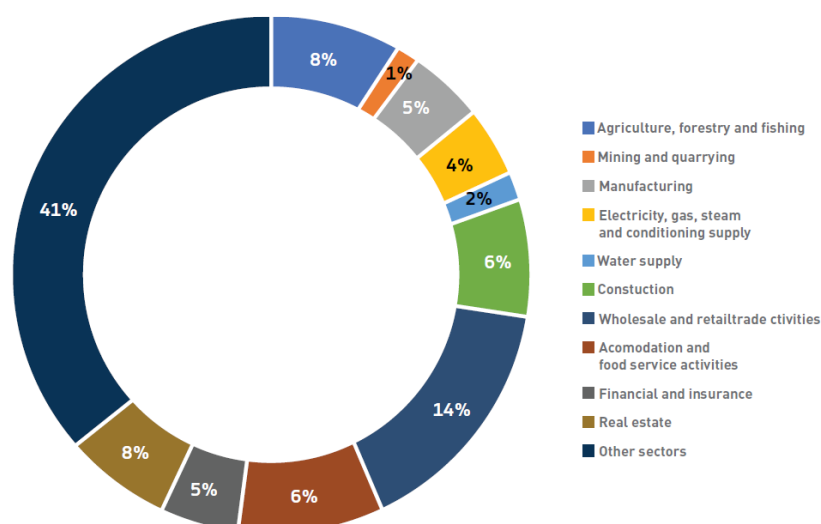


Figure 1: Montenegro's GDP structure – 2018 (Other sectors includes: public administration; professional, scientific, and technical activities; education; human health; and transportation)

⁵ https://monstat.org/eng/publikacije_page.php?id=1814

Montenegro's population is experiencing poverty and income inequality. However, in the last few years the conditions have improved. The at-risk-of-poverty rate in Montenegro in 2017 was 23.6%, which was 1.6% lower compared to 2013. A decreasing trend is also recorded in the relative at-risk-of-poverty gap, since the value of this indicator in 2013 was 39.7%, and in 2017 it was 34.0%, which is a decrease of 5.7%. The permanent at-risk-of-poverty rate for the period 2013–2016 was 15.6%. Income distribution inequality reduced from the value of 8.5 recorded in 2013 to 7.6 recorded in 2017 (MONSTAT, 2018).

ii. Strategy relating to the five dimensions of the Energy Union

There are three key legal and strategic acts that address the dimension of decarbonisation.

Energy Policy of Montenegro by 2030 (hereinafter the Energy Policy), which takes into account three main priorities (security of energy supply, the development of a competitive energy market and sustainable energy development in the country). The Policy will be updated soon, in line with the Energy Law.

Energy Development Strategy (EDS) until 2030 with Action Plan 2016-2020 and **The National Climate Change Strategy (NCCS)** until 2030 and appropriate Strategic Environmental Impact Assessments (SEIA) were adopted in 2012 and 2015 respectively. The NECP will replace both Strategies for the post-2020 period. This also applies with the **National Renewable Energy Action Plan of Montenegro**.

National Strategy for Sustainable Development (NSSD) until 2030 together with a corresponding Action Plan was adopted in 2016, integrating the UN Agenda for sustainable development until 2030. The document represents a strategic framework for the transposition of the UN sustainable development goals and defines a set of indicators to track national progress on the implementation of the sustainable development policy, which also involves the establishment of an indicator-based reporting information system.

The Law on Protection against Negative Impacts of Climate Change introduces the obligation to develop a Low-Carbon Development Strategy with an Action Plan.

The Low-Carbon Development Strategy with its action plan is in the final stage of preparation with the support of the World Bank, while the **Climate Change Adaptation Plan for the period 2025–2035, with the 2025–2027 action plan**, was adopted on 3 July 2025.

Within a number of international projects (EU4GREEN, TRATOLOW, CBIT, ADAPT, PMI, etc.), continuous capacity-building activities are being carried out for officials from relevant state institutions. During the reporting period, several training sessions were organized on various topics such as energy modelling, emissions trading, greenhouse gas (GHG) inventories, monitoring, reporting and verification (MRV) of GHG emission reports, as well as monitoring and indicators for climate change adaptation.

EU4GREEN is a major regional project implemented in the Western Balkan countries, including Montenegro, and is aimed at enhancing alignment with the EU climate acquis. This project represents key support for strengthening administrative capacities, legislative and institutional frameworks, and capacity for implementing climate policies in line with European standards

and GHG-reduction goals. The project is implemented by the Austrian Environment Agency, which has organized numerous training activities for Montenegrin institutions, enabling them to improve their capacity in GHG monitoring and reporting and emission reduction. Under the new Law on Climate Change, a GHG emissions monitoring system will be established to enable regular reporting, both nationally and to EU institutions. This system will be crucial for ensuring transparency and accountability in achieving climate policy objectives. The draft law promotes the integration of climate policies into the following sectors: disaster risk reduction and civil protection, agriculture, forestry, water management, energy, industry, transport, health, construction and infrastructure, hydrometeorology, gender equality, tourism, spatial planning, and coastal and marine areas. This means that all key sectors in Montenegro will have to align their activities with GHG reduction and climate adaptation goals. The continued implementation of the law will include the development of secondary legislation, institutional capacity building for enforcement, and additional training for relevant stakeholders. The law will also be regularly updated in line with new EU directives and international obligations, ensuring long-term compliance and progress toward climate neutrality, with significant support from the EU4GREEN project.

Under the project “Strengthening the Transparency Framework for Monitoring Nationally Determined Contribution and Adaptation Actions in Montenegro (CBIT)”, funded by the Global Environment Facility (GEF), the establishment of a fully operational national MRV system is underway. This system will include a clear definition of roles and responsibilities of all relevant stakeholders, fully developed methodologies, procedures and guidelines (MPG) for all system components, and an online portal containing information on mitigation, GHG inventory, and climate finance. The primary goal of the project is to strengthen institutional and technical capacities to support transparency-related activities, as required under Article 13 of the Paris Agreement. The project places special emphasis on the importance of the MRV portal for centralizing expertise. The initiative is structured around two components with four expected outcomes, aiming to establish a strong institutional mechanism for tracking contributions and developing a comprehensive transparency framework. The project also focuses on stakeholder engagement, capacity building, and institutionalized coordination and information exchange. The Ministry, as an implementing partner within the National Implementation Modality (NIM), is responsible for project management, while the UNDP oversees execution standards and project cycle management (DIM). Project activities began in January 2022 and are expected to be completed by February 2026.

The adoption of the new Law on Climate Change will require amendments to existing secondary legislation and the adoption of new legal acts to further align the national ETS with the EU ETS acquis. In this context, the Ministry is actively working on establishing a new carbon pricing policy, with technical assistance from the World Bank, coordinated through the EU4GREEN project. Determining a carbon price is one of the key policy instruments for achieving climate change mitigation targets set out in the NDC and NECP. Within the World Bank-funded project “Partnership for Market Implementation (PMI)”, a Carbon Pricing Impact Assessment and an Assessment of Carbon Pricing and Energy Sector Planning Interactions have been prepared. These analyses form a solid basis for assessing the impact of the Carbon Border Adjustment Mechanism (CBAM) on Montenegro’s electricity sector and for strengthening the existing national Emissions Trading System (ETS). The carbon pricing impact assessment was developed for the energy, forestry, and economy-wide sectors. The energy sector analysis

provides a solid foundation for reinforcing the national ETS. Four future carbon price evolution scenarios in Montenegro were considered, focusing on alignment with EU ETS prices. In addition, a legal gap analysis has been completed, and in the coming period, work will continue on preparing a Roadmap for aligning the national ETS with the EU ETS, followed by the drafting of a new regulation.

Through cooperation with the World Bank, work is also underway on the Low-Carbon Development Strategy. Additionally, a Decarbonization Communication Strategy 2025–2028 has been prepared, based on which a PR company will be engaged in 2026 to implement communication activities under the strategy. The Low-Carbon Development Strategy will analyze the necessary steps and timeline for achieving climate neutrality, taking into account sector-specific challenges and opportunities. It will also include recommendations providing a foundation for regular monitoring of the NDC and GHG reduction progress. The Strategy is expected to be adopted in the first quarter of 2026.

The Draft Green Hydrogen Development Programme, prepared with the support of the German Agency for International Cooperation (GIZ), aims to enable safer, cleaner, and more efficient energy use across all sectors — industry, transport, heating, and balancing of the power system with an increasing share of renewable sources. The adoption of the document is planned for the fourth quarter of 2025, as part of Montenegro's obligations under the Green Agenda for the Western Balkans, the Sofia Declaration, and the Paris Agreement.

When it comes to the fifth key area of the Energy Union, which refers to research, innovation, and competitiveness, the national strategic framework consists of several strategies, the most significant of which is the **Smart Specialisation Strategy of Montenegro (S3) 2019–2024**⁶, along with the **Operational Programme for the Implementation of the Smart Specialisation Strategy of Montenegro (2021–2024)**⁷.

This is an innovative strategic planning concept that involves identifying priority areas for regional or national development with the aim of modernizing and strengthening the competitiveness of the economy by concentrating research, innovation, economic, and other relevant sectoral potentials in these areas. The main goal of the Smart Specialisation Strategy (S3) in Montenegro is to enable the further accelerated development of narrowly defined priority areas, as well as the development of new sub-areas within them and new industries with strategic development potential.

Montenegro has identified four strategic S3 priorities, one of which relates to Energy and Sustainable Environment and is aligned with the NECP. In this context, the strategic commitment is to increase the share of energy generated from renewable sources, with a particular focus on the sustainable development of the sector, thereby contributing to alignment with the four identified priorities within the fifth area of the Energy Union.

The S3 recognises five strategic objectives:

- Improving the excellence and relevance of research activities;
- Strengthening human resources in research and innovation;

⁶ <https://www.gov.me/dokumenta/18205a91-1afc-4eb7-a5cb-8ad5bd0b7712>

⁷ <https://www.gov.me/dokumenta/b3e228b7-d1a2-4ee2-a3c9-e9b2550c4b6e>

- Enhancing cooperation within the innovation system;
- Supporting innovative activities in the business sector; and
- Improving the framework conditions for the innovation ecosystem.

Since February 2024, Montenegro has been developing a **new S3 strategic cycle**, namely the **Smart Specialisation Strategy of Montenegro (2026–2031)**⁸. The second phase of the document's preparation involves mapping potentials through the development of a quantitative and qualitative system analysis, with the ultimate goal of defining an initial proposal of priority areas. Preliminary results of the quantitative analysis, as well as the qualitative analysis, which is in its final stage, indicate the identification of five potential priority areas, one of which is Energy⁹. This demonstrates alignment with the NECP at the level of objectives, which will, in the later stages of development, be followed by the alignment of support measures and key indicators.

The Strategy for Scientific Research Activities of Montenegro (2024–2028)¹⁰ is the most important sectoral strategic document in the field of science and research in Montenegro. The Strategy defines three strategic objectives:

- Improving the framework conditions for the functioning of scientific research activities in Montenegro;
- Strengthening human resources and institutional capacities in the field of science and research; and
- Enhancing international cooperation in science and research.

The Strategy also defines nine priorities for scientific research activities until 2028, one of which relates to Energy and Sustainable Environment. This means that the instruments of scientific research policy and support measures are fully dedicated to the development of the identified priorities, thereby directly contributing to the objectives of the NECP.

The Research Infrastructure Roadmap of Montenegro 2024–2028¹¹ is a strategic document stemming from the European integration process, aimed at contributing to the long-term and sustainable development of national research infrastructures, as well as to Montenegro's integration into the European Research Area (ERA) through access to international bodies and pan-European research infrastructure networks.

The objectives of the Roadmap are to:

- Analyse the existing capacities of research infrastructures in Montenegro;
- Develop a systematic overview of the existing capacities of national infrastructures and provide guidelines on the principles of their operation;
- Provide guidance for establishing an efficient management and information framework to ensure a coordinated and strategic approach to resource management, development, visibility, and long-term sustainability of infrastructures; and
- Provide guidelines for establishing a framework for the selection of future memberships in international research bodies and pan-European research infrastructures.

⁸ <https://wapi.gov.me/download-preview/ebdcc51c-02f8-496b-9333-e57c9ff76eda?version=1.0>

⁹ <https://www.gov.me/clanak/odrzana-sesta-sjednica-savjeta-za-inovacije-i-pametnu-specijalizaciju>

¹⁰ <https://www.gov.me/clanak/strategija-naucnoistrazivacke-djelatnosti-2024-2028>

¹¹ <https://www.gov.me/clanak/usvojena-mapa-puta-za-istrazivacku-infrastrukturu-crne-gore-2024-2028>

The document provides an overview of national research infrastructures relevant to the energy-related priority area, such as the Laboratory for Power Systems (EES) at the Faculty of Electrical Engineering of the University of Montenegro.

The **National Circular Transition Strategy until 2030¹²** is a strategic document representing an important step toward the sustainable development of Montenegro. It enables adaptation to climate change and strengthens the resilience of the economy while ensuring citizens' quality of life and the protection of natural resources. As the circular economy is still an emerging policy area, a significant part of the document is focused on a systemic approach—aimed at changing mindsets and behaviors regarding resource use—as well as on educating micro, small, and medium-sized enterprises (MSMEs) and supporting their transformation toward sustainable business models.

The results of the analyses conducted for the development of this Strategy indicated that agriculture, forestry, construction, and tourism, as key sectors of Montenegro's economic development, also represent priority areas for circular transition. Therefore, the first four strategic objectives are focused precisely on these sectors.

The Strategy defines six strategic objectives:

- Improved stable supply of safe food in accordance with the principles of the circular economy;
- Enhanced social, ecological, and economic functions of forests and their resilience to the negative impacts of climate change, promoting rural development and bioeconomy through the strengthening of the circular economy in forestry and wood processing;
- Sustainable use of land and all resources in construction;
- Improved tourism development based on the principles of sustainable development;
- Enhanced competitiveness of the economy through diversification, innovation, and increased resource efficiency; and
- Creation of a supportive environment for circular transition.

The last two strategic objectives are **horizontal**, covering themes common to the four sectors mentioned above, such as technological development and innovation, energy efficiency, green public procurement, education and promotion of the circular economy concept, waste management, and coordination mechanisms for the implementation of the Strategy and the circular economy framework.

At the level of strategic objectives, this Strategy is **aligned with the NECP**, as the synergy between circular economy and energy efficiency contributes to building more resilient and sustainable economies. The main effects of this synergy include **cost reduction, increased competitiveness, preservation of natural resources, and reduction of greenhouse gas emissions**.

Furthermore, under the strategic objective related to **enhancing the competitiveness of the economy through diversification, innovation, and increased resource efficiency**, the Strategy identifies an operational objective titled *“Establish a stable system and develop financing mechanisms for the implementation of circular economy business models.”* This

¹² <https://www.gov.me/dokumenta/a2f027ec-d35d-44d2-8ced-3b840ba73c4a>

objective defines a set of support measures in the field of energy efficiency, which can significantly contribute to reducing energy consumption and protecting the environment.

Other strategies with cross-dimensional relevance are described below:

The **Industrial Policy of Montenegro 2024–2028**¹³ is a strategic document aimed at developing the competitiveness of Montenegro's economy, with a focus on the industrial sector. The purpose of this document is to enhance the competitiveness of the Montenegrin economy and contribute to dynamic economic growth, to strengthen enterprises through support that enables them to maximize their growth potential and competitiveness, and to promote sustainable development and job creation. The strategic goals are:

- Improving the environment for the digital and green transition of the industry;
- Growth of investments and financing models for long-term competitiveness of the industry;
- Encouraging innovation based on the principles of smart and sustainable industry development;
- Improving access to the EU single market and strengthening regional economic cooperation.

From the perspective of relevance to the NECP and the fifth dimension of the Energy Union, the importance of Montenegro's Industrial Policy lies in its focus on reducing the use of fossil fuels, increasing the utilization of renewable energy sources (RES), and improving energy efficiency through clearly defined goals and activities. These include the development of infrastructure and the promotion of energy transition, along with the crucial component of strengthening education and skills for the technological advancement of industry.

The alignment of the Industrial Policy with the NECP exists on multiple levels, starting from the consistency of operational objectives and key indicators related to monitoring progress in the areas of energy efficiency and sustainable development of Montenegro's energy sector. For example, at the level of the first strategic goal, the GHG emission intensity is identified as an impact indicator. Under Operational Objective 1.2, *Promotion of energy transition and resilience in industry*, the performance indicators include Installed capacity of the energy sector and Share of renewable energy in electricity production. At the level of Operational Objective 2.2, *Support for industry towards climate neutrality*, the recognized indicators are Share of renewable energy sources (RES) in final energy consumption and Share of electricity generated from RES in total annual net electricity consumption.

Among the horizontal policies is also the MSME Policy, regulated by the Strategy for Micro, Small, and Medium-Sized Enterprises of Montenegro 2023–2026¹⁴. The purpose of this document is to strengthen the MSME sector so that it becomes a key factor in Montenegro's transformation toward a digital and sustainable economy. The Strategy defines three strategic objectives:

- Improved business/regulatory environment;
- Support for transformation and strengthening of competitiveness; and

¹³ <https://www.gov.me/dokumenta/46dc2fa2-6885-482c-8c59-8179a69c68b6>

¹⁴ <https://www.gov.me/dokumenta/3e145aba-089d-40bf-8bbb-6e7a91b3e873>

- Business organization and access to new markets.

From the perspective of operational relevance, the most significant objective is the one related to the “*Transition of MSMEs toward sustainable green business*”, which includes measures aimed at strengthening energy efficiency in MSMEs within the industrial sector, as well as enhancing MSME competitiveness through diversification, innovation, promotion of green business models, and increased resource efficiency. In addition to reducing negative environmental impacts, the ultimate goal is to contribute to the long-term sustainability and competitiveness of enterprises.

Transport development strategy of Montenegro for the period 2019-2035 determines the situation in the areas of transport, defines the infrastructural, organizational and operational goals of the development of the transport system, which are realized through short-term and long-term implementation plans. The Strategy sets out plans for improving the economic development, efficiency, safety, connectivity and ecological sustainability of the country's transport system, ensuring at the same time the integration of the transport sector and the completion of the process of harmonizing the regulatory framework of the transport sector with the acquis of the EU, environmental and safety standards and obligations. The most important strategic goal is Environmental sustainability which includes:

- Reduction of carbon dioxide emissions, noise levels and the impact on the natural, historical and socio-economic environment.

Also, three priority areas are in direct correlation with 5 dimensions:

- Management of railway and port services;
- Introduction of Intelligent Transport Systems (ITS);
- Intermodality and freight transport in road traffic.

Tourism development strategy of Montenegro for the period 2022-2025 is developed in order to ensure the further development of tourism, an increase in employment, raising the standard of living population standards, more balanced regional development, but also the improvement of global recognition of the country. Also, the Government of Montenegro is committed to the continuous sustainable development of tourism, with a focus on efficient use of resources, with the promotion of Montenegro as a sustainable, inclusive, green and smart tourist destination. Green and responsible tourism is one of the strategic goals. Some of the measures are:

- Environmental certification - a voluntary mechanism confirmation of the quality of sustainable business. The certification process involves an expert assessment business compliance with certain sustainability criteria;
- E-mobility;
- Increasing the energy efficiency of tourist facilities with electricity saving measures;
- Energy transition towards renewable energy sources - use of solar energy in tourist facilities.

The strategy for the development of agriculture and rural areas in period 2023-2028 represents the development strategy of Montenegro, where directions for the management of agricultural resources are determined in a long-term sustainable way. This strategy provides a vision and a plan for implementing the strategic transformation of agriculture and rural areas in Montenegro until 2028, which will ensure the implementation of a different series of

activities and measures. It is important to emphasize Strategic goal 2: Ensure efficient management of natural resources of Montenegro and achieve the goals of the Green Agenda which includes:

- Contribute to mitigating climate impacts, including reducing greenhouse gas emissions and improving carbon sequestration, as well as promoting sustainable energy;
- Support sustainable development and effective management of natural resources such as water, land and air, including reducing dependence on chemicals;
- Contribute to stopping the process of biodiversity loss

Forest and forestry development strategy of Montenegro for the period 2023-2028 establishes goals and guidelines for the development of forests and forestry, in accordance with national forestry policy, measures for the improvement of forests, as well as indicative financial means for implementing the strategy and the way to provide them. National forest inventory is carried out for the purpose of drafting strategic planning documents in forestry and exchange information in accordance with the law (at national and global level). Important strategic goals are:

- Preserving and strengthening the capacity of forests for resilience and climate change resilience, including fire prevention and other solutions;
- Encouraging the sustainability and competitiveness of industries based on forests, bioenergy and beyond green industry and circular economy.

Since Montenegro's **National Biodiversity Strategy (with Action Plan) for the period 2016–2020** (NBS) has expired, it is planned to undergo a comprehensive revision in order to align it with new international biodiversity protection frameworks, particularly the Global Biodiversity Framework (GBF), which requires countries to update their national strategies and action plans. As part of this revision, the document Guidelines for Integrating Biodiversity into Spatial Planning was adopted — a tool that helps planners and decision-makers take biodiversity into account in urbanisation, spatial planning, development, and infrastructure projects. The new version of the strategy should establish realistic national targets aligned with the GBF, while also reflecting the specific circumstances of Montenegro (its ecological conditions, as well as economic and social context).

Waste management strategy until 2030 is adopted in 2015. The strategy has the task of defining the aspirations of the state with regard to the organization of the functioning system, to define priorities and direct the development and organization of the waste management system in accordance with the requirements of the legislation and assumed obligations, as well as the current real possibilities of Montenegro as a country, to define clear directions movements and specific tasks in terms of achieving the desired goals in all sub-areas that make the waste management system complete, to, if possible, define the deadlines for achieving the stated goals, as well as to establish the way of monitoring the achievement of the set goals. Some of the specific goals of the Strategy are:

- accelerated and intensive development of public awareness about the necessity of solving the situation in the country with regard to waste management, as well as about the equally important and binding participation of the population, economy and state institutions in the functioning and respect of the established waste management system;
- introducing the principles of circular economy into the production and trade system in Montenegro with the clear goal of improving the reuse of materials and products;

- achieving a satisfactory level of development and intensive application in practice of the system of primary and secondary waste selection, all with the aim of collecting recyclable, primarily packaging, materials for reuse and/or recycling, i.e. their economic valorization, i.e. processing into other products of similar or lower quality, which certainly have a place on the market;
- increasing the degree of separation and utilization of biodegradable waste;
- increasing the degree of separation and adequate recycling and disposal of construction waste and demolition waste;
- provision of sewage sludge treatment;
- reducing the amount of waste that must be permanently disposed of at one of the landfills;
- preparation of the waste management system for the future use of energy from waste and/or thermal treatment of waste.

The State Waste Management Plan for the period 2025–2029, adopted by the Government in October 2025, is a strategic document that defines the development directions and key measures for establishing an efficient and sustainable waste management system in Montenegro, in accordance with European standards and national legislation. The Plan envisages increasing the municipal waste recycling rate to 65 percent by 2035, reducing the amount of biodegradable waste disposed of in landfills, and closing and remediating all non-sanitary disposal sites by 2030.

iii. Overview table with key objectives, policies and measures of the plan

The key objectives outlined in the Integrated Energy and Climate Plan are the reduction in greenhouse gas emissions for 2030, the share of RES in the gross final energy consumption and energy efficiency, expressed as consumption of primary energy and direct consumption of energy.

Table 1.2 presents national targets with respect to primary energy consumption, final energy consumption, share of renewable energy in the gross final energy consumption and reduction of GHG emissions in target year (2030), as well as the estimation of the level of reaching of the goals for WEM (business as usual scenario with existing measures) and WAM scenarios (WEM scenario strengthened by adding new measures in order to reach the national goals).

The EnC targets for Montenegro are also presented to demonstrate compliance with the EnC provisions respectively to show that the targets are in the same order of magnitude as the results of the WAM scenario.

Key Objectives	EnC Targets for Montenegro ¹⁵	National targets	WEM scenario in 2030	WAM scenario in 2030
Primary energy consumption	0,92 Mtoe	0.92 Mtoe	0.98 Mtoe	0.90 Mtoe
Final energy consumption	0,73 Mtoe	0.73 Mtoe	0.76 Mtoe	0.72 Mtoe
Share of renewables in the gross final energy consumption	50 %	50 %	43 %	54 %

¹⁵ <https://www.energy-community.org/implementation/package/CEP.html>

GHG emission decrease ¹⁶	55 % (total 2.42 MtCO _{2eq})	55 % (total 2.42 MtCO _{2eq})	total 3.06 MtCO _{2eq}	total 2.40 MtCO _{2eq}

Table 1-2: Overview of the key objectives with projections

As it can be seen from the following table, the major difference between WEM and WAM scenario is in the usage of renewable energy for electricity production and consumption of renewable energy (biofuels and electricity) in the transport sector. This led to significant increase of RES share in the transport and as a consequence also to decrease of GHG emissions from transport sector (which is recognized as the second most intensive sector with respect to GHG emissions).

RES share per sector	WEM scenario in 2030 [%]	WAM scenario in 2030 [%]
RES T	7	24
RES E	66	79
RES HC	49	49

Table 1-3: Overview of RES share per sector (transport, electricity production and heating and cooling)

Table 1.4 presents an overview of all existing policies and measures (WEM scenario) and additional policies and measures designed in order to reach the national goals in target year (WAM scenario) with pointing out targeted EU dimensions and sectors.

There are 55 PaMs in total. More than half of them target Decarbonisation dimension (26 PaMs) since reaching of the GHG target is by far the most challenging task. Also, there are more PaMs defined for WEM scenario than for WAM scenario, but in terms of reaching of the key objectives, PaMs defined for WAM scenario are significantly more effective.

Policies and measures	Dimensions	Target sector	WEM	WAM
Reconstruction of the Pljevlja Thermal Power Plant (TPP) and the plan for its future operation	Decarbonisation	Energy industries / electricity generation	×	
Development of the Just Transition Plan for the Pljevlja Coal Region	Decarbonisation	Energy industries / electricity generation		×
New renewable power plants	Decarbonisation	Energy industries / electricity generation	×	
Additional renewable power plants	Decarbonisation	Energy industries / electricity generation		×
RES auctions	Decarbonisation	Energy industries / electricity generation		×
Development of CP mechanism (EU ETS)	Decarbonisation	Energy industries / electricity generation		×
Refurbishment of small hydro power plants (increased EE)	Decarbonisation	Energy industries / electricity generation	×	
Development of decentralized energy generation (distribution medium voltage connection)	Decarbonisation	Energy industries / electricity generation	×	
Additional development of decentralized energy generation (distribution medium voltage connection)	Decarbonisation	Energy industries / electricity generation		×
The Green Hydrogen Development Plan with an Action Plan for the period 2026–2028	Decarbonisation	Energy industries / electricity generation		×
Promotion of e-mobility	Decarbonisation	Transport		×
Introduction of mandatory share of biofuels in fuel supply	Decarbonisation	Transport		×
Uniprom KAP: electrolysis cells replacement and overhauling	Decarbonisation	Industry	×	
Uniprom KAP: Cell hibernation	Decarbonisation	Industry		×
Reduction of HFCs in line with the Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer	Decarbonisation	Industry	×	

¹⁶ This target excludes LULUCF emissions and removals.

Policies and measures	Dimensions	Target sector	WEM	WAM
Prosumers in industry	Decarbonisation	Industry		×
Biofuels in industry	Decarbonisation	Industry		×
Financial incentives for introduction of hybrid special working machines in industry sector	Decarbonisation	Industry		×
Development of decentralized energy generation by producer - customers (prosumer)	Decarbonisation	Residential / commercial sector	×	
Additional development of decentralized energy generation by producer - customers (prosumer)	Decarbonisation	Residential / commercial sector		×
Support for organic agricultural production	Decarbonisation	Agriculture		×
Support to Manure Management	Decarbonisation	Agriculture		×
Reduction of bio-waste in municipal waste	Decarbonisation	Waste	×	
Increase of connection rate to sewage system (target 93% by 2035)	Decarbonisation	Waste	×	
Increase of CH4 recovery in landfills	Decarbonisation	Waste		×
Reduction in the area annually affected by wildfires	Decarbonisation	LULUCF		×
Further increases in the share of industrial round wood used for long-term products	Decarbonisation	LULUCF		×
District Heating in Pljevlja	Energy efficiency	Energy industries / heat generation		×
Reduction of losses in the electricity distribution power network	Energy efficiency	Energy industries / electricity transformation	×	
Ban on import of old vehicles (Euro 4 or lower standard)	Energy efficiency	Transport		×
Passenger transport modal shift to public bus transport	Energy efficiency	Transport		×
Passenger and freight transport modal shift to rail	Energy efficiency	Transport		×
Development and implementation of energy efficiency regulatory framework in buildings	Energy efficiency	Residential / public / commercial	×	
Increased energy efficiency in public buildings	Energy efficiency	Public	×	
Energy labeling and ecodesign requirements for energy related products	Energy efficiency	Residential / public / commercial	×	
Establishment and implementation of EE criteria in public tendering	Energy efficiency	Residential / public	×	
Implementation of energy efficiency measures in public municipal companies	Energy efficiency	Public	×	
Establishment and development of energy management in public sector	Energy efficiency	Public	×	
Financial incentives for citizens/private households (for energy efficiency investments)	Energy efficiency	Residential	×	
Market coupling	Internal Energy Market	Energy industries / electricity transformation	×	
Implementation of European balancing platforms	Internal Energy Market	Energy industries / electricity transformation		×
Pilot project for improving the “visibility” of the low-voltage network	Internal Energy Market	Energy industries / electricity transformation		×
Operationalization of the capacity calculation region	Internal Energy Market	Energy industries / electricity transformation		×
Demand response	Internal Energy Market	Energy industries / electricity transformation		×
Establishment of a renewable energy community	Internal Energy Market	Energy industries / electricity transformation		×
Establishment of a dynamic electricity pricing model	Internal Energy Market	Energy industries / electricity transformation		×

Policies and measures	Dimensions	Target sector	WEM	WAM
Improvement of network access procedures for citizen energy	Internal Energy Market	Energy industries / electricity transformation		×
Methodology for defining energy-poor groups and measures to reduce energy poverty	Internal Energy Market	Residential		×
Development of electricity transmission power network	Security	Energy industries / electricity transformation	×	
Development of electricity distribution power network	Security	Energy industries / electricity transformation	×	
Developing battery electric storage systems (BESS)	Security	Energy industries / electricity transformation		×
Development of Risk preparedness plan	Security	Energy industries / electricity transformation		×
Operationalization of the region for security analysis	Security	Energy industries / electricity transformation		×
Implementation of Smart Specialisation in Montenegro	Research, Innovation & Competitiveness	All sectors	×	
Incentive measures for the development of research and innovation	Research, Innovation & Competitiveness	All sectors	×	
Program line for improving production capacities	Research, Innovation & Competitiveness	All sectors	×	
Programme for the promotion of innovation and energy efficiency services in industry	Research, Innovation & Competitiveness	All sectors	×	

Table 1-4: Overview of policies and measures

1.2 Overview of current policy situation

i. National energy system and policy context of the national plan

National energy system

All figures in this chapter are taken from (national energy balance, Monstat). Significant import dependence and low fuel diversification are the main characteristics of Montenegrin energy supply. There are four types of fuel in final energy use in Montenegro: coal (mostly lignite), mineral oil products, wood fuels and electricity (see Figure 2). Coal is mainly (99 % share) used for electricity production (it is responsible for 40-60% of annual electricity supply). Mineral oil products are mainly used in the transport sector (over 70 % share). Wood fuels are mainly used in residential and service sectors (86% and 9 %, respectively).

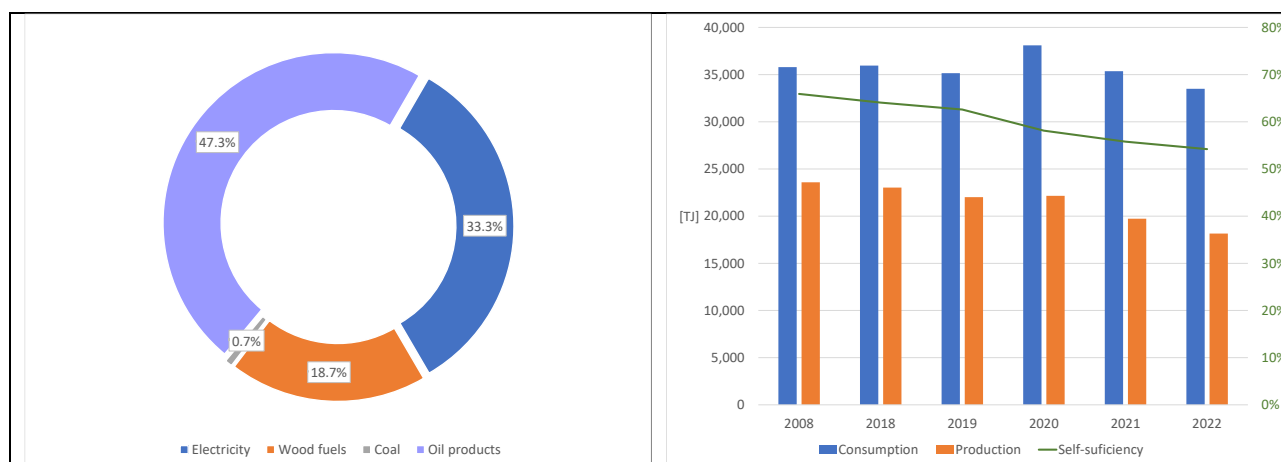


Figure 2: Final energy use per type of fuel in 2022 and historical trend of consumption

All needs for fuels are supplied from national sources except the need for mineral oil products which is supplied from imports (100 % of consumption). Oil products are the most dominant fuel in the final energy balance (47%) and this fuel determines the self-sufficiency level of national energy balance (54%-66%). Electricity is also an important component of the final energy balance (with increasing importance in the future) but almost all the needs for it are supplied from domestic production. However, it is important to emphasize that although there is enough electricity production for domestic needs at the annual level, there is a need for significant import during the second and third quarter of the year because the main electricity production corresponds to hydro power plants which are characterized by lower production during dry part of the year (period of the year with high demand because of touristic season). A great share of hydro power plants production is also the main reason why there is a significant change in self-sufficiency level of national energy balance over years (strong dependence on hydrology i.e. weather conditions throughout a year).

Total **final energy consumption** in recent years varies between 33 PJ and 38 PJ (see Figure 2) and it is expected to slightly increase in the next five-year period. Main driver of the demand increase in future is industry development (currently heavy industry is at its lowest production level in history). The most energy intensive sectors are the transport and the residential sector which consume more than two thirds of the total final energy (see Figure 3). However, their fuel mix significantly differs. The most dominant fuel in the transport sector is diesel (80 %

share) and the share of gasoline is 15 %. The remainder are LPG (3,5 %) and electricity (1,5 %). On the other hand, the fuel mix of the residential sector includes only electricity and fuel wood which together make a 99 % share. Taking into account that the electricity is mainly produced by hydro power plants and wind power plants (typically 60 % share) it is clear that carbon footprint of the residential sector is significantly lower than it is for the transport sector. This difference will be even more expressed in the following years due to expansion of prosumer concept in the residential sector. Therefore, only policies and measures targeting the transport sector are effective in terms of achieving the GHG target on the country level. With the expansion of prosumer concept and development of new renewable power plants the residential sector will become close to totally decarbonized by 2030.

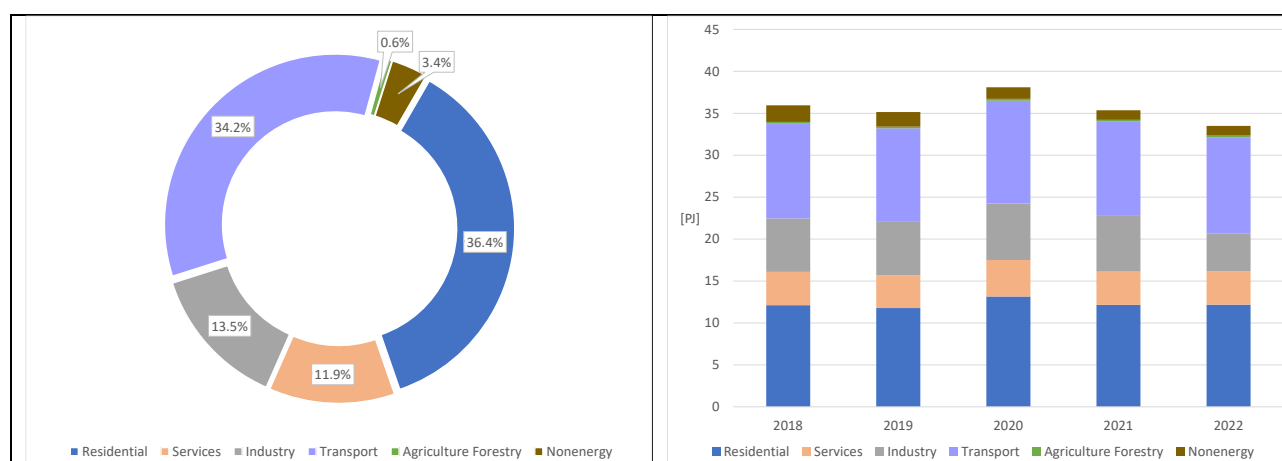


Figure 3: Final energy use per sector in 2022 and historical trend of sectorial consumption

As for **primary energy production** (see Figure 4), there are several sources: coal, wood fuels and renewables (hydro, wind and solar). Almost all the coal production (more than 99 % share) is used in thermal power plant for electricity production, as well as all renewables (2 large hydro power plants and currently 38 small hydro power plants, 2 wind power plants and 5 small solar power plants). During the last 3 years there is an ongoing expansion of prosumers (mostly PV plants at residential consumers sites) which has more and more impact on electricity mix of the country (currently ca 70 GWh per year which is 5 % of the total electricity consumption of the residential sector). Total primary energy production is around 30 PJ. Although coal has the most dominant place in the structure of the electricity production, renewable energy will play the most important role in the further development of the energy mix in Montenegro since there are plans for expansion of wind and solar energy use.

Thermal Power Plant Pljevlja has been the most stable source of electricity for the past 40 years. TPP Pljevlja with HPP Perucica and HPP Piva cover more than 85 % share of domestic electricity production. All of these plants are operated by state owned company (EPCG). This company is the only public supplier of electricity. As mentioned earlier, the annual electricity generation from hydropower plants is unstable both on a yearly and monthly basis, meaning that the Pljevlja Thermal Power Plant (TPP) is currently the most stable source of electricity. Although the cost of electricity generation from TPP — which is further burdened by the existing emission allowance price of €24/tCO₂ under the national GHG emissions trading system — is significantly higher than the generation cost from the aforementioned hydropower plants, the combined effect of their operation throughout the year allows for a very competitive electricity price for the company operating these facilities.

It is also important to note that the electricity price for consumers in Montenegro is significantly subsidized, reflecting the social standard of citizens. This is made possible by Elektroprivreda Crne Gore (EPCG), the state-owned utility company responsible for public electricity supply.

The company will continue to base its electricity production on TPP Pljevlja until a secure system operation with a sufficient number of new renewable energy sources is ensured.

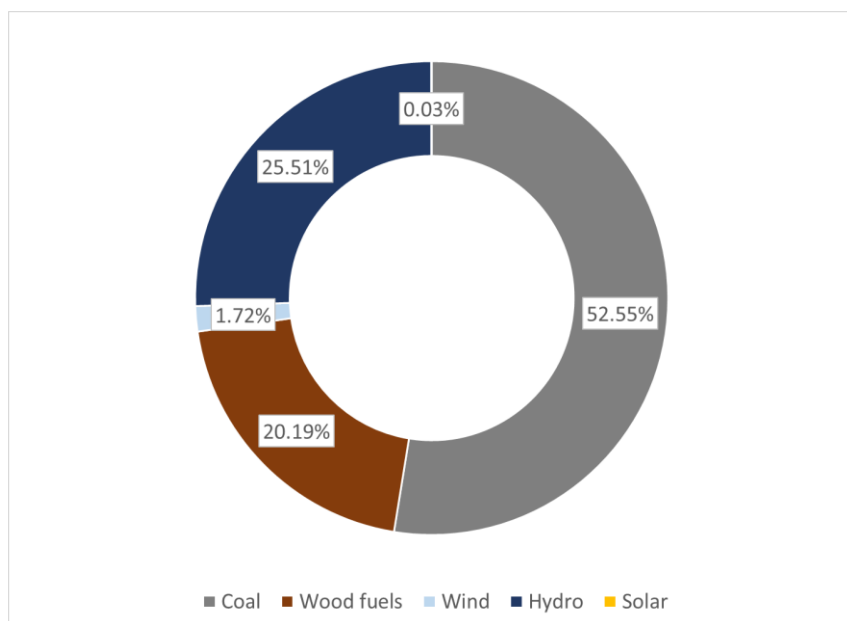


Figure 4: Primary energy production

If the electricity produced by the Pljevlja Thermal Power Plant (TPP) were to be replaced by imported electricity, the electricity price for consumers would increase significantly. The revised project documentation and accompanying guarantees indicate that the environmental reconstruction of TPP Pljevlja will ensure compliance with all criteria required to obtain an environmental operating permit. This reconstruction does not aim to reduce greenhouse gas (GHG) emissions, but rather to bring air pollutant emissions within prescribed limits in accordance with the Law on Industrial Emissions. However, due to the nature of the project, it will also lead to an increase in energy efficiency. The main goal of the environmental reconstruction of TPP Pljevlja is to meet the prescribed emission limits for air pollutants for plants of this type, in order to obtain an integrated operating permit. It is clear that the price of electricity produced at TPP Pljevlja will increase in the near future due to additional costs related to carbon pricing, but given its significant social and economic importance, as well as its role in maintaining energy security, the plant will remain operational. It is expected that this facility will remain in operation until the end of 2040, with a gradual reduction in annual operating hours over time, in order to achieve the national targets defined by this document.

The **total installed capacity of all power plants** in Montenegro at the end of 2023 was 1,067.238 MW. An overview of installed power by energy entities and power plants is shown in Table 1.5.

Operator	Power Plant	Installed power [MW]
EPCG AD Nikšić	TPP Pljevlja	225.000
	HPP Piva	342.000
	HPP Perućica	307.000
	sHPP Rijeka Crnojevića	0.650
	sHPP Lijeva Rijeka	0.110
	sHPP Rijeka Mušovića	1.950
	sHPP Podgor	0.465
	sHPP Šavnik	0.200
DOO Zeta Energy Danilovgrad	sHPP Glava Zete	4.480
	sHPP Slap Zete	1.672
DOO Hidroenergija Montenegro Podgorica	sHPP Jezerštica	0.844
	sHPP Bistrica	5.600
	sHPP Rmuš	0.474
	sHPP Spaljevići 1	0.650
	sHPP Orah	0.954
	sHPP Šekular	1.665
	sHPP Jelovica 1	3.285
	sHPP Jelovica 2	0.619
DOO Synergy Podgorica	sHPP Vrelo	0.615
DOO Igma Energy Andrijevice	sHPP Bradavec	0.954
	sHPP Piševska Rijeka	1.080
DOO Kronor Podgorica	sHPP Jara	4.568
	sHPP Babino polje	2.214
DOO Hydro Bistrica Podgorica	sHPP Bistrica Majstorovina	3.600
DOO Nord Energy Andrijevice	sHPP Šeremet Potok	0.792
DOO Simes Inženjering Podgorica	sHPP Ljevak	0.551
DOO Small Hydro Power Plant Kutska Andrijevice	sHPP Kutska 1	1.800
DOO Small Hydro Power Plant Mojanska Andrijevice	sHPP Kutska 2	0.810
DOO Small Hydro Power Plant Mojanska Andrijevice	sHPP Mojanska 1	1.600
DOO Small Hydro Power Plant Mojanska Andrijevice	sHPP Mojanska 2	1.050
DOO Small Hydro Power Plant Mojanska Andrijevice	sHPP Mojanska 3	0.720
DOO BB Hidro Podgorica	sHPP Lipovska Bistrica	0.993
DOO Power AB Group Kolašin	sHPP Bukovica	0.282
DOO Viridi Progressum Kolašin	sHPP Paljevinska	0.553
DOO Đekić Podgorica	sHPP Pecka	0.821
DOO Manira Hydro Mojkovac	sHPP Elektrana Mišnica	0.222
DOO „Hidroenergija” Andrijevice	sHPP Štitska	0.893
DOO „Hidroenergija” Andrijevice	sHPP Umska	0.442

DOO Vodovod i kanalizacija Andrijevića	sHPP Krkori	0.374
DOO SHPP Vrbnica Podgorica	sHPP Vrbnica	6.750
DOO Benergo Berane	sHPP Miolje polje	0.288
DOO Krnovo Green Energy Podgorica	WPP Krnovo	72.000
DOO Možura Wind Park Podgorica	WPP Možura	46.000
DOO Eco Solar System Danilovgrad	PV DG	0.997
DOO Bar-Kod Podgorica	PV Bar-Kod	0.585
DOO Invicta Podgorica	PV Invicta	0.416
„Fudbalski savez Crne Gore” Podgorica	PV FSCG	0.032
SE „Milenijum”	PV Milenijum	0.086
DOO „Čevo Solar” Podgorica	PV Čevo	3.250
Prosumers	PV	13.766
Prosumers	sHPP	0.012
	TOTAL	1,067.238

Table 1-5: Generation capacities in Montenegro

Depending on the energy source used for electricity generation, the capacities are divided into hydropower plants, thermal power plants, wind power plants and solar power plants. In the energy mix (installed power), hydropower plants are represented with 66.05 % (704,904 MW), thermal power plants with 21.08 % (225 MW), wind power plants with 11.06 % (118 MW), and solar power plants with 1.81 % (19.334 MW) in relation to the total installed production capacity.

In 2022, 3,235.09 GWh of electricity was generated. The share of electricity produced in renewable power plants was 55,05 % (45,08 % + 9,97 % from HPPs and WPPs respectively). The remainder of electricity production came from TPP Pljevlja. Only year after the situation was significantly different. Total amount of electricity generated was 4,046.71 GWh (2023) where the share of renewable energy was 62,36 % (54,29 % corresponds to HPPs). This shows how hydrological circumstances affect the electricity mix of Montenegro.

Already in 2016, 41.60% of the gross final electricity consumption came from renewable energy sources, thus exceeding the 2020 target of 33%, mostly due to the revision of statistical data on biomass.

In 2018, Montenegro exported 976 GWh of electricity, which is 25.12% more than imports, which amounted to 780 GWh.

During the period 24th May to 2nd June 2019, for the first time Montenegro produced enough electricity from renewable energy sources to meet all needs. Wind power plants Krnovo and Možura produced 12% of the electricity consumed.

Significant activities related to the diversification of electricity sources are underway. The greatest interest is in the development of photovoltaic power plants, although there is also interest in the construction of wind farms. It should be emphasized that the actual feasibility of construction is determined by market conditions and project viability.

Regarding large generation facilities, connection analyses have been carried out for 22 photovoltaic power plants (with a total installed capacity of over 3,300 MW) and 5 wind farms (with a total installed capacity of 720 MW), with further interest expected. Additionally, there is interest in connecting to the distribution network (medium voltage), where connection

feasibility analyses have been conducted for over 50 potential, mostly photovoltaic, power plants (with a total installed capacity of over 150 MW). The aforementioned interest primarily comes from private investors.

So far, the construction of 32 sHPPs was completed, which perform concession activities. Only in 2020, 13 small hydropower plants were put into operation. Before 2020, 15 sHPPs were completed, additional 11 in 2020 and 6 in 2021, all of which operate as privileged producers in line with its concession agreements.

New projects planned to be implemented by EPCG (status June 2025):

WF Gvozd – 54.6MW, 150GWh (also WF Gvozd 2 with 21 MW and 63 GWh is planned)

HPP Komarnica – 171.9MW, 213GWh

HPP Perućica – Agregat A8 – 58.5 MW, -50 GWh

SHHP Otilovići – 3.3 MW, 11.4 GWh

HPP Kruševo – 82 MW, 170 GWh

SPP Vilusi I - 30 MW, 45 GWh

SPP Dragalj/Vilusi II - 80 MW, 140 GWh

SPP Čevo - 100 MW, TBD

SPP Slano - 33,6 MW + 5-7 MW

SE Kapino polje L1 i L2 – 10MW

SE Željezara – 25 MW

Kapino polje B1 – 10MW

Kapino polje B2 – 40MW

SE Krupac – 40MW

SE Štedim – 120MW.

Road transport is the main mode for passengers, while rail is used for freight transport (see Figure 5). The economic situation is such that the main users of freight transport by rail have found an alternative or reduced their business volume.

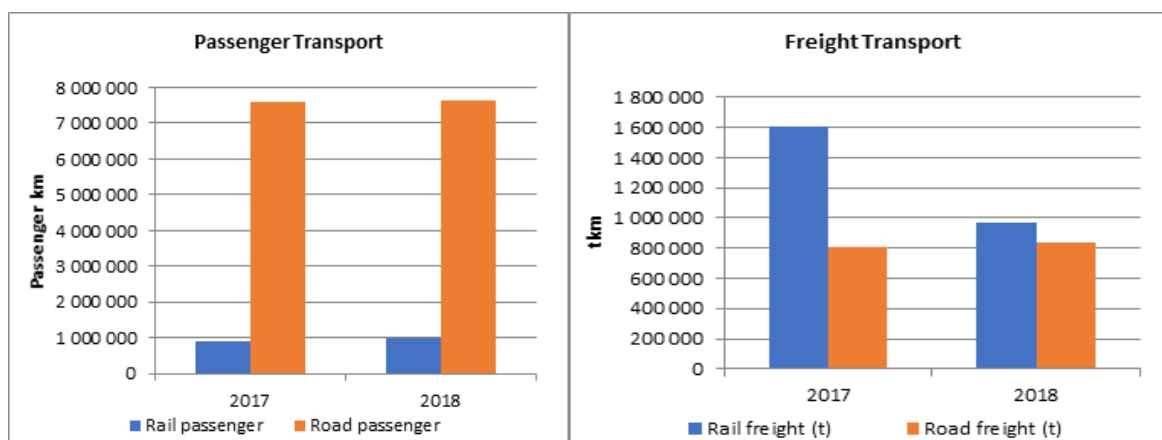


Figure 5: Passenger and Freight Transport per mode

There is a **high dependence on private vehicles**. There are no CO₂ emissions standards for passenger vehicles in force, but the regulation on the content of labels, guides, posters, displays and other promotional literature and materials on fuel consumption and carbon dioxide emissions from new passenger cars for such standards is currently under preparation. This Rulebook will additionally transpose Directive 1999/94/EC.

The total final consumption of petroleum products in 2020 amounted to 320 thousand tons, of which 268.2 thousand tons were spent in the transport sector, 59.0 thousand tons in the industry. In the total final consumption of petroleum products in 2018, traffic participated 68.9%, while industry had a share of 15.2%, the rest 15.9%. Import of petroleum products in 2018 amounted to 418.3 thousand tons.

Montenegro has so far concluded two Concession Contracts for the **Production of Hydrocarbons** Offshore of Montenegro, in accordance with the Law on Exploration and Production of Hydrocarbons:

1) Concession Contract for Production of Hydrocarbon for Blocks 4118-4; 4118-5; 4118-9; 4118-10, with a total area of 1,228 km², which was concluded on 14 September 2016 with the companies Eni Montenegro BV, the Netherlands and Novatek Montenegro, BV the Netherlands.

Duration of the Exploration Phase is seven (7) years, with two Exploration Periods (sub-phases) of four (4) and three (3) years.

The Government of Montenegro, on its sessions from 12 March and 29 December 2020, approved the requests of the concessionaire for the extension of the first Exploration Period, i.e. the Exploration Phase, for total of 18 months. The first Exploration Period will last until 14 March 2022, while Exploration Phase will last until 14 March 2025.

On 3rd April 2021, concessionaires have started drilling of the first exploration well offshore of Montenegro. Well depth is 6.5 km and it is situated 27 km of the port of Bar, where see depth is 99 meters. Main target of the concessionaires is commercial discovery of oil.

In accordance with the contract, within the first Exploration Period concessionaires are obliged to drill another well, which estimated depth is 1,045 m, on 14 km distance from port of Bar, where see depth is 72 m. Main target of the Concessionaires is discovery of gas, where further G&G analysis and market analysis will provide an answer if commercial exploitation is possible, having in mind low demand for gas in Montenegro and lack of gas infrastructure.

By mid-2022, the Concessioners were supposed to make decisions on further investments in the project, depending on the results of the current drilling campaign. However, in February 2022 it was clear that the drillings were not successful.¹⁷

2) Concession Contract for Production of Hydrocarbon for Blocks 4219-26 and 4218-30, with a total area of 338 km², which was concluded on March 15, 2017, with the company Energean Montenegro Limited, Cyprus.

Duration of the Exploration Phase is seven (7) years, with two Exploration Periods (sub-phases) of three (3) and four (4) years.

The Government of Montenegro, on its sessions from 19 December 2019 and 31 July 2020,

¹⁷ <https://balkangreenenergynews.com/no-oil-gas-in-first-offshore-test-hole-in-montenegro-but-more-drilling-ahead/>

approved the requests of the concessionaire for the extension of the first Exploration Period, i.e. the Exploration Phase, for total period of two (2) years. The first Exploration Period lasted until 15 March 2022, while Exploration Phase will last until 15 March of 2026.

Within the first Exploration Period Concessionaire is obliged to conduct 3D geophysical survey, which is already executed, and to developed set of G&G studies. Within the first Exploration Period Concessionaire is obliged to farm out 41% of Participating Interest to a new partner.

By mid-2022, Concessioners should have made decisions on further investments in the project including finding a new partner. However, Concessionaires did not meet the requirements to enter the second Exploration Period, and the contract was terminated.¹⁸

It is planned to continue the exploration of hydrocarbons, and further plans for exploration of oil and gas in Montenegro, including possible new licensing rounds, will be aligned with new Government and EU policies in the energy and climate sector.

Montenegro currently does not have access to natural gas sources, nor infrastructure to support its use. The Energy Development Strategy until 2030 clearly recognizes natural gas as an important energy source, which would contribute to the diversification of the Montenegrin energy mix and thus to increasing energy security. It is planned to use natural gas as a substitute for other more carbon-intensive forms of energy, and in particular for the use of electricity and coal for heating and cooling.

In 2017, the Government of Montenegro adopted the Master Plan for Gasification of Montenegro, which together with the Report on Strategic Environmental Assessment and Guidelines for Planning Priority Investments in Gas Pipeline Projects forms the umbrella document for the natural gas sector in Montenegro.

The master plan considers possible supply scenarios for Montenegro and concludes that it is most realistic for Montenegro to be supplied with natural gas by building the Ionian-Adriatic Gas Pipeline (IAP) and to valorize its gas reserves from the Adriatic submarine, as the hydrocarbon exploration efforts described in the sections above show.

The Government of Montenegro is primarily focused on the implementation of policy measures targeting the households and service end-use sectors.

Policy Context of the Plan

Through technical support provided by the regional project CDCP III financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Montenegro started with preparation of NECP.

With regard to energy data for planning and progress monitoring, the Ministry of Energy and Mining and MONSTAT should harmonize methodology of data collection and processing for preparation of the final energy balances and monitoring for implementation.

The Ministerial Council of the EnC in November 2021 adopted Decision No 2020/12//MC-EnC on the implementation of the Commission Regulation (EU) 2019/2146 of 26 November 2019 amending Regulation (EC) No 1099/2008 of the European Parliament and of the Council on

¹⁸ <https://montenegrobusiness.eu/montenegro-business-recent-energy-offshore-hydrocarbon-exploration/>

energy statistics, as regards the implementation of updates for the annual, monthly and short-term monthly energy statistics (EC).

Decarbonisation (GHG emissions and removals; renewable energy)

The Draft Law on Climate Change was adopted by the Government of Montenegro on 18 September 2025, and its adoption is expected by the end of 2025. The Law will enable alignment with the EU acquis, particularly concerning the emissions trading systems (EU ETS and EU ETS2), as well as monitoring and reporting, accreditation and verification, the Union registry, free allocation, and auctioning. It will also regulate the system for reporting on GHG inventories and projections, as well as on policies and measures for mitigation and adaptation to climate change. In addition, the Law includes provisions on mandatory GHG emission reduction targets in sectors outside the emissions trading system, including land use, land-use change and forestry (LULUCF), as well as issues related to ozone layer protection.

It is important to note that the adoption of the new Law on Climate Change will necessitate amendments to the existing secondary legislation, which will enable further alignment with EU regulations and initiate the practical implementation of the law. It is planned that all necessary by-laws will be adopted by the end of 2025, allowing for the full implementation of the MRVA system starting from January 1, 2026.

By submitting the Fourth National Communication (4NC) and the First Biennial Transparency Report (BTR), Montenegro once again fulfills its international obligations under the UNFCCC. This report contains the results of the new GHG inventories for 2021 and 2022, the recalculation of previous time series from 1990 onwards, as well as a general description of the formulated, adopted, and implemented measures for managing and planning GHG emission reductions. It also presents the country's climate profile, highlighting the sectors and regions most vulnerable to the impacts of climate change, while providing an analysis of potential adaptation measures.

The report summarizes information on processes related to strengthening national capacities and promoting mechanisms for investment and financing in the country, among other relevant issues. The information described in this 4NC provides a concise overview of the country's efforts in climate change management, with an emphasis on the period following the presentation of the Third National Communication (TNC) in 2019.

Energy Efficiency

In order to further develop the basic legal framework in the energy efficiency on the final consumption side, as well as to harmonize national legislation with EU directives, the Ministry of Capital Investments prepared bylaws on labelling/eco-design, EEO feasibility and notification drafting, Plan for reconstruction of central government buildings 2020-2022, work on buildings regulation and NEEAP 2019-2021 to implement the Law on Efficient Use of Energy.

Transport

Montenegro has not yet aligned its legislation with the Trans-European transport networks acquis, but has reached a satisfactory level of preparedness regarding strategic development of the transport networks in accordance with TEN-T design and objectives. The Ministerial Council in November 2021 adopted the Decision on amending the Treaty establishing the Energy Community and incorporating Directives (EU) 2018/2001 on the promotion of the use of energy from renewable sources.

Buildings

The Government of Montenegro received a loan from the International Bank for Reconstruction and Development (IBRD) for continuing the implementation of the project Energy Efficiency in Montenegro, through the phase two. Implementation of the second phase of the project *The Montenegrin Energy Efficiency Project (MEEP 2)* started on September 1, 2018, and it lasted until end 2023. The value of the project budget is EUR 6 million. The *Energy Efficiency Program in Public Buildings (EPPB)* has been implemented in two phases in period 2012-2020, based on a loan and financial contribution agreement signed with KfW Bank, in the amount of EUR 13.44 million (1st phase) + EUR 22.743 million (2nd phase) with the aim to provide technical support for establishment of the inventory on buildings and development of the national building certification software. The new project phase *Promotion of Energy Efficiency in Public Buildings - Greening Public Infrastructure in Montenegro* will last 2021-2025. The Project will be financed by KfW with a loan in the amount of up to EUR 45 million and EUR 5 million the EU grant.

Eco Fund is implementing the program Energy Efficient Home (overall coordination and by providing subsidies for the interest-free loans) aimed at reducing heating costs and increasing comfort in households, achieving a significant reduction in CO₂ emissions in residential sector and developing a market for biomass heating systems.

Energy Security

Energy security targets are being expected to be set up by the Government through general guidelines of the energy policy.

The most significant investment venture in the region was the commissioning of the submarine high-voltage direct current (HVDC) cable between Italy and Montenegro on 15 November 2019. The submarine cable connects the Italian and Montenegrin transmission systems, running from the Pescara province to Lastva, near Kotor. With the completion of this project, Montenegro has become a regional energy hub. This interconnection is of strategic importance for energy security, the stability of power systems, and the integration of national electricity markets between the two countries. The implementation of this investment has had a positive impact on attracting further investments, particularly those in renewable energy sources, in line with the evolving energy policies of the European Union and regional countries. The interconnection, named MONITA, has a capacity of 600 MW, but plans are underway to install an additional 600 MW HVDC cable in the coming years. This project is included in the European Union's list of Projects of Common Interest (PCI).

The connected infrastructure, which holds the status of a Project of Energy Community Interest (PECI), includes the construction of a double-circuit 400 kV transmission line Pljevlja 2 – Bajina Bašta – Višegrad (Trans-Balkan Corridor – part of the ME-BA section) and the increase of transmission capacity of the 220 kV Trebinje (BiH) – Perućica transmission line.

Internal Energy Market

In the process of accession to the European Union, Montenegro has undertaken the obligation to align its national legislation with the EU acquis. In terms of electricity market development, this involves the transposition of the **Third Energy Package** and the **Clean Energy Package for All Europeans (CEP)**, both of which have been adapted to the specific circumstances of the Energy Community Contracting Parties.

The **Third Energy Package (2009)** focuses on the liberalization of electricity and gas markets, the unbundling of activities that constitute natural monopolies from market-based activities, the establishment and strengthening of independent regulatory bodies, and the creation of preconditions for market integration. The **Clean Energy Package**, on the other hand, is aimed at greater integration of renewable energy sources, increased grid flexibility, and the creation of an environment that enables active participation of end consumers in the energy transition process.

With the implementation of the Third Energy Package, the reform of the electricity sector in Montenegro began through the unbundling of activities previously carried out within a single vertically integrated system into activities representing natural monopolies and those that are market-oriented. The objective was to ensure that public energy services are provided in a non-discriminatory manner, without distorting competition or hindering market development.

Energy activities in which better results can be achieved through increased competition and market mechanisms—such as generation, trade, and supply of electricity—have been deregulated. Activities that represent natural monopolies, such as transmission and distribution of electricity, have been separated from the vertically integrated structure and are regulated rather than market-oriented. The separation of regulated from market-based activities ensures that regulated entities provide their services under equal conditions to all customers and market participants (producers, traders, and suppliers). This also aligned the organization and functioning of Montenegro's energy sector with that of EU Member States¹⁹.

The unbundling process began in 2009 with the establishment of the Transmission System Operator (CGES, i.e. TSO) as an independent joint-stock company, followed by the creation of the Distribution System Operator (CEDIS, i.e. DSO) in 2016. This step was a prerequisite for initiating the liberalization of Montenegro's electricity market and its integration into the European single energy market.

On-going activities on the drafting legislation transposing Regulation (EU) No. 2015/1222 establishing guidelines for Capacity Allocation and Congestion Management (CACM) is important for providing a secure legal framework for connecting the electricity market of Montenegro with regional and European markets (market coupling).

The existence of interconnection between the transmission systems of Italy and Montenegro is a prerequisite for connecting the electricity markets of these two countries. The creation of connected regional markets and their integration into the single European electricity market is

¹⁹ REGAGEN: Report on the State of the Energy Sector for 2020

the basic goal of European energy policy, and thus the path of those countries that strive EU accession.

The realization of the project CEI Central European Initiative - Strengthening Energy Regulators in the Western Balkans aims to strengthen the human resources capacity of energy regulators, TSOs and PXs and their readiness for the new obligations of the market integration process.

The energy market in Montenegro is harmonized and developing in line with the EU Third Energy Package and the Clean Energy Package transposed by the Energy Law and the Law on Cross-border Exchange of Electricity and Natural Gas. According to current plan, Montenegrin Power Exchange (MEPX) will begin trading in Q3/2022 and currently is looking for service provider. The Energy and Water Regulatory Agency of Montenegro (REGAGEN) is the only Western Balkan 6 country regulator holding an observer status in ACER Working Groups. This status was achieved in 2018.

Drafting, adoption and enforcement of by-laws in the competence of REGAGEN, as defined in the Law in the forthcoming period up to 2030.

Research, innovation and competitiveness

In the context of considering the policies of the National Plan, it is very important to highlight the establishment and implementation of the Smart Specialisation concept in Montenegro, which represents the cornerstone of the national innovation and research policy and a key element of the country's economic development policy. In this regard, Montenegro has adopted and integrated into its system the EU's strategic planning concept that enables the concentration of research and innovation capacities and infrastructure around narrowly defined S3 priority areas. Through partnership and a bottom-up approach, Smart Specialisation brings together public administration, the academic and business communities, and civil society in the joint effort to implement a long-term, innovation-driven growth strategy.

Regarding S3 in Montenegro, the country is defined as a single NUTS region, and the concept has been implemented since 2019. When considering the Roadmap for the preparation of the new Smart Specialisation Strategy for the 2026–2031 cycle, the Government of Montenegro decided that the S3 will once again be developed at the national level²⁰ and, until official amendments to the strategic planning regulation are adopted, it will be regarded as one of Montenegro's umbrella strategies.

The first S3 cycle covered the period 2019–2024, during which three vertical and one horizontal key priority development sectors were defined, among them *“Energy and Sustainable Environment.”* This priority focuses on the sustainable development of energy capacities through increased use of renewable sources, improved energy efficiency, and innovations in waste management. The description of the priority also highlights the importance of infrastructural investments, such as the installation of an underwater electricity transmission cable²¹. Within this priority, two specific goals were defined:

²⁰ Government Conclusion No. 08-082/24-2299/2 of April 25, 2024

²¹ Recognized as a project of Energy Community interest, which positions Montenegro as a regional hub for energy transmission from Western Europe to the Western Balkans.

- Increasing innovative use of renewable energy sources, and
- Increasing innovative activities in recycling and waste valorization.

Additionally, two representative programs were established. The first, “*Renewable Energy Sources and Energy Efficiency*,” aims to increase the use of renewable electricity sources and energy efficiency in consumption, focusing on innovative technical solutions for the production, distribution, optimization, and consumption of electricity. Its innovation components include activities related to the introduction of the smart buildings and smart cities concept, as well as the development and transfer of innovative technological solutions for renewable energy sources. The second program, “*Circular Economy*,” aims to strengthen Montenegro’s industrial competitiveness through the recycling of industrial waste, i.e., technogenic mineral raw materials, by extracting residual raw materials of high economic value and/or transforming them into new materials suitable for industrial use. The Strategy also indicates that further improvements and technology transfer can be implemented in energy production from hydropower, wind, and wood waste, as well as in energy efficiency. Untapped potential lies in solar energy, the development of smart grids and cities, energy storage systems, consumer integration, and transport electrification. Research, innovation, and the transfer of smart technology in these areas have been recognized as potential drivers of competitiveness in the energy sector.

These objectives and support measures will continue through the *Implementation Plan for Smart Specialisation in Montenegro for 2025*²², while the preparation of the new S3 is simultaneously underway. The potential mapping phase is nearing completion, and the *Energy* sector is among the five identified potential priorities that will be further developed during the *Entrepreneurial Discovery Process (EDP)*²³. As the adoption of the NECP will precede the adoption of the new S3, alignment at the level of objectives and indicators for the next period will be carried out subsequently.

In 2021, Montenegro established the *Framework for the Implementation of Innovation and Smart Specialisation in Montenegro*²⁴, in line with EU recommendations in this field²⁵. This is a systemically structured institutional framework that ensures effective management and coordination of the process, continuous consultation with all stakeholders, and proper, high-quality monitoring and evaluation. In addition to the Government and the competent Ministry, key actors in this institutional setup include:

- the Council for Innovation and Smart Specialisation, the Government’s key advisory body coordinating innovation system stakeholders;
- Innovation Working Groups of the Council, established for each S3 priority area, maintaining continuous consultation among the four sectors;

²² The document is currently being developed, and its adoption is planned under the Work Programme of the Government of Montenegro for 2025.

²³ The EDP is a participatory, active process of identifying and prioritizing key activities that link research and innovation with economic growth and social progress. It is a bottom-up learning process that involves interaction and engagement among various stakeholders, such as public administration, the business sector, academia, and civil society.

²⁴ <https://s3.me/s3-nacionalni-implementacioni-okvir/>

²⁵ <https://s3.me/wp-content/uploads/2022/10/Smart-Specialisation-implementation-framework-for-the-EU-Enlargement-and-Neighbourhood-Region.pdf>

- the Innovation Fund of Montenegro, as the implementing body for innovation policy;
- Innovation infrastructures, which, in addition to providing physical infrastructure, support the strengthening of soft skills necessary for enhancing innovation capacities;
- the Interinstitutional S3 Group, as the governance body for interinstitutional cooperation; and
- the innovation community.

Montenegro today serves as an example of good practice in managing the system and maintaining continuous consultation through the work of the innovation working groups²⁶.

ii. Current energy and climate policies and measures relating to the five dimensions of the Energy Union

Cross-sectoral

National Sustainable Development Strategy of Montenegro by 2030 - approved by the Government in 2016

This is a comprehensive strategic document which covers an array of different topics, but one of the main objectives is transition to green economy through mitigation of climate change, efficient use of resources, circular economy, sustainable consumption and production, competitive growth of economy, etc. This strategy is an umbrella and long-term development Strategy of Montenegro, which fully integrates the UN Agenda 2030 and represents the national response to those requirements and identified national needs, including reporting on the national implementation of the Agenda. This is important because of the SDG 14 and other related goals.

Special Purpose Spatial Plan for Coastal Zone of Montenegro until 2030 approved by the Parliament in 2018

The Spatial plan for Coastal zone ensures a formal and planned basis for the sustainable development of the area. The document provides organizing and arranging issues of the Coastal zone valuable space until 2030. The plan proposes measures for improvement of energy efficiency: Improving energy efficiency is particularly related to the installation or application of low-energy buildings, the improvement of air-conditioning and hot water systems, the promotion of lighting, the concept of intelligent buildings (energy management of main consumers from a central location). All of these options can be used to some extent in the construction of facilities in the Coastal Region.

Spatial Plan of Montenegro until 2040 (PPCG-2040), adopted in 2025, is the most important national planning document and one of the key instruments for establishing a spatial development policy and a long-term sustainable and acceptable framework for the country's economic, social, and societal development. The prospect of successful spatial planning in Montenegro lies in the careful identification of potentials, the definition of strategic development goals, as well as the recognition and resolution of key constraints observed in the previous period, which relate to: an insufficiently efficient planning system, inefficiencies in the preparation and implementation of plans, lack of coordination among different levels of

²⁶ page 13 <https://publications.jrc.ec.europa.eu/repository/handle/JRC136309>

planning documents, irrational use of resources, and insufficient control over spatial changes.

Industrial policy of Montenegro 2024-2028. respects the principles based on the development of the green economy, resource efficiency and sustainable production and consumption, industrial waste management, introducing environmental standards and defining measures and activities for their implementation. The industrial policy is aimed at digital transformation and improvement of the innovative performance of companies, as well as their transformation towards green and sustainable business, which will enable an increase in the competitiveness of Montenegrin industry for faster integration with the EU single market. The strategic goals are:

- Improving the environment for the digital and green transition of the industry;
- Growth of investments and financing models for long-term competitiveness of the industry;
- Encouraging innovation based on the principles of smart and sustainable industry development;
- Improving access to the EU single market and strengthening regional economic cooperation.

Reform Agenda 2024–2027

The European Commission (EC) adopted the Growth Plan at the end of 2023, with the expectation that reforms and EU financial support will have a positive impact on the economic growth of candidate countries. The Plan provides a combination of grants and concessional loans in the total amount of €6 billion for the period 2024–2027, of which €383.5 million is allocated to Montenegro — €110 million in grants and €273.5 million in favorable loans. According to the European Commission's announcements, 7% of the total amount will be disbursed at the start of the Growth Plan's implementation as a form of pre-financing, while the remaining funds will be distributed in six semi-annual tranches, depending on the degree of implementation of the planned reforms.

The funds available to Montenegro are conditional on the successful implementation of the reform measures defined in the Reform Agenda 2024–2027, making this document crucial for Montenegro's economic and political development as well as for accelerating its European integration. The implementation of the Reform Agenda 2024–2027, through which Montenegro will receive €383.5 million, will be key to speeding up the country's EU integration process.

At the end of 2024, the European Commission adopted Montenegro's Reform Agenda 2024–2027, following the positive opinion of EU Member States, thereby fulfilling the main condition for accessing funds under the Reform and Growth Instrument within the Western Balkans Growth Plan. Reporting on the implementation of the Reform Agenda 2024–2027 is submitted to the European Commission twice a year — by 15 June and 15 January. Based on the Reform Agenda 2024–2027, an Implementation Plan has been developed to monitor all reform steps, which are divided into several specific activities.

Decarbonisation (GHG emissions and removals; renewable energy)

The decarbonisation dimension has two key elements

- GHG emissions and GHG emissions sinks;

- renewable energy sources (RES).

The issue of climate change on a global scale is addressed by the United Nations Framework Convention on Climate Change (UNFCCC). Montenegro became a party to the UNFCCC by succession, after becoming independent in 2006, being a non-Annex I Party to the UNFCCC.

During 2019, at the legislative level, **the Law on Protection against Adverse Impacts of Climate Change (Official Gazette of Montenegro, No 73/19)** was enacted, covering all the climate issues relevant for Montenegro. The law incorporates elements of the new EU policy set Clean Energy Transition for establishment of National Systems for GHG inventories and National Systems for PaMs and projections, carbon storage and ozone layer protection, obligations of the stationary plant and the aircraft operator as well as envisages Low Carbon Development Strategy (LCDS) and National Adaptation Plan (NAP) preparation. The Law provides the basis for the establishment of the National System for Monitoring, Reporting and Verification of Greenhouse Gases, the operation of the Emissions Trading System, as well as a sectoral distribution of efforts to reduce emissions outside the Emissions Trading System. Moreover, the Law represents the basis for enhancement of issues of the use of ozone-depleting substances and fluorinated gases. The Government adopted Regulation on Activities and Gases for Issuance of the Emission Allocation Allowances to the Stationary Plants Carrying out Activities Resulting in GHGs and has prepared set of other bylaws (regulations and rulebooks) in accordance with abovementioned Law.

In accordance with the Law, 14 bylaws have been adopted to achieve compliance with the EU regulations in this field.

In order to achieve a higher level of alignment in the field of climate change and to harmonize with the new EU climate legislation, it was necessary to further amend the existing law. Therefore, a draft of the new Law on Climate Change has been prepared, with its adoption planned for the end of 2025.

In this context, the new Law will ensure further improvement of the legislative framework for protection against the negative impacts of climate change and harmonisation with the EU acquis, particularly with the following acts: Directive 2003/87 establishing a system for greenhouse gas emission allowance trading within the Union (ETS); Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality ("European Climate Law"); Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action; Implementing Regulation (EU) 2018/2066 on monitoring and reporting of GHG emissions under the ETS; Implementing Regulation (EU) 2018/2067 on verification of data in accordance with the ETS Directive; Regulation (EU) 2015/757 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport; Regulation (EU) 2024/590 on substances that deplete the ozone layer; and Regulation (EU) 2024 on fluorinated greenhouse gases. The Law will also transpose the provisions of Regulation (EU) 2018/841 on greenhouse gas emissions reductions and measures in the land use, land-use change and forestry (LULUCF) sectors.

Montenegro as a Party to the UNFCCC prepares and submits every four years a national report on climate change reporting on the implementation of the Convention's obligations.

In addition to above mentioned, the key strategies and laws relevant to the dimension of Decarbonisation are as follows:

Updated nationally determined contribution

Montenegro adopted its updated **Nationally Determined Contribution (NDC)** in February 2025, as part of its commitments under the Paris Agreement. This document sets out more ambitious targets for reducing greenhouse gas (GHG) emissions compared to the previous version.

Key targets of the updated NDC:

- Reduce GHG emissions by 55% by 2030 compared to 1990 levels;
- Reduce GHG emissions by 60% by 2035 compared to 1990 levels.

These targets represent a significant advancement over the previous NDC, which aimed for a 35% reduction by 2030.

The updated NDC defines a dual time frame:

- 2025–2030;
- 2031–2035

This approach allows for gradual monitoring and adjustment of measures in line with achieved results and new insights. The preparation and adoption of the updated NDC were carried out with the support of the United Nations Development Programme (UNDP) in Montenegro.

National Air Quality Management Strategy until 2020 was adopted in 2012, along with an Action Plan for the period 2013–2016. Subsequently, an Action Plan for the period 2017–2020 was adopted in April 2017, accompanied by a four-year implementation report on the strategy. The main objective of the Strategy is to maintain and improve air quality, among other things, by reducing air pollutant emissions from stationary sources. A new Air Quality Management Strategy for the period 2025–2029 is currently under preparation and will be finalized after the adoption of the National Energy and Climate Plan (NECP).

Energy Law (OG MNE No.28/2025)

The Energy Law defines energy activities and regulates the conditions and manner of their performance in order to ensure high-quality and secure energy supply for end users; public services in the energy sector of interest to Montenegro; the organization and management of the electricity and gas markets; the use and conditions for the exploitation of renewable energy sources and cogeneration; energy efficiency in the production, transmission, and distribution sectors; as well as other issues of importance for the energy sector.

The Law on Nature Protection (“Official Gazette of Montenegro”, Nos. 054/16, 018/19, 084/24)

This law regulates nature protection in all its essential segments: the protection of habitats, biodiversity, and protected natural areas, as well as the regulation of human activities to ensure they are carried out in accordance with nature conservation. The law requires monitoring of the state of nature, planning, and harmonisation of development projects (urban planning, infrastructure, tourism, energy, etc.) with the principles of sustainable development, in order to prevent harmful impacts on nature. A new Law on Nature Protection is currently under preparation.

Law on Air Protection (OG MNE 043/15) regulates the manner of air quality monitoring,

protection measures, assessment and improvement of air quality, as well as air quality planning and management.

Law on Environment (OG MNE 080/16) regulates the principles of environmental protection and sustainable development, instruments and measures for environmental protection and other issues of importance for the environment.

Law on Industrial Emissions (OG MNE 017/19) regulates measures for the prevention and control of emissions from industrial plants, which may have negative impacts on human health, the environment or material goods and other issues of importance for integrated prevention and control of environmental pollution.

Law on Construction of Facilities (OG MNE 19/2025)

This law regulates the manner and conditions for the construction of buildings, the performance of construction activities, and other matters of importance for building construction.

Forest and forestry development strategy of Montenegro for the period 2023-2028 (adopted in 2023) establishes goals and guidelines for the development of forests and forestry, in accordance with national forestry policy, measures for the improvement of forests, as well as indicative financial means for implementing the strategy and the way to provide them. National forest inventory is carried out for the purpose of drafting strategic planning documents in forestry and exchange information in accordance with the law (at national and global level). Important strategic goals are:

- Preserving and strengthening the capacity of forests for resilience and adaptation and climate change resilience, including fire prevention and other solutions
- Encouraging the sustainability and competitiveness of industries based on forests, bioenergy and beyond green industry and circular economy.

Law of Forests (OG MNE 77/24)

This law regulates the cultivation, protection, preservation, and improvement of forests, the planning, manner, and conditions of forest use, the construction and maintenance of forest roads, forest monitoring, as well as other matters of importance for forests, forest land, and forestry.

The strategy for the development of agriculture and rural areas in period 2023-2028 (adopted in 2023) represents the development strategy of Montenegro, where directions for the management of agricultural resources are determined in a long-term sustainable way. This strategy provides a vision and a plan for implementing the strategic transformation of agriculture and rural areas in Montenegro until 2028, which will ensure the implementation of a different series of activities and measures. It is important to emphasize Strategic goal 2: Ensure efficient management of natural resources of Montenegro and achieve the goals of the Green Agenda which includes:

- Contribute to mitigating climate impacts, including reducing greenhouse gas emissions and improving carbon sequestration, as well as promoting sustainable energy
- Support sustainable development and effective management of natural resources such as water, land and air, including reducing dependence on chemicals

- Contribute to stopping the process of biodiversity loss

Law on Agriculture and Rural Development (OG MNE 56/2009, 34/2014, 1/2015, 30/2017 i 51/2017)

This law regulates the following: the development of agriculture and rural areas, support measures in agriculture and eligibility criteria for measures, usage, the organization of producers, the quality and labelling of agricultural products and food, for agricultural products and food, complementary agricultural activities, the organization of agriculture, for public services in agriculture, the establishment of a Paying Agency, for registration and record keeping, as well as many other issues in the field of Agriculture and Rural Development.

National Action Plan for Combating Land Degradation and Mitigation until 2023 adopted in 2015

The National Action Plan is document which foreseen positive effects of improvement of the situation in the area of soil degradation prevention in Montenegro are achieved. This document provide systematization and a comprehensive approach to land treatment as a single resource is of great importance for future planning and management activities by all institutions under the jurisdiction of the land issue.

Law on National Parks (OG MNE 28/14)

The Law on National parks stipulate that the resources national parks: land, forests, water, plant and animal world and other natural resources, as well as the work of created values in national parks, can be used in accordance with the law, the spatial plan of special purpose and the management plan, taking into account the preservation of biological and peripheral diversity.

National Waste Management Plan 2025–2029

The National Waste Management Plan (NWMP) 2025–2029 provides the country's strategic framework for sustainable waste management. As an EU candidate country, Montenegro has the obligation to establish a functional Integrated Waste Management System (IWMS), and this goal is considered one of the priorities on its path toward EU accession. The preparation of waste management plans is an obligation of EU Member States, stemming from Article 28 of Directive 2008/98/EC on waste.

The Waste Management Strategy of Montenegro by 2030 – adopted in 2015

This Strategy defines its objectives in line with the need to ensure synergy between national development and environmental protection regarding the impact of waste on the quality of key environmental parameters. The Strategy includes an Action Plan aimed at implementing the goals set out in the legal framework concerning waste reuse and recycling and the introduction of a circular economy.

Law on Waste Management - OGM No. 92/24, regulates the types and classification of waste, planning, the conditions and manner of waste management, as well as other issues of importance for waste management.

The Transport Development Strategy 2019-2035 adopted in 2019

The Transport Development Strategy of Montenegro is targeting to support the improvement

of the economic efficiency, safety, accessibility and environmental sustainability of the country's transport system whilst ensuring a seamless integration of the transport sector, as well as national and EU policies.

The Railway Development Strategy for the period 2017-2027 approved by the Government in May 2018

The railway Development Strategy stimulate financial sustainability and self-sustainability of railway infrastructure, provide qualitative and accountable maintenance of railway infrastructure and accuracy of transport, maximize development potentials of the region of Montenegro, be competitive and with an improved service in transportation of cargo and passengers, support efficient and effective system of state institutions taking care of the railway sector, minimize negative environmental impacts of transport.

The Maritime Development Strategy 2020-2030 summarizes the potential that the Blue Economy contributes to the Montenegrin public and private sectors. The strategic document consists of four main parts, which include all aspects that are correlated with the economic, social, infrastructural and regulatory framework in Montenegro.

The Strategy seeks to strengthen the role of the maritime economy sector in the development and competitiveness of Montenegro through a clearly defined maritime policy and sustainable development initiatives. More precisely, the strategic document sets out strategic goals and operational goals with accompanying indicators of success, and an action plan that clearly defines activities whose implementation contributes to the realization of strategic and operational goals, reporting and evaluation and other issues of importance for further development of the maritime sector and valorization potential in this area for period 2020-2030.

Law on Road transport (OG MNE 21/2009, and 40/2011 i 92/2017)

It regulates the conditions and the manner of performing activities of public transportation of passengers and freight, provision of bus and freight stations services, as well as transportation for own needs in road transport.

Law on Security, Organization and Efficiency of Rail Transport (OG MNE 1/14)

The Law regulates safe and uninterrupted railway traffic, interoperability, and the functioning of the railway system. It addresses the efficiency of railway systems and operations, but does not cover energy consumption. An important part of this law concerns the operation of urban railways (such as metros), cable cars, funiculars, and ski lifts, which are recognized as railways with specific traffic and technical characteristics (Article 134) and are used for the public transport of passengers and/or goods.

Law on Rail (OG MNE 27/13 i 43/13)

The Law stipulates that during the performance of the activity, the infrastructure manager shall be obliged to take care of environmental protection in accordance with the law regulating environmental protection. This Law is divided into three main chapters regulating three areas:

- 1) Planning of the rail development;
- 2) Management of the rail infrastructure;
- 3) Rail transport.

Law on Air Transport (“Official Gazette of Montenegro” No 30/2012, 30/2017)

Airborne noise and exhaust gases produced by the aircraft during take-off and landing must be below the prescribed maximum levels of noise and exhaust emissions in accordance with the regulations issued by the Ministry, with the consent of the state administration body competent for environmental protection and with the concluded international agreements.

The **Local Sustainable Urban Mobility Plan (SUMP)** enables the development of local transport infrastructure that takes into account citizens’ mobility needs, thereby improving the quality of life at the local government level. Currently, only the Capital City has an adopted SUMP. Montenegro does not have a National Urban Mobility Plan (NUMP). National Urban Mobility Plans/Policies (NUMPs) are action-oriented strategic frameworks for urban mobility developed by national governments to enhance cities’ capacity to plan, finance, and implement projects and measures designed to sustainably meet the mobility needs of people and businesses in urban areas and their surroundings. As part of the support provided by GIZ, the ProSUMP project has been launched, aiming to create the conditions for a systematic process of SUMP implementation, promote regional exchange between local governments and other relevant stakeholders regarding the implementation of SUMP measures, and establish strong regional cooperation and dialogue among selected local governments in the Western Balkans.

Montenegro has committed to transposing Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (RED II), a component of the EU’s “Clean Energy for All Europeans” package. Montenegro, as a Contracting Party, must transpose and implement **RED II** to remain compliant with the acquis and avoid enforcement measures. Second, it addresses urgent policy and energy system needs. The transport sector in the country remains heavily dependent on imported fossil fuels, contributing to energy insecurity, exposure to volatile oil markets, and rising emissions. Establishing clear renewable energy targets and a sustainability framework will help diversify energy supply, improve resilience, and accelerate the transition to low-carbon transport.

Montenegro, with the support of the Energy Community Secretariat, has initiated the implementation of part of the RED II Directive package to achieve full alignment with the requirements for meeting the mandatory share of renewable energy sources (RES) in the transport sector. Four objectives have been set:

- The first objective is to define who is obliged to supply renewable transport fuels, how annual obligations and trajectories to 2030 should be set and applied (including appropriate use of multipliers and limits on food and feed-based biofuels), and which compliance instruments are both legally sound and practicable in the national context. The design model will also specify the reporting requirements, data flows, and traceability arrangements necessary for transparent monitoring.
- The second objective, is to design a credible sustainability verification and GHG accounting framework so that only fuels meeting RED II sustainability and lifecycle emissions thresholds are eligible to count toward RES-T targets; this includes recommendations on recognition of voluntary certification schemes, national accreditation and audit roles, mass-balance and chain-of-custody rules, a REDII-compatible GHG calculation methodology, and the technical specification for a database to record certified consignments and guarantees of origin.
- The third objective is to convert the RTFO and verification concepts into draft secondary legislation and complementary regulatory instruments that integrate seamlessly with

existing primary laws and sectoral regulations, thereby ensuring the legal texts are immediately adoptable and operable by designated authorities.

- The fourth objective is to secure stakeholder understanding through targeted engagement and a workshop that will present the proposals, gather feedback, and provide practical guidance so that ministries, agencies, regulators, fuel suppliers, certifiers, and auditors share a common implementation roadmap.

In addition to the above, the Ministry of Transport is actively working on the development of the National Policy Framework for the implementation of the AFIR (Alternative Fuel Infrastructure Regulation), and in 2026, it plans to adopt the Law that will transpose this Directive.

Mapping optimal locations for the development of solar and wind power plants in Montenegro is a study currently under development, aimed at fulfilling the obligations under the RED III Directive regarding the establishment of zones for accelerated renewable energy deployment (the so-called 'RAA' zones). Due to minimal conflicts with natural values, permitting procedures for renewable energy projects will be shorter within RAA zones. Although the RED III Directive has not yet been transposed into Montenegro's legal system, the measure of mapping optimal locations for solar and wind development is in line with the recommendation adopted by the Ministerial Council of the Energy Community in December 2024, calling on its Contracting Parties, including Montenegro, to prepare their legislative and institutional frameworks for implementing provisions related to the establishment of RAA zones. To provide guidance to decision-makers and the expert community in the Contracting Parties on establishing RAA zones, the Energy Community, in cooperation with The Nature Conservancy, has developed the manual 'Operational Blueprint: Designation of Renewables Acceleration Areas.' The methodology described in the Manual has already been applied in Montenegro through the preparation of a pilot study in the Municipality of Nikšić, and a project is currently underway that applies the same approach at the national level (Montenegro Energy Growth and Acceleration). It should be emphasised that for every new energy generation project, the legally prescribed procedure for assessing the environmental impact of the project must be carried out.

Energy efficiency

Law on Efficient Use of Energy (published in OG MNE No. 57/14, 3/15, 25/19, 140/22)

The Law regulates the responsibilities for the introduction and the implementation of energy efficiency policy and measures in order to enable efficient energy consumption by end-users. The text of the Law is compliant with the main EU directives in the field of energy efficiency whereas the implementation of the Law is ensured through the adoption of bylaws. The Law on Efficient Use of Energy focuses mainly on establishment of framework conditions for energy efficiency (targets, EEAP and local plans), exemplary role of the public sector, energy performance of buildings, energy related products and energy services, while energy efficiency in transport sector did not get particular attention.

The current regulatory framework governing the energy efficiency of buildings, adopted under the Law on Efficient Use of Energy, was updated in 2024. New construction regulations were introduced, including:

- Stricter minimum energy efficiency requirements for the construction of new buildings and the renovation of existing ones;
- A procedure for certifying the energy performance of buildings based on national methodology and using national software for calculating energy performance.

Rulebooks for energy labeling have been adopted and cover the following energy-related products: washing machines, TV sets, dishwashers, air-conditioning, refrigerators, electric light bulbs and lamps and car tires, while the **eco-design rulebooks** cover the following energy-related products: non-directional light bulbs for households, fluorescent lamps without integrated dimmer switches, high intensity discharge lamps and accompanying dimmers switches and luminaires, electric motors, receivers converting digital to analogue signals, water pumps, non-seal circulation pumps, domestic washing machines, domestic clothes dryers, domestic dishwashers, external power supply devices, fans, domestic refrigerators, room air-conditioning and fans, TV sets, standby and off-mode electric power consumption for electric and electronic office equipment and domestic appliances, directional light bulbs, LED lights and the associated equipment.

Study on the Improvement of Energy Efficiency in Buildings was developed in 2025 as part of Montenegro's obligations as a Contracting Party of the Energy Community, in accordance with the requirements of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, as incorporated and adapted through the Ministerial Council Decisions 2010/02/MC-EnC and 2021/14/MC-EnC. The aim is to establish a long-term renovation strategy to improve the energy efficiency of the national stock of public and private, residential and non-residential buildings in a cost-effective manner. The Study was prepared in line with the detailed requirements prescribed by the Law on Efficient Use of Energy, which transposes the Directive.

The objectives of the Study include:

- establishing a set of data, assumptions, goals, and analyses necessary for the preparation and future development of the Strategy;
- defining measures to achieve high energy efficiency of the building stock in Montenegro over the next 10–20 years and beyond;
- identifying measures to accelerate the renovation of the building stock focused on energy efficiency;
- defining specific targets for reducing energy consumption in existing buildings;
- establishing a rational and effective framework for managing building renovation activities, in order to enable integrated effects both in achieving climate goals and in supporting economic development.

Energy Security

The energy security dimension is regulated mostly by **Electricity Transmission System Operation Rules**, which preparation is obligation under the **Energy Law**.

Energy Policy by 2030 - adopted in 2011.

The Energy Policy of Montenegro by 2030 is the main strategic document which establishes three main priorities for the development of energy sector of Montenegro: security of energy

supply, development of a competitive energy market and sustainable energy development. It is envisaged to prepare new Energy Policy for 2040.

The **Law on the Security of Supply of Petroleum Products** (OGM, No. 119/24) was adopted in 2024, thereby transposing Council Directive 2009/119/EC imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products. To achieve full alignment with this Directive, two by-laws were adopted:

- the Rulebook on the Method of Calculating and Paying Fees for Mandatory Petroleum Product Reserves (OGM, Nos. 07/25 and 12/25),
- the Rulebook on the Form and Methodology for Calculating the Quantity of Mandatory Petroleum Product Reserves (OGM, No. 12/25),

as well as the Decree Amending the Decree on the Method and Level of Elements Used to Determine the Maximum Prices of Petroleum Products (OGM, Nos. 23/21, 27/21, and 10/25).

The **Action Plan for the Establishment of Mandatory Petroleum Product Reserves** (adopted in 2024) serves as the key executive and operational document that considers all relevant and practical aspects affecting the establishment of mandatory petroleum reserves in Montenegro. It is intended to serve as the basis for establishing the reserves within the proposed timelines: 2025–2029 (baseline scenario) and 2025–2027 (alternative scenario).

The **Law on Safety Measures during the Exploration and Production of Hydrocarbons** (OGM, No. 51/25) was adopted in 2025 and is fully aligned with the EU acquis, transposing the provisions of Directive 2013/30/EU on the safety of offshore oil and gas operations and Directive 2004/35/EC on environmental liability. In accordance with EU best practices, the Law establishes minimum requirements to prevent major accidents during offshore hydrocarbon exploration and production operations in Montenegro. The Hydrocarbon Administration has been designated as the competent authority. The goal is to establish a regulatory framework that ensures safe operations without adverse impacts on the environment, people, or property, and to limit the consequences of possible accidents. Additionally, the following were adopted:

- the Decree Amending the Decree on the Method of Calculation and Payment of Fees for Oil and Gas Production (OGM, No. 121/24),
- the Decree Amending the Decree on the Method of Returning Blocks and Third-Party Access to Upstream Facilities (OGM, No. 121/24), and
- the Rulebook on the Content of the Report on the Results of Geological and Geophysical Hydrocarbon Research (OGM, No. 120/24), which prescribes the detailed content of such reports and the method of their submission.

By the end of 2025, the **Crisis Plan for Emergency Supply Situations** is also expected to be adopted. This plan defines broader policies and operational aspects that form the basis for the Government of Montenegro's response to disruptions in the supply of oil and petroleum products, ensuring that the effects of such disruptions—whether domestic or regional—are minimized and that future international obligations are met. The plan establishes procedures and steps to be taken by the main entities in Montenegro responsible for responding to potential oil supply crises. It serves as a reference framework for the main principles and strategies for rapid response to oil crises and establishes a shared understanding of the roles and responsibilities of all key stakeholders involved in Montenegro's emergency response system.

Internal Energy Market

The laws regulating the internal electricity market in Montenegro are:

- Law on Energy
- Law on the Use of Energy from Renewable Sources
- Law on Cross-Border Exchange of Electricity and Natural Gas
- Law on Cross-Border Infrastructure Projects.

The **Law on Energy** (“Official Gazette of Montenegro,” No. 28/25)²⁷ regulates the operation of the independent energy regulator, as well as the rights, obligations, and responsibilities of energy entities engaged in regulated activities (transmission system operator, distribution system operator, and market operator). It also covers the certification and licensing of energy entities for performing energy activities, balancing responsibility, connection to the transmission and distribution systems, and the organization and management of different types of markets.

Given the increasing presence of market-oriented activities, this law also governs the application of innovative technologies and the modern functioning of the power system, such as the implementation of a smart metering system, integration of electromobility, the role of the active customer and their participation in the electricity market—either independently or through aggregation—provision of flexibility services, energy storage, dynamic pricing for end-users, and citizen energy communities.

In addition, the law recognizes the importance of energy-vulnerable customers, addressing issues of **energy poverty**, the conditions for selecting the **supplier of last resort**, and **subsidies** for supplying vulnerable consumers. Although Montenegro does not yet have gas infrastructure, the law also regulates activities in the gas sector.

The following secondary legislation derives from this law:

- The **Ten-Year Transmission System Development Plan** aims to provide a detailed overview of the state of Montenegro’s transmission system in the year preceding the planning period, establish guidelines for its development in accordance with system users’ needs, and identify the necessary investments in line with the proposed development of the transmission system. The development plan is submitted to the independent regulator (REGAGEN) for approval in accordance with the Energy Law and is updated as needed. CGES has developed its own Transmission System Development Plan for the period **2020–2029**, which was approved by REGAGEN, and the new plan for the period **2023–2032** is currently in the approval process. The plan defines the network development for the next ten years and includes a list of agreed investments and projects to be implemented within the next three years.
- The **Ten-Year Distribution System Development Plan**²⁸ aims to provide a detailed overview of the state of Montenegro’s distribution system in the year preceding the planning period and establish development guidelines in accordance with system users’ needs. The plan is submitted to the independent regulator (REGAGEN) for approval in accordance with the Energy Law and is updated as necessary to include changes arising

²⁷ <https://www.sluzbenilist.me/propisi/64F3E28A-1501-407C-91D6-C8E949DE7C5C>

²⁸ https://cedis.me/wp-content/uploads/2022/12/Plan-razvoja-CEDIS-2023_2032_23052022-OD-za-stampu_23052022-avg_sep07.pdf

from objective reasons. CEDIS has prepared the Distribution System Development Plan for the period **2023–2032**, focusing on infrastructure modernization, improved energy efficiency, and the integration of renewable energy sources. CEDIS is required to prepare an updated Distribution System Development Plan for the period **2024–2032** and submit it to the Agency for approval no later than **June 1, 2025**.

- The **Market Rules** (“Official Gazette of Montenegro,” No. 44/17) further define the responsibilities of the electricity market operator, including: the procedure for admission and participation in the electricity market through contractual relationships between the market operator, system operators, and other market participants; supervision of privileged producers; management of the budget for financing incentives for electricity production by privileged producers; and the balancing mechanism.
- **Deregulation of retail prices**, which abolished the legally prescribed restrictions on electricity price increases for households and small customers that do not belong to the household category, allowing the supplier to freely determine electricity prices for end users.
- **Different tariff models for households** (“basic,” “blue,” “red,” and “green” models), through which the supplier (EPCG) offers customers options to select a model that best suits their electricity consumption pattern. This enables more active participation of end consumers in managing their electricity use and reducing consumption costs.
- **Compensation of electricity consumption costs for vulnerable customers**, as a special category of consumers who are health- and/or socially disadvantaged. Funds for this purpose are provided from the **state budget of Montenegro**.

The **Law on the Use of Energy from Renewable Sources** (“Official Gazette of Montenegro,” No. 82/24)²⁹ establishes the legal framework introducing a new incentive system for electricity generation from renewable energy sources based on market premiums. The objective of this law is to promote the integration of renewable energy sources, reduce dependence on fossil fuels, and lower greenhouse gas emissions, while ensuring a supportive environment and sustainable development. This law also regulates the process of issuing guarantees of origin for energy produced from renewable sources, further defines the status of prosumers and renewable energy communities, governs the use of renewable energy in the heating and cooling sectors and the transport sector, promotes regional cooperation, and addresses other matters relevant to the use of renewable energy. The following secondary legislation derives from this law:

- A **register of guarantees of origin** has been established, representing an electronic system for issuing guarantees of origin in accordance with prescribed European standards. To align with the European market for guarantees of origin, the market operator is working to meet the requirements for obtaining **full membership in the AIB (Association of Issuing Bodies)**³⁰, which will be preceded by the adoption of a rulebook on the issuance of guarantees of origin.
- The implementation of the **“Solari+” project**, carried out by EPCG, contributes to the strong development of decentralized production and the prosumer market, enabling citizens and businesses to actively participate in the generation of clean energy and the reduction of their environmental footprint.

²⁹ <https://www.sluzbenilist.me/registri/46ED1B5D-EE98-4A07-BCDC-FA932921F7A3>

³⁰ <https://www.aib-net.org/aib>



- The **publication of the first auction** and the adoption of a **three-year incentive system plan** are in preparation and are expected to be implemented by the end of the current year. In **August 2024**, Montenegro adopted its **first Law on the Use of Energy from Renewable Sources**. By adopting this law, Montenegro has made significant progress in aligning its national energy legislation with EU regulations and has established the framework for achieving national objectives in this area. The new Law on the Use of Energy from Renewable Sources will enable the transition to a **modern incentive system based on market premiums**, while the current **feed-in tariff** concept will be phased out and remain applicable only to small installations and demonstration projects.

The **Law on Cross-Border Exchange of Electricity and Natural Gas** (under development) will regulate international cooperation in the prevention, preparedness, and management of electricity crises; market transparency for electricity and gas; cross-zonal capacity allocation and congestion management in the day-ahead and intraday electricity markets; cross-zonal capacity allocation in long-term markets; electricity system balancing; and the operation of the electricity transmission system in emergency and recovery conditions. The following secondary legislation derives from this law:

- **The development of methodologies for the establishment of the CCR IT ME** involves coordinated work by teams consisting of technical experts from Montenegro and Italy, representing the regulatory authorities (REGAGEN and ARERA) and transmission system operators (CGES and Terna), under the supervision of the Ministry of Energy and Mining. The teams are working on the development of the following methodologies: the Methodology for Coordinated Capacity Calculation, the Methodology for Redispatching and Countertrading, and the Methodology for Cost Sharing of Redispatching and Countertrading.
- The Rulebook on the Data Provided by the Electricity Transmission System Operator and the Method of Submitting and Publishing Data Relevant to the Electricity Market defines the data to be provided by the transmission system operator that are relevant to the electricity market, as well as the procedure for their submission and publication on the ENTSO-E transparency platform, ensuring availability of information to all electricity market participants.

The **Law on the Supervision of the Wholesale Electricity and Natural Gas Market** ("Official Gazette of Montenegro," No. 1/22)³¹ aims to create conditions for the proper functioning of the wholesale electricity and natural gas market by establishing an effective market surveillance system to prevent, detect, and sanction market abuse. In addition, this law contributes to improving transparency in the wholesale electricity and natural gas market to increase market confidence, expand the number of market participants, establish a reliable price signal, and provide additional consumer protection through oversight of market participants' behavior.

The **Law on Cross-Border Infrastructure Projects** (under development) regulates the procedures, conditions, and methods for implementing cross-border energy infrastructure projects of special importance to Montenegro, including cross-border cost allocation, incentives granted for such projects, and other relevant issues concerning their implementation. Projects

³¹ <https://www.sluzbenilist.me/propisi/7CB0D9CD-5563-43EF-BF17-EBA1C73C488E>

of special importance to Montenegro are those listed as **Projects of Energy Community Interest (PECI)** and/or **Projects of Mutual Interest (PMI)**, which influence Montenegro's overall development, regional and international connectivity and impact, energy security, market and system integration, competition, and energy price affordability, while also contributing to **climate change mitigation, achievement of energy and climate goals, and climate neutrality**.

By the **Decision of the Ministerial Council from 2022³²**, a set of adapted regulations and directives known as the **Electricity Integration Package** was adopted. This package includes four legal acts from the **Clean Energy Package (CEP)** and five guidelines, i.e., network codes:

- **Regulation (EU) 2019/941** of the European Parliament and of the Council on risk preparedness in the electricity sector and repealing Directive 2005/89/EC,
- **Regulation (EU) 2019/942** of the European Parliament and of the Council establishing a European Union Agency for the Cooperation of Energy Regulators,
- **Regulation (EU) 2019/943** of the European Parliament and of the Council on the internal market for electricity,
- **Directive (EU) 2019/944** of the European Parliament and of the Council on common rules for the internal market for electricity and amending Directive 2012/27/EU,
- **Commission Regulation (EU) 2016/1719** establishing guidelines on forward capacity allocation (FCA),
- **Commission Regulation (EU) 2015/1222** establishing guidelines on capacity allocation and congestion management (CACM),
- **Commission Regulation (EU) 2017/2195** establishing guidelines on electricity balancing (EBGL),
- **Commission Regulation (EU) 2017/2196** establishing a network code on electricity emergency and restoration (ERNC),
- **Commission Regulation (EU) 2017/1485** establishing guidelines on electricity transmission system operation (SOGI).

In March 2025, the new **Law on Energy** is adopted, thereby aligning national legislation with **EU Directive 2019/944** and partially with the **Electricity Market Integration Package**. The remaining part of the energy package will be incorporated into the forthcoming **Law on Cross-Border Exchange of Electricity and Natural Gas**, which is expected to be adopted during **2025**. The adoption and implementation of these laws represent the legal foundation for the process of integrating Montenegro's electricity market with the EU's internal market, which may create conditions for the EU to consider the possibility of exempting Montenegro from the CBAM until 2030, provided that full technical and regulatory market integration is achieved.

Research, innovation and competitiveness

The legal framework for the field of research and innovation consists of three laws that establish the foundations for financing research and innovation in Montenegro:

- The **Law on Innovation Activities** ("Official Gazette of Montenegro," No. 82/20)³³ regulates the organization, conditions, methods of financing, and promotion of innovation activities in order to improve the national innovation system. This system encompasses

³² Decision No. 2022/03/MC-EnC of December 15, 2022

³³ <https://www.gov.me/dokumenta/e4de3d3b-f1cf-4a14-9bd8-20c39b570536>

an interconnected network of actors that contribute to the development of innovation capacities, the creation of ideas, and the application of innovations. The actors within the innovation system are classified through the Register of Innovation Activities³⁴, which currently includes nine innovation entities implementing innovative projects in the fields of energy and climate.

- The **Law on Incentive Measures for the Development of Research and Innovation** (“Official Gazette of Montenegro,” No. 82/20)³⁵ prescribes the conditions for obtaining the status of a beneficiary of incentive measures, i.e., tax incentives available to innovation entities — particularly those engaged in innovation activities such as startups, spin-offs, companies, and freelancers, as well as those investing or donating in this field. The law established six incentive measures, but only two have been active so far: reductions of personal income tax and corporate profit tax. As this represents an entirely new instrument for supporting the development of innovation activities, the implementation of the law revealed several shortcomings. Consequently, at the end of 2024, the Government of Montenegro adopted a draft of a new law (“Official Gazette of Montenegro,” No. 51/25), which is adopted in May 2025³⁶.
- The **Law on Scientific Research Activities** (“Official Gazette of Montenegro,” Nos. 80/10, 57/14, and 82/20)³⁷ regulates the organization, conditions, and methods of financing scientific research activities. In the context of reform activities in the field of science and research, the Government of Montenegro, at the end of 2024, adopted a draft of a new law, which is which is adopted in May 2025³⁸. The new legislation establishes a strengthened system for identifying and monitoring actors within the research system — particularly licensed research institutions — an improved support model, a reformed system for the evaluation of the scientific system and its full digitalization through the establishment of an Information System, as well as a new framework for recognizing human resources in research activities, aimed at encouraging continuous career development, visibility of their work, and international recognition.

Funds and support instruments for research and innovation are allocated on a competitive basis, in accordance with the priorities defined in the Smart Specialisation Strategy and the Strategy for Scientific Research Activities (most often applying a bottom-up approach).

Innovation financing in Montenegro was significantly transformed with the establishment of the Innovation Fund of Montenegro (IFMNE) in September 2021, whose key role is the implementation of innovation policies, projects, and programs within the framework of the Smart Specialisation Strategy. To provide strategic guidance for the Fund’s operations, clearly define its role in relation to the line ministry in supporting innovation development, and establish a programmatic framework for innovation, the Government of Montenegro adopted the Innovation Programme 2023–2027³⁹. The Programme aims to ensure that state support covers the entire innovation cycle — from the initial innovative idea to its commercialization and market entry.

³⁴ https://inovacije.gov.me/ords/f?p=111:LOGIN_DESKTOP:6121294833011:::

³⁵ <https://www.gov.me/dokumenta/3a639a2d-b37c-4ffd-89c6-9776a055dd22>

³⁶ <https://www.sluzbenilist.me/propisi/CEF314D9-0CFC-4432-AD03-6AD9D0B9FFBE?page=1>

³⁷ <https://www.gov.me/dokumenta/3a639a2d-b37c-4ffd-89c6-9776a055dd22>

³⁸ <https://www.sluzbenilist.me/propisi/2730B46C-EC20-4151-A2D9-890889700B9A>

³⁹ <https://www.gov.me/dokumenta/efca9f6a-618f-4fb5-b1fd-1d9d1e83264f>

In 2022, the Innovation Fund of Montenegro began financing innovation programs and projects and has since implemented ten program lines for supporting innovation⁴⁰, namely:

- Startup Pre-Acceleration Program⁴¹;
- Startup Early-Stage Development Support Program;
- Innovation Concept Validation Program;
- Program for the Implementation of Educational Activities in Smart Specialisation Areas;
- Program for Promoting Innovation Culture;
- Invention Protection and Development Voucher Program⁴²;
- Innovation Voucher Program;
- Collaborative Innovation Grant Program;
- Program for Strengthening the Innovation Capacity of Micro, Small, and Medium-Sized Enterprises; and
- Program for Promoting Innovations in Support of Energy Efficiency in Industry.

In the period 2022–2024, the Innovation Fund of Montenegro (IFMNE) published a total of 17 public calls. During this period, 556⁴³ applications were received, of which 155 were approved for funding. Out of the total number of approved applications, 32 projects (20.65%) were in the fields of energy, environment, and green technologies. The only program in which no projects from the above-mentioned fields have yet been supported is the Program for Strengthening the Innovation Capacity of Micro, Small, and Medium-Sized Enterprises, which funds projects at higher Technology Readiness Levels (TRLs)⁴⁴. The total value of these projects amounted to €3,464,045.99, of which IFMNE grants accounted for €2,090,342.88 (60.34%), while beneficiary co-financing amounted to €1,363,703.11 (39.37%). The value of approved projects in the fields of energy, environment, and green technologies represents 41% of the total value of all projects, or 35% of the total amount financed by IFMNE. It is notable that projects in these areas have the highest share of beneficiary co-financing, accounting for 55% of total co-financing across all projects.

The line ministry responsible for research and innovation implements several program lines supporting research and innovation⁴⁵. In the period 2021–2024, it supported 11 projects in the fields of energy and climate with a total value of €838,817.89, while through the incentive measures mechanism, 3 innovative projects were supported with a total amount of

⁴⁰ Six program lines have been taken over from the line ministry and adapted to the new demands of the innovation market.

⁴¹ Starting from 2024, the implementation of this program line has been taken over by IPC Tehnopolis.

⁴² As the Technology Transfer Office was established within the Science and Technology Park of Montenegro (STP MNE) in 2024, this innovation infrastructure will take over the support for the development and protection of inventions starting in 2025.

⁴³ Almost half of the total number of applications — 268 in total — were submitted in 2024, which demonstrates both the trust of the community in the work of the Innovation Fund of Montenegro (IFMNE) and the maturity of the innovation culture and readiness of the innovation community to implement innovation programs and projects.

⁴⁴ The system used to assess the maturity and readiness of technology for commercial application (Technology Readiness Level – TRL) is applied.

⁴⁵ In the field of innovation, the Ministry implements measures aimed at supporting the participation of Montenegrin beneficiaries in EU and international programs and initiatives for innovation, while in the field of research, it serves as the main implementing body.

€209,000.00. The key support measures for science and research in Montenegro are:

- **National Scientific Research Projects**, aimed at strengthening the capacities of research teams in Montenegro to promote excellence and contribute to the development of a knowledge-based society and international competitiveness⁴⁶;
- **Excellence Scholarship Program for Doctoral Research in Montenegro**⁴⁷, which enables young researchers to dedicate themselves to doctoral studies conducted at Montenegrin universities while also gaining access to state-of-the-art laboratories abroad under the mentorship of leading experts;
- **Research Grants for Excellence Program 2024**⁴⁸, designed to enhance the capacities of scientific research institutions/teams in Montenegro in order to strengthen high-quality and sustainable partnerships at both the national and international levels, foster excellence, and contribute to the development of a knowledge-based society and the international competitiveness of Montenegrin science; and
- **Various calls supporting scientific research activities**, such as participation in scientific conferences, publication of research papers in open-access journals, organization of scientific conferences in Montenegro, support for short-term mobility, and assistance for participation in various EU and international research programs.

In the area of market-oriented research and innovation activities, the line ministry implements program lines supporting participation in EUREKA projects and the promotion of innovation⁴⁹.

National activities are aligned with the **EU Framework Programme for Research and Innovation – Horizon Europe**. Montenegro currently participates in 24 projects that have received EU grants, 6 of which (25%) are related to energy and climate. These projects focus on improving green technologies and sustainable urban development — specifically, building green and climate-neutral urban hubs, developing new technologies for hybrid AC/DC energy systems, and promoting the widespread use of integrated photovoltaic systems, which are key to expanding renewable energy use. One of the projects focuses on training programs for renewable energy and alternative fuels.

IPC Tehnopolis, the first national innovation infrastructure, implements the **Startup Pre-Acceleration Program**, which supports formal and informal startup teams in validating their innovative ideas on the market and further developing their startup projects. Since 2020, Tehnopolis has supported four startup projects⁵⁰ in the areas of energy efficiency, green technologies, and waste management, which reached the final phase of the program.

Additionally, Tehnopolis implements the **RISE**⁵¹ **Program**, aimed at supporting young people in the Western Balkans in transforming their ideas into sustainable social enterprises. Since

⁴⁶ <https://www.gov.me/clanak/2300000-eura-za-sufinansiranje-nacionalnih-naucnoistrativackih-projekata>

⁴⁷ ENG: <https://www.gov.me/en/documents/71efa327-ac7b-4ea9-97f7-1a7b6c170b6f>

⁴⁸ <https://www.gov.me/en/documents/0a76ffa8-3347-47bc-a656-184983e53c8b>

⁴⁹ In the period 2021–2022, the Ministry implemented support measures aimed at stimulating the protection and development of inventions, promoting innovation culture, implementing educational programs in S3 areas, and supporting the early-stage development of startups, which have been taken over by the Innovation Fund of Montenegro (IFMNE) since 2023.

⁵⁰ SolarVillager, SUNBUN, ButtMade, and LumiKor

⁵¹ Regional Incubator for Social Entrepreneurs – RISE

2020, the program has supported 11 projects focused on reducing CO₂ emissions, promoting the circular economy, using new recycled materials, and developing new ecological practices, among others. During the 2020–2023 period, IPC Tehnopolis implemented two important international projects, namely:

- The **AWeSOME Project**⁵², aimed at improving the application of energy efficiency measures within public sector infrastructure, strengthening capacities in the field of environmental protection, and promoting the use of environmentally sustainable materials through the application of ecological strategies, particularly in the construction sector; and
- The **CSSC LAB Project**⁵³, focused on the use of renewable energy sources and the introduction of innovative solutions for energy storage and sector coupling in medium-sized and smaller cities, developing pilot capacity-building programs for municipalities, establishing demo centers in various partner regions, creating a network-based learning platform, and setting up CSSC laboratories for sustainable knowledge transfer.

The SMART DeCARB⁵⁴ project is currently being implemented, aiming to develop, test, and apply pilot solutions for the decarbonization of public buildings, establish regional decarbonization centers, and build capacities for replicators.

The Science and Technology Park of Montenegro (STP MNE), also a state innovation infrastructure, is implementing the following international projects:

- The Circular Innovation Hub Project⁵⁵, aimed at fostering innovation in less developed regions, focusing on the plastics, metals, and construction sectors, as well as on developing tools for monitoring the transition to a circular economy; and
- The STOREMORE⁵⁶ Project, which focuses on analyzing and promoting energy storage solutions to mitigate the unpredictability of renewable energy sources.

There are also numerous initiatives within the academic community that contribute to the development of the five areas of the Energy Union:

- The Balkan Institute of Science and Innovation (BISI) was established in 2019 by the University of Montenegro (UCG) and the Université Côte d'Azur (UCA) from France, with the aim of strengthening mutual cooperation — particularly in the areas of scientific and educational collaboration — with a special focus on topics such as smart regions, healthcare, energy, materials science, and tourism;
- In 2023, UCG became a full member of the Ulysseus European University Network, which connects leading higher education institutions across Europe with the goal of jointly addressing today's major challenges by building innovation capacities and establishing regional and digital innovation ecosystems. Some of the key focus areas include innovation ecosystems, smart specialisation, sustainable energy, transport, and mobility within smart cities, among others; and

⁵² Agricultural Waste as Sustainable 0 km building Material (AWeSOME), 2020–2023, Program: Interreg – IPA CBC Italy – Albania – Montenegro

⁵³ City Storage and Sector Coupling Lab (CSSC LAB), 2020–2022, Program: Danube Transnational Programme

⁵⁴ Smart Sector Coupling for Decarbonisation of Public Buildings (SMART DeCARB), 2024–2026, Program: Interreg – IPA CBC Croatia – Bosnia and Herzegovina – Montenegro

⁵⁵ Program: Interreg Danube, 2024–2026

⁵⁶ Program: Interreg Danube, 2024–2027

- The ABCD Project⁵⁷, supported through the EIT HEI Initiative by EIT Climate-KIC, aims to become the leading platform for innovation and deep-tech entrepreneurship in the Western Balkans region.

In 2022, the Capital City of Podgorica was included on the list of cities participating in the EU Mission for Climate-Neutral and Smart Cities by 2030⁵⁸. The goal of the Mission is to support, promote, and showcase cities in their systemic transformation toward climate neutrality by 2030, turning them into innovation hubs that enhance quality of life and sustainability across Europe.

On the other hand, at the end of 2023, the Chamber of Economy of Montenegro established the Circular Economy Hub⁵⁹, a platform for circular initiatives and solutions. The purpose of its establishment is to encourage the exchange of circular business models and practices and to foster strong and continuous cooperation between the public administration, the business sector, and the academic community.

The fifth dimension of the Energy Union also recognizes the importance of vocational and lifelong education to train and develop new labor market profiles. To connect the Smart Specialisation Strategy (S3) with the labor market, the European Training Foundation (ETF) prepared a detailed analysis of Montenegro's situation regarding skills relevant to renewable energy sources (RES)⁶⁰. The analysis showed that Montenegro's education system is not yet fully aligned with the sector's needs but that there are relevant programs at the secondary vocational and higher education levels capable of meeting qualification demands. Key recommendations include: establishing closer cooperation between businesses and educational institutions to identify skill needs and develop corresponding curricula; developing training standards and programs specific to renewable energy; and implementing innovative and flexible learning models to meet the needs of small and micro enterprises, which dominate Montenegro's economy.

In this context, further development of vocational education and new adult education programs in the field of green transition has been prioritized within the third policy area of Montenegro's Reform Agenda 2024–2027 for the EU Reform and Growth Instrument⁶¹, specifically under Reform Measure 3.1.1 – Addressing labor market mismatches through lifelong learning and increasing graduates' employability through practical work, including jobs in the green and digital economy.

The first results of implementing the National Circular Transition Strategy of Montenegro until 2030⁶² indicate progress in applying circular economy principles and improving resource efficiency in the economy. However, continued support and the development of new

⁵⁷ The Alliance of Boundary Crossing for Deep Tech: <https://abcd-project-deeptech.org/>

⁵⁸ The list includes 100 cities from 27 EU Member States and 12 cities from countries associated with the EU "Horizon Europe" program.

⁵⁹ <https://www.ce-hub.me/me>

⁶⁰ https://s3.me/wp-content/uploads/2022/06/skills_for_smart_specialisation_in_montenegro.pdf

⁶¹ <https://www.gov.me/dokumenta/2cc3baa0-65d6-4d97-a25c-fa171aa559b3>

⁶² <https://www.gov.me/en/documents/85fe1938-191f-4d1a-ad15-4b2dc76becd8>

technologies are needed to enhance competitiveness and sustainability. The Program for Promoting Innovations in Support of Energy Efficiency in Industry⁶³ — the first targeted S3 program in the field of energy — has been launched, while continuous support is being provided in the areas of energy efficiency and renewable energy sources (RES), promotion of circular economy, and production optimization through innovation. In addition, energy audits in SMEs and measures to optimize energy use in public sector buildings are being implemented, alongside green business loan schemes. In addition to specific support measures, several initiatives stand out as important for further progress in this area, such as: the Analysis with Recommendations for the Development of MSME Business Models toward Circular Practices, the Eco Fund's initiative for introducing electric and hybrid vehicles in the public sector, and ongoing work on the Guidelines for Greening Public Administration. The challenges identified during implementation include the absence of relevant legislation, funding limitations, and certain procedural issues, all of which point to the need for accelerated reforms and the adoption of adequate legal frameworks to realize the full potential of this strategy.

The first year of implementation of the **Industrial Policy of Montenegro 2024–2028**⁶⁴ was marked by progress in implementing relevant operational goals related to the green transition:

- 1.2. Promoting Energy Transition and Resilience in Industry – The planned reconstruction of existing energy infrastructure was carried out through the implementation of projects for the rehabilitation and modernization of the Piva and Perućica hydropower plants (HPPs) and the environmental reconstruction of the Pljevlja Thermal Power Plant (TPP), while activities related to the construction of new energy infrastructure were implemented through the Gvozd Wind Farm project.
- 2.2. Supporting Industry Toward Climate Neutrality – A total of 34 businesses were supported in transitioning to green vehicles (electric and hybrid), while two companies received support for improving energy efficiency in their business facilities. Under the IPARD Program, Measure 3, which promotes investments in processing technologies and the use of renewable energy sources (RES), supported 11 beneficiaries with a total of €3 million. Under Measure 7, promoting investments in diversification, agri-food processing, waste management, and RES, 17 beneficiaries were supported with €1.2 million. This goal also includes the results of the Program for Promoting Innovations in Support of Energy Efficiency in Industry.
- 3.2. Strengthening Industrial Ecosystems Based on Green Transition Principles – A total of 106 projects in the field of sustainable tourism were supported, and 16 facilities received eco-certification. Additionally, through the Program for Supporting Energy Efficiency Improvement in the Hotel Industry⁶⁵, 15 companies were supported with a total of €2.2 million.
- 3.3. Encouraging Further Development of Circular Business Models – A waste collection and sorting transfer station was constructed in Andrijevica, and technical documentation was prepared for the Nikšić Regional Recycling Center.

⁶³ 2023: <https://www.gov.me/dokumenta/f4636e7b-9e2f-40b5-ad97-9925bd150e58>, 2024: <https://www.gov.me/dokumenta/7c7143b9-7fa9-4b29-86bc-9c329ac39a7c>

⁶⁴ <https://www.gov.me/dokumenta/2924aa6a-5e12-4884-b2bb-c732bc9eaf9c>

⁶⁵ <https://www.gov.me/dokumenta/136fc9e3-c642-4ae6-86fb-78a6ff9e4f39>

The implementation of the Action Plan for the Development Strategy of Micro, Small, and Medium-Sized Enterprises (MSMEs) in Montenegro⁶⁶ during its first year, in addition to measures supporting innovation and the circular transition recognized by the previously mentioned strategies, stands out for measures aimed at promoting the development of the green economy within MSMEs. As part of this, an analysis of the existing legislative framework supporting the practical application of the circular economy concept was conducted, identifying the necessary additional interventions, along with an individual case study analysis for 10 enterprises.

The most significant support instrument for competitiveness is the Program for Improving the Competitiveness of the Economy, which focuses on strengthening manufacturing activities and transforming the economy toward digital and green business models. A special part of the program is dedicated to incentives for transforming business and technological processes from a linear to a circular business model, in line with all strategies in this area. During the period 2020–2023, the Program Line for Promoting the Circular Economy supported six beneficiaries/projects with a total value of €42,071.41. In 2024, the program was optimized, resulting in the introduction of the Program Line for Improving Production Capacities, which includes the procurement of equipment aimed at enhancing resource efficiency and environmental performance in production processes (e.g., industrial wastewater treatment systems, waste recycling, collection, and separation equipment). During 2024, however, there were no requests for the procurement of the aforementioned equipment.

iii. Key issues of cross-border relevance

International cooperation with bodies in the **European Union and the Energy Community** is an extremely important segment in the work of all the energy entities in Montenegro. Montenegro as Energy Community Contracting Party and EU candidate country is willing to follow the European energy policy and is obliged to transpose and implement the EU energy directives and regulations. Key issues of cross-border significance are the integration of energy markets, major infrastructure projects near the national border and cross-border infrastructure projects, international scientific and research cooperation related to the dimensions of the Energy Union, and other activities that may affect non-EU and EU Member States.

At the Ministerial Council held in November 2021, the General Policy Guidelines on the Adoption of the Decarbonisation Roadmap for the Energy Community Contracting Parties, proposed by the European Union, were adopted. The adoption of the Decarbonisation Roadmap by the Ministerial Council sends an important signal of the Energy Community's readiness to join the European Union and other international partners in achieving net-zero greenhouse gas emissions by 2050.

Montenegro is a member of the **CESEC (Central and South-Eastern Europe Connectivity)** regional initiative, which aims to speed up the integration of gas and electricity markets in central and south-eastern Europe. The initiative was set up in February 2015 by Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia and Slovenia. These countries were

⁶⁶ <https://wapi.gov.me/download-preview/833c390d-cd5b-4399-a740-c07c8af1c862?version=1.0>

later joined by eight Contracting Parties to the Energy Community: Ukraine, Moldova, Serbia, North Macedonia, Albania, Bosnia and Herzegovina, Kosovo and Montenegro.

CGES is a member with observer status in the IGCC (European Imbalance Netting cooperation) and has applied for membership in MARI (European Tertiary balancing energy cooperation - European cooperation for the exchange of tertiary balancing energy).

Within the control block of Montenegro, Serbia, and North Macedonia (the SMM block), regional cooperation has been established for netting deviations, based on the exchange of ancillary services (frequency containment reserves and balancing energy). The goal of the advanced SMM control block option is to increase market flexibility and reduce reserve allocation costs. The Transmission System Operators (TSOs) of Serbia, North Macedonia, and Montenegro form a control block that aligns with the target model for regional integration of electricity balancing markets in accordance with the ENTSO-E Network Code on Electricity Balancing. For individual country balancing, the total amount of balancing reserves is 1,000 MW, while for the SMM control block, it amounts to 700 MW. Thus, the advanced operation of the SMM block, through the sharing and exchange of ancillary services, would reduce the costs of securing balancing capacities and free part of the generation capacity for the supply of energy on the commercial market. Additionally, the SMM block is important from the perspective of cross-border electricity balancing. With the future integration of renewable energy sources (RES)—particularly wind and solar power plants—market integration within the SMM block will enable more efficient balancing of supply and demand.

The **Balkan Energy School**⁶⁷ is a regional initiative established in December 2022, with the goal of exchanging knowledge and experiences, and advancing energy regulation, market integration, and sustainability in the Balkan countries. The initiative was launched by the Italian Regulatory Authority for Energy (ARERA) and brings together energy regulatory authorities from Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Greece, and Italy. Additionally, Serbia participates as an observer through its Energy Agency (AERS).

CGES is a member of the Med-TSO, Association of the Mediterranean Transmission System Operators (TSOs) for electricity and Multilateral Cooperation platform among the TSOs operating the High Voltage Transmission Networks of 19 Mediterranean Countries, including Montenegro. Med-TSO is engaged in facing this challenging evolution of the regional power sector by facilitating the creation of a Mediterranean energy market, through the definition of common methodologies, rules, sharing costs, risks and best practices for optimizing the operation of the existing infrastructures and facilitating the development of new ones.

The establishment of an organized wholesale electricity market began in 2017, when, pursuant to the Energy Law and the Decision of the Government of Montenegro, the three main Montenegrin electricity sector entities — the Electric Power Company of Montenegro (EPCG) as producer and supplier, the Transmission System Operator (CGES), and the Market Operator (COTEE) — jointly founded the company Electricity Exchange LLC Podgorica (BELEN), with the goal of establishing and operating an organized day-ahead electricity market in Montenegro

⁶⁷ <https://www.balkanenergyschool.org/>

and, at a later stage, coupling it with neighboring WB6 and EU markets in line with EU energy legislation.

In 2024, the Government of Montenegro designated BELEN as the Nominated Electricity Market Operator (NEMO), which enables the integration of Montenegro's day-ahead and intraday electricity markets with EU markets, increases liquidity and transparency, and allows for more efficient integration of renewable energy sources.

In the previous period, several regional projects were launched to initiate market coupling. The Energy and Water Regulatory Agency (REGAGEN), Electricity Exchange (BELEN), and Transmission System Operator (CGES) are participating in the Albania–Italy–Montenegro–Serbia (AIMS) project, which aims to couple the electricity markets of these countries. The project involves the active participation of transmission system operators and electricity exchanges in creating the preconditions for market integration. Additionally, the Central European Initiative (CEI) project – Strengthening Energy Regulatory Authorities in the Western Balkans aims to build the institutional and human capacities of energy regulators, TSOs, and power exchanges and to enhance their preparedness for new obligations arising from the electricity market integration process.

The implementation of the “Covenant of Mayors for Climate and Energy” will contribute to the application of EU climate and energy legislation and targets. The signatories of the Covenant support a shared vision for 2050, which entails accelerating the decarbonization of their territories, strengthening resilience to the unavoidable impacts of climate change, and ensuring access to secure, sustainable, and affordable energy for citizens. To translate this commitment into concrete measures and projects, the signatories pledge to develop a Sustainable Energy and Climate Action Plan (SECAP). Through the project “EU4 Energy Transition: Covenant of Mayors in the Western Balkans and Türkiye”, GIZ has supported the preparation of SECAP documents for four Montenegrin municipalities. Several municipalities have already adopted their SECAPs, while others are in various stages of the process (drafting, public consultations, or adoption).

It is important to note that 12 out of 25 municipalities in Montenegro are currently registered on the Global Covenant of Mayors platform.

In relation to the dimension Decarbonisation and dimension Research & Innovation it is important to mention the establishment of the Draught Management Centre for South-Eastern Europe (DMCSEE), and South-East European Multi-Hazard Early Warning Advisory System (SEE-SHPPWS-A) initiated by the World Meteorological Organisation (WMO). The South-East European Consortium for Operational Weather Prediction (SEECOP) was established in March 2015 and supported by the directors of hydro-meteorological services of the WB economies.

Medium to long-term weather forecasting, which includes statistical assessment, finds its use in planning of activities, particularly in agriculture and energy sector, providing data necessary for risk and financial loss reduction. Responsible institution for climate monitoring and long-term forecast in the region is South East European Virtual Climate Change Centre (SEEVCCC) hosted by the Hydrometeorological Institute of Serbia. Expansion of these regional initiatives and ensuring dissemination of information to serve the regional needs and priorities, including those in the energy sector, are expected.

iv. Administrative structure of implementing national energy and climate policies

The Ministry of Energy and Mining is responsible for the adoption, implementation, and monitoring of policies in the areas of energy, energy efficiency, mining, oil, and gas. The Ministry of Energy prepares laws and regulations on energy and energy efficiency, as well as strategies and programs, and is responsible for developing policies and measures aimed at achieving the established targets for energy savings and renewable energy.

Ministry of Ecology, Sustainable Development and Northern Region Development / The Directorate for Climate Change and Sustainable Development is the main national entity responsible for climate change policy and the National Focal Point to the UNFCCC. The Ministry of Ecology, Sustainable Development and Northern Development performs administrative tasks related to: the preparation and monitoring of regulations and strategic planning of the system in the fields of ecology, sustainable development and northern development; the system of integrated environmental protection and sustainable use of natural resources; the area of environmental impact assessment and strategic environmental impact assessment, integrated pollution prevention and control; nature protection; air quality; climate change and the approval and monitoring of projects implemented with the aim of mitigating the effects of climate change; ozone layer protection; protection from noise and vibration; chemicals; radiation protection (radioactive substances and ionising radiation); non-ionising radiation; and soil protection from pollution.

The **Environment and Nature Protection Agency (ENPA)** is the responsible authority and main body for coordinating and articulating GHG inventory development, implementing inventory quality assurance procedures, maintain activity database, processing, storage and inventory reporting, data collection and data quality improvement, implementation of QA/QC procedures and uncertainty assessments, archiving data as well as keeping records.

The **Energy and Water Regulatory Agency of Montenegro (REGAGEN)** is the national regulatory authority (NRA) responsible for regulating energy activities. It is in charge of the drafting, adoption, and implementation of secondary legislation in accordance with the Energy Law, the issuance of licenses, supervision of the wholesale energy market, and monitoring the operations of energy companies engaged in regulated activities. The Agency was established in 2004 and is legally separate and functionally independent from any other public or private entity in Montenegro.

The **Hydrocarbon Authority** provides operational support to competent bodies for activities related to hydrocarbon exploration and exploitation, activities for ensuring compulsory stocks of oil and petroleum products, hydrocarbon operations safety, hydrocarbon resource management and monitoring the concession agreement. The Hydrocarbon Authority has been designated as the body responsible, on behalf of the state, for establishing at least 50% of the mandatory reserves of petroleum products, while the remaining reserves will be established by petroleum product importers. The Directorate and importers of petroleum products are required to maintain a minimum level of mandatory reserves equivalent to 90 days of net imports or 61 days of domestic consumption in Montenegro, whichever quantity is greater. Furthermore, the Law stipulates that the mandatory reserve system in Montenegro shall be

financed through a reserve-holding fee. The Directorate forms reserves in the form of finished products, while importers may choose the form in which they hold their reserves, either as physical stocks or through contractual rights, known as “tickets.”

In accordance with the Law on Security of Supply of Petroleum Products, a **Council for Ensuring the Secure Supply of the Petroleum Products Market** has been established for a four-year period. Its primary role is to monitor the situation on the petroleum products market and to propose to the Government decisions on the release of mandatory petroleum reserves and the implementation of other measures to prevent or address potential disruptions in the supply of petroleum products.

The **Electricity Market Operator (COTEE)** was established in July 2011 as a limited liability company wholly owned by the state. It performs the public service of organizing the electricity market and is responsible for analyzing and proposing measures to improve its functioning in accordance with the Energy Law, market rules, and international standards. COTEE is also responsible for managing the incentive system for the generation of electricity from renewable energy sources and cogeneration, which includes collecting fees from suppliers, calculating and allocating funds based on contracts with eligible producers entitled to incentives, and issuing guarantees of origin for electricity produced from renewable sources and high-efficiency cogeneration.

The **transmission/distribution system operators (CGES/CEDIS)** are responsible for transmission and distribution of electricity within the grid.

The **Fund for Environmental Protection (Eco Fund)**

The main activity of the Eco Fund is financing the preparation, implementation and development of programmes, projects and similar activities in the field of the preservation, sustainable use, protection and improvement of the environment, energy efficiency and the use of renewable energy sources at the national and local levels. Eco fund may also participate in the co-financing of aforementioned programmes, projects and activities which are conducted on the territory of Montenegro, organized and financed by international organizations, financial institutions and bodies, as well as other foreign legal entities. The beneficiaries of the Eco-Fund funds can be: companies and other legal and natural persons registered in accordance with the law, local self-government, state administration bodies and other independent legal entities financed from the state budget, non-profit organizations and individuals.

Chaired by the Deputy Prime Minister for Infrastructure and Regional Development, a multi-institutional **National Council for Sustainable Development, Climate Change and Integrated Coastal Zone Management** has been established as an advisory body to the Government of Montenegro, with the aim of ensuring inter-institutional coordination and cooperation. The Council reviews national documents and provides suggestions and approval to the Government before their adoption.

In addition, the **National Council for Just Transition (NCJT)** has been established, chaired by the Minister of Energy and Mining. It serves as the central body for guiding and coordinating the transition process in line with national development goals, European standards, and the needs of local communities—particularly Pljevlja, which is at the center of this process.

The **Council for Innovation and Smart Specialisation** is a body which should coordinate policies and funding sources under the sustainable smart specialization, approve programmes and budget of the Innovation Fund and make informed decisions based on the continuous Entrepreneurial Discovery Process. The Council under the Law on Innovation Activity was constituted in 2021.

1.3 Consultations and involvement of national entities and their outcome

The NECP is the subject of hearings, discussions, and exchanges of opinions with the following stakeholder groups: various ministries and agencies directly or indirectly affected by the NECP — including the Ministry of Energy and Mining, Ministry of Ecology, Sustainable Development and Northern Region Development, Ministry of Agriculture, Forestry and Water Management, Ministry of Education, Science and Innovation, Ministry of Finance, Environmental Protection Agency (AZZZŠ), Eco-Fund, CGES, EPCG, CEDIS, REGAGEN, COTEE, BELEN, and the Hydrocarbon Administration — as well as local authorities, civil society, energy experts, and various business associations.

Stakeholders are partially or fully involved throughout the entire cycle of development, implementation, and monitoring of the NECP. Additionally, a public consultation and cross-border consultations on the draft NECP were organized, based on which the document was updated.

i. Involvement of the national parliament

A plenary session with the Parliament on the NECP is organized, to explain that a successful NECP is based on ambitious targets, clear policies and measures, a sufficient investment package (a part provided by state budget), implementation of measures, naming the responsible institutions, and an effective monitoring process. According to the Law, the NECP is adopted by the Government. Presentation in Parliament is not mandatory (not envisaged in the Law), therefore involvement and support of the Parliament, although welcome, should be elaborated procedurally and substantially.

ii. Involvement of local and regional authorities

The local governments are active stakeholders during the process of drafting and implementing the NECP as they play a key role for the implementation of the EE measures in building projects, transport and services areas. In line with the Energy Law, the local authority is obliged to consult the Ministry and State aid authority when developing the local energy plan and to report on its implementation. This ensures the alignment of goals, policies, and measures at all levels in order to achieve integrated and coordinated action.

iii. Consultations of stakeholders, including the social partners, and engagement of civil society and the general Public

Consumers association, other non-governmental associations, etc. are informed through Social Media channels.

Through the work of the Technical Working Group, the two local NGOs dealing mostly with energy, climate and environment issues but also with social and health issues, are involved with very active participation and engagement. The NGOs are addressing problems with lignite and generally fossil fuels combustion, providing the possible solutions for the phasing the coal out. The NGO sector is involved in the NECP technical Working Group (tWG) from the very beginning, being invited to the consultations along with the public institutions representatives. The civil society organizations remain an important partner within the whole NECP process.

In accordance with the Law on Strategic Environmental Assessment, a Strategic Environmental Assessment (SEA) procedure was carried out for Montenegro's National Energy and Climate Plan, with the aim of identifying, evaluating and integrating environmental and human health considerations into the planning of energy and climate policies and measures.

The results of the SEA indicate that the implementation of the National Energy and Climate Plan, with the application of the defined protective measures and recommendations, may have predominantly positive long-term effects on the environment, particularly in terms of:

- reducing greenhouse gas emissions,
- increasing the share of renewable energy sources,
- improving energy efficiency,
- reducing air pollution and pressures on public health.

At the same time, the SEA identified potential negative impacts associated with the development of energy infrastructure (especially large RES projects, the electricity grid and related facilities), which may affect biodiversity, land use, landscape and protected areas. For these impacts, appropriate avoidance, reduction and mitigation measures have been defined, with an emphasis on the need to conduct project-level environmental impact assessments (EIA), in accordance with applicable regulations.

It was concluded that the NECP, as a strategic document, does not define specific project locations but rather establishes a framework for policies and measures, and that potential local and cumulative impacts will be examined in detail in later stages of planning and implementation of individual projects, through environmental impact assessment procedures.

It is also important to emphasize that the Environmental Protection Agency issued to the Ministry of Energy and Mining the Act on Nature Protection Guidelines and Conditions, No. 03-D-1164/6 of 12 May 2025, which forms an integral part of the report.

Within the SEA procedure, possible transboundary impacts of implementing the National Energy and Climate Plan were also examined, in accordance with Montenegro's international obligations and relevant conventions.

A transboundary consultation procedure was conducted, during which potentially affected states were notified. During this process, the competent authorities of Albania and Italy submitted their comments and opinions. The received suggestions and remarks were analysed

and, where relevant and justified, incorporated into the Strategic Environmental Assessment Report, thereby further improving the quality of the document and ensuring the consideration of transboundary impact aspects.

Based on the conducted SEA procedure, including consultations with competent institutions, the interested public and the states in a transboundary context, it was concluded that Montenegro's National Energy and Climate Plan represents an acceptable strategic framework from an environmental protection perspective, provided that the SEA recommendations and measures are consistently implemented during its execution.

iv. Consultations of other Contracting Parties

The Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action stipulates that Member States must cooperate and consult with one another during the preparation of their NECPs. The obligation to conduct cross-border consultations with neighbouring countries in the preparation of their plans, before finalising them, is clearly emphasised. These consultations should allow neighbouring states to provide comments on possible cross-border effects of the policies or measures envisaged in the NECP. The aim is to eliminate negative cross-border impacts, ensure alignment with regional plans, enable better integration of energy markets, and enhance security of supply.

As part of the public consultation on the NECP document, the Ministry of Energy and Mining also carried out cross-border consultations, which were completed on 20 October 2025. Within the cross-border consultation process, Albania and Italy submitted comments and suggestions. The comments and suggestions relate to the NECP and the SEA. Particular emphasis was placed on the need to further improve cooperation on future cross-border projects. In addition, a number of suggestions were made in the field of the energy sector (the impact of TPP Pljevlja on targets, the expansion of citizen energy, electrification of transport), air pollution, waste management, and special attention was dedicated to biodiversity. The need to increase the pace of transposition of EU legislation into national law was also highlighted. All of the aforementioned suggestions were taken into account in the NECP and SEA documents.

It should be emphasised that both countries concluded that there are no significant cross-border impacts caused by the implementation of Montenegro's NECP.

More information on policies and measures implemented based on a cross-border or regional collaboration is available in the respective chapter 1.4.

v. Iterative process with the Energy Community Secretariat

The Energy Community Secretariat has been involved from the beginning and has supported the NECP technical Working Group with input in the drafting phase, the discussion of preliminary versions and consultations with EnCS in accordance with the Recommendations 2018/01.

The Secretariat has participated in the following meetings:

- Virtual meetings for informal coordination among the members of the core team
- NECP technical Working Group meetings
- Other coordination meetings

1.4 Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Contracting Parties

The Energy Community and the Transport Community are an important basis for regional cooperation:

- Established in 2005, the **Energy Community** brings together the European Union and its neighbours to create an integrated pan-European energy market. Its key objective is to extend the EU internal energy market rules and principles to South East Europe, the Black Sea region and beyond on the basis of a legally binding framework. A stable regulatory and market framework capable of attracting investment in power generation and networks, right conditions for cross-border energy trade, enhanced security of supply and increased uptake of renewable energy and energy efficiency are the Community's core axes of focus. It will remain a crucial promoter of clean energy transition rules and standards in the Western Balkan region.
- The **Transport Community Treaty** in force since 2017 aims at the integration of the Western Balkan transport market systems in the EU. To achieve this, the Treaty foresees the setting up of technical committees to assist partners in transposing the acquis and implementing appropriate reforms. The Transport Community can be instrumental in identifying the priority transport investments with a focus on the TEN-T, addressing regulatory barriers to green transition, and promoting and developing green mobility strategies and investments throughout the region, as well as mainstreaming the environment in all aspects of transport. In this vein, the **Transport Community** is developing a rolling work plan for the development of priority projects, which shall contribute, to a balanced sustainable development in terms of economics, spatial integration, environmental and social impact.

Joint or coordinated planning with other Contracting Parties is based also on the following policies shown in the table below.

Policies	NECP dimensions of joint or coordinated planning
The Western Balkans Strategy acknowledges the efforts the countries need to do to progress with alignment in the field of environment. The Strategy also prioritises to expand the Energy Union to the Western Balkans.	Energy Union (all dimensions of the NECP)
The Declaration of the EU-Western Balkans Summit in Sofia in May 2018 specifically refers to helping the Western Balkans move faster towards sustainable and climate friendly societies in line with the Paris Agreement.	Decarbonisation, Energy Security, Research, Innovation and Competitiveness
The 2019 Communication on EU Enlargement Policy confirmed that there is considerable scope for the Western Balkans to embark on a	Decarbonisation

Green Agenda, for the region to address environmental issues such as waste management, air pollution and climate change.	
In the joint “Statement on Clean Energy Transition for the Western Balkans” signed in Podgorica on 21 February 2019, the Western Balkans ministers of energy and of environment confirmed their will to align as swiftly as possible with the EU's energy, climate and environmental policies and the long-term objectives of the Paris Agreement, by this contributing to the well-being of citizens and the sustainable development of the region. This transition should reduce energy imports, develop renewable energy sources, strengthen regional energy security, unlock greater economic growth, and address persistent air and related health pollution challenges.	Decarbonisation, Energy Security, Research, Innovation and Competitiveness
In the conclusions of the Berlin 6 Summit in Poznań in July 2019 , the Western Balkans leaders expressed their willingness “to work together for the launching of an ambitious Green Agenda, to contribute to the leading efforts of the EU in fighting climate change, protecting the environment and to unlock the economic potential of the green, low carbon and circular economy in the region. The Leaders confirmed their readiness to meaningfully contribute to such an agenda, which was presented at the EU Western Balkans Summit being hosted by Croatia in May 2020.”	Decarbonisation, Research, Innovation and Competitiveness
The Zagreb Summit Declaration (May 6, 2020) concludes that a prominent role should be given to the association of the region to the EU's climate-related ambitions, in line with the Paris Agreement, to promoting the Green Agenda for the Western Balkans, as well as to furthering the digital economy and, strengthening connectivity in all its dimensions: transport, energy, digital and people-to-people, including tourism and culture. Energy security should be prioritised, including the diversification of sources and routes.	Decarbonisation, Energy Security, Research, Innovation and Competitiveness

Table 1-6: Policies and NECP elements of joint or coordinated planning

Regional cooperation provides the opportunity for tackling common problems and for sharing knowledge and good practice. The EU has been financing dedicated regional cooperation projects in the area of environment and climate for a number of years shown in the table below.

Projects	NECP dimensions
The Regional Environmental Network for Accession (RENA) project contributed to environmental and climate improvements in the Western Balkans and approximation of the region to EU standards.	Decarbonisation
The Environment and Climate Regional Accession Network (ECRAN) which provided a link between regional aspects and national priorities in these areas, continued to strengthen regional cooperation between the candidate countries and potential candidates. The continuation of ECRAN was achieved through the Regional Implementation of Paris Agreement Project (RIPAP) project in 2018 where regional cooperation in the field of climate change was achieved. It is currently followed up by the EU Environment Partnership Programme for Accession and the EU Support for Climate Action in IPA II beneficiaries “Transition towards the low emissions and climate-resilient economy”	Decarbonisation

(TRATOLOW), which supports the EU integration of the Western Balkan partners in the field of environment and climate.	
The Regional Cooperation Council (RCC) could play an important role in building the regional dimension of the Green Agenda. The RCC is a regionally owned and led cooperation framework aiming at advancing the European and Euro-Atlantic integration of the region. It works to develop and maintain a political climate of dialogue, reconciliation, tolerance and openness towards cooperation through the implementation of regional initiatives aimed at economic and social development. In terms of environment and climate change, RCC maintains a permanent high-level regional policy dialogue and supports regional cooperation towards achieving Paris Climate commitments and 2030 energy and climate targets.	Decarbonisation

Table 1-7: Projects and affected NECP dimensions

Capacity building and **financing** are the pillars for planning and implementing joint or coordinated activities and are described in more detail in the sections below.

Capacity building for regional cooperation

The Energy Community will keep monitoring the implementation of an expanding EU acquis and will engage in the newly launched initiative for **Coal Regions in Transition Platform for the Western Balkans and Ukraine**. Many of the actions proposed here will require strong capacity building components. In addition to the traditional consultancy-type assistance, DG NEAR oversees two important instruments for administrative capacity building which can be useful in the delivery of the Agenda. **The Technical Assistance and Information Exchange (TAIEX)** supports public administrations with regard to the approximation, application and enforcement of EU legislation as well as facilitating the sharing of EU best practices. It is needs-driven and delivers short-term tailor-made expertise on the transposition, implementation or enforcement of a specific part of EU legislation. **Twinning** is a European Union instrument for institutional cooperation between Public Administrations in the Member States and the beneficiaries. It brings together public sector expertise to achieve concrete results through peer to peer activities defined in a medium term programme. Both TAIEX and Twinning are important instruments when it comes to capacity building in the Western Balkans.

Energy and climate planning issues related with the Energy Market are consulted with other Contracting Parties: In terms of promoting and further facilitating the implementation of the Gas Master Plan, inter-ministerial cooperation has already been established between Albania, Montenegro, Bosnia and Herzegovina and Croatia on the IAP (Ionian Adriatic Pipeline) project.

Financing regional cooperation

The Green Agenda for the Western Balkans is one of the key actions listed in the annex to be achieved. In October 2020, the Commission prepared **An Economic and Investment Plan for the Western Balkans** aiming to spur the long-term recovery - backed by a green and digital transition - leading to sustained economic growth, implementation of reforms required to move forward on the EU path, and bringing the Western Balkans closer to the EU Single Market. In addition to this and based on the approach of the European Green Deal, a **Staff Working Document setting out a Green Agenda for the Western Balkans** is also prepared, containing relevant actions and recommendations, including alignment with the EU standards and the acquis.

During the **Western Balkans Sofia Summit**, held on 10 November 2020, the region reached an important milestone by endorsing the Leaders' Declaration on the Green Agenda that aligns with EU Green Deal. Declaration is to support and accelerate changes and processes in the region with the overarching goal of addressing climate change. Also, the Global Climate Summit was held on December 12, 2020 where national governments leaders were invited to present more ambitious and high-quality climate plans at the summit, as well as the private sector and civil society.

The objective of the 2023 **Growth Plan** for the Western Balkans proposed by the European Commission is to:

- integrate the Western Balkan partners into the EU Single Market,
- improve regional economic cooperation,
- deepen EU-related reforms, and
- increase pre-accession funding to accelerate the socio-economic convergence of the Western Balkans with the EU.

The Growth Plan supports the preparation of Western Balkan countries for EU membership, aiming to significantly accelerate both the enlargement process and the economic growth of the region over the next decade. To successfully implement this process, a new financial instrument worth €6 billion has been adopted — the *Reform and Growth Facility for the Western Balkans 2024–2027*.

Key topics for regional cooperation:

- Infrastructure projects
- Integration of energy markets
- Fossil fuel phase out, including elaboration on aspects such as base load coverage and just transition, to support the change of paradigm.
- Research, innovation and competitiveness: Research infrastructure is expensive and hardly affordable for small countries. Regional collaboration among Western Balkan countries could contribute to innovation and competitiveness of the participating countries.

Challenges for regional cooperation:

- Coverage of upfront transaction cost (project development cost needed to start an activity)
- Lack of alignment of government programs
- Government programs are geared towards the short term, while the priority issues described above are long-term in nature

ii. Explanation of how regional cooperation is considered in the plan

Regional cooperation is facilitated by working group meetings organised by the Energy Community Secretariat.

The CDCP III project has facilitated regional cooperation between Montenegro and Albania to exchange information and experience especially about Modelling approaches for Part B of the



NECP. GIZ implements the regional program “Capacity Development for Climate Policy in the Countries of South East, Eastern Europe, the South Caucasus and Central Asia, Phase III (CDCP III)”.

At the regional level (Energy Community), regulatory bodies harmonize the concepts of implementation of EU legislation through the Energy Community Regulatory Board (ECRB) or the ECRB working groups. These working groups provide a platform for discussing NECP topics of regional importance.

2 NATIONAL OBJECTIVES AND TARGETS

Definition of national objectives and targets is largely based on Part B of the NECP, where PaMs are modelled in the WEM scenario and WAM scenario. PaMs considered in the scenarios are shown in table 4.3 including descriptions of the effects on variables.

The operation of the Thermal Power Plant (TPP) Pljevlja plays a key role in achieving the NECP targets. It should be noted that there is a conflict of objectives between GHG savings and contributing to energy security in Montenegro, which can only be resolved with a long-term time horizon.

Comparison of NECP 2030 targets with EnC targets according to [Decision 2022/02/MC-EnC](#)⁶⁸ demonstrates compliance as shown in the next table.

The EnC targets for Montenegro are also presented to demonstrate compliance with the EnC provisions respectively to show that the targets are in the same order of magnitude as the results of the WAM scenario.

Key Objectives	EnC Targets for Montenegro ⁶⁹	National targets	WEM scenario in 2030	WAM scenario in 2030
Primary energy consumption	0,92 Mtoe	0.92 Mtoe	0.98 Mtoe	0.90 Mtoe
Final energy consumption	0,73 Mtoe	0.73 Mtoe	0.76 Mtoe	0.72 Mtoe
Share of renewables in the gross final energy consumption	50 %	50 %	43 %	53 %
GHG emission decrease ⁷⁰	55 % (total 2.42 MtCO _{2eq})	55 % (total 2.42 MtCO _{2eq})	total 3.06 MtCO _{2eq}	total 2.40 MtCO _{2eq}

Table 2-1: Comparison of NECP Targets with EnC Targets

2.1 Dimension Decarbonisation

2.1.1 GHG emissions and removals

Basic information from Part B of the NECP regarding the national target for GHG emissions by 2030 is shown in the tables below.

Total GHG emissions (kt CO_{2eq} without LULUCF) as projected for 2030 with existing measures amounts to 3058.7 kt CO_{2eq}, whereas the values in WAM reach 2401,5 kt CO_{2eq}, which corresponds to a reduction of 21.5% relative to WEM values. In comparison with 2022, WAM entails a decrease of emissions of 27.4% in 2030, later 40.8% in 2040, and 78.4% in 2050. The

⁶⁸ <https://www.energy-community.org/implementation/package/CEP.html>

⁶⁹ <https://www.energy-community.org/implementation/package/CEP.html>

⁷⁰ This target excludes LULUCF emissions and removals.

WEM scenario sees a decrease of emissions by 15.1% in 2030 compared to 2022, and a decrease by 22.4% in 2050.

The analysis shows that highest emissions are generated by the sectors Transformation (mainly electricity production) and Demand, and within Demand, Transport and Industry are the main emitter of greenhouse gases. These sectors require special attention.

The following tables show an overview of GHG emissions as projected by WEM and WAM scenario.

Sector	WEM 2030	WAM 2030
Demand	1,049.1	814
Transformation (mainly electricity production)	1,280.6	1,014
Non-Energy (without LULUCF)	729	573.5
Total	3058.7	2401.5

Table 2-2: GHG emissions [kt CO₂eq] as projected with existing measures (WEM) and with additional measures (WAM) for 2030 for the Whole economy

Sector	WEM 2030	WAM 2030
Residential	11.4	1.4
Services	33.6	33.6
Industry	250.2	206.8
Transport	742.7	610.2
Agriculture Forestry	11.2	10.6
Total	1,049.1	813.5

Table 2-3: GHG emissions [kt CO₂eq] as projected with existing measures (WEM) and with additional measures (WAM) for 2030 for the specific Demand sectors

Sector	WEM 2030	WAM 2030
IPPU (Industrial Processes and Product Use)	186.5	183.9
Agriculture	204.9	205.8
LULUCF ⁷¹	-2,440.4	-2,616.9
Waste	337.6	183.8
Total	-1,711.4	-2,043.4
Total (without LULUCF)	729	573.5

Table 2-4: GHG emissions [kt CO₂eq] as projected with existing measures and with additional measures for 2030 for the specific Non-Energy sectors

The updated NDC target, adopted in 2025, of a 55% reduction by 2030 compared to 1990 levels, represents a significant increase in ambition compared to the updated NDC from 2021. However, it is evident that this target cannot be achieved with the measures currently planned.

⁷¹ In this table, the effect of LULUCF (emission sinks) is shown for informational purposes only, but its effect is not taken into account in the national target. According to the EnC decision, Montenegro's target is not linked to net emissions. Emission sinks are excluded from the target.

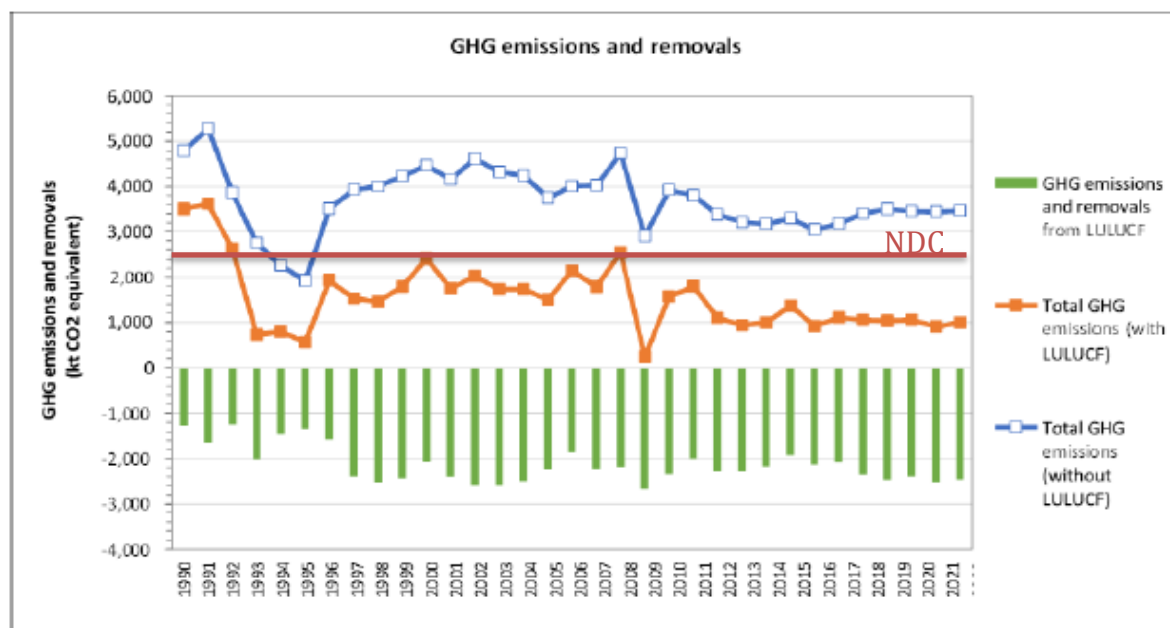


Figure 6: Comparison of past emission trend and INDC target (-55% by 2030 compared to 1990)

Regarding the data and methods applied in the GHG inventory for calculating emissions, removals in the LULUCF sector are excluded. Key challenges and issues remain for the future development of the LULUCF sector. The proposed revised NDC target takes the LULUCF sector into account.

Other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies

ICAO National Action Plan for reducing CO₂ Emissions in Civil aviation was approved in July 2013.

The Low-Carbon Development Strategy (LCDS) to 2050 is in its final stage of preparation, while the Climate Change Adaptation Plan for 2025–2035 focuses on strengthening Montenegro's resilience and enhancing its capacity to adapt to climate change, with the aim of effectively managing key climate risks in Montenegro through the application of a transformative adaptation strategy. In this way, the CCAP aims not only to mitigate the consequences of climate change but also to reduce the underlying causes of vulnerability in the long term, thereby contributing to Montenegro's long-term vision of climate resilience.

Regulation on Activities or Operations Emitting Greenhouse Gases for Which the Permit for Greenhouse Gas Emissions has been Issued (2020) shall govern activities or operations emitting greenhouse gases for which the permit for greenhouse gas emissions has been issued, the total amount of emission allowances to be allocated in relation to the initial status of the greenhouse gas emissions, the method of carrying out the auction for allocation of emission allowances, the minimum price of emission allowances offered in the auction, allocation of emission allowances free of charge, use of funds collected through the auction for allocation of emission allowances, and the method of keeping records of allocated emission allowances, their transfer and use.

Outlook up to 2050

The outlook to 2050 shows that existing policies and measures (WEM scenario) are appropriate to reduce GHG emissions in the demand sectors and to increase the carbon sinks, with the exception of Transformation (mainly electricity production), where the emissions remain the same. The WAM scenario shows a major change in the Transformation sector which is attributed to the change in operation of TPP Pljevlja.

Sector	WEM 2050	WAM 2050
Demand	838.3	412.6
Transformation	1,261.0	36.5
Non Energy (without LULUCF)	468.1	277.7
Total	2567.4	726.8

Table 2-5: GHG emissions [kt CO₂eq] as projected with existing measures and with additional measures for 2050 for the Whole economy

Until 2040 the largest part of emissions reduction appears in the non-energy and demand sectors, while by 2045 the largest part of emissions reduction is due to the transformation sector and the phasing out of the thermal power plant.

Sector	WEM 2050	WAM 2050
Residential	7.4	0.9
Services	27.2	27.2
Industry	306.0	153.0
Transport	486.9	221.4
Agriculture Forestry	10.7	10.1
Total	838.3	412.6

Table 2-6: GHG emissions [kt CO₂eq] as projected with existing measures and with additional measures for 2050 for the specific Demand sectors

Sector	WEM 2050	WAM 2050
IPPU (Industrial Processes and Product Use)	85.6	82.2
Agriculture	133.3	144.5
LULUCF	-2,416.8	-2,642.6
Waste	249.2	51.0
Total	-1,948.7	-2,364.9
Total (without LULUCF)	468.1	277.7

Table 2-7: GHG emissions [kt CO₂eq] as projected with existing measures and with additional measures for 2050 for the specific Non-Energy sectors

Sector Transformation/TPP Pljevlja: In addition to the Environmental Reconstruction Project, which was necessary to allow the lignite-fired Pljevlja Thermal Power Plant to operate during the specified period and to contribute to the implementation of a successful and just energy transition, there are plans for the construction of new renewable energy facilities, as well as indications of the possible use of natural gas, which would represent a temporary solution for the energy transition. In cooperation with the EPCG company, the possibility of

implementing a pilot project for using the Pljevlja Thermal Power Plant's capacity for energy storage is being considered.

2.1.2 Renewable energy

Basic information from Part B of the NECP regarding the national target for RES shares by 2030 is shown in the table below.

RES shares in final energy demand

In overall terms, the additional measures increase the share of renewables in final energy from 42.8% (WEM scenario) in 2030 to 53.3% (WAM scenario).

The table below shows RES shares in final energy demand, calculated according to EUROSTAT SHARES methodology with existing (WEM) and additional measures (WAM) in 2030.

Sector	WEM 2030	WAM 2030
RES E	66.3	79.4
RES T	7.2	24.4
RES HC	48.8	49.2
RES	42.8	53.3

Table 2-8: Renewable shares (%) in 2030 in final energy demand

In terms of renewable energy supply, hydropower accounts for the lion's share, followed at some distance by wind and solar energy.

Estimated trajectories for the sectoral share of renewable energy in final energy consumption from 2021 to 2030 in the electricity, heating and cooling, and transport sector

Estimated trajectories by renewable energy technology are available in Part B of the NECP in Table 4.9.

Estimated trajectories by renewable energy technology

Estimated trajectories by renewable energy technology are available in Part B of the NECP in Table 4.10.

Estimated trajectories on bioenergy demand

Estimated trajectories on bioenergy demand are available in Part B of the NECP. Table 4.12 presents the Shares of wood final energy demand by sectors Residential, Services, Industry, Agriculture/Forestry.

2.2 Dimension Energy Efficiency

National target of increase in energy efficiency by 2030

Basic information from Part B of the NECP regarding the national target for increasing energy efficiency by 2030 is shown in the tables below.

Primary energy supply

In both the WEM and WAM scenarios, net energy demand is slightly decreasing in total towards 2050. In the WEM scenario, net primary energy consumption increases (compared to 2022) by 0.5 % until 2030 and decreases by 8.4 % until 2050. In the WAM scenario, it decreases by 6.4% in 2030 compared to 2022 and decreases by 32% in 2050. Comparatively, the consumption in the WAM scenario decreases compared to the WEM scenario by 6.9 % in 2030 and 23.6 % in 2050.

Final energy demand

In the WEM scenario, final energy consumption increases (compared to 2022) by 7.3 % until 2030 but then decreases by 3.8 % in 2050. WAM scenario increases by 1.3 % until 2030 and then decreases by 14.2 % in 2050. Comparatively, the final energy consumption in the WAM scenario decreases compared to the WEM scenario by 6 % in 2030 and 10.4 % in 2050.

Targets 2030	WEM 2030 Ktoe	WAM 2030 Ktoe
Total Primary Energy Supply (Production)	1,037.9	966.6
Final Energy Consumption	817.3	771.6

Table 2-9: Indicative national energy efficiency targets in 2030

The table below shows Final energy consumption (ktoe) for different demand sectors and as projected until 2030 and 2050.

Sector	WEM 2030	WEM 2050	WAM 2030	WAM 2050
Residential	231.5	162.4	231.5	162.4
Services	92.4	82.1	92.4	82.1
Industry	181.9	224.4	179.2	222.4
Transport	252.2	185.6	210.2	111.7
Agriculture Forestry	5.5	5.3	5.5	5.3
Non energy	53.8	72.6	52.8	69.7
Total [ktoe]	817.3	732.4	771.6	653.6
Total [Mtoe]	0.817	0.732	0.772	0.654

Table 2-10: Final energy consumption [ktoe] as projected with existing and additional measures for different scenarios

The major reduction in final energy consumption between the two scenarios is attributed to the transportation sector.

Cumulative energy savings in the period 2021-2030 in accordance with Article 7 (1) (b) on the energy efficiency obligation scheme of Directive 2018/2002 amending Directive 2012/27/EU on energy efficiency

Detailed information regarding EEO schemes and alternative measures is given in the 4th EEAP – Chapter 3.1.1 and Annex 1.

Targets 2030	Annual savings	Cumulative savings
According to Article 7 (3a) (b) (With the exceptions referred to in Articles 7 (2))	3.72	204.59

Table 2-11: Indicative annual and cumulative savings in 2030

Indicative targets of the long-term strategy of renovation of the national residential and non-residential building stock

Addressed by PaM EO4b “Development and implementation of energy efficiency regulatory framework in buildings: Long term renovation strategy and inspection of technical building systems”.

The total area of public administration buildings that are being renovated or equivalent savings in the period 2021-2030

Article 8 of the Law on efficient use of energy stipulates that state-owned, administrative buildings which are used by state authorities have to meet minimum energy efficiency requirements. The same article stipulates, that the Ministry in cooperation with administration body, which is competent for property affairs, shall prepare a three-year plan for reconstruction of administrative buildings.

Article 5 focuses on the annual renovation of 1% of the total treated (heated / cooled) space of buildings owned by central administration bodies and occupied by members of the central authorities in Montenegro. According to the available data on inventory of buildings of the central administrative buildings, the total heated area is 72,235 m².

Considering the preliminary estimations and the condition of the existing buildings including space heating and cooling systems, a unit final energy savings of 130 kWh/m² has been estimated. The renovation of 1% of the heated space results in an annual mandatory share of 722.35 m², which, taking into account the adopted assumptions, results in an annual saving of 93.9 MWh or 0.008 ktoe annually.

Long-term renovation strategies for the national stock of residential and non-residential buildings

In accordance with Article 2a of Directive 2018/844 amending Directive 2010/31/EU on the energy performance of buildings (EPBD), Montenegro has prepared a long-term study to

promote investment in the renovation of the national building stock, including a plan of measures and indicators for 2030, 2040, and 2050, which will be aligned with the National Energy and Climate Plan (NECP) and the Low-Carbon Development Strategy.

Addressed by PaM EO4b “Development and implementation of energy efficiency regulatory framework in buildings: Long term renovation strategy and inspection of technical building systems”.

National objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling

No long-term targets or strategies and sectoral targets in the transport sector and with regard to heating and cooling planned.

Certain activities were initiated in the previous period with the aim of meeting the obligations from Article 14 EED, that stipulates that member countries shall prepare an overall analysis of potential of high-efficiency cogeneration, as well as efficient systems of district heating and air conditioning. According to the Energy Law, Article 20, a special Action Plan for the development and use of district heating and/or cooling and high-efficiency cogeneration, has been adopted for a ten-year period.

2.3 Dimension Energy Security

This dimension includes targets on security of supply, which is ensured by generation adequacy and system operation security.

A risk analysis and assessment of security in several scenarios to select the most sustainable policy and roadmap is not yet available as this is a project on its own.

The target is 100% security of supply that should be achieved by managing the availability of fluctuating renewable electricity, diversification of energy sources for base load coverage, and ensuring the stability of the electricity grid. In this regard, the electrification of the transport sector play important roles.

The sections below present relevant background information.

Electricity

The main characteristics of the Montenegrin power system in the recent years is a dynamic increase of domestic electricity production which results in the decrease of import dependency. All new power plants are RES and it is expected that the present trend further evolves.

The current electricity production mix is represented by:

- 2 large hydropower plants (307+342 MW),
- 1 large thermal plant (225 MW),
- 2 wind power plants (72+46 MW)

- 3 small solar power plants (cca 2 MW) and
- 30 small hydropower plants (cca 39.4 MW).

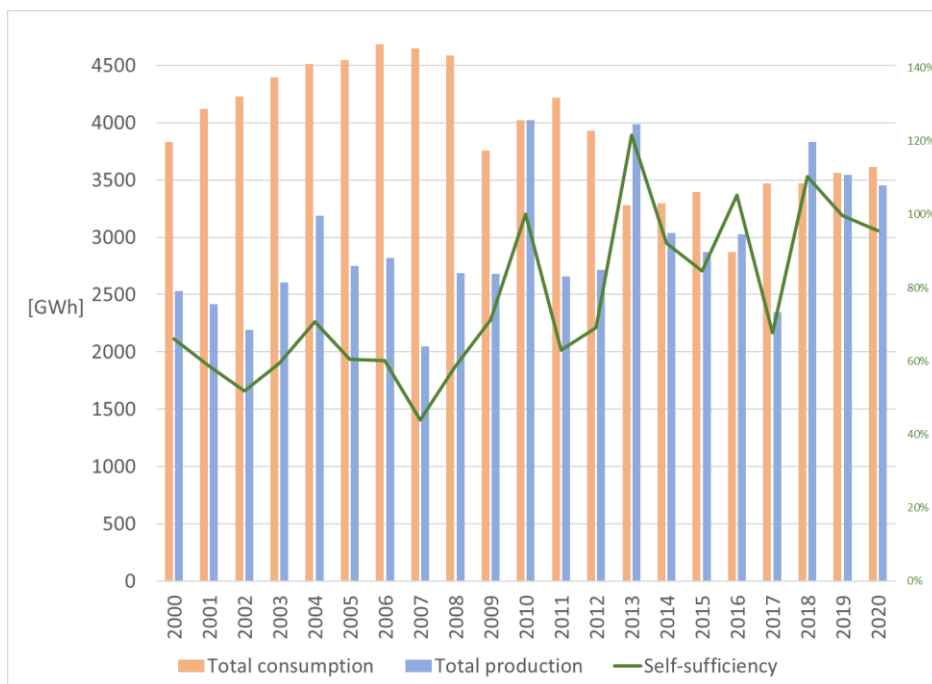


Figure 7: Electricity balance of Montenegro

The most dominant share in electricity production corresponds to 2 large HPPs (Figure 8), but TPP Pljevlja has also a very important share in the total annual electricity production. The low production costs and high production flexibility that characterize the aforementioned HPPs make them extremely important for electricity supply security, as well as for the integration of new renewable energy sources characterized by variable and less controllable generation. Their drawback is the dependence on hydrological conditions, which have been favorable in recent years (resulting in an increase in the share of HPPs in total generation).

On the other hand, the Pljevlja Thermal Power Plant (TPP) represents a very reliable source of power supply, and together with the aforementioned HPPs, forms the foundation of secure electricity supply. Small hydropower plants make their contribution but do not represent a significant alternative.

The potential opt-out of TPP Pljevlja and the increasing problems with lack of precipitation regarding HPP make it clear that the expansion of solar power and wind power are important targets.

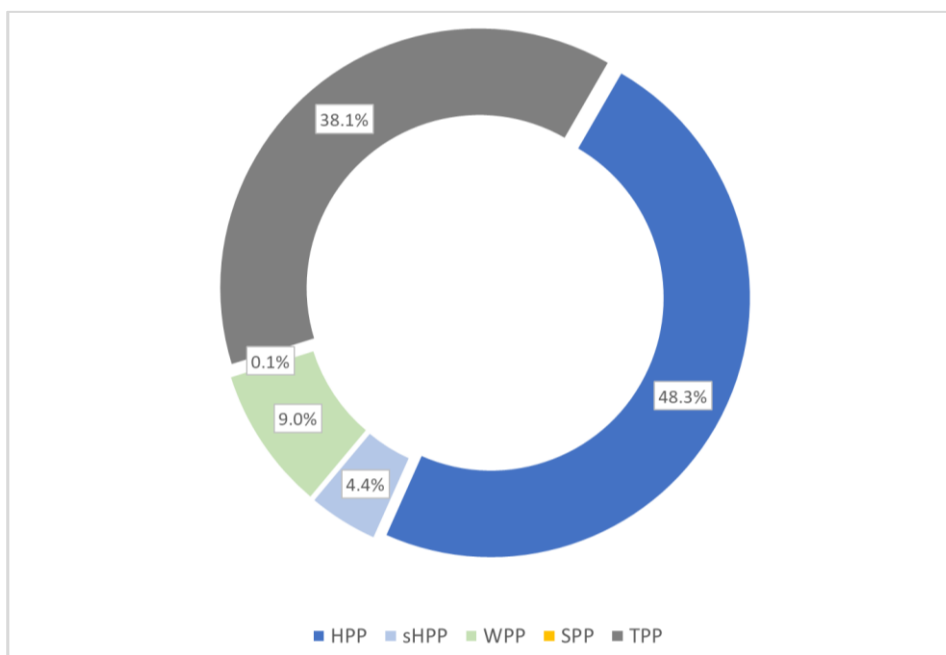


Figure 8: Electricity production structure in 2020

The share of RES in annual electricity production is highly dependent on hydrological situation (Figure 9), and it can reach 77 %, but the typical share of RES is about 60 %. It is expected that this share would further increase in the following years.

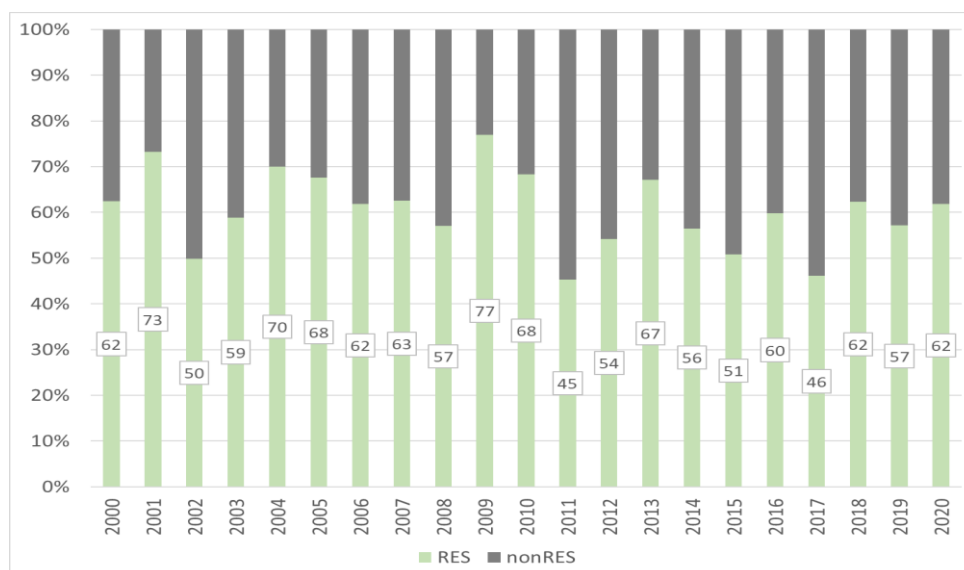


Figure 9: The share of RES electricity production in Montenegro

There are plans for several new wind power plants of similar size and solar PVs are recognized as power plants that will expand with the greatest dynamics since the utilization of their potential is currently very low.

Coal

The total Montenegrin needs for coal are produced in Montenegro. There are two main areas where the coal is exploited in Montenegro: Pljevlja area and Berane area. In these areas two types of coal are registered: lignite (Pljevlja) and brown coal (Berane). Currently, coal still plays an important role for energy security reasons, but due to climate impact a JUST TRANSITION process needs to be initiated in Pljevlja and Berane area. The gradual phase-out of coal is closely linked to the planned decommissioning of the Pljevlja Thermal Power Plant (TE Pljevlja), which is directly conditioned by the level of security of electricity supply to end consumers at affordable conditions, as well as by the overall socio-economic situation in the northern region. With the entry into force of various mechanisms — such as the Carbon Border Adjustment Mechanism (CBAM), the national Emissions Trading Scheme (ETS) and its alignment with the EU ETS — which significantly limit coal use, a gradual decommissioning of TE Pljevlja is planned, taking into account the above-mentioned aspects.

It is important to note that the timeline for aligning the national ETS scheme is directly conditioned by Montenegro's accession to the European Union. Although the expected year of EU accession is 2028, it is still unclear how the national emissions trading scheme will be adapted, as key issues remain open — including the rate of increase in emission prices, the annual reduction rates of allowed emissions, and the possibility of free allocation of emission allowances and their gradual reduction during the transition period. These factors will have a significant impact on the costs and profitability of TE Pljevlja's operation in the coming period.

The current expected year for decommissioning is 2041, but this primarily depends on the successful implementation of the just transition process and the maintenance of secure electricity supply.

Almost total annual consumption of the coal in Montenegro corresponds to TPP Pljevlja (1.4 million tons). The rest of it is consumed in local domestic or industrial boilers in Pljevlja.

Distribution network

It is an important target to improve the electricity distribution grid because it is very heterogeneous with respect to the network configuration, capacity, location, geographical consumption distribution, etc. which leads to challenging tasks in its exploitation and development planning.

The distribution network consists of the following voltage levels: 35 kV, 10 kV and 0.4 kV. Recently there is also 20 kV voltage level which is used for supplying highway infrastructure. Also, there are small parts of 6 kV voltage level as a remainder of old industrial grids.

The total length of medium voltage lines is 6,258.88 km (1,043.06 km (35 kV) + 5,215.82 km (10 kV)) in 2020. The share of cables is 27.67%, and it is increasing. The length of low voltage grid is 13,302.51 km. The share of low voltage cables is 15.63%. Total number of power substations (including 4 SS 110/10 kV) is 5,069, with installed power of 3,169.29 MVA.

There are 396,462 distribution network users in Montenegro. The most used indicators of operational quality of a distribution system are SAIFI and SAIDI. Their values for 2019 in Montenegro are 3,258.88 min and 34.51 respectively. However, due to the regional grid

characteristics the mentioned parameters are regionally monitored (Figure 10, Figure 11). It is evident that the performance of the grid is significantly better in central and southern regions of the country.

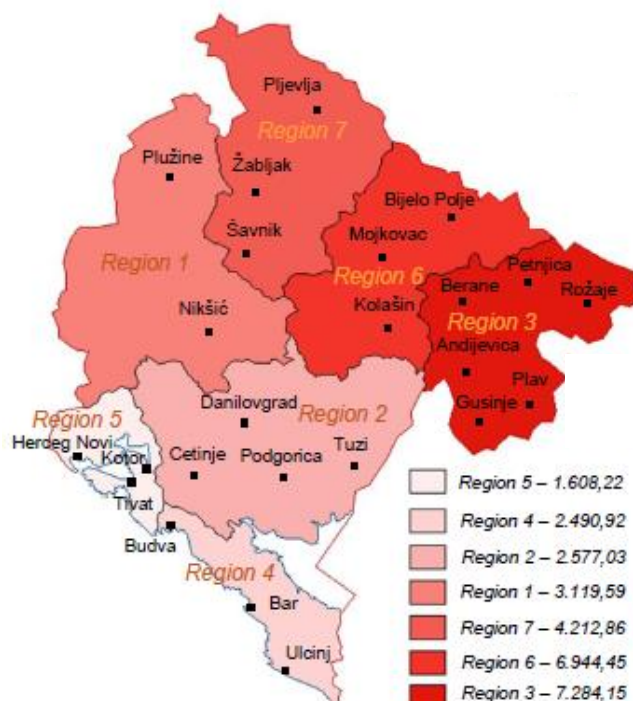


Figure 10: SAIFI values per distribution network regions

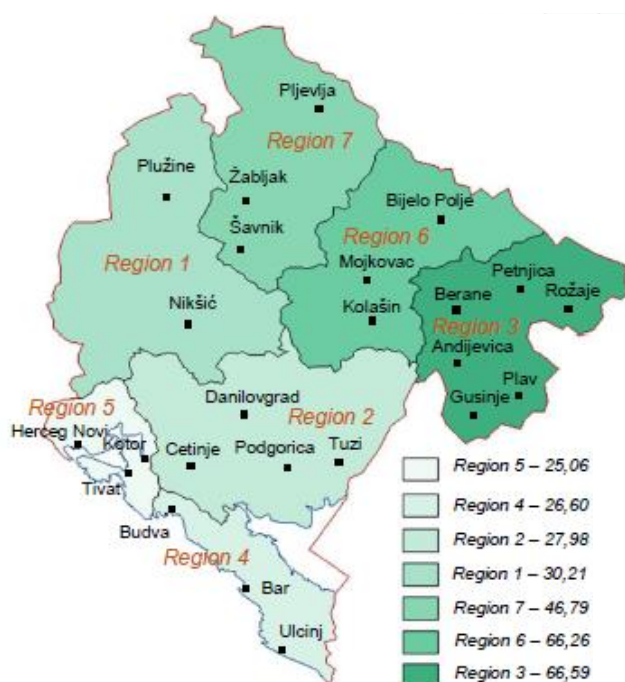


Figure 11: SAIDI values per distribution network regions

The 'Rules of minimum quality of supply of electricity' (2017) prescribe a rule according to which the Distribution System Operator is obligated to keep records of system reliability indicators, which are related to the operation and functioning of the system (SAIFI and SAIDI). The first year in which the SAIFI and SAIDI indicators were calculated is 2018, by manual collection at 35kV, 10kV and 0.4kV voltage levels. Such data collection carries risk of certain errors but CEDIS is certainly obliged to publish official data in its website of the values of the SAIFI and SAIDI reliability indicators at the end of the year.

The Network Management Sector in CEDIS has implemented the ISSCEDIS software solution, which one of the modules would be used for automated record keeping of interruptions throughout the territory of Montenegro. With the development of this software, the accuracy and acquisition of the data would be raised to a higher level, which would contribute to more efficient data processing, as well as system calculation at the level of all organization units.

Although there are no plans and projections for reducing SAIFI and SAIDI reliability indicators, as they have not been imposed by Energy Regulatory Agency, CEDIS is doing their best to reduce reliability indicators. The previous three-year period of data collection and processing and calculation of reliability indicators will serve CEDIS and the Energy Regulatory Agency to set achievable goals, all with the aim of better reliability and quality of delivered energy to the end consumers.

According to the Law on Energy of Montenegro, which is harmonized with the Energy Policy until 2030, Article 4 stipulates that "providing sufficient quantities of energy necessary for the life and work of citizens and business and development of economic entities and their safe supply, a safe, reliable and quality way, as well as energy development are in the public interest.

The Energy Law stipulates respective obligations the Distribution System Operator (DSO) has to comply with.

The Energy Development Strategy of Montenegro until 2030 states that the development of the ED network in recent years is not sufficiently harmonized with spatial planning documents, as a result of which EDS is not able to adequately respond to increasing consumption requirements, i.e. very intensive construction, especially in Podgorica and the coastal part of Montenegro, which often leads to investor dissatisfaction. At the same time, electrical losses in ED networks are still significantly above acceptable international standards. In a number of cases, especially suburban and rural networks, unsatisfactory voltage quality and longer power outages are recorded, which also leads to dissatisfaction of electricity customers.

In accordance with the Energy Development Strategy of Montenegro until 2030, the development of the ED network until 2030 should be planned so as to increase security of supply (provision of two-way power supply, especially in the most important points of the ED network) and reduce losses (technical and commercial) below 10%. To this end, it is necessary to envisage the construction of new 110/35 kV substations, reconstruction of existing 110/35 kV substations, expansion of 35/10 kV and 110/10 kV substations and reconstructions aimed at increasing the capacity of existing 35/10 kV substations. With the increase in electricity needs, the concept of ED network with two medium voltages (35 and 10 kV) has become

inadequate, especially in urban areas with higher load density. Conducted analyzes and international experiences have indicated the need to introduce direct 110/10 kV transformation, which began in Montenegro in the 1980s with the construction of the first 110/10 kV substations in Podgorica.

In the case of reconstructions and new constructions, all substations 35/10 kV will be prepared for remote control with the installation of numerical control, protection and measurement systems. In the future, the ED network will switch to remote control from a modern control center, which is envisaged by the Energy Development Strategy of Montenegro until 2030.

Due to global structural changes in the economy, energy sector and customer requirements, electricity distribution in general, and thus CEDIS, faces completely new challenges. The development of the national economy will significantly depend on the manner and dynamics in which CEDIS will solve the new challenges. Therefore, in addition to the current goals, it is necessary to introduce new elements in the development of CEDIS that will:

- create conditions for more intensive introduction of distributed RES plants into the ED network,
- support the development of new products on the electricity market with smart metering systems,
- create conditions for the introduction of DSM with modern communication systems and smart local and remote control,
- support the construction of infrastructure for the introduction of places for charging batteries of electric vehicles in road traffic.

In addition to investing in the so-called primary equipment, ED activities entail considerable investments in other segments. Particular emphasis is placed on investments in dispatch centers and communication equipment, remote control system, as well as electricity meters

It is generally recommended to use modern ("smart") electronic meters that enable remote reading and consumption management, because in this way the wider issue of connection arrangement (metering point) in terms of access to the meter and reduction of commercial losses due to unauthorized consumption, etc..

Taking into account the basic principles and guidelines of network development, as well as the applied criteria for the reconstruction and construction of the elements, it is possible to single out the general types of projects that are candidates in this Plan. All projects can be divided into 3 groups according to the part of the electricity distribution network to which they refer:

- Network construction, reconstruction and revitalization projects (35 kV, 10 kV and LV): Construction of groundwater, construction of overhead line, network relocation, cable line replacement, replacement of poles, suspension equipment, conductors, installation of reclosers, installation of line disconnectors.
- Projects for construction, reconstruction and revitalization of substations (TS 35 / X kV, TS 10 / 0.4 kV and TS 110 / X kV): Construction of substations, complete reconstruction of substations, replacement of MV plants, replacement of LV plants, replacement of MV and LV plants, replacement of transformers, replacement of transformers and MV plants, replacement of transformers and LV plants, reconstruction of relay protection and control of substations, procurement of industrial computers with software, replacement of circuit

breakers and reconstruction of relay protection and control of substations, equipping of MV cells, installation of circuit breakers, rehabilitation / reconstruction of the construction part of substations.

- Other projects related to the improvement of the network operator's business as a whole: Reconstruction of connections for the needs of relocation of measuring points, installation of measuring equipment, procurement of personal computers, procurement and installation of server computer and communication equipment, procurement of instruments, auxiliary equipment of tools and software, procurement of vehicles, rehabilitation / reconstruction of work premises, protection at work and environmental protection, supervision and management of the electricity distribution network, improvement of business processes.

The largest number of projects per year refers to the 10 kV network and the transformation of 10 / 0.4 kV, especially in the first half of the planning period. In the second half of the plan, the focus is on the 35 kV network. When it comes to the distribution of projects by region, it follows the characteristics of the region (size, number of consumers and expected increase in consumption), so most projects follow regions of the coastal area, which are characterized by a pronounced trend of increasing consumption in the planning period. Other regions, due to a slight trend of growth or stagnation of consumption, are characterized mainly by projects of reconstruction and revitalization of network capacities with investments aimed at improving the reliability and quality of electricity supply.

The prices of electricity for households in Montenegro are significantly lower than EU average (Figure 12).

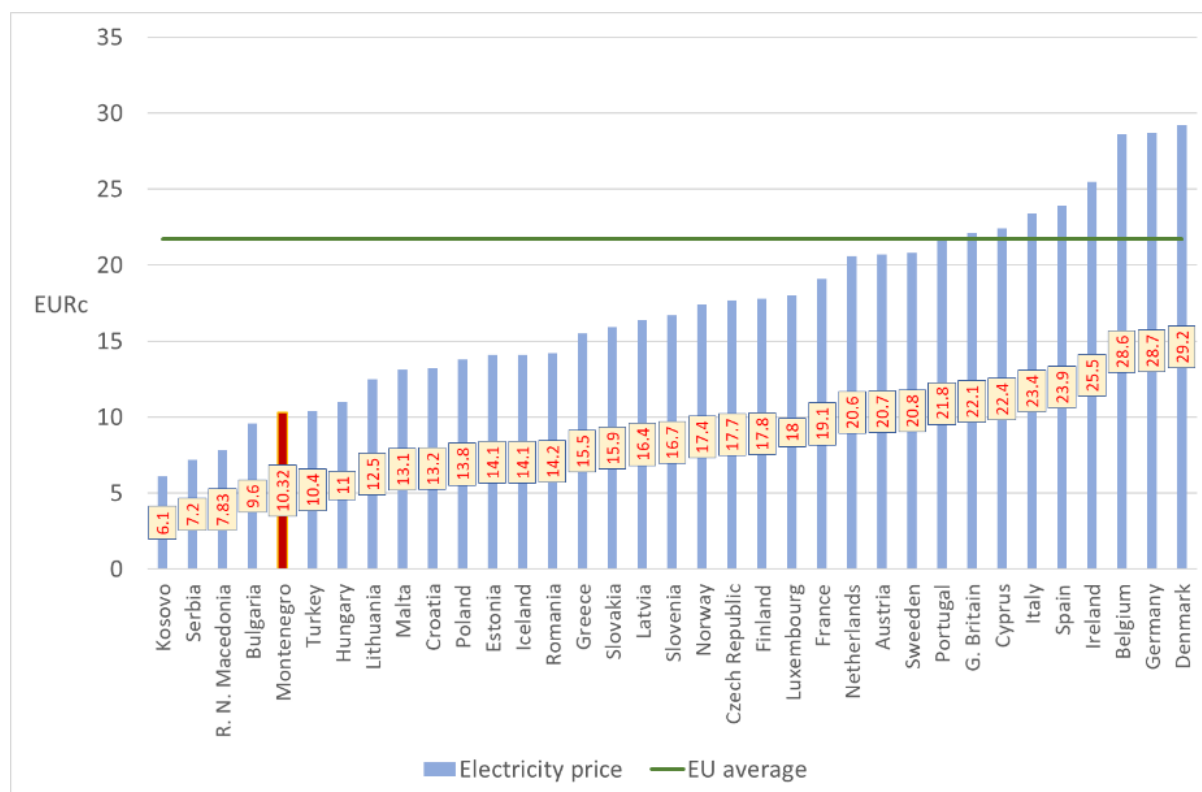


Figure 12: Average electricity price for households in 2019

Natural gas

Montenegro currently does not have access to natural gas sources, nor infrastructure to support its use. The Energy Development Strategy until 2030 clearly recognizes natural gas as an important energy source, which would contribute to the diversification of the Montenegrin energy mix. It is planned to use natural gas as a substitute for other forms of energy, especially for the use of electricity and to substitute coal for heating and cooling.

The Master Plan for Gasification of Montenegro (2017), which together with the Report on Strategic Environmental Assessment and Guidelines for Planning Priority Investments in Gas Pipeline Projects forms the umbrella document for the natural gas sector in Montenegro. The Master Plan considers possible scenarios for Montenegro's gas supply and concludes that it is most realistic for Montenegro to be supplied with natural gas by building the Ionian-Adriatic Gas Pipeline (IAP) and valorizing its gas reserves from the Adriatic submarine.

However, the drilling projects have not been successful so far, so that the valorisation of the gas reserves only appears possible in the long term, if at all, in view of the phase-out of fossil fuels and the negative environmental impacts that are being investigated using the Strategic Environmental Assessment (SEA).

In 2016, the Project Management Unit (PMU) was established, consisting of one representative of the state body responsible for energy and one representative of the Transmission System of Natural Gas (TSO) from all four signatory countries of Memorandum of Understanding and Cooperation on the implementation of the IAP project - Albania, Bosnia and Herzegovina, Montenegro and Croatia. The Azerbaijani company SOCAR and the Secretariat of the Energy Community have the status of observers in the PMU, without the right to vote. The Ministry of Energy and Mining is in charge of coordinating all activities and represents the permanent Secretariat of the PMU.

During 2019, the IAP project activities included the following activities:

- Resuming activities on establishing a joint company Gas Transmission System Operator for Albania, Montenegro, Bosnia & Herzegovina and Croatia.
- Preparation of Preliminary design of the Ionian-Adriatic gas pipeline on the territory of Albania and Montenegro.

Oil and petroleum products

In the previous period, concession agreements were signed for the production of hydrocarbons, with a total area of 1,228 km², with the companies Eni Montenegro, BV Netherlands and Novatek Montenegro, BV Netherlands, with a share of 50% each, as well as with Energean Montenegro Limited Cyprus for blocks with a total area of 338 km². However, the drilling projects have not been successful so far, so that the valorisation of the oil reserves only appears possible in the long term, if at all, in view of the phase-out of fossil fuels and the negative environmental impacts that are being investigated using the Strategic Environmental Assessment (SEA).

There are also plans by the relevant ministry and the Hydrocarbons Authority to announce new calls for seismic surveys and calls for exploration and production of hydrocarbons in

Montenegro's offshore area. The objective of publishing a Public Call and concluding concession agreements for hydrocarbon exploration and/or production is to increase knowledge of Montenegro's offshore hydrocarbon potential and to assess and valorize potential commercial reserves of oil and gas.

The total storage capacities of petroleum products and LPG at the end of 2019 amounted to 143,685 m³, of which the storage capacities of petroleum products amounted to 141,116 m³, while the capacities for storage of LPG amounted to 2,569 m³. The total storage capacity in 2019 was increased by 1,358 m³.

The current situation is that the three largest importers of petroleum products, which are obligated to establish mandatory petroleum product reserves, have already formed 40% (36 out of 90 days of net imports) of the total prescribed obligation for 2025/2026, amounting to 112,340 tons of petroleum products. Meanwhile, the Hydrocarbon Authority, in accordance with the Action Plan for the Establishment of Mandatory Petroleum Product Reserves and the Annual Plan for the Formation and Maintenance of Mandatory Petroleum Product Reserves for 2025, plans to purchase between 14,000 and 17,000 tons of Eurodiesel (equivalent to 12–13 days of reserves) during 2025, depending on market conditions and the availability of financial resources.

District heating

District heating (lignite-fired) is operational only in Pljevlja, but covers only a minor part of the town. Significant expansion of district Pljevlja heating has been envisaged after the planned TPP refurbishment, to supply heating to households currently using individual boilers.

Currently, there are further plans for biomass district heating development in several towns, such as Nikšić, Rožaje, Bijelo Polje, Kolašin i Žabljak.

National objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems

Reduction of electricity import shares is another specific target. The electricity import share is already very low in the WEM scenario (2.7% in 2030 and 4.8% in 2050) and can be reduced to 0% in the WAM scenario.

PaMs addressing energy efficiency in the demand sectors and additional renewable energy production are essential in this context.

National objectives with regard to increasing the diversification of energy sources and supply from third countries for the purpose of increasing the resilience of regional and national energy systems

According to Article 8 of the Energy Law (**Objectives of the energy sector development**):

- (1) Long-term goals, economic and institutional-organizational framework of energy development are determined by general guidelines of energy policy.
- (2) The guidelines referred to in paragraph 1 of this Article shall be adopted by the Government of Montenegro.

(3) The guidelines referred to in paragraph 1 of this Article shall be further elaborated and implemented by the National Energy and Climate Plan of Montenegro (hereinafter: the National Energy and Climate Plan), the action plan for the development and use of district heating and / or cooling and highly efficient cogeneration energy plans and energy balance.

(4) The plans referred to in paragraph 3 of this Article shall be published on the website of the state administration body responsible for energy affairs (hereinafter: the Ministry).

According to Article 7 of the Energy Law (**Long-term energy development objectives**):

Development of the energy sector is planned with the following objective:

- 1) ensuring of regular, secure and quality energy supply;
- 2) ensuring sustainable and efficient generation and use of energy;
- 3) developing and usage of different energy sources;
- 4) increasing production and/or use of energy from renewable sources and high-efficiency cogeneration;
- 5) efficient carrying out of energy activities and public services while ensuring sustainable development;
- 6) environmental protection in all areas of the energy activities;
- 7) ensuring competition on the energy market based on the principles of objectivity, transparency and non-discrimination;
- 8) maintaining stable business conditions and encouraging public, private and public-private investment and business in the field of energy;
- 9) protecting final energy customers;
- 10) connecting of the Montenegrin energy system with the European energy systems and systems of the neighbouring countries in accordance with energy requirements and requirements in economic development;
- 11) developing energy market and its connecting with regional and internal European Union market;
- 12) creating conditions for investments in the energy sector.
- 13) developing of gas systems and their connection with neighbouring gas systems, so as to cover domestic requirements for natural gas and diversification of energy sources.

National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage

The first priority of the Energy Policy of Montenegro by 2030 is security of energy supply, which means permanent, secure, quality and diversified energy supply in order to balance supply with customer's requirements.

According to the recently amended Energy Law, security of system functioning means a continuous managing over transmission and, if necessary, distribution system under the forecasted circumstances, while security in supply means capability of energy or gas system to provide adequate quantity of energy or gas to continuously service the needs of final customers, as well as capability of transmission and distribution systems to ensure delivery of energy to the final customers.

According to article 87 of the Energy Law, Transmission System Operator shall: ensure security of operation of electric power system, revise operation plans for power plants in case of a threat to security of operation of electric power system, failures, big deviations from planned demand, ensure cross-border cooperation including allocation of cross-border capacity in order to check security of the grid.

According to article 130 of the Energy Law, Gas Transmission System Operator shall: provide distribution system operators, neighbouring transmission system operators or other gas undertakings with required information to ensure system inter-operability and secure and efficient operations of the interconnected system

In line with the Master plan for the development of the gas transmission system (Montenegro gasification) November 2015, the dynamics of the planned connection to the IAP and TAP is possible earliest from 2020 onwards, as well as the potentially discovery and exploitation of domestic gas would determine the later specifics of the natural gas market. Although there is currently no significant project development, in December 2024, Montenegro adopted a list of 15 priority infrastructure projects in the energy sector — among which the Ionian-Adriatic Pipeline (IAP) is included.

Within the European Investment and Recovery Plan, in the area of renewable energy, the Commission suggests the flagship project: The Piva Hydro Power System in Montenegro will be expanded with the start of the construction of the Komarnica Hydro Power Plant. In 2020, the Government of Montenegro approved concession act to the EPCG for construction of the plant with installed power of 172 MW and expected annual production of electricity up to 213 GWh. However, significant environmental challenges have been identified in relation to this project, which substantially hinder its implementation. Therefore, in order to increase the flexibility of the power system and enable a high level of integration of renewable energy sources, the construction of the Kruševo hydropower plant has been prioritized. Although the technical documentation is still under preparation, the latest data indicate an installed capacity of 82 MW and an annual generation of 170 GWh.

2.4 Dimension Internal energy market

2.4.1 Electricity interconnectivity

There are several parameters that indicate the state of the power connectivity of Montenegro's electric power system. The voltage levels of interconnections with neighboring systems are: 400 kV (3), 220 kV (5), 110 kV (3), and a single 500 kV HVDC connection. The total installed transmission capacity of existing interconnectors amounts to 5,738 MVA (permanent thermal limits of conductors). However, the total available cross-border capacity for import and export, which is commercially available to market participants after accounting for system reliability criteria, currently stands at around 2,500 MW. Considering the total installed generation capacity of 1,067.2 MW (approximately 79% from renewable energy sources), it is evident that the EU target — a desired level of electricity interconnection of at least 15% of the installed generation capacity in a given Member State by 2030 — has been more than achieved. In addition, the average peak system load reaches up to 600 MW, which is expected to grow at a

slower rate than installed generation capacity, thus ensuring self-sufficiency in electricity supply.

Nevertheless, despite the fact that the minimum required share of interconnector capacity relative to installed generation capacity has been significantly exceeded, further optimization of interconnection resources is necessary to meet energy and climate goals. On the one hand, commercially available capacities will be increased through measures related to regional coordination of capacity calculation and regional security. On the other hand, due to pronounced natural power flows and a high level of natural energy transit through the Montenegrin system, it is necessary to construct additional transmission lines, which will further strengthen Montenegro's position as a key partner in regional interconnection.

Strengthening interconnection can be achieved in the following ways:

- By constructing new transmission lines or revitalizing existing ones (both internal and cross-border),
- By applying an improved capacity calculation methodology (flow-based), and
- Through redispatching and counter-trading.

According to CGES investment plans, by 2030, several projects are planned to expand transmission capacities toward Bosnia and Herzegovina, Serbia, and Albania, which will significantly increase market capacities and reduce congestion (or lower congestion costs). In addition to investment projects, low NTC values will be improved by transitioning from the traditional NTC methodology to a flow-based approach, which will soon be implemented in line with EU regulations. Moreover, before the full implementation of the flow-based methodology (which is technically complex), an increase in cross-border capacities can be achieved through a coordinated NTC calculation. In this approach, TSOs would collaborate more closely, using joint tools and methods to reach harmonized and optimal capacity values. Such calculations would be carried out through regional coordination centers. Another way to improve interconnector utilization is through the adoption of a methodology for coordinated redispatching and counter-trading between capacity calculation regions, which will be defined during the process of establishing these regions.

The Study on Resource Adequacy and Flexibility of Montenegro's Power System, conducted under the Energy Market Integration (EMI) project within the USAID Energy Security in Europe and Eurasia (ESEA) initiative, aims to assess the capability of Montenegro's power system to adapt to changes in electricity generation and consumption, particularly in the context of renewable energy integration and regional market coupling. The results of this study indicate favorable characteristics of Montenegro's power system in terms of resource adequacy and flexibility, even under extreme regional decarbonization scenarios in Southeast Europe.

2.4.2 Energy transmission infrastructure

Key electricity and gas transmission infrastructure projects

There are two main directions of further improvement of the Montenegrin power system interconnectivity:

- HVDC cable MONITA – This project is in the PCI list. Currently, only 600 MW of the link capacity is operational, but it is planned that full capacity of the interconnection reaches 1200 MW in the following years, in accordance with the Contract. Terna and CGES have jointly ordered the Study, being developed by CESI and EKC, which examines the justification of technical preconditions for the installation of the second pole of the submarine cable between Italy and Montenegro
- The connected infrastructure, which holds the status of a Project of Common Interest (PECI) for the Energy Community, includes the construction of a double-circuit 400 kV transmission line Bajina Bašta – Pljevlja – Višegrad. This project is part of the Trans-Balkan Corridor, which represents the main backbone for electricity transmission in the Western Balkans region. Considering the mentioned HVDC connection, this project is of significant pan-European interest. The development of new interconnection projects will soon begin, based on technical and economic assessments and cost-benefit analyses in line with ENTSO-E methodology. Another project listed as a PECO project is the increasing of transmission capacity of the 220 kV line Trebinje (BiH) – Perućica.

Main infrastructure projects envisaged other than Projects of Common Interest (PCIs)

Both electricity projects are of regional significance and the first one has been listed as a Projects of Common Interest (PCI) and the second one as a Project of Energy Community Interest (PECI).

2.4.3 Market integration

National objectives related to other aspects of the internal energy market

The liberalisation of the electricity market in Montenegro started with the Energy Law entering into force in 2003. In December 2015, Montenegro adopted a new Energy Law followed by adoption of numerous pieces of secondary legislation in relation to electricity, which transposed the main pieces of legislation from the Third Energy Package for Electricity and Gas Markets-TPEGM (Directive 2009/72/EC, Regulation (EC) No 714/2009, Regulation (EC) No 713/2009 and Regulation No 543/2013). In line with the decisions of the Ministerial Council from 2022, activities have begun on the transposition of laws from the Clean Energy Package.

The potential for the development of small electricity markets, such as the Montenegrin market, can be realized through market coupling with regional markets and integration into the pan-European single day-ahead cross-zonal electricity market. The importance of achieving this goal has also been recognized in Montenegro's EU accession process, under Chapter 15 – Energy, where the coupling of the wholesale electricity market is one of the final benchmarks for the provisional closure of this chapter. Moreover, the process of day-ahead and intraday

market coupling is part of Montenegro's Reform Agenda 2024–2027, within the new EU's Growth Plan for the Western Balkans. Market coupling ensures more reliable electricity supply and greater competition in performing market-based energy activities. It helps overcome the disadvantages of small, less attractive markets, which due to their size do not attract enough traders and suppliers—potentially delaying the gradual phase-out of thermal power plant operations. In addition, market coupling will lead to price stabilization, the creation of a favorable investment environment, strengthening of domestic production, and it is a prerequisite for exemption from the application of the CBAM regulation for electricity until 2030.

Given Montenegro's direct interconnection with the EU electricity system through the submarine cable (MONITA), Montenegro has decided that the coupling—first of the day-ahead market, and later the intraday market—will take place on the Montenegro–Italy border. Liquidity attracts liquidity, which gives particular importance to coupling Montenegro's electricity market with the stable and liquid Italian market. However, the possibility of coupling with other regional markets is not excluded, should circumstances prove that to be a better option at a given time.

The creation of a liquid wholesale market is a precondition for the development of a competitive retail electricity market. To meet all the requirements and formally initiate the market coupling process, Montenegro needs to:

- Fully adopt and implement the Electricity Market Integration Package,
- Adopt (together with other Contracting Parties) the Market Coupling Operator (MCO) Integration Plan, and
- Establish Capacity Calculation Regions (CCR).

Once these conditions are fulfilled, at least 18 months will be required for the implementation and accession to the Single Day-Ahead Coupling (SDAC).

Montenegro has an active role for cross-border electricity exchange. CGES as the transmission system operator in Montenegro is responsible for the allocation of rights to use the available cross-border transmission capacity on interconnections of the transmission system of Montenegro. Joint auctions are organized on border with Serbia. Based on the agreement on organizing joint auctions/allocations with the transmission system operator of Serbia, CGES is responsible for organizing day ahead and intraday explicit auctions on border with Serbia while EMS performs yearly and monthly explicit auctions on the aforementioned border. Based on the Service Agreement between CGES and Coordinated Auction Office in South East Europe (SEE CAO) and the agreement on organizing joint auctions/allocations with the neighbouring TSOs, SEE CAO is responsible for organizing yearly, monthly and daily explicit auctions on borders with Bosnia and Herzegovina, Kosovo, Albania and Italy. The method of payment on all long term and daily auctions for all borders is according to the last accepted price ("marginal price"). In 2016 CGES became a founding partner of the SEE CAO (South East Europe Coordinated Auction Office). SEE CAO facilitates cross-border electricity trade, through alignment of technical, financial and legal prerequisites among participants, which allows for simpler and cost effective trade process. From 2019 electrical power trade on the ME-IT border is organized by SEE CAO. For other borders which are not part of the SEE CAO contract, CGES has appropriate Auction Rules for allocation of cross-border transmission capacities.



Figure 13: Current state in cross-border capacities auctions

The coupling of the day-ahead electricity market will affect the method of allocating daily cross-zonal capacity on the border where the coupling is implemented. This means that daily capacity will no longer be allocated explicitly through the auction platform (SEE CAO) but implicitly through the market coupling mechanism, and the calculation of available capacity will depend on the methodology adopted for the Capacity Calculation Region (CCR) to which that border belongs.

Currently, the NTC (Net Transfer Capacity) methodology is applied for capacity calculation. However, with market coupling, there will be a gradual introduction of the flow-based methodology, which will ensure better utilization of existing cross-zonal transmission capacities.

In accordance with the Energy Law, the electricity market in Montenegro consists of the retail market, the wholesale market, and other markets. The other electricity markets include the ancillary services market, including the balancing market and the non-frequency ancillary services market, as well as the flexibility services market.

The balancing market in Montenegro is based on bilateral contracts between producers and the transmission system operator (TSO), as well as cross-border agreements signed with the neighboring TSOs of Serbia, Bosnia and Herzegovina, and Italy.

COTEE is responsible for the administration of the bilateral electricity market between balancing groups. The administration is carried out in accordance with the Market Rules through a planning process that is part of the ESS (ENTSO-E scheduling system). Nominations are submitted daily by the Balance Responsible Party (BRP), with hourly values. The daily balancing group schedule includes, among other elements:

- the generation plan (PRS);
- the consumption plan (CRS);
- the internal trade plan between balancing groups;
- the cross-border exchange plan.

The daily plan serves to monitor the submission, validation, and confirmation of the listed schedule elements. Internal transactions may be executed exclusively between balancing groups, and for their proper confirmation and verification, both parties must mutually align the transaction. Cross-border transactions can only be submitted if at least one BRP holds capacity rights for the requested capacity. The plans are verified and confirmed once the transaction is aligned with the neighboring Transmission System Operator (TSO).

In addition to COTEE, the daily wholesale market operation plan is also submitted to the TSO for the purposes of system operation planning and management of the power system.

Neighboring system	Import	Export
Albania	830.107	654.963
Bosnia and Herzegovina	3.598.710	612.457
Italy	51.872	4.196.750
Kosovo	454.776	532.700
Serbia	485.812	295.360
Total	5.421.277	6.292.230
Transit	5.196.600	
Surplus	878.200	

Figure 14 Physical electricity flows into and out of the Montenegrin power system in 2023 [MWh]

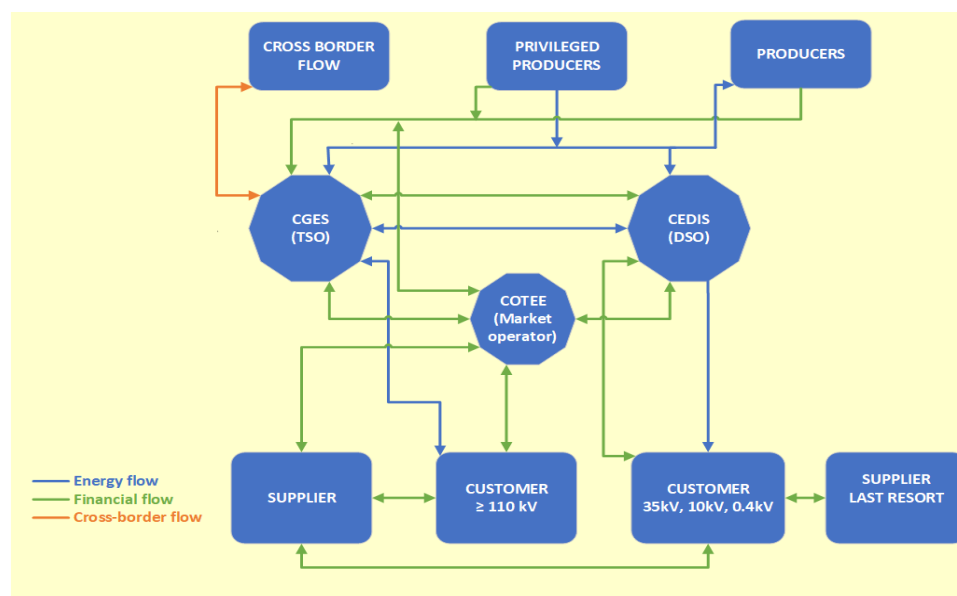


Figure 15: Montenegrin Electricity market model

Frequency Restoration Reserve (mFRR) and aFRR has to be at least equal to the size of the largest production unit in TSO, but being part of SMM block, this amounts only to 50MW (an increase to 70 MW is expected in the near future based on the analyses conducted) and remaining amount is shared between SMM members. Prices for reservation of capacity is set

on a yearly basis by the NRA's Decision on determination of prices for auxiliary and balancing services according to the formula proscribed in Methodology for setting prices and conditions for provision of ancillary and system services and balancing services for electricity transmission system. The TSO pays for capacity reservation and activation of upward regulation services. If secondary regulation is available only in one direction, half of the agreed reservation price is paid. The reservation of downward mFRR is provided free of charge. For each hour of unavailability or inadequate delivery of mFRR by the Balancing Service Provider (BSP), the TSO is entitled to compensation equal to twice the amount of the reserved capacity price.

In addition to bilateral agreements, regional cooperation has been established based on the netting of imbalances, as well as the sharing and exchange of ancillary services (power control reserves and balancing energy) between the control block of Serbia, North Macedonia, and Montenegro (SMM). This method of balancing significantly increases grid flexibility and enables greater integration of renewable energy sources. The TSOs of Serbia, North Macedonia, and Montenegro form a control block that is aligned with the target model for regional integration of electricity balancing markets as defined by the ENTSO-E Electricity Balancing Network Code. For the individual balancing of each country, the total balancing reserves amount to 1,000 MW, while for the SMM control block, they total 700 MW.

In addition to successfully establishing a system for imbalance netting within the SMM control block, Montenegro has obtained observer status in the European imbalance netting platform (IGCC), with the goal of becoming a full member. In line with the decisions of the Ministerial Council from 2022, which include the obligation to transpose and implement the EU Regulation establishing the Electricity Balancing Guidelines, it is necessary to meet the conditions for membership in the European balancing platforms — MARI, PICASSO, TERRE, and IGCC — within the deadlines set by the Law on Cross-Border Exchange of Electricity and Natural Gas.

Where applicable, national targets related to the non-discriminatory participation of renewable energy sources, demand-side management, and energy storage, including through aggregation, in all energy markets, as well as the timeframe for achieving these targets.

In accordance with the Law on the Use of Energy from Renewable Sources, the Ministry published the first auction (July 2025) for the allocation of market premiums to privileged producers during the current year (250 MW). All produced energy will be sold on the wholesale market, and state incentives will be calculated based on the Contract for Difference (CfD) principle. Once the integrated intraday electricity market is established, privileged producers will become responsible for their imbalances, thereby creating conditions for their participation in the balancing market.

In addition, by the end of 2025, a three-year incentive scheme plan will be published for large energy projects aimed at electricity generation using solar and wind potential, as well as for renewable energy projects implemented by renewable energy communities. The plan will also include the allocation of feed-in tariffs for small-scale facilities and demonstration projects.

National objectives with regard to ensuring that consumers participate in the energy system and benefit from self-generation and new technologies, including smart meters

By completing the third phase of the Measurement System improvement (AMM-III phase), about 80% (325.000 smart meters) of the total number of active electricity meters in Montenegro will be covered by the modern metering devices (AMM).

Given the constant increase in the number of consumers with self-generation and the wide deployment of smart metering systems, conditions are being created for the development of prosumers who can, either independently or through aggregation, provide greater system flexibility. To continue in this direction, it is necessary to further invest in the distribution network through plans for the development of new grid infrastructure and its revitalization (improving operational characteristics, control capabilities, and developing advanced metering infrastructure) in order to enable its optimal utilization and the full realization of the potential of prosumers, i.e. to allow their participation in the balancing market.

National targets regarding the adequacy of the power system, as well as the flexibility of the power system in relation to renewable energy production, including the timeframe for achieving these targets

In order to meet the needs of growing consumption and enable further integration of renewable energy sources—particularly considering the goals of gradually reducing production from the thermal power plant—it is necessary to continue investing in the transmission and distribution network without delay. One of the objectives in the transmission system development plan is the creation of a so-called “golden grid”, which will be dynamic, flexible, and robust, adaptable to future changes in production and consumption⁷². In this regard, the transmission system operator (TSO) will, by the end of the period covered by this document, expand the internal and cross-border transmission network through the construction of new transmission capacities, the expansion and revitalization of existing ones, as well as the completion of ongoing projects that are of great importance for electricity market integration and congestion relief. The distribution system operator (DSO) will also remain active in the investment cycle, improving the metering system and undertaking reconstruction and construction of power infrastructure to create the necessary preconditions for the connection of renewable energy sources and ensure safer and more reliable supply to end users.

To ensure power system adequacy, in addition to infrastructure, it is of priority importance to construct new generation facilities. Over the next five-year period, new renewable-based generation capacities (hydro, wind, and solar) will be built.

Beyond investment projects, the operation of the power system must be further optimized through enhanced grid flexibility. This can be supported by the active participation of end users, who can manage their own consumption to contribute to stable system operation.

⁷² Transmission System Development Plan of Montenegro 2023–2032

The Study on Resource Adequacy and Flexibility of the Montenegrin Power System, conducted through the Energy Market Integration (EMI) project within USAID's Energy Security in Europe and Eurasia (ESEA) Initiative, was completed on September 30, 2022. Key findings of the study:

- **Resource adequacy:** The analysis showed that Montenegro has no issues with resource adequacy under any of the considered scenarios up to 2030, including scenarios of extreme decarbonization in the Southeast Europe region. The main reasons are the controllability of existing hydropower plants and the robustness of interconnections.
- **System flexibility:** The study identified that Montenegro possesses sufficient flexibility in its power system to respond to changes in electricity demand and production, thanks to high import capacities and planned investments in renewable energy sources.
- **Recommendations:** It was recommended that Montenegro continue conducting regular annual assessments of power system adequacy and flexibility to timely identify potential challenges and opportunities for improving the energy sector.

National objectives to protect energy consumers and improve the competitiveness of the retail energy sector

One of the prerequisites for developing a competitive retail electricity market is the existence of a liquid wholesale market. In Montenegro, there is an organized wholesale market with moderate liquidity, which is expected to become more stable once it is connected to the integrated European energy market. Since 2023, participants in the retail market have been free to form electricity prices, thereby removing the legal restrictions that previously hindered market competition. However, only six entities currently hold a supply license, with EPCG remaining the only active supplier.

To further stimulate the development of the retail market, it is necessary that electricity prices be market-oriented, while taking into account vulnerable customer categories. In this regard, the new Energy Law introduced the concepts of energy poverty and protection of vulnerable consumers, aimed at subsidizing users who have limited access to basic energy services or who are socially or medically vulnerable.

Additional inclusivity for end-users will be ensured through a supplier offer comparison application, including offers for dynamic electricity pricing contracts, providing consumers with timely and accurate information. This will ensure an appropriate level of transparency and consumer awareness regarding electricity prices and offers available on the retail market.

The protection of end consumers must be ensured by the supplier providing electricity, other energy entities performing public-interest activities or public services, through their compliance with customer-related obligations prescribed by the Energy Law, as well as by the Agency, through handling complaints and supervising supplier operations.

Electricity consumers have the right to network connection, to choose and switch suppliers, to access data on their own consumption, to have technical or other supply disturbances resolved, to receive electricity of the required quality, and to be informed. This includes the supplier's obligation to publish applicable prices on its website at least 15 days before supply begins, to inform consumers of any price or fee changes, to notify them of their right to terminate

contracts if they do not accept price changes, and to inform them annually of their rights, including details on how to submit and resolve complaints.

The protection of vulnerable consumers, as a special category of customers who are socially and/or medically vulnerable, includes:

- A ban on electricity supply disconnection for households with persons with disabilities, special needs, or poor health conditions, where supply restriction or interruption could endanger life or health; and
- A ban on electricity supply disconnection for households with persons in social need, as determined by the competent public institution or state authority responsible for social welfare, from October 1 to April 30, regardless of any outstanding electricity debts.

2.4.4 Energy poverty

National objectives with regard to energy poverty

There is no Poverty Reduction Strategy in Montenegro, nor is there a defined method for identifying and monitoring energy poverty, and there are currently no programs aimed specifically at energy-poor households.

In line with the Study on Addressing Energy Poverty in the Energy Community Contracting Parties, prepared by DOOR, EIHP in 2021, according to the available data, the share of energy-poor households in Montenegro ranges (8-15) % of all households. This percentage implies that there are between 16,000 and 30,000 energy-poor households in Montenegro.

By introducing the definition of energy poverty into the current legal framework (Energy Law), Montenegro has already taken the first important step toward protecting vulnerable consumers. Currently, the general criteria for determining energy poverty are defined as follows: high energy costs, low household income, and low energy efficiency of the dwelling. The law stipulates that within 12 months from the date of its adoption, the Government, upon the proposal of the Ministry of Energy and Mining and the state authority responsible for social welfare, shall further define the detailed criteria for determining energy poverty.

The Energy Law, in Articles 186–187, defines the supply of vulnerable consumers and the method of financing. Vulnerable consumers who are socially and/or medically disadvantaged, within the meaning of this law, are households that include:

- persons with disabilities,
- persons with special needs, and
- persons in poor health whose life or health could be endangered due to limitations or interruption of energy supply,
- as well as persons in a state of social need, as determined by the state authority responsible for social welfare.

The Government has also adopted a regulation specifying:

- the criteria for identifying customers from the aforementioned categories,
- the amount of subsidies granted to these customers, and

- the monthly consumption limit of electricity or gas eligible for the subsidy.

Currently, only protective measures in the form of direct financial assistance for the most vulnerable groups are in force; however, long-term measures to mitigate energy poverty have not yet been established.

The fact that only short-term measures aiding socially vulnerable consumers are currently in place, and due to the low energy efficiency of dwellings located in certain parts of the country with a significant number of HDD and CDD in others, all this indicates the need for energy efficiency improvements in homes of the energy-poor and energy vulnerable. Therefore, most of the measures we propose relate to long-term measures aimed at improving the energy efficiency of dwellings and reducing the energy needs of households.

Short term measures

Protection measures

Importantly, utility disconnection of vulnerable groups in case of non-payment is an important issue. If fulfilling vulnerability criteria, disconnections from an electricity grid should be prohibited, especially during the winter months. Currently, Article 198 (5) of the Energy Acts prohibits disconnecting vulnerable consumers that fulfill eligibility criteria, from electricity and gas network in the period from October to April. Therefore, Montenegro has the required measures in place for vulnerable consumers, though it is suggested disconnections from the grid should be prohibited for all household consumers during the winter months.

Direct financial support

There are two measures aimed at directly subsidizing energy costs for vulnerable consumers. These financial measures should be limited only to the most socially vulnerable consumers and implemented alongside infrastructural measures aimed at alleviating the main causes of energy poverty. Furthermore, direct financial support should be provided for those households, which after receiving long-term measures, still required support as they are unable to cover their energy-related expenses.

Long term measures

The main approach to mitigating energy poverty in Montenegro should be targeted at improving the energy efficiency of the dwellings of energy-poor households. In addition, due to the specific climate and diversity of the three climate zones in Montenegro, measures should also vary across the climate zones. Though energy efficiency improvements should be the main measure for all three zones, depending on the zone the improvements should be followed by (1) heating system improvements along with fuel switching - for those vulnerable households situated in the zone with longer and colder winters and reliant on traditional inefficient stoves, or (2) the provision of cooling systems for those facing hot and long summers. Furthermore, the use of RES should be considered given the favorable climate in Montenegro.

The primary measures should provide long-term effects in contributing to eliminating the root causes of energy poverty. The proposed measures focus primarily on providing maximum benefits for households while easing the burden on the national budget in the long run. Where applicable, we have indicated whether similar measures exist in the specific CP complementary

to the proposed measure and the possibility of expanding it to accommodate measures for energy poor households.

Accordingly, the long-term measures given below are proposed:

1. Programme for Mitigating Energy poverty. It is evident that there is no systematic approach to addressing the issue of energy poverty in Montenegro. We propose the drafting and adoption of a formal document that provides a detailed plan for implementing measures to address energy poverty. The program should go beyond income support and incentivize energy efficiency improvements as well as targeted measures for vulnerable households.
2. Energy Retrofitting of Buildings. The major cause of energy poverty is the low energy efficiency of homes. The measure aimed at improving the energy efficiency of homes, hence reducing energy demand is also proposed. This measure is to some extent complimentary to the R2 Financial support for EE investments for physical persons from the 4th NEEAP. However, energy retrofits aimed at mitigating energy poverty need to be delivered through more comprehensive co-financing schemes and support mechanisms.
3. Replacement of Household Appliances via the Old for New Scheme. Due to low disposable income, energy-poor households own low efficient appliances that contribute to increased energy demand and hence energy poverty. The measures that assist energy-poor households in replacing aging home appliances is proposed.
4. Heating System Improvements (HSI) in Households, including: (i) HSI 1: Improving the energy efficiency of the system; (ii) HSI 2: Modernization and expansion of the heating system. This measure is to some extent complimentary to the R2 Financial support for EE investments for physical persons from the 4th NEEAP.
5. Implementation of Low-Cost Energy Efficiency and Energy Advice (EEEEA), including: (i) EEEA1: Implementing simple and low-cost energy efficiency measures; (ii) EEEA2: Undertaking simple energy audits with education
6. Support for Renewable Energy Sources, including the following measures: (i) RES 1 Incentives for installing photovoltaic panels; (ii) RES 2 Incentives for installing solar thermal collectors. This measure is to some extent complimentary to R2 Financial support for EE investments for physical persons and measure E7 Development of Decentralized Energy Consumption through prosumers from the 4th NEEAP. This measure in the 4th NEEAP specifically mentions the possible benefit of mitigating energy poverty.

Though some of the proposed measures are in line with the existing framework and are viewed as complementary to already proposed measures available in the 4th NEEAP, making those measures accessible to the energy poor requires taking into consideration vulnerability criteria and the provision of higher co-financing rates. Furthermore, unlike for general public, designing schemes to implement measures aimed at alleviating energy poverty requires devising and putting into place support systems. This should be elaborated in the Programme for Mitigating Energy Poverty. The aim of these support systems is to identify persons in need and provide them with support in applying to and accessing the available measures.

Based on the EU directives on the internal market in electricity (2009/72/EC) and gas (2009/73/EC), Montenegro should define energy poverty and protect vulnerable energy consumers.

The Energy Law in its articles 198-200 defines supply of vulnerable customers, request for supply of vulnerable customers and procedure on selection of the supplier of last resort and vulnerable customers. Vulnerable customers which need health and social care, in terms of this Law, represent households with disabled persons, persons with special needs and persons of poor health condition, who may be exposed to a threat to life or health as a result of a limitation or suspension of energy supply, and persons who need social care as determined by the state authority competent for social care affairs. In its further regulations, the Government shall define the criteria for customers from above categories, amount of subvention for such customers, as well as limit of monthly electricity or gas consumption for which the right on subvention can be acquired.

Further EnCS support is expected: development of policy guidelines, database, improving statistics where possible, continuous monitoring.

2.5 Dimension Research, innovation and competitiveness

National objectives and funding targets for research and innovation relating to the Energy Union

The Energy Union Strategy recognizes the importance of research and development, which should be at the core of planned activities. As Europe strives for leadership in renewable energy, smart grids, smart home technologies, clean transport, and safe nuclear solutions, the development of new technologies and energy storage solutions represents a key task for research and innovation.

Furthermore, the Energy Union views the transition toward a low-carbon economy driven by innovation as a major opportunity for growth and employment. In addition to developing new technologies, the Strategy highlights the need for better utilization of available research programs, such as the EU Framework Programme for Research and Innovation, and emphasizes the importance of synergies between national research programs and shared goals, as well as collaboration between science and industry, in order to bring new technologies to the market more efficiently.

In this context, within the area of research, innovation, and competitiveness, Montenegro is committed to achieving specific goals and tasks in line with the Energy Union dimension, with a particular focus on supporting clean energy and low-carbon technologies. These goals are designed to improve energy efficiency, increase the use of renewable energy sources (RES), and foster innovation in industry.

Specific goals and tasks of Montenegro in the field of research and innovation related to the Energy Union:

- Development of research and innovation in clean energy
- Specific goal: Develop at least 15 innovative clean energy solutions and research projects by 2030.
- Task: Finance projects that promote research and development of new technologies for energy storage, smart grids, and other innovations that contribute to reducing CO₂ emissions.



- Improving energy efficiency
- Specific goal: Increase energy efficiency and/or the use of available renewable energy sources (RES) by micro, small, and medium-sized enterprises (MSMEs) in the manufacturing industry through the adoption of innovative technologies.
- Task: Invest in innovative solutions and new technologies to improve energy efficiency and increase the use of available RES by MSMEs in the manufacturing industry.
- Strengthening cooperation between science and industry
- Specific goal: Enhance knowledge transfer and strengthen cooperation between science and industry.
- Task: Through the Technology Transfer Office at the Montenegrin Science and Technology Park (NTP CG), develop a policy for the effective management of intellectual property (IP), licensing, and a commercialization framework that prioritizes sustainability. Continue financing collaborative projects that encourage innovation and the implementation of new technologies.
- Support for participation in the EU Framework Programme for Research and Innovation “Horizon Europe” and other relevant research and innovation programs (EUREKA, COST, Digital Europe, EIT, etc.)
- Specific goal: Increase the participation of Montenegrin institutions and companies in the Horizon Europe program and other relevant initiatives to strengthen cooperation, knowledge transfer, research, and innovation.
- Task: Organize information days, trainings, and networking activities, provide support for project proposal preparation, and introduce incentives for participation in these programs.
- Support for strengthening research capacities
- Specific goal: Strengthen human resources in the field of research and innovation through doctoral and postdoctoral research, training, and education.
- Task: Implement scholarship, mobility, and training programs for young and experienced researchers, with the goal of increasing the number of experts in clean energy and sustainable development.

The key support measures relate to:

- Financial incentives in the form of grants, scholarships, and tax reliefs for scientific research and innovation projects;
- Educational programs for representatives of the research and innovation community on new technologies and approaches in the field of clean energy and energy efficiency; and
- Support measures for active participation in European and international research and innovation programs, with a particular focus on the energy sector.

A major potential in Montenegro’s energy transition lies in hydrogen and biofuel research. Montenegro’s abundance of solar and hydro energy can be leveraged for the production of green hydrogen, while organic waste can be used for biofuel production.

In the field of competitiveness, regarding national goals and measures for improving sustainable development and energy efficiency, the key indicators of the Montenegrin Industrial Policy 2024–2028 play an essential role in monitoring progress in areas aligned with the goals of the Energy Union. For example, the GHG emission intensity is set as an impact indicator, with a baseline value of 0.7554 kg per unit of GDP in 2023, and interim and target



values for 2026 and 2028 of 0.72 and 0.68, respectively — reflecting an ambition to reduce emissions through more efficient resource use. Another result indicator is the installed capacity of the energy sector, which is planned to increase from 1,080 MW in 2023 to 1,330 MW by 2028, strengthening energy infrastructure and reducing dependence on fossil fuels. In the renewable energy context, ambitious targets have been set, such as increasing the share of renewable energy in electricity generation from 62% in 2023 to 80% by 2028. Additionally, the share of renewables in final energy consumption is planned to reach 50% by 2030. These indicators represent key aspects for achieving sustainability goals and reducing emissions in Montenegro, thereby ensuring a successful energy transition and contributing to global climate action efforts.

Within the SME policy framework, the importance of orienting production toward renewable energy sources and resource efficiency is recognized. In the circular transition domain, by 2030, several tasks/measures are established:

- Establish incentive programs to support energy efficiency investments and the use of renewable energy on the final energy consumption side,
- Introduce measures to optimize household energy use,
- Ensure the implementation of energy audits for SMEs, and
- Introduce measures to optimize energy use in the public sector.

3 POLICIES AND MEASURES

Scope of chapter 3

Article 7 Governance Regulation specifies that **the NECP should contain “the main existing and planned policies and measures to achieve in particular the objectives set out in the national plan**, including, where applicable, measures providing for regional cooperation and appropriate financing at national and regional level, including mobilisation of Union programmes and instruments.” It is also stated that a general overview should be provided of the investments needed to achieve the objectives and targets/contributions set out in the national plan, as well as a general assessment on the sources of those investments. According to Governance Regulation it is not the objective to provide a full overview of policies and measures.

The Policies and Measures (PaMs) presented in this chapter have been developed based on the following set of criteria:

- Considered in which scenario: WEM scenario or WAM scenario
- Single PaM or part of a group of PaMs
- “General context”, here one could describe the history of the project/ PaM/ company
- “Description of the PaM”: a few sentences on what is planned to be implemented:
 - Legal, technical, financial, informational, regulatory policy or measure
 - Problem the policy or measure is addressing
 - Objective of the policy or measure
- “Steps in implementation – implementation process”: in combination with actions taken, this allows for easy progress reporting
- “Implementation period”: From when to when will the PaM be implemented and how long will it have an effect?
 - Policy or measure's (expected) starting date
 - If relevant the expected end date
- “Status of implementation”: planned, started, stopped, finalized etc.
- “Responsible for implementation:” Entity(ies) responsible for Setting the regulation(s), Providing the funding, Planning, Monitoring, Evaluation
- “Actions taken”: What steps in the implementation process (described earlier) have already been taken?
- “Impact”: What impact will the PaM have on different dimensions of the Energy Union e.g. energy or GHG savings
 - Energy Union Dimension(s) affected
 - Sectors affected
 - GHG areas and greenhouse gases covered by the policy or measure: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), F-gases, CO₂ Land use land use change and forestry (LULUCF), non-CO₂ LULUCF
- Costs – associated costs of the PaM
- Who provides the funding: state budget, financing organization, etc.

- Please specify (in net present value terms) the annual public budgetary impacts (expenditure-revenues) the policy or measure is expected to have over its expected operational lifetime
 - Year(s) for which costs and benefits have been calculated
 - Price reference year used
- References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure

However, it must be noted that often, the requested level of detail is not yet available, and sometimes specific studies will be needed for which resources have not been available.

Definitions according to Article 2 Governance Regulation

The following definitions apply:

- (1) **‘policies and measures’** means all instruments which contribute to meeting the objectives of the integrated national energy and climate plans and/or to implement commitments under points (a) and (b) of Article 4(2) of the UNFCCC, which may include those that do not have the limitation and reduction of greenhouse gas emissions or change in the energy system as a primary objective;
- (2) **‘existing policies and measures’** means implemented policies and measures and adopted policies and measures;
- (3) **‘implemented policies and measures’** means policies and measures for which one or more of the following applies at the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report: directly applicable Union or national law is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised;
- (4) **‘adopted policies and measures’** means policies and measures for which an official government decision has been made by the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report and there is a clear commitment to proceed with implementation;
- (5) **‘planned policies and measures’** means options that are under discussion and that have a realistic chance of being adopted and implemented after the date of submission of the integrated national energy and climate plan or of the integrated national energy and climate progress report;

Types of Policies and Measures (PaM) in the Montenegrin NECP

In addition to the types of **existing and planned PaMs** as defined above, **suggestions for new PaMs** are also presented. These suggestions result from the analysis of status quo, targets, existing and planned PaMs. Suggestions for new PaMs have been drafted by consultants to address conflicting targets and PaMs, and to respond to stakeholder feedback received during the NECP drafting process.

Policies and Measures either result in direct impact in terms of achieving the targets on national level or enable the achievement of direct impact.

Types of PaM:

- Legal
- Technical
- Financial
- Informational
- Regulatory

Financing of Measures

Successful implementation of PaMs is only possible if financing is secured. Financing of measures can be through state budget, private capital, targeted European programmes⁷³, and Sovereign green bonds⁷⁴.

Eco Fund

The Eco Fund is financing the preparation, implementation and development of programmes, projects and similar activities in the field of preservation, sustainable use, protection and improvement of the environment, energy efficiency and use of renewable sources and energy at the state and local level, as follows:

- implementation of national strategic planning documents in the field of environmental protection, sustainable development and energy efficiency;
- mediation related to financing of environmental protection, energy efficiency and renewable energy sources from funds provided from loans, donations and assistance, instruments, programmes and funds of the European Union, United Nations and international organizations, foreign investments intended for environmental protection, from foreign countries, financial institutions and domestic and foreign legal and natural persons;
- maintaining a database of programmes, projects and similar activities in the field of environmental protection and energy efficiency, the necessary and available financial resources for their implementation;
- establishing cooperation with international and domestic financial institutions and other legal and natural persons, in order to finance environmental protection and energy efficiency, in accordance with national strategic planning documents in the field of environmental protection, energy efficiency and renewable energy sources; and
- other activities related to financing environmental protection and energy efficiency.

The Eco Fund carries out its activities in cooperation with the Ministry of Ecology, Spatial Planning and Urbanism, Ministry of Finance and Social Welfare, Ministry of Economic Development, Ministry of Energy and Mining, other state administration bodies, local self-government units, professional, scientific and financial institutions, as well as in cooperation with international organizations and financial institutions.

⁷³ For example: https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en (last access 31.03.2022)

⁷⁴ For example: https://www.climatebonds.net/certification/netherlands_sovereign (last access 31.03.2022)

The mission of the Eco Fund is to raise and invest funds in building a sustainable society in Montenegro, which will be based on the efficient use of all natural resources and low-carbon development.

The vision of the Eco Fund is to position itself as a leading professional and financial institution in the field of environmental protection and sustainable development in Montenegro.

In order to fulfill its mission and vision, the Eco Fund defines the following priorities on which it will work through defining programme areas, measures and activities:

- Ensuring the income of the Eco Fund
- Co-financing of projects, programmes and other activities within the scope of work of the Eco Fund
- Implementation of the Decree on activities or activities that emit greenhouse gases for which a permit for the emission of greenhouse gases is issued
- Institutional strengthening and recognizability of the institution

The information and inputs for long-term projections of financing instrument, amount, and donors, Eco Fund is not in the position to provide in this moment, having in mind that the document for developing the roadmap for the Eco Fund is not yet available. At the national level, the reliable national plans, programmes and strategies are not yet developed or are in process of preparation (for example the National strategy for development of e-mobility, National study for energy efficiency in residential buildings etc.).

The NECP needs to identify the potential source of funding, namely national contribution, donors, and international financing institutions (EU funds, international banks), as well as to identify the institutional framework and obligations. The NECP gives the overview in defining medium- and long-term projections of financing instruments with full support of national decision making bodies, so that the Eco Fund can take the role of the leading financial institution for the realization of concrete measures, as presented in the NECP.

The present situation is, that Eco Fund started with operations last year, and still struggles with short term fund providing from eco tax fees, in accordance with the Law on environment protection.

Eco fees tax in accordance with the Law

The charge of emission credits in accordance with REGULATION ON ACTIVITIES which EMITTING GREENHOUSE GASES is EUR 7,368 for 2020, the same amount in 2021.

Preparation work is being done on developing bylaws, rulebooks and regulation for providing the eco fees which represent the basics of Eco Fund sustainability (change of regulation on activities which emit greenhouse gases and regulation on the amount of fees, method of calculation and payment of fees due to environmental pollution, as well as inclusion of Eco Fund in the management systems of special waste categories and regulation on fee levels).

The projections and the amount that should be provided through this source are still unknown. Eco tax fees represent the only reliable financial source for Eco Fund in this moment.

Green Climate fund

An initiative has been launched towards the Green Climate Fund (GCF) to obtain accreditation, which will provide access to an international fund to finance projects in the field of environmental protection and energy efficiency in Montenegro. Through the National

Programme of Priority Activities in the Field of Climate Change Mitigation and Adaptation within the Cooperation with the Green Climate Fund, the Eco Fund has been recognized as a potentially accredited body for direct access to the GCF. Through selected project proposals within the Programme of Priority Activities, where it is identified as a potential implementing partner in projects related to: increasing climate resilience of health care institutions, implementation of EE measures and introduction of RES in the housing sector, as well as low-carbon transport. During the accreditation process, it is necessary to adopt certain prescribed GCF policies and procedures, as well as to present the capacity to implement projects and programmes of various financial instruments from the categories of environmental and social risk that are assessed according to GCF standards. The outcome of the accreditation process will determine the size of the project or programme; fiduciary functions, which will shape the way of its business using the resources of the Eco Fund (grants, loans and guarantees).

Eco fund started the procedure for accreditation on Green Climate fund. The first phase of the accreditation document procedure Financial Management Capacity Assessment has been submitted to GCF.

The focal point for GCF is from Ministry of Ecology, Spatial Planning and Urbanism.

Climate Fund of Slovenia

Eko-Fund has also established communication with the Eco Fund of the Republic of Slovenia (Eko sklad), which forms the basis for initiating cooperation with the Slovenian Climate Fund. Through this cooperation, financial resources amounting to EUR 1,500,000 were provided in an earlier period for a three-year timeframe, supporting projects in the areas of energy efficiency, e-mobility, as well as capacity development and strengthening within the Eko-Fund. Additionally, the latest Development Cooperation Programme between the Government of Montenegro and the Government of the Republic of Slovenia (2024–2025) allocates EUR 2,668,572 for several projects, and also includes co-financing of the Eko-Fund's programme for the 2024–2026 period — with a total budget of EUR 1,800,000, of which Slovenia contributes EUR 1,150,000.

Croatian Fund for the environment protection

Also, through communication with the Croatian Fund for the environment protection there is a potential for provision of grant financial support for the projects to Eco Fund. The details of cooperation are not yet defined and officially formalised.

In addition to activities related to cooperation with international financial institutions and organizations, as well as bilateral cooperation, the decision makers need to strive Eco Fund to be involved in the processes of planning and programming the use of EU pre-accession funds.

Description of existing and planned PaMs for WEM and WAM scenario

For consideration of PaMs in scenario modelling two requirements must be met: (a) direct impact on GHG and energy, and (b) a certain level of detail regarding the information available about the PaM.

The description of measures contains information on financing. If the financing is not yet secured, necessary activities to secure the financing are described, such as conducting studies

on changes in tax revenues, feasibility studies for the preparation of pilot activities, and carrying out pilot projects demonstrating the feasibility of measures.

The tables below show the overview of key policies and measures affecting the national climate target to 2030. PaMs considered in the scenario with existing measures (WEM) are marked in column WEM, and PaMs considered in the scenario with additional measures (WAM) are marked in column WAM. Some measures can be allocated to more than one dimension. The description is included in the dimension listed in the first place.

The majority of measures are aligned with NDCII. Alignment is also planned for the rest of measures.

Policies and measures	Dimensions	Target sector	WEM	WAM
Reconstruction of the Pljevlja Thermal Power Plant (TPP) and the plan for its future operation	Decarbonisation	Energy industries / electricity generation	×	
Development of the Just Transition Plan for the Pljevlja Coal Region	Decarbonisation	Energy industries / electricity generation		×
New renewable power plants	Decarbonisation	Energy industries / electricity generation	×	
Additional renewable power plants	Decarbonisation	Energy industries / electricity generation		×
RES auctions	Decarbonisation	Energy industries / electricity generation		×
Development of CP mechanism (EU ETS)	Decarbonisation	Energy industries / electricity generation		×
Refurbishment of small hydro power plants (increased EE)	Decarbonisation	Energy industries / electricity generation	×	
Development of decentralized energy generation (distribution medium voltage connection)	Decarbonisation	Energy industries / electricity generation	×	
Additional development of decentralized energy generation (distribution medium voltage connection)	Decarbonisation	Energy industries / electricity generation		×
The Green Hydrogen Development Plan with an Action Plan for the period 2026–2028	Decarbonisation	Energy industries / electricity generation		×
Promotion of e-mobility	Decarbonisation	Transport		×
Introduction of mandatory share of biofuels in fuel supply	Decarbonisation	Transport		×
Uniprom KAP: electrolysis cells replacement and overhauling	Decarbonisation	Industry	×	
Uniprom KAP: Cell hibernation	Decarbonisation	Industry		×
Reduction of HFCs in line with the Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer	Decarbonisation	Industry	×	
Prosumers in industry	Decarbonisation	Industry		×
Biofuels in industry	Decarbonisation	Industry		×
Financial incentives for introduction of hybrid special working machines in industry sector	Decarbonisation	Industry		×
Development of decentralized energy generation by producer - customers (prosumer)	Decarbonisation	Residential / commercial sector	×	
Additional development of decentralized energy generation by producer - customers (prosumer)	Decarbonisation	Residential / commercial sector		×
Support for organic agricultural production	Decarbonisation	Agriculture		×
Support to Manure Management	Decarbonisation	Agriculture		×
Reduction of bio-waste in municipal waste	Decarbonisation	Waste	×	
Increase of connection rate to sewage system (target 93% by 2035)	Decarbonisation	Waste	×	
Increase of CH ₄ recovery in landfills	Decarbonisation	Waste		×
Reduction in the area annually affected by wildfires	Decarbonisation	LULUCF		×
Further increases in the share of industrial round wood used for long-term products	Decarbonisation	LULUCF		×

Table 3-1: Overview table of key policies affecting the national climate target to 2030: Dimension Decarbonisation

Policies and measures	Dimensions	Target sector	WEM	WAM
District Heating in Pljevlja	Energy efficiency	Energy industries / heat generation		×
Reduction of losses in the electricity distribution power network	Energy efficiency	Energy industries / electricity transformation	×	
Ban on import of old vehicles (Euro 4 or lower standard)	Energy efficiency	Transport		×
Passenger transport modal shift to public bus transport	Energy efficiency	Transport		×
Passenger and freight transport modal shift to rail	Energy efficiency	Transport		×
Development and implementation of energy efficiency regulatory framework in buildings	Energy efficiency	Residential / public / commercial	×	
Increased energy efficiency in public buildings	Energy efficiency	Public	×	
Energy labeling and ecodesign requirements for energy related products	Energy efficiency	Residential / public / commercial	×	
Establishment and implementation of EE criteria in public tendering	Energy efficiency	Residential / public	×	
Implementation of energy efficiency measures in public municipal companies	Energy efficiency	Public	×	
Establishment and development of energy management in public sector	Energy efficiency	Public	×	
Financial incentives for citizens/private households (for energy efficiency investments)	Energy efficiency	Residential	×	

Table 3-2: Overview table of key policies affecting the national climate target to 2030: Dimension Energy Efficiency

Policies and measures	Dimensions	Target sector	WEM	WAM
Development of electricity transmission power network	Energy Security	Energy industries / electricity transformation	×	
Development of electricity distribution power network	Energy Security	Energy industries / electricity transformation	×	
Developing battery electric storage systems (BESS)	Energy Security	Energy industries / electricity transformation		×
Development of Risk preparedness plan	Security	Energy industries / electricity transformation		×
Operationalization of the region for security analysis	Energy Security	Energy industries / electricity transformation		×

Table 3-3 Overview table of key policies affecting the national climate target to 2030: Dimension Energy Security

Policies and measures	Dimensions	Target sector	WEM	WAM
Market coupling	Internal Energy Market	Energy industries / electricity transformation	×	
Implementation of European balancing platforms	Internal Energy Market	Energy industries / electricity transformation	×	
Pilot project for improving the “visibility” of the low-voltage network	Internal Energy Market	Energy industries / electricity transformation		×
Operationalization of the capacity calculation region	Internal Energy Market	Energy industries / electricity transformation		×
Demand response	Internal Energy Market	Energy industries / electricity transformation		×
Establishment of a renewable energy community	Internal Energy Market	Energy industries / electricity transformation		×

Policies and measures	Dimensions	Target sector	WEM	WAM
Establishment of a dynamic electricity pricing model	Internal Energy Market	Energy industries / electricity transformation		×
Improvement of network access procedures for citizen energy	Internal Energy Market	Energy industries / electricity transformation		×
Methodology for defining energy-poor groups and measures to reduce energy poverty	Internal Energy Market	Residential		×

Table 3-4: Overview table of key policies affecting the national climate target to 2030: Dimension Internal Energy Market

Policies and measures	Dimensions	Target sector	WEM	WAM
Implementation of Smart Specialisation in Montenegro	Research, Innovation & Competitiveness	All sectors	×	
Incentive measures for the development of research and innovation	Research, Innovation & Competitiveness	All sectors	×	
Program line for improving production capacities	Research, Innovation & Competitiveness	All sectors	×	
Programme for the promotion of innovation and energy efficiency services in industry	Research, Innovation & Competitiveness	All sectors	×	

Table 3-5: Overview table of key policies affecting the national climate target to 2030: Dimension Research, Innovation & Competitiveness

3.1 Dimension Decarbonisation

3.1.1 GHG emissions and removals

3.1.1.1 Energy sector

Exact name: Reconstruction of the Pljevlja Thermal Power Plant (TPP) and the plan for its future operation

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The initial goal of the reconstruction was related to mitigating the environmental impact of the thermal power plant's operation, particularly concerning its impact on air quality. However, since the reconstruction project involved work on the boiler, chimney, and auxiliary systems, requiring a complete shutdown of operations, the opportunity was taken to include additional technological processes relevant to improving the plant's efficiency and operational reliability. The ecological refurbishment of TPP Pljevlja aims to address non-compliance with air quality standards and extend the lifespan of the power plant. This refurbishment includes the installation of modern flue gas treatment technologies in line with EU environmental standards (Industrial Emissions Directive – IED). The mentioned standards imply the application of technologies that comply with the EU LCP BREF document (Best Available Techniques (BAT) Reference Document for Large Combustion Plants). The guidelines from the EU LCP BREF document served as the starting basis for preparing the technical documentation for the

reconstruction. In addition, for the purpose of reliably monitoring environmental impacts, it is necessary to introduce an EMS (Environmental Management System) that includes established indicators of energy, water, and material consumption, as well as reuse, in accordance with the requirements of the IED (2024). TPP Pljevlja has the greatest impact on stable electricity production and affordability of electricity in Montenegro. Additionally it directly and indirectly impacts more than 3000 jobs and it is the main economy driver in northern part of the country. Regarding the future operation plan of the Pljevlja Thermal Power Plant (TE Pljevlja), in addition to its crucial role in achieving national decarbonization goals, it is important to highlight the following challenges:

- Implementation of CBAM – a direct impact on the competitiveness of electricity production (particularly concerning exports to the EU until Montenegro's accession);
- Dominant influence on the national emission factor, which is used in fee calculations;
- Average electricity export volume – 400 GWh to 1,300 GWh, resulting in a significant financial impact on producers (currently, the dominant effect is on EPCG);
- National CO₂ emission trading scheme and the transition to the EU ETS – including timing, allocation of free emission allowances, and the substantial additional financial burden on the power plant, which would make operations financially unsustainable.

It is expected that this facility will remain operational until 2040, albeit with a gradual reduction in annual operating hours, which is necessary to achieve the national climate goals. It should be emphasized that when the operation of the thermal power plant is definitively discontinued, the operator is required to assess the level of soil and groundwater contamination in relation to the condition established in the baseline report. If the installation has caused significant pollution compared to the reference state, the operator must take the necessary measures — removal, control, remediation, or containment of the pollutants — so that the site, taking into account its current or planned future use, does not pose a significant risk to human health or the environment (IED).

Description of the PaM:

The measure involves the construction of a de-sulfurization (FGD) and de-nitrification (SCR) installation, the upgrade of electro-filtering equipment, the construction of a wastewater treatment facility, and the reconstruction of the internal system for transporting by-products. Additionally, a heating station will be built as part of the district heating system. These changes are aimed at reducing sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions from the power plant. Also the energy efficiency of the plant will be slightly increased.

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure (compliance with IED Law).

Problem the policy or measure is addressing: Air pollution and non-compliance with the IED Law.

Objective of the policy or measure: Reduction of SO₂ and NO_x emissions to comply with IED standards (SO₂ ≤ 130 mg/Nm³ and NO_x ≤ 150 mg/Nm³). Slight increase in energy efficiency of the power plant (from 34.1% to 34.5 %).

Implementation process:

- June 2020: EPCG (Electricity Power Utility of Montenegro) signed an agreement for the ecological refurbishment.
- 2021-2022: The contract for the equipment supplier and installer was awarded and implementation began.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2025
- The measures will have long-term effects, significantly reducing emissions and improving air quality and efficiency after installation.

Status of implementation:

- The project is ongoing, with the equipment installation scheduled to be completed within the specified period.

Responsible for implementation:

- EPCG (Electricity Power Utility of Montenegro) is responsible for setting regulations, providing funding, and overseeing the implementation process.

Actions taken:

- Agreement signed with EPCG in June 2020.
- Public procurement procedure initiated for the selection of the equipment supplier and installer.
- Contract awarded for installation of flue gas desulfurization and denitrification systems.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security, Energy efficiency.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases⁷⁵ covered: This measure targets sulfur oxides (SO_x) and nitrogen oxides (NO_x) emissions rather than direct GHG reductions, but because of slight increase of energy efficiency of the plant it will contribute to GHG emission decrease (cca 200 Gg CO_{2eq} per year with respect to the base year).

Costs:

- The total budget for the project is EUR 54.45 million, spread over 2 years (2024-2025).

Funding:

- EPCG is providing the funding, which will be financed through the company's budget.

Annual public budgetary impacts:

- None.

⁷⁵ Quantification of the PaM impact on GHG emission decrease is given for target year (2030) with respect to the last known historical year (2022).

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The project is designed in line with the Industrial Emissions Directive (IED) and follows the legal requirements for reducing sulfur and nitrogen oxide emissions. All technical and financial information regarding PaM is defined in the Main design of Ecological refurbishment of Thermal Power Plant (TPP) Pljevlja.

Exact name: Development of the Just Transition Plan for the Pljevlja Coal Region

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The purpose of developing the Just Transition Plan for the Pljevlja region is to provide a comprehensive response to the challenges arising from the transition of the Pljevlja region from a coal-based economy to sustainable, low-carbon development, in accordance with the obligations under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, adapted for the Energy Community, as well as the Energy Community Policy Guidelines on Just Transition and Implementing Regulation (EU) 2022/2299, which together define the mandatory content of this document and the reporting mechanisms for its implementation.

The measure combines technical, legal-regulatory, and informational approaches to mitigate the negative effects of decarbonization in the Pljevlja coal region. The development of the Plan is based on a participatory approach, including public consultations and multisectoral cooperation. Special emphasis is placed on an inclusive transition, which actively recognizes and involves vulnerable social groups, youth, and gender equality as key pillars of sustainable development.

Through defined pillars such as economic diversification, social inclusion, environmental remediation, institutional governance, and financial mobilization, the Plan builds upon existing strategic documents and directly contributes to achieving the NECP objectives in the dimensions of “Decarbonization” and “Energy Security.” It ensures effective investment planning, development of alternative sectors (renewable energy, agriculture, tourism, forestry, light industry, etc.), workforce reskilling, and improvement of local infrastructure—making the transition just, sustainable, and inclusive.

Description of the PaM:

This measure represents a preparatory activity that creates the prerequisites for defining investment and operational measures for a just transition in Pljevlja. The resulting Plan will serve as a strategic and operational framework for investments and support programs during the 2027–2035 period.

The goal of the Just Transition Plan is to identify investments for the region’s future development, with a focus on improving infrastructure and repurposing land currently used

for lignite mining, while preserving and creating new jobs, ensuring reskilling and upskilling of workers, mitigating the social impacts of coal phase-out, diversifying income sources, and ensuring social cohesion throughout the transition. The Plan will also define the implementation costs of measures, investment incentives, and implementation timelines.

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure.

Problem the policy or measure is addressing: Socioeconomic dependence of the region on coal extraction and use. Enabling the achievement of national decarbonization targets.

Objective of the policy or measure: A just transition and coal phase-out without social destabilization; preservation and creation of jobs; economic diversification, empowerment of the local community, environmental remediation, and reclamation of mining areas.

Implementation process:

- Selection of consultant
- Preparation of the Plan and consultations
- Adoption of the Plan.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2027

Status of implementation:

- In the planning and consultation phase.

Responsible for implementation:

- Ministry of Energy and Mining
- Municipality of Pljevlja
- Private sector entities, NGOs, and trade unions in the field of social transition.

Actions taken:

- Council for Just Transition established
- Team for the plan preparation selected.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security, Energy efficiency.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: As the Pljevlja Thermal Power Plant accounts for nearly 50% of Montenegro's annual GHG emissions, the impact of this measure on achieving decarbonization goals is of crucial importance.

Costs:

- No current estimates available.

Funding:

- Donations.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The proposed content and approach for developing the Just Transition Plan are aligned with Article 11 of Regulation (EU) 2021/1056 on the Just Transition Fund, and with the Energy Community recommendations (May 2025).
- Montenegro Just Transition Roadmap 2023 (UNDP)
- Socio-economic diagnostics of the coal region, Pljevlja (UNDP)
- Compliance with Articles 8 and 15 of the adapted Regulation (EU) 2018/1999
- LURA – Assessment of mine land repurposing potential (PMI–World Bank).

3.1.1.2 Transport sector

Exact name: Promotion of e-mobility

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Transport sector is the second most important source of GHG emissions with share of 23 % in the total GHG emissions. The main reason for this is the fuel mix used in the sector. The most dominant share (energy wise) corresponds to diesel (80 %), then follows gasoline (15 %), LPG (4 %) and very low usage of electricity (1 %). There is no usage of bio fuels. This kind of energy mix greatly impacts GHG emissions. Therefore, PaMs targeting emissions decrease in transport sector may greatly contribute to the national goal. Dominant usage of diesel leads to 83 % share in total GHG emissions from the transport sector. Passenger cars are responsible for 96 % of the total GHG emissions in transport sector. Acceptable fuel economy is the main motivation for usage of vehicles powered by diesel in Montenegro. Fuel switch of diesel to electricity improves the economy of vehicle stock, increases RES share and enables significant decrease of GHG emissions. However, high cost of electric vehicles and low availability of charging infrastructure present great challenges.

Description of the PaM:

Mitigation of the recognized challenges in order to support promotion of e-mobility is done in the following manner:

- Financial incentives for e-vehicles
- Financial incentives for e-vehicles charging infrastructure.

The financial framework to encourage e-mobility typically includes investment incentives to purchase e-vehicles and / or to build e-charging infrastructure or tax policy measures that favor e-vehicles. The tax on the motor vehicles use is paid annually according to the engine cc for passenger motor vehicles. This tax is paid by legal and natural persons who are owners of

registered passenger cars according to the prescribed tariff. This tax is not paid for e-vehicles, so this tax relief is the only financial incentive for e-vehicles and e-mobility in general that currently exists in Montenegro. The most effective financial incentive is the subsidy for the purchase of electric vehicles (EVs) available to individuals, companies, entrepreneurs, and the public sector:

- Category M1 – Passenger vehicles
- €7,200 for a new zero-emission electric vehicle with a total value (including VAT) not exceeding €35,000;
- €6,500 for a new electric vehicle with a total value (including VAT) between €35,000.01 and €45,000;
- €4,500 for a new electric vehicle with a total value (including VAT) between €45,000.01 and €65,000.
- Category N1 – Light commercial vehicles
- €6,500 for a new electric vehicle with a total value (including VAT) not exceeding €45,000;
- €4,500 for a new zero-emission electric vehicle with a total value (including VAT) between €45,000.01 and €65,000.
- Category L – Light electric vehicles
- €1,500 for L7 – heavy quadricycles;
- €1,000 for L6 – light quadricycles;
- €750 for L3, L4, L5 – motorcycles and tricycles;
- €500 for L2 – light tricycles;
- €300 for L1 – mopeds (excluding electric bicycles with auxiliary motors).

In order to reach the national goal regarding GHG emissions it is necessary to have dynamic development of e-mobility until 2030. At least 35000 passenger cars within the total vehicle stock have to be electric until 2030.

The following incentives could be considered: reduced VAT rate when buying new e-vehicles, reduced tax rate when buying used e-vehicle vehicles, reduced tax rate for vehicle registration, vehicle use, road use. The same could apply for plug-in hybrid electric vehicle (PHEV), as well. Transposition of Directive 2014/94/EU on the establishment of infrastructure for alternative fuels and development of the National Policy Framework for the establishment of infrastructure for alternative fuels in transport is the prerequisite for further e-mobility development. In order to enable necessary dynamics of the electric vehicles share increase until 2030, charging infrastructure should be equally developed. Currently, there are around 90 charging stations (mostly slow charging). Low number of electric vehicles impacts feasibility of investments in charging infrastructure and there is a need for financial incentives until the number of vehicles is great enough to enable profitable operation of charging stations. Therefore, in order to enable fast development of e-charging infrastructure a financial incentive is needed:

- Slow chargers - EUR 5,000.00
- Fast chargers (DC chargers) - EUR 15,000.00.

The number of chargers included by the PaM are 50 fast charging stations and 500 slow charging stations.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Diesel fuel substitution, low RES share in transport sector.

Objective of the policy or measure: New technologies, financial incentives for cleaner traffic and the use of alternative fuels in traffic, decrease of GHG emissions.

Implementation process:

- Obtaining funding.
- Preparation of the calls.
- Monitoring and reporting on implementation.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2030
- The measures will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of Energy and Mining, Ministry of transport, Eco Fund, local municipalities.

Actions taken:

- Environmental Protection Fund (Eco-Fund) already realized similar calls.
- The Eco Fund has announced a new programme for subsidising electric, plug-in hybrid and full hybrid vehicles, both for citizens and companies / entrepreneurs.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy efficiency.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A3 Transport).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 195 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 353 million, spread over 6 years (2025-2030).

Funding:

- International donors, funds collected from carbon taxes.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- For the purpose of e-mobility development in Montenegro, Energy Institute Hrvoje Požar Zagreb, Croatia has developed four comprehensive studies in 2019.

Exact name: Introduction of mandatory share of biofuels in fuel supply

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Transport sector is the second most important source of GHG emissions with share of 23 % in the total GHG emissions. The main reason for this is the fuel mix used in the sector. The most dominant share (energy wise) corresponds to diesel (80 %), then follows gasoline (15 %), LPG (4 %) and very low usage of electricity (1 %). There is no usage of bio fuels. This kind of energy mix greatly impacts GHG emissions. Therefore, PaMs targeting emissions decrease in transport sector may greatly contribute to the national goal. Dominant usage of diesel leads to 83 % share in total GHG emissions from the transport sector. Diesel substitution with cleaner fuels helps reaching of the national targets.

Description of the PaM:

All needs for diesel and gasoline are supplied from imports. In the oil and gas sector, there are 61 entities engaged in trade, storage and/or transportation of oil derivatives, LPG and natural gas. Creating the regulation that impacts the diesel and gasoline mix supplied to final consumers directly impacts RES share and therefore GHG emissions. This PaM envisages introduction of mandatory share of biodiesel and biogasoline in the total supply of diesel and gasoline in the following amount:

- 6 % of biodiesel until 2030
- 10 % of biogasoline until 2034.

The shares are introduced gradually starting from 2025 (1 % increase each year).

Legal, technical, financial, informational, regulatory policy or measure: Legal measure.

Problem the policy or measure is addressing: Diesel fuel substitution, low RES share in transport sector.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Preparation of the first draft.
- Consultations with stakeholders.
- Finalization of the draft.
- Adoption procedure.

Implementation period:

- Expected starting date: 2025
- Expected end date: -
- The measures will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of Energy and Mining, Ministry of transport.

Actions taken:

- Initial phase of consultations with stakeholders.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A3 Transport).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 46 Gg CO_{2eq}.

Costs:

- There is no estimation of the costs.

Funding:

- None.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

3.1.1.3 Building sector

Exact name: Development of decentralized energy generation by producer - customers (prosumer)

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The Energy Law and the Law on renewable energy usage have established legal basis for prosumers installment in housing/commercial/public sector, while the Govt. has announced intention to subsidise such installations to citizen. The legislation offers the possibility for each household/commercial buyer to generate electricity from renewable sources and high efficient cogeneration and supply electricity grid. Also, the Law on Spatial Planning eliminates detected barriers for expansion of small photovoltaic systems and introduces a simple procedure for building systems up to 10 kW installed power on its own or on the roof of an auxiliary building.

The procedure for larger installations mainly applicable to commercial electricity buyers is also facilitated by the same Law. The most effective manner to target all national goals is including renewable electricity generation at locations where the electricity is consumed. This directly affects national RES share since electricity produced by prosumers has the highest priority in the national energy mix (the first order in dispatching). The connection issue, that is one of the greatest challenges for integration of large-scale RES, is significantly easier to overcome. However, it is needed to develop hosting capacity calculation procedures in order to enable efficient implementation of the PaM. Currently, there are no specific hosting capacity calculation methodology, an empirical approach is used. It is very limiting but there are intentions for improvement of the methodology.

Description of the PaM:

EPCG is the main driver of prosumer concept development in Montenegro. This company offers all necessary technical services and financing (in a form of a loan which is repaid through electricity bills in a manner that part of a bill is the investment). Currently, this concept is mainly targeting residential sector but it can be effectively applied to larger consumers also. There is a lot of interest expressed by consumers (potential 26000 prosumers) and power-wise it is expected that there is a total power of close to 250 MW by 2030. There are plans for even greater integration of prosumers, but there is a need for hosting capacity methodology development as well as for inclusion of battery electric storage systems as a mandatory part of a prosumer installation. It is important to emphasize that achieving a high level of integration depends on several key factors:

- Coordination of prosumer expansion with the Distribution System Operator (DSO);
- Optimal sizing of prosumers' generation capacities (the goal is for production to cover annual consumption — any surplus generation should be discouraged);
- Dynamic development of the electricity distribution network in terms of infrastructure and management, including modern systems for monitoring network operating parameters.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Energy mix diversification.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Preparation of call for equipment.
- Obtaining funding.
- Consultations with stakeholders (connection issues).
- Public call for prosumers from the sector.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2030
- The measure will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Ongoing.
- More than 26000 consumers expressed interest to become prosumers.
- 70 MW of installed power of prosumers is mounted.

Responsible for implementation:

- EPCG.

Actions taken:

- Several public calls for equipment are finalized.
- Continuous communication with DSO regarding connection issues.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHG because it leads to RES share increase. There is a direct impact on GHG emission decrease from residential sector because of fuel switch (electricity becomes dominant fuel in the sector with respect to wood and coal). Residential sector has a very small impact on total GHG emissions because it relies on electricity and wood fuels (and very small share of coal). An estimate of GHG decrease is about 10 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 220 million, spread over 8 years (2023-2030).

Funding:

- IFIs, commercial banks.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed by EPCG in order to improve electricity generation mix by high expansion of electricity generation from RES (solar) at location of consumption.

Exact name: Additional development of decentralized energy generation by producer - customers (prosumer)

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

In order to additionally support development of prosumers as it was proposed with the previous PaM targeting residential/service/public sector, this PaM takes into account evident connection issues because there is not clearly defined hosting capacity. Distribution grid was developed for consumption and although there is a necessary grid capacity the operation of prosumers follows significantly different patterns which limit the capacity of prosumers to be connected to the existing grid. Also, prosumers have proven their impact on RES share, and therefore their impact on all other national goals. In order to enable additional prosumers, there is a need for similar support mechanism (as for the previous PaM) but with mandatory inclusion of battery electric storage systems at prosumer site. It increases the investment in a certain extent, but it provides necessary flexibility.

Description of the PaM:

EPCG is the main driver of prosumer concept development in Montenegro. This company offers all necessary technical services and financing (in a form of a loan which is repaid through electricity bills in a manner that part of a bill is the investment). Currently, this concept is mainly targeting residential sector but it can be effectively applied to larger consumers also. There is a lot of interest expressed by consumers (potential 26000 prosumers) and power-wise it is expected that there is a total additional power of close to 140 MW by 2030. In order to integrate this additional capacity of prosumers inclusion of battery electric storage systems should become a mandatory part of a prosumer installation. EPCG is planning to extend their technical and financial offer for all prosumers with battery electric storage systems in order to reach planned level of prosumers installed power. The feasibility of implementing this measure is directly conditioned by the operational characteristics of the electricity distribution network, particularly by the availability of advanced monitoring capabilities for prosumer operations and active voltage management within the network.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Energy mix diversification.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Preparation of call for equipment.
- Obtaining funding.
- Consultations with stakeholders (connection issues).
- Public call for prosumers from the sector.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2030
- The measure will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Ongoing.

- More than 26000 consumers expressed interest to become prosumers.
- 70 MW of installed power of prosumers is mounted.

Responsible for implementation:

- EPCG.

Actions taken:

- Several public calls for equipment are finalized.
- Continuous communication with DSO regarding connection issues.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHG because it leads to RES share increase. There is a direct impact on GHG emission decrease from residential sector because of fuel switch (electricity becomes dominant fuel in the sector with respect to wood and coal). Residential sector has a very small impact on total GHG emissions because it relies on electricity and wood fuels (and very small share of coal). An estimate of GHG decrease is about 10 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 130 million, spread over 6 years (2025-2030).

Funding:

- IFIs, commercial banks.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed by EPCG in order to improve electricity generation mix by high expansion of electricity generation from RES (solar) at location of consumption.

3.1.1.4 Industrial sector

Exact name: Uniprom KAP: electrolysis cells replacement and overhauling

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Although bankruptcy was instituted in July 2013, the new owner Uniprom, who bought the KAP factory (Aluminum Smelter Podgorica) in 2014, has invested a lot in technological processes improvements, since then. The newly installed plants are BAT BREF technics, so with limited

emissions and in line with new IED Law (transposed IED directive) requirements. Altogether, four aluminum processing plants are being built, which will exclusively work for the automotive industry. The small ingot alloy plant (equipped for the production of 30,000 tons of special alloys) and new production line for aluminum alloys have been opened. Besides, all the necessary installations for use of liquefied natural gas (LNG), replacing heavy and light fuel oil for production at Anode, Smelter and future plants, are in operation since October 2018 (LNG supplied to the Plant by rail). This investment has already largely decreased both air emissions as well as GHGs. Further investments worth EUR 30 million in a new billet production plant with a capacity of 60,000 tons as well as a new plant with state-of-the-art technology for the production of fences and wires will be built in 2 years.

Description of the PaM:

Since end 2015, outdated series A assembly line in electrolysis plant is out of operation, which is reflected in lowering PFC emission from the electrolysis plant, starting from 2016. Only operating series B assembly line in electrolysis plant has installed automatized control of number and duration of anode effects on the cells, so the duration is up to several times shorter (less than a minute) and number of anode effects per cell per day is more than 10 times smaller, compared to dismantled series A assembly line. Furthermore, 24 out of 264 cells in series B assembly line are ADG type having spot dosing of alumina that result in decreased F gases emissions. Currently, 155 out of 264 cells are in operation, while the remaining cells are scheduled for overhaul or replacement, with the aim of enabling the electrolysis plant to reach its full liquid metal production capacity (65,000 t). According to the operator development plan, the technological improvements on the electrolysis cells have been considered so achieving increase of production output and better metal quality. Starting from 2019, only electricity and LNG have been used in the facility's technological processes.

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure (compliance with IED Law).

Problem the policy or measure is addressing: Anode effect in the production and decrease of PFCs emissions which are known by high GWP.

Objective of the policy or measure: New electrolysis cells technologies, improved product quality, PFCs decrease.

Implementation process:

- New billet production plant with a capacity of 60,000 tons
- New plant with state-of-the-art technology for the production of fences and wires
- 109 cells have to be either overhauled or replaced, when electrolysis plant will achieve full capacity of liquid metal production (65,000 t)

Implementation period:

- Expected starting date: 2026
- Expected end date: 2028
- The measures will have long-term effects in reducing emissions.

Status of implementation:

- Currently on hold due to unfavorable market conditions.

Responsible for implementation:

- Aluminum plant operator Uniprom KAP.

Actions taken:

- All the necessary installations for use of liquefied natural gas (LNG), replacing heavy and light fuel oil for production at Anode, Smelter and future plants, are in operation.
- Starting from 2022, there is no production of liquid metal (electrolysis plant is not operating).

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Industry (IPCC sector: 2C Metal Industry, subcategory: 2C3 PFC emissions from primary aluminum production).
- GHG areas and greenhouse gases covered: This measure targets tetrafluoromethane (CF₄ i.e. PFC - 14) and it enables cca 95 % of decrease of CF₄ emissions per year with respect to the base year.

Costs:

- Project total budget amounts EUR 30 mil. spread over the whole period (2026-2028).

Funding:

- Uniprom KAP.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The project is prepared according to an internal study prepared by Uniprom KAP.

Exact name: Uniprom KAP: Cell hibernation

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Company Uniprom KAP has decided to test new technologies that can improve the productivity, energy intensity and lowering of GHG emissions. Therefore the target is to implement only BAT BREF technics in line with new IED Law (transposed IED directive) requirements. Since the goal is to increase the production level, it is planned to fulfill that goal in the optimal manner taking into account the energy use and GHG emissions. Therefore, it is planned to test the efficiency and feasibility of PFCs capturing technologies (so called "cell hibernation") on a limited number of cells in the electrolysis plant prior to the extending the new technology on all the cells.

Description of the PaM:

According to the installation business plan, after the testing phase, it is envisaged to invest in PFCs capturing technology in all cells (approximately 33 cells per year), starting from 2022. In such case, by 2030, all cells will be covered, so the zero PFCs will occur in the electrolysis plant and at the same time there will be savings in electricity consumption (5.5%).

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure (compliance with IED Law).

Problem the policy or measure is addressing: Anode effect in the production and decrease of PFCs emissions which are known by high GWP.

Objective of the policy or measure: New electrolysis cells technologies, PFCs decrease, energy savings.

Implementation process:

- Testing phase – implementation of the new technology for PFCs capturing on 2 cells.
- Extension of the technology on all cells of the electrolysis plant.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects in reducing emissions.

Status of implementation:

- Currently on hold due to unfavorable market conditions.

Responsible for implementation:

- Aluminum plant operator Uniprom KAP.

Actions taken:

- Testing phase on 2 cells.
- Starting from 2022, there is no production of liquid metal (electrolysis plant is not operating).

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Industry (IPCC sector: 2C Metal Industry, subcategory: 2C3 PFC emissions from primary aluminum production).
- GHG areas and greenhouse gases covered: This measure targets tetrafluoromethane (CF₄ i.e. PFC - 14) and Hexafluoroethane (C₂F₆ i.e. PFC - 116). It enables cca total elimination of these GHG with respect to the base year.

Costs:

- Project total budget amounts EUR 32 mil. spread over the whole period (2022-2024).

Funding:

- Uniprom KAP.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The project is prepared according to an internal study prepared by Uniprom KAP.

Exact name: Reduction of HFCs in line with the Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

In April 2019, Montenegro officially became a member of the Kigali Amendment. The obligations arising from the Amendment is to reduce the consumption of HFC substances. IPPU sector is responsible for 18 % share of total emissions of Non energy sector and almost all emissions are caused by usage of HFCs.

Description of the PaM:

The Government is obliged to develop a Plan for the gradual reduction of consumption of HFC substances. After the Plan development and adoption, the Government would apply for financial resources for the Plan implementation. Targeted decrease of all HFCs (HFC 32, HFC 125, HFC 134a, HFC 143a and HFC 227ea) by 2030 is 10 % and by 2045 is 80 %.

Legal, technical, financial, informational, regulatory policy or measure: Legal, regulatory measure (compliance with Kigali Amendment).

Problem the policy or measure is addressing: Decrease of HFCs in accordance with Kigali Amendment.

Objective of the policy or measure: Reduction of HFCs, new technologies of refrigeration and air conditioning devices due to more advanced refrigerants.

Implementation process:

- Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer adoption.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2045
- The measures will have long-term effects, significantly reducing emissions of HFCs.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Agency for Nature and Environmental Protection.

Actions taken:

- Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer adoption.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Demand sectors (IPCC sector: 2F Product Uses as Substitutes for Ozone Depleting Substances, subcategory: 2F1 Refrigeration and Air Conditioning).
- GHG areas and greenhouse gases covered: HFC 32, HFC 125, HFC 134a, HFC 143a and HFC 227ea. Expected impact on total emissions is 30 Gg CO_{2eq}.

Costs:

- Negligible. However, it can be expected that technology owners/end users will have to bear additional cost when substituting appliances.

Funding:

- Multilateral Fund for the Implementation of the Montreal Protocol.

Annual public budgetary impacts:

- Negligible.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Montreal Protocol
- Kigali Amendment
- All analyses are prepared basing on historical data, set targets and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

Exact name: Prosumers in industry

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The most effective manner to target all national goals is including renewable electricity generation at locations where the electricity is consumed. This directly affects national RES share since electricity produced by prosumers has the highest priority in the national energy mix (the first order in dispatching). The connection issue, that is one of the greatest challenges for integration of large-scale RES, is significantly easier to overcome. However, it is needed to develop hosting capacity calculation procedures in order to enable efficient implementation of the PaM. Currently, there are no specific hosting capacity calculation methodology, an empirical approach is used. It is very limiting but there are intentions for improvement of methodology.

Description of the PaM:

EPCG is the main driver of prosumer concept development in Montenegro. This company offers all necessary technical services and financing (in a form of a loan which is repaid through electricity bills in a manner that part of a bill is the investment). Currently, this concept is mainly targeting residential sector but it can be effectively applied to larger consumers also. Although current level of industrial activity is not high in Montenegro, its impact on energy consumption is significant and there is a need to improve diversification of the energy mix in the sector which will lead to the increase of the RES share, improvement of energy efficiency and decrease of GHG emissions. In order to help reaching of the national GHG target, total of 60 MW of installed power is needed by 2030. This will lead to a slight increase of electricity consumption in the sector (about 5 %) and decrease of other fuels (diesel has the most dominant share). It should be noted that EPCG Željezara and Uniprom KAP have already built the first megawatt-scale photovoltaic power plants and plan to significantly expand their capacity, owing to the good availability of grid infrastructure for connection (as they were previously very intensive electricity consumers).

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Energy mix diversification, Diesel fuel substitution.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Preparation of call for equipment.
- Obtaining funding.
- Consultations with stakeholders (connection issues).
- Public call for prosumers from the sector.

Implementation period:

- Expected starting date: 2026
- Expected end date: -
- The measure will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of Energy and Mining, EPCG.

Actions taken:

- Market analysis regarding equipment availability, funding possibilities.
- Initial phase of consultations with stakeholders.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.

- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A2 Manufacturing Industries and Construction).
- GHG areas and greenhouse gases covered: This measure targets all GHG because it leads to RES share increase.

Costs:

- The total budget for the project is EUR 50 million, spread over 5 years (2026-2030).

Funding:

- IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

Exact name: *Biofuels in industry*

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Diesel usage is the second most important reason for GHG emissions in Montenegro (23 % share in total emissions). Although its main usage corresponds to transport sector, the share of diesel usage that corresponds to Industry is also important (16 %). Diesel fuel plays a vital role in the industrial sector, powering a wide range of machinery and equipment. Diesel generators are widely used in industries as a backup or emergency power source. They provide electricity when the main power supply fails, ensuring continuous operation. Diesel fuel is used to power heavy machinery such as bulldozers, excavators, cranes, and dump trucks. These machines require significant power for earth-moving and construction tasks, which diesel engines can efficiently deliver. Diesel engines drive large mining trucks, drills, and other equipment used in extracting minerals and ores. Diesel's high energy density is ideal for the rugged and demanding environment of mining operations. Therefore, diesel substitution in this sector also leads to more efficient achieving of the national goals regarding GHG emissions.

Description of the PaM:

Creating the regulation that impacts the diesel used in industry sector impacts RES share and therefore GHG emissions. This PaM envisages introduction of mandatory share of biodiesel in the total supply of diesel in industrz sector in the following amount:

- 25 % of biodiesel until 2030.

The share is introduced gradually starting from 2026.

Legal, technical, financial, informational, regulatory policy or measure: Legal measure.

Problem the policy or measure is addressing: Diesel fuel substitution.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Preparation of the first draft.
- Consultations with stakeholders.
- Finalization of the draft.
- Adoption procedure.

Implementation period:

- Expected starting date: 2026
- Expected end date: -
- The measure will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of Energy and Mining.

Actions taken:

- Initial phase of consultations with stakeholders.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A2 Manufacturing Industries and Construction).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 40 Gg CO_{2eq}.

Costs:

- There is no estimation of the costs.

Funding:

- None.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

Exact name: *Financial incentives for introduction of hybrid special working machines in industry sector*

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Diesel usage is the second most important reason for GHG emissions in Montenegro (23 % share in total emissions). Although its main usage corresponds to transport sector, the share of diesel usage that corresponds to Industry is also important (16 %). Diesel fuel plays a vital role in the industrial sector, powering a wide range of machinery and equipment. Diesel fuel is used to power heavy machinery such as bulldozers, excavators, cranes, and dump trucks. There is cca 250 of heavy machinery vehicles in Montenegro. These machines require significant power for earth-moving and construction tasks, which diesel engines can efficiently deliver. Diesel engines drive large mining trucks, drills, and other equipment used in extracting minerals and ores. Diesel's high energy density is ideal for the rugged and demanding environment of mining operations. However, diesel combustion heavily increases the challenges of reaching the national goals regarding GHG emissions. Therefore, any decrease of diesel usage is a means to reach the goal. Hybrid heavy machinery offers a promising solution for industries looking to reduce fuel consumption, emissions, and noise pollution while maintaining performance. Hybrid systems use less fuel by relying on electric power during low-load operations, leading to fuel savings of 15% to 30% compared to diesel-only models. Although there are challenges, the continued development of hybrid technology and the increasing demand for environmentally friendly solutions point to a growing role for hybrids in the future of heavy equipment. The price of hybrid equipment is usually 10% to 30% higher than the equivalent standard diesel-powered machinery.

Description of the PaM:

Hybrid heavy machinery tends to have a higher initial purchase price compared to traditional diesel-powered equipment. However, the long-term operational savings can offset this cost. Therefore, a financial incentive for hybrid heavy machinery is needed in order to promote usage of hybrid heavy machinery in the sector. This PaM envisages a subsidy of 15 % when purchasing hybrid heavy machinery.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Diesel fuel substitution.

Objective of the policy or measure: Decrease of GHG emissions, increasing RES share.

Implementation process:

- Obtaining funding.
- Preparation of the calls.
- Monitoring and reporting on implementation.

Implementation period:

- Expected starting date: 2026
- Expected end date: -
- The measure will have long-term effects, affecting the RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of Energy and Mining, Eco Fund.

Actions taken:

- Initial phase of consultations with stakeholders.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A2 Manufacturing Industries and Construction).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 15 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 5 million, spread over 5 years (2026-2030).

Funding:

- None.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

3.1.1.5 Agriculture sector

Exact name: Support for organic agricultural production

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The impact of N₂O emissions from managed soils on all GHG emissions in Agriculture sector is represented by close to 15 % share in the base year. Since the usage of synthetic fertilizer is the main driver of increasing N₂O emissions from managed soils, there is a possibility to impact the decrease of emissions by better control of synthetic fertilizer usage.

Description of the PaM:

Support to organic production is leading to the decrease of usage of synthetic fertilizers. The impact of this measure has been estimated by assuming that between 2015 and 2020 the amount of synthetic fertiliser used is reduced by 20%, and the amount of manure applied to soils remains unchanged. Besides, ammonia emission abatement techniques applying manure to soils also reduce indirect N₂O emissions.

Legal, technical, financial, informational, regulatory policy or measure: Legal and financial measure.

Problem the policy or measure is addressing: Sustainable management of natural resources, reduction of adverse impacts of agriculture on the environment, biodiversity preservation, upgrading the quality of agricultural produce.

Objective of the policy or measure: Reduced amount of synthetic fertiliser used, decrease of N₂O emissions.

Implementation process:

- Support to organic production is a measure included in the Agrobudget 2025 (Measure 2.2.2).
- Extension of the financial mechanism implementation.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, reducing emissions of N₂O.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Ministry of Agriculture, Forestry and Water Management (MAFWM), Monteorganica.

Actions taken:

- Financial support is provided to producers who produce organic products in accordance with the Organic Production Act (Official Gazette MNE No. 56/13), per hectare or by a minimum number of specific livestock.
- Certification procedure in the field of protected agricultural and food products performs accredited certification body Monteorganica on the basis of the authorization of Ministry of Agriculture, Forestry and Water Management, in accordance with the Law on Quality Schemes of Agricultural and Food Products (Official Gazette MNE, No. 22/17) and in accordance with the requirements of the standard MESTEN ISO / IEC 17 065: 2013.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Agriculture sector (IPCC sector: 3D Agriculture, subcategory: 3.D.a Direct N₂O emissions from managed soils – Inorganic N-fertiliser, N₂O 3.D.b Indirect N₂O emissions from managed soils, N₂O).
- GHG areas and greenhouse gases covered: Direct and indirect Nitrous oxide (N₂O) emissions from managed soils. Total decrease of N₂O emissions from managed soils with respect to the base year is 15 %.

Costs:

- Project total budget amounts EUR 4.4 mil.. The budget forecast up to 2030 is based on annual financial support allocation in Agrobudget 2025 (EUR 400k).

Funding:

- MARD/ IFI loans, IPARD EU funds and other international donors.

Annual public budgetary impacts:

- EUR 4.4 mil. spread over the whole period 2022-2030.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The impact of this measure is estimated according to the historical data regarding soil management and usage of fertilizers. It is included in Agrobudget 2025 (it includes elaboration of various measures, incentives in agriculture sector).

Exact name: *Support to Manure Management*

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The impact of direct N₂O emissions from manure management on all GHG emissions in Agriculture sector is represented by close to 6 % share in the base year. The change in cattle manure management systems leads to decrease of N₂O emissions.

Description of the PaM:

The measure leads to a change in cattle manure management systems from liquid/slurry to liquid with natural crust (i.e. all liquid system have natural crust in 2030) and to treatment of swine manure in pit storage, rather than solid storage, a linear change from 2015 to 2030 is applied. This measure foresees financial support for construction and/or reconstruction of facilities (basins) for storing manure or the procurement of specialized manure tanks to prevent negative environmental effects.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Air quality problems due to ammonia (NH₃) emissions, underground waters pollution.

Objective of the policy or measure: New technologies, reduced N₂O emissions, improved air quality due to reduced ammonia (NH₃) emissions, less water pollution due to less nitrogen losses.

Implementation process:

- Support to manure management is a measure included in the Agrobudget 2025 (Measure 2.2.4).
- Extension of the financial mechanism implementation.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, reducing emissions of N₂O.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Ministry of Agriculture, Forestry and Water Management (MAFWM), Monteorganica.

Actions taken:

- Support to manure management is a measure included in the Agrobudget 2025 (Measure 2.2.4).

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Agriculture sector (IPCC sector: 3D Agriculture, subcategory: 3.B Manure Management, direct N₂O).
- GHG areas and greenhouse gases covered: Direct Nitrous oxide (N₂O) emissions from manure management. Total decrease of N₂O emissions from manure management with respect to the base year is 15 %.

Costs:

- Project total budget amounts EUR 0.99 mil.. The budget forecast up to 2030 is based on annual financial support allocation in recent Agrobudget 2025 (EUR 90k).

Funding:

- MARD/ IFI loans, IPARD EU funds and other international donors.

Annual public budgetary impacts:

- EUR 0.99 mil. spread over the whole period 2022-2030.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The impact of this measure is estimated according to the historical data regarding manure management. It is included in Agrobudget 2025 (it includes elaboration of various measures, incentives in agriculture sector).

3.1.1.6 Waste management

Exact name: *Reduction of bio-waste in municipal waste*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Waste sector is the most intensive Non energy sector in terms of GHG emissions with 49 % share, and almost all the emissions are coming from the solid waste (92 % share). Therefore, improvement of solid waste management will lead to significant results with respect to the emission levels decrease. The installation of separate waste collection system has the following co-benefits: moving towards a circular economy, recovery and recycling of materials (e.g. metals, glass, plastics, ...), potential use of waste as a renewable energy source (e.g. anaerobic digestion), recycling of biowaste by composting creates nutrient rich soil and reduced risk of releasing harmful substances to the environment by separate collection of hazardous waste.

Description of the PaM:

Greater separate collection of municipal waste leads to a decrease of organic waste being disposed to landfills. This is to be achieved by a system of primary separation (2 bins – dry and wet), network of waste collection in rural areas, construction of recycling yards in municipalities, equipment for waste collection, as well as educational and awareness raising activities. This directly impacts CH₄ emissions which represent almost all of the emissions from Waste sector. The goal is to significantly decrease (by 50 % until 2029 with respect to the base year) the contents of paper, food and garden waste within the total amount of deposited solid waste.

Legal, technical, financial, informational, regulatory policy or measure: Legal (Landfill Directive (1999/31/EC) implementation).

Problem the policy or measure is addressing: Unsustainable waste management.

Objective of the policy or measure: Reduced CH₄ emissions.

Implementation process:

- Educational and awareness raising activities.
- Public calls for equipment.
- Monitoring of implementation.

Implementation period:

- Expected starting date: 2023

- Expected end date: 2033
- The measures will have long-term effects, reducing emissions of CH₄.

Status of implementation:

- The implementation of this measure is ongoing and will be continued to achieve defined milestones in 2025, 2029, and 2033, i.e. reduction of biodegradable waste by 35 %, 50 % and 75 %, respectfully.

Responsible for implementation:

- Ministry of Ecology, Sustainable Development and Development of the North.

Actions taken:

- Educational and awareness raising activities.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Waste sector (IPCC sector: 5A – Solid Waste Disposal on Land).
- GHG areas and greenhouse gases covered: Methane (CH₄) emissions from solid waste. Total decrease of CH₄ emissions from solid waste with respect to the base year is 10 %.

Costs:

- No information on costs available.

Funding:

- Ministry of Ecology, Sustainable Development and Development of the North, local governments / EU funds, other international donors and IFIs.

Annual public budgetary impacts:

- No information on costs available.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The impact of this measure is estimated according to the targeted content of biodegradable waste within deposited municipal solid waste which is defined for years 2025, 2029 and 2033.

Exact name: Increase of connection rate to sewage system

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Although waste water has a low impact on total GHG emissions from waste sector with 8 % share in the total emissions, there is a possibility to decrease their impact on CH₄ emissions by decreasing the number of septic tanks, i.e. increasing of connection rate to sewage system. The construction of sewage connection systems and wastewater treatment plants in recent years

has led to decreased amount of wastewater collected in septic tanks and released untreated to aquatic environment. In Montenegro, there are currently ten wastewater treatment plants that are in operation or in trial operation. According to the Negotiation Chapter 27 (February 2018), Montenegro sets the target that by 2035 93% of the population (37 city cores with suburbs) will be connected to sewage systems with wastewater treatment plants except of agglomerations of less than 2000 PE which are not obliged to comply with the UWWTD. Remaining percentage of population, which is not possible to be connected to the network for technical reasons, will be achieved with the individual systems according to UWWTD. With this approach, until the end of 2035, wastewater management in all agglomerations will be provided, according to the UWWTD.

Description of the PaM:

The manner waste water is treated in Montenegro is through sewage systems connected to treatment plants and septic tanks. Technology used in treatment plants is characterized by great methane emission factor. Current share of waste water managed by sewage systems in total generated waste water is 60 %. It is planned to increase the share to 93 % by 2035 through construction of sewage connection systems and modern wastewater treatment plants. This will have a significant impact on decrease of CH₄ emissions (close to 80 %) from waste water treatment.

Legal, technical, financial, informational, regulatory policy or measure: Legal (UWWTD Directive (91/271/EEC, 98/15/EC) implementation).

Problem the policy or measure is addressing: Unsustainable wastewater management.

Objective of the policy or measure: Reduced CH₄ emissions.

Implementation process:

- Development of technical design.
- Public calls for equipment and construction works.
- Monitoring of implementation.

Implementation period:

- Expected starting date: 2020
- Expected end date: 2035
- The measures will have long-term effects, reducing emissions of CH₄.

Status of implementation:

- Project is ongoing.

Responsible for implementation:

- Ministry of Ecology, Sustainable Development and Development of the North and business entities.

Actions taken:

- Realised 42% of total investments planned for central and northern part of the country.
- Realised 66% of total investments planned for coastal part of the country and Municipality of Cetinje
- Municipal Wastewater Management Plan of Montenegro (2020-2035) is adopted.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Waste sector (IPCC sector: 5D1 Domestic Wastewater Handling, CH₄).
- GHG areas and greenhouse gases covered: Methane (CH₄) emissions from waste water. Total decrease of CH₄ emissions from waste water with respect to the base year is 77 %.

Costs:

- EUR 553.9 million (including the costs of maintaining and constructing the system).

Funding:

- Ministry of Ecology, Sustainable Development and Development of the North, local governments / EU funds, other international donors and IFIs.

Annual public budgetary impacts:

- EUR 553.9 million spread over the period 2020-2035.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Strategic Master Plan for Sewerage and Wastewater in the Central and Northern Region of Montenegro (2005-2029).
- Strategic Master Plan for Sewerage and Wastewater in the Coastal Region of Montenegro and Municipality of Cetinje (2005-2029).
- Municipal Wastewater Management Plan of Montenegro (2020-2035).

Exact name: Increase of CH₄ recovery in landfills

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Waste sector is the most intensive Non energy sector in terms of GHG emissions with 49 % share, and almost all the emissions are coming from the solid waste (92 % share) and it all corresponds to methane emissions (CH₄). In the landfill, the waste undergoes series of decomposition processes generating various gases. The landfill gas (LFG) mainly comprises of 50–55% methane (CH₄), 45–55% carbon dioxide (CO₂), less than 1% non-methane organic compounds (NMOCs), and trace amounts of inorganic compounds. Collecting LFG not only reduces the problems of odor and hazardous effect of LFG but also provides opportunity to use it as an alternative source of energy. Since, the landfills are highly heterogeneous and the gas production rate and gas composition may vary significantly, it is very important to assess the viability of the gas extraction from a particular landfill. In this regard, site assessment is crucial to obtain basic information on the landfill and its LFG generation potential. Historically, in Montenegro, there is some CH₄ recovery, but it is very low (between 2 % and 4 % of available emissions). Total amount of CH₄ emissions from solid waste management amounts up to 11.4 kt. Therefore, there is a large potential for CH₄ recovery in landfills.

Description of the PaM:

Conduct a study to assess the viability of the gas extraction from all landfills in Montenegro and select the most promising locations for development of CH₄ recovery systems. Creating designs of LFG recovery system for selected landfills. A LFG collection system is made up of vertical wells and or horizontal collectors that cover 100% of all waste areas within one year after the waste is deposited in a landfill. A landfill recovery collection system is designed to extract the LFG to further use it in energy projects. It includes wells and piping systems for collecting and transporting the gas to the processing location. The LFG can be used to fuel the electricity generation equipment on site or can be supplied to the grid. Electricity can be generated by either internal combustion engines, gas turbines or microturbines. If it is assumed a typical requirement of an internal combustion engine for generating 1 MW of electricity as 500 m³/h of LFG at 50% CH₄ to generate 1MW of electricity, the total potential of CH₄ recovery and its usage for electricity production in Montenegro can be estimated to 5 – 7 MW of installed power (taking into account current annual CH₄ emissions). This PaM aims to utilize available CH₄ emissions to produce electricity in plants (at selected locations) with total installed power of 2 MW by 2030, and using the experience from the process to extend it further after 2030 in order to recover CH₄ from landfills as much as it is possible.

Legal, technical, financial, informational, regulatory policy or measure: Technical.

Problem the policy or measure is addressing: Unsustainable waste management, electricity production.

Objective of the policy or measure: Reduced CH₄ emissions, decentralized electricity production.

Implementation process:

- Prepare a study on feasibility of gas extraction from all landfills in Montenegro.
- Prepare inception designs for LFG recovery systems and its usage for electricity production.
- Public calls for equipment and construction works.
- Monitoring of implementation.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2030
- The measures will have long-term effects, reducing emissions of CH₄.

Status of implementation:

- Preparation of a public call for development of feasibility study.

Responsible for implementation:

- Ministry of Ecology, Sustainable Development and Development of the North.

Actions taken:

- The implementation has not yet started.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.

- Sectors affected: Waste sector (IPCC sector: 5A – Solid Waste Disposal on Land).
- GHG areas and greenhouse gases covered: Methane (CH₄) emissions from solid waste management. Total decrease of CH₄ emissions from solid waste with respect to the base year is around 50 %.

Costs:

- EUR 6 million (including the costs of maintaining and constructing the system).

Funding:

- Ministry of Ecology, Sustainable Development and Development of the North, local governments / EU funds, other international donors and IFIs.

Annual public budgetary impacts:

- EUR 6 million spread over the period 2023-2030.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

3.1.1.7 Land-use change and forestry

Exact name: *Reduction in the area annually affected by wildfires*

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Due to their geographical position and the increasingly pronounced negative impact of climate change, Montenegrin forests are particularly endangered. During July and August 2017 alone, 115 forest fires were registered in state forests, while 39 fires were recorded in privately owned forests. The estimated burned wood mass was 96,309.13 m³, and furthermore it was recorded that 267,500 pieces of seedlings afforested during 2015 and 2016 (young forest crops) were destroyed. Currently the most important threat to forests is climate change with increased risk of drought, fire and biotic pests, and the threat is expected to increase in future. The forest fires have significantly increased since 1990. In the decade of the 90s the average annual area of forest affected by fires was 888 ha, whilst in the 00s raised to 3,609 ha and from 2010-2018 the average further increase to 9,370 ha.

Description of the PaM:

In 2014, the National Forest Strategy 2014-2023 (Nacionalna Šumarska Strategija, NŠS) already identified the problem and provided actions to reduce the area of forest burnt.

However, those measures were not effectively put in practice. So, this measure is based on NŠS vision.

The measure envisages:

- Preservation of open areas between the forests and support of meadow mowing
- Improving the organization of institutions involved in forest fire fighting
- Investments in equipment and preventive measures for fire fighting (including modern equipment for early fire detection and field activity monitoring, such as video surveillance (cameras) with smoke and fire detection, as well as the identification of persons or vehicles that could be potential causes of fires)
- Inclusion of local population in prevention and fire fighting
- Development and testing of rehabilitation methods for fire burnt areas
- Exchange of experience and cooperation with the institutions from the region.

Legal, technical, financial, informational, regulatory policy or measure: Legal and financial measure.

Problem the policy or measure is addressing: GHG emissions from wildfires.

Objective of the policy or measure: Reduced large areas affected by fire and large amounts of wood subject to postfire salvage-logging, better biodiversity preservation, avoidance of economic damages due to the extension of forest fires to populated areas, reduction of the health effect due to the fire smokes and the number of casualties, better sustainable management of natural resources, upgrading the quality of forest, firefighting teams more motivated.

Implementation process:

- Coordination between all stakeholders.
- Educational and awareness raising activities.
- Public calls for equipment.
- Monitoring of implementation.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, reducing emissions of CO₂, CH₄ and N₂O.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Ministry of Agriculture, Forestry and Water Management (MAFWM), State Forest Management Company, population in rural areas, including forest owners and association of forest owners, Environmental Protection Agency, Forestry sector companies, Municipal services for protection and rescue, Entrepreneurial and volunteer fire fighting units, Scientific institutions.

Actions taken:

- Enhanced fire protection was defined as part of Objective 1 in the NŠS.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Agriculture sector (IPCC sector: 3B1 – Forest Land).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), Methane (CH₄) and Nitrous oxide (N₂O) emissions caused by wildfire. Total decrease of all emissions caused by wildfires with respect to the base year is about 40 %.

Costs:

- No information on costs available.

Funding:

- MAFWM / EU funds, other international donors and IFIs.

Annual public budgetary impacts:

- No information on costs available.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- National Forest Strategy 2014-2023.

Exact name: *Further increases in the share of industrial round wood used for long-term products*

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The sale of wood assortments in warehouses in the forest replaced the old model of giving forests for use with sales in the dumping state. Thus, real market prices of wood were obtained and a timber exchange was formed, on which providers of wood assortments (state-owned Forest Management Company and private forest owners) and wood buyers, primarily domestic wood processors, provide their position. The private sector was introduced into the system of services, specifically contracting and performing the tasks of felling trees and making wood assortments, as well as their delivery to forest warehouses. Wood assortments, classified by quality classes, are offered on auction to wood processors who have a registered production of wood products.

Description of the PaM:

Historically, the production of wood commodities shows a prevalence of fuelwood, representing approximately 70 % of production, whilst industrial roundwood only represents the remaining 30 %. The objective of the PaM is to increase the amount of wood used for long-term products, reducing the share of energy use of the wood. However, this is not expected to result in high competition of large dimension trees harvest with other round wood uses (e.g. household heating) especially due to an improvement in the general efficiency of wood for energy use. This higher efficiency in wood use is envisaged to be achieved through:

- restricting high-quality round wood use to industrial use; and

- preventing and limiting the damage of wildfires (as long as some 24 % of the annual total harvest volume originates in salvage logging after wildfires).

It is planned to increase the share of industrial round wood by 10 % until 2030.

Legal, technical, financial, informational, regulatory policy or measure: Legal and financial measure.

Problem the policy or measure is addressing: Unsustainable forest management.

Objective of the policy or measure: Better sustainable management and resilient of natural resources.

Implementation process:

- Coordination between all stakeholders.
- Educational and awareness raising activities.
- Monitoring of implementation.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, increasing CO₂ sinks.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Ministry of Agriculture, Forestry and Water Management (MAFWM), State Forest Management Company, population in rural areas, including forest owners and association of forest owners, Environmental Protection Agency, Forestry sector companies, Municipal services for protection and rescue, Entrepreneurial and volunteer fire fighting units, Scientific institutions.

Actions taken:

- The Government has recently adopted Forest concession use reorganization programme.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation.
- Sectors affected: Agriculture sector (IPCC sector: 3B1 – Forest Land).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂) sinks increase caused by limiting wood harvest. The resulting effect is about 6 % increase of total CO₂ sinks.

Costs:

- No information on costs available.

Funding:

- MAFWM / EU funds, other international donors and IFIs.

Annual public budgetary impacts:

- No information on costs available.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Forest concession use reorganization programme
- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data during modelling of the PaM as a part of WAM scenario.

3.1.1.8 Other

3.1.2 Renewable Energy

3.1.2.1 Sector and technology specific measures: Electricity

Exact name: New renewable power plants

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Montenegro is characterized by low electricity production diversification (high dependence on HPPs and TPP) which makes electricity supply vulnerable to meteorological circumstances, stochastic electricity market prices and availability of cross border capacity during dry part of the year. Also, Montenegro has a great and proven renewable energy potential (hydro, solar, wind). Therefore, an increase of wind and solar energy utilization, which are currently characterized by very small share in electricity production, will bring a necessary robustness to electricity production mix because of their complementary effect with respect to the operation of HPPs which are the most dominant power plants in country. However, it is important to take into account their variable production which is a great challenge for their integration in power system. There is a need for more balancing reserve, higher flexibility of power system which are strengthened by electricity storage power plants (HPPs with reservoir, pump storage power plants, battery electric storage systems etc.). However, this PaM does not include high installation powers of new RES power plants but only projects with high level of readiness, and due to this there are no expected problems with new RES integration and operation in the current power system.

Description of the PaM:

Although there is a great interest for development of new RES power plants in Montenegro by EPCG and private investors, this PaM only includes projects with the highest and soonest realization possibility basing on the current level of technical and legal documentation readiness:

- HPPs – additional capacity 58.5 MW (50 GWh) – existing HPP Perucica

- sHPPs – additional capacity 5,3 MW (17.4 GWh) – construction of a new sHPP Otilovici and sHPP Durutovici
- WPPs – new WPP Gvozd with 54.6 MW (150 GWh) and Gvozd 2 with 21 MW (63 GWh)
- SPPs (PV power plants) – 2 new plants (Krupac, Slano) with capacity 35+50 MW (52+73 GWh) and SPP Potrlica RUP with capacity 81.1 MW (105 GWh)

All of these power plants are planned and developed by EPCG (only WPP Gvozd project includes a private investor as a partner). EPCG is responsible for more than 85 % share of the total electricity production in Montenegro. Its portfolio includes HPPs capable for balancing new renewables and therefore their optimal utilization in the electricity market. This PaM does not envisage any PPA support by the Government.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Electricity production diversification, power system flexibility.

Objective of the policy or measure: Greater utilization of RES potential for electricity production, increasing energy security, improvement of position in electricity markets, higher integration of RES in power system.

Implementation process:

- Development of feasibility studies for new RES.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of power plants.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2027
- The measures will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- EPCG (Electricity Power Utility of Montenegro).
- Private investor (in cooperation with EPCG on the development of WPP Gvozd I).

Actions taken:

- Montenegrin power company (EPCG) developed plans for increase of RES power sources in their portfolio.
- Part of technical documentation is prepared.

- Public procurement procedure initiated for the selection of the equipment supplier and installer for all power plants.
- Contract awarded for construction of WPP Gvozđ I.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets fuel switch to renewable electricity and therefore impacts decrease of all GHG emissions, however, its effect is greatly dependent on annual operation of TPP Pljevlja and penetration of e-mobility (since these two sectors impact the most GHG emissions level). It is expected that major effect of the PaM on national targets is evident after 2029.

Costs:

- The total budget for the project is EUR 181 million, spread over 4 years (2024-2027).

Funding:

- EPCG, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- All power plants have feasibility studies. Most of them have technical documentation prepared (inception design, main design).

Exact name: Additional renewable power plants

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Montenegro is characterized by low electricity production diversification (high dependence on HPPs and TPP) which makes electricity supply vulnerable to meteorological circumstances, stochastic electricity market prices and availability of cross border capacity during dry part of the year. Also, Montenegro has a great and proven renewable energy potential (hydro, solar, wind). Therefore, an increase of wind and solar energy utilization, which are currently characterized by very small share in electricity production, will bring a necessary robustness to electricity production mix because of their complementary effect with respect to the operation of HPPs which are the most dominant power plants in country. However, it is important to take into account their variable production which is a great challenge for their integration in power system. There is a need for more balancing reserve, higher flexibility of power system which are strengthened by electricity storage power plants (HPPs with reservoir,



pump storage power plants, battery electric storage systems etc.). As the main objective, this PaM targets high integration of new RES in order to substitute the electricity production of TPP Pljevlja as soon as possible in the most effective manner. This task is very challenging due to large amount of electricity production that corresponds to TPP Pljevlja, as well as due to a power system limitation when high integration of new RES power plants is in question, like balancing, system flexibility, necessary infrastructure for connection to the grid. Therefore a coordination between investors and the state administration is needed.

Description of the PaM:

Development of additional renewable power plants is necessary in order to reach the most challenging national targets regarding RES share and GHG emissions. Also, it impacts energy security and internal energy market development. This PaM includes planned power plants whose project readiness is at lower level of preparation, because all necessary technical documentation has not been prepared, financing is not confirmed, some aspects of environmental impact assessment are not elaborated in details. There are a lot of projects that are being developed by private investors, and EPCG. While EPCG does not need a support regarding financing, and therefore some PPA support from the Government, most of investors do. Therefore, it is expected that for a certain part of installed power of new renewable power plants there will be a need for PPA support as it is envisaged by the Law on renewable energy usage. It will be done through public auctions where all bidders would compete to get the PPA for the installed power defined by the call. PPA is based on electricity market premium that is determined using reference electricity market price. Maximum electricity price for auction is defined in the call. Participation is possible if the investor submitted a construction application or obtained a construction permit in accordance with the law governing the construction of buildings for the power plant type that is targeted by the auction. Companies awarded with PPA are not free of the balancing costs. Balancing cost calculation is defined by the Law. The level of installed power per year that will have PPA support will be decided basing on the plan that is prepared for three years period. There is a possibility that the first auction is organized prior to the preparation of the mentioned three year plan and after the decision of the Government.

The overview of renewable power plants structured per type of technology planned to be operational until 2030 with basic technical characteristics follows:

- WPPs – new WPPs 145 MW (380 GWh);
- SPPs – new WPPs 746 MW (1044 GWh).

There are plans for development of new HPPs (253.9 MW / 383 GWh) and SPPs with additional installed power of more than 1000 MW that are planned to be operational in period 2031-2035. The dynamics of realization of all new renewable power plants is mainly impacted by the grid infrastructure development because of the great number of new power plants and very significant challenges with construction of the new power lines in Montenegro (mainly due to land ownership issues). It is safe to point out that beside financial viability of a renewable energy project (which can be mitigated using PPAs), the main challenge for timely construction of a new plant is construction of the power lines needed for grid connection.

It is important to emphasize that in order to reach the national targets (RES share and GHG emission decrease) it is not necessary that all power plants planned until 2030 are operational, but only half of them (half of the planned installed power). However, their mix should be diversified in order to support and strengthen the flexibility of the power system. Therefore, all types of renewable power plants should take part in the mix. Furthermore, if the realized

dynamics of the development of the planned new renewable sources would threaten the security of the power system operation, additional measure for increase of system flexibility is needed, which can be done through including of a certain level of battery electric storage systems within the new plants (SPP and WPP). The capacity of BESS per new plant will be defined within bylaw that regulates grid operation.

Legal, technical, financial, informational, regulatory policy or measure: Technical and regulatory measure.

Problem the policy or measure is addressing: Electricity production diversification, power system flexibility.

Objective of the policy or measure: High integration of RES electricity production, increasing energy security, improvement of position in electricity markets.

Implementation process:

- Development of feasibility studies for new RES.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Preparation of Auction plan for three-year period.
- Auctions.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of power plants.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2035
- The measures will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- EPCG.
- Private investors.

Actions taken:

- EPCG developed plans for increase of RES power sources in their portfolio.
- Part of technical documentation is prepared.
- Basic permits obtained (the first step for construction permit).
- Connection studies prepared.
- Contracts for joint infrastructure development prepared.
- Several construction permits issued.
- Preparation of the first auction organizing.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets fuel switch to renewable electricity and therefore impacts decrease of all GHG emissions, however, its effect is greatly dependent on annual operation of TPP Pljevlja and penetration of e-mobility (since these two sectors impact the most GHG emissions level). It is expected that major effect of the PaM on national targets is evident after 2032.

Costs:

- The total budget for the project is EUR 1.5 billion up to 2030 and taking into the account all power plants planed to be operational after 2030 additional EUR 1 billion, spread over 12 years (2024-2035).

Funding:

- EPCG, IFIs, private investors, public budget.

Annual public budgetary impacts:

- It depends on the prices achieved and PPAs awarded after auctions.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- All power plants have feasibility studies. Detailed technical documentation is under preparation, but most of them dispose of Inception design.

Exact name: Refurbishment of small hydro power plants

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The group of small hydropower plants covered by this measure has been in operation for many years without serious investments that would envisage technological innovations, so they are characterized by low energy efficiency in terms of using the available hydro potential in relation to today's solutions.

Description of the PaM:

The operating life of small hydro power plants owned by EPCG: Rijeka Crnojevića, Podgor, Šavnik, Mušovića rijeka and Lijeva Rijeka are over 50 years. Small hydro power plants have a total installed capacity of 2.8 MW. The modernization of the sHPP Glava Zete and sHPP Slap Zete has been completed in 2020. The modernization of the small hydropower plants (SHPP) Rijeka Crnojevića and sHPP Podgor was completed in 2024. The goal is to renew equipment of remaining sHPPs owned by EPCG in order to increase their reliability and efficiency. There will

be a slight increase in the total installed power to 3.38 MW. This PaM does not envisage any PPA support by the Government.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Increase of RES share.

Objective of the policy or measure: New technologies, better utilization of hydro potential.

Implementation process:

- Preparation of technical documentation.
- Obtaining permits.
- Selection of equipment and construction works providers.
- Commissioning of power plants.

Implementation period:

- Expected starting date: 2020
- Expected end date: 2026
- The measures will have long-term effects, affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- EPCG.

Actions taken:

- Public procurement procedure initiated for the technical documentation preparation, selection of the equipment supplier and installer for all power plants.
- All contracts are awarded.
- All necessary technical documentation is prepared.
- All equipment is installed.
- Commissioning is ongoing.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: The effect of this measure is small but it positively affects RES goals and GHG emission decrease. However, the effect on both goals is evident after 2029 and it depends on the annual operation of TPP Pljevlja.

Costs:

- The total budget for the project is EUR 0.8 million, spread over 2 years (2023-2024).

Funding:

- EPCG, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Technical documentation is prepared for all sHPPs (inception design, main design).

Exact name: Development of decentralized energy generation (distribution medium voltage connection)

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

It is confirmed that Montenegro has a great RES potential. High integration of new renewable power plants in a more dynamical manner is an important means to achieve the national targets. However, some barriers affecting the dynamics of realization of the mentioned potential are identified:

- Existing legal framework regulating construction of objects and spatial planning
- Grid connection.

Therefore some updates of laws and bylaws are prepared and done in order to enable more efficient realization of medium size RES potential. In the same time, medium sized renewable power plants can be connected to distribution grid where the challenges with infrastructure are significantly lower. Additionally, distributed generation is closer to load centers and it can be used to enable positive effects on the grid operation (lower energy losses, better voltage regulation). However there can be some negative effects so it is of great importance to prepare connection studies in order to mitigate potential problems.

Description of the PaM:

Making the procedures more efficient, including local municipalities in the process of realization of medium sized RES potential (up to 5 MW of installed power), as well as Distribution System Operator, great number of private investors recognized a chance to develop distributed generation projects in a reliable and efficient manner. Therefore, there is a following plan for increase of distributed generation by 2030:

- New SPPs – additional capacity up to 25 MW (33.75 GWh), numerous new distributed power plants in all parts of Montenegro, which will be operational starting from 2023 and gradually increasing the total installed power until 2030.

The plants included by the PaM are selected basing on the readiness of the projects, level and quality of preparation of technical documentation and accompanying permits issued. This PaM does not envisage any PPA support by the Government.

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure.

Problem the policy or measure is addressing: Electricity production diversification, increasing RES share.

Objective of the policy or measure: Greater utilization of RES potential for electricity production, increasing energy security, higher integration of RES in power system.

Implementation process:

- Development of feasibility studies for new RES.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of power plants.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2030
- The measures will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Private investor (in cooperation with EPCG on the development of WPP Gvozd I)
- Local municipalities
- Distribution system operator.

Actions taken:

- Part of technical documentation is prepared.
- Local municipalities issued requirements necessary for further development of technical documentation.
- DSO is providing support through development of connection studies.
- Construction of certain number of power plants is ongoing.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets fuel switch to renewable electricity and therefore impacts decrease of all GHG emissions, however, its effect is greatly dependent on annual operation of TPP Pljevlja and penetration of e-mobility (since these two sectors impact the most GHG emissions level). It is expected that major effect of the PaM on national targets is evident after 2029.

Costs:

- The total budget for the project is EUR 30 million, spread over 7 years (2024-2030).

Funding:

- IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- All power plants have feasibility studies. Most of them have technical documentation prepared (inception design, main design).

Exact name: Additional Development of decentralized energy generation (distribution medium voltage connection)

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Although there are some positive effects of already planned measures on development of medium sized RES potential, national targets regarding RES share and GHG emission are set very high and there is a need for further support of distributed generation. The power plant investment costs are decreasing (especially in SPPs which are the focus of investors interest) but the grid connection may be an issue since the grid was primarily planned for electricity distribution to consumers and its development needs time. Therefore in a lot of cases grid connection is significantly increasing the investment and becomes a barrier for obtaining the funding.

Description of the PaM:

Introducing a separate auction for PPA for distributed generation (up to 5 MW of installed power per power plant) as it is envisaged by the Law on renewable energy usage will enable more investments and higher rate of new RES integration. It will be done through public auctions where all bidders would compete to get the PPA for the installed power defined by the call. PPA is based on electricity market premium that is determined using reference electricity market price. Maximum electricity price for auction is defined in the call. Participation is possible if the investor submitted a construction application or obtained a construction permit in accordance with the law governing the construction of buildings for the power plant type that is targeted by the auction. Companies awarded with PPA are not free of the balancing costs. Balancing cost calculation is defined by the Law. Therefore, there is a following plan for increase of distributed generation by 2030:

- New SPPs – additional capacity up to 25 MW (33.75 GWh), where a single power plant does not have installed power higher than 5 MW. New plants will be operational starting from 2023 and gradually increasing the total installed power until 2030.

Legal, technical, financial, informational, regulatory policy or measure: Financial and regulatory measure.

Problem the policy or measure is addressing: Electricity production diversification, increasing RES share.

Objective of the policy or measure: Greater utilization of RES potential for electricity production, increasing energy security, higher integration of RES in power system.

Implementation process:

- Development of feasibility studies for new RES.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of power plants.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2030
- The measures will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- Private investor (in cooperation with EPCG on the development of WPP Gvozd I)
- Local municipalities
- Distribution system operator.

Actions taken:

- Part of technical documentation is prepared.
- Local municipalities issued requirements necessary for further development of technical documentation.
- DSO is providing support through development of connection studies.
- Organization of the first auction is under preparation.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets fuel switch to renewable electricity and therefore impacts decrease of all GHG emissions, however, its effect is greatly dependent on annual operation of TPP Pljevlja and penetration of e-mobility (since these two sectors impact the most GHG emissions level). It is expected that major effect of the PaM on national targets is evident after 2029.

Costs:

- The total budget for the project is EUR 33 million, spread over 6 years (2025-2030).

Funding:

- IFIs, private investors, public budget.

Annual public budgetary impacts:

- It depends on the prices achieved and PPAs awarded after auctions. An estimate is EUR 0.6 million if all planned capacities are developed.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- All power plants have feasibility studies. Most of them have technical documentation prepared (inception design, main design).

Exact name: The Green Hydrogen Development Plan with an Action Plan for the period 2026–2028

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Montenegro possesses significant potential for the use of solar and wind energy due to its favorable natural conditions. The country has, on average, more than 2,000 hours of sunshine per year, particularly along the coast and in central regions, which allows for high profitability of solar power plants. At the same time, the mountainous areas in the north and the Adriatic coast offer excellent conditions for the development of wind farms, with an estimated technical potential exceeding 4 TWh annually. Together, solar and wind energy represent the backbone of Montenegro's future energy development and the key drivers of the country's energy transition toward a low-carbon economy. However, there are significant limitations regarding the availability of power infrastructure and the stable operation of the power system with such variable energy sources.

One solution for better utilization of the recognized large potential of renewable energy sources is the production of green hydrogen. Green hydrogen is defined as hydrogen produced by electrolysis of water using electricity generated from renewable energy sources (RES). The main sectors identified as the first in which green hydrogen could be most rapidly integrated as an energy carrier are transport, industry, and energy storage. However, green hydrogen is not yet competitive with traditional energy sources in all applications, and additional incentives and technological advancements are needed.

In order to examine the possibilities and timeline for integrating green hydrogen into Montenegro's energy mix, it is necessary to prepare a Green Hydrogen Development Plan.

Description of the PaM:

The preparation and adoption of the Plan aim to enable the development of green hydrogen in Montenegro through the establishment of a regulatory, infrastructural, and market framework, as well as the integration of hydrogen into the industry, transport, heating, and energy storage sectors. It is necessary to analyze these aspects and define appropriate measures to establish

all the essential foundations for the production and use of green hydrogen. In addition, the analyses should include investment incentives, public-private partnerships, the development of human resources, and hydrogen technology research. The Plan foresees the development of a pilot project to test all aspects of operation (technical, legal, and market-related), thereby establishing the foundation for further expansion.

To ensure transparent monitoring of the Plan's implementation, an accompanying Action Plan for the period 2026–2028 is also envisaged. The Plan is intended to be updated after the expiration of the currently defined planning period.

Legal, technical, financial, informational, regulatory policy or measure: Technical and regulatory measure.

Problem the policy or measure is addressing: Constraints to the high utilization of renewable energy potential.

Objective of the policy or measure: Establishment of a framework for the integration of green hydrogen into the energy mix.

Implementation process:

- Selection of consultant;
- Preparation of the Green Hydrogen Development Program;
- Preparation of the Green Hydrogen Development Plan and Action Plan;
- Implementation and monitoring of implementation.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2028

Status of implementation:

- Initial phase.

Responsible for implementation:

- Ministry of Energy and Mining.

Actions taken:

- The Draft Green Hydrogen Development Program has been prepared.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: N/A.

Costs:

- EUR 50 thousand.

Funding:

- IFIs, EU funds.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The Draft Green Hydrogen Development Program.

3.1.2.2 Sector and technology specific measures: Heating and cooling

3.1.2.3 Sector and technology specific measures: Transport

PaMs targeting the Transport sector have decreasing of GHG emissions and increasing of energy efficiency as the main goals. These measures have also impact on the RES share because of the introduction of biofuels and greater share of electricity consumption in the sector.

3.1.2.4 Measures on financial support

3.1.2.5 Specific measure: Streamlining administrative procedures and contact point

Not applicable

3.1.2.6 Specific measure: Information and training

Not applicable

3.1.2.7 Specific measure: Facilitating the uptake of power purchase agreements

Not applicable

3.1.2.8 New infrastructure for district heating and cooling produced from RES

Not applicable

3.2 Dimension Energy Efficiency

3.2.1 Energy efficiency obligation schemes and alternative policy measures

Detailed information regarding EEO schemes and alternative measures is given in the 4th EEAP – Chapter 3.1.1 and Annex 1.

http://energetska-efikasnost.me/download/strateska_dokumenta/3.-Akcioni-plan-energetske-efikasnosti-Crne-Gore-za-period-2019-2021.-godina.pdf

3.2.2 Long-term renovation strategy and stimulating cost-effective deep renovation

Exact name: *Development and implementation of energy efficiency regulatory framework in buildings*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

This measure has a significant impact on new buildings and the renovation of existing ones, as all fully renovated and newly constructed buildings must meet the prescribed minimum energy efficiency requirements. The implementation of the regulatory framework for the energy performance of buildings is a measure that ensures compliance with standards relevant to the minimum energy performance requirements. The implementation mechanisms include:

- control of compliance with minimum energy efficiency requirements,
- verification of the obligation to certify both new and renovated buildings before their use,
- verification of the validity of energy certificates, and
- inspection supervision.

The main national targets affected by this measure relate to final energy consumption and, consequently, primary energy use, while it also has an indirect effect on targets related to the share of renewable energy sources (RES) and GHG emissions reduction. The residential and service sectors are the main sectors affected by this policy and measure, as their combined share in total final energy demand was around 48% in the base year (approximately 36% residential + 12% service sector, respectively).

Description of the PaM:

The Ministry of Energy and Mining has already transposed the previous EPBD Directive (2010/31/EU) into the national legislation through the Law on Efficient Use of Energy (2014) and the accompanying bylaws. The Amending Directive (EU) 2018/844 has also been largely transposed into the national legal framework through amendments to the Law on Energy Efficiency, adopted by the Parliament of Montenegro in December 2022. With regard to the framework for building energy efficiency, the provisions governing minimum energy efficiency requirements and building energy certification have been improved. The article of the Law prescribing the obligation to prepare a building renovation strategy (recognized as the Study on Improving the Energy Efficiency of Buildings in Montenegro) has also been enhanced — the results of which have been incorporated into the NECP scenarios. Furthermore, there are new obligations for local municipalities and large legal entities (with more than 500 employees), which must:

- prepare programs for improving energy efficiency,
- report annually on their implementation, and
- conduct energy audits of their facilities at least once every four years.

In the coming period, activities related to the enforcement of prescribed obligations should be intensified, particularly regarding the energy certification of buildings and the quality control of issued certificates. Special attention should also be given to the further tightening of construction standards in line with EU recommendations and to the application of nearly zero-energy building (NZEB) standards.

Legal, technical, financial, informational, regulatory policy or measure: Legal measure (compliance with EPBD and the amending Directive (EU) 2018/844).

Problem the policy or measure is addressing: Energy efficiency in building sector.

Objective of the policy or measure: PaM will contribute to EPBD implementation (with certification tool), and together with the development of Building Renovation Study achieve legal and strategic preconditions for effective “Renovation Wave” in Montenegro.

Implementation process:

- Adoption of the amendments of the Law on energy efficiency.
- Preparation of the bylaws.
- Implementation of prescribed obligations and quality control of energy certificates.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2026
- The measures will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- New minimum energy efficiency requirements and the obligation for building energy certification have been in force since July/August 2024..

Responsible for implementation:

- State administration (Ministry of Energy and Mining, local governments), citizen, private companies / owner of commercial buildings, investors in buildings for housing and commercial sector.

Actions taken:

- Amendments to the Law on Energy Efficiency, adopted by the Parliament of Montenegro in December 2022.
- Bylaws necessary for the full implementation of the Law were adopted in June 2024, prescribing the updated minimum energy efficiency requirements for buildings (effective from July 1, 2024) and the obligation to certify building energy performance (effective from August 1, 2024).
- The Ministry of Energy and Mining has fulfilled its obligations related to the development of a building inventory, the identification of reference buildings by category, and the determination of energy classes, which enabled the finalization of the national software for calculating and certifying building energy performance.
- Based on the prepared building inventory, the Ministry of Energy and Mining also developed the Building Renovation Strategy in June 2025, in the form of the Study on Improving the Energy Efficiency of Buildings in Montenegro.
- New training cycles for conducting building energy audits have been organized, with a special focus on the use of the national software for building energy certification.
- The training of certified energy auditors is currently ongoing, in cooperation with the University of Montenegro (implemented by the Faculty of Mechanical Engineering)..

Impact:

- Energy Union Dimension(s) affected: Energy efficiency, Decarbonisation.
- Sectors affected: Residential sector, Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, coal and wood which are the main sources of GHG emissions in service and residential sectors. Although the residential sector is energy wise more intensive than the service sector, the situation with GHG emission intensity is opposite due to greater usage of oil derivatives in the service sector. This PaM has as an effect of more efficient energy usage which enables lower usage of more intensive fuels with respect to GHG emissions (oil derivatives, wood and in some extent of the coal (lower usage of coal is mainly affected by the introduction of district heating in Pljevlja where this fuel is mainly used)). The effect of PaM on GHG emissions in residential and service sectors is a decrease of GHG emissions in amount of 2 Gg CO_{2eq}. However there is a great synergy between this PaM and introduction of prosumer concept which directly impacts RES share in these sectors.

Costs:

- Total budget for bylaws amendments negligible (EUR 10k) and EUR 0.55 mil. for development of software for energy certification of buildings and buildings inventory in order to provide conditions for determining energy classes.

Funding:

- The state budget/donor support.

Annual public budgetary impacts:

- EUR 10 thousand.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The Building Renovation Strategy, prepared in June 2025, represents a comprehensive document that analyzes the current state of policies in the field of building energy efficiency and provides recommendations for further improvements in this area. The development of building energy efficiency regulations represents an initial step toward improving the energy performance of new and existing buildings and is directly linked to the fulfillment of obligations under the relevant EU Directives (Directive 2012/27/EU, Directive 2010/31/EU, and Directive 2018/844/EU).

Exact name: District Heating in Pljevlja

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The district heating development in Pljevlja town will follow after TPP Pljevlja eco-refurbishment, while during the refurbishment, all the heating system connection related

preparatory works are to be completed. The heating project shall solve the long-lasting air pollution problem and other urgent environmental and public health issues in Pljevlja and its surroundings. The citizens of Pljevlja for heating purposes fire around 80% of the total coal used in residential sector in the country. The air in Pljevlja during the winter season is heavily loaded primarily with air pollutants (SO₂, NO_x, PM_{2.5}, PM₁₀, ash and dust), which are mostly the by-products of lignite combustion in individual mostly inefficient furnaces in around 5,000 local households. It is assumed that the project will eliminate lignite as a fuel used for heating purpose in Pljevlja. The phasing out of lignite used in Pljevlja municipality residential sector will result in GHG emission reduction that follows the dynamics of lignite decrease throughout the observed period.

Description of the PaM:

The project includes the construction of a heat source, primary and secondary hot water networks. In the first phase, the construction of the primary heat pipe will create the conditions for supply of 6 of the largest boiler plants in the city center. This will be done with unregulated removal of steam from the turbine block of the Pljevlja Thermal Power Plant, with a capacity of 10 MW, immediately after the completion of the Environmental Reconstruction in 2025. In addition, the construction of 20 connections on the primary heat pipe of the appropriate diameter for all consumption zones creates the conditions for the second phase and regulated removal of steam from the turbine block of the Pljevlja Thermal Power Plant and further development of the heating of the city with a heat consumption of 44 MW.

As the operation of this heating system is clearly dependent on the functioning of the Pljevlja Thermal Power Plant (TE Pljevlja), and in light of the previously mentioned phase-out of lignite use and eventual decommissioning of the plant, it is necessary to find a long-term sustainable solution for the city's district heating system.

Legal, technical, financial, informational, regulatory policy or measure: Legal and technical measure (compliance with IED Law).

Problem the policy or measure is addressing: Air pollution and inefficient households lignite furnaces.

Objective of the policy or measure: New technologies, heat energy supply of Pljevlja town via modern centralized heat supply system, from central heat source, that will close down the households' coal furnaces.

Implementation process:

- Phase I.1: Construction of the primary heat pipe part 1 (2.281 km).
- Phase I.2: Construction of the primary heat pipe part 2 and 3 (4.451 km).
- Phase II: Creation of conditions for the development of heating of all consumption zones of the city of Pljevlja with capacities up to 2x22 MW on the same heat pipe already built in the first phase.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2030
- The measures will have long-term effects, significantly reducing emissions and improving air quality and efficiency after installation.

Status of implementation:

- The project is ongoing. More than 90% of the primary heating pipeline has been completed.

Responsible for implementation:

- Local government, EPCG.

Actions taken:

- EPCG has granted EUR 2.5 mil.
- Phase I.1 finished.
- Phase I.2 is ongoing – the primary heating pipeline is under construction.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy efficiency.
- Sectors affected: Residential sector, Energy generation (thermal power plants).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during lignite combustion. Total removal of coal usage in residential sector leads to decrease of GHG emissions in amount of 12.4 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 23 million. EPCG has granted EUR 2.5 million. 8.3 million is already allocated for phases I.1 and I.2. Local government will cover expropriation costs.

Funding:

- The entire funds for implementation are provided by the capital budget of the state of Montenegro.

Annual public budgetary impacts:

- It depends on the realization. 8.3 million is already allocated (period 2023-2025), the rest of funds will be spread over the remaining 5 years (period 2026-2030).

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Project “Heating of Pljevlja, for clean and warm Pljevlja” – project of public significance.

3.2.3 Uptake of energy performance contracting and other EE service models

There are no separate policies or measures. Addressed within the measure “Implementation of Energy Efficiency Measures in Public Infrastructure.”

3.2.4 Exemplary role of public buildings and energy-efficient public procurement

Exact name: Increased energy efficiency in public buildings

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Public buildings have a share of 9 % in total energy demand of service sector. Electricity is the dominantly used fuel (64 % share) but there are also extralight fuel oil (15 %), charcoal (15 %), wood (6 %) and negligible usage of LPG. Buildings are characterized by low energy efficiency and in some cases very low comfort conditions. There is a need for significant improvement of building envelope, HVAC systems, water heating, lighting, but also it is necessary to introduce energy management systems, renewable energy integration and behavioral and operational changes. Since public buildings are part of public administration energy efficiency measures are significantly easier to implement than in residential sector due to lower financial and organizational challenges.

Description of the PaM:

Several years of investments in increasing energy efficiency in public (healthcare, education, cultural and administrative buildings) buildings has occurred through two programmes: Energy Efficiency in Montenegro (MEEP) and Energy Efficiency Program in Public Buildings (EPPB), implemented since 2010 and 2012, respectively. These programmes have already effected big savings and emission reductions. The two programmes have covered 60 public buildings so far.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Energy efficiency in public buildings.

Objective of the policy or measure: Improve energy efficiency and comfort conditions in selected public buildings.

Implementation process:

- Energy audits preparation.
- Selection of public buildings.
- Obtaining funding.
- Public call for equipment and construction works.
- Implementation and monitoring.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- Implementation of EE measures is ongoing. Works have been completed on educational institutions in Tuzi, Kotor, Nikšić, Cetinje, and Bar, with around 40% of the budget spent. Projects for public buildings and schools in Podgorica, Plav, Gusinje, Rožaje, and Nikšić are currently in the development and preparation phase.

Responsible for implementation:

- State administration (Ministry of Energy and Mining, authorities responsible for the management of public buildings of municipalities).

Actions taken:

- The Govt. has prepared the Reconstruction plan of state-owned official buildings for period 2024-2026.
- The Ministry of Energy and Mining is currently implementing two programs for energy efficiency renovation of public buildings (including educational facilities, social care institutions, and administrative buildings);
- The ministries responsible for educational and healthcare facilities are also implementing separate energy efficiency programs focused on these sectors.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency, Decarbonisation.
- Sectors affected: Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, coal and wood which are the main sources of GHG emissions in service sector. Public administration has a share of 12 % in the total GHG emissions. Main source of GHG emissions is usage of extra light fuel oil (86 %). It is expected that this PaM enables decrease of GHG emissions in amount of 2 Gg CO_{2eq}.

Costs:

- Total budget amounts EUR 80 million.

Funding:

- The state budget, IBRD, EBRD and KfW loans.

Annual public budgetary impacts:

- It depends on the dynamics of realization (total budget is to be divided into 2019-2025).

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The Building Renovation Strategy, prepared in the form of the Study on Improving the Energy Efficiency of Buildings in June 2025, is a comprehensive document that analyzes the current state of the building stock and provides scenarios for improving the energy performance of private and public buildings.
- The Reconstruction Plan for State Administrative Buildings for the period 2024–2026 is a document aimed at achieving the goal of renovating 3% of the central government's administrative buildings, in line with the country's international commitments..

Exact name: *Implementation of Energy Efficiency Measures in Public Infrastructure*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

There are no statistical data on the share that public infrastructure (public lighting, water supply, and sewerage), managed by public services established by local self-governments, has in the total sectoral energy consumption. However, it is certain that their energy consumption can be reliably monitored and analyzed in terms of energy efficiency. Therefore, optimal measures to improve energy efficiency can be effectively selected. Based on the adopted local EE programs, several municipalities have already implemented various energy efficiency measures. So far, many Montenegrin municipalities have improved their public lighting systems and transitioned to high-efficiency technologies (e.g., LED). All local energy efficiency programs include this activity, as it is simple to implement and cost-effective..

Description of the PaM:

In accordance with the Law on Efficient Energy Use, local governments are obliged to prepare a programme for improving local government energy efficiency for a period of three years. The programme shall contain proposal of energy efficiency measures in the area of the local government, which includes plan for adaptation and maintenance of buildings used by local government bodies to perform activities and public services founded by local government, with the aim of improving energy efficiency; plans for the improvement of the communal services system (public lighting, water supply, waste management, etc.) and transport to improve energy efficiency; specific energy efficiency measures in buildings protected as cultural property, etc.; other energy efficiency measures to be implemented in the area of local self-government.

In the previous period, numerous local self-government units have actively worked on developing programs for improving energy efficiency, local energy plans, and Sustainable Energy and Climate Action Plans (SECAPs). These documents are intended to assess the current state of infrastructure managed by local self-governments and to identify priority activities and projects that require funding in the coming period. As a first step toward implementing these projects, it is necessary to prepare a professional analysis to propose a technical solution and estimate the level of investment costs required for implementation.

Support for the implementation of energy efficiency projects in public utility companies has, to some extent, been provided by the Eco Fund in the previous period, and this support needs to be further strengthened.

Special attention in implementing this type of investment should be given to promoting alternative financing mechanisms, such as energy services or the ESCO concept. This financing model has already proven effective, particularly in public lighting improvement projects, and efforts should be made to expand its use through further development of the legal framework and enhancement of energy performance and energy supply contracting models.

Legal, technical, financial, informational, regulatory policy or measure: Technical, regulatory measure.

Problem the policy or measure is addressing: Energy efficiency in public municipal companies.

Objective of the policy or measure: This measure accounts for the improvement of condition, monitoring and maintenance, as well as investments in order to improve energy efficiency related to public lighting, water supply and sewerage and other utilities.

Implementation process:

- Energy audits preparation.
- Preparation of technical documentation.
- Obtaining funding.
- Public call for equipment and construction works.
- Implementation and monitoring.

Implementation period:

- Expected starting date: 2019
- Expected end date: 2030
- The measure will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- Implementation is ongoing.

Responsible for implementation:

- Local governments.

Actions taken:

- Several local municipalities implemented projects targeting improvement of public lighting.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency, Decarbonisation.
- Sectors affected: Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: It is difficult to differentiate with respect to the GHG emissions decrease achieved by total public sector.

Costs:

- EUR 20 mil. until 2030.

Funding:

- Local municipalities, Eco fund, Govt. of Montenegro and international donors.

Annual public budgetary impacts:

- It depends on the dynamics of realization.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Continuation of activities from the Energy Efficiency Action Plan (NEEAP).

Exact name: *Establishment and implementation of EE criteria in public tendering*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Public administration participates with share of 9 % in total energy demand of service sector. Numerous energy audits have shown that there is a great potential for improvement of energy efficiency. Also, energy efficiency measures are significantly easier to implement in public sector than in residential sector due to lower financial and organizational challenges. Considering that the public sector is a very important contracting authority for goods and services relevant to the energy consumption aspect, successful implementation of this measure can significantly transform the market towards more energy efficient solutions, reducing the price of new technologies and promoting their wider use.

Description of the PaM:

In 2018 and 2022, amendments were made to the relevant provisions of the Law on Efficient Use of Energy, and the new legal solution envisages the possibility of introducing energy efficiency not only as a criterion for the most economically advantageous offer, but also as a mandatory technical requirement. For the full application of the amended provision of the Law, it is necessary to make amendments to the Ordinance on the methodology for determining the energy efficiency degree in the public procurement procedure.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Energy efficiency in public buildings.

Objective of the policy or measure: Establish systematic mechanisms for introducing energy efficiency criteria into the public procurement process, in order to achieve significant energy savings as well as financial and other benefits.

Implementation process:

- Preparation of the first draft.
- Consultations with stakeholders.
- Finalization of the draft.
- Adoption procedure.

Implementation period:

- Expected starting date: 2023
- Expected end date: -
- The measures will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- Regulation came into effect on December 12, 2022.

Responsible for implementation:

- Ministry of Energy and Mining, Public Procurement Authority and public institutions.

Actions taken:

- Amending of the Law on Efficient Use of Energy in 2022.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency.
- Sectors affected: Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, coal and wood which are the main sources of GHG emissions in service sector. Public administration has a share of 12 % in the total GHG emissions. Main source of GHG emissions is usage of extra light fuel oil (86 %). This PaM will gradually affect the lowering of the growth rate of energy consumption in the sector and therefore limit the growth rate of GHG emissions. However, its impact on GHG emissions decrease is not great (below 1 Gg CO_{2eq}).

Costs:

- Cost is negligible (EUR 10k).

Funding:

- Govt. of Montenegro.

Annual public budgetary impacts:

- The costs of developing appropriate procurement rules are negligible, while actual compliance will represent an additional expense for the state budget; however, the effects of additional investments in more efficient technologies will pay off in the coming period through reduced energy costs.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- There is no specific study in Montenegro that could serve as a basis for this policy and measure. In the previous period, energy efficiency was not systematically recognized as one of the criteria in public procurement procedures. The priority in public procurement was achieving the lowest price for equipment that meets the basic technical requirements.

Exact name: Energy labeling and ecodesign requirements for energy related products

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The energy labeling legal provisions require that economic operators provide customers with information about the energy consumption of the devices. The ecodesign requirements set minimum energy efficiency standards (and in some cases pollution standards) for a number of products, meaning that if they do not meet these standards they cannot be put on the market. In order to provide conditions and practices for the labeling and ecodesign requirements of devices, an appropriate legal framework is already in place obliging market players (suppliers and distributors) to comply with a number of legal requirements for products.

Description of the PaM:

The Ministry of Energy and Mining has adopted more than 60 regulations introducing eco-design and energy efficiency labeling requirements for products that affect energy consumption, in accordance with EU regulations in this field. These regulations cover various groups of products used in households (washing machines, TVs, dishwashers, air conditioners, refrigerators, electric bulbs, etc.), as well as products used in the service sector/industry (electric motors, circulation pumps, external power supplies, fans, heating and cooling technologies, monitors and displays, computers and servers, etc.). In addition to adopting regulations, market inspection authorities have organized control of the implementation of these regulations when placing products on the market for several product groups. It is necessary to continue activities on updating the regulations in line with the revised EU framework and further strengthening the capacities of the market inspection authorities regarding the enforcement of these regulations in practice.

Legal, technical, financial, informational, regulatory policy or measure: Legal measure (alignment with the EU legal framework for eco-design and energy efficiency labeling of products that affect energy consumption).

Problem the policy or measure is addressing: Energy consumption reduction.

Objective of the policy or measure: Improvement of the energy efficiency of products that affect energy consumption.

Implementation process:

- Adoption of the amendments of the Law on energy efficiency.
- Preparation of the necessary bylaws.

Implementation period:

- Expected starting date: 2018
- Expected end date: 2033
- The measures will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- All regulation came into effect from 2018. Their regular updating is in progress.

Responsible for implementation:

- Ministry of Energy and Mining, market players (suppliers and distributors).

Actions taken:

- Energy labeling regulations are in effect starting from 2015 and eco design regulations from 2018.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency.
- Sectors affected: All demand sectors, (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, coal and wood which are the main sources of GHG emissions in service and residential sectors. Although the residential sector is energy wise more intensive than the service sector, the situation with GHG emission intensity is opposite due to greater usage of oil derivatives in the service sector. This PaM has as an effect of more efficient energy usage which enables lower usage of more intensive fuels with respect to GHG emissions (oil derivatives, wood and in some extent of the coal (lower usage of coal is mainly affected by the introduction of district heating in Pljevlja where this fuel is mainly used)). The effect of PaM on GHG emissions in residential and service sectors is a decrease of GHG emissions in amount of 2 Gg CO_{2eq}. However there is a great synergy between this PaM and introduction of prosumer concept which directly impacts RES share in these sectors.

Costs:

- Total budget amounts EUR 139 mil. in 2021-2030 (expenditure for products purchase)
- The policy transposition costs only EUR 10k.

Funding:

- Govt. of Montenegro and international donors.

Annual public budgetary impacts:

- EUR 10k.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Market Readiness Study prepared in 2018 through REEP+ project, financed by EBRD. The study has assumed that all energy related products covered by new labeling and eco-design legislation, which was that time in phase of transposition from EU ordinances, will be replaced in all MNE households with high-efficient ones in period 2018-2033. Also, the calculated energy savings within the study were also used in the Energy Efficiency Action Plan (NEEAP) that preceded the NECP.

3.2.5 Promoting energy audits and energy management systems

Exact name: *Establishment and development of energy management in public sector*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Public buildings have a share of 9 % in total energy demand of service sector. Electricity is the dominantly used fuel (64 % share) but there are also extralight fuel oil (15 %), charcoal (15 %), wood (6 %) and negligible usage of LPG. Monitoring of energy consumption is at very low level and there is no energy management system application in public sector. Reliable monitoring of energy consumption is an important pillar for development of various policies and measures that enable improvement of energy efficiency. There are various very affordable technological solutions for establishing an energy management system and to tailor it in an optimal manner for government-owned and managed facilities, infrastructure, and operations. It is significantly simpler to introduce energy management in public sector due to lower financial and organizational challenges. By implementing structured energy management practices, the public sector can achieve significant energy savings, contribute to environmental sustainability, and set a benchmark for energy efficiency across all sectors.

Description of the PaM:

This measure aims at reducing energy consumption in public buildings. The measure is based on the establishment of an organizational structure for energy management, employee education and the application of IT tools for continuous monitoring and analysis of energy and water consumption in public sector facilities. The establishment of energy management (energy management system) is the first step towards a designed, systematic and gradual action to improve energy efficiency. However, there are several requirements in order to establish an effective energy management in public sector:

- Establishing an obligation for it through legislation;
- Set clear standards for energy use, renewable energy adoption, and operational efficiency;
- Use digital tools to track energy performance and for monitoring and reporting;
- Conducting energy audits;
- Selecting and implementing energy efficiency measures;
- Renewable energy integration;
- Development of financial strategies to implement selected measures (grants, green loans, public-private partnerships, energy service companies).

Ministry of Energy and Mining has prescribed the obligation of energy management to state administration bodies, local self-government units, public services founded by the state, i.e. local government, as well as large consumers. The law also prescribes sanctions in case of non-compliance with this obligation. Regulations are being drafted which will further regulate the manner of establishing the energy management system, organizational structure, the manner of calculation and collection of achieved energy savings and other issues of importance for energy management in public sector facilities, which will legally regulate this area.

Support to the energy management system in the public sector is provided through the Central Energy Efficiency Information System, which, in accordance with the Law, is planned as a central registry of all public buildings, including data on their energy characteristics and energy and water consumption. The establishment of this system is in its final phase and is expected to be fully implemented at the beginning of 2026.

Legal, technical, financial, informational, regulatory policy or measure: Technical and legal measure.

Problem the policy or measure is addressing: Energy efficiency in public buildings.

Objective of the policy or measure: Improve energy efficiency and energy management in public sector.

Implementation process:

- Implementation and monitoring (providing support).

Implementation period:

- Expected starting date: 2019
- Expected end date: 2026
- The measure will have long-term effects, improving energy efficiency.

Status of implementation:

- Providing support to all those obliged to conduct energy management through the elements named above.

Responsible for implementation:

- State administration (Ministry of Energy and Mining, public sector entities that pay energy costs for their facilities).

Actions taken:

- Legal basis is established.
- Energy management systems are developing with support of the ministry.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency.
- Sectors affected: Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, charcoal and wood which are the main sources of GHG emissions in public sector. Public administration has a share of 12 % in the total GHG emissions. Main source of GHG emissions is usage of extra light fuel oil (86 %). It is expected that this PaM enables decrease of energy intensity of the sector and as a consequence, GHG emissions decrease. This sector is not significant source of GHG emissions so the amount of GHG decrease caused by this PaM is negligible (lower than 1 Gg CO_{2eq}).

Costs:

- Total budget amounts EUR 1.345 million.

Funding:

- GIZ and KfW.

Annual public budgetary impacts:

- It depends on the dynamics of realization (to be divided into 2019-2026).

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- There is no specific Montenegrin study that is the base for this PaM. However, there are energy audits performed for all public buildings which include analysis of the current situation and potential measures for energy efficiency improvement.

3.2.6 Consumer information and training measures

No PaMs

3.2.7 Measures to utilise energy efficiency potentials of gas and electricity infrastructure

Exact name: Reduction of losses in the electricity distribution power network

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The importance of loss analysis arises from the need to reduce losses both during the design phase and in the operation of power networks and systems (PES) and their components. High losses, particularly in electricity distribution (ED) networks, are a clear indicator of mismatched network development with the growing demands of consumers. The first step in the process of reducing losses in the ED network is to calculate losses based on available information about the network infrastructure, customers, and their consumption. Therefore, a study (Study of reduction of power and energy losses in electrical distribution networks of Montenegro) is prepared in order to enable identification of hot spots as well as measures to decrease electricity losses. In EU countries, there are significant differences in the average level of losses, ranging from 1% to 13.5%. The percentage of total (technical and commercial) losses in Montenegro's electricity distribution networks has consistently remained above 12% of the energy received at the distribution threshold over the past half-century. In 2005 and 2006, losses reached a very high level of 29%, but since 2006, they have been steadily decreasing, reaching 12.39% or 354.5 GWh in 2021. However, in certain electricity distribution regions, losses remain significantly above the average.

Article 116 (Point 5) of the Energy Law establishes the obligation of the Distribution System Operator (DSO) to develop a ten-year distribution system development plan, based on the condition and level of system utilization, which is updated every five years. In the document Rules for the Operation of the Electricity Distribution System, provides a detailed specification of the content, methodology, objectives, types, general conditions for designing the distribution system, operational safety, quality, reliability, data, documentation, and technical criteria required for planning during the preparation of the ten-year and three-year development plans. One of the goals of the plan that is directly affecting energy efficiency of the existing grid operation is to ensure the safe, efficient, and high-quality operation of the distribution system.

Also, projects that target reconstruction of the existing elements (increased capacity) and construction of new grid elements (substations, lines) also positively affect the level of electricity losses.

Description of the PaM:

Controlling technical and commercial losses involves implementing measures to minimize energy losses in the electricity distribution system, ensuring efficiency, reliability, and financial sustainability. Key aspects include:

- Reduction of technical losses through network optimization, upgrading infrastructure, and improving system design.
- Mitigation of commercial losses by addressing unauthorized usage, improving metering accuracy, and enhancing billing systems.
- Integration of advanced technologies, such as smart meters and real-time monitoring systems, to identify and rectify inefficiencies.
- Regular system audits to identify loss hotspots and implement targeted interventions.
- Awareness campaigns and customer engagement to reduce non-technical losses and promote responsible energy consumption.

By focusing on these strategies, the distribution system operator can effectively reduce losses, improving overall system performance and profitability. Ten year development plan includes the following projects types in order to improve grid efficiency:

- Projects for the Construction, Reconstruction, and Revitalization of the Network (35 kV, 10 kV, and LV)
 - Construction of underground cables
 - Construction of overhead lines
 - Replacement of cable lines
- Projects for the Construction, Reconstruction, and Revitalization of Substations (TS 35/X kV, TS 10/0.4 kV, and TS 110/X kV)
 - Construction of substations (TS)
 - Complete reconstruction of substations
 - Replacement of transformers
 - Replacement of transformers and MV switchgear
 - Replacement of transformers and LV switchgear
- Other Projects Related to Enhancing the Operations of the DSO
 - Reconstruction of connections for the relocation of metering points
 - Installation of measurement equipment
 - Monitoring and management of the electricity distribution network.

Considering the current state of the metering system and the experience gained from its operation, as well as its positive impact on grid efficiency, further investment in the development and modernization of the metering system is planned. This includes the replacement of the remaining "traditional" meters with a new advanced metering system. The connection of new users will also be carried out within the existing advanced metering system. One of the key objectives of further development of the advanced metering system is to enable the collection of load profiles from all metering devices.

The primary goal of the plan for developing the advanced electricity metering system, as defined by the Energy Law (Article 247), is to fulfill the obligation of the Electricity Distribution System Operator to establish an advanced metering system (smart meters) by January 1, 2025, while conducting an economic assessment of all long-term costs and benefits for the market

and consumers. It is planned that by the end of 2025, the advanced AMM metering system will be implemented at over 85% of all metering points. Based on the benefits of the advanced metering system already in use by CEDIS, further implementation will be carried out in the coming period, focusing on replacing the "traditional" metering system. This will aim to achieve a coverage level of 95% of all metering points. As one of the main results, it will be enabled better monitoring and allocation of technical and commercial losses which is the first step in their decrease.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: electricity supply quality, energy efficiency.

Objective of the policy or measure: Introduction of new technologies, energy management, energy efficiency, electricity supply security.

Implementation process:

- Development of necessary studies.
- Preparation of technical documentation.
- Preparations of grid connection studies (hosting capacity).
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of new infrastructure.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2032
- The measure will have long-term effects, affecting energy security, energy efficiency and GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- CEDIS (Montenegrin power distribution system operator).

Actions taken:

- Ten year development plan is adopted.
- Study of reduction of power and energy losses is prepared.
- Part of technical documentation is prepared.
- Public procurement procedure initiated for some of the selected projects.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).

- GHG areas and greenhouse gases covered: The main target is energy efficiency improvement. Indirect effect is a decrease of GHG emissions. It is not estimated since it depends on the share of RES in the national electricity production mix.

Costs:

- Total budget for all the planning period is EUR 331 million. Investments in advanced metering systems alone are EUR 49.2 million. Other investments in new grid elements also impact electricity losses.

Funding:

- CEDIS, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Ten year development plan of the power distribution network until 2032.
- Study of reduction of power and energy losses in electrical distribution networks of Montenegro.

3.2.8 Regional cooperation

3.2.9 Energy efficiency in transport

Exact name: Ban on import of old vehicles (Euro 4 or lower standard)

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Transport sector is the second most important source of GHG emissions with share of 23 % in the total GHG emissions. Although the main reason for this is the fuel mix used in the sector, an important reason is also average age of vehicles. Passenger transport is dominant with 96 % share and almost all corresponds to usage of passenger cars. Average age of vehicles is close to 18 years which significantly affects fuel economy of the total vehicle stock. Banning the import of vehicles older than 15 will improve fuel consumption in the sector. Younger vehicles are generally more efficient than those older than 15 years for several reasons:

- Fuel Consumption: Newer vehicles typically utilize advanced technologies that reduce fuel consumption. Furthermore, emission laws are continually becoming stricter, pushing manufacturers to produce more efficient vehicles.

- **Emissions:** Newer vehicles must meet stricter emission standards. As a result, cars younger than 10 years emit fewer harmful gases into the atmosphere compared to older models.
- **Maintenance:** Older vehicles often require more maintenance and repairs, which can further decrease their overall efficiency and increase costs.
- **Engine Technology and Drive Systems:** Modern engines are optimized for better performance with lower fuel consumption and are often equipped with systems like start-stop technology, which further reduces fuel usage in urban settings.

Overall, vehicles younger than 15 years are more efficient and economical to operate, and they are also more environmentally friendly.

Description of the PaM:

In Montenegro, a regulation banning the import of vehicles older than 15 years was introduced in late March 2024, as part of amendments to the Rulebook on Technical Requirements for Vehicles. This regulation came into effect on July 1, 2024. It set a minimum standard of "Euro 5" for imported vehicles, which includes vehicles manufactured between 2009 and 2013. Previously, Montenegro required new vehicles to meet the "Euro 6" standard, while used vehicles needed to comply with the "Euro 4" standard. The purpose of this regulation is to modernize the vehicle fleet and reduce the environmental and safety risks associated with older vehicles. It is important to note that this ban applies only to the import of vehicles. Older vehicles already on the roads in Montenegro can continue to operate as long as they pass the required registration inspections. It is expected that this PaM will enable about 10 % improvement of fuel economy of the total vehicle stock by 2030.

Legal, technical, financial, informational, regulatory policy or measure: Regulatory policy.

Problem the policy or measure is addressing: Energy efficiency of the vehicle stock, GHG emissions in transport sector.

Objective of the policy or measure: Decrease of GHG emissions.

Implementation process:

- Preparation of the first draft.
- Consultations with stakeholders.
- Finalization of the draft.
- Adoption procedure.

Implementation period:

- Expected starting date: 2024
- Expected end date: -
- The measures will have long-term effects, decrease of energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Regulation came into effect on July 1, 2024.

Responsible for implementation:

- Ministry of transport.

Actions taken:

- Amending of the Rulebook on Technical Requirements for Vehicles.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy efficiency.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A3 Transport).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 30 Gg CO_{2eq}.

Costs:

- There is no cost estimation.

Funding:

- None.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- None.

Exact name: Passenger transport modal shift to public bus transport

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Transport sector is the second most important source of GHG emissions. Passenger transport is dominant with 96 % share. Public transport has a negligible 1 % share in the total passenger transport. The main reason for that are old vehicles, availability of lines, timing. In order to increase the share of public transport in the total passenger transport it is necessary to target the mentioned challenges. Local municipalities are the main partner to the ministry.

Description of the PaM:

There is a need for financial subsidizes for bus fleet renewal, a study regarding optimization of city lines and accompanying IT solutions for tracking of buses, ticket management. The goal is to increase share of bus public transport in the total passenger transport up to EU average 7 % by 2030. Increasing the share of public bus transport in total passenger kilometers involves implementing strategies that enhance accessibility, reliability, affordability, and appeal to a broader segment of the population. Below are some key approaches:

- Improve service quality and coverage
- Invest in modern, comfortable fleet
- Implement Incentives for public transport use (introduce competitive pricing strategies like flat-rate monthly passes or discounts for regular users)

- Public awareness campaigns
- Enable passengers to buy and validate tickets via apps
- Simplify payment across multiple transport modes.

There is a good example implemented in Podgorica where 45 new buses completely renewed bus fleet used for local public transport. Therefore, PaM targets to create a financial basis for purchase of 100 new buses for public transport in other municipalities. A study should be prepared in order to address mentioned approaches for improvement of public bus transport.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Low usage of public transport, GHG emissions.

Objective of the policy or measure: New technologies, financial incentives for cleaner traffic and the use of alternative fuels in traffic, decrease of GHG emissions.

Implementation process:

- Preparation of studies targeting local public transport optimization.
- Obtaining funding.
- Preparation of the calls.
- Monitoring and reporting on implementation.

Implementation period:

- Expected starting date: 2026
- Expected end date: 2030
- The measure will have long-term effects, affecting decrease in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Local municipalities, Ministry of transport, Eco Fund.

Actions taken:

- Renewed bus fleet in Podgorica (2 phases, 16+29 of new buses).

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy efficiency.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A3 Transport).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 25 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 10 million.

Funding:

- Grants or loans focused on sustainable urban mobility from IFIs.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- A good practice example is the Capital City of Podgorica, where 45 new buses have completely renewed the public transport fleet used for local transportation. At the same time, city routes are being optimized to better meet the identified needs of citizens, including the introduction of new lines, expanded route coverage, and the designation of specific lanes for local buses.

Exact name: Passenger and freight transport modal shift to rail

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Since there is only a negligible number of electric vehicles in the total vehicle stock, railway is the main reason electricity is a part of energy demand of the sector. Electricity usage is becoming more and more clean because of increasing RES share in electricity production, therefore, obtaining greater usage of electricity in the transport sector will help reaching of the all national goals (GHG emissions, RES share and energy usage). Usage of railway decreased significantly in the last 15 years. The main reasons are reliability of vehicles, infrastructure, low connectivity with neighboring countries, control systems. Current shares of railway in the transport of passengers and freight are below 1 % and 60 %, respectively.

Description of the PaM:

There is a significant grant (112 million EUR) which will be used for solving of the issues with infrastructure and vehicles. This will lead to increased reliability and increasing of the share of railway in the passenger and freight transport. The goal is to reach the share which was the case before until 2030 and further increase it after:

- 5 % share in the total passenger transport in 2030
- 70 % share in the total freight transport in 2030.

These shares were the case when the vehicles and infrastructure were in much better state (before 2010). These share should improve after 2030.

Legal, technical, financial, informational, regulatory policy or measure: Financial and technical measure.

Problem the policy or measure is addressing: Diesel fuel substitution, low RES share in transport sector.

Objective of the policy or measure: Decrease of GHG emissions, diversification of energy mix.

Implementation process:

- Preparation of the technical documentation for infrastructure and vehicle stock improvement.
- Preparation of the calls.
- Monitoring and reporting on implementation.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2030
- The measure will have long-term effects, significantly affecting RES share in the energy consumption as well as decrease of GHG emissions.

Status of implementation:

- Preparatory phase.

Responsible for implementation:

- Ministry of transport.

Actions taken:

- Documentation needed for application for grant is prepared.
- Grant obtained.

Impact:

- Energy Union Dimension(s) affected: Decarbonisation, Energy efficiency.
- Sectors affected: Energy demand (IPCC sector: 1A Energy, subcategory: 1A3 Transport).
- GHG areas and greenhouse gases covered: This measure targets all GHG and it enables decrease of 25 Gg CO_{2eq}.

Costs:

- The total budget for the project is EUR 112 million.

Funding:

- EU grant.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The PaM is developed as an additional measure in order to reach national GHG target. All analyses are prepared basing on historical data and typical technology characteristics during modelling of the PaM as a part of WAM scenario.

3.2.10 Financing measures

Exact name: *Financial incentives for citizens/private households (for energy efficiency investments)*

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Residential sector is responsible for over 36 % share in the total energy demand and it is the most energy intensive sector with the transport sector in the country. The average energy intensity of residential sector is 169 kWh/m² per year. There are 3 climate zones and the energy intensity varies across them. In order to reach energy efficiency goals, it is important to target the most energy intensive sectors with measures. Space heating is represented by the most dominant share of energy consumed in the residential sector (60 %). Electricity and wood are almost the only fuels used in the sector (99 % share). Although the share of wood consumption is greater (55 %) it is gradually decreasing in the last years. Wood is dominantly used for space heating (77 %) and the rest is used for cooking needs. Energy efficiency of these technologies is very low. Also, almost 70 % of residential buildings is built before 2000, i.e. prior to establishing of any of the modern standards targeting energy efficiency.

There are some significant challenges for implementing energy efficiency measures in residential sector:

- Energy-efficient technologies, such as high-performance insulation, energy-efficient appliances, or renewable energy systems, often have higher upfront costs compared to standard options. They offer long-term savings on energy bills, but the initial investment can deter homeowners;
- Low-income families may lack the resources to invest in energy-efficient upgrades, even if they result in long-term savings;
- Low awareness of the benefits that can be achieved after implementation of energy efficiency measures;
- Market penetration of energy-efficient products.

By addressing financial and behavioral barriers, financial incentives play a key role in transforming the residential sector towards greater energy efficiency and sustainability, thereby contributing to reduced energy consumption and the achievement of environmental goals.

Description of the PaM:

The aim of this measure is to provide financial support mechanisms available to individuals for investing in energy efficiency and RES. It includes an introduction of dedicated state and local government subsidizing programmes for energy savings in private households and RES use. Measures that contribute to reducing energy needs, as well as use of solar energy and modern forms of biomass (pellets, briquettes, wood chips) should be primarily encouraged. Some of the programmes include:

- Favorable loan arrangements:
 - favorable loans for the installation of modern biomass heating systems
 - favorable loans for improving the energy performance of the building envelope
- Subsidy programme for the installation of solar systems in new buildings, through the reduction of local communal taxes

- Direct financial support for energy efficiency measures up to 60 % (depending on the development level of region):
 - Installation of thermal insulation on facades
 - Replacement of facade windows and doors
 - Installation of heating systems using modern biomass forms
 - Installation of split and multi-split systems for heating and cooling
 - Installation of high-efficiency heat pumps
 - Installation of solar systems for domestic hot water preparation
 - Installation of photovoltaic systems for electricity production for self-consumption.

Which of the mentioned financial mechanism is applied depends on the available funds. Lower funds often lead to mechanisms like interest free loans, and in the case of greater funds availability direct financial support (grants) is the main financial mechanism.

In the previous period, the Ministry of Energy and Mining implemented several support programs structured as interest-free loans (e.g., the Energy Efficient Home program), aimed at reducing heating costs and increasing comfort in households, achieving significant CO₂ emission reductions in the residential sector, and developing the biomass heating systems market in Montenegro.

As part of EU support, certain funds have been allocated to the Western Balkans countries to support the household sector in energy efficiency measures implementation through the EBRD Western Balkans Residential Green Economy Financing Facility (GEFF-Residential) project. In order to implement the project, EBRD in cooperation with commercial banks in Montenegro has established dedicated loan lines for energy efficiency. Using these credit lines funds for energy efficiency improvement in households, 15-30% of the investment costs are subsidies from EU funds.

In addition, Montenegro is successfully implementing a comprehensive subsidy program for households aimed at improving energy efficiency. The total budget for the program is €8.8 million, with €2.8 million allocated to the municipality of Pljevlja and the remaining €6 million for other municipalities across the country. The maximum amount of non-refundable funds per beneficiary is €10,000, with amounts for individual measures ranging from €2,000 to €6,000. The program is implemented in collaboration of the Ministry of Energy and Mining with the Eco Fund, which acts as the implementing body, with technical support from the United Nations Development Program (UNDP).

It is important to ensure the continuation of similar support programs in the coming period to further advance the renovation of the residential sector. Special emphasis in the next period should be placed on the multi-apartment building sector and on finding solutions for financing energy efficiency measures in cases of condominium ownership.

The Building Renovation Strategy, prepared by the Ministry of Energy in the form of the Study on Improving the Energy Efficiency of Buildings in June 2025, represents a comprehensive document that analyzes the current state of the building stock and provides scenarios for improving the energy performance of residential buildings, as well as an assessment of the necessary financial investments.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Energy efficiency in building sector.

Objective of the policy or measure: PaM will contribute to the implementation of the EPBD and the realization of the Building Renovation Strategy.

Implementation process:

- Preparation of public call for equipment and construction work providers.
- Preparation of public call for financial service providers (banks).
- Organizing calls.
- Creation of the list of providers of all services (technical and financial).
- Preparation of a support concept for improving energy efficiency in multi-apartment residential buildings.

Implementation period:

- Expected starting date: 2022
- Expected end date: 2030
- The measures will have long-term effects, significantly improving energy efficiency.

Status of implementation:

- Implementation of the support program is ongoing.

Responsible for implementation:

- Ministry of Capital Investments, Eco Fund, local qualified EE equipment distributors and installers as well as local commercial banks.

Actions taken:

- Programmes implemented: MONTESOL, Energy Wood and Programme Energy Efficient Home.
- The household energy efficiency incentive program is ongoing.

Impact:

- Energy Union Dimension(s) affected: Energy efficiency, Decarbonisation.
- Sectors affected: Residential sector, Service sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions are all produced during combustion of oil derivatives, coal and wood which are the main sources of GHG emissions in service and residential sectors. The effects of the PaM on GHG emissions are directly influenced by the number of residential units that have applied for this mechanism. Currently this is a small part of consumption of the whole sector and therefore the impact on GHG emissions decrease is below 1 Gg CO_{2eq}.

Costs:

- Within the ongoing household energy efficiency incentive program, €8.8 million has been allocated to support the household sector. It is necessary to secure additional funds to continue the support program in the coming period. For the period up to 2027, implementation should be guided by the indicators set out in the Reform Agenda for the period 2024–2027.

Funding:

- Eco fund, Govt. of Montenegro and international donors.

Annual public budgetary impacts:

- EUR 15 million until 2030.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- The Building Renovation Strategy, prepared in the form of the Study on the Improvement of Building Energy Efficiency in June 2025, is a comprehensive document that analyzes the current state of the building stock and provides scenarios for improving the energy performance of residential buildings.

3.3 Dimension Energy Security

3.3.1 Power sector

Exact name: Development of electricity transmission power network

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

According to the Energy Law of Montenegro, the electricity transmission system operator is obligated to perform the transmission of electricity under the conditions specified by the license, adhering to the principles of objectivity, transparency, and non-discrimination. To fulfill this key role and meet the operational requirements placed upon it, the electricity transmission system operator is required, under Article 112 of the Energy Law of Montenegro, to prepare a ten-year transmission system development plan. This plan must align as much as possible with Montenegro's planning documents and with the development plans of neighboring transmission systems. In line with this, the transmission system operator also submits annual investment plans tailored to the needs of system users. These plans are consistent with the ten-year transmission system development plan and spatial planning documents.

The development plans for the transmission system must be robust and adequate enough to accommodate a wide range of potential future system states. For this reason, it is no longer merely desirable but essential to conduct market analyses prior to network analyses. These market analyses optimize the operation of the generation portfolio, generate plans for the dispatch of generation units, and identify specific (non-standard) hours that require a detailed system state analysis. This practice of combining market and network analyses in the preparation of development plans is also applied in the pan-European transmission system development planning process by the ENTSO-E association.

Description of the PaM:

The main goal of the measure is increase of power system security, connecting new consumption areas and enabling integration of RES. All projects can be divided in two groups:

- Projects that already started and will be finished until 2027:
 - Reconstruction of 110kV Line Lastva - Budva: 2013–2024
 - Reconstruction of 110kV Line Lastva - Tivat: 2013–2022
 - Reconstruction of 110kV Line Podgorica - Danilovgrad - Perućica: 2020–2023
 - Reconstruction and Expansion of Substation 110/35kV Pljevlja 1: 2019–2023
 - Reconstruction of a Section of 110kV Line Nikšić - Bileća (Vilusi): 2020–2022
 - Replacement of High-Voltage Equipment in Substations: 2016–2023
 - Reconstruction of Protection Systems: 2016–2023
 - New reconstruction of 110kV Line Bar - Budva: 2017–2022
 - Revitalization of 110kV Line Herceg Novi - Tivat: 2021–2022
 - Revitalization of 110kV Line Bar - Možura - Ulcinj: 2023–2024
 - Construction of 400kV Line Čevo - Pljevlja: 2013–2023
 - Substation 400/110/35 kV Brezna: 2016–2026
 - Construction of 400kV Line Pljevlja2 - Bajina Bašta - Višegrad: 2012–2026
 - Construction of 110kV Line Virpazar - Briska Gora - Ulcinj: 2018–Post-2026
 - Installation of 250MVar Variable Shunt Reactor in Substation Lastva: 2020–2023
 - Construction of Substation 110/35kV Luštica with Connection to the 110kV Network: 2015–2024
 - Construction of Substation 110/35kV Žabljak: 2012–2024
 - Construction of Substation 110/10kV Podgorica 7 with Connection to the 110kV Network: 2021–2026
 - Construction of Substation 110/35kV Buljarica with Connection to the 110kV Network: 2021–2026
 - Construction of 110kV Line Lastva - Kotor: 2013–2024
 - Construction of 110kV Line Vilusi - Herceg Novi: 2013–Post-2026
 - Construction of Substation 110/10kV Bečići: 2023–2027
- Project that will start after 2025:
 - Construction of 400kV Line Brezna - Sarajevo
 - Construction of 110kV Line Ulcinj - Briska Gora - Kosmač
 - Construction of Substation 110/35kV Kolašin
 - Construction of Substation 110/35kV Velika Plaža with Connection to the Transmission Network
 - Construction of Substation 110/10kV Igalo
 - Construction of Substation 110/10kV Podgorica 6
 - Construction of Substation 110/10kV Podgorica 8
 - Construction of Substation 110/35kV Bijela
 - Reconstruction of the 110kV Line Podgorica 1 - EVP Trebješica - Andrijević
 - Reconstruction of the 110kV Line Bar - Možura - Ulcinj to Increase Capacity
 - Reconstruction of the 110kV Line Bar - Budva to Increase Capacity
 - Reconstruction of the 110kV Line Podgorica 2 - Virpazar to Increase Capacity
 - Installation of a Synchronous Compensator.

The transition to new technologies is of great importance for CGES, considering that the following projects are either planned or already being implemented:

- Transition to a new SCADA system and remote management of the power system
- Video surveillance of substations and protection of CGES facilities

- Disaster Recovery Data Center
- Remote access to process networks and integration of new facilities into the SCADA system
- Expansion and improvement of the Automated Meter Reading (AMR) system
- Implementation of the pan-European PCN ENTSO-E IP/MPLS network
- Regional connection of TSO operators through the implementation of the Balkans Digital Highway project.

The main features of this system include a modern IT infrastructure with a high level of reliability and cybersecurity, complete observability of the high-voltage power system, and the integration of advanced functions such as:

- Wide Area Monitoring System (WAMS),
- Forecasting of renewable energy production,
- Dispatch log,
- Imbalance Netting mechanism, and more, into the SCADA system.

Additionally, the establishment of a backup dispatch center (RDC) has fulfilled one of the most important tasks of the new SCADA system, providing a fully redundant system configuration at an alternative location.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: power system security, RES integration.

Objective of the policy or measure: energy security, internal energy market and GHG emissions.

Implementation process:

- Development of necessary studies.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of new infrastructure.

Implementation period:

- Expected starting date: 2023 (some of the projects started earlier)
- Expected end date: 2032
- The measures will have long-term effects, affecting energy security, internal energy market and GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- CGES (Montenegrin transmission system operator).

Actions taken:

- Ten year development plan is adopted.
- Part of technical documentation is prepared.
- Public procurement procedure initiated for some of the selected projects.

Impact:

- Energy Union Dimension(s) affected: Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: The main targets are energy security and higher integration of RES. Indirect effect is a significant decrease of GHG emissions. It is not estimated since it depends on the share of RES in the national electricity production mix.

Costs:

- CGES has adopted the Investment Plan for the period 2024–2028, which envisions an investment of 198 million euros in the development and modernization of the transmission network. However, the cost for projects that will be implemented after 2025 was not defined since studies and inception designs are under preparation.

Funding:

- CGES, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Ten year development plan of the transmission network until 2032.

Exact name: Development of electricity distribution power network

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Article 116 (Point 5) of the Energy Law establishes the obligation of the Distribution System Operator (DSO) to develop a ten-year distribution system development plan, based on the condition and level of system utilization, which is updated every five years. In the document Rules for the Operation of the Electricity Distribution System, provides a detailed specification of the content, methodology, objectives, types, general conditions for designing the distribution system, operational safety, quality, reliability, data, documentation, and technical criteria required for planning during the preparation of the ten-year and three-year development plans. Main goals of the plan are:

- Ensure the safe, efficient, and high-quality operation of the distribution system;
- Timely provide sufficient network capacity to meet the realistic needs of existing distribution system users for increased power and electricity consumption;

- Ensure sufficient capacity of the distribution system to meet the realistic needs for connecting new users to the distribution system;
- Ensure the dynamic construction and reconstruction of the distribution system in a way that satisfies users' electricity needs, align the development of the distribution system with urban planning, and ensure the normal operation of the distribution system.

In general, main focus of the plan is on the reliable operation of the distribution grid and to enable secure supply of the existing and new consumers as well as to enable high integration of distributed RES and prosumers.

Description of the PaM:

Power distribution grid includes numerous grid elements and therefore, in order to monitor implementation of all projects, they have to be grouped in following manner:

- Projects for the Construction, Reconstruction, and Revitalization of the Network (35 kV, 10 kV, and LV)
 - Construction of underground cables
 - Construction of overhead lines
 - Relocation of the network
 - Replacement of cable lines
 - Replacement of poles, suspension equipment, and conductors
 - Installation of reclosers
 - Installation of line disconnectors
- Projects for the Construction, Reconstruction, and Revitalization of Substations (TS 35/X kV, TS 10/0.4 kV, and TS 110/X kV)
 - Construction of substations (TS)
 - Complete reconstruction of substations
 - Installation of grounding resistors for the neutral point
 - Replacement of MV switchgear
 - Replacement of LV switchgear
 - Replacement of MV and LV switchgear
 - Replacement of transformers
 - Replacement of transformers and MV switchgear
 - Replacement of transformers and LV switchgear
 - Reconstruction of relay protection and control systems in substations
 - Procurement of industrial computers with software
 - Replacement of circuit breakers and reconstruction of relay protection and control systems
 - Equipping MV cells
 - Installation of circuit breakers
 - Repair/reconstruction of the civil works in substations
- Other Projects Related to Enhancing the Operations of the DSO
 - Reconstruction of connections for the relocation of metering points
 - Installation of measurement equipment
 - Procurement of personal computers
 - Procurement and installation of server computing and communication equipment
 - Procurement of instruments, auxiliary tools, equipment, and software

- Procurement of vehicles
- Repair/reconstruction of the structural parts of workspaces
- Equipping workspaces
- Work safety and environmental protection
- Monitoring and management of the electricity distribution network
- Improvement of business processes.

An overview of number and structure of the planned projects is given in the table.

Type of grid element	2023	2024	2025	After 2025	Total
Substation 110/X kV		1	3	13	17
35 kV grid	10	4		43	57
Substation 35/X kV	8	14	11	72	105
10 kV grid	37	35	19	142	233
Substation 10/0.4 kV	104	118	64	211	497
LV grid	4	3	1	33	41
Other	31	30	27	24	112
Total	194	205	125	538	1062

It is evident that the largest number of projects per year is related to the 10 kV network and 10/0.4 kV transformation, particularly during the first three years of the planning period. In the second half of the plan, the focus shifts more toward the 35 kV network. Regarding financial investments in projects, the most significant investments are allocated to the revitalization of the 10 kV and low-voltage (LV) network, including the secondary network (10 kV lines, 10/0.4 kV substations, and the low-voltage network), as well as AMR systems and metering points. Investments in these projects, combined with investments in the primary network (35 kV lines, 110/x kV substations, and 35/x kV substations), account for approximately 87% of all investments in the ten-year development plan.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: electricity supply quality, RES integration.

Objective of the policy or measure: energy security, distributed RES integration, prosumers expansion, GHG emissions.

Implementation process:

- Development of necessary studies.
- Preparation of technical documentation.
- Preparations of grid connection studies (hosting capacity).
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of new infrastructure.

Implementation period:

- Expected starting date: 2023
- Expected end date: 2032

- The measures will have long-term effects, affecting energy security, internal energy market and GHG emissions.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- CEDIS (Montenegrin power distribution system operator).

Actions taken:

- Ten year development plan is adopted.
- Part of technical documentation is prepared.
- Public procurement procedure initiated for some of the selected projects.

Impact:

- Energy Union Dimension(s) affected: Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: The main targets are energy security and higher integration of RES. Indirect effect is a significant decrease of GHG emissions. It is not estimated since it depends on the share of RES in the national electricity production mix.

Costs:

- Total budget for all the planning period is EUR 331 million.

Funding:

- CEDIS, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Ten year development plan of the power distribution network until 2032.

Exact name: Developing battery electric storage systems (BESS)

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Increasing the share of renewable energy sources in total final energy consumption has been a strategic commitment of the state for many years, with EPCG (Montenegrin power company) as the most dominant domestic supplier of renewable energy. Achieving high integration of renewable energy sources is a highly challenging task, as new sources, such as those based on

solar or wind energy, significantly complicate (and increase the cost of) managing the power system. The solution lies in enhancing the flexibility of the power system, and Battery Energy Storage Systems (BESS) are one of the ways to achieve this. EPCG has been providing balancing services for Montenegro's power system for many years, and with the construction of BESS, it will further strengthen its balancing capacities. Additionally, it will create opportunities for better utilization of its own electricity production and secure a stronger position in the market. The fundamental characteristic of electricity is that it must be produced precisely when there is a demand for it and in exactly the required amount (production and consumption must always be balanced). Therefore, it cannot be easily stored. Energy storage systems aim to overcome this significant limitation. Battery systems perform electrochemical energy conversion. This feature is utilized both for storing and generating electricity.

Description of the PaM:

BESS (Battery Energy Storage Systems) have been considered a solution for the high integration of renewable energy sources (RES) for the past decade. However, large-scale implementation has been slow due to high investment costs. In recent years, this situation has been changing as competition among manufacturers has grown, making BESS more affordable. The benefits of BESS primarily stem from their high controllability (charging/discharging), which allows them to provide system balancing services with the same quality as the hydropower plants managed by EPCG. On the other hand, considering significant fluctuations in electricity prices (with multiple differences in hourly prices) throughout the day—particularly during the summer months due to the variability in electricity availability and demand—BESS can be used to transfer electricity from hours with low prices to those with high prices. BESS also has applications in:

- Households (energy consumption optimization, integration with photovoltaic systems, electric vehicle charging);
- Service sectors;
- Industry (peak demand optimization, improving supply security, electric vehicle charging).

This PaM primarily includes development of large-scale BESS on selected locations where there is an existing grid infrastructure for connection (owned by EPCG). Several locations are recognized by the availability of transformers connected to the transmission grid (voltage level 110 kV and 220 kV):

- HPP Perucica – available transformer with 63 MVA of installed power (3 winding transformer)
- Steel factory Niksic – 2 available transformers with installed power 63 MVA each.
- Future location of WPP Gvozdi.
- Other locations are still under analysis.

Therefore, it is planned to install BESS at these locations with the following characteristics: 60 MW/60 MWh. In total, there will be 240 MW/240 MWh of BESS connected to transmission power grid.

Also, there is a plan of developing medium sized BESS which would be distributed by substations 10/0.4 kV in order to enable more efficient integration of prosumers. Their installed power per location would be in range 0.2 MW – 1 MW, but this is still under analysis and there are no selected locations for installation.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Power system flexibility.

Objective of the policy or measure: New technologies, increasing energy security, improvement of position in electricity markets, higher integration of RES in power system.

Implementation process:

- Development of feasibility study.
- Preparation of technical documentation.
- Preparations of grid connection studies.
- Obtaining permits.
- Obtaining financing.
- Selection of equipment and construction works providers.
- Commissioning of BESS.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2027
- The measures will have long-term effects, enabling large scale RES integration.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- EPCG.

Actions taken:

- Montenegrin power company (EPCG) collected the information necessary for feasibility study and inception technical design preparation.

Impact:

- Energy Union Dimension(s) affected: Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: There are no direct impacts on GHG emission.

Costs:

- The total budget for the project is EUR 100 million, spread over 5 years (2025-2029).

Funding:

- EPCG, IFIs, private investors.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Preliminary analysis is done. Feasibility study and inception technical design are under preparation.

Exact name: Risk Preparedness Plan

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The increasing integration of renewable energy sources and the frequent occurrence of natural disasters caused by climate change jeopardize the operation of certain elements of the power system, thereby affecting its overall stability. Considering that the power system operates within a broader geographical context and that system disturbances transcend operator jurisdictions, it is of crucial importance to establish a mechanism for cooperation between countries in a coordinated and clearly defined manner to preserve the stability and security of system operation.

Description of the PaM:

By adopting the EU Regulation 2019/943 on risk preparedness in the electricity sector, Montenegro commits to preparing a Risk Preparedness Plan, i.e., rules on how to prevent, prepare for, and manage electricity crises. The regulation introduces greater transparency both in the preparatory phase and during electricity crises, allowing measures to be taken in a coordinated and efficient manner. This plan should be operationally applicable, periodically tested, and updated in line with available capacities and resources. During its preparation, it is necessary to take into account the recommendations of the Energy Community Secretariat and the competent authorities of relevant contracting parties in the region.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Unforeseen system disturbances.

Objective of the policy or measure: Prevention and management of critical situations in system operation to ensure the security of electricity supply.

Implementation process:

- Identification of regional electricity crisis scenarios
- Identification of national electricity crisis scenarios.

Implementation period:

- Expected starting date: 2026
- Expected end date: -

Status of implementation:

- The regulation is in the process of adoption.

Responsible for implementation:

- Ministry of Energy and Mining
- CGES (TSO)
- REGAGEN.

Actions taken:

- Rules for the Operation of the Electricity Transmission System (CGES), Market Rules (COTEE).

Impact:

- Energy Union Dimension(s) affected: Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: There are no direct impacts on GHG emission.

Costs:

- There is no cost assessment.

Funding:

- The preparation of the plan is not subject to any costs.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Regional and national electricity crisis scenarios.

Exact name: Operationalization of the Security Coordination Region

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Following the adoption of the adapted EU legislative package (Clean Energy Package) and the proposal on the configuration of security coordination regions by the Ministerial Council in 2022, transmission system operators initiated the operationalization of the decision. The formalization of the decision on the establishment of the security coordination regions is currently underway, after which the preparation of a set of joint methodologies aimed at more efficient and higher-quality real-time management of the power system will follow.

The methodologies will be prepared within the working groups of transmission system operators with the consent of independent regulatory authorities. Unlike capacity calculation regions, it is foreseen that each country will belong to only one security coordination region,

and the decision on the establishment of the region to which Montenegro will belong is expected during 2026.

Description of the PaM:

This measure specifically refers to the operationalization of the security coordination region. The measure is of particular importance for further integration into the EU electricity market and the connection of planned new renewable energy sources to the power system, as coordination with the transmission system operators of neighboring countries increases the level of system operational security and optimizes the use of remedial measures necessary for maintaining stable system operation.

Of special importance for coordination will be the regional methodology for operational security coordination, through which, when necessary, physical power flows in the electricity system will be adjusted, and physical congestions and other critical situations in the system will be resolved in a coordinated manner. In this way, the level of security and system stability will be significantly improved.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Coordination of operational security.

Objective of the policy or measure: Optimization of the use of remedial measures to maintain system operational security.

Implementation process:

- Definition of the security coordination region;
- Preparation of methodologies;
- Approval by NRAs;
- Application of methodologies at the level of transmission system operators.

Implementation period:

- Expected starting date: 2025;
- Expected end date: 2028.

Status of implementation:

- At the initial stage.

Responsible for implementation:

- Ministry of Energy and Mining
- CGES (TSO)

Actions taken:

- A team established for preparing the proposal for regional configuration.

Impact:

- Energy Union Dimension(s) affected: Energy security.

- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHGs, as it enables greater availability of renewable energy sources.

Costs:

- €3–5 million annually.

Funding:

- Electricity transmission tariff (CGES).

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Technical analysis for the establishment of the security coordination region, EC Regulation 2017/1485.

3.3.2 Oil & Gas sector

Not applicable

3.3.3 Waste sector (Waste to Energy)

Not applicable

3.3.4 Regional cooperation

Regional security coordination between Montenegrin TSO and its neighbours in accordance with the EU regulations started back in 2015. when regional security coordination initiative was formalised by 3-TSOs through the joint venture SCC. Today this initiative is a platform for cooperation between 7 regional TSOs that provides coordinated validation and merging of Individual Grid Models, Common Grid Model (CGM) creation, Coordinated Security Analysis (CSA), Outage Planning Coordination (OPC) and Short-Term Adequacy (STA) forecast. At the moment, participating TSOs are jointly developing Regional Operational Security Coordination Methodology

Coordinated capacity calculation process will be initiated once proper the EU regulations are transposed in the WB6 region, having in mind complexity of Capacity Calculation Region definition in mixed regulatory environment. From technical perspective no open issues are left open.

Cross-border capacity allocation procedure is performed on each ME border where Montenegrin TSO- CGES and Serbian TSO - EMS are responsible for the capacity allocation on ME-RS border, while the renting of the capacity on other borders (XK, IT, AL, BA) falls under the jurisdiction of regional allocation office SEE CAO. Cross-border capacity is auctioned through short term and long term allocation procedures, where operators are remunerated

only when congestion occurs. Daily, monthly and yearly allocation procedures are conducted applying the pricing method where congestion price is a marginal price, but on the other hand, the capacity reservation during the intraday is based on the “First come first served” principle and it is free of charge.

The following associations, committees, groups and subgroups, which CGES representatives participate in, are dealing with the aforesaid matters:

1. European association for the cooperation of transmission system operators (TSOs) for electricity (ENTSO-E);

1.1 Assembly of ENTSO-E

1.2 System Development Committee

1.2.1 Asset Implementation Management within System development Committee

1.2.2 Subgroup Data and Models

1.2.3 Southeast Europe Cooperation Initiative Transmission System Planning Project

1.3 Research, Development and Innovation Committee

1.4 System Operation Committee - SOC) and Regional Group of the Continental Europe (RG CE)

1.4.1 Network Models and Forecast Tools -NMFT

1.4.2 FSkar implementation

1.4.3 Sub Group Coordinated System Operation –SG CSO

1.4.4 Technical user group „ Electronic Highway“

1.4.5 International Grid Control Cooperation Expert Group -IGCC

1.5 Market Committee

1.5.1 Congestion Management and Market Integration-CMMI

1.6 Legal and Regulatory Group-LRG

1.7 Resource Planning Project

2. Association of the Mediterranean Transmission System Operators for electricity (MedTSO)

2.1 Assembly Med-TSO

2.2 Technical committee „Regulations and Institutions“

2.3 Technical committee „Planning“

2.4 Technical committee „Operation“

2.5 Working group „Economic Studies and Scenarios“

2.6 Technical committee „Knowledge sharing“

3. Energy Community

3.1 Security of Supply Coordination Group - Subgroup for electricity

3.1.1 Working group for cybersecurity

3.2 Central and South-Eastern European Gas Connectivity – CESEC

3.3 PECE/PMI Electricity Working Group

3.4 DSO2TSO Working Group for Smart Grid Concept

4. Other activities

4.1 Electricity Market Initiative-EMI

4.2 Know-how Exchange Programme-KEP

4.3 Working group AIMS – coupling of markets (Albania, Italy, Montenegro and Serbia)

4.5 Working group for SMM

4.6 Utility Cyber Security Initiative (UCSI) for Balkan and United States Energy Association - USEA

4.7 Horizon Projekat Trinity (increasing regional border capacity of transmission system by means of intelligent market technology)

4.8 Projekat Balkans Digital Highway

4.9 Horizon Projekat CROSSBOW – CROSS Border management of variable renewable energies and storage units enabling a transnational Wholesale market

3.4 Dimension Internal Energy Market

3.4.1 Electricity infrastructure

No PaMs

3.4.2 Energy transmission infrastructure

HVDC cable MONITA (the first phase – 600 MW capacity) is in commercial operation since January 2020 and it proved itself as an important energy corridor with regional impact. It enabled better distribution of renewable energy surplus i.e. better utilization of renewable power plants located in Balkans region as well as in Italy. Montenegro and Italy signed a Memorandum of Understanding on electricity market coupling in October 2025, enabling the continuation of the project and the construction of the second pole of the HVDC cable (second phase – additional capacity of 600 MW).

Even better utilization of HVDC cable MONITA will be possible if the capacity of Montenegrin interconnections with Bosnia and Herzegovina and Serbia would increase. This would help better usage of the existing and future renewable power plants. Therefore, 400 kV OHL Bajina Basta – Pljevlja – Visegrad project is expected to remove present congestions and enable reliable electricity transit between Balkans and Italy. This project will support electricity transits through Montenegrin transmission grid and enable secure operation of the power system nevertheless the load, i.e. the amount of transits.

In order to support the realization of the mentioned projects, several regulation and strategic documents are prepared:

- Law on confirmation of agreement between Montenegro and Italy regarding construction of submarine power interconnection between Montenegrin and Italian transmission grid with realization of strategic partnership of TSOs ("National Gazette – International contracts", No 8/10)
- Energy – WB5-REG-ENE-02 Feasibility Study: 400kV Interconnection Serbia – Montenegro – BiH, February 2015
- Detailed spatial plan for 400 kV OHL Bajina Basta – Pljevlja – Visegrad – in procedure, to be adopted by Parliament
- WB13-REG-ENE-01, 400 kV OHL Bajina Basta-Pljevlja-Visegrad, Technical documentation preparation and TSO support, Financial and Economic Assessment Report, September 2020

- Inception design of 400 kV OHL Bajina Basta – Pljevlja – Visegrad, under revision.

All mentioned projects are of great interest for Montenegro, Italy, Serbia, and Bosnia and Herzegovina as direct participants, but both projects will generate multiplicative positive effect on energy security of the region and enable more efficient integration of renewable energy as one of the main means to achieve decarbonization goals. Currently, all the studies related to the projects implementation are prepared with direct participation of Montenegro, Italy, Serbia and Bosnia and Herzegovina and with the assistance of the European Union.

Montenegro and CGES (national transmission company) received a grant for project implementation (400 kV OHL Bajina Basta – Pljevlja – Visegrad) financing by WBIF, which envisages implementation according to requirements of the Special Contract, signed by KfW bank and CGES. The technical documentation that is prepared in order to develop the best approach to realize the project is financed by European Investment Bank.

3.4.3 Market integration

Exact name: Market coupling

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

After the adoption of the Electricity Market Integration Package by the Ministerial Council of the Energy Community (December 2022), a legal framework was established for integrating the electricity markets of the contracting parties of the Energy Community into the single European market. One of the key steps to initiate activities for integration was defining the "direction" of integration.

At its session held on March 7, 2024, the Government of Montenegro adopted conclusions based on the information provided by the Ministry of Energy and Mining, approving that the integration of Montenegro's day-ahead electricity market with the single European market proceeds in the direction of Montenegro–Italy.

Market coupling contributes to jointly overcoming challenges regarding energy supply security, increasing market competition, expanding the use of renewable energy, and thereby improving the environmental situation. Through the integration of electricity markets:

- A larger and more liquid market is created, where prices are formed based on the supply and demand of all connected markets;
- Competition is encouraged;
- Cross-border electricity trading is enabled in accordance with harmonized regulations;
- The efficient use of production resources across Europe is facilitated.
- Ensures more efficient use of cross-border transmission capacities through the application of implicit auctions, which enable maximum utilization of available capacities.
- Facilitates electricity trading and reduces risks for market participants, as separate trading of transmission capacities is not performed. Instead, implicit auctions combine electricity trading and cross-border transmission capacity trading in a single step.

- Increases energy security and reduces dependence on dominant market participants, as connected markets can rely on each other during shortages or unexpected supply disruptions.
- Facilitates the integration of renewable energy sources by balancing intermittent electricity production from renewables with supply and demand across a larger market, reducing the need for backup generation through pooling production resources and increasing cross-border trade.

Description of the PaM:

The single day-ahead and intraday market coupling (SDAC and SIDC) is based on intensive cooperation and activities carried out by nominated electricity market operators (NEMO) and transmission system operators (TSO) through three distinct dimensions:

- Pan-European dimension: (pan-European rules and methodologies (TCM), Market Coupling Steering Committee, All NEMO Committee, ENTSO-E, agreements on mutual cooperation and procedures, etc.);
- Regional dimension: (capacity calculation regions and local implementation projects, regional TCMs, agreements, and procedures);
- National dimension: (local agreements and procedures implemented by NEMOs and TSOs, national TCMs).

Regulatory authorities play a significant role in this process through:

- Approving regional and national TCMs,
- Supervising the fulfillment of obligations by NEMOs and TSOs, etc.

Montenegrin Electric Transmission System AD Podgorica (CGES) and Electricity Exchange LLC Podgorica (BELEN) have already obtained observer status in the Market Coupling Steering Committee (MCSC), whose main role is to ensure continuous cooperation between NEMOs and TSOs in the implementation of SDAC and SIDC. The observer status will allow BELEN and CGES to familiarize themselves with the functioning of the MCSC, which is crucial for preparing and implementing the market coupling process. Additionally, BELEN has obtained observer status in the All NEMO Committee, which was established to enable mutual cooperation between NEMOs in fulfilling their prescribed obligations. This status will allow BELEN to monitor the processes conducted by the All NEMO Committee prior to obtaining full membership status.

Terna and CGES have established working and management bodies through which they cooperate on the preparation of regional TCMs. ARERA and REGAGEN signed a Memorandum of Cooperation in May 2024, which regulates the mode of collaboration aimed at approving regional TCMs. The IT-ME Implementation Group was also established to enable discussions and consultations between regulatory authorities and TSOs.

The first draft of the capacity calculation methodology has been prepared.

The IBWT (Italian Borders Working Table) is a joint project of Italy, Austria, France, Greece, Slovenia, and Switzerland aimed at coupling electricity markets. It involves TSOs and power exchanges from these countries working together on the implementation of the European target model for capacity allocation and congestion management. IBWT works on the implementation of the European target model for electricity markets, which includes the harmonization of capacity allocation and congestion management across borders. At the end of 2024, Montenegro gained access to the project through the inclusion of CGES and BELEN representatives in the working group.

Legal, technical, financial, informational, regulatory policy or measure: Regulatory policy.

Problem the policy or measure is addressing: Integration of electricity market

Objective of the policy or measure: Energy security increase.

Implementation process:

- Preparation of the first draft.
- Consultations with stakeholders.
- Finalization of the draft.
- Adoption procedure.

Implementation period:

- Expected starting date: 2027
- Expected end date: -
- The measures will have long-term effects regarding energy security.

Status of implementation:

- The Montenegro–Italy border has been included in the IBWT (Italy Borders Working Table) and the IBWT Steering Committee, with a letter of support from the Agency.

Responsible for implementation:

- Ministry of Energy and Mining, CGES, Energy and Water Regulatory Agency of Montenegro.

Actions taken:

- Obtained observer status in the Market Coupling Steering Committee (MCSC).
- BELEN has obtained observer status in the All NEMO Committee.
- Established working and management bodies.
- ARERA and REGAGEN signed a Memorandum of Cooperation.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHG since it enables greater integration of RES.

Costs:

- There is no cost estimation.

Funding:

- None.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- None.

Exact name: Implementation of European Balancing Platforms

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

By the decision of the Energy Community Ministerial Council in 2022, a set of adapted regulations was adopted, including European Commission Regulation (EU) 2017/2195 on establishing a guideline on electricity balancing (EBGL), which has been incorporated into the draft Law on Cross-Border Exchange of Electricity and Gas. The adoption and implementation of this law, i.e. the relevant regulation, will provide the legal basis for Montenegro's connection to the European balancing platforms.

ENTSO-E, with the aim of integrating electricity balancing markets and procuring balancing services, has developed the following common platforms:

- PICASSO (Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation) – for automated frequency restoration reserve (aFRR);
- MARI (Manually Activated Reserves Initiative) – for manually activated frequency restoration reserve (mFRR);
- TERRE (Trans-European Replacement Reserves Exchange) – for activation of replacement reserves;
- IN (Imbalance Netting Platform) – for the imbalance netting process.

Description of the PaM:

Access to these platforms will enable:

- Improved efficiency of power system balancing (EPS);
- Integration of balancing service markets and facilitation of balancing service exchanges across ENTSO-E, allowing the use of the least-cost balancing reserves to enhance system security;
- Optimization to achieve the highest overall efficiency and lowest total cost for all stakeholders;
- Greater transparency in procurement;
- Use of market-based mechanisms to the maximum extent possible, ensuring security and stability of the EPS.

Legal, technical, financial, informational, regulatory policy or measure: Technical and regulatory measure.

Problem the policy or measure is addressing: Secure and efficient operation of power system

Objective of the policy or measure: Energy security increase, high integration of RES.

Implementation process:

- Preparation of technical specifications (to enable high-quality real-time data exchange and communication between TSOs).
- Cross-border coordination to harmonize regulations.

Implementation period:

- Expected starting date: 2027
- Expected end date: 2030
- The measure will have long-term effects regarding energy security.

Status of implementation:

- The project is ongoing.

Responsible for implementation:

- CGES, Energy and Water Regulatory Agency of Montenegro.

Actions taken:

- Preparation of technical documentation.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHG since it enables greater integration of RES.

Costs:

- There is no precise cost estimate for this specific policy and measure. The cost is reflected in the procurement and implementation of the application system for organizing and administering the balancing market and balancing the EPS, including its integration with the SCADA system.

Funding:

- CGES.

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- European Commission Regulation (EU) 2017/2195 on establishing a guideline on electricity balancing (EBGL).

Exact name: Demand Response

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Following the adoption of the adapted EU Clean Energy Package by the Energy Community Ministerial Council in 2022, Montenegro began aligning its national legislation with this set of EU regulations. The intensive integration of new renewable energy sources will inevitably increase the need for system flexibility and lead to greater variations in electricity prices, both seasonally and within the day. In this context, apart from traditional solutions such as the construction of additional balancing generation resources and battery systems, EU legislation and practice foresee the possibility for consumers to adjust their consumption behavior in response to market signals, with appropriate financial compensation. This approach allows for optimization of the need for new controllable generation capacity and gives consumers new opportunities to adapt to the conditions of a liberalized market.

Description of the PaM:

This measure specifically refers to the creation of prerequisites for the active participation of consumers in the electricity market, in accordance with the adapted EU regulations (CEP).

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Optimization of electricity consumption.

Objective of the policy or measure: Optimization of system balancing resources and reduction of costs for end consumers.

Implementation process:

- Adoption of bylaws;
- Promotion of the demand response concept;
- Implementation of adopted acts.

Implementation period:

- Expected starting date: 2026
- Expected end date: 2030
- The measure will have long-term effects on the use of balancing resources.

Status of implementation:

- Planned.

Responsible for implementation:

- Ministry of Energy and Mining;
- CGES (Montenegrin Transmission System Operator);
- CEDIS (Montenegrin Distribution System Operator).

Actions taken:

- Preparatory phase.

Impact:

- Energy Union Dimension(s) affected: Energy security, Internal energy market.

- Sectors affected: Demand (IPCC sector: 1A Energy, subcategories 1A2 – Industry and 1A4 – Other consumption).
- GHG areas and greenhouse gases covered: This measure targets all GHG since it enables greater integration of RES.

Costs:

- No additional costs.

Funding:

- Through electricity transmission and distribution tariffs (CGES, CEDIS).

Annual public budgetary impacts:

- None.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Technical analysis for the implementation of the demand response project, European Commission Regulation (EU) 2017/2195.

Exact name: Pilot project for improving the “visibility” of the low-voltage network

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

One of the key barriers to continuing the development of decentralized generation at the low-voltage level is the limited availability of distribution capacity for their connection. It is certain that in the future, public demand for installing photovoltaic systems will continue to grow, making it necessary to optimally plan the development of the distribution network, supported by appropriate investment efforts. In addition to building additional capacity, problems with poor voltage profiles and network congestion can be addressed by introducing smart grids (improved monitoring and network management). Given the high level of installed smart meters in households, the continuation of power grid modernization should focus on applying digital technology, sensors, automation, and real-time communication.

Description of the PaM:

The project involves the installation of advanced metering devices (meters) and sensors in the low-voltage network, as well as specialized software and an Application Programming Interface (API) for integrating new devices with the Meter Data Management (MDM) system, which is currently under development. This will provide information on key electrical parameters (e.g., voltage, current, power, and energy) necessary for better network development planning and assessing the potential for connecting new rooftop photovoltaic systems, i.e., prosumers. The detailed design and implementation of this investment will rely on a technical study and feasibility study that will form part of this project. The technical solutions will be harmonized with the SCADA/ADMS investment that CEDIS plans to implement as a separate project.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Optimization of low-voltage network operation.

Objective of the policy or measure: Greater integration of photovoltaic systems into the low-voltage network.

Implementation process:

- Technical study
- Feasibility study.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2030
- The measure will have long-term effects in terms of energy security

Status of implementation:

- Consultant selection is in progress.

Responsible for implementation:

- Ministry of Energy and Mining
- Ministry of Finance
- CEDIS.

Actions taken:

- Loan agreement signed with the World Bank.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Energy security, Decarbonization.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHGs as it enables greater integration of renewable energy sources.

Costs:

- There is no cost assessment.

Funding:

- State funds and loan financing.

Annual public budgetary impacts:

- Exists, but no cost data available.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Operational experience from the electricity distribution network with existing prosumers and from the operation of the low-voltage network in suburban and rural areas before the connection of distributed generation. These networks are currently the focus of interest for customers seeking to obtain prosumer status.

Exact name: Operationalization of the Capacity Calculation Region

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

After the Energy Community Ministerial Council adopted the adapted EU Clean Energy Package and the proposal on the configuration of capacity calculation regions (CCR) in 2022, the transmission system operators (TSOs) began the operationalization of the decision.

The formalization of the decision on establishing capacity calculation regions is currently underway, after which the preparation of a set of common methodologies will follow, including:

- Methodology for coordinated capacity calculation;
- Methodology for redispatching and countertrading; and
- Methodology for cost sharing related to redispatching and countertrading.

These methodologies are being developed within TSO working groups, with the approval of independent regulatory authorities. According to the current proposal, Montenegro will have its borders distributed across three regions, with the Italy–Montenegro region being in the most advanced phase of implementation.

Description of the PaM:

This measure specifically refers to the operationalization of capacity calculation regions (CCR) on all of Montenegro's borders with neighboring countries. It is envisaged that:

- the borders with Bosnia and Herzegovina and Serbia will be coordinated within the temporary East Central East region (ECE CCR), which will later merge with the Central European region;
- the borders with Albania and Kosovo will belong to the South-East Europe region (SEE CCR); and
- the Montenegro–Italy border will form a separate region (ITME CCR).

Of particular importance for Montenegro's integration with the EU electricity market is the establishment of the ITME CCR, which will enable the coupling of electricity markets and full access to the EU internal electricity market in line with the relevant European legislation.

A crucial element for coordination of system operations will be the methodology for redispatching and countertrading, which will allow, when necessary, for adjustments of physical power flows in the electricity system and coordinated congestion management between two bidding zones, in order to ensure system security, grid stability, and reliable electricity supply.

Legal, technical, financial, informational, regulatory policy or measure: Technical and financial measure.

Problem the policy or measure is addressing: Coordinated optimization of cross-zonal capacities.

Objective of the policy or measure: Optimization of the use of physical cross-border capacities and market coupling.

Implementation process:

- Definition of the Capacity Calculation Region
- Preparation of methodologies
- NRA approval
- Adoption of methodologies at the TSO level.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2027
- The measure will have long-term effects regarding the use of cross-border capacities

Status of implementation:

- In the initial phase.

Responsible for implementation:

- Ministry of Energy and Mining
- CGES (TSO).

Actions taken:

- A team established for the preparation of the regional configuration proposal;
- An organizational structure established for the development of methodologies within the ITME region;
- Draft methodologies prepared for the ITME region.

Impact:

- Energy Union Dimension(s) affected: Internal energy market.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHGs as it enables greater availability of renewable energy sources (RES).

Costs:

- 0,5M€ per year.

Funding:

- Electricity transmission tariff (CGES).

Annual public budgetary impacts:

- No impact.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Existing experience from the application of the NTC method for cross-border capacity calculation and its implementation in relation to available physical cross-border capacities. It has been observed that there is room for optimization and better utilization of available capacities.

Exact name: Establishment of Renewable Energy Communities

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The development of decentralized generation has become an essential part of the energy transition, which has gained significant traction in Montenegro. Thanks to the Solari+ project, a large number of households and businesses have installed rooftop photovoltaic systems, gaining personal benefits such as reduced electricity bills and greater energy independence, while also contributing to broader societal benefits such as reducing GHG emissions and protecting the environment.

With the growing number of installed photovoltaic systems, natural conditions for their association are being created, as they are typically located in close geographical proximity. Renewable energy communities are defined for the first time in the Law on the Use of Energy from Renewable Sources and represent a system for efficient generation and use of renewable energy, where surplus energy is shared among members, enabling supply even to those who do not have their own rooftop systems.

For this reason, it is important that community projects include public institutions, households, and vulnerable consumer groups. Private companies may also participate, provided that electricity generation is not their primary business activity. Although recognized by law, a roadmap has not yet been developed to establish a clear mechanism encompassing all aspects of forming and operating these communities within the national energy and legal framework.

Description of the PaM:

Renewable energy communities are local, citizen-led initiatives in which citizens, municipalities, cooperatives, or small and medium-sized enterprises jointly produce, use, share, or sell energy from renewable sources. Their establishment will increase the share of renewable energy in final consumption, reduce energy system losses, and create conditions for market development. One of the key technical prerequisites — the installation of photovoltaic systems — has already been met and continues to expand. For this project, a suitable location will be assessed, and upon agreement of potential members, implementation will begin.

Legal, technical, financial, informational, regulatory policy or measure: Technical and regulatory measure.

Problem the policy or measure is addressing: Decentralized generation and efficient energy use.

Objective of the policy or measure: Increase the share of renewable energy in final consumption.

Implementation process:

- Preparation of a feasibility study for the development of a renewable energy community project.

Implementation period:

- Expected starting date: 2026
- Expected end date: 2026
- The measure will have long-term effects regarding the use of cross-border capacities

Status of implementation:

- Planned.

Responsible for implementation:

- Ministry of Energy and Mining
- CEDIS (DSO).

Actions taken:

- Legal basis established through the adoption of the Law on the Use of Energy from Renewable Sources.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Decarbonization.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure targets all GHGs as it enables greater access to renewable energy sources.

Costs:

- There is no cost assessment.

Funding:

- State budget (Growth Plan).

Annual public budgetary impacts:

- There is no estimation.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Law on the Use of Energy from Renewable Sources
- Energy Community Secretariat Guidelines on Regulations and Establishing a Legal Framework for the Creation of Energy Communities.

Exact name: Establishment of a Dynamic Electricity Pricing Model

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The retail electricity market in Montenegro is still developing. Although it is open to other suppliers, the low prices offered by the dominant supplier do not provide a sufficiently competitive environment for the market to fully develop. However, this situation is unlikely to remain sustainable for long, as changes in the wholesale market will inevitably affect the retail market.

On the consumer side, the increasing use of smart devices in households allows end users to more easily monitor and manage their electricity consumption. This environment creates favorable conditions for implementing dynamic electricity pricing contracts.

Description of the PaM:

The dynamic pricing model is defined in the new Energy Law, allowing end consumers to choose a tariff contract linked to stock market prices if they consider this model more advantageous for their consumption pattern. This option will also serve as an additional incentive for other licensed suppliers to actively participate in the retail market.

Legal, technical, financial, informational, regulatory policy or measure: Technical measure.

Problem the policy or measure is addressing: Demand-side management.

Objective of the policy or measure: Development of the retail market and increased system flexibility.

Implementation process:

- Installation of advanced metering infrastructure.
- Development of an application for comparing supplier offers.

Implementation period:

- Expected starting date: 2026
- Expected end date: -

Status of implementation:

- Planned.

Responsible for implementation:

- REGAGEN
- EPCG
- Other suppliers.

Actions taken:

- Installation of advanced metering infrastructure (modern AMM system) is in progress.

Impact:

- Energy Union Dimension(s) affected: Internal energy market.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: N/A.

Costs:

- There is no cost assessment.

Funding:

- The measure does not require additional financing.

Annual public budgetary impacts:

- No impact.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Analyses conducted by suppliers indicate that the rapid expansion of renewable energy sources has significantly affected traditional generation profiles, and consequently, price patterns on the wholesale market. These no longer correspond to consumption profiles and traditional tariff structures for end consumers. The analyses highlight considerable potential for optimizing the use of available energy through improved demand-side management.

Exact name: Improvement of network access procedures for citizen energy

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The expansion of distributed generation from renewable energy sources has enabled production to be optimally located closer to consumption, thereby becoming one of the key tools for achieving sustainable development in the energy sector. For this reason, it is essential to promote its further development, especially when it comes to end-users (final consumers). Prosumer customers, active customers, and energy communities are mechanisms that effectively utilize the potential of distributed generation.

However, since the grid infrastructure itself was not originally designed for this type of generation, there are significant challenges to overcome—primarily ensuring that the power system operates within its technical limits even after a large-scale expansion of distributed generation. Additionally, there are challenges related to grid access, transparency, efficiency, simplicity of procedures, and the level of digitalization, all of which considerably slow down the expansion of distributed generation—even in parts of the grid where existing infrastructure could accommodate such generation.

The technical limitations of the current grid infrastructure are being addressed through grid planning and the establishment of more advanced management systems via full digitalization and increased observability of the network and its operational characteristics.

This measure focuses on improving existing procedures. The current connection procedures for prosumers have yielded some results (around 3,000 prosumers have completed the connection process, while an equal number are still in progress). However, inertia in implementation has been observed, caused both by the complexity of the procedure and by limited capacities and weaker coordination among stakeholders.

Description of the PaM:

Following an analysis of existing procedures and implementation experiences, the main barriers will be identified, and new procedures will be defined. Furthermore, professional capacities will be strengthened through training and knowledge transfer from the EU to implement best practices. The goal is to create standardized forms and fully digitalize the procedures.

Preparing an information portal for prosumers and energy communities—through which they could obtain all necessary information, apply, and check connection possibilities—would significantly enhance transparency and efficiency. Additionally, if the analyses identify deficiencies in existing secondary legislation that hinder or slow the expansion of prosumers, active customers, and energy communities, the relevant ministry will be involved to address these issues.

Legal, technical, financial, informational, regulatory policy or measure: Technical and regulatory measure.

Problem the policy or measure is addressing: Insufficient efficiency and transparency of grid connection procedures..

Objective of the policy or measure: Expansion of prosumers, active customers, and energy communities.

Implementation process:

- Capacity building;
- Analysis of existing procedures and identification of barriers and opportunities;
- Updating of procedures;
- Preparation of a digital service for future prosumers, active customers, and energy communities;
- Initiation of amendments to secondary legislation.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2026

Status of implementation:

- Initial phase..

Responsible for implementation:

- CEDIS
- CGES
- REGAGEN
- Ministry of Energy and Mining.

Actions taken:

- New Rules for the functioning of the electricity distribution system are being prepared.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Decarbonization, Energy security.
- Sectors affected: Energy generation (IPCC sector: 1A Energy, subcategory: 1A1 Energy industries).
- GHG areas and greenhouse gases covered: This measure directly supports the expansion of renewable energy use and thereby reduces GHG emissions.

Costs:

- EUR 30,000.

Funding:

- CEDIS, CGES – electricity tariff.

Annual public budgetary impacts:

- No impact.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Directive (EU) 2019/944 (Directive on common rules for the internal market for electricity).
- Experiences from the implementation of the prosumer connection procedure.

3.4.4 Energy poverty

Exact name: Methodology for Defining Energy-Poor Groups and Measures to Reduce Energy Poverty

Considered in which scenario: WAM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The protection of vulnerable consumers and the reduction of energy poverty are obligations derived from the Third Energy and Climate Package adopted by the European Parliament. This includes subsidizing heating costs for vulnerable consumers, improving building insulation and energy efficiency, and promoting the use of efficient and safe local heating systems.

With the adoption of the new Energy Law, Montenegro has transposed the EU Directive on Common Rules for the Internal Electricity Market (Directive (EU) 2019/944), thereby introducing, for the first time, the concept of energy poverty into national legislation. Energy poverty is defined as a condition in which a household lacks access to basic energy services that ensure decent living and health standards, including adequate heating and cooling, hot water, lighting, and energy for household appliances.

The Energy Community Secretariat prepared a Study on Tackling Energy Poverty in the Contracting Parties of the Energy Community, which provides guidelines on how to measure energy poverty levels and design appropriate policies to address it. In line with these recommendations, Montenegro must undertake activities to collect relevant data for monitoring energy poverty and to design measures for its mitigation.

Implementing a national energy poverty reduction policy would yield multiple benefits for both affected households and the wider community, such as:

- Improved quality of life and public health;
- Reduced use of individual solid-fuel stoves, directly contributing to lower air pollution both indoors and outdoors;
- Reduced use of low-quality and outdated appliances;
- Lower household energy expenditure as a share of income.

Description of the PaM:

Montenegro already implements subsidy programs for socially and medically vulnerable households. According to EPCG data from December 2023, there were 323 vulnerable consumers receiving a 50% electricity bill subsidy under the applicable regulation.

With the implementation of the new Energy Law, the concept of protecting vulnerable consumers will expand to include specific measures against energy poverty. Introducing the definition of energy poverty into national legislation represents the first prerequisite for identifying and addressing it.

The law further stipulates that, within 12 months of its adoption, a methodology must be developed to define criteria for identifying energy-poor households. This methodology will be based on guidelines proposed by the Energy Community Secretariat and will serve as the foundation for defining state measures and programs to ensure universal access to electricity. These measures must include indicators for monitoring effectiveness and data collection methods for tracking energy poverty. Based on all available data, Montenegro will adopt an Energy Poverty Reduction Program in line with national capacities and resources.

Legal, technical, financial, informational, regulatory policy or measure: Legal and financial measure.

Problem the policy or measure is addressing: Ensuring access to electricity and improving energy efficiency.

Objective of the policy or measure: Mitigation of energy poverty.

Implementation process:

- Preparation of a methodology for identifying energy-poor households;
- Development of measures to combat energy poverty;
- Establishment of an energy poverty monitoring system;
- Adoption of the national Energy Poverty Reduction Program.

Implementation period:

- Expected starting date: 2025
- Expected end date: 2026

Status of implementation:

- Planned.

Responsible for implementation:

- Ministry of Energy and Mining,
- Ministry of Social Welfare, Family and Demography,
- Eco-Fund,
- MONSTAT.

Actions taken:

- Adoption of the Energy Law including the definition of energy poverty and obligations for secondary legislation.

Impact:

- Energy Union Dimension(s) affected: Internal energy market, Energy efficiency, Energy security.
- Sectors affected: Residential sector, Services sector (IPCC sector: 1A Energy, subcategory: 1A4 Other sectors).
- GHG areas and greenhouse gases covered: This measure targets all GHGs by contributing to improved energy efficiency.

Costs:

- There is no cost assessment.

Funding:

- State budget (Growth Plan)..

Annual public budgetary impacts:

- No cost data available.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Study on Tackling Energy Poverty – Energy Community Secretariat (ECS), DOOR, EIHP, 2021.

3.5 Dimension Research, Innovation and Competitiveness

Exact name: Implementation of Smart Specialization in Montenegro

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Smart specialization is a European concept of growth policy planning based on identifying priority sectors of national development that represent a country's competitive advantage, supported through instruments of science and innovation policy. The Smart Specialization Strategy (S3) of Montenegro represents a key element of the country's national innovation and research policy. It focuses on identifying priority development areas that contribute to the modernization and strengthening of the competitiveness of the national economy.

Montenegro was the first non-EU country to adopt an S3 strategy for the period 2019–2024, and also the first to establish an Innovation and Smart Specialization Implementation Framework, as well as a system for monitoring and external evaluation of the Strategy. Between 2019 and 2023⁷⁶, €113.4 million was invested in measures supporting smart specialization in Montenegro. The majority of funding came from the national budget (€52.2 million), followed by EU funds (€30.8 million), while the share of private sector investments and donations was significantly lower.

The most significant achievements of the Smart Specialization Strategy in Montenegro so far include:

- Establishment of an innovation governance system through the Council for Innovation and Smart Specialization and a structured consultation process involving all four sectors via innovation working groups for each S3 priority;
- Creation of the Innovation Fund of Montenegro as the main S3 implementation body;
- Strengthened role of innovation infrastructures such as IPC Tehnopolis and NTP Montenegro in supporting the innovation community and boosting its capacity;
- Establishment of Centers of Excellence and promotion of excellence through scholarship and research grant programs;
- Creation of a continuous innovation support framework covering all innovation development stages;
- Development of S3-targeted programs (ICT cluster, the first EDIH in Montenegro, industrial energy efficiency innovations, and a draft research program for health tourism, among others).

Description of the PaM:

Smart specialization involves analyzing national research, innovation, and economic potential through a systematic consultation process between the public sector, private sector, academia, and civil society. This process identifies development priorities that represent the country's comparative advantages. Once priorities are identified, state investments are directed toward these sectors.

In the previous strategic cycle, Energy and Sustainable Environment was identified as a vertical priority aimed at increasing the use of renewable energy sources (RES) and improving energy efficiency.

⁷⁶ The preparation of the Final Report on the Implementation of the Smart Specialisation Strategy (S3) 2019–2024, which will also include data for 2024, is currently underway; therefore, at this moment, it is possible to refer only to the period 2019–2023, for which reports are available.

In February 2024, Montenegro launched the process of preparing the Smart Specialization Strategy 2026–2031 by strengthening institutional capacities. During the second phase — mapping of potential — Energy has once again been highlighted as a high-potential area. Montenegro will now enter the Entrepreneurial Discovery Process (EDP) to determine sectoral goals, focus areas, and propose targeted support measures.

To maintain the continuity of support measures from the previous strategic cycle, a Smart Specialization Implementation Plan for 2025 is being developed.

Legal, technical, financial, informational, regulatory policy or measure: Regulatory policy.

Problem the policy or measure is addressing: Low level of specialization within key sectors of Montenegro's economy; Insufficient exploitation of research and innovation in priority sectors, resulting in limited investment; The need to enhance the efficiency and sustainability of the economy.

Objective of the policy or measure: To increase competitiveness and innovation in the economy by focusing on specialized sectors and developing new industries with strategic potential.

Implementation process:

- Preparation and adoption of the Smart Specialization Implementation Plan for 2025;
- Completion of the potential mapping phase and publication of the qualitative and quantitative analysis report;
- Conducting the Entrepreneurial Discovery Process to identify priority sectors;
- Designing a monitoring and evaluation system and defining a financial framework for the new S3;
- Preparation of the new Smart Specialization Strategy;
- Establishment of an implementation framework for the new S3;
- Implementation of the new Strategy.

Implementation period:

- Smart Specialization Implementation Plan for 2025: Q1–Q4 2025
- Preparation of the new S3: Q1 2025 – Q2 2026
- Implementation of the new S3: Q3 2026 – Q4 2031

Status of implementation:

- Continuity of support measures from the Smart Specialization Strategy 2019–2024 is being maintained. The mapping phase is nearing completion, and the report on qualitative and quantitative analysis is being prepared.

Responsible for implementation:

- Ministry of Education, Science and Innovation – Directorate for Smart Specialization
- Interinstitutional S3 Group
- National Team for Preparing the New Smart Specialization Strategy
- Qualitative Analysis Teams, EDP Teams
- Council for Innovation and Smart Specialization
- Innovation Fund of Montenegro (FZI CG), IPC Tehnopolis, NTP Montenegro

- Relevant ministries.

Actions taken:

- Adoption of the Smart Specialization Strategy (S3) of Montenegro.

Impact:

- Energy Union Dimension(s) affected: Research, innovation and competitiveness.
- Sectors affected: Industry.
- GHG areas and greenhouse gases covered: This measure targets all GHGs but the effect is not estimated.

Costs:

- The financial framework will be clearly defined after the finalization of the Implementation Plan and the new S3.
- Based on previous implementation experience, the average annual budget was approximately €40 million.

Funding:

- Primarily from the national budget, with additional sources including EU funds, the private sector, and other donors.

Annual public budgetary impacts:

- When the S3 Implementation Plan and the new Strategy are submitted for adoption, a Regulatory Impact Assessment (RIA) report will be prepared, assessing the costs, benefits, and overall effects of the new policies.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Smart Specialization Strategy of Montenegro 2019–2024
- Action Plan for the Implementation of the Smart Specialization Strategy (2019–2020)
- Operational Program for the Implementation of the Smart Specialization Strategy (2021–2024) with Action Plan (2021–2022)
- Action Plan for the Operational Program (2023–2024)
- Implementation Reports for 2019–2020, 2021–2022, and 2023
- Evaluation Report of the Smart Specialization Strategy 2019–2022⁷⁷.

Exact name: Incentive Measures for the Development of Research and Innovation

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

In order to stimulate investment in innovation—particularly in early-stage innovative enterprises—and to promote employment in the innovation sector, Montenegro adopted the

⁷⁷ <https://s3.me/biblioteka/>

Law on Incentive Measures for the Development of Research and Innovation in 2020. This law defines the conditions and types of incentives for conducting scientific research and innovation activities, as well as for investing in these activities, with the goal of fostering economic growth, technological development, innovation, and entrepreneurship. The law establishes a wide range of tax incentives and relief measures, including reductions, exemptions, or relief related to:

- Personal income tax and surtax;
- Mandatory social security contributions;
- Corporate income tax;
- Fees for communal land development;
- Use of immovable property and/or state-owned land; and
- Property tax.

The law has been in force since September 2021, when the relevant by-laws were adopted. During the implementation period, three energy-sector projects were supported with total investments of €209,000, representing only 3% of all realized innovation investments. However, several challenges have been identified:

- Only two of the six incentive measures (personal income tax and corporate income tax relief) have proven effective and applicable in practice, attracting interest from the innovation community;
- Difficulties in tax administration and alignment with systemic tax laws;
- Incomplete compliance with state aid rules;
- Insufficiently defined system for monitoring incentive measures;
- Absence of penalty provisions; and
- The adoption of the new fiscal policy Europe Now 2, which promotes employment and offers more favorable conditions than some existing incentive measures under this Law.

Consequently, a new draft law has been prepared with the aim of improving the efficiency and effectiveness of incentive measures, clarifying application procedures, and establishing a monitoring system to support future policy planning.

Description of the PaM:

This regulatory measure aims to increase the competitiveness and innovativeness of the economy by supporting innovation-oriented entities and encouraging investment in research and development (R&D). Specific objectives:

- Create a more favorable environment for developing new technologies and innovative products and services;
- Strengthen existing companies engaged in innovation and support the growth of new startups and spin-offs;
- Expand access to funding for research projects conducted by licensed institutions;
- Increase the number of research and innovation projects;
- Promote the employment of young, highly qualified professionals; and
- Boost exports, particularly in medium- and high-tech sectors and knowledge-based services.

The new draft law introduces:

- Personal income tax relief for freelancers, inventors, and self-employed individuals who donate funds to startups, spin-offs, licensed research institutions, or the Innovation Fund; and
- Corporate income tax relief for private companies that reinvest profits into their own innovation programs or projects, or that donate funds to startups, spin-offs, licensed research institutions, or the Innovation Fund.

Legal, technical, financial, informational, regulatory policy or measure: Legal and regulatory policy.

Problem the policy or measure is addressing: Low level of investment in R&D in Montenegro, high costs of innovation and technology development, and the need to accelerate the growth of the innovation market.

Objective of the policy or measure: Increase competitiveness and innovation in the economy by stimulating R&D investment, with a target of directing 10% of total R&D investment toward energy and climate-related projects by 2030.

Implementation process:

- Adoption of the Draft Law
- Adoption of the Law
- Preparation and adoption of by-laws.

Implementation period:

- Expected start of implementation: Q3 2025

Status of implementation:

- The new draft law is currently under parliamentary review.

Responsible for implementation:

- Ministry of Education, Science and Innovation
- Ministry of Finance
- Tax Administration.

Actions taken:

- The draft law is prepared.

Impact:

- Energy Union Dimension(s) affected: Research, innovation and competitiveness.
- Sectors affected: Industry.
- GHG areas and greenhouse gases covered: This measure targets all GHGs but the effect is not estimated.

Costs:

- Implementation costs are limited to the additional annual operating expenses of the Commission, estimated at €15,000.

Funding:

- The measure is based on tax relief — that is, foregone state revenue from the two tax categories for which incentive status is granted.

Annual public budgetary impacts:

- The estimated value of incentive measures for research and innovation development is €2,000,000.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Regulatory Impact Assessment Report for the Draft Law on Incentive Measures for the Development of Research and Innovation;
- Report of the Commission for Granting Incentive Measure Beneficiary Status, dated 26 July 2024.

Exact name: Program Line for the Improvement of Production Capacities

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

The Competitiveness Enhancement Program is Montenegro's most important financial instrument for the further development of micro, small, and medium-sized enterprises (MSMEs) and for strengthening their productivity. One of the program's specific objectives focuses on encouraging the transformation of business and technological processes from a linear to a circular business model. Until 2024, within this program, a Program Line for Supporting the Circular Economy was implemented — a financial support mechanism for entrepreneurs and SMEs focused on wastewater treatment, with an annual budget of €200,000. The measure covered:

- Implementation of biological wastewater treatment systems,
- Improvement of water quality and recycling capacity in industry, and
- Better waste management and recycling practices.

Between 2020 and 2023, six beneficiaries were supported, revealing the need to improve this support model to ensure optimal utilization.

As part of the optimization of the Competitiveness Enhancement Program — and to further promote circular business models — a new Program Line for the Improvement of Production Capacities was introduced.

Description of the PaM:

This measure provides co-financing for the procurement of new equipment and machinery to modernize production processes, with an emphasis on resource efficiency and environmental sustainability in manufacturing and service provision.

The program supports the purchase of industrial equipment for:

- Wastewater treatment,
- Recycling and waste collection, and
- Waste separation (glass, plastic, wood, rubber, paper and cardboard, cans, organic waste, oils, electrical and electronic waste, waste oils and lubricants, tailings).

The supported equipment includes production lines consisting of multiple interdependent machines or standalone machines that together form an integrated production process.

The amount of support ranges from €20,000 to €150,000 per beneficiary.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Environmental pollution caused by industrial waste and non-compliance of Montenegrin industrial processes with EU directives 91/271/EEC, 98/83/EC, and 2000/60/EC related to wastewater management and water resource use; Lack of modern production capacities and equipment in MSMEs, which limits competitiveness and innovation in both domestic and international markets.

Objective of the policy or measure: Increase MSME production capacities, improve resource efficiency and environmental performance in production, and strengthen export potential; Reduce industrial waste; Improve energy efficiency.

Implementation process:

- Adoption of the annual Competitiveness Enhancement Program;
- Launch of a Public Call for applications to the program line;
- Submission of applications and required documentation by business entities;
- Review of applications by the Commission for administrative verification;
- Approval of funds and signing of contracts with beneficiaries;
- Monitoring and evaluation of implemented activities.

Implementation period:

- Continuous — annual implementation

Status of implementation:

- Initial phase.

Responsible for implementation:

- Ministry of Economic Development.

Actions taken:

- Preparation of the Competitiveness Enhancement Program for 2025 is underway.

Impact:

- Energy Union Dimension(s) affected: Research, innovation and competitiveness.
- Sectors affected: Industry.
- GHG areas and greenhouse gases covered: This measure targets all GHGs but the effect is not estimated.

Costs:

- €2,000,000 annually.

Funding:

- National budget.

Annual public budgetary impacts:

- €2,000,000 annually, with at least 5% allocated for equipment that improves resource efficiency and environmental performance in production processes.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- N/A.

Exact name: Programme for the Promotion of Innovation and Energy Efficiency Services in Industry

Considered in which scenario: WEM scenario

Single PaM or part of a group of PaMs: Single PaM

General context:

Montenegro has recognized the importance of establishing synergy between industrial policy, energy policy, and smart specialization, and has established the Programme for the Promotion of Innovation and Energy Efficiency Services in Industry in order to contribute to reducing energy consumption, lowering energy intensity, reducing carbon dioxide emissions, improving resource efficiency, lowering production costs, developing higher value-added products and services, increasing the innovation capacities of enterprises, and improving product quality.

The adoption of the first Programme (2023) was preceded by a survey of micro, small and medium-sized enterprises (MSMEs) in the manufacturing sector, conducted between December 2022 and January 2023. The survey identified typical measures for introducing innovations in support of energy efficiency and estimated the required level of investment. In this way, a specific programme was designed exclusively for the needs of the Montenegrin market, representing one of the most important S3 key initiatives.

The objective of the Programme is to increase energy efficiency and/or the use of available renewable energy sources (RES) by MSMEs in the manufacturing industry through the introduction of innovative technologies. It focuses on the modernization of technologies and equipment to reduce energy intensity and improve productivity.

The first Programme was adopted in August 2023 and implemented through a public call by the Innovation Fund of Montenegro. A total of 15 project proposals were submitted, out of which 7 projects with a total value of €1.6 million were approved for co-financing. In September 2024, the second cycle of the Programme was adopted, and following the public call published

in October, 32 applications were received, indicating a strong interest from the target community and good prospects for future cycles..

Description of the PaM:

The Programme provides non-repayable grants to micro, small and medium-sized enterprises (MSMEs) for investments in innovative solutions and new technologies that contribute to improving energy efficiency and the use of renewable energy sources.

Key results include:

- Introduction of new digital solutions in MSMEs in the manufacturing industry to improve energy management;
- Strengthening MSME infrastructure in the manufacturing industry to enhance energy efficiency or use renewable energy sources;
- Improvement of specific skills of MSME employees in energy management and energy consumption optimization; and
- Increased engagement of MSME staff in activities related to improving energy efficiency and/or using renewable/clean energy sources.

An additional value of the Programme is investment in strengthening the capacities of experts in energy management and energy consumption optimization and/or the introduction of energy management standards EN ISO 50001, as well as the potential for new employment opportunities. The support intensity ranges from €50,000 to €200,000 per project, and the implementation period of selected projects is a minimum of 6 months and a maximum of 24 months. Projects require co-financing by the beneficiaries.

Legal, technical, financial, informational, regulatory policy or measure: Financial measure.

Problem the policy or measure is addressing: Outdated technologies and equipment in production processes lead to high energy intensity, high greenhouse gas (GHG) emissions, low productivity in industry, and insufficient product quality. Additionally, the focus of industrial enterprise management is often on investments that increase production volume or product quality, rather than improving energy efficiency, which must be more strongly integrated into business processes. This is mainly due to a lack of adequate knowledge and skills within companies — first, to assess energy performance, and then to identify, plan, and implement energy efficiency measures and projects.

Objective of the policy or measure: To establish a financial mechanism for improving the operations of MSMEs in the manufacturing industry through the introduction of innovative solutions and new technologies that will enhance energy efficiency, promote the use of renewable energy sources, establish energy management systems, and increase the overall use of sustainable energy.

Implementation process:

- Adoption of the Programme
- Signing of an agreement between the relevant ministries for economic development, energy, and innovation with the Innovation Fund of Montenegro (IFM)

- Publication of the public call
- Two-round project application evaluation
- Selection of projects and signing of contracts with beneficiaries
- Project monitoring.

Implementation period:

- The implementation period of the current cycle of the Programme is 2024–2027

Status of implementation:

- The second round of project evaluation is currently in progress.

Responsible for implementation:

- The Innovation Fund of Montenegro,
- Ministry of Economic Development,
- Ministry of Education, Science and Innovation, and
- Ministry of Energy.

Actions taken:

- The Programme is adopted.
- The agreement between the relevant ministries for economic development, energy, and innovation with the Innovation Fund of Montenegro (IFM) is signed.
- Public call is organized.
- Two-round project application evaluation is in progress

Impact:

- Energy Union Dimension(s) affected: Research, innovation and competitiveness.
- Sectors affected: Industry.
- GHG areas and greenhouse gases covered: This measure targets all GHGs but the effect is not estimated.

Costs:

- €2,300,000.

Funding:

- National budget: €1,177,140.02 and €1,122,859.98 (Current budget reserve – IPA III direct budget support package from the European Commission to Montenegro for overcoming the energy crisis).

Annual public budgetary impacts:

- It is estimated that the programme will be published every two years, with a projected budgetary impact of around €2 million.

References to the underlying analysis performed or other technical reports used to underpin the selection and design of the policy or measure:

- Research on the interest of MSMEs in the manufacturing sector in implementing energy efficiency measures

- Information on the implementation status of the Programme for the Promotion of Innovation in Support of Energy Efficiency in Industry for 2023, with the Proposal of the Programme for 2024.⁷⁸

⁷⁸ <https://www.gov.me/dokumenta/d9c2bdb9-e67c-4074-8e3e-ed79d321643f>

SECTION B: ANALYTICAL BASIS

The analytical part of the NECP has been developed with LEAP (Low Emissions Analysis Platform). LEAP⁷⁹ is a software tool for energy policy analysis and climate change mitigation assessment. Figures without explicit sources in the caption are taken from the LEAP Model.

4 CURRENT SITUATION AND PROJECTIONS WITH EXISTING POLICIES AND MEASURES

4.1 Projected evolution of main exogenous factors influencing energy system and GHG emission developments

Macroeconomic forecasts (GDP and population growth)

The macroeconomic drivers underlying this analysis are based on the most up-to-date available projections. GDP projection is based on calculations of the International Monetary Fund (IMF 2021) including impacts of the COVID-19 pandemic impacting economic development starting in 2020 with a decrease of 12% in GDP. The recovery starting in 2021 with 5.5% of GDP growth, which then gradually decreases to 3% p.a. in 2024 decreasing further to 1.8% 2040. Figure 16 shows the real GDP development (monetary value of 2015).

The population development uses MONSTAT Population Estimations for the 1st of January of each year (MONSTAT 2021). From 2022, the projection uses 5-year average annual growth rates from the UN World Population Prospects 2019 in the medium fertility scenario. According to this projection, population will decrease from 622 Thousand in 2018 to 617 Thousand in 2030 and 603 Thousand in 2040. Figure 17 shows the population development.

⁷⁹ <https://www.sei.org/tools/leap-long-range-energy-alternatives-planning-system/>

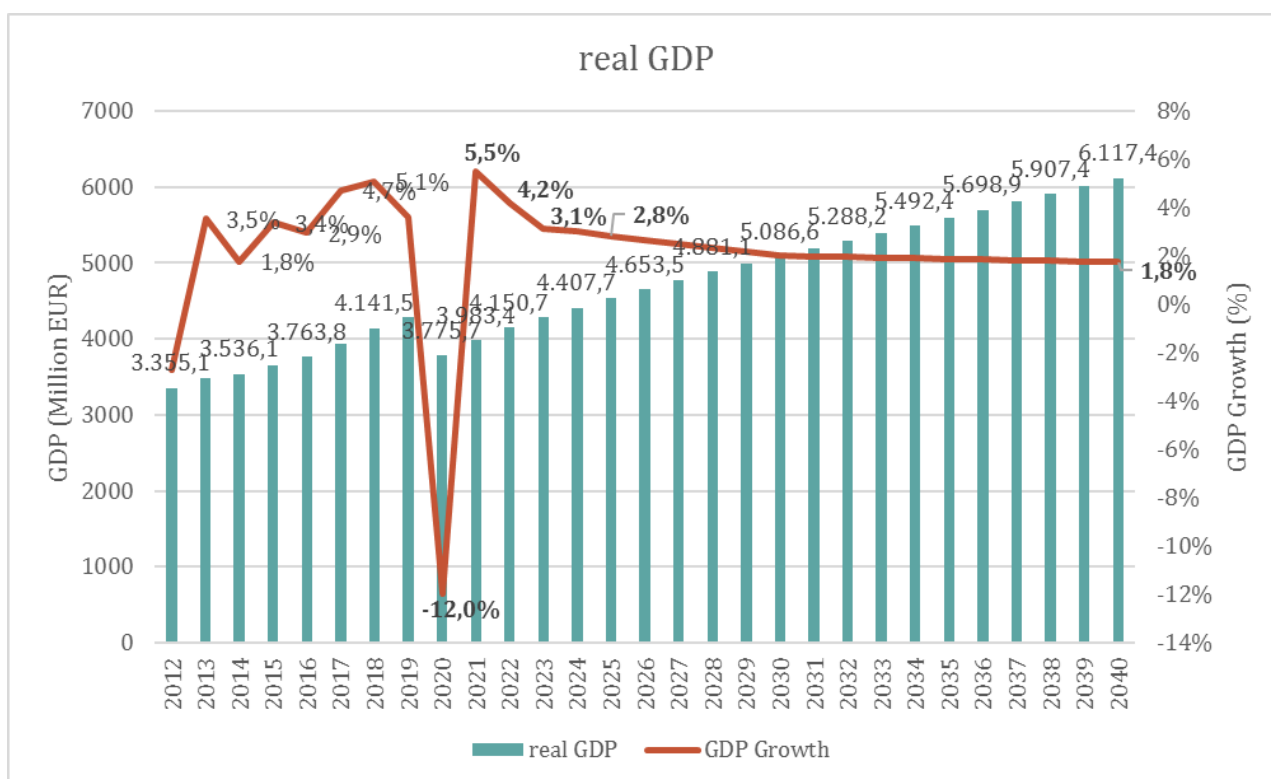


Figure 16: Real GDP (monetary value of 2015) development 2012 - 2040 Source: IMF 2021

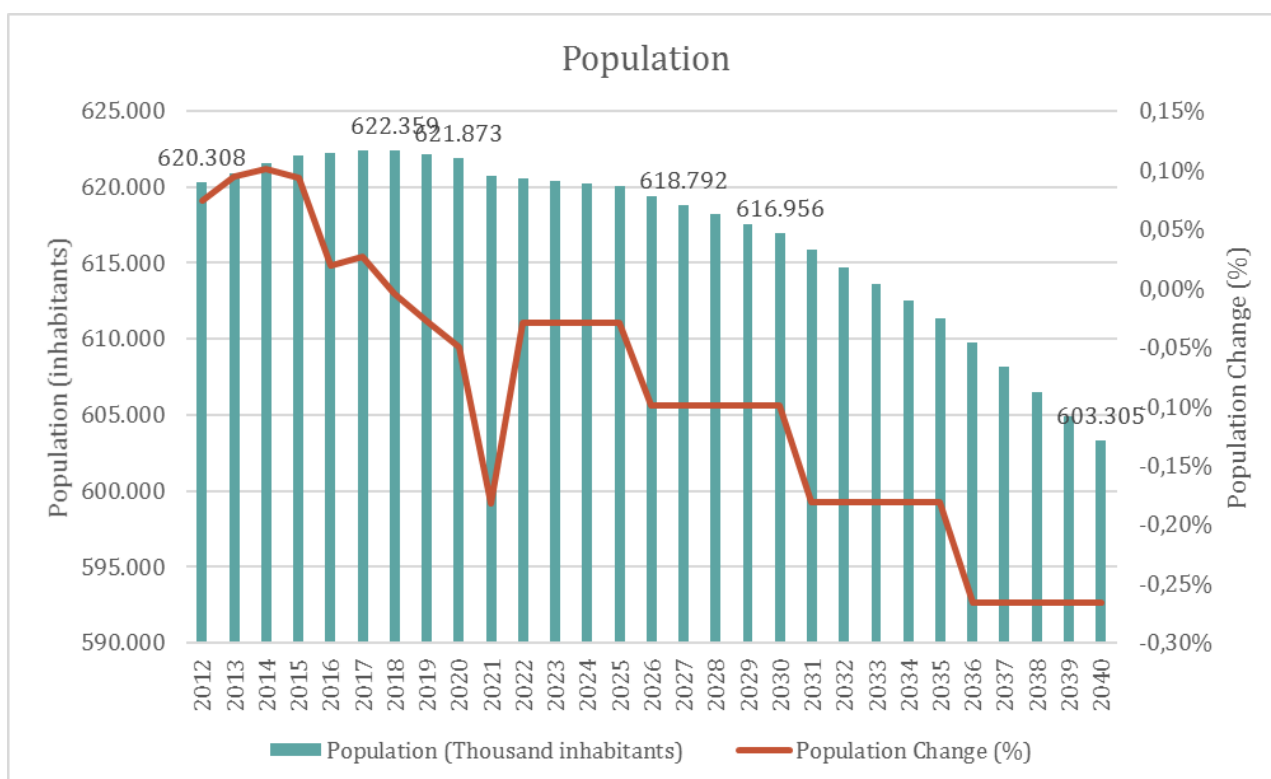


Figure 17: Population development 2012-2040. Source: MONSTAT 2021, United Nations 2019

Sectoral changes expected to impact the energy system and GHG emissions

Apart from GDP and Population, the distribution of value added among energy demand sectors plays an important role in energy consumption. Figure 18 shows the growth development of the industrial, services and agricultural sector between 2000 and 2018. The strong growth in the services sector is projected to continue.

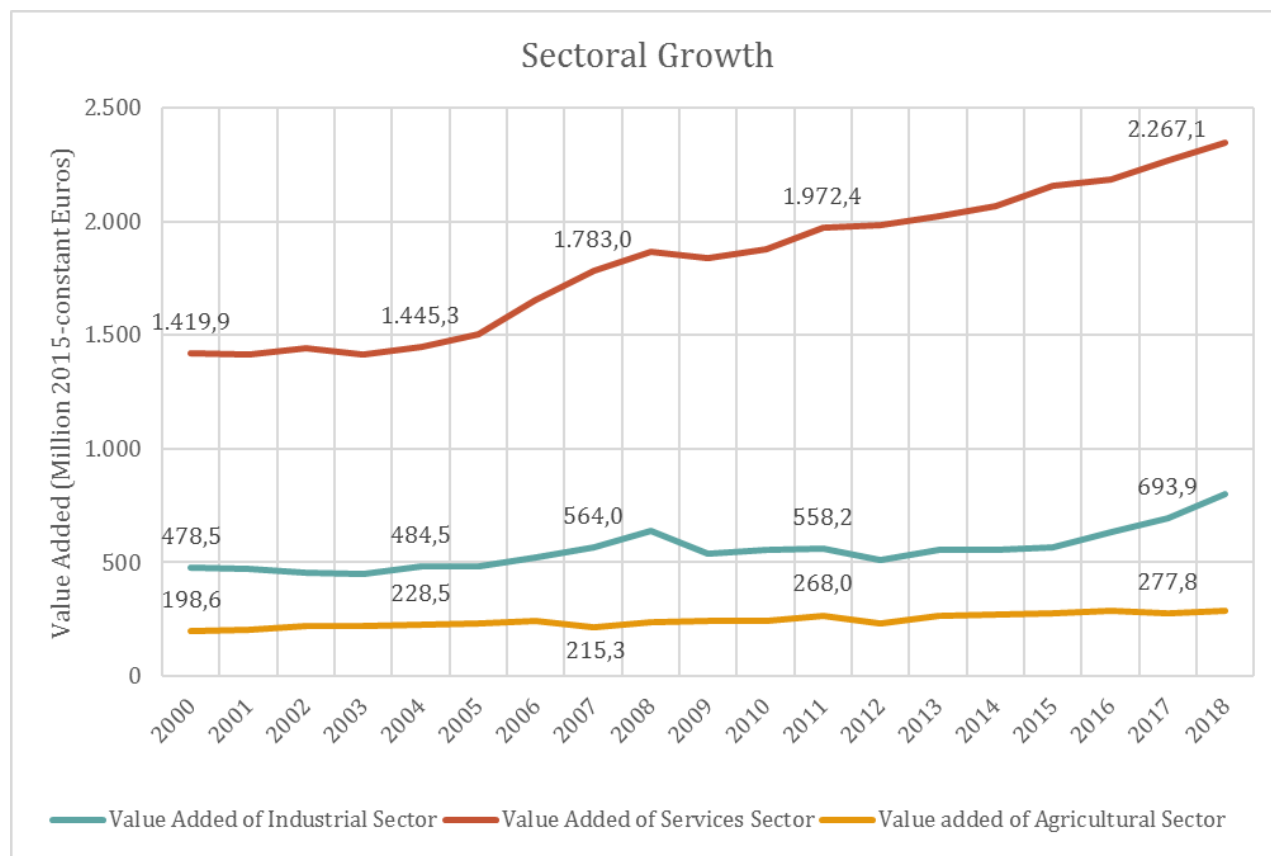


Figure 18: Sectoral growth of energy demand sectors explicitly analysed in the model from 2000 to 2018

Apart from macroeconomic impacts, different structural changes affect energy consumption on sectoral level. The most important effects are presented subsequently ordered by sector.

Residential sector

The household size is decreasing from on average 3.2 persons per household in 2011 to 2.8 persons per household in 2030 and then decreasing further to 2.6 in 2040 (MONSTAT 2021). The floor area per person is considered to increase from 27.1m² in 2012 to 29.5 m² in 2018 and 33.5 m³ in 2030. It further increases to 37.7m² in 2040. Overall, total floor area increases from 16.8 Million m² in 2012 to 20.6 Million m² in 2030 and further to 22.8 Million m² in 2040 despite the decrease in population. Figure 19 shows the development of building age classes based on SLED 2015, which is assumed as projection here. The reconstruction rate is rather high, leading to a share of 32% of floor area by 2040 that is built or refurbished after 2015. The strongest deconstruction is seen in buildings built between 1971 and 1990.

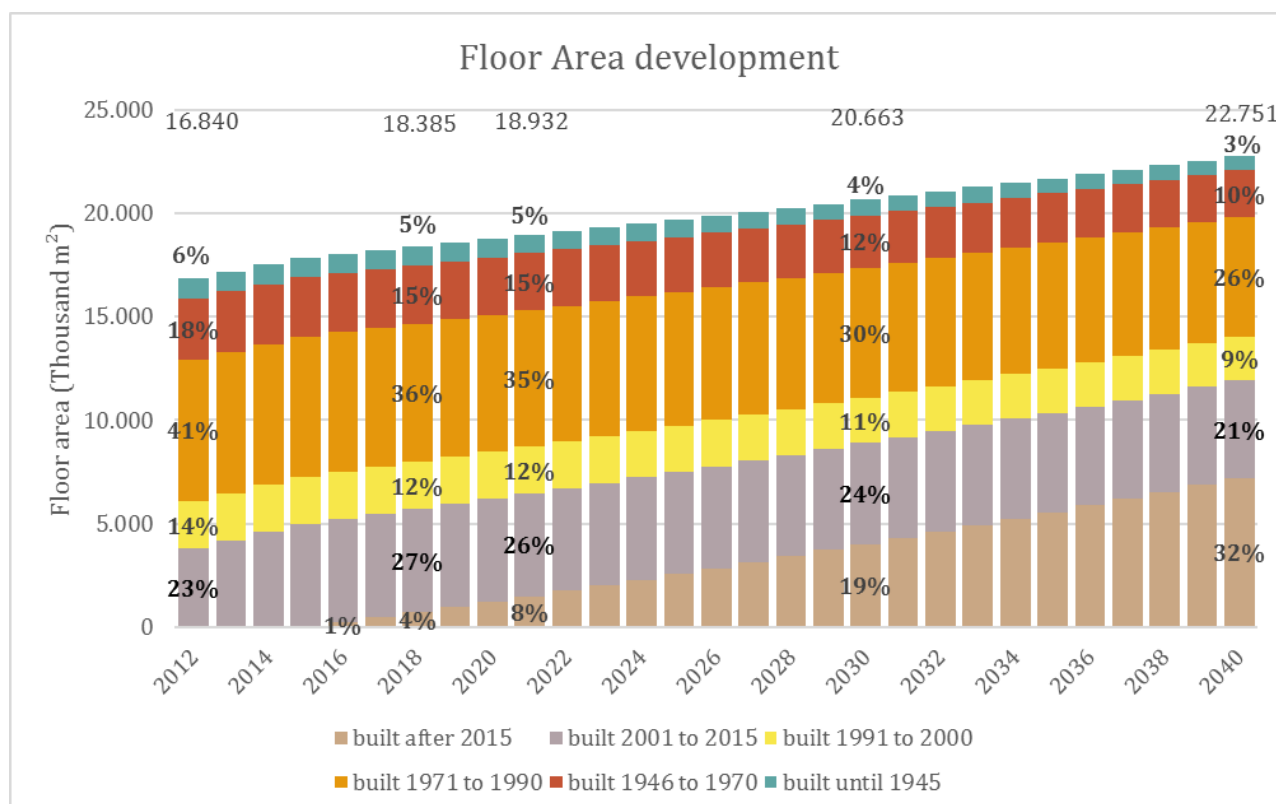


Figure 19: Floor area development by year of construction. Source: SLED 2015, own representation

Notable as well is the change in distribution of floor area over different building types. Table 4-1 defines these building classes.

Building type	Number of dwellings per building
Small houses	1 to 2
Medium houses	3 to 9
Large houses	More than 9

Table 4-1: Definition of building types

With the share of medium houses remaining constant at 14% in terms of floor area and at 13% in terms of number of dwellings, small houses see the highest change in share, dropping from 67% in 2012 to 63% in 2040 in terms of floor area and from 61% to 55% in terms of floor area. The strongest increase is seen in large buildings, rising from 20% of floor area in 2012 to 24% in 2040 and 25% in terms of the number of dwellings to 30%.

The impact of the change in housing composition decreases energy intensity due to lower energy consumption per floor area in large apartment buildings than in smaller building types. Figure 20 shows the development of floor area by building type. Figure 21 the development by number of dwellings. Furthermore, newer and larger buildings tend to use a lower share of fuel wood for space heating and water heating, giving way for electric heating and increasingly heat pumps. The reconstruction rate of buildings therefore has the largest share in decreasing energy intensity and a changing fuel split in the residential sector. Wood usage in space heating decreases from 71% in 2012 to 66.3% in 2030 and 61.2% in 2040 when not accounting for any

policies and measures. In the same timeframe the use of electricity rises from 29% to 37%. The rest is covered by lignite coal in the Pljevlja region.

Energy Intensity for space heating and space cooling is determined by heating degree days (HDD) and cooling degree days (CDD). Values are taken for three climate zones. Zone A being the warmest region along the coast and including the capital Podgorica, Zone B the central area with intermediate climate and Zone C being the mountainous north of the country with the coolest climate.

Degree Days	Zone A	Zone B	Zone C
HDD (19°C)	1209	3050	4015
CDD (26°C)	224	128	53

Table 4-2: Heating and Cooling degree days (HDD base temperature: 19°C, CDD base temperature 26°C)

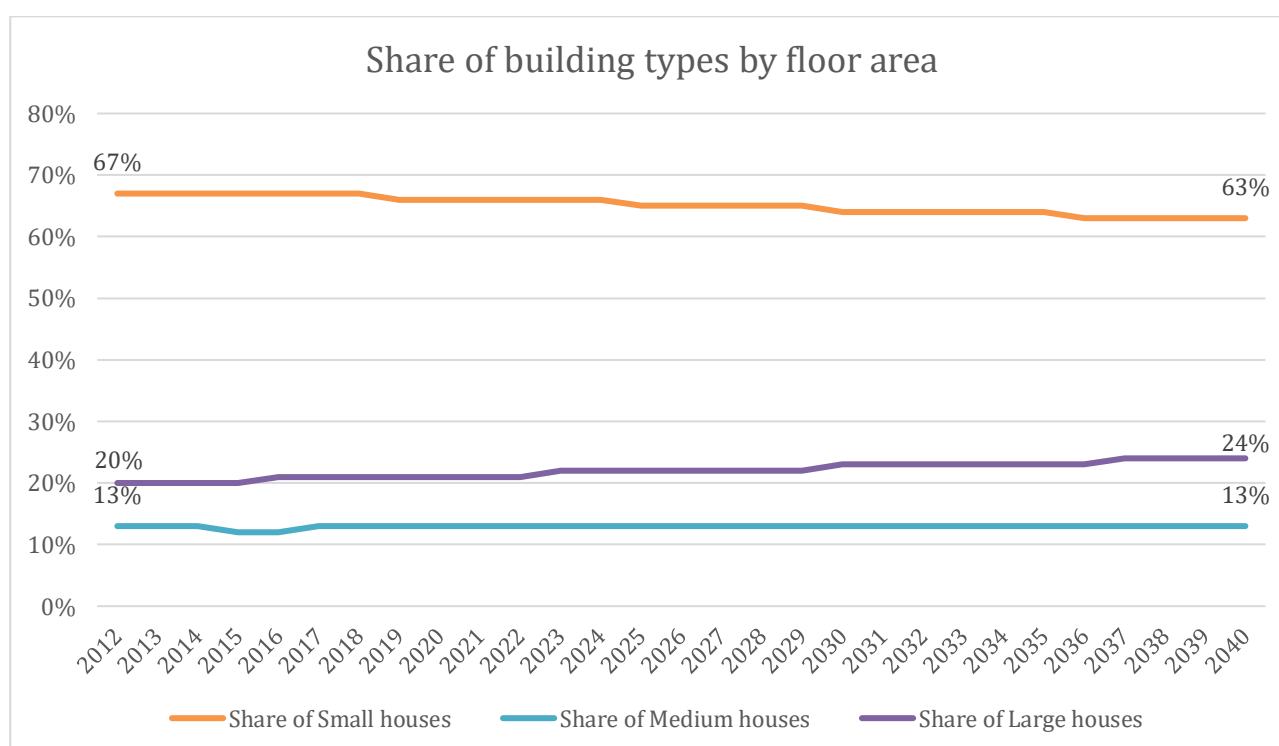


Figure 20: Share of building types by floor area. Source: SLED 2015, own representation

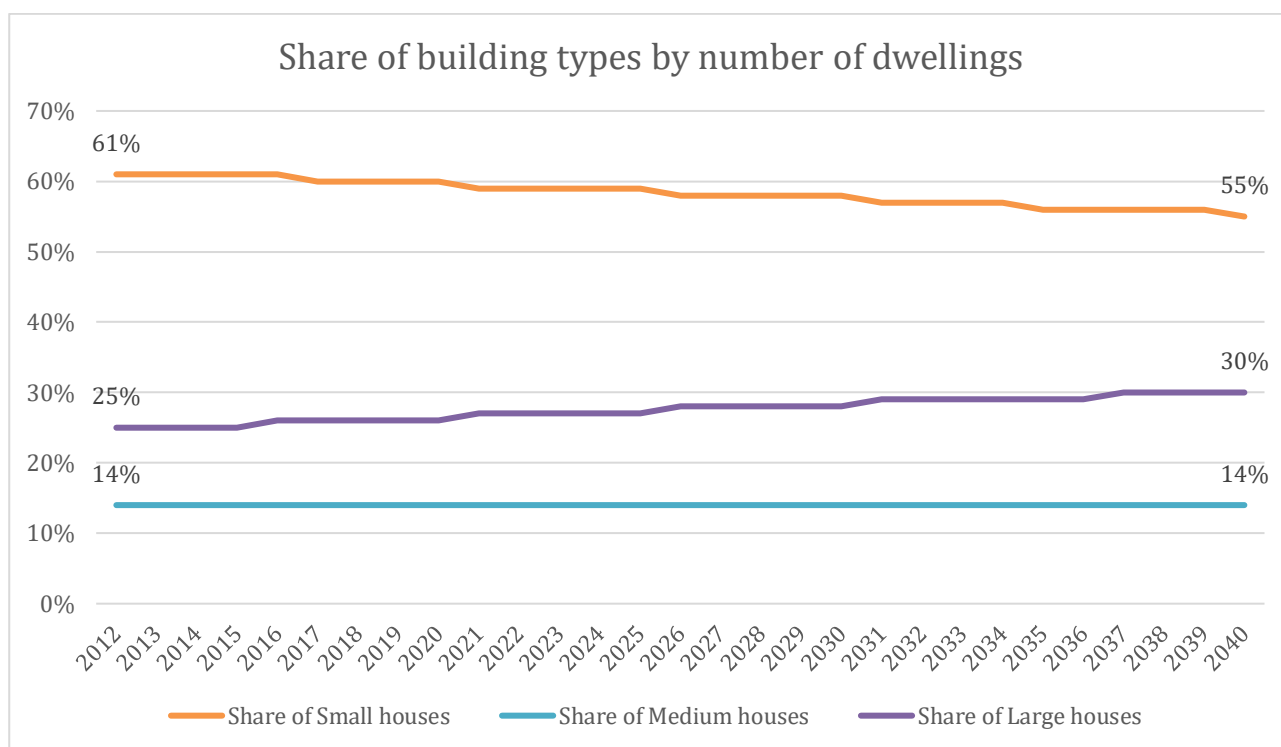
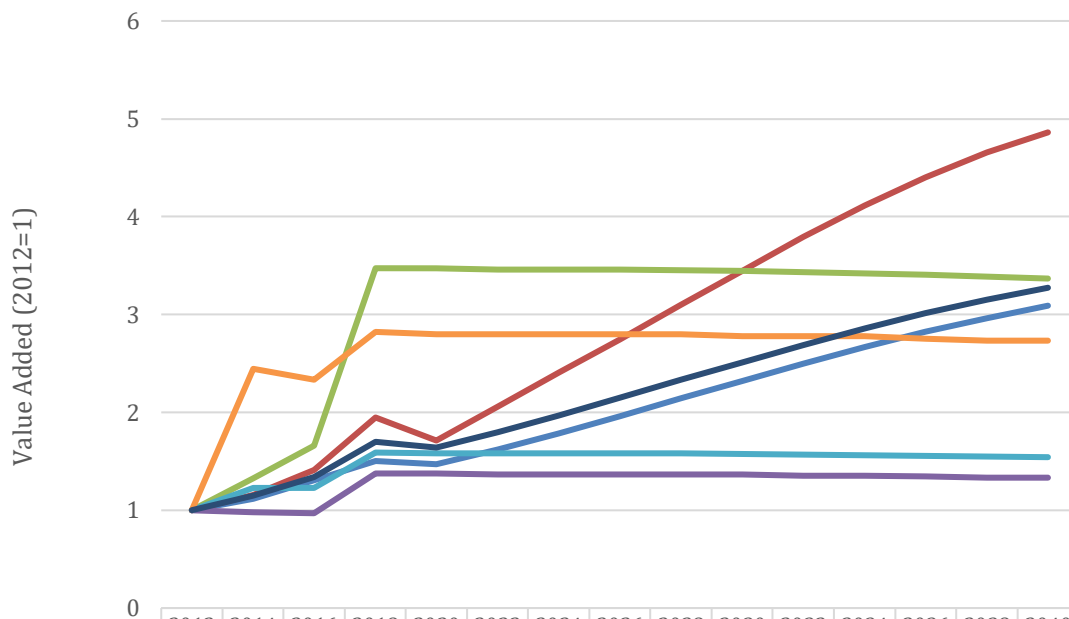


Figure 21: Share of building types by number of dwellings. Source: SLED 2015, own representation

Services Sector

In the services sector, the most important driver is the strong growth performance in value added as was shown in the sectoral development of the economy in Figure 18. In 2040, the sector reaches a value added of 3.3 times that of the 2012-base value (in constant Euros). The strongest growth performance originates from the accommodation and food subsector, increasing 4.9-fold between 2012 and 2040 (Figure 22).

Value added development of Services Subsectors



	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034	2036	2038	2040
Trade	1.0	1.1	1.3	1.5	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.7	2.8	3.0	3.1
Accommodation and Food	1.0	1.2	1.4	1.9	1.7	2.1	2.4	2.7	3.1	3.4	3.8	4.1	4.4	4.7	4.9
Public Administration	1.0	1.3	1.7	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4
Education	1.0	1.0	1.0	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3
Health	1.0	1.2	1.2	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5
Other Services	1.0	2.4	2.3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7
all subsectors	1.0	1.1	1.3	1.7	1.6	1.8	2.0	2.1	2.3	2.5	2.7	2.9	3.0	3.2	3.3

Figure 22: Value added development of Services subsectors representation

Industry

In industry, the energy demand is determined by production volumes. The most important sector in terms of energy demand is the nonferrous metals sector, i.e., the production of aluminium. There is also some production of steel (in electric arc furnaces), as well as industrial gases. The bauxite required for aluminium is also mined in the country, as is lignite for power generation. Marble is also produced in Montenegro (represented under the sector 'Other' in the following). Processing of food, drink and tobacco plays only a minor role in terms of energy consumption. The demand for energy increases in all sectors with production volumes, which are projected to grow according to GDP growth projections. The aluminium production is an exception to this rule, projected to increase from 40 kt in 2018 to 65 kt in 2024 and 90 kt in 2032. This also drives bauxite extraction. The increasing energy demand in industry is in part compensated by an efficiency gain of 0.1% p.a.

Transport

The main driver of the transport sector is the demand for mobility, seen in a rising annual demand for person km, as given in Figure 23. This variable has been growing in the past and is projected to continue to grow with historic growth rate. Transport of freight is projected to undergo growth with GDP.

In addition to total demand for transport, the share between transport modes is an important factor to consider, see Figure 24 for numbers on passenger transport. The largest share of passenger transport happens by passenger cars, with bus and rail transport taking small shares of 2.3% and 1.3%, respectively, in 2018. Rail transport has seen a slight decrease over the past years. Without additional measures, these low shares are expected to continue in the future. Next to overall demand and public transport, an important factor to regulate energy demand in passenger transport is the load of vehicles, but this is not projected to change with existing measures. Freight transport is delivered by trucks and to a small share by rail. The shares between these modes do not see a change until 2040.

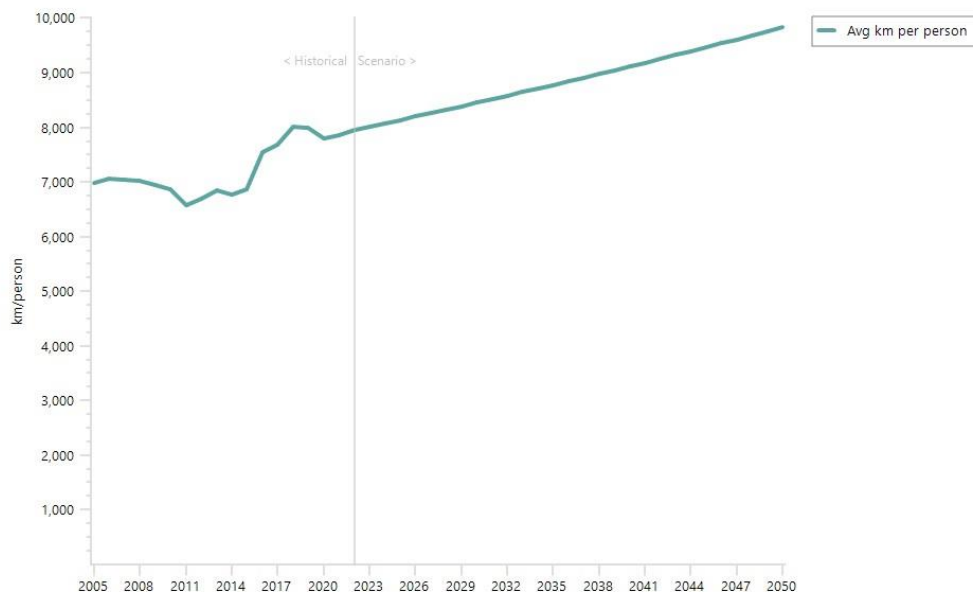


Figure 23: Annual demand for passenger transport in Montenegro, giving historic values and the future growth.

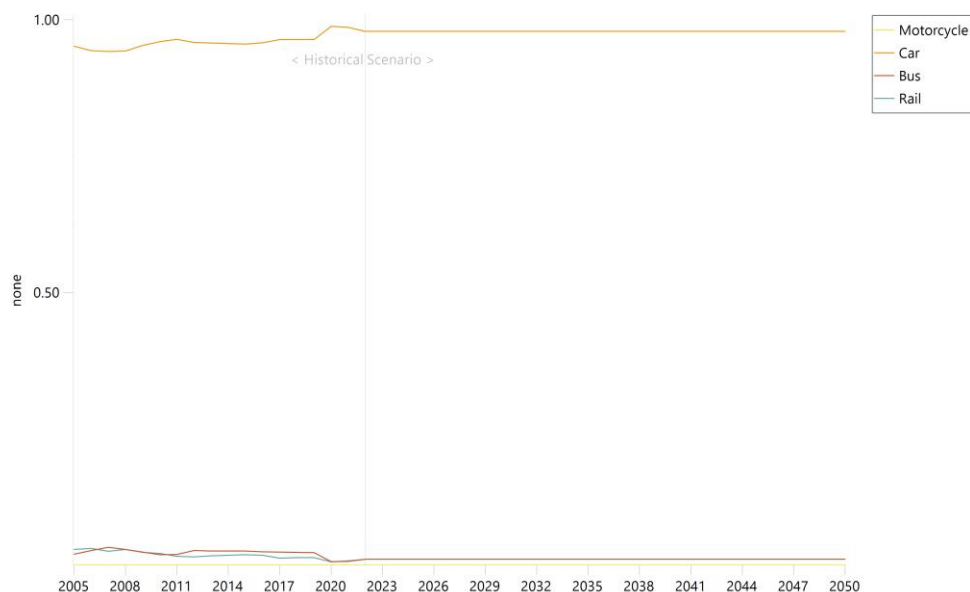


Figure 24: Shares of transport modes in passenger transport in Montenegro projected without additional measures until the year 2050.

The energy demand in the transport sector is also determined by the technology used for propulsion and respective fuels. As has been discussed above, passenger transport and notably by car is the main driver of energy demand. Figure 25 shows how electric vehicles are projected to penetrate the vehicle stock of passenger cars in Montenegro. Other modes do not see a change in transport technologies away from fossil fuels.

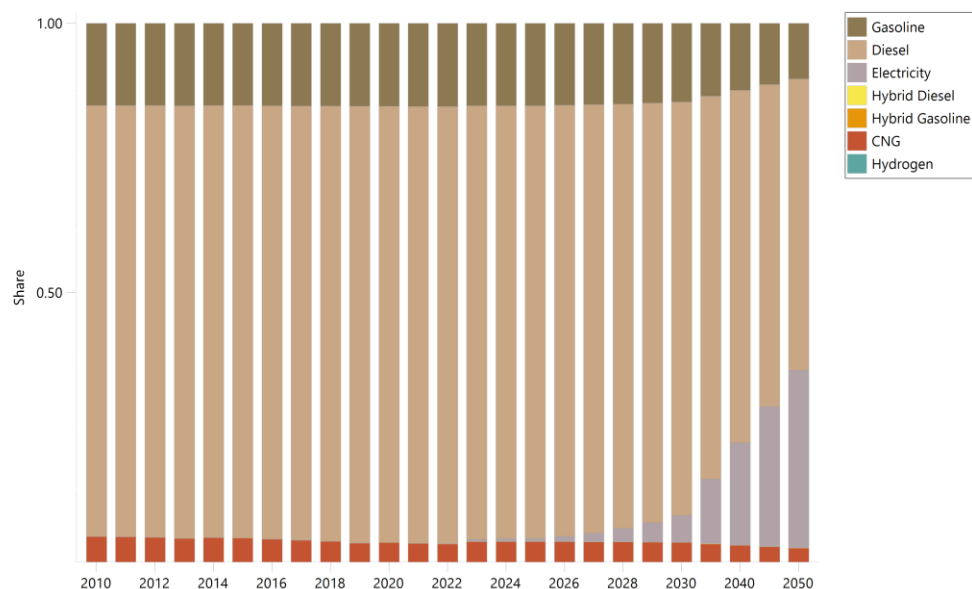


Figure 25: Technology shares in passenger transport by cars as given for historic vehicle statistics and as projected under consideration of existing measures until the year 2030 and for 2035 to 2050 in five year steps

Other energy demand

Other energy demand sectors are distinguished as in the energy balance of Montenegro. Energy demand in the agriculture and forestry sector is driven by the production volume, which has been stable over the past years and is continued to remain constant.

Non-energy use of energy carriers is associated with production in the chemical sector (growing with GDP, roughly two thirds of non-energy demand) and with the total demand for transport.

Energy transformation

The energy transformation sector includes Coal extraction, electricity production and transmission and distribution.

Montenegro has one principal lignite coal mining zone in the area of Pljevlja in the north of the country. The coal is directly used to fire the coal-fired thermal power plant of Pljevlja being the only one in the country. Pljevlja power plant delivers between 40 and 50% of the overall power generation. Most of the rest is delivered from both reservoir and run-of-river hydroelectric plants.

Aspects of energy security play an increasing role with changing climate conditions and diminishing rainfall. Dry years with low hydroelectric output can currently only be compensated by output from the Pljevlja lignite power plant. That power plant accounts for about 60% of Montenegrin GHG emissions and its future critically determines the overall performance in terms of GHG emissions reduction.

Finally, while transmission networks incur losses of about 3.8%, distribution networks account for the larger share of losses at roughly 14%. These losses are continually decreasing by existing measures in the coming years reaching only 2.5% by 2029.

Industrial processes and product use

The largest share of IPPU emissions (8.6% of total emissions in terms of CO₂eq without LULUCF) stem from the use HFCs used as refrigerants in place of ozone depleting substances. These are projected to continue to rise until the year 2024 with historic trends. After 2024, emissions of these substances see no further increase in line with the Kigali amendment of the Montreal protocol. Emissions of polyfluorinated carbons in aluminium production have seen a decline over the last decade with decreasing aluminium production, but also a decreasing trend in specific emissions. Steel production contributes with a very low share to IPPU emissions.

Agriculture

The development of non-energy emissions in the agricultural sector (8.1% of total emissions in terms of CO₂eq without LULUCF) is determined by the livestock population and agricultural practices. The population of all livestock species has been relatively constant over the past years, except for poultry and pigs. The number of the respective species is therefore seen to continue in this increasing trend. Manure management practices are not projected to change.

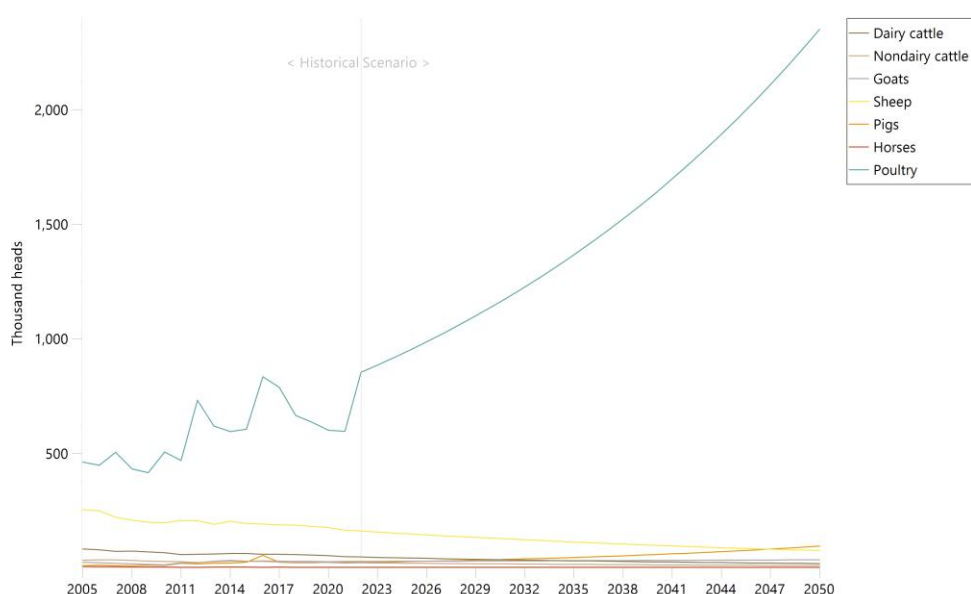


Figure 26: Livestock historically and until the year 2050

In addition to livestock, agricultural emissions stem from field management practices. The share of organic farming is projected to remain constant at 20% without additional measures. The application of urea and lime is also projected to remain constant.

LULUCF

According to recent statistics, the LULUCF sector is a major sink of emissions (compensating 63% of the emissions attributed to other sectors in 2018). The sink capacity is projected to continue in the future in absolute numbers. Other land conversions contribute to a small part to emissions, with the conversion of land to settlements taking the highest of the minor shares.

Forest fires have been a major source of emissions and can potentially become a dominant factor in the overall GHG balance. Improved forest management can help to reduce the impact and spread of forest fires, but an increase to median fire area (2.1kha) is still projected (increase of 50% until 2050), with no large fire episodes considered.

Waste

Emissions from the waste sector (8.8% of total emissions in terms of CO₂eq without LULUCF, considering solid waste and wastewater treatment) are projected to see a decline with the policies currently in place.

The emissions of solid waste management are driven by the overall generation of waste per capita, which is projected to increase from 518 kg/cap in 2018 with an annual growth rate to 566 kg/cap in 2030 and 628 kg/cap in 2050, continuing historic trends. Waste management then determines the amount of emissions generated. Waste is deposited in managed landfills with a small share or methane recovery. With existing policies, the recycled share of biogenic waste increases, which reduces the emissions.

Likewise, the share of wastewater treated in managed sites rises from 58% today to 93% in 2035 with the measures currently in place.

Policies reflected in the model

The following table provides an overview of those policies listed as relevant for the existing measures scenario. It shows how the policies have been reflected in the modelling activity underlying this document. Main effects have been described in the previous paragraphs.

Abbr.	Policies and measures	Effect on Variable
EI01	Reconstruction of the Pljevlja Thermal Power Plant (TPP) and the plan for its future operation	Slightly higher energy efficiency from 2026 (34.5 %). Operating as usual.
EI02	New renewable power plants	58.5 MW of additional capacity of HPP Perucica from 2024. 54.6 MW of additional capacity of WPP from 2025. 85 MW of additional capacity of PV power plants from 2027. Gradual increase to 4 MW of additional capacity of sHPPs from 2027.
EI04	Refurbishment of small hydro power plants (increased EE)	Gradual additional capacity of 30% over the existing 2.8 MW from 2019 to 2024.
EI05	Development of decentralized energy generation (distribution medium voltage connection)	Gradual increase to 25 MW of installed power in 2030.
IP01	Uniprom KAP: electrolysis cells replacement and overhauling	Anode effect minutes fall to 10% of 2018 in 2024.
IP03	Reduction of HFCs in line with the Law Acknowledging Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer	Emissions of HFC 32 and others decrease as given in PaM description.
E01	Development of decentralized energy generation by producer - customers (prosumer)	Gradual increase to 248.4 MW of installed power in 2030.
W1	Reduction of bio-waste in municipal waste	MSW composition: Food, Paper, Garden shares change to 75% in 2025, 50% in 2029 33% in 2035.
W2	Increase of connection rate to sewage system (target 93% by 2035)	Sceptic wastewater treatment; linear decrease from 2018 to 2035, reaching 7%.
EI08	Reduction of losses in the electricity distribution power network	Gradual reduction from 17% transmission and distribution losses until 2021 to 4,83% in 2029.
E03	Development and implementation of energy efficiency regulatory framework in buildings	Gradual reduction in final energy intensity for different building categories (by climate zone, building age, building size) according to the SLED "Ambitious" scenario.
E04	Increased energy efficiency in public buildings	Final Energy intensity in Public administration, education and health by reconstruction and refurbishment.

Abbr.	Policies and measures	Effect on Variable
E05	Energy labeling and ecodesign requirements for energy related products	Reduction in energy intensity of refrigerators, freezers, dishwashers and washing machines by 42,4% until 2040 and 50% until 2050.
E06	Establishment and implementation of EE criteria in public tendering	Final Energy intensity in Public administration, education and health: reduction in energy intensity of 10.6% until 2040 and 12.5% until 2050.
E07	Implementation of energy efficiency measures in public municipal companies	Final Energy intensity in Public administration: reduction by 30% in energy intensity until 2024 and by 45% until 2050
E08	Establishment and development of energy management in public sector	Not explicitly modelled as these are indirect effects and not clearly quantifiable.
E09	Financial incentives for citizens/private households (for energy efficiency investments)	Gradual reduction in final energy intensity for different building categories (by climate zone, building age, building size) according to the SLED "Ambitious" scenario.
EI10	Market coupling	Not explicitly modelled but necessary for enabling higher accessibility of electricity from other markets, as well as for enabling export of the surplus of electricity production which is increasing over years as more renewable energy sources are part of the system.
EI12	Development of electricity transmission power network	Not explicitly modelled but necessary for enabling secure operation of power system, high integration of renewable energy sources and better connectivity with neighboring systems.
EI13	Development of electricity distribution power network	Not explicitly modelled but necessary for higher integration of distributed renewable energy sources and prosumers.
RIC01	Implementation of Smart Specialisation in Montenegro	Not explicitly modelled.
RIC02	Incentive measures for the development of research and innovation	Not explicitly modelled.
RIC03	Program line for improving production capacities	Not explicitly modelled.
RIC04	Programme for the promotion of innovation and energy efficiency services in industry	Not explicitly modelled.

Table 4-3: The implementation in modelling of policies and measures listed in Chapter 3 as relevant to the scenario with existing measures

Global energy trends, international fossil fuel prices, EU ETS carbon price

Global energy demand grew by 2.2% in 2024 – faster than the average rate over the past decade. Demand for all fuels and technologies expanded in 2024. The increase was led by the power sector as electricity demand surged by 4.3%, well above the 3.2% growth in global GDP, driven by record temperatures, electrification and digitalisation. Renewables accounted for the largest share of the growth in global energy supply (38%), followed by natural gas (28%), coal (15%), oil (11%) and nuclear (8%).

Global oil demand growth slowed markedly in 2024, in line with the IEA's forecast. Oil's share of total energy demand fell below 30% for the first time ever, 50 years after peaking at 46%. Demand for oil rose by 0.8% in 2024, compared with a 1.9% increase in 2023.

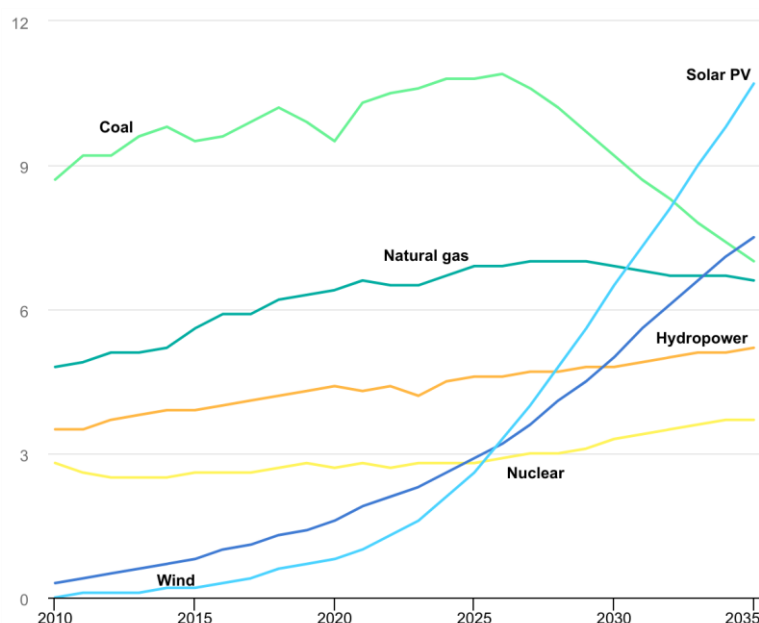


Figure 27 World electricity generation forecast 2010-2035 (IEA)

The oil price in the model is assumed to incur a drop in 2020 due to the COVID-19 pandemic. Figure 28 displays the development. This plays into the final energy consumption in the residential sector.

EU ETS Carbon prices are not considered in the existing measures scenario up to 2040. An introduction of carbon pricing is considered as part of an additional policy, the effect of which is described in Section 5.

Finally, the progression of climate change leads to changes in availability of renewable energy. With Montenegro producing a large share of electric energy from hydroelectric sources, related changes in the water cycle are of crucial impact. According to a study by the World Bank (World Bank ESMAP 2009), output from reservoir hydroelectric plants is expected to decrease by 15% until 2050. Run-of-river hydroelectric plants are expected to see a 20% drop in output.

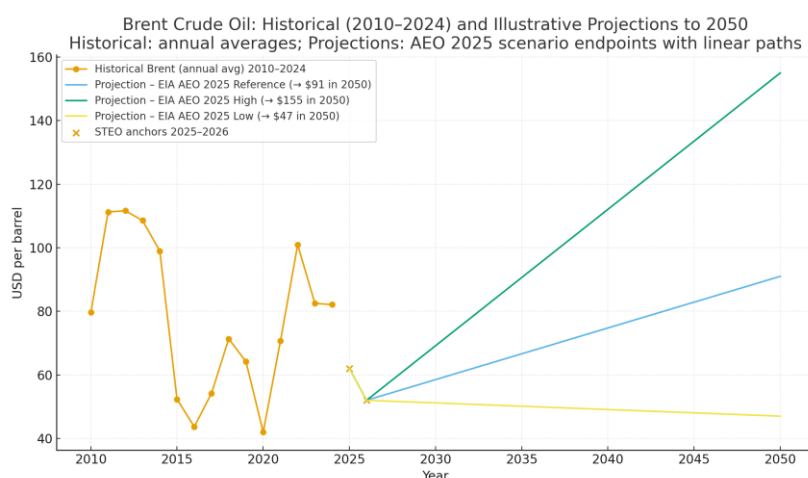


Figure 28: Oil Price (USD/bbl). Historical and data and forecast (EIA, 2025)

Technology cost developments

In electricity production, the most important technologies used are reservoir hydroelectric plants, followed by run-of-river hydroelectric plants and some wind and solar PV power generation.

Cost assumptions are given in Table 4-4. The table gives those costs relevant for dispatch. In addition, the total system costs are also determined by the capital costs of investments. While conventional power systems are not expected to see a decrease in investment costs, wind and solar power plants will continue to be subject to a substantial decrease in investment costs.

Electricity Production Technology	2019	2040
Hydroelectric Fixed OM Cost (USD/MW _{el} Capacity)	60 000	60 000
Photovoltaic power Variable OM Cost (USD/MWh _{el} Output)	10	10
Wind power Onshore Variable OM Cost (USD/MWh _{el} Output)	15	15
Thermal power Lignite Variable OM Cost (USD/MWh _{el} Output)*	70	90

Table 4-4: Electricity Production Costs by technology. Source: IEA 2020

4.2 Dimension Decarbonisation

4.2.1 GHG emissions and removals

Trends in current GHG emissions and removals in the EU ETS, effort sharing and LULUCF sectors and different energy sectors

Long time trends in GHG emissions can be assessed for Montenegro since the year 2010, due to limited statistics available prior to this date. Several data sources have been assessed and compiled to best of knowledge, mostly building on the data provided by the statistical office MONSTAT (MONSTAT 2021), data supplied by experts in the country and the National Inventory Report (NEPA 2020). The main difficulties currently lie in assessing the energy balance prior to 2009 and transport statistics prior to 2010.

For these reasons, historic trends are only shown here starting from the year 2010. Current trends are given until and including the year 2018. The modelling activity underlying this document starts the projection in 2019. For a better overview of historic developments and future projections considering existing measures, figures and tables are given here only once, in the following section.

Main trends in the period of time up to 2018 include increasing emissions from the energy sectors, in particular (in terms of relative increase) the industrial sector (+38% relative to 2010), the services sector (+34% relative to 2010) and the transport sector (+14%). In absolute numbers, the transport sector dominates (increase of close to 100 ktCO₂eq). As explained above, IPPU emissions have seen a decline over this period due to the changes in aluminium production, which is in part compensated by an increase in the use ODS replacement substances. Agriculture and LULUCF emissions have remained largely unchanged, apart from large forest fire events recorded in 2010 and 2016. Emissions from waste treatment have increased by 7% since 2010.

Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Considering the measures classified as existing measures in Chapter 3 and summarized in section 3, the following figures and table show GHG emissions for different sectors. Where appropriate, the emissions are broken down to subsectors, showing an increasing level of sectoral detail.

For better readability, these figures show values for historic trends from the year 2010 to 2018, followed by projections for the years up to 2030, as well as projected values for 2035 to 2050 in five year time steps. Table 4-5 lists historic values for 2010, 2017-2018 as well as projections for 2020 to 2050 in five-year time steps.

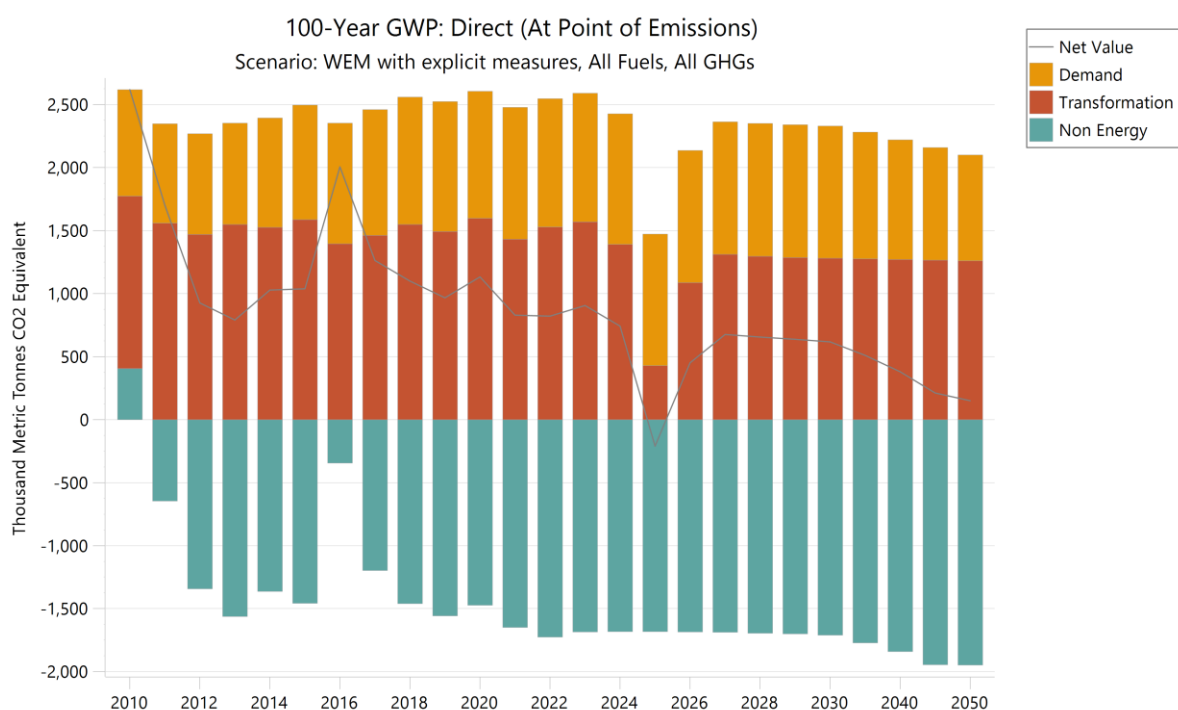


Figure 29: GHG emissions (CO₂eq) for the whole economy for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

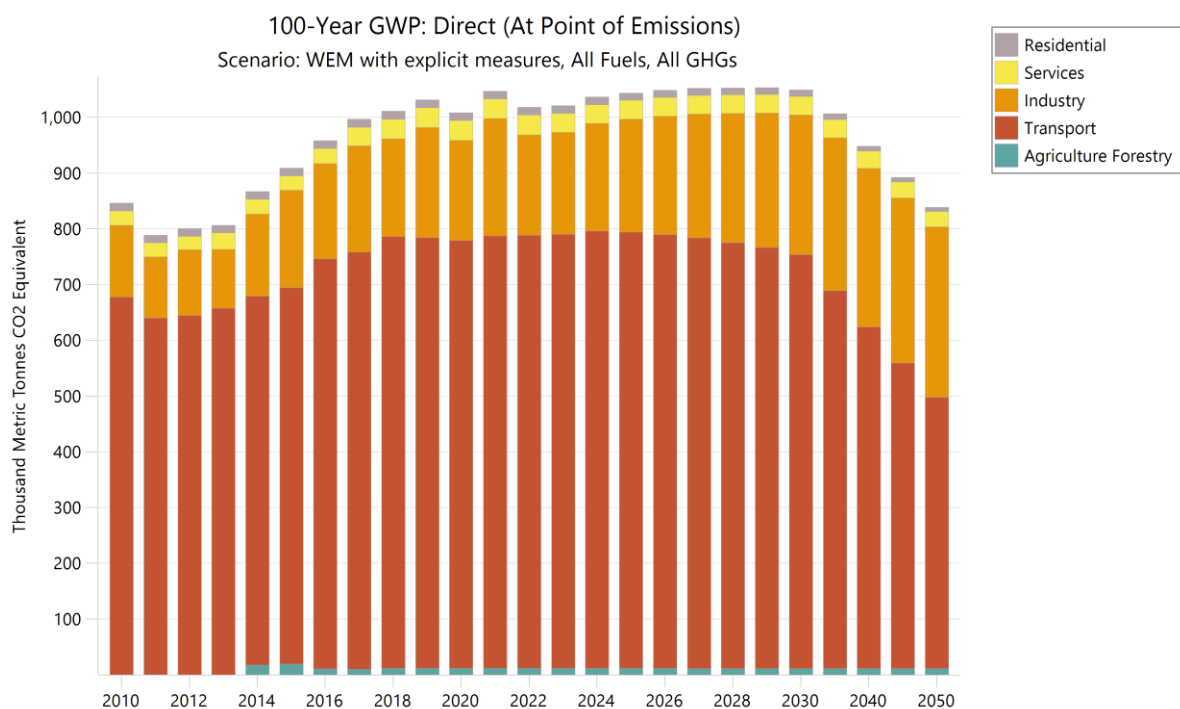


Figure 30: GHG emissions (CO₂eq) for direct emissions of the energy demand sectors for the historic years 2010-2012 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

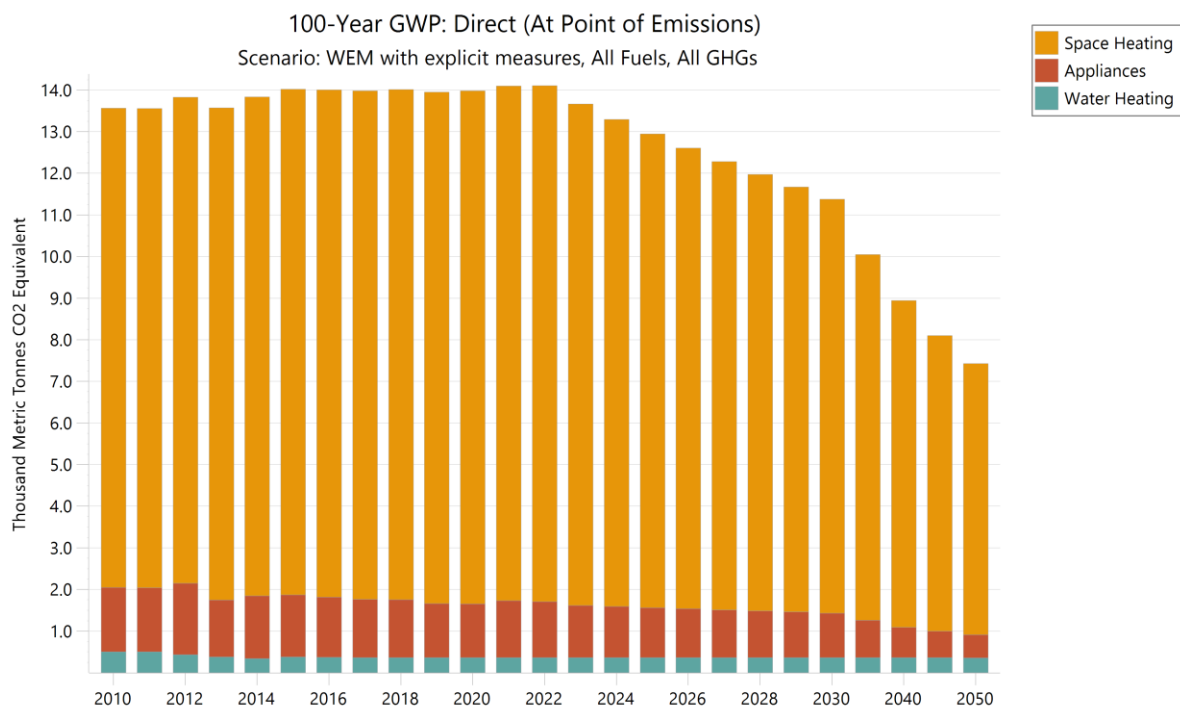


Figure 31: GHG emissions (CO₂eq) for the residential sector for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

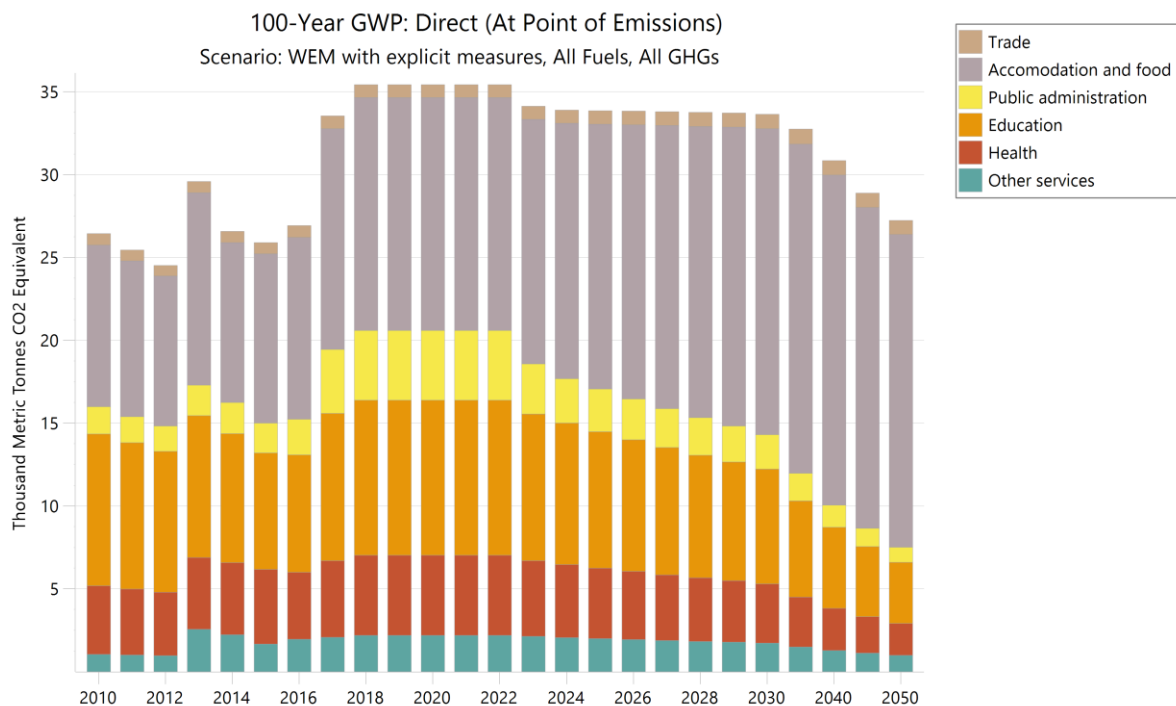


Figure 32: GHG emissions (CO₂eq) for the services sector for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

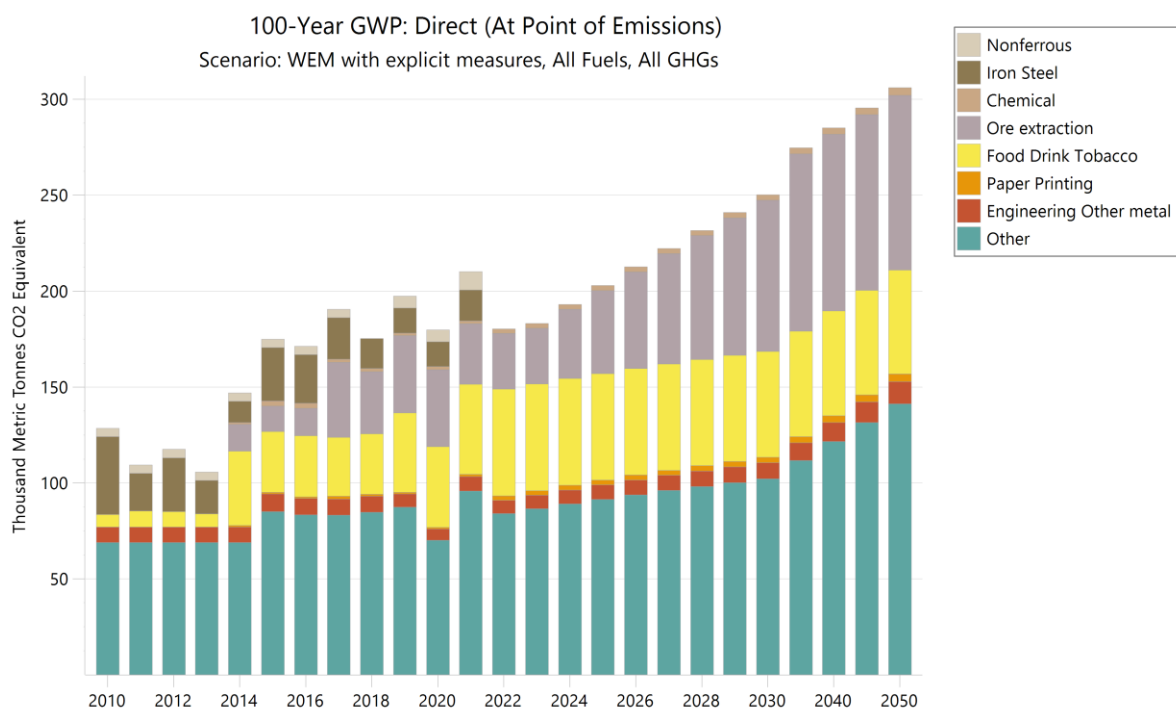


Figure 33: GHG emissions (CO₂eq) for the industry (energy demand) for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

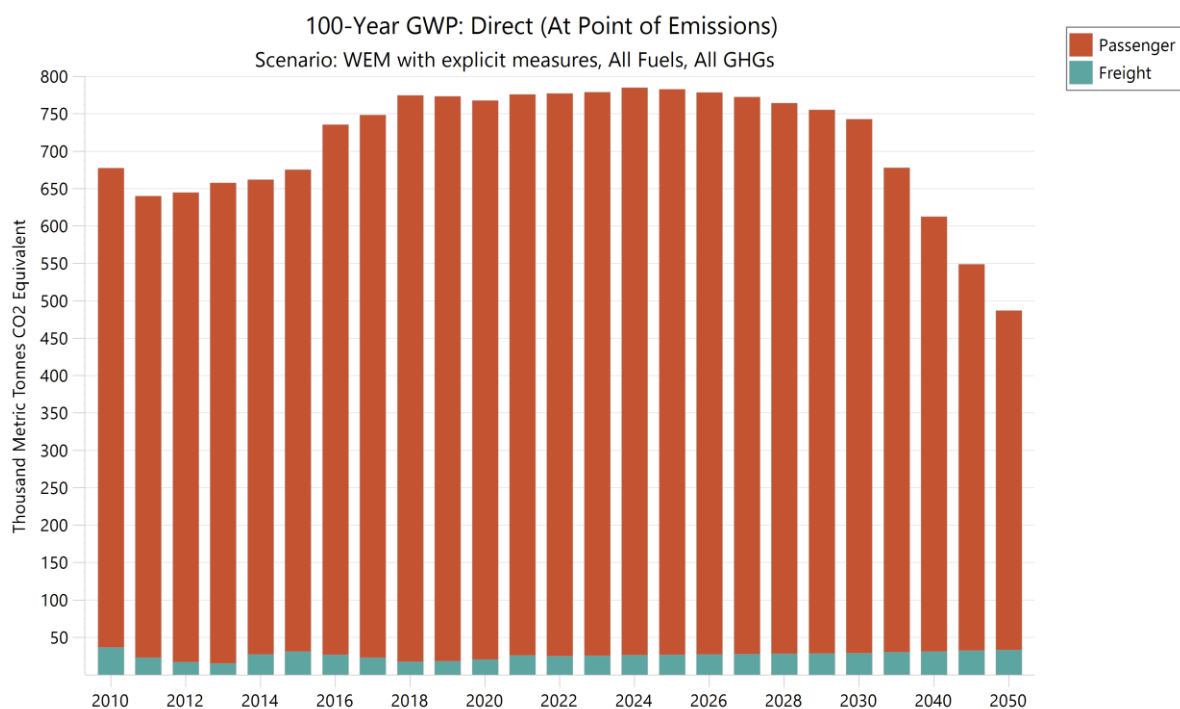


Figure 34: GHG emissions (CO₂eq) for the transport sector for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

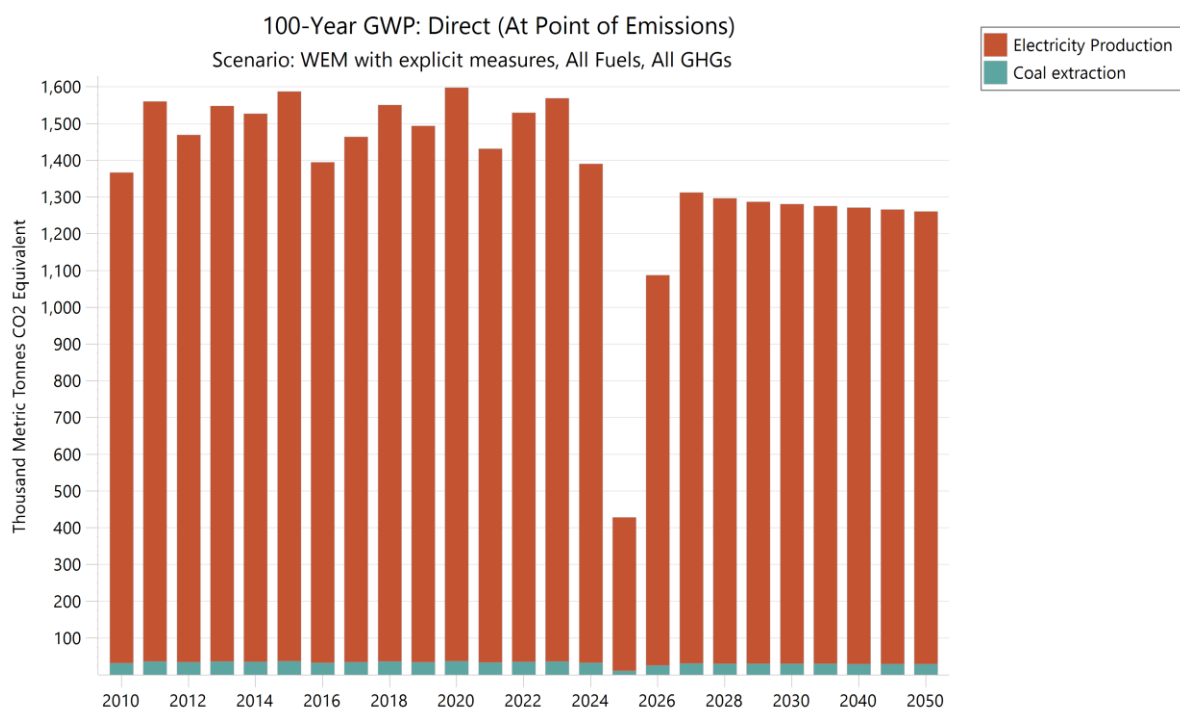


Figure 35: GHG emissions (CO₂eq) for the transformation sector for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

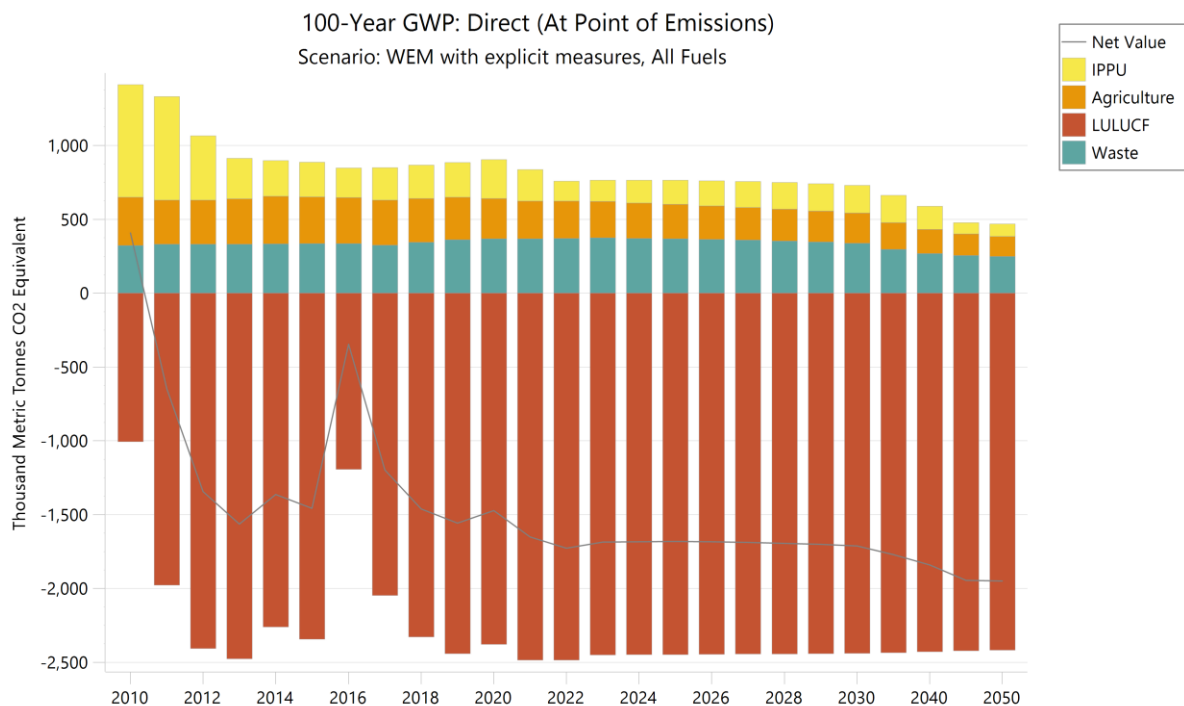


Figure 36: Non-energy related GHG emissions (CO₂eq) for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

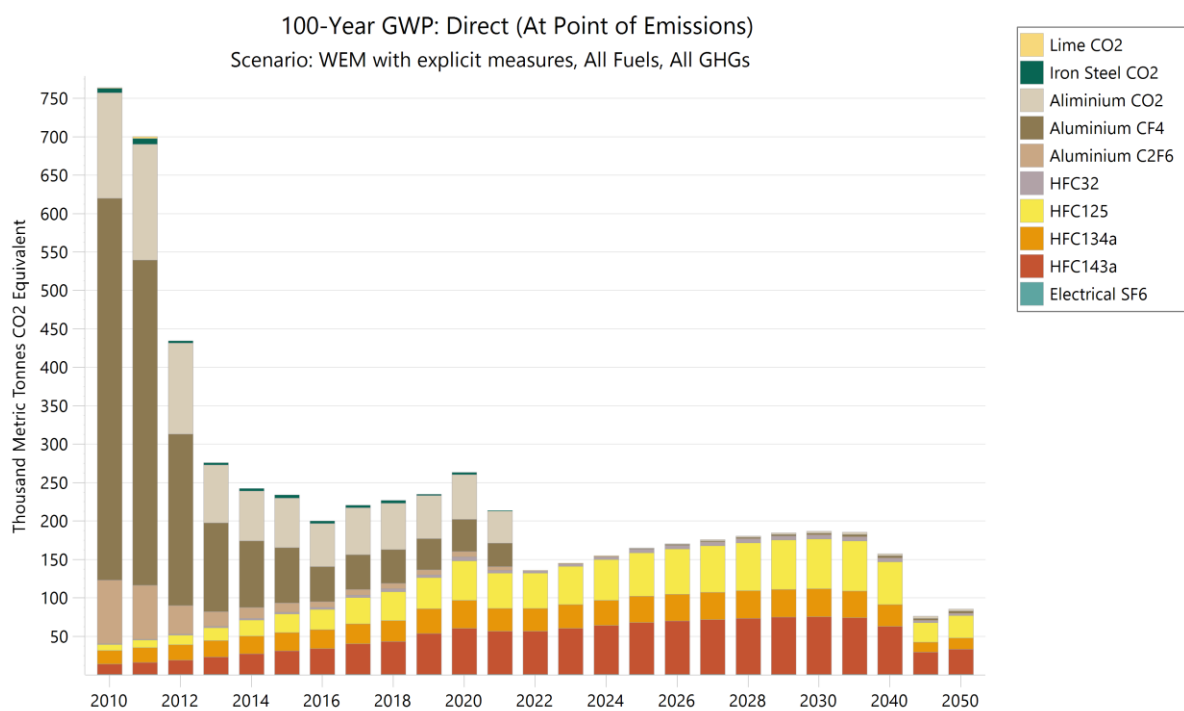


Figure 37: GHG emissions (CO₂eq) from industrial processes and product use for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

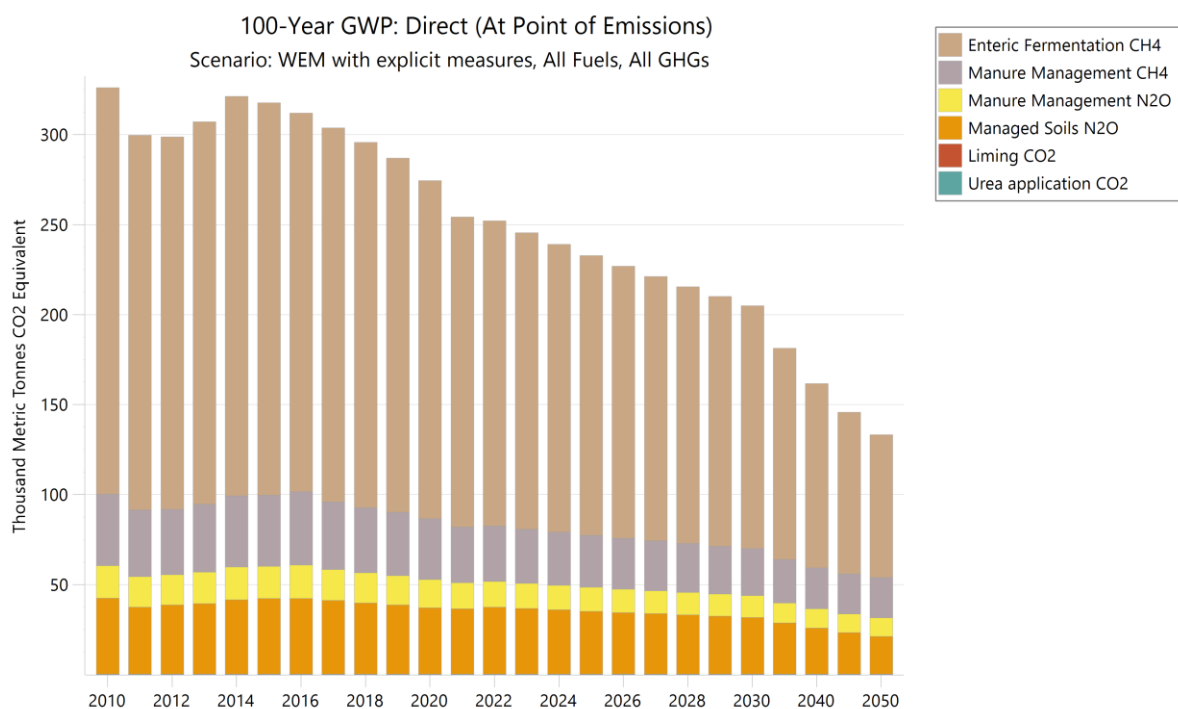


Figure 38: Non-energy related GHG emissions (CO₂eq) from agricultural activities for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

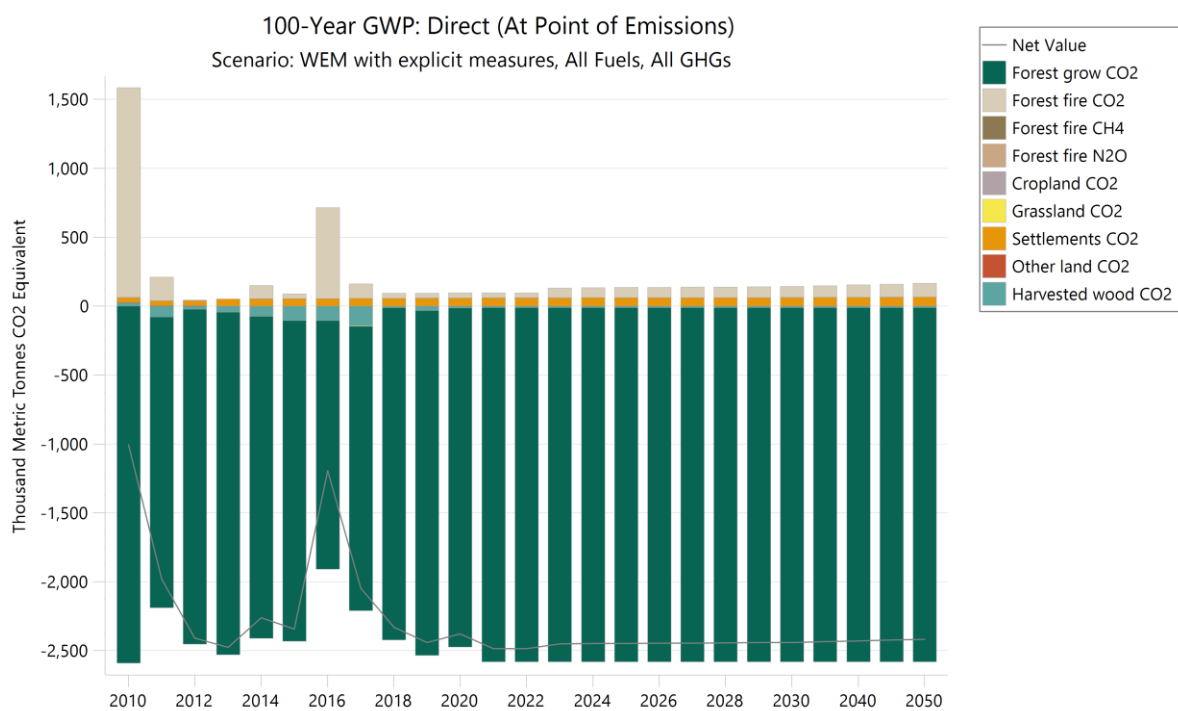


Figure 39: Non-energy GHG emissions (CO₂eq) from land-use, land-use change and forestry (LULUCF) for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

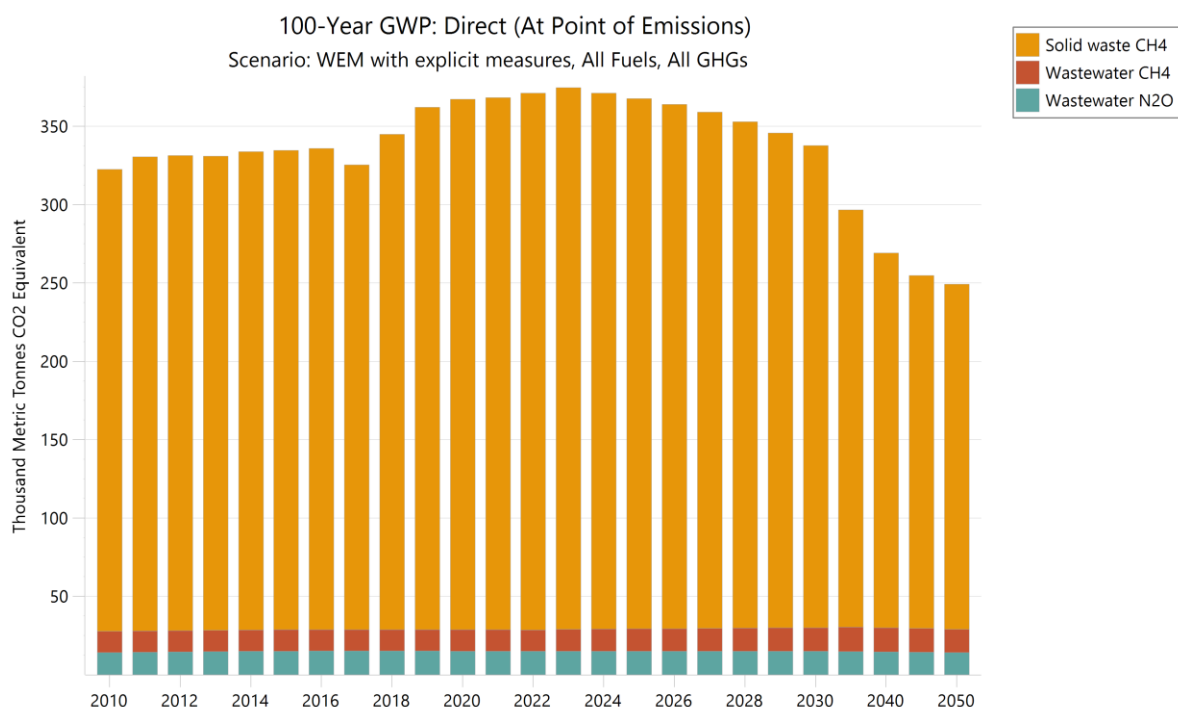


Figure 40: Non-energy GHG emissions (CO₂eq) from the waste sector for the historic years 2010-2022 and as projected for 2023-2030, 2035 and 2040, 2045 and 2050 with existing measures

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Energy Demand	846.0	909.2	1,010.9	1,018.2	1,043.7	1,049.1	1,006.3	948.5	892.1	838.3
Transformation	1,366.4	1,587.0	1,550.1	1,529.6	427.9	1,280.6	1,275.7	1,270.8	1,265.9	1,261.0
Non Energy	406.7	-1,457.3	-1,461.5	-1,726.4	-1,681.7	-1,711.4	-1,770.9	-1,839.9	-1,945.5	-1,948.7
Total	2,619.1	1,038.9	1,099.5	821.4	-210.1	618.3	511.1	379.4	212.5	150.6
Energy Demand										
Residential	13.6	14.0	14.0	14.1	12.9	11.4	10.0	8.9	8.1	7.4
Services	26.4	25.9	35.4	35.4	33.9	33.6	32.7	30.8	28.9	27.2
Industry	128.5	175.0	175.3	180.3	202.9	250.2	274.7	285.1	295.6	306.0
Transport	677.5	675.3	774.9	777.0	782.8	742.7	677.8	612.7	548.6	486.9
Agriculture Forestry	-	19.1	11.4	11.4	11.3	11.2	11.1	11.0	10.8	10.7
Total	846.0	909.2	1,010.9	1,018.2	1,043.7	1,049.1	1,006.3	948.5	892.1	838.3
Residential										
Space Heating	11.5	12.1	12.3	12.4	11.4	9.9	8.8	7.9	7.1	6.5
Appliances	1.5	1.5	1.4	1.3	1.2	1.1	0.9	0.7	0.6	0.5
Water Heating	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total	13.6	14.0	14.0	14.1	12.9	11.4	10.0	8.9	8.1	7.4
Services										
Trade	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9
Accommodation and food	9.8	10.2	14.1	14.1	16.0	18.5	19.9	19.9	19.4	18.9
Public administration	1.6	1.8	4.2	4.2	2.6	2.1	1.7	1.3	1.1	0.9

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Education	9.2	7.0	9.3	9.3	8.2	6.9	5.8	4.9	4.2	3.7
Health	4.1	4.5	4.8	4.8	4.3	3.6	3.0	2.5	2.2	1.9
Other services	1.1	1.7	2.2	2.2	2.0	1.7	1.5	1.3	1.1	1.0
Total	26.4	25.9	35.4	35.4	33.9	33.6	32.7	30.8	28.9	27.2
Industry										
Nonferrous	4.4	4.4	-	-	-	-	-	-	-	-
Iron Steel	40.6	27.9	15.6	-	-	-	-	-	-	-
Chemical	0.0	2.7	1.7	2.3	2.5	2.8	3.1	3.4	3.6	3.9
Ore extraction	-	13.2	32.5	29.0	43.3	78.7	92.5	92.0	91.6	91.1
Food Drink Tobacco	6.5	31.6	31.5	55.7	55.6	55.3	55.0	54.8	54.5	54.2
Paper Printing	-	0.9	0.9	2.3	2.5	2.8	3.1	3.4	3.7	3.9
Engineering Other metal	8.0	9.2	8.5	6.9	7.5	8.4	9.2	10.0	10.8	11.6
Other	68.9	85.0	84.7	84.0	91.4	102.1	111.8	121.6	131.4	141.2
Total	128.5	175.0	175.3	180.3	202.9	250.2	274.7	285.1	295.6	306.0
Transport										
Passenger	640.8	644.4	757.6	752.2	755.9	714.1	647.8	581.5	516.5	453.9
Freight	36.8	30.9	17.3	24.8	26.8	28.6	30.0	31.1	32.2	33.1
Total	677.5	675.3	774.9	777.0	782.8	742.7	677.8	612.7	548.6	486.9
Transformation										
Electricity Production	1,334.8	1,550.0	1,514.3	1,494.3	417.7	1,251.0	1,246.3	1,241.5	1,236.7	1,231.9
Biomass District Heating	-	-	-	-	-	-	-	-	-	-
Coal extraction	31.6	37.1	35.8	35.3	10.2	29.6	29.4	29.3	29.2	29.1
Total	1,366.4	1,587.0	1,550.1	1,529.6	427.9	1,280.6	1,275.7	1,270.8	1,265.9	1,261.0
Non Energy										
IPPU	763.7	233.9	226.7	135.9	164.9	186.5	185.4	157.5	76.2	85.6
Agriculture	326.0	317.7	295.7	252.1	232.9	204.9	181.3	161.8	145.9	133.3
LULUCF	-1,005.5	-2,343.5	-2,328.8	-2,485.7	-2,447.2	-2,440.4	-2,434.2	-2,428.2	-2,422.4	-2,416.8
Waste	322.5	334.7	345.0	371.2	367.7	337.6	296.6	269.1	254.9	249.2
Total	406.7	-1,457.3	-1,461.5	-1,726.4	-1,681.7	-1,711.4	-1,770.9	-1,839.9	-1,945.5	-1,948.7
IPPU										
Lime CO2	0.6	-	-	-	-	-	-	-	-	-
Iron Steel CO2	6.0	4.2	3.4	-	-	-	-	-	-	-
Aluminium CO2	136.9	64.5	60.4	0.3	0.8	2.2	2.8	2.8	2.8	2.8
Aluminium CF4	497.2	71.9	43.9	0.2	0.8	2.3	2.8	2.8	2.8	2.8
Aluminium C2F6	82.8	12.0	7.3	0.0	0.1	0.4	0.5	0.5	0.5	0.5
HFC32	0.8	2.2	3.7	3.3	4.3	5.1	5.3	4.6	2.2	2.5
HFC125	7.8	24.3	37.6	46.1	56.9	64.9	65.0	55.4	25.8	29.3
HFC134a	17.9	23.6	27.3	29.4	34.1	36.3	34.8	28.7	13.1	14.6
HFC143a	13.5	30.9	42.8	56.2	67.5	75.0	73.9	62.2	28.7	32.5
HFC227ea	-	-	-	-	-	-	-	-	-	-
Electrical SF6	0.2	0.3	0.4	0.5	0.3	0.4	0.4	0.4	0.5	0.5
Total	763.7	233.9	226.7	135.9	164.9	186.5	185.4	157.5	76.2	85.6
Agriculture										

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Enteric Fermentation CH ₄	225.7	218.1	202.9	169.4	155.4	134.9	117.4	102.5	90.0	79.4
Manure Management CH ₄	39.7	39.4	36.2	30.9	28.8	26.1	24.0	22.7	22.1	22.3
Manure Management N ₂ O	18.1	18.0	16.7	14.2	13.3	12.1	11.1	10.6	10.3	10.4
Managed Soils N ₂ O	42.1	41.9	39.5	37.1	34.9	31.4	28.4	25.6	23.1	20.8
Liming CO ₂	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Urea application CO ₂	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total	326.0	317.7	295.7	252.1	232.9	204.9	181.3	161.8	145.9	133.3
LULUCF										
Forest growth CO ₂	-2,590.7	-2,325.6	-2,410.2	-2,569.0	-2,569.0	-2,569.0	-2,569.0	-2,569.0	-2,569.0	-2,569.0
Forest fire CO ₂	1,522.5	34.2	36.3	36.3	74.0	79.2	84.4	89.6	94.8	100.0
Forest fire CH ₄	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forest fire N ₂ O	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cropland CO ₂	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Grassland CO ₂	0.3	-0.6	-0.9	-	-	-	-	-	-	-
Wetlands CO ₂	-	-	-	-	-	-	-	-	-	-
Settlements CO ₂	35.5	53.4	56.4	59.2	60.0	61.5	62.6	63.3	63.9	64.3
Other land CO ₂	1.9	-	-	-	-	-	-	-	-	-
Harvested wood CO ₂	24.0	-105.3	-11.0	-12.7	-12.7	-12.7	-12.7	-12.7	-12.7	-12.7
Total	-1,005.5	-2,343.5	-2,328.8	-2,485.7	-2,447.2	-2,440.4	-2,434.2	-2,428.2	-2,422.4	-2,416.8
Waste										
Solid waste CH ₄	294.8	305.8	316.1	342.6	338.4	307.6	266.2	239.0	225.3	220.2
Wastewater CH ₄	13.7	13.7	13.7	13.6	14.3	15.0	15.6	15.4	15.1	14.9
Wastewater N ₂ O	14.1	15.1	15.1	15.0	15.0	15.0	14.8	14.6	14.4	14.1
Total	322.5	334.7	345.0	371.2	367.7	337.6	296.6	269.1	254.9	249.2

Table 4-5: GHG emissions (kt CO₂eq) for different branches of the economy, as determined for the historic years 2010, 2015, 2018, 2020, 2022 and as projected for 2025, 2030, 2035 2040 and 2050 with existing measures

Some of the emissions account for gases other than CO₂. As noted above, these are given in terms of their 100-year global warming potential CO₂-equivalent. For completeness, the following table gives the factor used to calculate this value from physical emissions of the respective gases.

Common name	Abbreviation	GWP (100 yr: tCO ₂ eq/t)
Carbon Dioxide	CO ₂	1
Methane	CH ₄	30
Nitrous Oxide	N ₂ O	265
HFC-125	CHF ₂ CF ₃	3170
HFC-134a	CH ₂ F ₂ CF ₃	1300
Sulphur hexafluoride	SF ₆	23500
PFC-14	CF ₄	6630
PFC-116	C ₂ F ₆	11100
HFC-143a	CH ₃ CF ₃	4800
HFC-227ea	CF ₃ CH ₂ CF ₃	3350

HFC-32	CH2F2	677

Table 4-6: 100 year global warming potential for those gases considered in the projection.

4.2.2 Renewable Energy

Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

Current overall RES share (2022 as drawn from the modelling study) is at 45.5% with RES-E at 65.3%. Current values in renewable energy are discussed in conjunction with projections with existing measures in the next section.

Indicator	2022
RES	45.5
RES T	1.5
RES E	65.3
RES HC	63.1

Table 4-7: RES indicators in base year

Indicator	2022
RES E hydro	60.5
RES E wind	4.8
RES E solar	0.1

Table 4-8: RES E indicator structure per technology in base year

Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)

Renewable shares in final energy consumption are determined according to Directive 2009/28/EC (RED; EU (2009); also see European Commission (2018)). The following figures show historic data in RES share for 2010-2018 and projections with existing measures. For the share in transport (RES-T), this includes the multipliers for the use of electricity in road and rail transport, which explains the strong increase (electricity is used to meet 2.1% of final energy demand in the transport sector in 2030, increasing to 6.6% in 2040 in the scenario with existing measures). No advanced biofuels (with increased multipliers) are considered. The share of renewable energy in heating and cooling (RES-HC) falls as the share of wood for heating decreases. The share of renewable electricity (RES-E) is largely determined by hydropower, with a small share of wind energy. Subsequent figures give technological details on each RES indicator.

Figure 41 gives historic values as calculated from the model underlying this document. In addition to the standard RES indicators, the figure also gives the overall RES share except for the use of wood in all sectors. This shows that the use of wood as energy carrier presents a

substantial part of the overall final energy demand. However, as RES share decreases, the share of RES ex wood stays constant, showing that this importance is projected to decline.

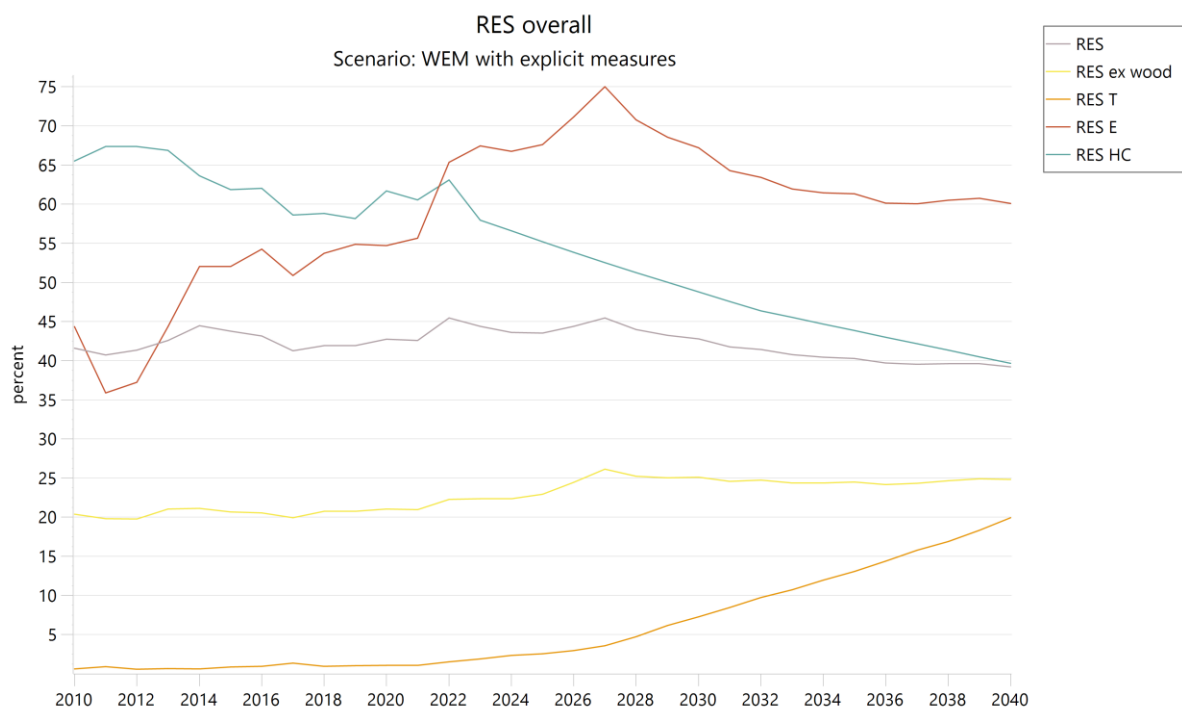


Figure 41: RES shares in final energy demand, calculated according to RED (Directive 2009/28/EC) for historic years 2010-2022 and projections up to year 2040 with existing measures

Values in [%]	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
RES	41.6	43.8	41.9	45.5	43.5	42.8	40.3	39.2	39.3	38.8
RES ex wood	20.4	20.7	20.8	22.3	22.9	25.1	24.5	24.8	26.0	26.7
RES T	0.6	0.9	0.9	1.5	2.6	7.3	13.1	20.0	27.8	36.5
RES E	44.4	52.0	53.7	65.3	67.6	67.2	61.3	60.1	61.0	60.4
RES HC	65.5	61.9	58.8	63.1	55.2	48.8	43.9	39.7	36.0	32.5

Table 4-9: RES shares in final energy demand, calculated according to RED (Directive 2009/28/EC) for historic years 2010, 2015, 2018, 2022 and projections up to year 2050 in five year time steps with existing measures

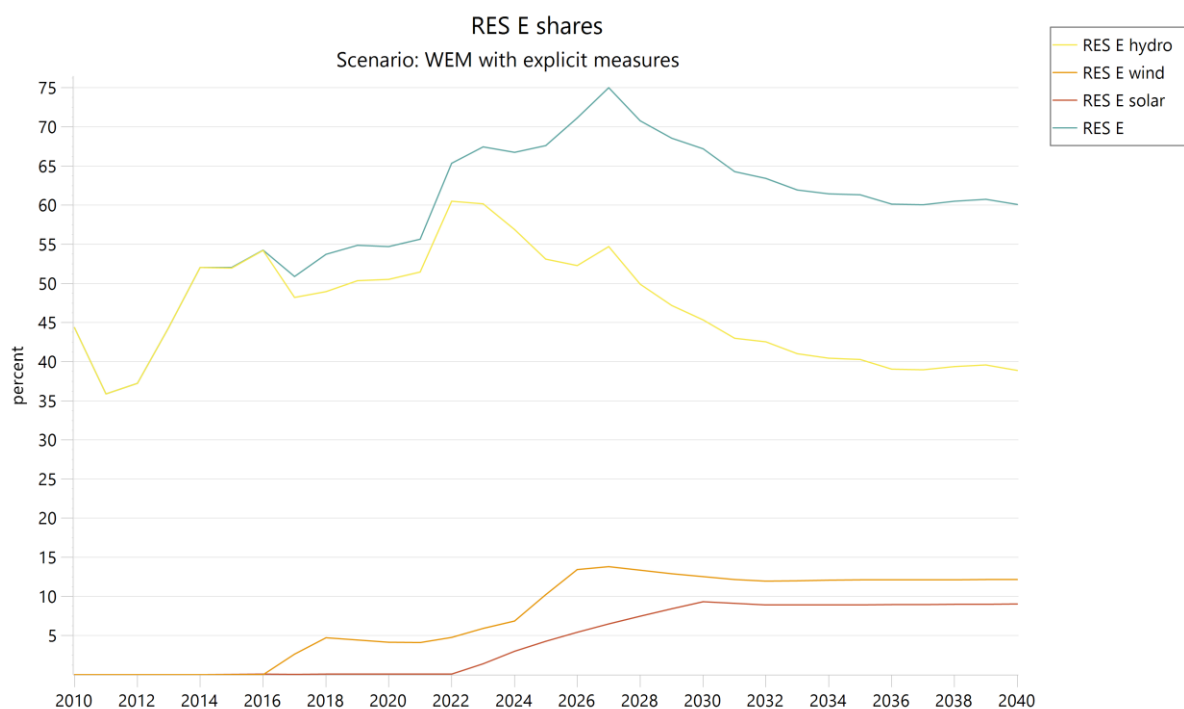


Figure 42: RES-E share and components thereof, calculated according to RED (Directive 2009/28/EC) for historic years 2010-2022 and projections up to year 2040 with existing measures

Values in [%]	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
RES E hydro	44.4	52.0	48.9	60.5	53.1	45.3	40.3	38.9	39.7	39.2
RES E wind	-	-	4.7	4.8	10.2	12.5	12.1	12.2	12.2	12.1
RES E solar	-	0.1	0.1	0.1	4.3	9.3	8.9	9.0	9.1	9.1
RES E	44.4	52.0	53.7	65.3	67.6	67.2	61.3	60.1	61.0	60.4

Table 4-10: RES E shares in final energy demand, calculated according to RED (Directive 2009/28/EC) for historic years 2010, 2015, 2018, 2022 and projections up to year 2050 in five year time steps with existing measures

The following figure shows fuels currently used in the transport sector and projections until 2050. No biodiesel share is considered and this is not projected to play a role with existing measures. Electricity is used to meet a limited share of energy demand in the transport sector.

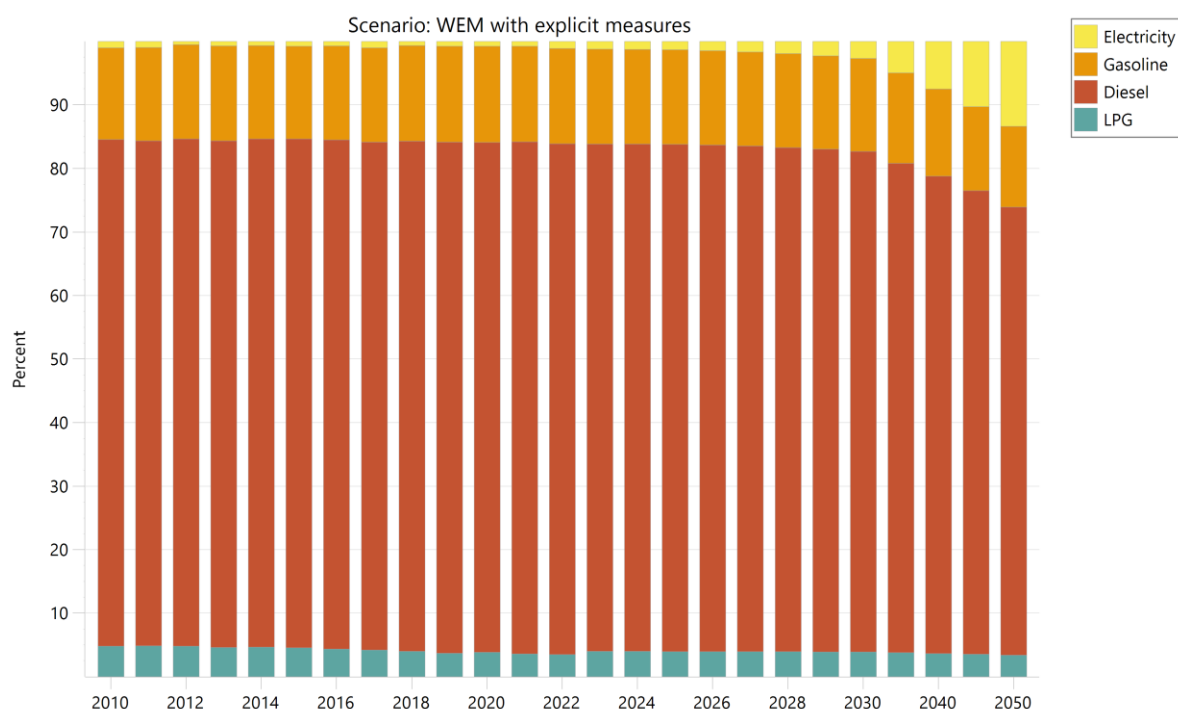


Figure 43: Energy sources in the transport sector given in percent of total demand to accompany and explain the RES-T share given in Figure 41

Fuel	2010	2017	2018	2020	2025	2030	2035	2040	2045	2050
Electricity	1.0%	0.7%	0.7%	1.1%	1.3%	2.7%	5.0%	7.5%	10.3%	13.4%
Gasoline	14.5%	14.6%	15.0%	15.0%	14.9%	14.6%	14.2%	13.7%	13.2%	12.7%
Diesel	79.7%	80.1%	80.3%	80.4%	79.8%	78.8%	77.0%	75.1%	73.0%	70.6%
Hydrogen	-	-	-	-	-	-	-	-	-	-
CNG	4.8%	4.6%	4.0%	3.5%	4.0%	3.9%	3.8%	3.7%	3.5%	3.4%
Biodiesel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hybrid Diesel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hybrid Gasoline	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 4-11: Shares of technologies in the transport sector for historic years 2010, 2015, 2018, 2022 and as projected up to year 2050 with existing measures

The RES-HC share combines all renewable energies other than electricity, heat and bioliquids in sectors other than transport. This concerns the residential, services, industry, agriculture and forestry sector and the fuels wind, solar, wood, hydro and biomass. Of these, only wood plays a substantial role, which is used mainly for space and water heating and cooking as well as some industrial and agricultural processes. The following table gives the share of wood in total final energy in each of the demand sectors. Note that the RES-HC share reports the share of renewable energy in relation to the final energy demand other than electricity, which explains the higher percentage in RES-HC compared to the values shown in the following table.

Sector	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Residential	58.5%	56.5%	55.6%	55.1%	54.0%	51.9%	49.3%	46.3%	43.0%	39.5%
Services	10.3%	9.7%	10.1%	10.1%	10.3%	10.5%	10.6%	10.6%	10.6%	10.5%
Industry	0.5%	7.8%	6.8%	13.5%	11.1%	8.0%	7.2%	7.1%	7.1%	7.0%
Agriculture Forestry	0.0%	0.0%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
Overall	21.2%	23.1%	21.2%	23.2%	20.6%	17.7%	15.8%	14.4%	13.3%	12.2%

Table 4-12: Shares of wood final energy demand. Note that the share here does not equal the RES HC share, as the reference in RES HC is not final energy, but final energy other than electricity

Figure 44 shows the final energy demand for space heating in the residential sector as the sector with the largest demand in renewable energy other than electricity. The final energy demand decreases over time as buildings are renovated, explained in section 4.1. The renovation leads to a decrease in the final energy intensity for heating. In addition, it is assumed that heat pumps replace electricity for heating if deep renovation takes place, where deep renovation is understood as e.g. replacing windows in line with SLED (2015). The energy contained in the ambient heat is not explicitly reflected in the projection, only the electricity used to run the heat pump. This determines the final energy intensity of space heating, which consequently sees a strong reduction.



Figure 44: Final energy and fuels used in the residential sector for space heating across all building classes and geographic zones for historic years 2010-2022 and as projected for up to year 2030 and up to 2050 in five year steps with existing measures

4.3 Dimension Energy Efficiency

Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)

The current final energy consumption of Montenegro (2018) is at 820.2 ktoe, with primary energy consumption at 1203 ktoe. Historic values for the years 2010 to 2018 are shown below in combination with projections considering existing policies and measures.

Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling

The power supply of Montenegro is currently based on hydropower and the thermal power plant in Pljevlja, with small shares of solar PV and wind. The thermal power plant presents the chance for cogeneration of heat and a related project is considered as an additional measure, described in chapter 5. There is limited industry that could provide a source for cogeneration, potentially the iron and steel manufacturing. There is a general potential for district heating, as the use of fuel wood for heating is high, particularly in older buildings.

Projections considering existing energy efficiency policies, measures and programmes as described in point 1.2. (ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)

Net primary energy supply in Montenegro is currently (2018 value) at 1203 ktoe and is projected to remain in this order of magnitude, with a value of 1196 ktoe by 2030 and 1163 ktoe by 2040 with existing measures. Figure 45 shows the projection of the primary energy supply. The figure shows net values of each fuel category, e.g., electricity is only displayed when it is not produced in the country from primary energy sources (mostly hydro and coal), but imported. There is almost no net export of primary energy, an exception being the historic year 2018 with limited net export of electricity.

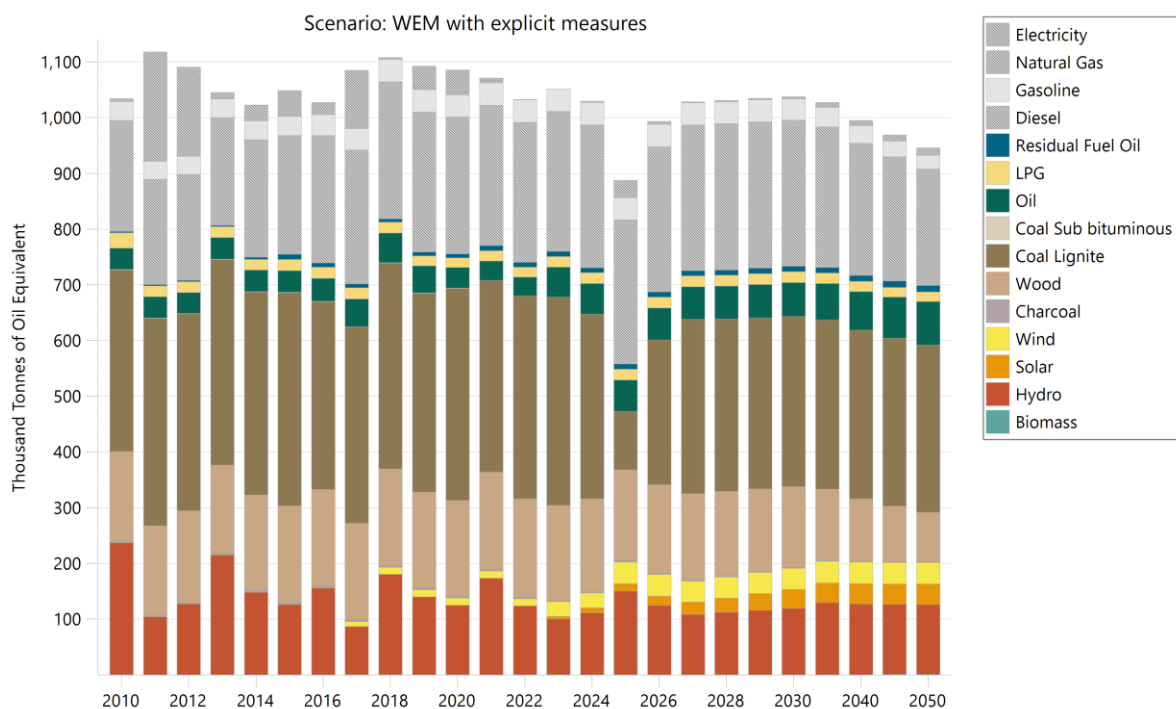


Figure 45: Primary energy supply for historic years 2010-2022 and as projected up to the year 2030 and 2050 in five year steps with existing measures

Fuel	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Electricity	5.3	45.8	0.1	1.0	31.1	4.0	8.8	9.4	10.8	13.0
Natural Gas	-	-	3.7	-	-	-	-	-	-	-
Gasoline	33.8	34.9	40.3	40.3	40.3	38.3	35.0	31.7	28.5	25.4
Diesel	199.4	213.2	245.9	251.3	258.6	262.4	252.2	237.3	222.7	208.6
Residual Fuel Oil	2.4	8.9	5.8	8.7	9.1	9.7	10.2	10.8	11.3	11.8
LPG	27.8	20.3	19.6	17.6	19.4	19.4	19.0	18.4	17.8	17.1
Oil	38.2	38.9	53.4	33.9	56.2	60.9	65.1	69.3	73.5	77.9
Coal Sub bituminous	0.8	0.5	0.4	-	-	-	-	-	-	-
Coal Lignite	326.0	383.0	369.7	364.2	105.3	305.4	304.0	302.8	301.5	300.3
Wood	162.0	173.7	173.8	176.6	162.9	144.7	127.6	112.0	99.7	88.9
Charcoal	2.0	3.3	3.0	3.0	2.4	2.0	1.7	1.4	1.2	1.1
Wind	-	-	12.4	12.4	39.0	38.3	39.0	39.0	39.0	39.0
Solar	0.1	0.2	0.3	0.3	13.2	33.7	35.6	35.9	36.5	37.1
Hydro	236.5	125.5	179.9	123.4	150.0	119.0	128.8	127.0	126.0	125.3
Biomass	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Total	1,034.2	1,048.5	1,108.5	1,032.8	887.7	1,037.9	1,027.3	995.2	968.8	945.9

Table 4-13: Primary energy supply for historic years 2010-2022 and as projected up to the year 2030 and for 2035 and 2040 with existing measures

Final energy consumption is currently (2018 value) at 820.2 ktoe, projected to increase to 856 ktoe by 2030 and then decrease to 822 ktoe by 2050. Final energy consumption is used synonymous to final energy demand and abbreviated by FEC in the following. Table 4-14 gives

the total final energy demand. The ratio of FEC to TPES is also given, remaining at approximately 71% throughout. This is largely determined by the efficiency of the thermal power plant. Figure 46 and Table 4-15 show the share of different sectors in final energy demand.

Following this, a series of figures show the final energy demand per sector, broken down to respective subsectors, again for historic values from 2010 to 2018, projections until the year 2030 and for 2035 and onward to 2050 in five year time steps. As with GHG emissions, this is followed by a table, which gives the values for 2010, 2017-2018, and 2020 to 2050 in five year time steps.

	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Final energy demand [ktoe]	764.6	752.6	821.1	761.6	790.7	817.3	807.2	777.5	753.2	732.4
FEC to TPES	73.9%	71.8%	74.1%	73.7%	89.1%	78.7%	78.6%	78.1%	77.7%	77.4%

Table 4-14: Final energy demand for historic years 2010, 2015, 2018, 2022 and as projected up to the year 2030 as well as up to 2050 in five year time steps with existing measures

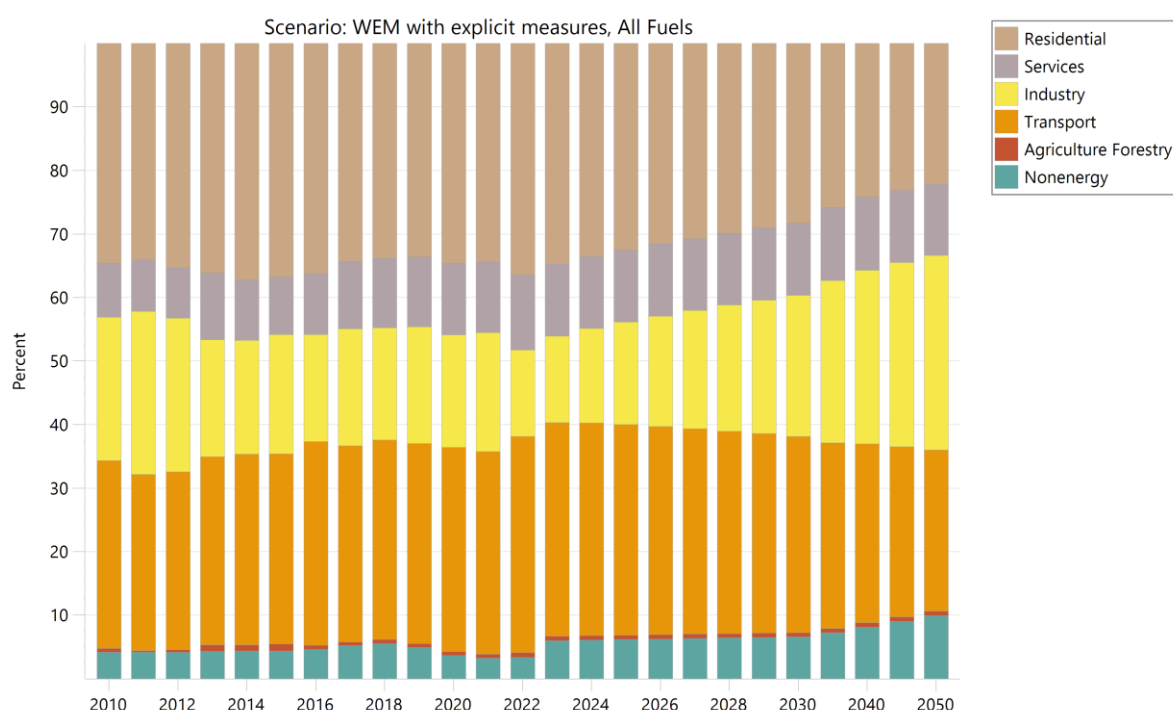


Figure 46: Shares of final energy demand for the demand sectors for historic years 2010, 2015, 2018, 2022 and as projected up to the year 2030 as well as up to 2050 in five year time steps with existing measures

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Residential	34.6%	36.8%	33.9%	36.5%	32.6%	28.3%	25.8%	24.2%	23.1%	22.2%
Services	8.5%	9.0%	10.9%	11.8%	11.3%	11.3%	11.5%	11.5%	11.3%	11.2%
Industry	22.6%	18.8%	17.7%	13.6%	16.1%	22.3%	25.6%	27.3%	29.0%	30.6%
Transport	29.6%	29.9%	31.4%	34.0%	33.1%	30.9%	29.2%	28.1%	26.8%	25.3%
Agriculture Forestry	0.6%	1.1%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Nonenergy	4.2%	4.4%	5.5%	3.4%	6.2%	6.6%	7.2%	8.1%	9.0%	9.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4-15: Shares of final energy demand for the demand sectors for historic years 2010, 2015, 2018, 2022 and as projected up to the year 2030 as well as up to 2050 in five year time steps with existing measures

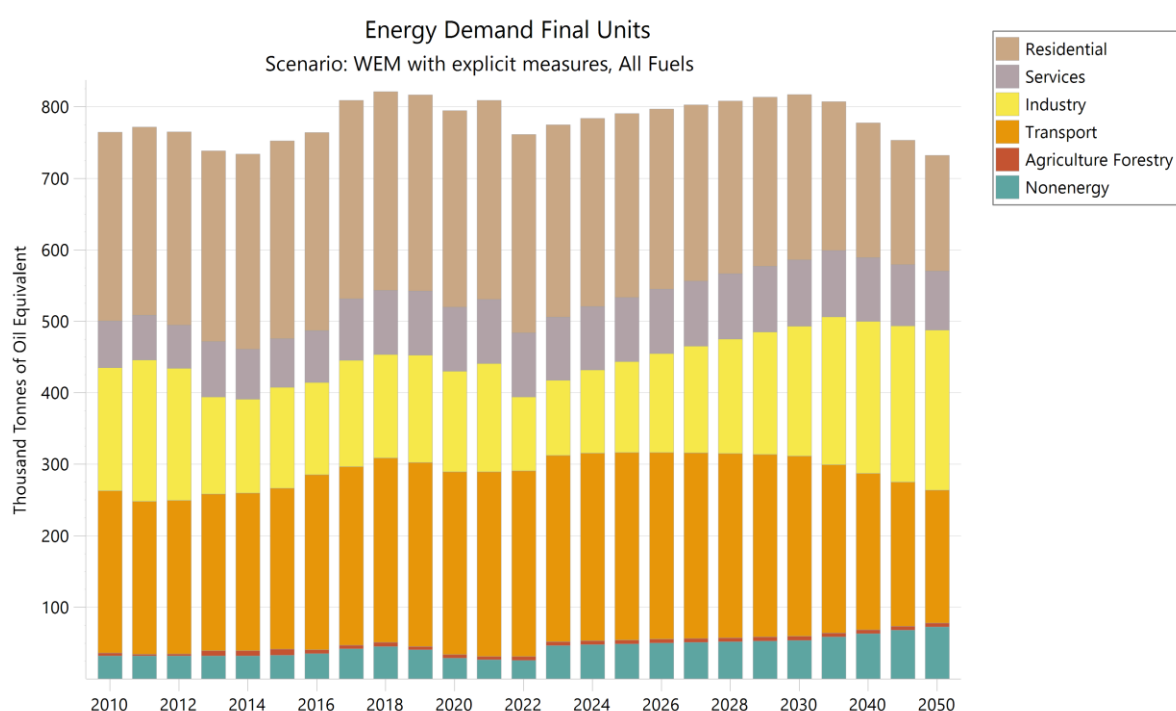


Figure 47: Final energy consumption (ktoe) for all main demand sectors for historic values from 2010, 2015, 2018, 2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

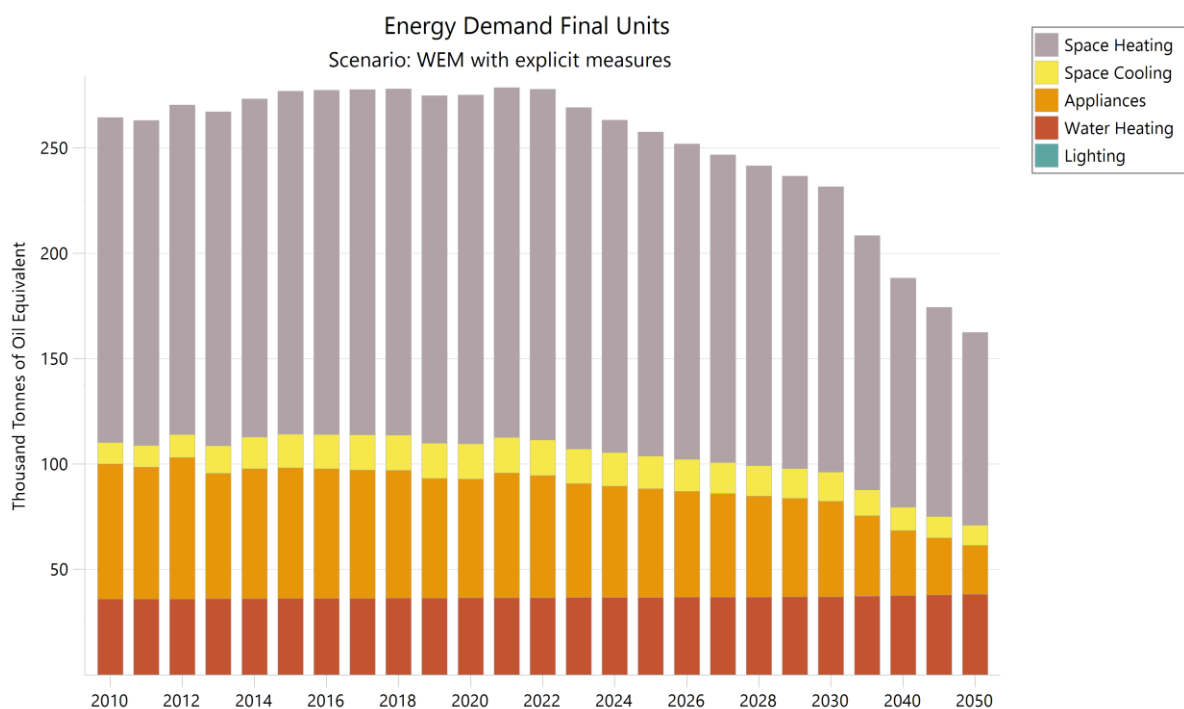


Figure 48: Final energy consumption (ktOE) for the residential sector for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

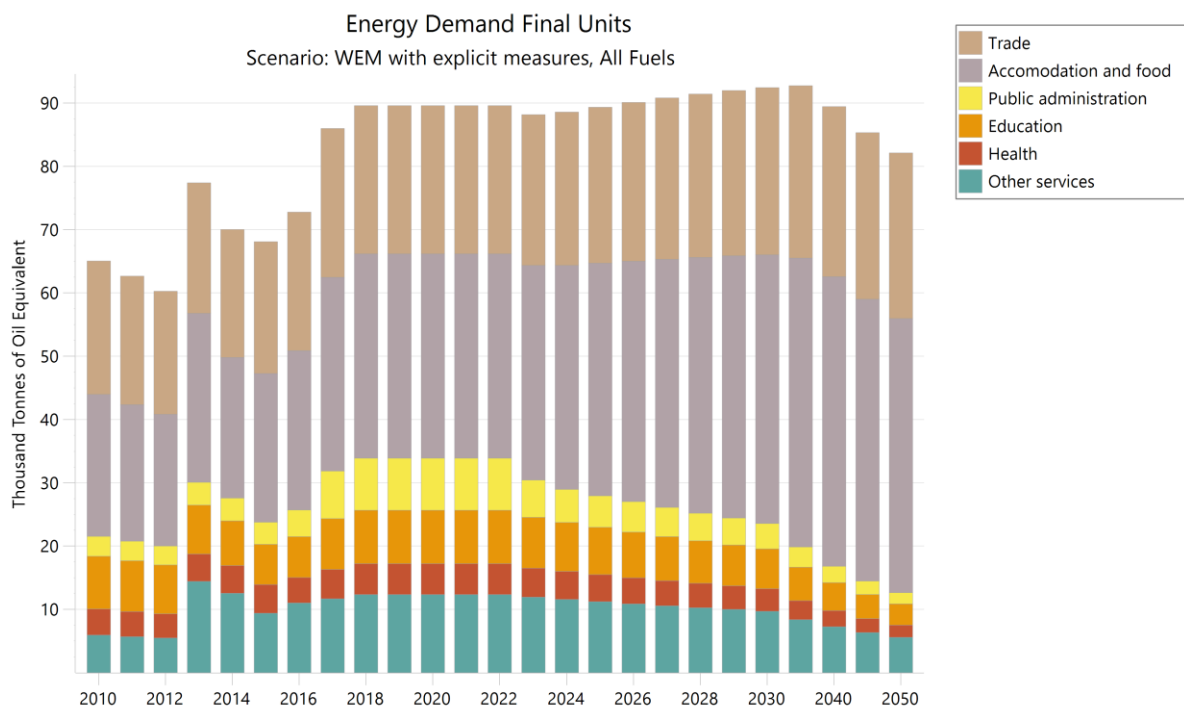


Figure 49: Final energy consumption (ktOE) for the services sector for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

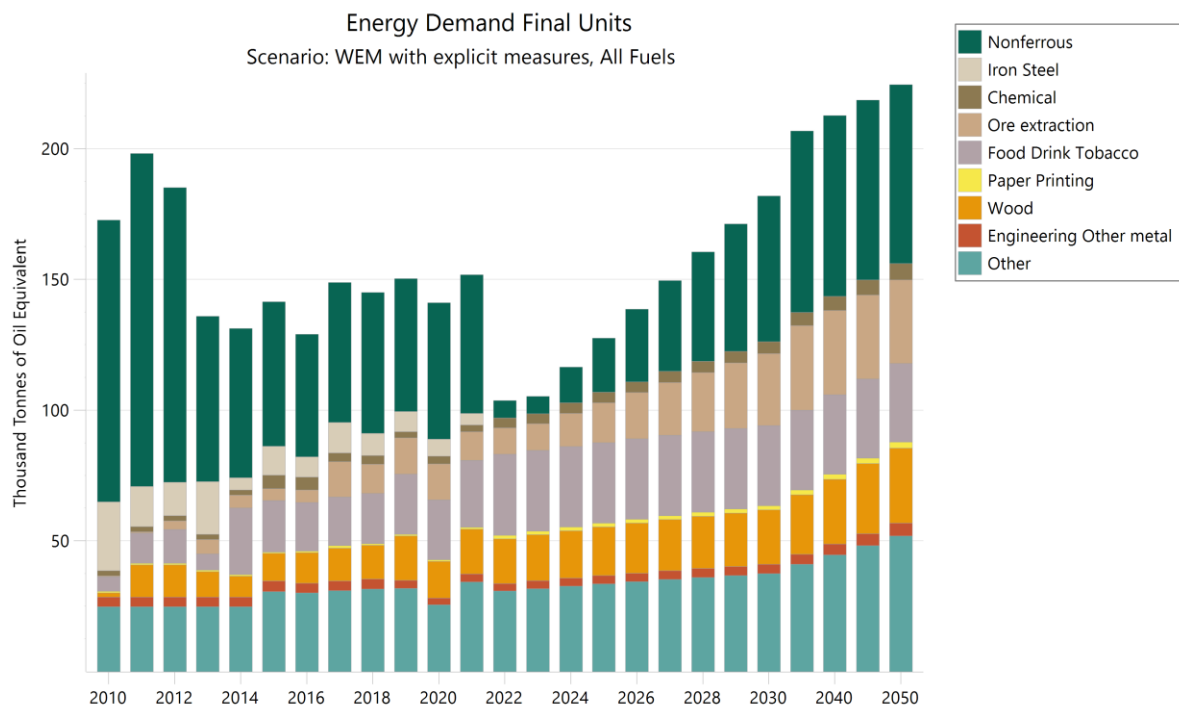


Figure 50: Final energy consumption (ktOE) for the industry sector for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

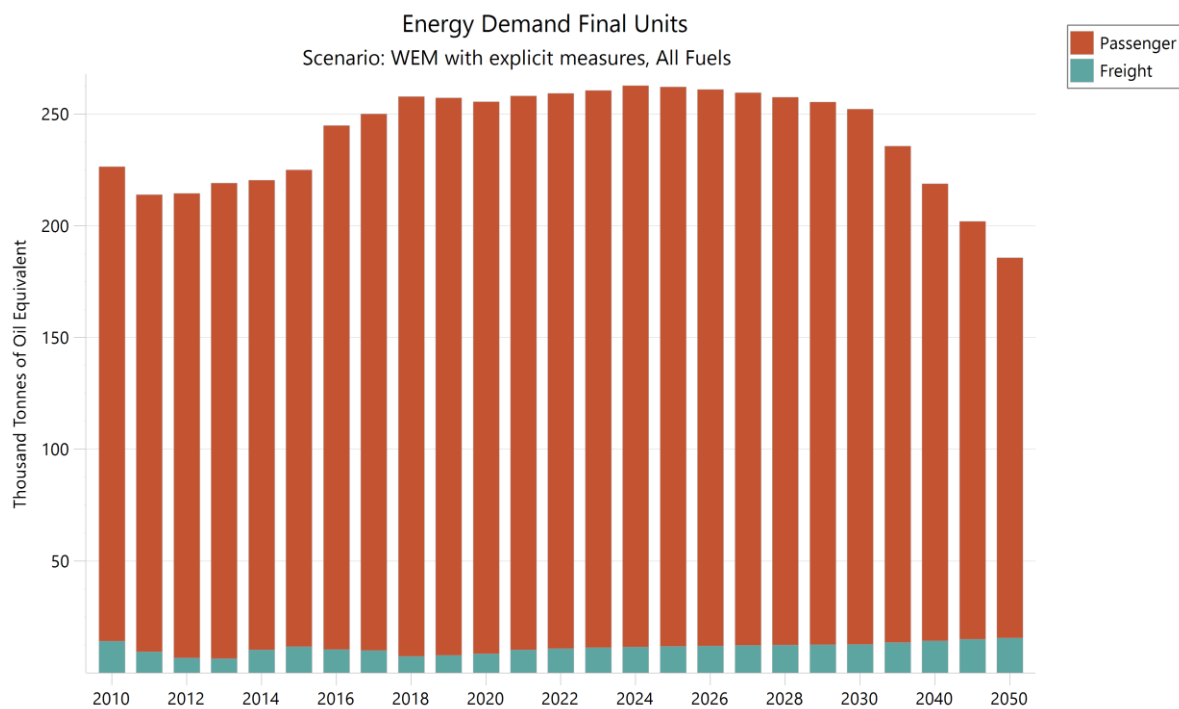


Figure 51: Final energy consumption (ktOE) for the transport sector for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

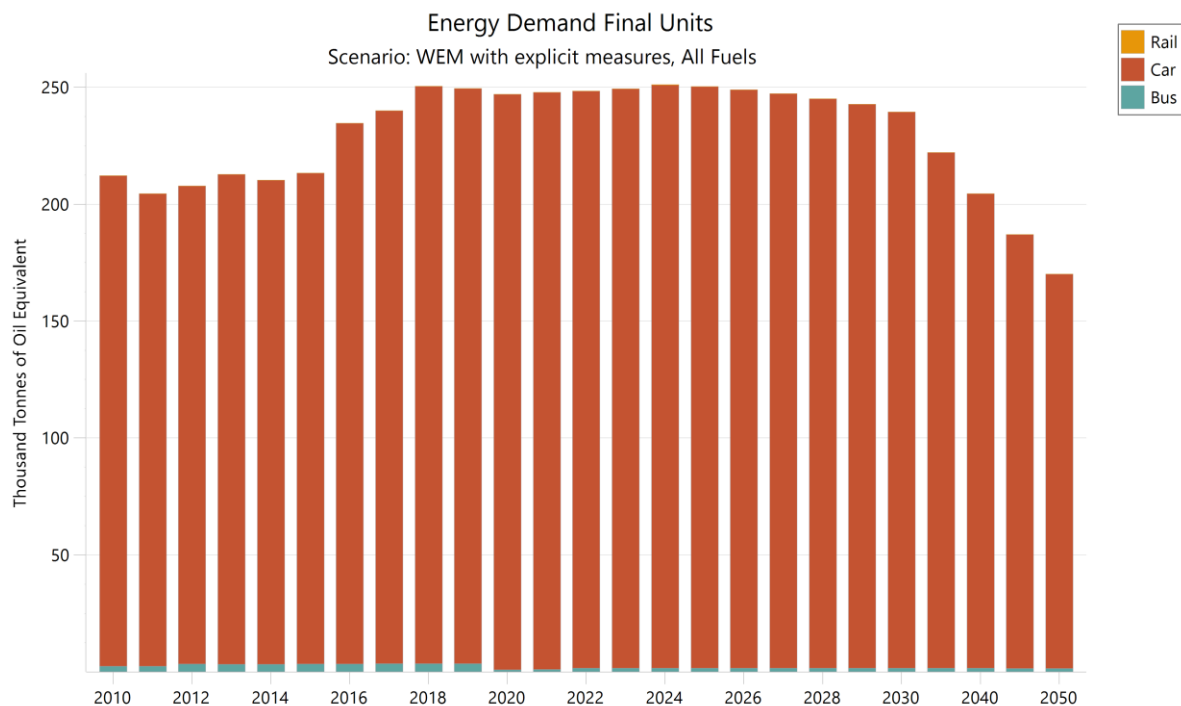


Figure 52: Final energy consumption (ktoe) for passenger transport for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

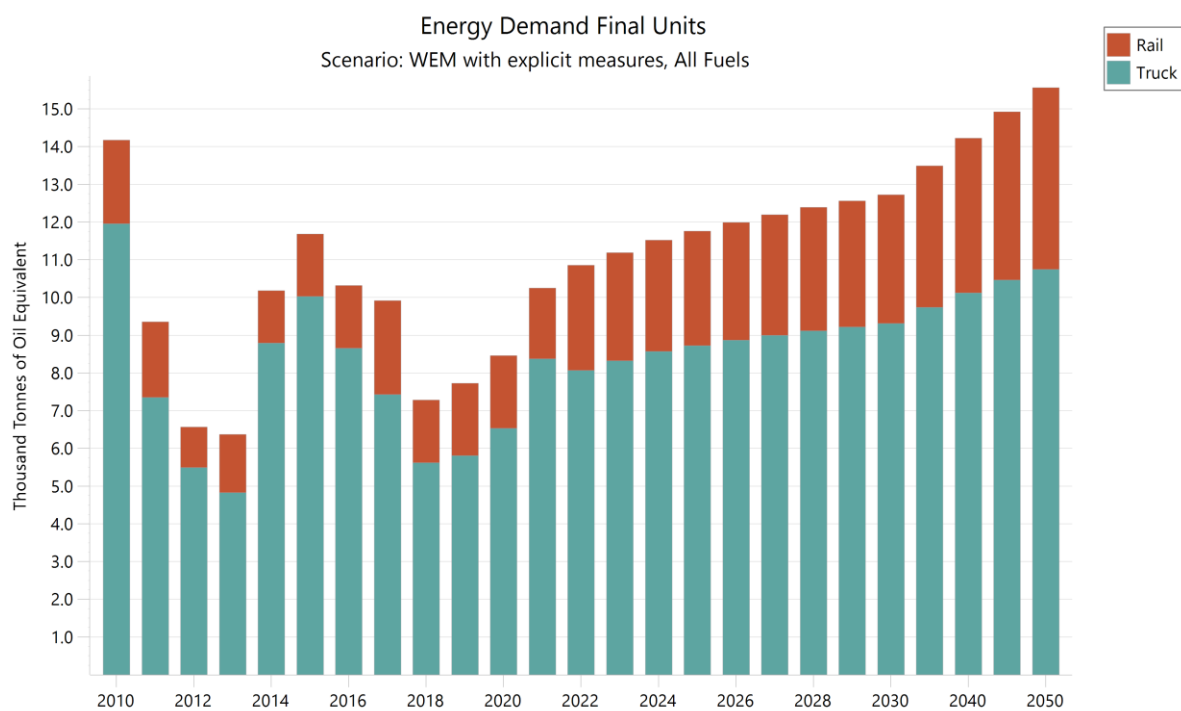


Figure 53: Final energy consumption (ktoe) for freight transport for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

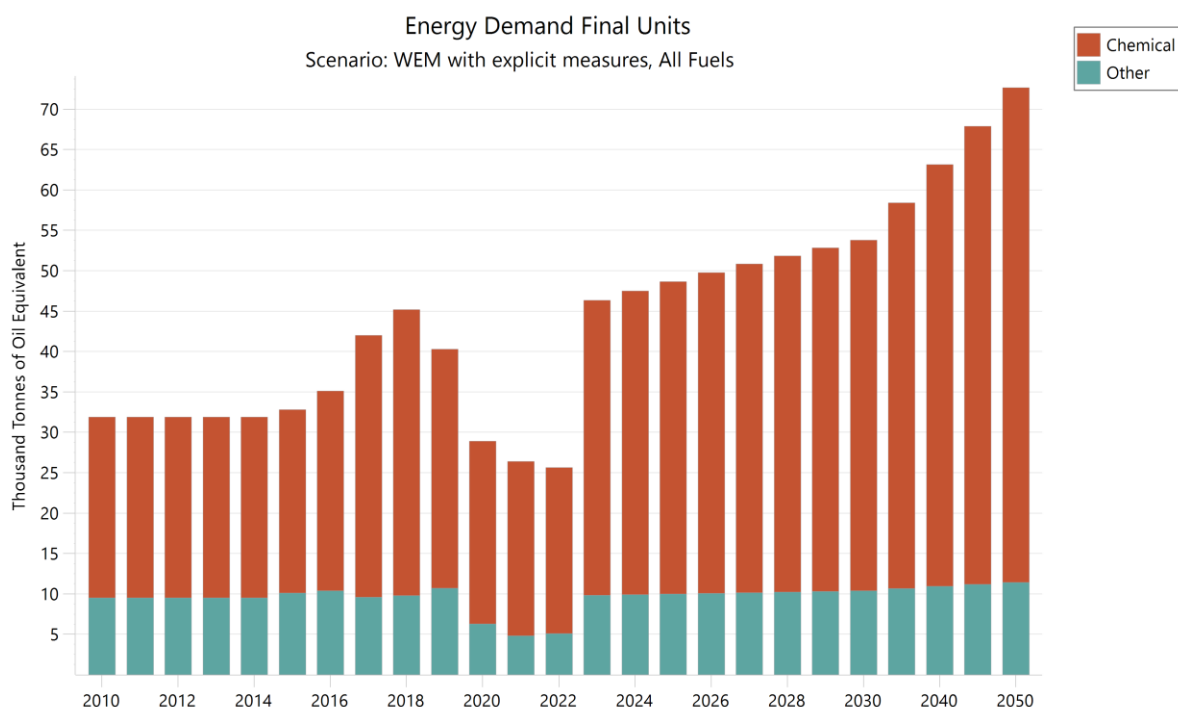


Figure 54: Final energy consumption (ktoe) for non-energy use of energy carriers for historic values from 2010-2022 and as projected with existing measures until 2050, given for 2023-2030 and for 2035 to 2050 in five year time steps

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Residential	264.3	276.8	278.0	277.8	257.4	231.5	208.4	188.2	174.2	162.4
Services	65.0	68.1	89.6	89.6	89.4	92.4	92.7	89.4	85.3	82.1
Industry	172.6	141.4	145.0	103.6	127.6	181.9	206.7	212.6	218.5	224.4
Transport	226.5	225.0	257.8	259.3	262.1	252.2	235.6	218.7	201.9	185.6
Agriculture Forestry	4.3	8.4	5.6	5.6	5.6	5.5	5.4	5.4	5.3	5.3
Nonenergy	31.9	32.8	45.2	25.6	48.6	53.8	58.4	63.1	67.9	72.6
Total	764.6	752.6	821.1	761.6	790.7	817.3	807.2	777.5	753.2	732.4
Residential										
Space Heating	154.2	162.7	164.3	166.4	153.6	135.4	120.6	108.7	99.1	91.5
Space Cooling	10.2	16.0	16.8	16.9	15.6	13.8	12.4	11.2	10.3	9.6
Appliances	64.1	62.0	60.6	58.0	51.5	45.3	38.1	30.9	27.1	23.3
Water Heating	35.8	36.1	36.3	36.5	36.7	36.9	37.2	37.5	37.8	38.1
Lighting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	264.3	276.8	278.0	277.8	257.4	231.5	208.4	188.2	174.2	162.4
Services										
Trade	21.1	20.9	23.5	23.5	24.7	26.4	27.2	26.9	26.4	26.2
Accommodation and food	22.4	23.4	32.3	32.3	36.7	42.4	45.6	45.7	44.5	43.3
Public administration	3.2	3.5	8.2	8.2	5.0	4.0	3.2	2.6	2.1	1.8
Education	8.3	6.4	8.5	8.5	7.5	6.3	5.3	4.4	3.8	3.4
Health	4.1	4.5	4.8	4.8	4.3	3.6	3.0	2.5	2.2	1.9

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
Other services	5.9	9.4	12.4	12.4	11.2	9.7	8.4	7.2	6.3	5.6
Total	65.0	68.1	89.6	89.6	89.4	92.4	92.7	89.4	85.3	82.1
Industry										
Nonferrous	107.7	55.2	53.8	6.7	20.7	55.7	69.4	69.0	68.7	68.4
Iron Steel	26.3	11.1	8.5	-	-	-	-	-	-	-
Chemical	2.0	5.2	3.3	3.7	4.1	4.5	5.0	5.4	5.8	6.3
Glass Pottery Building mat	-	-	-	-	-	-	-	-	-	-
Ore extraction	0.4	4.5	11.3	10.2	15.2	27.6	32.4	32.3	32.1	31.9
Food Drink Tobacco	5.5	19.6	19.1	30.9	30.8	30.6	30.5	30.3	30.2	30.0
Textile Leather Clothing	-	-	-	-	-	-	-	-	-	-
Paper Printing	0.6	0.6	0.6	1.4	1.5	1.6	1.8	2.0	2.1	2.3
Wood	1.6	10.5	13.0	17.1	18.6	20.8	22.7	24.7	26.7	28.7
Other	24.9	30.6	31.6	30.8	33.6	37.5	41.0	44.6	48.3	51.9
Engineering Other metal	3.6	4.1	3.7	2.9	3.2	3.5	3.9	4.2	4.5	4.9
Total	172.6	141.4	145.0	103.6	127.6	181.9	206.7	212.6	218.5	224.4
Transport										
Passenger	212.3	213.4	250.5	248.5	250.3	239.5	222.1	204.5	187.0	170.1
Freight	14.2	11.7	7.3	10.9	11.8	12.7	13.5	14.2	14.9	15.6
Total	226.5	225.0	257.8	259.3	262.1	252.2	235.6	218.7	201.9	185.6
Passenger transport										
Motorcycle	-	-	-	-	-	-	-	-	-	-
Car	209.9	210.1	247.0	246.9	248.8	237.9	220.6	203.0	185.6	168.7
Bus	2.4	3.2	3.4	1.5	1.5	1.5	1.5	1.5	1.4	1.4
Rail	.	.	.	.	.	.	.	.	.	.
Total	212.3	213.4	250.5	248.5	250.3	239.5	222.1	204.5	187.0	170.1
Freight transport										
Rail	2.2	1.6	1.7	2.8	3.0	3.4	3.8	4.1	4.5	4.8
Truck	12.0	10.0	5.6	8.1	8.7	9.3	9.7	10.1	10.5	10.7
Total	14.2	11.7	7.3	10.9	11.8	12.7	13.5	14.2	14.9	15.6
Non-energy demand										
Chemical	22.4	22.7	35.4	20.5	38.7	43.4	47.7	52.2	56.7	61.2
Other	9.5	10.1	9.8	5.1	10.0	10.4	10.7	11.0	11.2	11.4
Total	31.9	32.8	45.2	25.6	48.6	53.8	58.4	63.1	67.9	72.6

Table 4-16: Final energy consumption (ktoe) for different demand sectors for historic values 2010, 2015, 2018, 2022 and as projected with existing measures until 2050, given in five year time steps

Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

To be completed at a later stage.

4.4 Dimension Energy Security

Current energy mix, domestic energy resources, import dependency including relevant risks

Montenegro's current electricity mix consists of hydropower, wind, solar, and lignite-based energy. Critical for energy security is the dependence on unflexible lignite coal power from the Pljevlja Thermal Power Plant (TPP) that generates about 50% of all Montenegrin GHG emissions. Being used as a base load source of electricity, emissions are not going to decrease when keeping up the status quo. In 2025, Pljevlja power plant will be off grid for eight months for ecological refurbishment that integrates filtering systems for Nitrogen Oxides (NO_x) and Sulfur Dioxide (SO₂) to bring it into compliance with the EU Large Combustion Plants Directive (European Union 2001) that entered into effect in the Energy Community Contracting Parties in January of 2018. Montenegro to date made use of the opt-out clause for TPP Pljevlja which exempted the plant from compliance, however limiting its allowed operating hours to 20,000 hours between 01.01.2018 and 31.12.2023 (Energy Community Secretariat 2020). Reporting of operating hours of Pljevlja (European Environment Agency 2021) confirm that the 20,000 hours have been surpassed already in late 2020 and the plant therefore does not have the permission to run under the directive. In terms of energy security, uncertainties about the status pose risks in energy supply. Under the current regime with Pljevlja TPP running in base load, impacts of dry years with little hydroelectric output are not influencing supply security significantly. However, in the case of decommissioning of the TPP, no other energy source can currently fill the gap. It is important to point out that although there is a certain surplus of electricity production with respect to needs of domestic consumption at annual level, there is a constant need for import of electricity during the summer (higher consumption due to the touristic season) and dry months. Variable hydrological situation makes import planning more challenging and it is subjected to increased costs due to electricity availability and cross border capacity allocation. Taking into account that the electricity price for distribution consumers is subsidized (significantly lower than the market price), the importance of stable domestic production of electricity is evident.

Figure 55 shows the total gross inland consumption with yearly fluctuations remaining between 380 ktoe and 460 ktoe (red line, values in ktoe are given in the table). Net imports are shown in columns and the net import share as a second line (with values given in the plot).

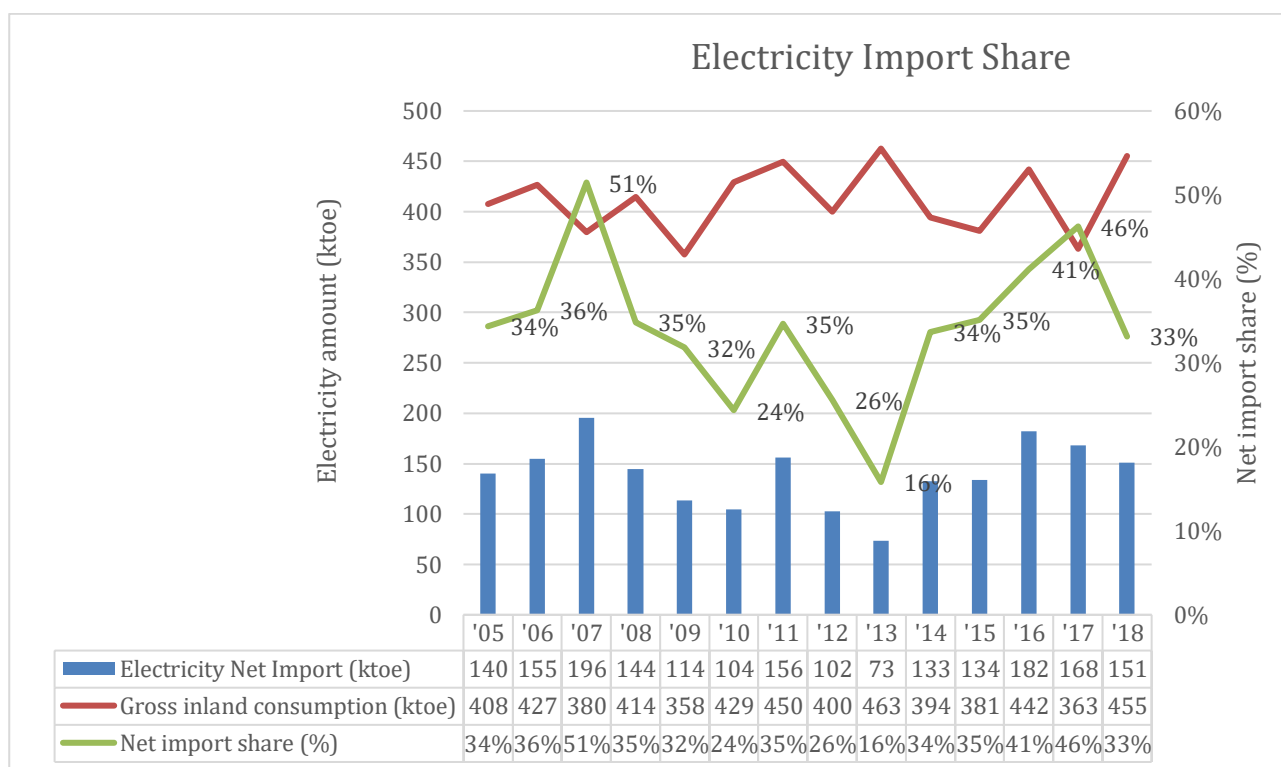


Figure 55: Electricity import share (historical data 2005 - 2018)

Fossil fuels play another important role in total Montenegrin energy supply. The country only produces lignite coal in the Pljevlja coal mines. In all other products, especially oil products, it is dependent on imports. A natural gas infrastructure does not exist and Montenegro is not connected to international natural gas pipelines. Lignite coal is exclusively used for the Pljevlja TPP. Some residential buildings in the area of the Pljevlja coal mines also use the coal for space heating.

Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

For projections from 2023 to 2040, the gross inland consumption of electricity is expected to increase significantly, decelerating slightly in 2030. Due to insufficient capacities, the net imports will continually rise from 21% in 2019 to 47% in 2030 and 56% in 2040 (with a drop to 19% due to the 2020 COVID-19 economic downturn). The cause for this increase is the increase in electricity consumption and the decrease in hydroelectric output due to falling precipitation levels. Climate conditions are expected to lead to a decrease by 20% in output for run-of-river hydroelectric plants and 15% in reservoir hydroelectric plants under 2010-levels until 2050. Output of Solar power however is expected to increase by 5% until 2050 over 2010-levels (World Bank ESMAP 2009).

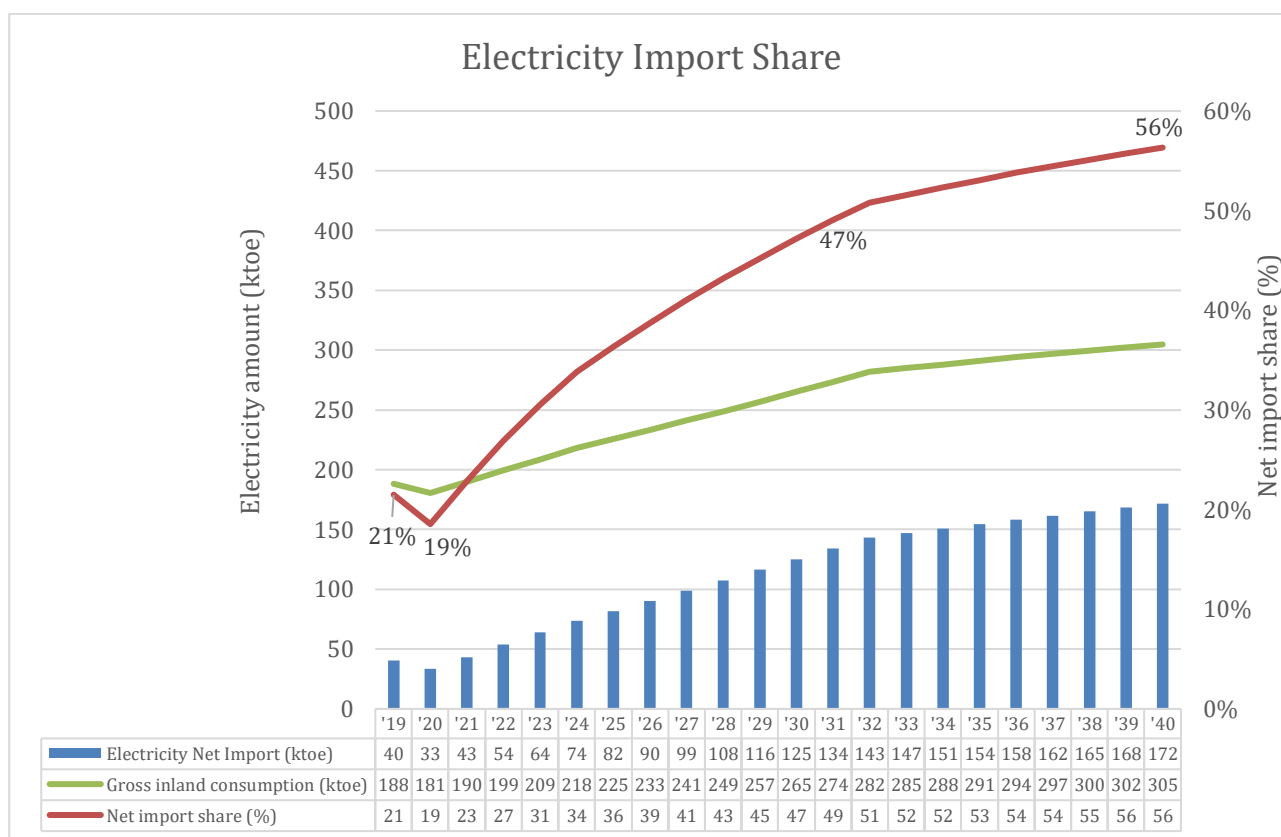


Figure 56: Electricity import share (projection 2019 - 2040)

4.5 Dimension internal energy market

4.5.1 Electricity interconnectivity

Current interconnection level and main interconnectors

Montenegro has nine interconnection lines with a total installed capacity of 5.542 MW with all neighbouring countries except Croatia (Energy Community Secretariat 2021) as shown in Table 4-17.

Voltage (kV)	Level	Bus (domestic)	1 Bus 2 (non-domestic)	From Albania to	Max active power (MW)
400		Ribarevine	Peja 3	Kosovo	1185
400		Lastva	Trebinje	Bosnia and Herzegovina	1196
400		Podgorica	Tirana 2	Albania	1197
500 (HVDC)		Lastva	Villanova	Italy	600
220		Podgorica	Koplik	Albania	270
220		HPP Piva	Sarajevo 20	Bosnia and Herzegovina	329
220		HPP Perucica	Trebinje	Bosnia and Herzegovina	271

220	Pljevlja	Bajina Basta	Serbia	247
220	Pljevlja	Pozega	Serbia	247
110	Pljevlja	Potpeć	Serbia	90
110	Herceg Novi	Trebinje	Bosnia and Herzegovina	90
110	Nikšić	Bileća	Bosnia and Herzegovina	90

Table 4-17: Existing cross-border interconnectors. Source: (Energy Community Secretariat 2021)

In 2023, the amount of electricity that entered Montenegro's transmission system, according to data from CGES, amounted to 5,421,277 MWh, which is almost twice as much as in 2018 and 35% higher than in 2008, while the energy that exited the Montenegrin system amounted to 6,292,230 MWh, which is double the amount in 2018 and four times higher than in 2008. The transit through the Montenegrin electricity transmission system reached 5,196,600 MWh in 2023, which is twice as high as in 2018 and almost three and a half times higher than in 2008.

Figure 57 shows a scheme of cross-border interconnectors including nominal interconnector transmission capacity (max active Power in MW) and the maximum cross-border capacity given to market participants for commercial use (NTC).

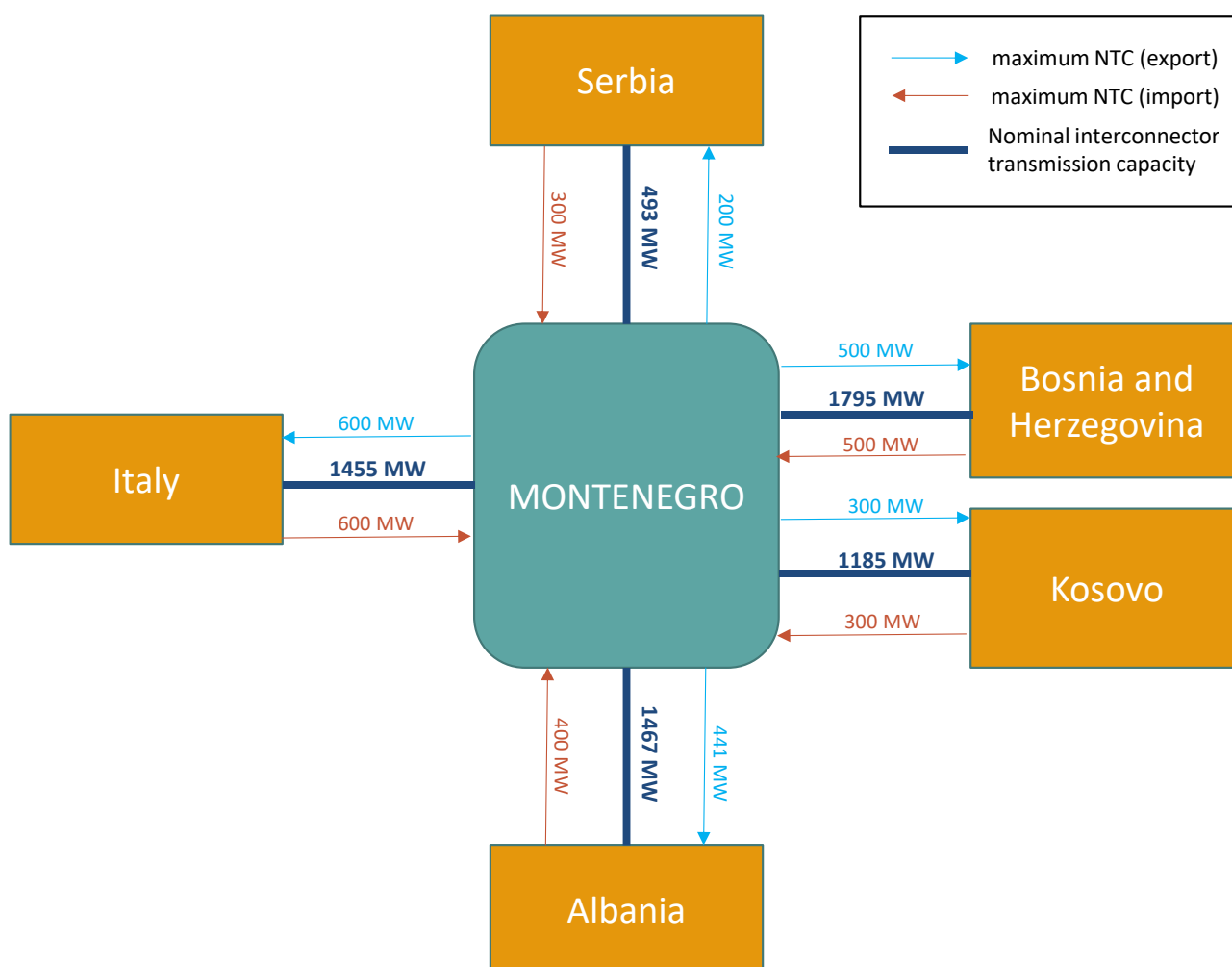


Figure 57: Interconnector capacities. Source: Energy Community Secretariat 2021

For the calculation of the interconnectivity target, the NTC in import direction is put in relation to the renewable power generation capacity. As shown in Table 4-18: Interconnection levels in Montenegro, it follows that the interconnection target of 15% until 2030 has been reached over 15-fold already and will continue to be reached at least until 2040 in the scenario with existing measures. Due to the insufficient energy supply capacity in the country, the renewable capacity is expected to increase with further policies decreasing the interconnection level. With high import amounts, in the past and future (see Figure 56), strong interconnection capacities have been and will continue to be an important pillar of Montenegrin energy security.

Year	2019	2021	2030	2040
Renewable Capacity (MW)	778	789	870	870
Max NTC Import (MW)	2.100	2.100	2.100	2.100
Interconnection Level	270%	266%	241%	241%

Table 4-18: Interconnection levels in Montenegro

Taking into account the planned infrastructure projects (particularly interconnections) and the improvement of the methodology for cross-border capacity allocation, an increase in capacity is expected, especially on the borders with Italy, Bosnia and Herzegovina, and Serbia.

Projections of interconnector expansion requirements (including for the year 2030)

The Transmission Network Development Plan foresees the following projects:

- Construction of the 400 kV Transmission Line Brezna – Crkvičko Polje – Sarajevo with the 400/220 kV Substation Crkvičko Polje

The implementation of this project is planned in two phases:

- Phase I – Construction of the 400/220 kV Substation Crkvičko Polje and a new 400 kV transmission line from Crkvičko Polje to the border with Bosnia and Herzegovina (further to B. Bijela – Sarajevo);
- Phase II – Construction of the 400 kV transmission line between SS Brezna and SS Crkvičko Polje.

The project aims to improve the transmission network in the northwestern region of Montenegro in order to enhance grid stability, enable the connection of renewable energy sources (RES), and upgrade the interconnection with Bosnia and Herzegovina. It will support cross-border electricity trade, including with Italy via the HVDC cable, creating a favorable environment for the development of RES projects in the country and the region.

The new link between Montenegro and Bosnia and Herzegovina will additionally eliminate potential congestion on this border, supporting open access to a larger electricity market in the region and with the EU. The project will also directly reduce network losses, provide a connection to the future Komarnica Hydropower Plant, and improve the connection with Piva Hydropower Plant.

In 2023, a WBIF grant of €1.8 million was obtained for the feasibility study, which is currently under preparation. According to the Investment Plan for 2025–2029, the project value is estimated at €70.065 million, with the expected completion year 2032.

- Construction of the 110 kV Line Ulcinj – Velika Plaža – Velipojë with the 110/35 kV Substation Velika Plaža

The project includes the construction of a 110 kV cable line from the existing 110/35 kV Substation Ulcinj to the location of Velipojë in Albania, as well as the construction of a 110/35 kV Substation Velika Plaža at the eponymous site, due to the expected increase in electricity consumption resulting from the further development of tourism. The construction of the Velipojë Substation is currently underway. Analyses have shown that connecting the Ulcinj Substation to the new 110/35 kV Velika Plaža Substation, and further linking it to the nearest point in Albania, would be extremely beneficial for Montenegro's transmission system and its users. This would meet the N-1 security criterion for the electricity supply of Ulcinj and the delivery of electricity from the Možura Wind Power Plant. According to the Investment Plan for 2025–2029, the project value is estimated at €35 million, with the expected completion year 2028.

- Increasing the Transmission Capacity of the 220 kV Line Trebinje (BiH) – Perućica – Podgorica – Koplik (AL)

Taking into account the connection requests for renewable energy sources in Montenegro, the capacity of the existing conductor of this transmission line, as well as its age and operating condition, it is necessary to carry out a reconstruction. Due to insufficient capacity, the reconstruction must include the complete replacement of conductors, shield wires, insulation, suspension, and connecting equipment. Because the existing towers, due to their structural characteristics, cannot accommodate standard higher-capacity conductors, this entails replacing them with special-design conductors that have the same transmission capacity as a 1500 A conductor but without increasing the mechanical load on the towers beyond their design capacity.

The implementation of this project will increase the Net Transfer Capacity (NTC) on the borders with Albania and Bosnia and Herzegovina, enhance system security in case of an outage of the 400 kV line from Lastva, and enable greater integration of renewable energy sources. According to the Investment Plan for 2025–2029, the project value is estimated at €15 million, with the expected completion year 2027.

4.5.2 Energy transmission infrastructure

Key characteristics of the existing transmission infrastructure for electricity and gas

To date, Montenegro does not have a natural gas transmission infrastructure and is not connected to international natural gas pipelines or LNG Terminals. The following analysis is therefore confined to the electricity transmission infrastructure. Information stems mainly from the Transmission System Development Plan of Montenegro 2020-2029 (CGES 2019b).

Montenegrin transmission network consists of lines operating on voltages: 400 kV, 220 kV and 110 kV, and substations with transformation ratio: 400/X kV, 220/X kV and 110/X kV. Within all lines the most dominant ones are OHL with the total length of 1,548.95 km, i.e. per voltage levels:

- 6 400 kV OHL with length of 402.8 km;
- 10 220 kV OHL with length of 374.7 km;
- 40 110 kV OHL (3 of which are double system lines) with length of 664.67 km;
- 4 110 kV OHL that operate on 35 kV with length of 97 km;

- 2 110 kV power cables with length of 9.78 km.

As for power substations, transmission system operator operates with:

- 4 400/X kV substations,
 - 4 220/X kV substations, and
 - 22 110/X kV substations,
- with 54 transformers. Their total installed power is 4,454.5 MVA.

About 50% of the power lines are running at 110 kV and are concentrated in the coastal region of the country. Due to the expected increased demand in the future, they are more likely to be replaced with priority over the other voltages. The 400 kV lines are part of the three 400 kV international interconnection transmission lines to Kosovo, Bosnia and Herzegovina and Albania (Table 4-17) as well as Ribarevine to Podgorica 2 and Ribarevine to Pljevlja. The two main hydroelectric power plants Piva and Perućica are connected to the 220 kV and 110 kV network.

This structure is characterised by the dynamic that the 400 and 220 kV overhead lines are underloaded, mostly connecting the same system components or working in parallel. The 110 kV network is characterised by the injection of the significant part of HPP Perućica generation towards Podgorica, as well as the fact that the whole consumer area of the coastal area is supplied with power via overloaded 110 kV overhead lines from the direction of Podgorica as the main power-supply point and from the direction of Trebinje (B&H) wherefrom the west coastal area is supplied with power (Herceg Novi and Tivat). With the entry into operation of SS Lastva and the entry into operation of WPP Možura, the situation will considerably change and lead to unloading of the mentioned directions (CGES 2019b).

Figure 58 shows the geographic distribution of the main transmission lines of Montenegro.

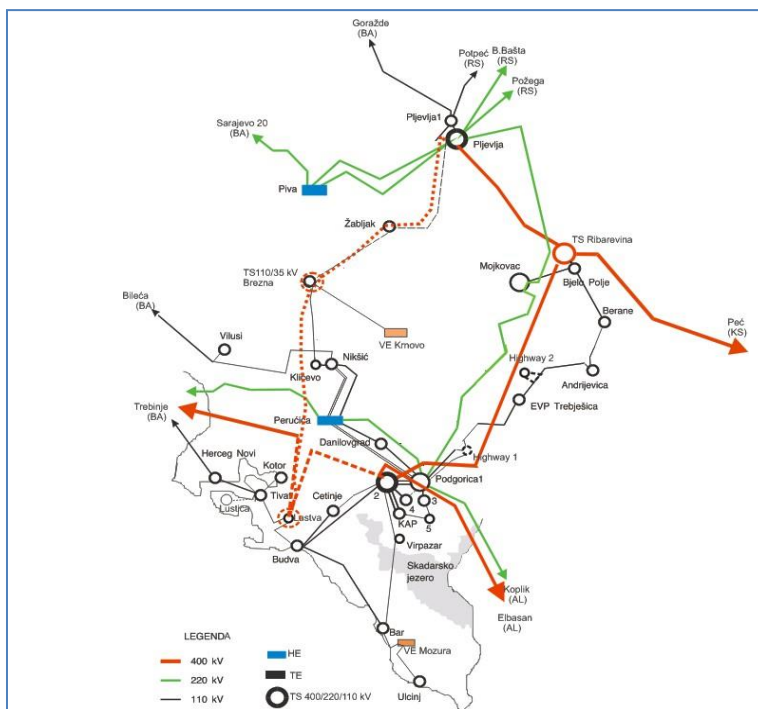


Figure 58: Map of main transmission of Montenegro. Source: CGES 2019b

Projections of network expansion requirements at least until 2040 (including for the year 2030)

Transmission losses accounted for 4.34% of gross energy consumption in 2024. This number does not include distribution grid losses.

According to model calculations from the scenario with existing measures, the annual increase in energy demand amounts to an average of one percent per year between 2019 and 2040. In sum, electricity demand increases from 275 ktoe in 2019 to 314 ktoe in 2030 and 329 ktoe in 2040. At the same time, production capacities increase from 1003 MW in 2019 to 1094 MW in 2030 and remaining constant after that according to existing measures. Additional measures, as presented in chapter 5, will further widen production capacity.

The Transmission System Development Plan of Montenegro 2020-2029 and Updated Investment Plan 2023 - 2025 foresee a number of projects for improving transmission networks as presented in Table 4-19.

Project	Benefits
Construction of SS 110/35 kV Luštica with connection to 110 kV transmission network (IPI030)	- allowing connection of new consumers in the subject region including also the consumption of the "Luštica Bay" complex in full capacity 40 MW - providing reliable and safe supply of consumers of the entire region with electricity, whereby ensuring supply from 110 kV transmission network.
Construction of 400kV OHL Pljevlja 2-Bajina Bašta-Višegrad (IPI009)	- increasing border transmission capacity towards Bosnia and Herzegovina and Serbia, - improving voltage and reactive conditions in the 400 kV network of Montenegro, - loss reduction in transmission network, - the project is part of a broader, international project linking the electric power systems of Montenegro, Serbia and Bosnia and Herzegovina at the 400 kV level, which is of regional importance, - allows full merger of market system.
Construction of 110 kV OHL Vilusi-Herceg Novi	- ensuring bidirectional supply of SS Vilusi, - ensuring bidirectional supply of SS Herceg Novi from transmission network of Montenegro, - solving the problem of overload of 110 kV OHL Herceg Novi-Trebinje, - ensuring reliable and safe supply of consumers with electricity in the region of Vilusi and Herceg- Novi.
Reconstruction of SS 110/35 kV Vilusi and Herceg Novi	- ensuring safer, more reliable and high quality supply of consumers in the area of Vilusi and Herceg Novi, - allowing construction of 110 kV OHL Vilusi-H.Novi to reduce dependence on power supply of 110 kV substations in Montenegro from neighbouring transmission network

	(BiH).
Reconstruction of systems of protection, control and auxiliary consumption in SS 220/110/35 kV Podgorica 1	• reduction of duration of no-load time due to unreliable operation of protections, • improvement of operating capability of EPS of Montenegro, • increasing availability of transmission network elements, • extending the useful life of main transmission network elements, • reduction of maintenance costs due to the possibility of remote access to protection devices, • use of data from protection devices for rationalisation of maintenance plans, • use of data for developing various types of analyses and studies.
Reconstruction of protection and control in the rest of 110 kV network	• reduction of duration of no-load time due to unreliable operation of protections, • improvement of operating capability of EPS of Montenegro, • increasing availability of transmission network elements, • extending the useful life of main transmission network elements, • reduction of maintenance costs due to the possibility of remote access to protection devices, • use of data from protection devices for rationalisation of maintenance plans, • use of data for developing various types of analyses and studies.
Construction of 110kV OHL Virpazar-Ulcinj (IPI015)	• loss reduction, • ensuring reliable and safe supply of consumers with electricity (bi-directional supply of SS 110/35 kV Ulcinj), • improvement of voltage reactive conditions, • allowing more stable operation of future WPP Možura.
Replacement of HV equipment in substations (IPR034)	• more reliable operation of switchgear, • decreasing maintenance costs, • decreasing number and duration of unplanned interruptions in supply, • achieving preconditions for remote control from the competent dispatching centre, • increasing availability of transmission network elements, • extending the useful life of main transmission network elements.

Construction of SS 110/35 kV Buljarica and its connection to 110 kV network (IPI056)	- increased quality of supplied electricity, - reduced distribution network losses, - reduced unsupplied electricity, - safer and more reliable supply of the coastal region (Budva and Bar).
Reconstruction of 110 kV OHL Podgorica-Danilovgrad-Perućica (IPR089)	- increased transmission power of 110 kV overhead line from HPP Perućica, - ensuring conditions for further development of generation capacities in this part of the state, - ensuring reliable and safe supply of consumers in the area of Danilovgrad with electricity, - higher operational safety of the overhead line, - reduced maintenance cost.
Video surveillance of substations and protection of CGES facilities (IPD016)	- providing video surveillance of substations as additional security in the process of remote control of substations, - implementation of legal regulations, - better security of property and persons.
Reconstruction of OHL 110 kV Podgorica2- Virpazar (31-1u) (IPR059)	- Increasing of operational reliability of the overhead line, - increasing the security of supply to the consumption areas of Bar, Virpazar and Ulcinj, especially in the summer months when there is a high load on the southern part of the coast, - lower maintenance costs.
Reconstruction of a part of OHL 110kV Nikšić-Vilusi (IPR072)	- higher level of operational capability of the overhead line, - reduction of OHL maintenance costs, - reduction of duration of no-load condition of the overhead line.
Reconstruction of anchor parts of gantry towers of OHL 110 kV Bar-Ulcinj (IPR061)	- increasing static reliability of anchor towers and avoiding major damages, - providing more reliable supply of electricity to consumers on the territory of Ulcinj - increasing operational capability of the overhead line
Reconstruction of fire protection system in NDC (NDC104)	- ensuring safe work of employees, - respecting the legislation, - protection of CGES property
SS 400/110/35 kV Brezna (IPI019)	- creating preconditions for connection of generation facilities in this region; - improving the supply reliability in Piva region (Brezna, Plužine, Unač, Mratinje, Crkvičko Polje); - more reliable supply of Žabljak after the construction of 400+110 kV OHL Čevo-Pljevlja.

Table 4-19: Ongoing and planned transmission network projects. Source: CGES 2019a

4.5.3 Electricity and gas markets, energy prices

Current situation of electricity and gas markets including energy prices

The electricity market consists of the wholesale and retail markets. The wholesale market refers to electricity trading between generation companies, suppliers, and electricity trading companies, while the retail electricity market covers the market in which the purchase and sale of electricity take place directly between the final customer and the supplier or an independent aggregator, based on a supply contract or an aggregation contract.

Electricity trading on the Montenegrin wholesale market takes place on a bilateral basis as well as on an organized market, i.e., through long-term and day-ahead electricity exchange markets.

On the long-term electricity exchange market, managed by BELEN, electricity is purchased solely for the purpose of covering system losses by CGES (Montenegrin Transmission System Operator) and CEDIS (Montenegrin Distribution System Operator).

The day-ahead wholesale market became operational on April 26, 2023, and since then, it has functioned with constant and stable price signals. Participants in the wholesale electricity market include: producers, traders, suppliers, self-supplying customers, supplier of last resort, and supplier for vulnerable customers.

In addition, the following are also considered market participants:

- The Transmission System Operator (TSO), as an entity that buys and/or sells electricity to cover losses in the transmission system, provide ancillary services, and balance the system;
- The Distribution System Operator (DSO), as an entity that purchases electricity to cover losses in the distribution system; and
- The Market Operator, as an entity that purchases electricity produced by qualified producers and sells it to suppliers and self-supplying customers.

As of April 2025, there were 28 traders operating on the Montenegrin wholesale market (BELEN)⁸⁰ and 94 market participants registered with COTEE⁸¹.

⁸⁰ <https://belen-spot.me/lista-ucesnika/>

⁸¹ <https://cotee.me/wp-content/uploads/2021/09/Ucesnici-Market-Participants-maj-2025.-godine.doc>

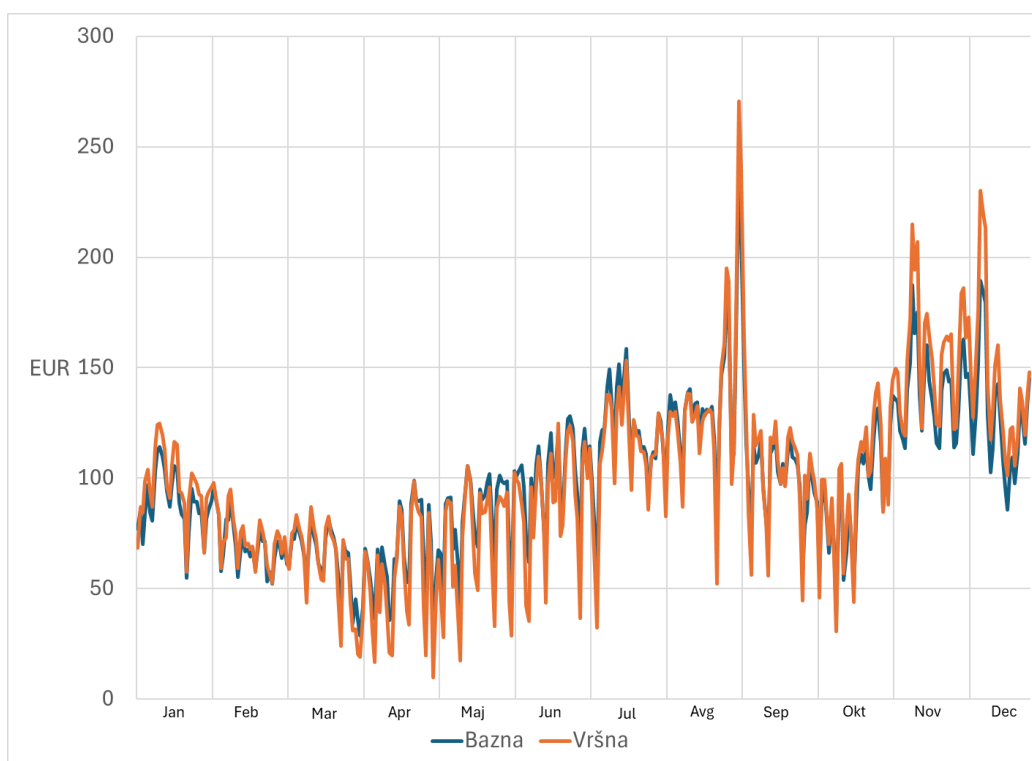


Figure 59 Overview of prices achieved on the organized wholesale market in 2024 (BELEN)

The retail electricity market encompasses the market in which the purchase and sale of electricity take place directly between the final customer and the supplier or an independent aggregator, based on a supply contract or an aggregation contract, while the wholesale market refers to electricity trading between companies engaged in generation, supply, and electricity trading.

The retail market was opened to other suppliers in 2016, allowing final customers to choose their supplier under prices and conditions defined in an electricity supply contract. Participants in the retail market include:

- The final customer, as a legal or natural person who purchases electricity for their own consumption;
- The supplier, as an entity that buys, sells, and resells electricity in its own name and for its own account and holds a license to sell electricity to final customers;
- Closed distribution systems, which have a dual role — acting both as distributors and suppliers.

Despite the measures undertaken, during 2023, only six entities held a license for electricity supply; however, EPCG remained the only active supplier⁸².

Household customers have the right to choose among different tariff models: “basic”, “blue”, “red”, and “green” models (Table 4-20)⁸³.

MODEL	Tariff	PRICE [€/kWh]

⁸² REGAGEN: Report on the State of the Energy Sector for 2023

⁸³ Electricity supply prices for final customers connected to the distribution system, EPCG, 2024

Customers with two-rate metering (households)		
Basic model	VT ⁸⁴	5,2424
	NT	2,6212
Blue model	VT150	4,8434
	NT150	2,4217
	VT+	5,5340
	NT+	2,7670
Red model	JT	4,4932
Green model	VT	5,2424
	NT	2,6212
	Naknada za 100% OIE	0,200
Customers with two-rate metering (other)		
Basic model	VT	5,5340
	NT	2,7670
Green model	VT	5,5340
	NT	2,7670
	100% RES fee	0,200

Table 4-20 Electricity prices for customers (households and other customers) by tariff models

In the last 10 years (from 2014 to 2024), an increase in electricity consumption at the distribution level has been recorded (Table 4-21).

Voltage level	2014 [GWh]	2023 [GWh]	2023/2014
35kV	82,66	108,6	+31,3%
10kV	292,56	397,81	+35,97%
0,4Kv	1640,66	2099,14	+27,94%
Total	2015,88	2605,55	+29.25%

Table 4-21 Comparison of distribution-level consumption with the period ten years earlier

Projections of development with existing policies and measures at least until 2040

The integration (day-ahead and intraday) of Montenegro's wholesale electricity market with the European single energy market is one of Montenegro's strategic goals, bringing benefits such as more reliable electricity supply, greater competition in energy market activities, and the creation of an attractive environment for investors interested in developing generation capacities. This integration will help overcome the disadvantages of small markets, such as price volatility risk and reduced liquidity. The commissioning of the submarine cable connecting the electric power systems of Montenegro and Italy fulfilled a key prerequisite for linking the two markets — the direct physical connection. Recognizing the advantages of establishing an energy border with Italy, Montenegro decided to join the Integrated Balancing and Wholesale Target (IBWT) market directly, as part of its path toward joining the European single energy market.

Ongoing work on legal regulations transposing Regulation (EU) No. 2015/1222 on establishing guidelines for capacity allocation and congestion management (CACM) is crucial to provide a

⁸⁴ VT – High tariff; NT – Low tariff; VT150 – High tariff for the first 150 kWh consumed; VT+ – High tariff for consumption above 150 kWh; JT – general tariff

secure legal framework for connecting Montenegro's electricity market with regional and European markets (market coupling).

Taking into account all the necessary preconditions for integration, it is expected that the day-ahead wholesale market coupling could be established at the beginning of 2027. Afterwards, activities will focus on connecting the market with other regional borders, which will further enhance market stability and functionality.

In this process, the development of the intraday market is also essential, as it is planned to be connected to the European market via the Italian border. Given the growing share of renewable energy sources, this step will be highly important, as it will enable producers to offer their electricity on an hourly basis within the day, thereby reducing the risk of system imbalances.

The integration of Montenegro's market with the European and regional markets will require alignment with new standards to ensure market competitiveness and stability. The implementation of 15-minute trading intervals represents an important step toward market modernization, allowing for better alignment of production and consumption and improved integration of renewable energy sources. Although Montenegro has not yet implemented these changes, the further development of the European market will influence future decisions and adjustments of the Montenegrin market in line with European standards.

4.6 Dimension research, innovation and competitiveness

Current situation in the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis has to be carried out at Union or global level)

A study to provide such information has not been completed for Montenegro.

Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents and current number of researchers

According to the most recent official data on research and development (R&D) statistics, validated by EUROSTAT and dating from 2018⁸⁵, the total domestic expenditure on R&D in Montenegro amounted to 0.50% of GDP, or €23,490,044.00 in gross R&D expenditure. In order to improve this area, the Ministry of Education, Science and Innovation (MPNI) became the official producer of R&D statistics in November 2024⁸⁶. A statistical survey covering the period 2021–2023 is currently underway, with preliminary results expected in May 2025.

Given the lack of official statistical data, state investments can be observed through the annual budget laws, which allocate funds for programmes related to science, innovation, energy efficiency in industry, and capital projects, along with additional incentive mechanisms, as outlined in the Strategy for Scientific Research Activities of Montenegro 2024–2028⁸⁷. The analysis indicated an increase in state investment from €5 million planned in 2021 to almost €15 million in 2024, representing a 200% growth.

It is important to note that official R&D statistics do not allow for the identification of expenditures or personnel data related to low-carbon technologies, nor is it currently possible to isolate the share of R&D investments in energy and green technology sectors. Developing such statistics would require the adaptation of statistical methodologies and tools, although Montenegro's R&D statistics are already fully harmonized with EU statistics. Considering the planned establishment of the Information System for Research and Innovation, which will, among other things, track the number and profiles of researchers, this tool will in the future enable the identification of registered researchers working in low-carbon technology fields.

Therefore, investments can currently be monitored based on identified research and innovation projects focused on low-carbon technologies, financed by the relevant ministry for science and innovation or the Innovation Fund of Montenegro, though this does not include all projects in this field implemented within Montenegro.

⁸⁵ <https://www.gov.me/clanak/227831--objavljeni-finalni-podaci-o-statistici-istrazivanja-i-razvoja-za-2018-godinu>

⁸⁶ <https://www.gov.me/dokumenta/5f7f6eb1-52c5-4b88-8427-d9bae8dbd9be>

⁸⁷ Page 26

During the period 2018–2020, there were 11 such projects with a total value of €803,254.00⁸⁸, co-financed by the Ministry of Science (MN), as follows:

- 2018: €523,879.00 (5 projects);
- 2019: €214,387.00 (3 projects); and
- 2020: €64,988.00 (3 projects).

In the period 2021–2024, an increase was recorded in the number of research and innovation projects in this area — 46 projects with a total value of €4,511,863.88⁸⁹, (co-)financed by the Ministry of Economic Development (MER), the Ministry of Science and Technological Development (MNTR), the Ministry of Education, Science and Innovation (MPNI), and the Innovation Fund of Montenegro (FZI CG), as follows:

- 2021: no relevant projects in this field;
- 2022: €1,157,995.59 (5 projects);
- 2023: €663,507.77 (18 projects); and
- 2024: €2,690,360.52 (23 projects).

Out of 31 patents registered with the Intellectual Property Directorate of the Ministry of Economic Development for the territory of Montenegro in the period 2018–2021, 7 were in the field of low-carbon technologies, of which 6 patents were authored by Montenegrin nationals. During the 2021–2024 period, 1 patent in the field of low-carbon technologies was registered, authored by a Montenegrin national.

Breakdown of current price elements that make up the main three prices components (energy, network and taxes/levies)

Price element	Percent share
Energy	48.46 %
Network	45.12 %
Market Operator	0.015 %
subventions for energy producers from renewable sources, for consumers over 300kWh	6.17 %
VAT	+ 21%

Table 4-22: Breakdown of current price elements that make up the main prices components

Description of energy subsidies including fossil fuels

Subsidies foreseen under the Action plan for energy efficiency 2019-2021

- Subsidy for purchase of electric and hybrid vehicles, up to EUR 5,000 for one buyer; budget for 2021 is EUR 100,000 implemented through Eco Fund of Montenegro
- Subsidized loans (up to EUR 10,000, 0% interest rate, 6-years repayment), for installation of EE heating / cooling systems, thermo-insulation and PV-s in households

⁸⁸ The total value of these projects is €803,254.00, of which €490,182.00 was financed from the state budget, and €313,072.00 represents the beneficiaries' own contribution (including €177,752.00 contributed by the business sector).

⁸⁹ The relevant ministry supported 14 projects with a total value of €1,047,817.89, while the Innovation Fund of Montenegro (FZI CG) supported 32 projects with a total value of €3,464,045.99.

(project: Energy Efficient Home); implemented by Ministry and commercial banks, from 2020 through EBRD-GEFF Residential project. In 2019 the Government subsidized loans with the amount of EUR 100,000 from the budget, where 187 households received loans and installed EE appliances.

- New grant scheme under preparation from 2021: EE measures for sector of commercial services and industry; foreseen total budget of the measure is EUR 25,000. Exploration and preparation of the scheme were supported under EU-IPA project BESME in 2020.
- Subsidies for investments in EE measures for energy supply – transformation, transmission and distribution – infrastructure projects financed by energy subjects; measure introduced since 2011 and has achieved high benefits in cost reductions.

Subsidies for producers of energy from renewable sources

Subsidies for producers of energy from renewable sources were introduced from 2014. The regulating policy of subsidies for electricity produced from renewable sources - solar and wind power plants and small hydro power plants is the Regulation on the fee for encouraging the production of electricity from renewable sources and highly efficient cogeneration. There are currently 28 small hydropower plants, two wind farms and five solar power plants up to one megawatt (MW). According to data from the Montenegrin electricity market operator (COTEE) in 2020, EUR 19.42 M incentives was paid to privileged producers and totally from May 2014 to the end of 2020, a total of EUR 52.25 M. The Regulation also stipulates that electricity end customers from the households' category are exempted from paying the fee for stimulating production from renewable energy sources for the first 300 kilowatt hours (kWh) of electricity consumed on a monthly basis. The producer exercises the right to incentivizing measures on the basis of the decision of the Energy Regulatory Agency and regulated communal activities. Based on that decision, a purchase agreement is concluded with COTEE, on the basis of which the payment is made.

In April 2021 there were 23 producers with the status of privileged producer and 20 producers with the status of temporarily privileged producers. Among the privileged producers, there are small hydropower plants (18), wind power plants (2) and solar power plants (8). Among the temporarily privileged producers, there are small hydropower plants (11) and solar power plants (9). Further construction of the small hydro power plants has been banned by the Government, in 2021, while the existing concession agreements are under revision.

Subsidies for fossil fuel production

The electricity generation capacity from coal accounts for 21.9% of the total capacity and 41% of the production. The only thermal power plant operates as a part of the majority state-owned company Elektroprivreda Crne Gore (EPCG). The Pljevlja Thermal Power Plant is supplied with coal from the Pljevlja coal mine, which in 2018 became wholly-owned by EPCG. In line with the study *An analysis of Direct Subsidies to Coal and Lignite Electricity Production in the Energy Community Contracting Parties 2018–2019* (Miljević 2020), estimated amount of subsidies in Montenegro during the observed period was EUR 1.14 million. Fiscal support includes the arrears of the Pljevlja coal mine in tax and contributions, which the government consolidated and reprogrammed over five years, with 2017 as the repayment starting date. Public finance subsidies are related to a government guaranteed loan provided by KfW to the TPP. Finally there was no state-owned enterprise investment support during the 2018–2019. More data can be found in the following tables, produced within the above mentioned study on coal subsidies.

Activity / instrument	2018	2019	2018–2019 average per year
Fiscal support	0,36	0,16	0,26
Public finance support	0,37	0,25	0,31
SOE investment support	0,00	0,00	0,00
TOTAL:	0,73	0,41	0,57

Table 4-23: Estimated amount of subsidies in Montenegro in EUR million (Miljević 2020)

Electricity Facts and Figures	2015	2016	2017	2018	2019
Description of data (unit)					
Electricity production [GWh]	2.872	3.023	2.343	3.744	3.383
Gross electricity consumption [GWh]	3.466	3.328	4.744	3.468	3.461
Final consumption of electricity [GWh]	2.876	2.794	4.210	2.945	2.967
Consumption structure [GWh]					
Industrial, transport, services and other non-residential sectors	1.625	1.543	2.924	1.659	1.677
Households (residential customers)	1.251	1.251	1.286	1.286	1.290
Capacity of power plants [MW] by source:					
Coal-fired	219	219	219	219	225
Hydro	668	674	681	682	684
Other renewable	0	0	72	72	120
Electricity generation in coal-fired TPP [GWh]	1.412	1.216	1.265	1.444	1.390
Share of coal-fired el. generation in total el. production	49%	40%	54%	39%	41%
Share of coal-fired el. generation in final el. consumption	49%	44%	30%	49%	47%

Table 4-24: Overview of electricity generation in Montenegro (Miljević 2020)

5 ASSESSMENT OF IMPACTS OF PLANNED POLICIES AND MEASURES

5.1 Impacts of planned policies and measures described in section 3 on energy system and ghg emissions and removals, including comparison to projections with existing policies and measures (as described in section 4)

This section addresses the impacts of planned policies and measures described in Chapter 3 on the energy system and GHG emissions and removals, including a comparison to projections with existing policies and measures (as described in section 4). As discussed below, one of the key parameters of the energy and GHG balance is the operation of the thermal power plant in Pljevlja.

5.1.1 Projections of the development of the energy system and ghg emissions and removals as well as, where relevant, of emissions of air pollutants in accordance with directive (EU) 2016/2284 under the planned policies and measures at least until ten year after the period covered by the plan (including for the last year of the period covered by the plan), including relevant union policies and measures

The scenario presented in this section is the scenario With Additional Measures (WAM). This scenario includes the phasing out the use of the thermal power plant in Pljevlja which remains in operation until 2040. The power plant is currently a major source of emissions in Montenegro. This scenario is named WAM in the following table (in the figures we use the full description *WAM 0: WAM Additional measures until Pljevlja 4.5khours*). The main difference in the operation of the Pljevlja Thermal Power Plant (TPP) between the WEM and WAM scenarios lies in the number of annual operating hours at maximum capacity. In the WAM scenario, this number is reduced to 4,500 hours (*4.5khours*), starting from 2030 until the plant's decommissioning (as previously mentioned, the exact year of decommissioning depends on the dynamics of the Just Transition Plan implementation, while 2040 is assumed here for the purpose of modeling the impact on national targets), in order to achieve the national greenhouse gas (GHG) emission reduction target by 2030.

The following table gives an overview of relevant 2030 target values without accounting for negative emissions from LULUCF. Details and more time steps are given in the following subsections.

		WEM	WAM
Energy demand	Absolute values	9505.3 GWh	8974.1 GWh
	Reduction relative to 2022	+6.8%	+1.3% (-5.5% reduction relative to WEM)
Renewable energy share	RES E	66.3%	79.4%
	RES overall	42.5%	53.3%

GHG emissions	Absolute values	3058.7 kt CO ₂ eq	2401.1 kt CO ₂ eq
	Reduction relative to 2022	-7.5%	-27.4%

Table 5-1 Overview of energy efficiency, renewable energy share and GHG emission target values (year 2030) achieved in WEM and the WAM scenario.

5.2 Impacts of planned additional policies and measures

This section describes the development of GHG emissions, renewable energy shares and energy efficiency targets of the scenario considering the additional policies and measures described under Chapter 3. It is referred to as WAM scenario in the following text and tables (it is referred to as *WAM additional measures but Pljevlja 4.5 khours* in the figures).

5.2.1 Dimension Decarbonisation

5.2.1.1 Greenhouse gas emissions with LULUCF

In terms of GHG emissions with LULUCF, the WEM scenario leads to total emissions of 618 kt CO₂eq in 2030, whereas the values in WAM reach -216 kt CO₂eq, which corresponds to a reduction of -101.5% relative to WEM values. Table 5-2 shows an overview of values for WEM and WAM. In comparison with the base year 2022, WAM entails a decrease of 126.3 % in 2030, with a further decrease of emissions seen in the years after 2030, reaching values 333.2% below 2022 in 2050. The WEM scenario sees also decrease of emissions by 24.7% in 2030 and a decrease by 81.7% in 2050. Table 5-2 lists the values shown in the figures for historic years (2010, 2015, 2018, 2022) as well as projections for 2025, 2030, 2035, 2040, 2045 and 2050.

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
WAM										
Demand	846	909	1,011	1,018	1,020	814	642	531	471	413
Transformation	1,366	1,587	1,550	1,530	428	1,014	1,014	1,014	36	36
Non Energy	407	-1,457	-1,461	-1,726	-1,866	-2,043	-2,125	-2,217	-2,339	-2,365
Total WAM	2,619	1,039	1,099	821	-419	-216	-469	-672	-1,832	-1,916
WAM reduction relative to 2022 [%]					-151.0%	-126.3%	-157.2%	-181.8%	-323.0%	-333.2%
WEM										
Demand	846	909	1,011	1,018	1,044	1,049	1,006	948	892	838
Transformation	1,366	1,587	1,550	1,530	428	1,281	1,276	1,271	1,266	1,261
Non Energy	407	-1,457	-1,461	-1,726	-1,682	-1,711	-1,771	-1,840	-1,945	-1,949
Total WEM	2,619	1,039	1,099	821	-210	618	511	379	212	151
WEM reduction relative to 2022 [%]					-125.6%	-24.7%	-37.8%	-53.8%	-74.1%	-81.7%
Relative reduction (WAM vs. WEM) [%]					-25.4%	-101.5%	-119.4%	-128.0%	-248.9%	-251.6%

Table 5-2: GHG emissions (in Thousand Tonnes of CO₂eq) for the whole economy in the WEM and WAM scenarios

The following figures give an overview of the sectoral split of GHG emissions in WAM (note that the results are presented in five year intervals after 2030). Starting with the total emissions in Figure 60 and sectoral direct emissions in Figure 61. Figure 62 and Figure 63 show the difference of the emissions to the WEM scenario. The drop in emissions in 2025 is connected with the rehabilitation of the thermal power plant, which will not be available at full capacity during part of the year.

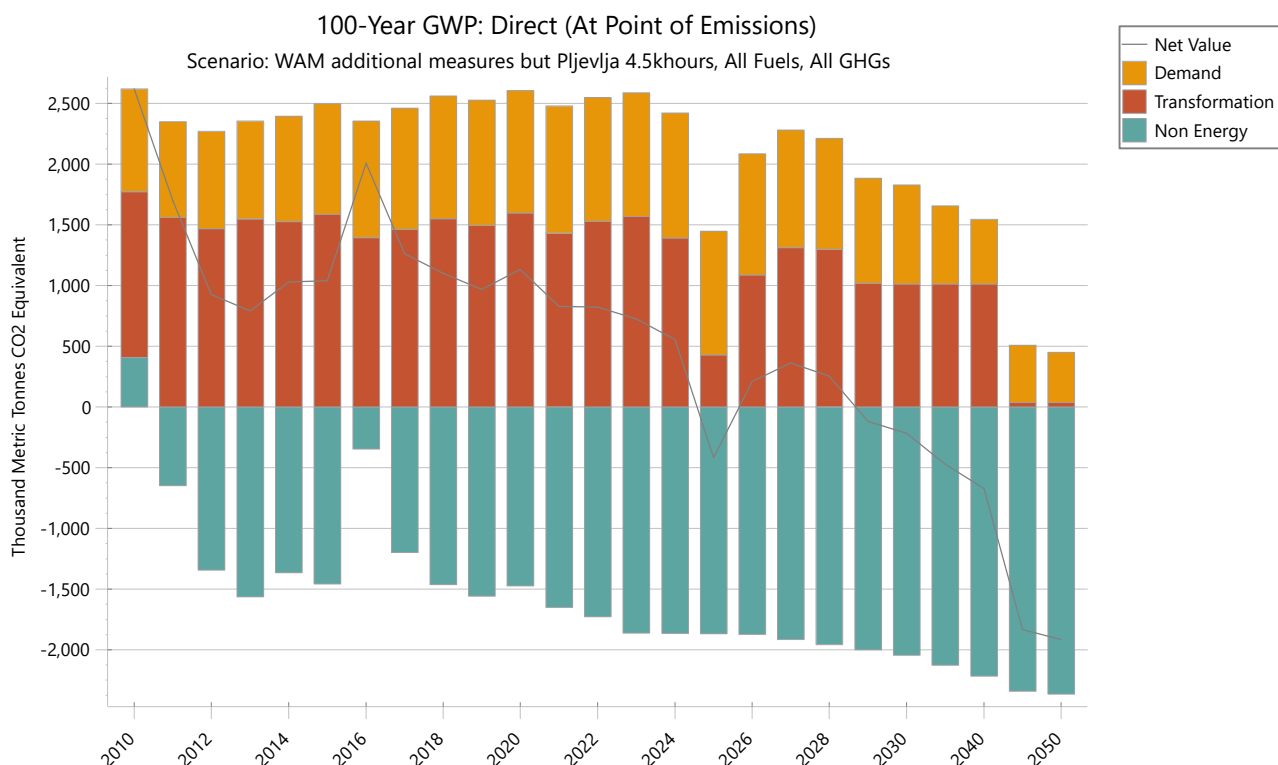


Figure 60: GHG emissions (CO₂eq) for the whole economy for the historic years 2010-2022 and as projected for 2023-2050 on sectoral level.

As can be seen in Figure 63, until 2040 the largest part of emissions reduction appears in the non-energy and demand sectors, while by 2045 the largest part of emissions reduction is due to the transformation sector and the phasing out of the thermal power plant.

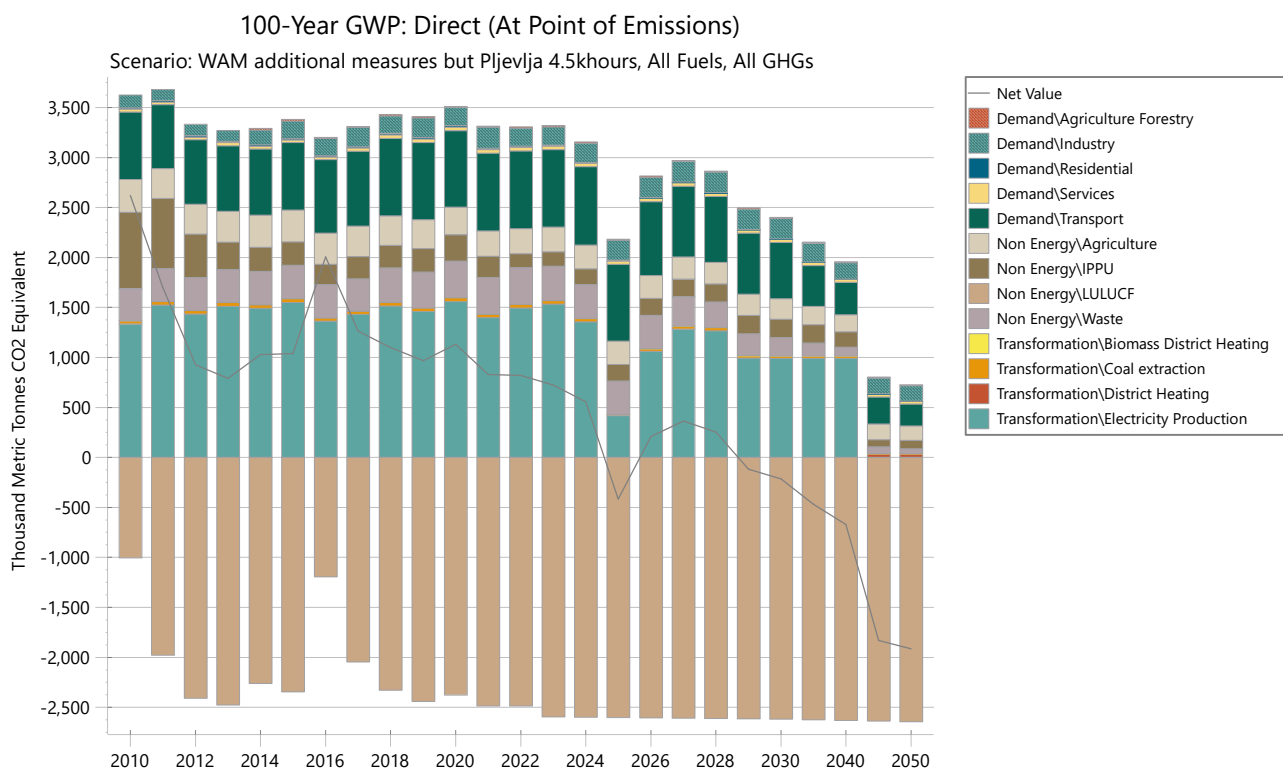


Figure 61: GHG emissions (CO₂eq) for the whole economy for the historic years 2010-2022 and as projected for 2023-2050 on sub-sectoral level.

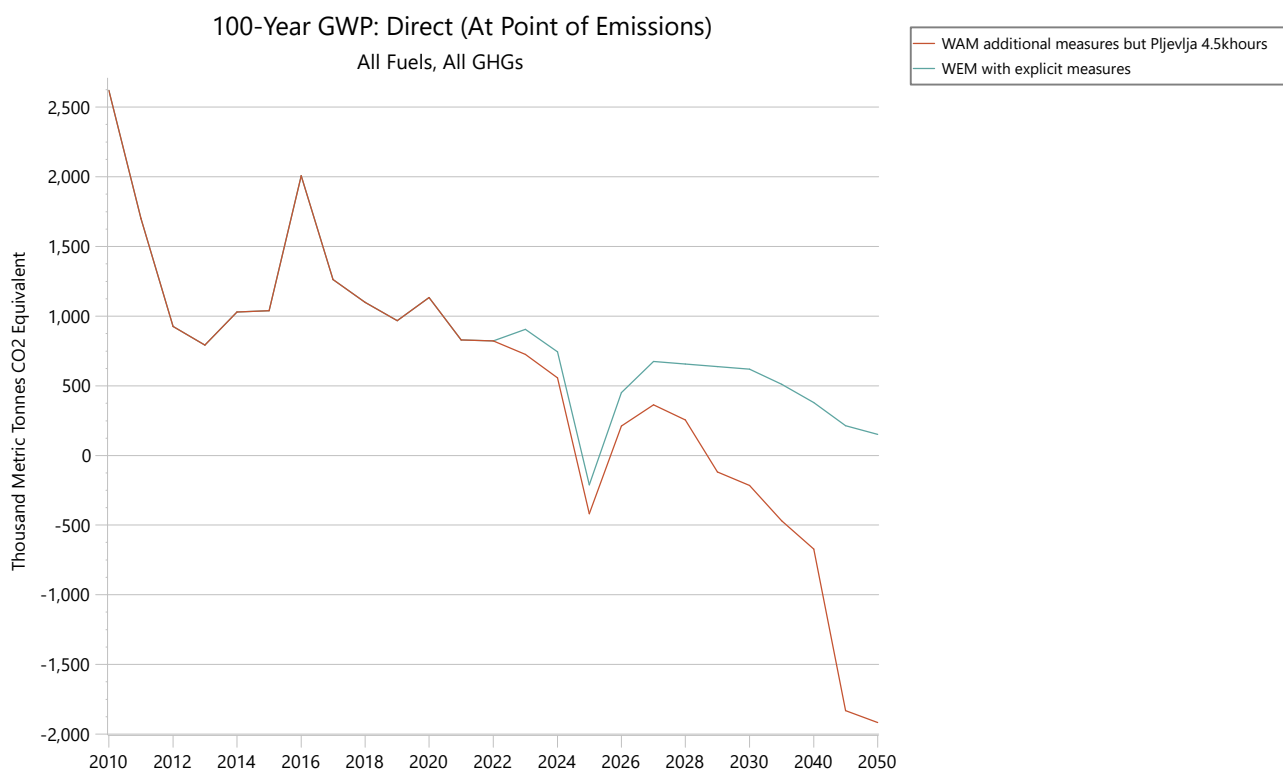


Figure 62: GHG emissions (CO₂eq) for the whole economy for the historic years 2010-2022 and as projected for 2023-2050, WAM and WEM

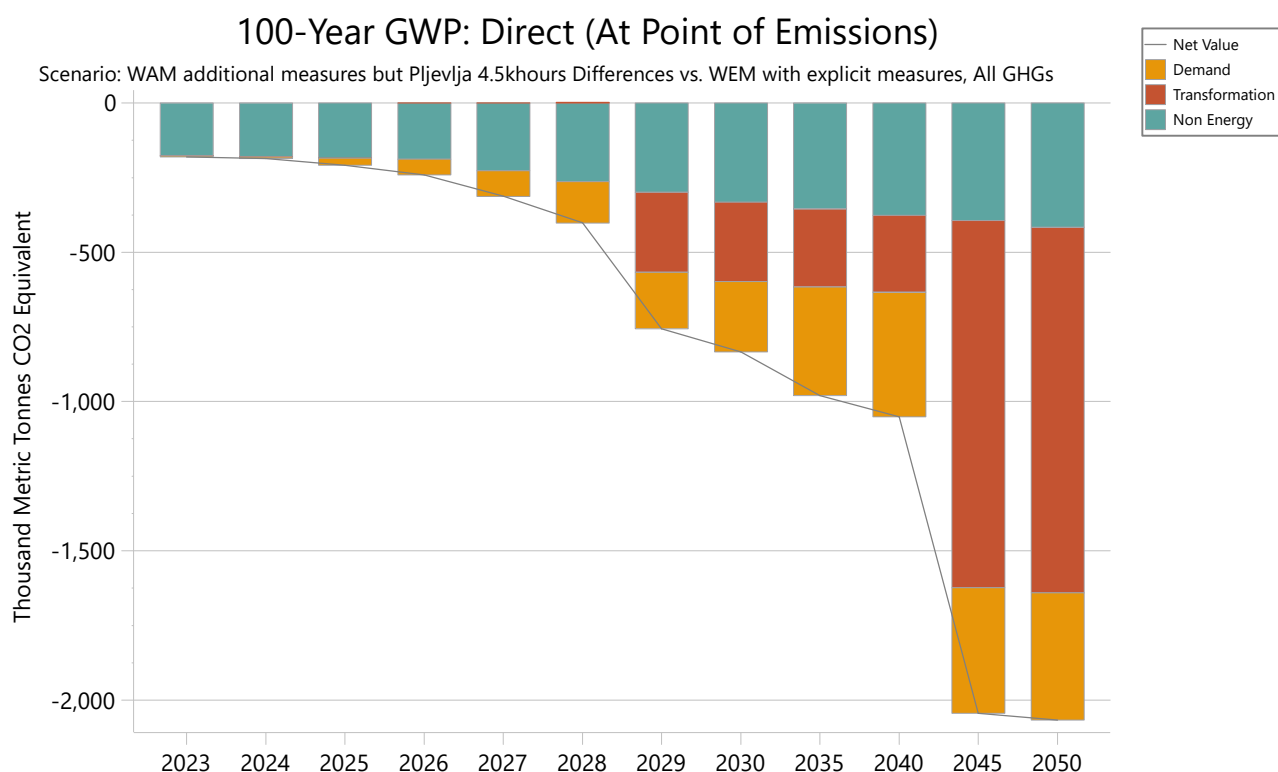


Figure 63: GHG emissions (CO₂eq) for the whole economy for the historic years 2010-2022 and as projected for 2023-2050 (WAM). Differences between WAM and WEM broken down into subcategories.

5.2.1.2 Renewable energy share

The renewable energy share is calculated according to EUROSTAT SHARES methodology. The SHARES method accounts for the share of renewable electricity (RES E), which is one of the basic starting points. RES-E is used in the overall share of renewable energy (RES) and the renewable energy share in the transport sector (RES T). In addition, SHARES accounts for the share of renewable energy in heating and cooling other than electricity (RES HC).

The following Figure 64 shows RES E, RES T and overall RES share. For RES E, it is interesting to note that the share in WAM first increases in discrete steps and then decreases and again increases at the end. This behaviour is a statistical artefact when combining the plans for hydro power plants (large power plants in Komarnica and Krusevo coming online) with the SHARES methodology. The RES E share according to SHARES foresees to multiply the average availability of hydro power plants (average over the past 15 years) with the current capacity to calculate the average generation from hydro power plants in a certain year. Even if a part of the new capacity is not used, the average availability will first be the same as previously (hence a stepwise increase) and then only gradually drop (the decline seen afterwards). In this special case, the RES E share according to SHARES strongly deviates from the measurable RES share. The top right panel of the Figure 64 therefore also gives the simple RES E share, where no normalisation is applied to the hydro power plants. A similar logic applies to wind power (averaged over four years), but this is of less strong influence as wind power plays only a limited role currently and new capacities are actually used by the model.

The overall RES share (bottom left panel) is also influenced by these statistical effects in WAM. When assessing the RES T share (bottom right), it needs to be considered that these values are also strongly influenced by the multipliers applied to certain parts of the energy demand in numerator and denominator, so it should not be mistaken as the measurable share of renewable energy in the transport sector.

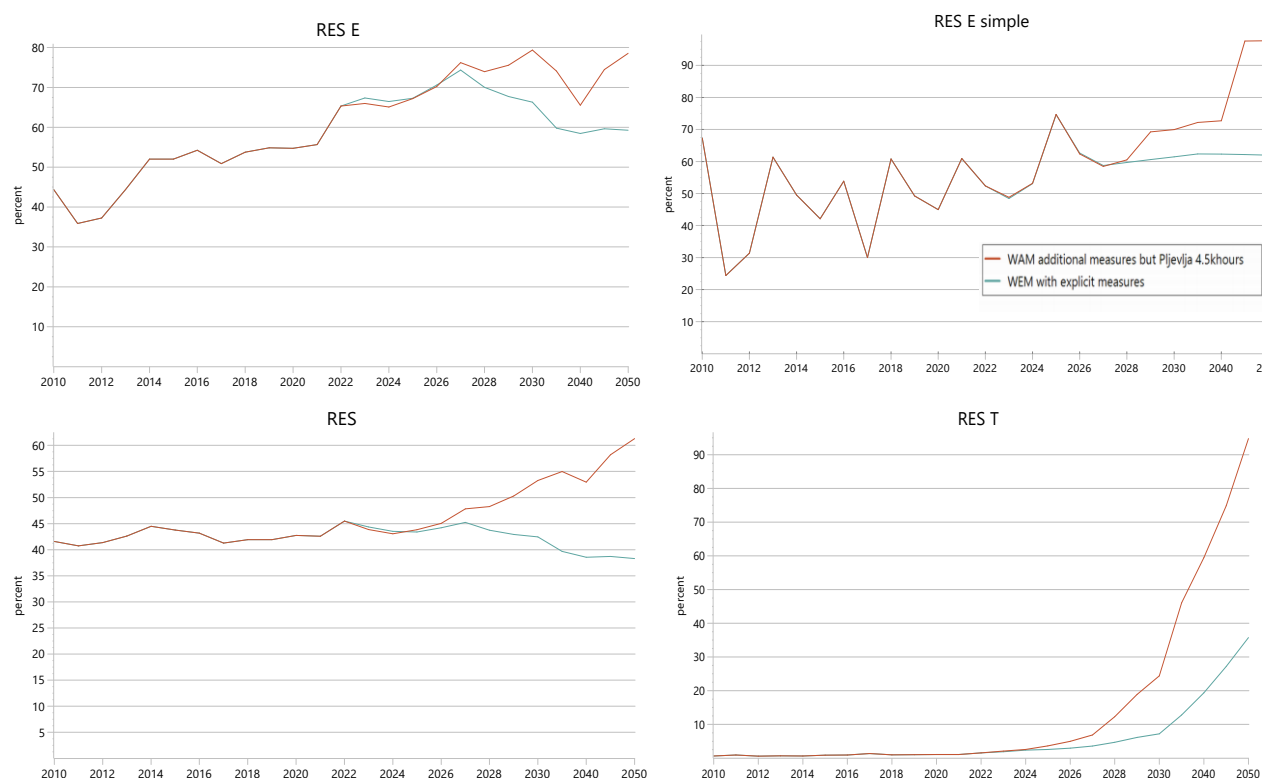


Figure 64: Overview of the different RES shares (%) for the WEM (blue) and WAM (red) scenario

For completeness, the following table gives the numbers for different renewable energy indicators in WEM and WAM.

	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
WEM										
RES E	44.4	52.0	53.7	65.3	67.3	66.3	59.8	58.5	59.6	59.3
RES E simple	67.4	42.1	60.8	52.4	74.6	61.5	62.4	62.3	62.2	62.0
RES T	0.6	0.9	0.9	1.5	2.5	7.2	12.8	19.4	27.2	35.8
RES HC	65.5	61.9	58.8	63.1	55.2	48.8	43.9	39.7	36.0	32.5
RES	41.6	43.8	41.9	45.5	43.4	42.5	39.7	38.5	38.7	38.3
WAM										
RES E	44.4	52.0	53.7	65.3	67.2	79.4	74.1	65.6	74.5	78.6
RES E simple	67.4	42.1	60.8	52.4	74.7	70.0	72.2	72.7	97.6	97.7
RES T	0.6	0.9	0.9	1.5	3.6	24.4	46.1	59.5	74.9	94.8
RES HC	65.5	61.9	58.8	63.1	54.6	49.2	48.7	49.1	47.5	46.1

RES	41.6	43.8	41.9	45.5	43.8	53.3	55.0	53.0	58.2	61.3

Table 5-3: Renewable energy indicators given in percent for the WEM and WAM scenario

5.2.2 Dimension Energy Efficiency

This section details projections with underlying additional measures for the energy consumption of the economy. It starts with an overview of primary energy supply for all fuels, followed by an assessment of final energy demands, also in a sectoral view of final energy consumption.

5.2.2.1 Primary energy supply

For an analysis of primary energy supply, Table 5-4 shows a comparison of primary energy supply in the WEM scenario (from Chapter 4) and the WAM scenario (this chapter). In both scenarios, net energy demand is slightly decreasing in total towards 2050. While in the WEM scenario, net primary energy consumption increases (compared to 2022) by 0.5 % until 2030 and decreases by 8.4 % until 2050. In the WAM scenario, it decreases by 6.4% in 2030 compared to 2022 and decreases by 32% in 2050. Comparatively, the consumption in the WAM scenario decreases compared to the WEM scenario by 6.9 % in 2030 and 23.6 % in 2050.

Branch	2010	2015	2018	2022	2025	2030	2035	2040	2045	2050
WAM										
Exports	-	-	-	-	-	-	-	0	0	-
Imports	309.8	366.0	372.4	356.0	419.2	361.9	313.6	286.6	273.3	260.6
Production	724.5	682.5	736.1	676.8	467.6	604.6	612.8	603.9	450.6	441.9
Total WAM	1,034.2	1,048.5	1,108.5	1,032.8	886.9	966.6	926.4	890.6	723.9	702.6
WAM reduction relative to 2022 [%]					-14.1%	-6.4%	-10.3%	-13.8%	-29.9%	-32.0%
WEM										
Exports	-	-	-	-	-	-	-	-	-	-
Imports	309.8	366.0	372.4	356.0	419.7	400.5	394.9	380.8	367.8	356.6
Production	724.5	682.5	736.1	676.8	468.0	637.4	632.4	614.5	601.0	589.3
Total WEM	1,034.2	1,048.5	1,108.5	1,032.8	887.7	1,037.9	1,027.3	995.2	968.8	945.9
WEM reduction relative to 2022 [%]					-14.0%	0.5%	-0.5%	-3.6%	-6.2%	-8.4%
Relative reduction (WAM vs. WEM) [%]					-0.1%	-6.9%	-9.8%	-10.1%	-23.7%	-23.6%

Table 5-4: Primary energy supply [ktoe] in WAM and WEM scenarios

Figure 65 to Figure 68 show the primary energy supply broken down by energy source as well as a comparison between the WEM and WAM scenarios for the years up to 2050. The drop in in primary energy consumption in 2025 is connected with the rehabilitation of the thermal power plant, as already mentioned above.

Primary Supply

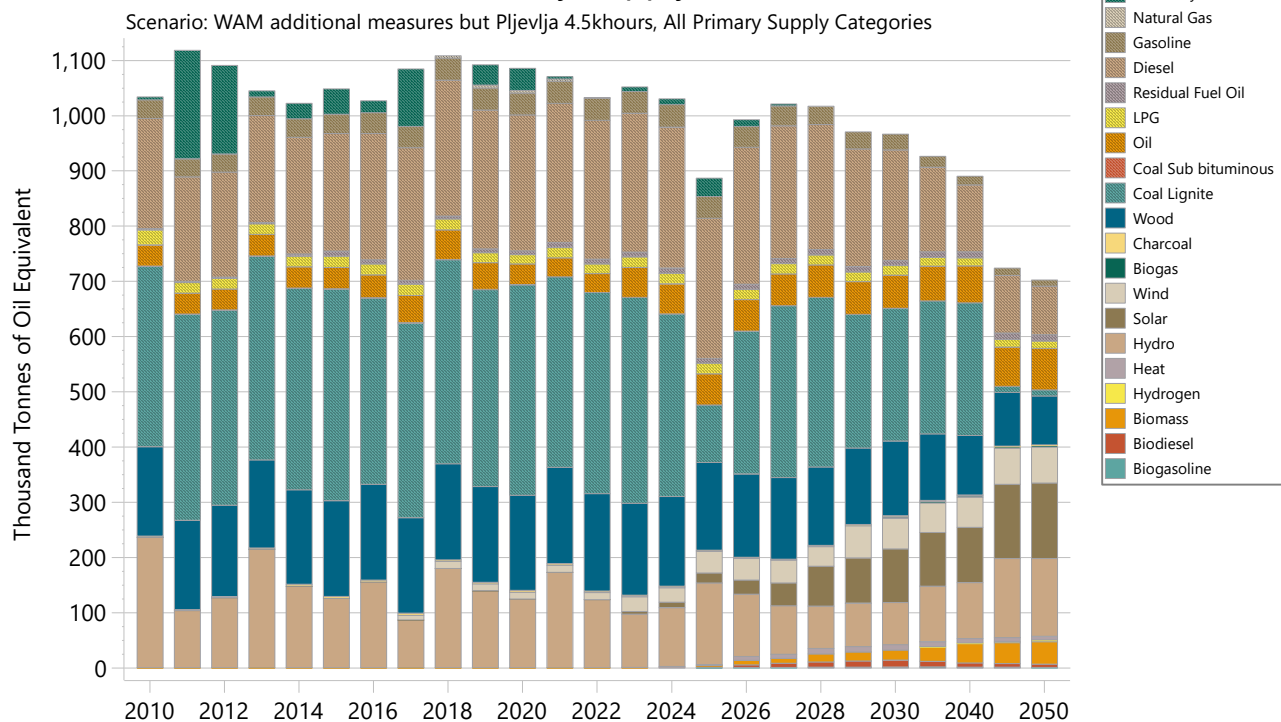


Figure 65: Primary energy supply by fuels (in ktoe) for historic years 2010-2022 and as projected up to the year 2050 with additional measures

Primary Supply

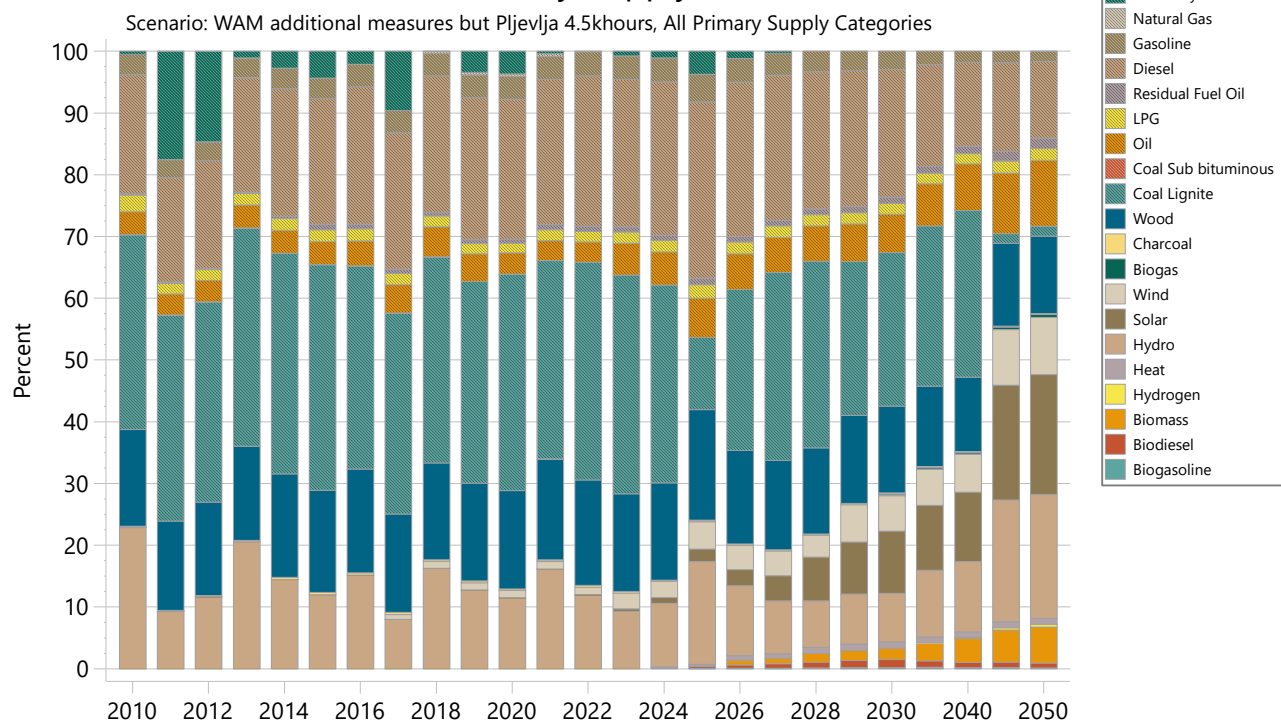


Figure 66: Share of primary energy supply by fuels (in %) for historic years 2010-2022 and as projected up to the year 2050 with additional measures

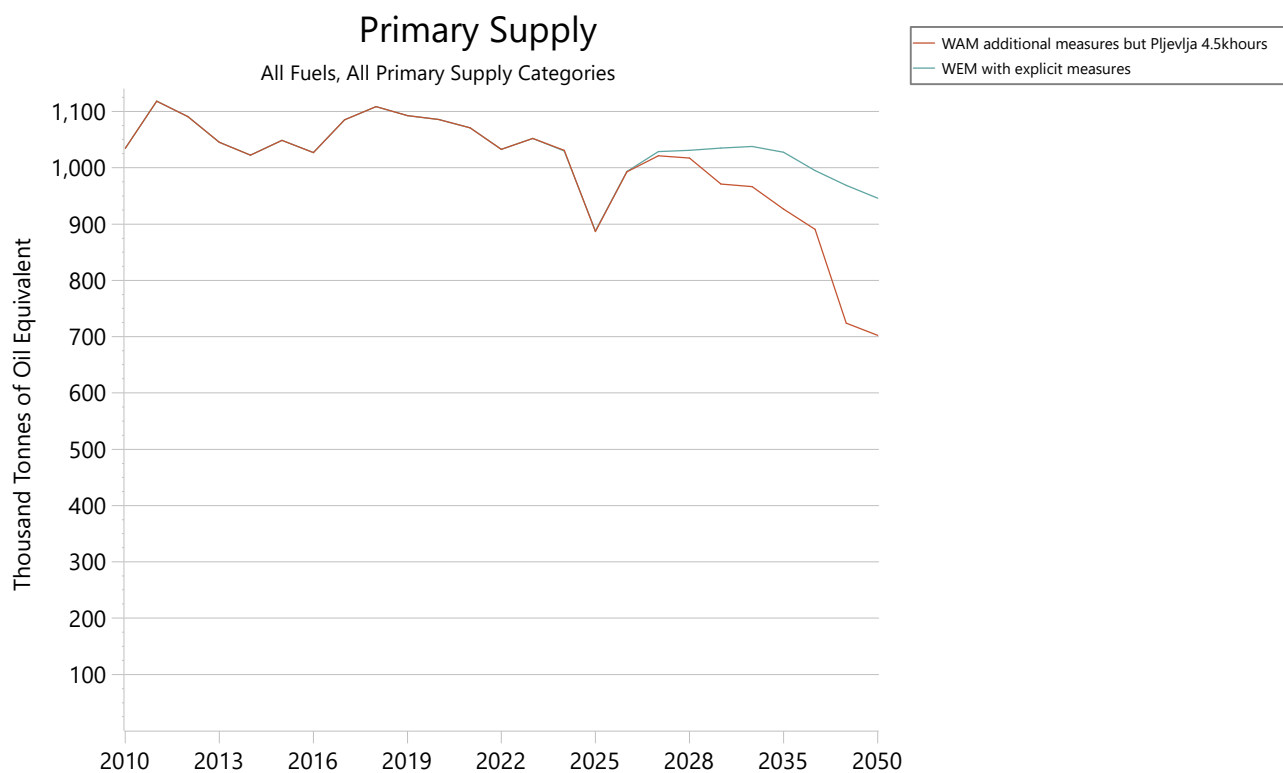


Figure 67: Net value of primary energy supply for historic years 2010-2022 and as projected for 2023-2050, WAM and WEM

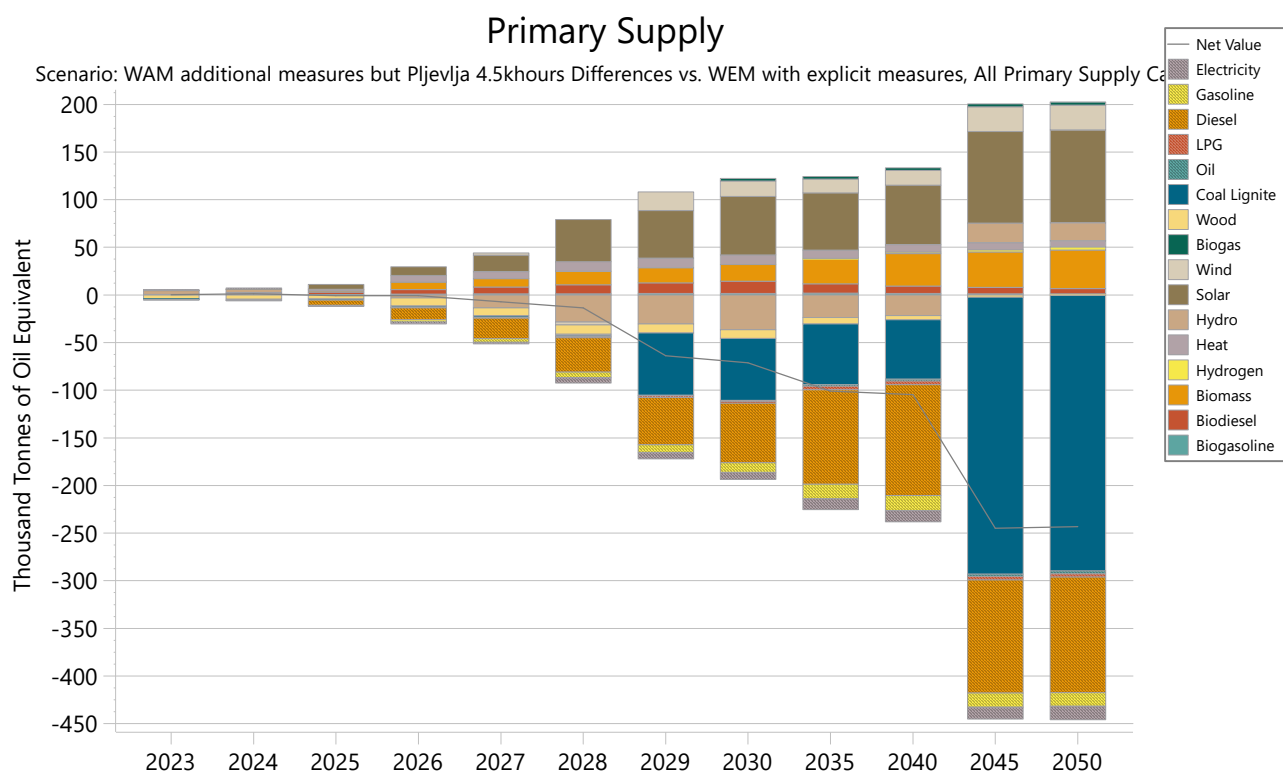


Figure 68: Primary energy supply projected up to the year 2050. Differences between WAM and WEM broken down into subcategories.

5.2.2.2 Final energy demand

To assess the final energy demand in the Montenegrin economy, Table 5-5 shows a comparison of final energy consumption of energy demand sectors between the WEM scenario (from Chapter 4) and the WAM scenario (this chapter).

While in the WEM scenario, final energy consumption increases (compared to 2022) by 7.3 % until 2030 but then decreases by 3.8 % in 2050. WAM scenario increases by 1.3 % until 2030 and then decreases by 14.2 % in 2050. Comparatively, the final energy consumption in the WAM scenario decreases compared to the WEM scenario by 6 % in 2030 and 10.4 % in 2050.

Branch	2010	2018	2020	2022	2025	2030	2035	2040	2045	2050
WAM										
Residential	264.3	276.8	278.0	277.8	257.4	231.5	208.4	188.2	174.2	162.4
Services	65.0	68.1	89.6	89.6	89.4	92.4	92.7	89.4	85.3	82.1
Industry	172.6	141.4	145.0	103.6	127.4	179.2	203.7	209.9	216.2	222.4
Transport	226.5	225.0	257.8	259.3	259.8	210.2	164.0	142.2	126.9	111.7
Agriculture Forestry	4.3	8.4	5.6	5.6	5.6	5.5	5.4	5.4	5.3	5.3
Non Energy	31.9	32.8	45.2	25.6	48.6	52.8	56.6	61.0	65.4	69.7
Total WAM	764.6	752.6	821.1	761.6	788.2	771.6	730.8	696.2	673.4	653.6
WAM reduction relative to 2022 [%]					3.5%	1.3%	-4.0%	-8.6%	-11.6%	-14.2%
WEM										
Residential	264.3	276.8	278.0	277.8	257.4	231.5	208.4	188.2	174.2	162.4
Services	65.0	68.1	89.6	89.6	89.4	92.4	92.7	89.4	85.3	82.1
Industry	172.6	141.4	145.0	103.6	127.6	181.9	206.7	212.6	218.5	224.4
Transport	226.5	225.0	257.8	259.3	262.1	252.2	235.6	218.7	201.9	185.6
Agriculture Forestry	4.3	8.4	5.6	5.6	5.6	5.5	5.4	5.4	5.3	5.3
Non Energy	31.9	32.8	45.2	25.6	48.6	53.8	58.4	63.1	67.9	72.6
Total WEM	764.6	752.6	821.1	761.6	790.7	817.3	807.2	777.5	753.2	732.4
WEM reduction relative to 2022 [%]					3.8%	7.3%	6.0%	2.1%	-1.1%	-3.8%
Relative reduction (WAM vs. WEM) [%]					-0.3%	-6.0%	-10.0%	-10.7%	-10.5%	-10.4%

Table 5-5: Final energy consumption (ktoe) for energy demand sectors in the WEM and WAM scenarios

Figure 69 to Figure 76 show the final energy demand broken down by sector, sub-sector and energy source as well as a comparison between the WEM and WAM scenarios for the years up to 2050. As can be seen in Figure 75, major reduction in final energy consumption between the two scenarios is attributed to the transportation sector.

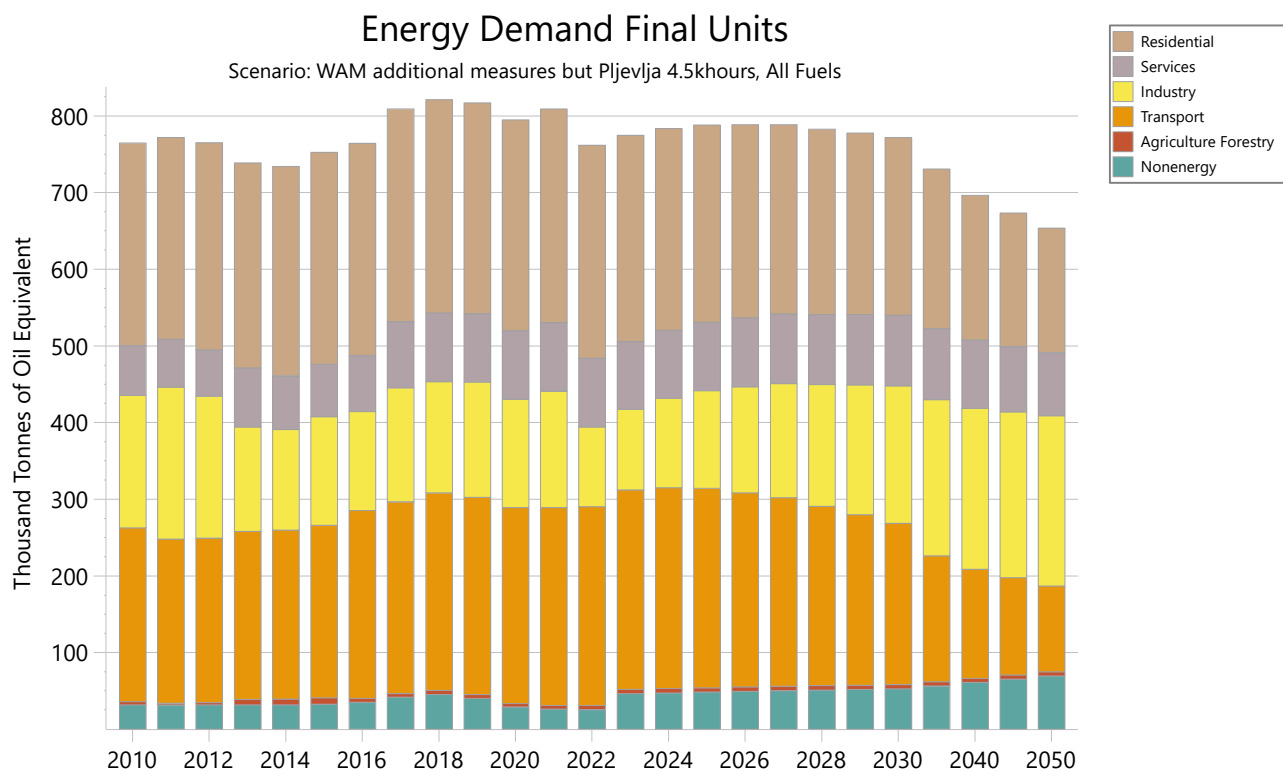


Figure 69: Final energy demand for the demand sectors for historic years 2010-2022 and as projected up to the year 2050 with additional measures

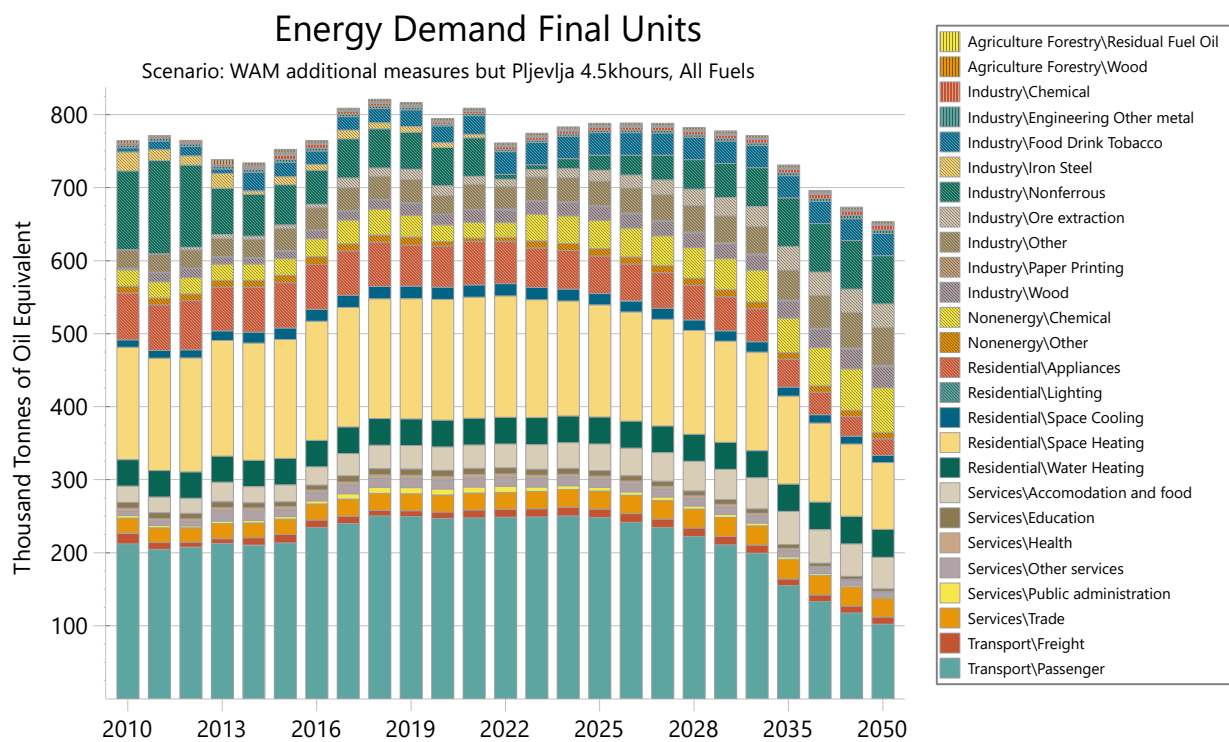


Figure 70: Final energy demand for the demand sub-sectors for historic years 2010-2022 and as projected up to the year 2050 with additional measures

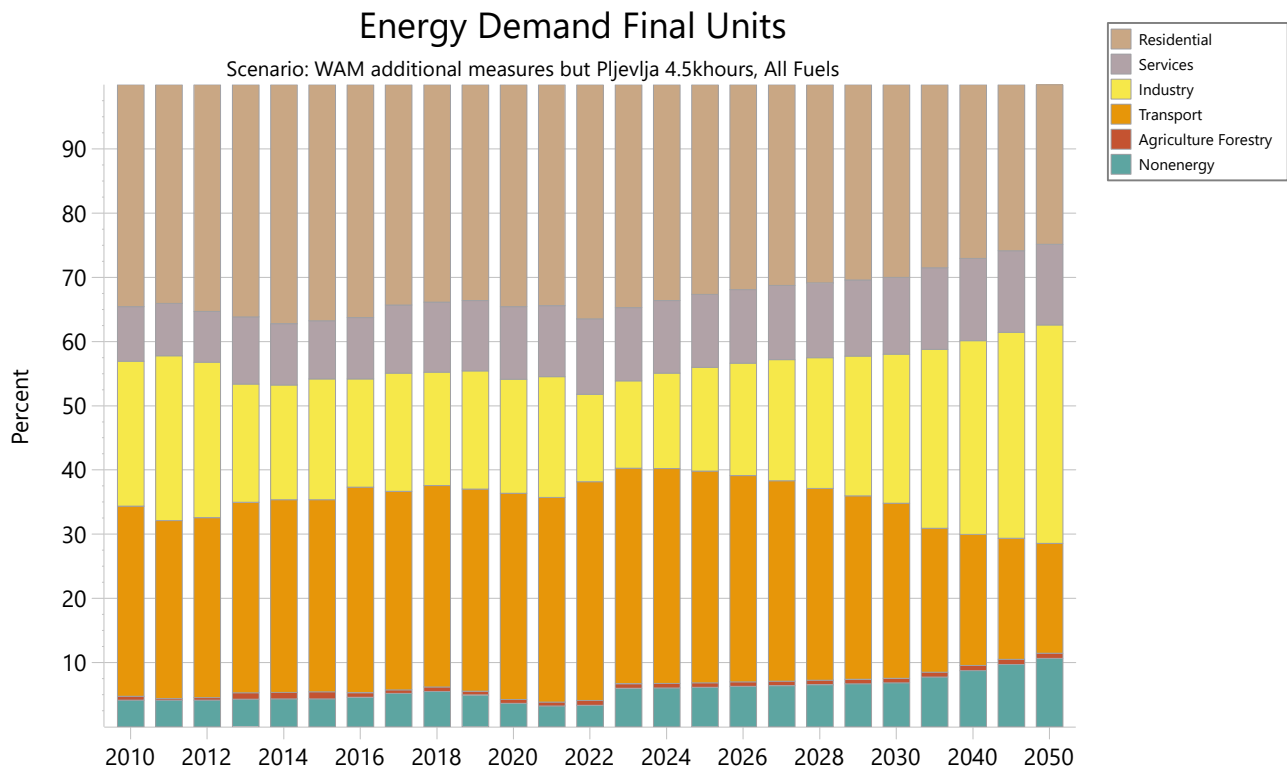


Figure 71: Shares of final energy demand for the demand sectors for historic years 2010-2022 and as projected up to the year 2050 with additional measures

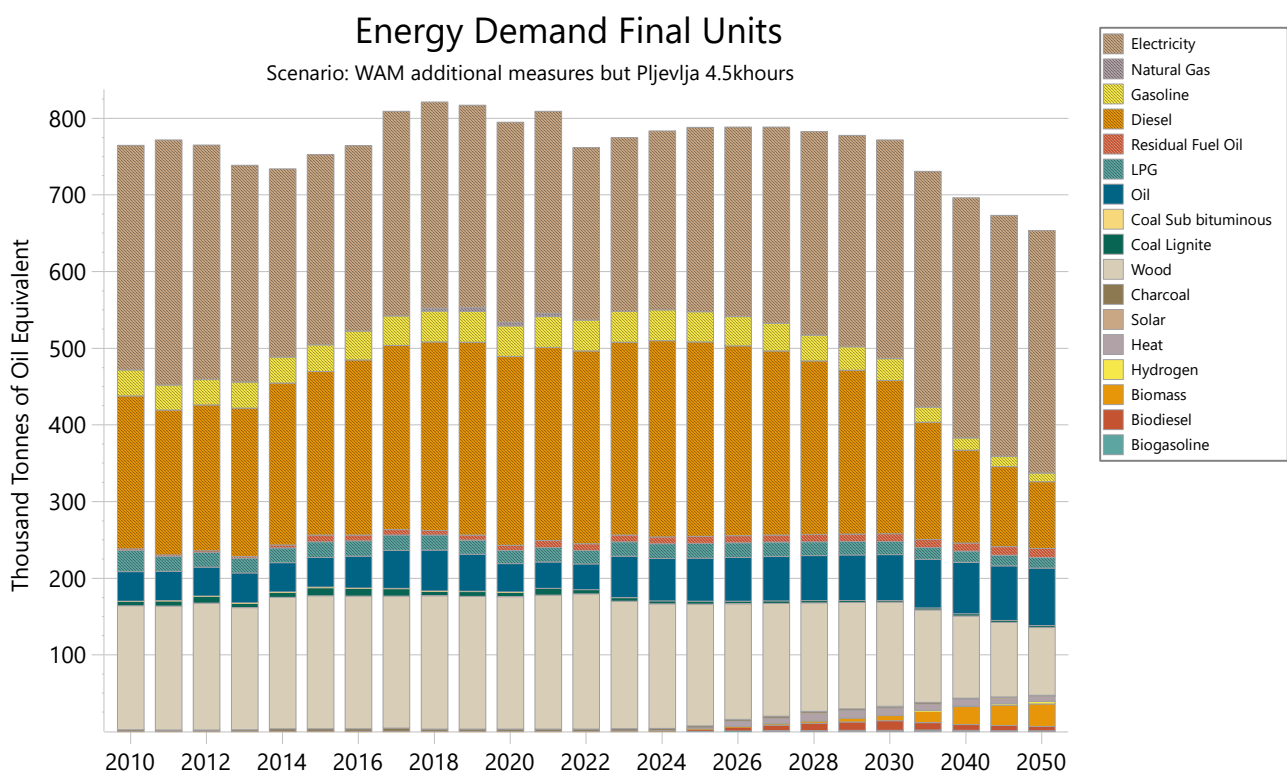


Figure 72: Fuel split underlying the final energy consumption (ktoe) for all main demand sectors for historic values from 2010-2022 and as projected until 2050

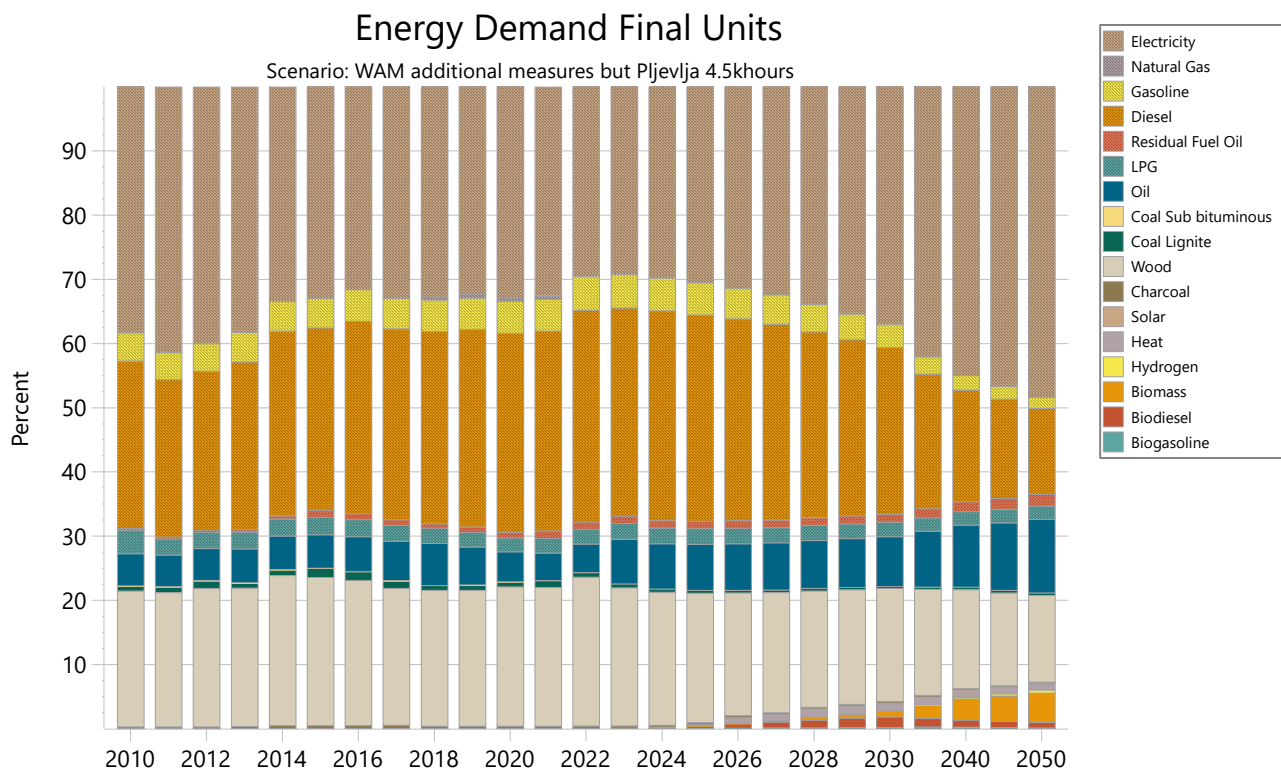


Figure 73: Share of fuel split underlying the final energy consumption (%) for all main demand sectors for historic values from 2010-2022 and as projected until 2050

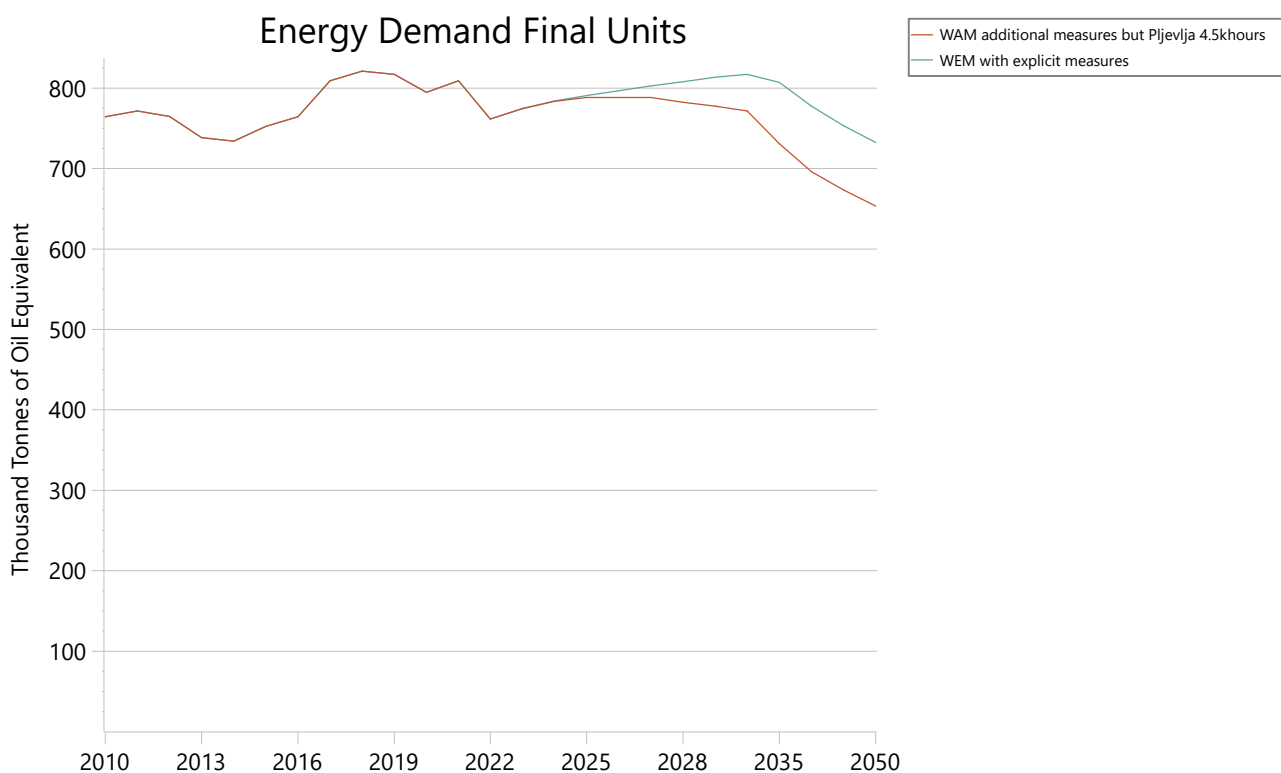


Figure 74: Final energy consumption (ktoe) for all main demand sectors for historic values from 2010-2022 and as projected until 2050, Scenario comparison with the WEM scenario presented in Chapter 4.

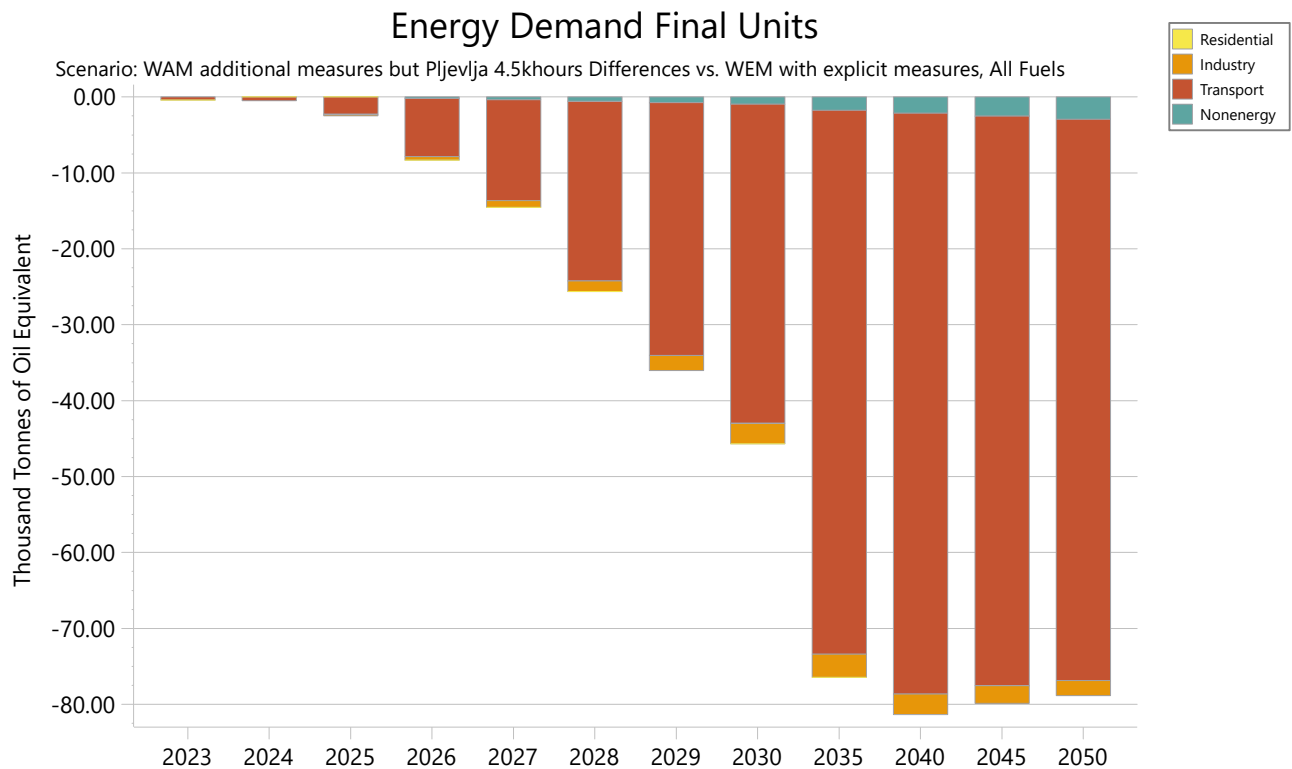


Figure 75: Final energy consumption (ktOE) for all main demand sectors as projected until 2050, Differences between WAM and WEM broken down into subcategories.

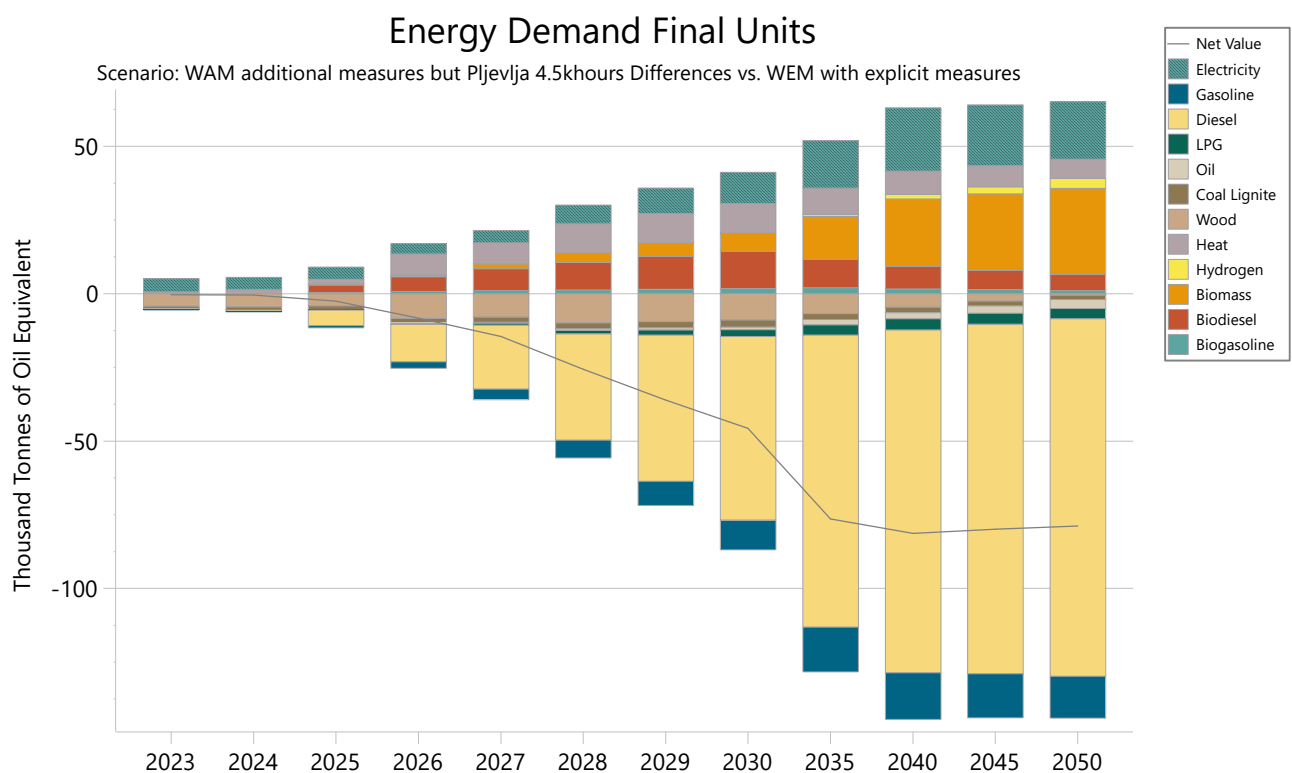


Figure 76: Final energy consumption (ktOE) for all main demand sectors by fuel as projected until 2050, Differences between WAM and WEM broken down into subcategories.

5.2.3 Dimension Energy Security

Electricity import shares

With regard to the energy security of the Montenegrin energy system, the power sector is of particular interest. Therefore, in the following, the development of electricity imports, generation and demand until 2050 is compared for the WAM and WEM scenarios. Figure 77 and Figure 78 combine this information in one graph for WAM and WEM scenario, respectively, and additionally show the import shares relative to the electricity generation each year. The respective numbers for selected historical years as well as the projected values are listed in Table 5-6. As these figures show, the WAM scenario reduces the import dependency for electricity as the installed capacity can supply the total demand.

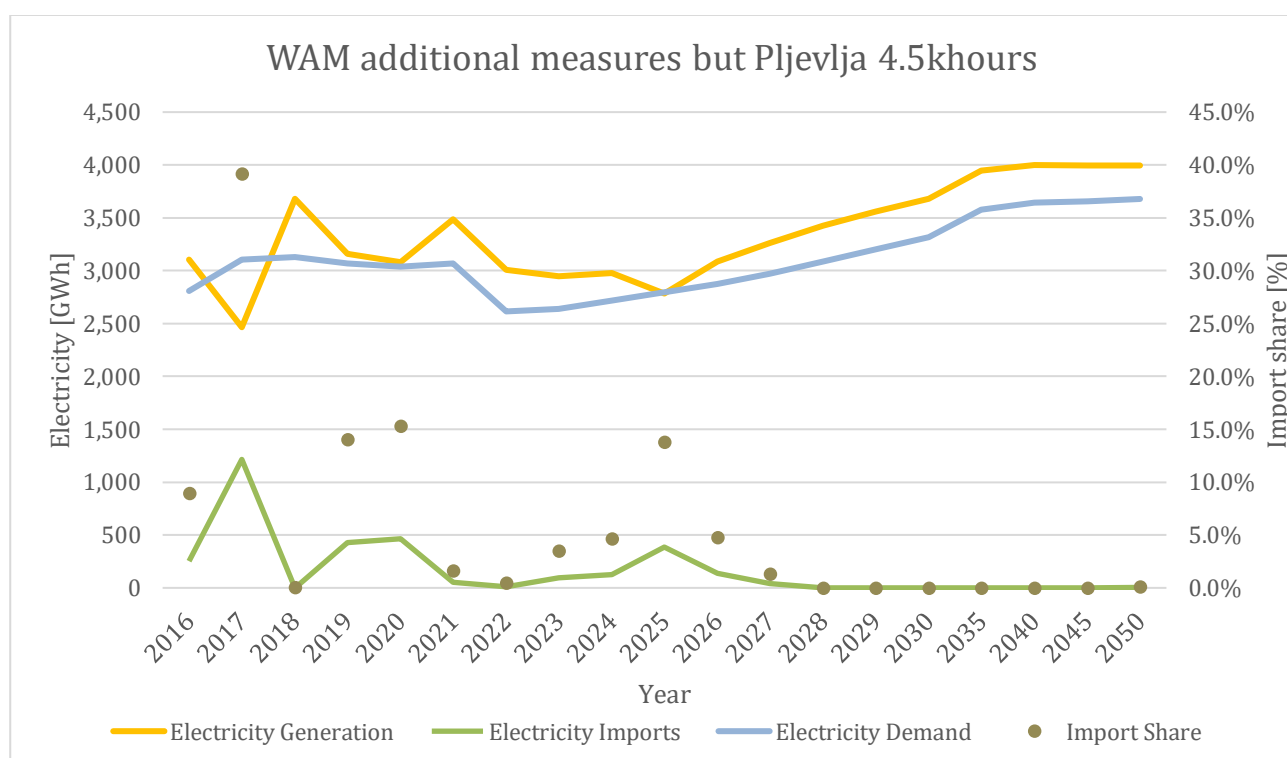


Figure 77: Electricity generation, demand and imports in GWh as well as the import shares in % relative to the generation for the WAM scenario (projection 2023 - 2050)

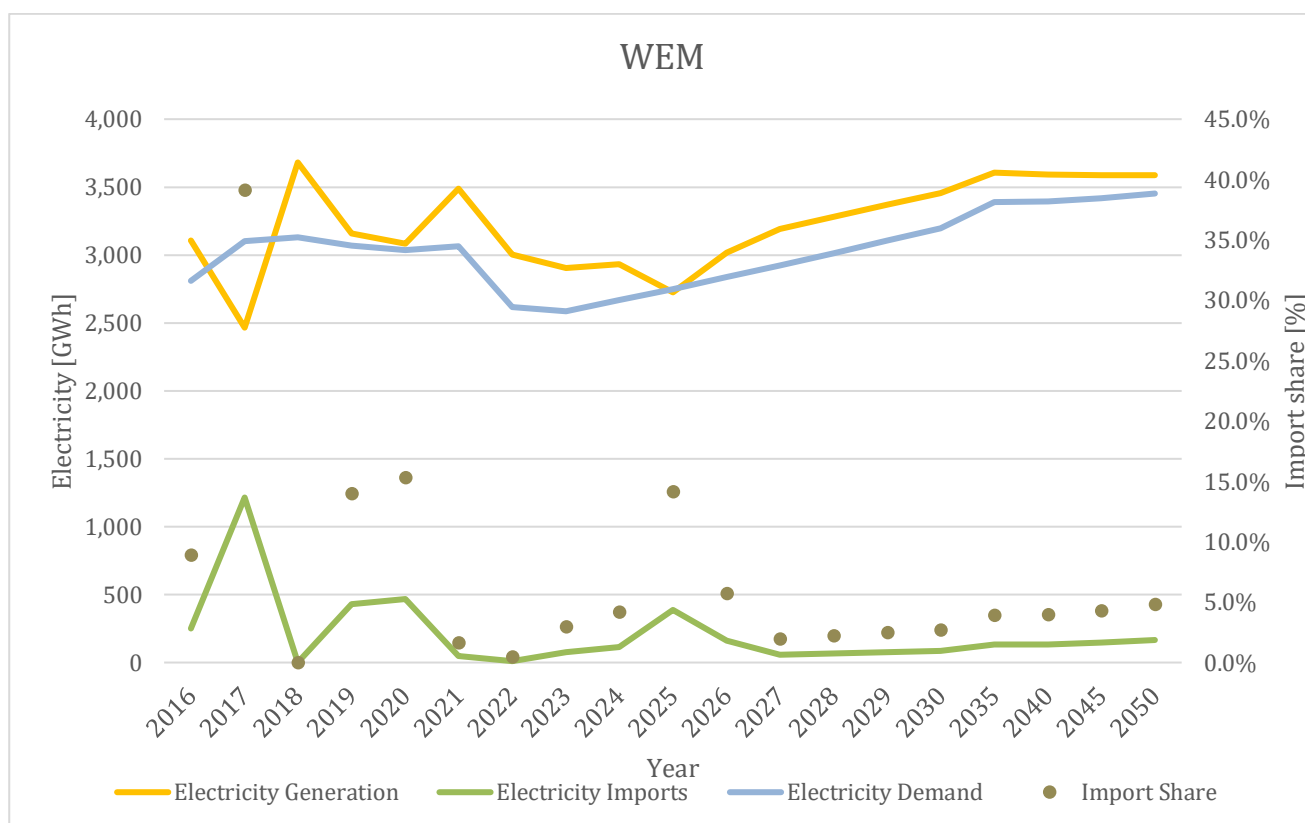


Figure 78: Electricity generation, demand and imports in GWh as well as the import shares in % relative to the generation for the WEM scenario (projection 2023 - 2050)

	2016	2018	2020	2022	2025	2030	2035	2040	2045	2050
WEM										
Electricity Demand (GWh)	2,811.1	3,128.7	3,036.7	2,614.7	2,750.0	3,195.2	3,389.1	3,392.8	3,416.2	3,452.6
Electricity Generation (GWh)	3,107.2	3,681.3	3,081.1	3,005.0	2,722.8	3,457.9	3,607.6	3,590.4	3,585.9	3,586.4
Electricity Imports (GWh)	251.0	1,214.8	465.6	12.2	389.0	86.8	132.9	135.1	146.2	166.4
Import Share (% of Gen.)	8.9%	39.1%	15.3%	0.5%	14.1%	2.7%	3.9%	4.0%	4.3%	4.8%
WAM										
Electricity Demand (GWh)	2,811.1	3,128.7	3,036.7	2,614.7	2,798.3	3,318.8	3,576.2	3,642.2	3,655.9	3,678.4
Electricity Generation (GWh)	3,107.2	3,681.3	3,081.1	3,005.0	2,781.4	3,681.8	3,947.1	3,999.4	3,994.0	3,995.4
Electricity Imports (GWh)	251.0	1,214.8	465.6	12.2	385.2	0.0	0.0	0.0	0.0	2.9
Import Share (% of Gen.)	8.9%	39.1%	15.3%	0.5%	13.8%	0.0%	0.0%	0.0%	0.0%	0.1%

Table 5-6: Electricity generation, demand and imports in GWh as well as the import shares in % relative to the generation for the WEM and WAM scenario (projection 2023 - 2050)

5.2.4 Discussion

The following section discusses the most important points of the scenario analysis for the different sectors.

For the **residential** sector, the issue of energy efficiency is central to reducing overall energy demand and thus reversing the increase observed in recent years. The scenarios show that new construction of buildings with performance standards (EPBD) proves to be efficient in achieving a reduction in heating demand. Nevertheless, further changes in space heating technologies and fuel substitution need to be triggered to obtain further energy savings. In particular, the increased usage of heat pumps, the introduction of district heating, as well as the substitution of wood by pellets are worth mentioning.

Within the **service sector**, an increase in energy demand was observed until 2030 in the subsectors of trade, accommodation and food, as an effect of increased economic activity in these sectors. The question therefore arises as to how the energy savings that can be seen in public buildings can also be achieved in the private sector and in particular trade and hospitality.

As the demand for mobility (passenger and freight transport) is expected to increase further in the future, targeted measures are required in **the transport sector**. In the area of individual mobility, an ambitious introduction of electric vehicles, which are more energy efficient than internal combustion engines (ICE), is one of the focal points for reducing energy demand. The scenario modelling shows that in the WAM scenario, the deployment is ambitious enough to counteract the growing mobility demand for passenger transportation (which is the main consumer in the transportation sector). Other effective measure that is included (see Chapter 3) is a stronger focus on public transportation. As the current share of public transportation in Montenegro is below average for the area of western Balkan countries, the implementation of a bus network is considered. A final issue that represents an untapped source of decarbonization for both passenger and freight transport is the increased use of biofuels. In addition to CO₂ reduction, this can be associated with the creation of a new local value chain. In the **industrial sector**, the implementation of energy efficiency measures could be complemented by a possible fuel switch, as refurbishment for a fuel switch is also expected to lead to further efficiency gains. In addition to switching from fossil and emission-intensive fuels to electricity, solar heating could also be an interesting option for low-temperature heat in certain subsectors.

As has been discussed above, the transformation sector - i.e. energy supply - is a substantial source of emissions in Montenegro. Emissions from energy supply, which are considered in the model are only those stemming from the thermal plant of the power system, namely that in Pljevlja (referred to as TPP Pljevlja in the following) and is modelled accordingly. To highlight the importance of the TPP Pljevlja in the level of emissions and in the electricity supply in the country, the following figure shows the current energy generated in the form of electricity by the different power plants considered in the system. TPP Plevlja currently carries approximately 40% of the electricity supply (47.4% in 2022). In the scenario WAM, new power plants are considered, and the share of electricity which is supplied by TPP Pljevlja falls to 27.5% in 2030. TPP Pljevlja is put in cold reserve after 2040. The refurbishment of TPP Pljevlja is currently under way and is included in the WEM scenario.

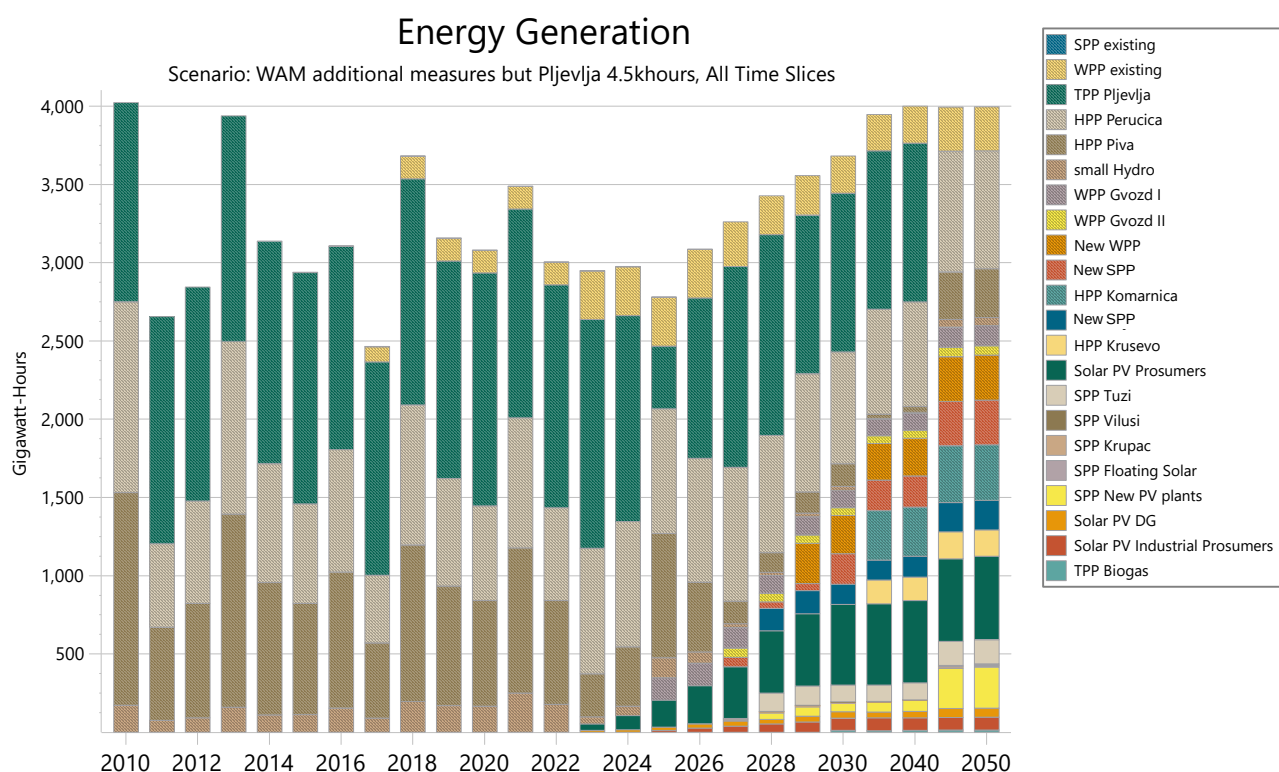


Figure 79: Electricity generation from the different power plants considered in the model in the WAM scenario

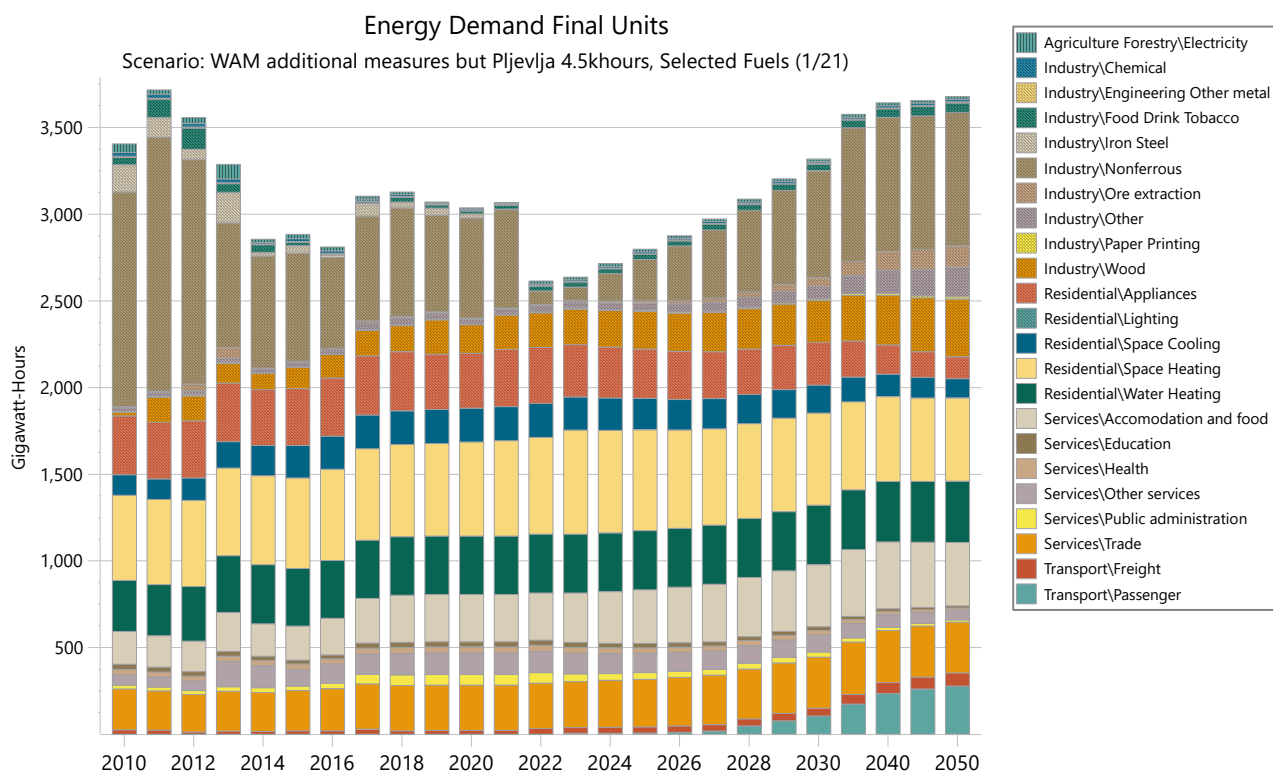
New hydro power plants (HPP) are considered in the WAM scenario (notably adding 171.9 MW capacity as HPP Komarnica in 2032 and 82 MW as HPP Krusevo in 2033). Furthermore, new solar photovoltaic installations are considered in the model for the time horizon to 2050 and an additional 200MW of wind plants.

In all cases, the model will match the electricity demand with the available capacities under the constraints of availabilities and seasonalities (see below). The following figure shows the development of electricity demand in different subsectors and the losses in the electricity grid which lead to slightly higher electricity generation than final demand. The model does not generate net exports of electricity.

In agriculture, the most important source of emissions is still from enteric fermentation. For N₂O emissions, a better manure management could lead to significant emission reductions. Emissions from cropland cultivation could be further reduced by an increase of organic farming.

Within the LULUCF sector, the focus is on monitoring forest fires for GHG emissions. Emissions from biomass burning have a strong impact on the capacity of the forestry sink. In absolute terms, the latter can be considered the most important element of the GHG balance. In addition, emissions from land conversion to residential land are rising and should thus also be monitored.

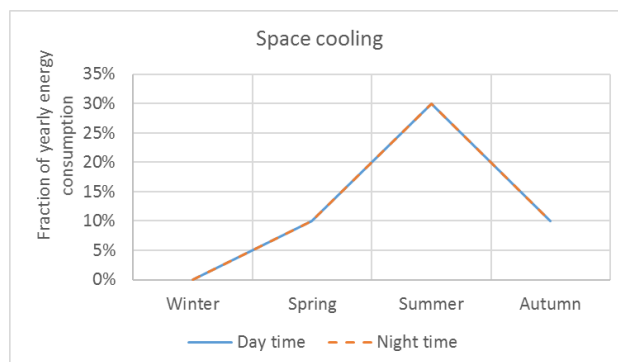
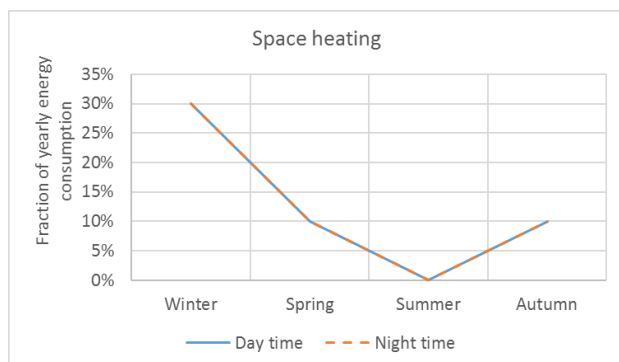
The last sector to mention is the waste sector. Here, solid waste disposal requires target-oriented policies. In particular, the issue of a better waste management and higher recycling rates should be addressed.



5.2.4.1 Technical notes on the scenarios

Seasonalities in electricity generation and demand

In addition to the total demand for electricity, the model considers demand and availability of power plants in eight time slices through the year (four seasons and two periods of day) in all scenarios. Within these time slices, the dispatch order is the same, but some electricity demand sectors vary to reflect changing demands over seasons and times of day. The following figure shows this variation.



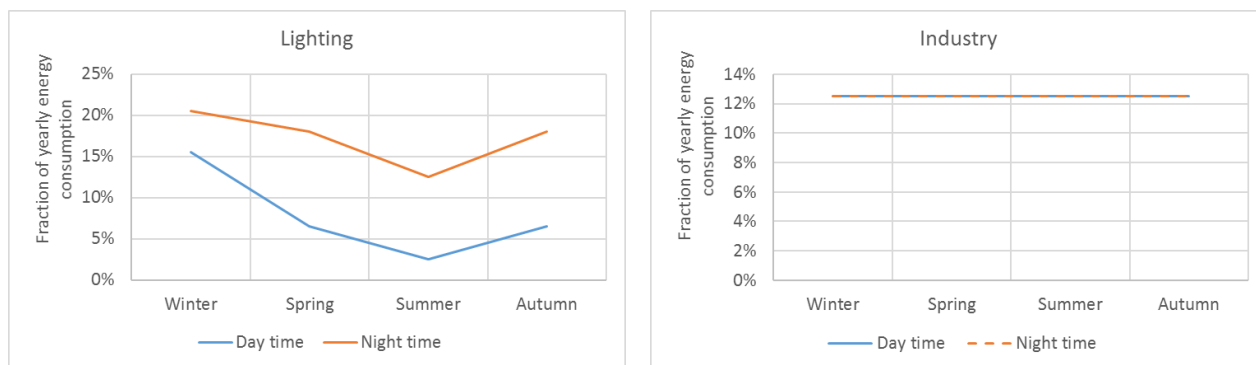


Figure 81: Time slice variations of electricity demand. Note that the industry variation is used by all those branches that are not explicitly covered by one of the others, e.g. transport electricity

In addition, the power plants also show seasonal and daily variations in their availability, as given in the following figure.

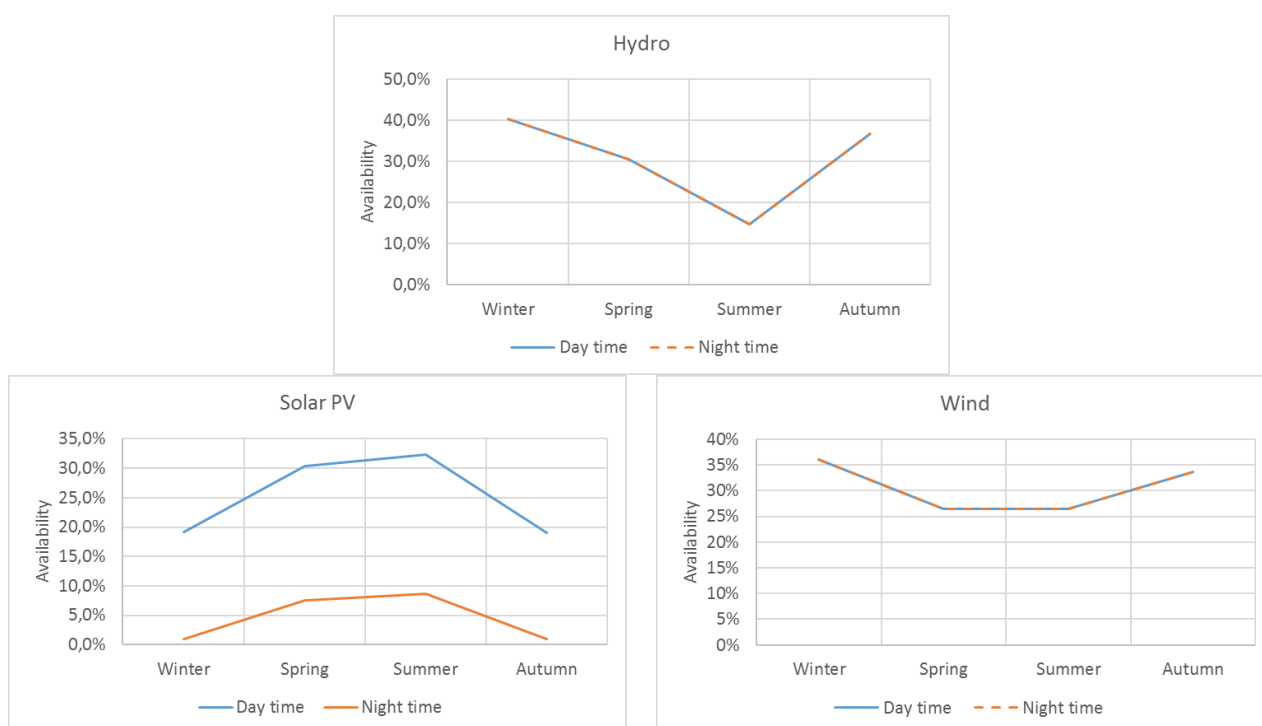


Figure 82: Time slice variations of electricity supply from RES.

5.3 Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

This section will assess the non-energy impacts of energy and climate policies outlined in the NECP. While the environmental effects of policies promoting renewable energy (RE) and

energy efficiency (EE) are well-documented, these measures also affect households, employment, businesses, and the public sector. Their impacts, ranging from macroeconomic effects to health and social outcomes, can be significant. This overview will focus on three key areas: 1) disposable household income, to assess fuel and energy poverty; 2) public budgets, to evaluate potential changes in revenue; and 3) employment, as these policies can create green jobs.

Employment effects - Energy efficiency

In terms of employment effects, PaMs focused on building renovation tend to have the largest impact. Most job creation occurs in the construction and manufacturing sectors.

PaMs related to building refurbishment are expected to significantly impact employment due to energy savings and the associated investments. These measures could create a few thousand full-time job equivalents from 2024 to 2030. Since public buildings make up a small portion of the total building stock, the majority of these employment gains will result from implementing energy performance standards for residential building renovations.

Employment effects - Renewable energy

The development of renewable energy power plants offers significant potential for job creation. While these plants will not be manufactured in Montenegro, the construction phase of renewable energy (RE) power plants will generate notable employment, although their operation is not labor-intensive. Most job creation is expected during the construction phase. Figure 83 provides an estimate of employment creation during the construction, operation, and maintenance phases of solar PV and wind power plants. This estimate uses normalized employment factors, converting person-years/MW into jobs/MW based on a 20-year project lifespan. The results are derived from the high-bound estimates by Cameron and van der Zwaan (2015)⁹⁰, who reviewed relevant peer-reviewed literature. Solar PV offers substantial potential for green job creation.

In the WEM scenario, around 318 MW of solar PV are added to the power system until 2030. This results in around 522 jobs in the installation phase, and 522 further jobs in the operation and maintenance phase, resulting in a total of 1045 solar PV related jobs until 2030. By a similar metric, a total of around 57 jobs are created due to wind power plants, with a higher share (two thirds) attributed to the operation and maintenance phase.

The WAM scenario comprises a capacity addition of 1589 MW until 2030 for solar PV and 145 MW in the same timeframe for wind. This results in around 2610 jobs in each the installation and operation and maintenance phase for solar PV, or a total of 5220 jobs. As for wind, a total of around 150 jobs are created in the WAM scenario.

⁹⁰ Lachlan Cameron and Bob van der Zwaan, *Employment factors for wind and solar energy technologies: A literature review*, Renewable and Sustainable Energy Reviews, 2015, vol. 45, issue C, pp 160-172.

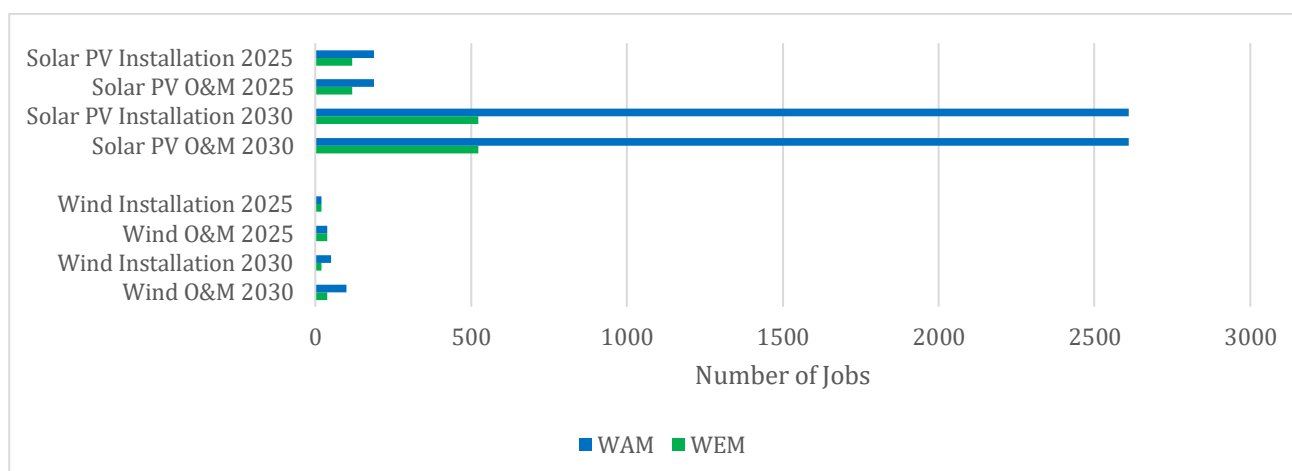


Figure 83: Cumulative employment until 2025 and 2030 for solar PV and wind for the installation and O&M phases (own elaboration based on Cameron and van der Zwaan (2015)).

5.4 Overview of investment needs

Existing investment flows and forward investment assumptions with regard to the planned policies and measures

In the PaM description in chapter Chapter 3, the budget and investment are presented per PaM.

Sector or market risk factors or barriers in the national and regional context

One risk that could hinder the growth of RES is the limitation of the state budget. Most new capacity would rely on support mechanisms such as FIT/CfD or net metering, which impact the state budget through national utilities and electricity prices.

Analysis of additional public finance support or resources to fill identified gaps identified under point ii

5.5 Impacts of planned policies and measures described in section 3 on other Member States and regional cooperation at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

This section examines the impacts of the planned policies and measures outlined in Chapter 3 on neighbouring countries and regional cooperation, at least through the final year of the plan's coverage.

Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

No impact is expected in the oil and gas sector of the region and the neighbouring countries. Furthermore, the projections of WAM in electricity sector show that there is on net imports or exports, which means that overall the effect in the region will be minimal.

Impacts on energy prices, utilities and energy market integration

It is expected that the increase of renewable energy, combined with the rehabilitation of the lignite fired power plant and its eventual phase out, will lead to cheaper electricity prices.

Where relevant impacts on regional cooperation

The projected regional interconnections are expected to enhance the integration with neighbouring countries energy systems, impacting positively regional cooperation.

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