

Climate Strategy & Action Plan Republic of Serbia

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DRAFT LOW CARBON DEVELOPMENT STRATEGY with Action plan

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Climate Strategy and Action Plan
EuropeAid/135966/DH/SER/RS

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Acronyms

B1	Baseline Scenario 1
B2	Baseline Scenario 2 or Baseline Scenario
M1	Mitigation Scenario 1
M2	Mitigation Scenario 2
M3	Mitigation Scenario 3
M4	Mitigation Scenario 4
APF	Adaptation Planning Framework
BAT	Best Available Technology
BIn	Billion
ETS	Emissions Trading System
DSIP	Directive Specific Implementation Plan
EB	Energy Balance
EU	European Union
EUR	Euro
EU-ETS	European Union Emissions Trading System
ESD	Effort Sharing Decision
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
HPP	Hydropower plant
IPA	Instrument for Pre-Accession
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product Use
JP-EPS	Public Utility Elektroprivreda Serbia
kt CO₂ eq	Kilo-tonne carbon dioxide equivalent
LULUCF	Land Use, Land Use Change and Forestry
MAC	Mobile Air Conditioning
MEP	Ministry of Environmental Protection
Mio	Million
N	Nitrogen
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NFI	National Forestry Inventory
NGO	Non-Governmental Organization
NPAA	National Plan for the Adoption of the <i>Acquis</i>
NREAP	National Renewable Energy Action Plan
PM_{2.5}	Particulate Matter 2.5 micrometres
RES	Renewable Energy Sources
RCP	Representative Concentration Pathways
SEPA	Serbian Environmental Protection Agency
SNC	Second National Communication
SORS	Statistical Office of the Republic of Serbia
UNFCCC	United Nations Framework Convention on Climate Change
WG	Working Group
WWTP	Wastewater Treatment Plants



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On the basis of Article 38 of the Law on the Planning System of the Republic of Serbia (Official Gazette of RS, No 30/18) and Article 4, paragraph 19 of the Law on ratification of the Paris Agreement (Official Gazette of RS – International agreements No. 4/2017),

Government adopts,

LOW CARBON DEVELOPMENT STRATEGY with action plan (Long-term Strategy)

1. INTRODUCTION

The risks of climate change to Serbia's sustainable development are evident. Moreover, the impacts of climate change already threaten, while the risk in the future could jeopardize, among other, infrastructure, agriculture productivity, water availability and public health.

The latest data shows an average temperature increase of 0,36°C per decade between 1961 and 2017, while climate change scenarios predict increase between 2°C and 4,3°C until 2100, compared to the period 1986-2005. Average precipitation decreased up to 10% between 1961 and 2017, while according to climate change scenarios average yearly precipitation may decrease up to 4,5% by 2100 compared to the reference period 1986-2005¹.

On the other hand, existing high carbon dependency may jeopardize the competitiveness of Serbia's economy in medium and long-term.

In addition to these, obligations of the Republic of Serbia under the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC), require significant shift of the Serbian economy to the low-carbon and climate adaptable economy, in the long-term period.

Serbia is actively contributing to global efforts against climate change, in accordance with the principle of common but differentiated responsibilities, as a Non-Annex I Party of the United Nations Framework Convention on Climate Change. Serbia is also signatory to the Kyoto Protocol and to the Paris Agreement.

Under the Paris Agreement Serbia is committed to reduce its **GHG emissions by 9.8% by 2030 compared to 1990 levels**¹. Moreover, this Nationally Determined Contribution (NDC) under the Paris Agreement states that: "climate change strategy with action plan [...] will further define the precise activities, methods and implementation deadlines."

The Paris Agreement requests from countries to revise and update their NDCs periodically, (starting from 2020) progressively increasing their ambitions/GHG emission reduction commitments, taking into account national circumstances and capacities.

¹ Appendix A: Observed climate change and projections of future climate for Serbia



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Therefore, the first goal of the Strategy is to support Serbia in fulfilment of obligations under the Paris Agreement.

Moreover, as the EU candidate country, Serbia is making an effort to align it's with the EU policies and actions. The EU 2030 Climate and Energy Framework sets three key targets to be achieved by 2030: at least 40% cuts in GHG emissions (from 1990 levels); at least 32% share for renewable energy; and at least 32,5% improvement in energy efficiency.

Similar to the European Union, Energy Community Contracting Parties including Serbia are committed to monitoring and reporting in the areas of renewables, energy efficiency, and greenhouse gas emissions as well as other information relevant to climate change. The Paris Agreement further defines the climate change related reporting obligations for the period after 2020 by establishing an enhanced transparency framework for action and support. In this context, the Energy Community (EnC) adopted a Recommendation 2018/01/MC-EnC on preparing for the development of National Energy and Climate Plans (NECPs) addressing the five dimensions of the Energy Union by the Contracting Parties of the Energy Community.

Thus, the second goal of the Strategy is to presents possibilities and recommends preferable options for alignment of Serbia's GHG emissions pathway to the EU's on affordable and socially fair way.

For the mentioned purposes and in order to evaluate different mitigation options, six GHG emission scenarios are developed, while the Strategy determines the pathway until 2030 and proposes a range up to 2050.

Additionally, in the first NDC Serbia underlines its vulnerability, losses and damages associated with extreme weather events and needs for adaptation. The Strategy also identifies adaptation options relevant for the GHG emissions reduction and mitigation actions.

An Action plan, that is integral part of the Strategy, evaluates potential and proposes preferable measures and actions for achievement of a vision and objectives of the Strategy.

Development of the Strategy and its Action plan was led by the Ministry of Environmental Protection as responsible institution. It is developed with financial and technical support of the EU, throughout IPA 2014 project: "Climate Strategy and Action Plan", while the Strategy is mostly result of a close cooperation and permanent consultations with relevant stakeholders (governmental, public, private and CSOs organizations²).

2. CURRENT SITUATION AND STRATEGY'S VISION

2.1. Policy framework

Serbia has ratified the United Nations Framework Convention (UNFCCC) on the 12th of March 2001, and the Paris Agreement on 25th of July 2017. Serbia has commitment under the Paris Agreement, throughout its first Nationally Determined Contribution (NDC) submitted on June 30th, 2015, to "reduce GHG emissions by 9,8%³ until 2030 compared to emissions in 1990". However, Republic of Serbia does not have obligations in terms of GHG emission reduction under the Energy Community Treaty.

² Appendix B: Information on consultations process in the preparation of the Strategy

³ For the definition of nationally determined contributions, among others, also targets from Energy Sector Development Strategy of Republic of Serbia for the period up to 2025, with the projections up to 2030 were considered.



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Up to now climate change related activities in the country were mostly analysed and described under the national communications and biannual updated reports, as the reporting obligations to the UNFCCC.

Process of the EU integration, speeded up development of the Law on Climate Change that is in an adoption phase. This Law transposes the EU relevant legislation⁴ providing, among else, a legal basis for development and updates of low-carbon development and adaptation strategies, monitoring, reporting and verification of the GHG emissions and implementation of a climate policies and measures.

Besides this Law, Serbia introduced certain sectoral policies and measures that contribute to the GHG emission reduction and efficient adaptation.

However, as identified in the process of development of the Strategy, there is still a lack of adequate mechanisms and instruments, especially financial ones as well as capacity constraints for fostering a low carbon and climate resilient development.

2.1.1. Sectoral policies

Intergovernmental Panel on Climate Change (IPCC) has classified economy sectors relevant for the GHG emissions as: Energy (including energy industries, transport and the residential and services buildings sector); Industrial Processes (including, among others, the mineral, chemical and metal industry) and Product Use (IPPU); Agriculture, Forestry and Other Land Use; and Waste (including solid waste disposal and wastewater treatment). The EU reports emissions of these sectors as ETS and non-ETS sectors.

At the same time, sectoral policies relevant for the GHG emission reduction and through that for the Strategy are those that maintain economy sectors with the largest GHG emissions (based on historical GHG emissions).

As for almost all countries in the world, the energy sector (includes transportation) is the most important GHG emitting sector in Serbia which represents in 2015⁵ more than 80% of total GHG emissions.

The energy related legal and policy framework recognizes importance of Efficient Use of Energy and increase of RES share in final consumption. It introduces certain EE and RES targets, as commitments under the Energy Community Treaty:

- Energy Law which define the long-term main goals of energy policy and Energy Strategy as the main document which define the energy policy.
- Law on efficient use of energy
- Energy Sector Development Strategy of Republic of Serbia for the period up to 2025, with the projections up to 2030, which defines the three main priorities: improvement of energy security, development of energy market and sustainable development, and implement the obligations under the Energy Community Treaty.
- Decree on establishing Program for the Implementation Energy Sector Development Strategy of Republic of Serbia for the period up to 2025, with the projections up to 2030, for the period from

⁴ Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading (EU-ETS)

Decision 406/2009/EC-Effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments,

Regulation 525/2013/EC on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change

Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO₂ emissions in respect of the marketing of new passenger cars

⁵ Last year for which GHG emissions data were available for the Strategy preparation process



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2017 until 2023., which defines all measures, activities and projects which should be done in all energy sectors.

- Treaty on Establishing Energy Community. Under this Treaty, the targets for RES and energy efficiency are defined for 2020 as well as the obligation for the preparation Integrated national energy and climate plans.

In compliance with the same obligation, National Renewable Energy Action Plan and National Energy Efficiency Action Plans introduce measures and actions that contribute to the GHG emissions reduction.

The GHG emissions from agriculture, which accounted for 8,5% on national total in 2015, stem from use of fertilizers, enteric fermentation and emission from manure management.

The National Agriculture and Rural Development Strategy of Republic of Serbia for the period 2014-2024 takes into consideration the importance of climate change as an external factor for the agricultural production. The relevance of adaptation and use of biomass residues and waste for renewable energy is mentioned in the document, as well as general impacts of agriculture to GHG emissions.

The Serbian agricultural policy combines different types of subsidies, that change from year to year. Some of these (e.g. better mechanization, improved manure management and use of renewable energy sources) will potentially contribute to GHG emission reduction and support adaptation (e.g. irrigation systems). However, there are no defined objectives in terms of GHG emission reduction or reduction of vulnerability or adaptation.

Serbian forest contributes to the removal of carbon dioxide from the atmosphere through photosynthesis (so-called carbon sink or carbon sequestration). In 2015, the CO₂ removed from the atmosphere by the Serbian forest⁶ amounted to 4 533 ktCO₂, which can compensate 7,4% of Serbia's emissions.

"Forestry Development Strategy of Serbia," emphasizes "conservation and improvement of the state of forests and the development of forestry as an economy branch". The draft Forest Development Program with action plan (2010), although not in force, provides guidance to stakeholders in relation to the development of the sector and includes specific targets, namely for afforestation. Such approaches/targets are aligned with the need to increase the carbon sinks in Serbia but there is no the GHG emissions reduction targets and it is not a driver for forestry related actions.

In addition, the Spatial Development Strategy of Serbia in the field of forestry determines the long-term basis and the objectives of development and use of forests and forest land management, management of hunting opportunities and the protection of natural resources. The Law on Spatial Planning stipulates that area under the forests should be 41,4% of the total area of Serbia, which is considered an extremely ambitious target.

Serbian forest is particularly vulnerable to biotic (such as pests and diseases) and abiotic (such as fires) factors, which will be aggravated by climate change. In order to minimize impacts, sustainable forest management requires the adoption of practices that take into account scenarios of future climate.

In 2015, waste emissions represented 4,2% of national total emissions. Solid waste management in Serbia is generally based on landfilling. Several cities have facilities for manual waste separation, with low efficiency (maximum separation of recyclables is 6%), mostly due to lack of separation at source. This mean that most organic waste is sent to landfill, thus contributing to GHG emissions. There are no systems for collection and treatment of landfill gas, meaning that it is directly released into the atmosphere in the form of methane (CH₄). Emissions would be reduced if methane is combusted for electricity and/or heat production and released

⁶ This corresponds to the land use category Forest Remaining Forest in the National GHG Inventory.



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into the atmosphere as CO₂ (CO₂ has lower impact on global warming than CH₄). There is no appropriate landfill taxation system in Serbia to incentivize diverting waste from landfills to other management systems such as recycling. The current waste policy framework in Serbia is aligned with the EU legislation, however, implementation is assessed lower than the inscribed in the policy documents. Waste management policies still do not recognize the GHG emission reduction as important driver for strategic development in the sector.

According to the draft Water Pollution Protection Plan, about 55% of the overall population has access to public sanitation. There are 32 operational urban wastewater treatment plants (WWTPs), of which relatively few operate to design criteria, while the remainder are non-compliant. Sludge treatment is currently present in Subotica and Sombor, while few other wastewater treatment facilities have no treatment, which has significant impact of increase of GHG. According to the Serbian plans, compliance with the EU urban wastewater treatment directive is planned by 2044 (assuming entering into the EU in 2025).

2.2. Climate change vulnerability and adaptation

The risks of climate change to Serbia's sustainable development are evident. The Second National Communication (SNC) and the draft National Adaptation Plan (NAP) confirm the temperature increases during the period 1960-2012, by an average of 0.3°C/decade. Moreover, climate scenarios project future temperature increase, in the range from 3.8 to 4.6°C (depending on climate scenarios). For the period 2071-2100, and for the majority of the country significant decrease in precipitation compared to the reference period (1961-1990) during the most of seasons (except in spring) is projected. It goes up to 30% in the summer season across almost the whole territory of Serbia.

Moreover, the impacts of climate change may, among other, jeopardize infrastructure, agriculture productivity, water availability and public health. Vulnerability and Adaptation options for the purpose of the Strategy were identified also based on the Second National Communication (SNC) and the draft National Adaptation Plan (NAP). These documents underline three most vulnerable sectors: Agriculture, Forestry and Hydrology and Water Resources. These sectors are important from the Strategy's perspective due to their relation with the mitigation potentials and options.

Thus, using the Adaptation Planning Framework, adaptation measures up to 2030/2050 for each of the following priority sectors, have been identified:

1. Agriculture – food production:
2. Forestry – bioenergy:
3. Hydrology and Water Resources – hydro-electric production:

These priority sectors have been selected as particularly vulnerable on climate change, and due to their importance for the achievement of climate change mitigation goals, respecting social and environmental aspects.

The production of energy from hydro potential, forest or agricultural biomass depend on, among else, climate change impacts to these sectors and sub-sectors. At the same time these sectors contribute significantly to economic and environmental aspects of the Serbian society, and though that social aspects. Therefore, adaptation of these sectors and sub-sectors to climate change contribute to sustainable planning under the Strategy and the Action Plan.

The Adaptation Planning Framework (APF) was developed under the process of development of the Strategy. The main purpose of the APF development was to provide a tool for assessment of the adaptation requirements of future projects, policies and measures.

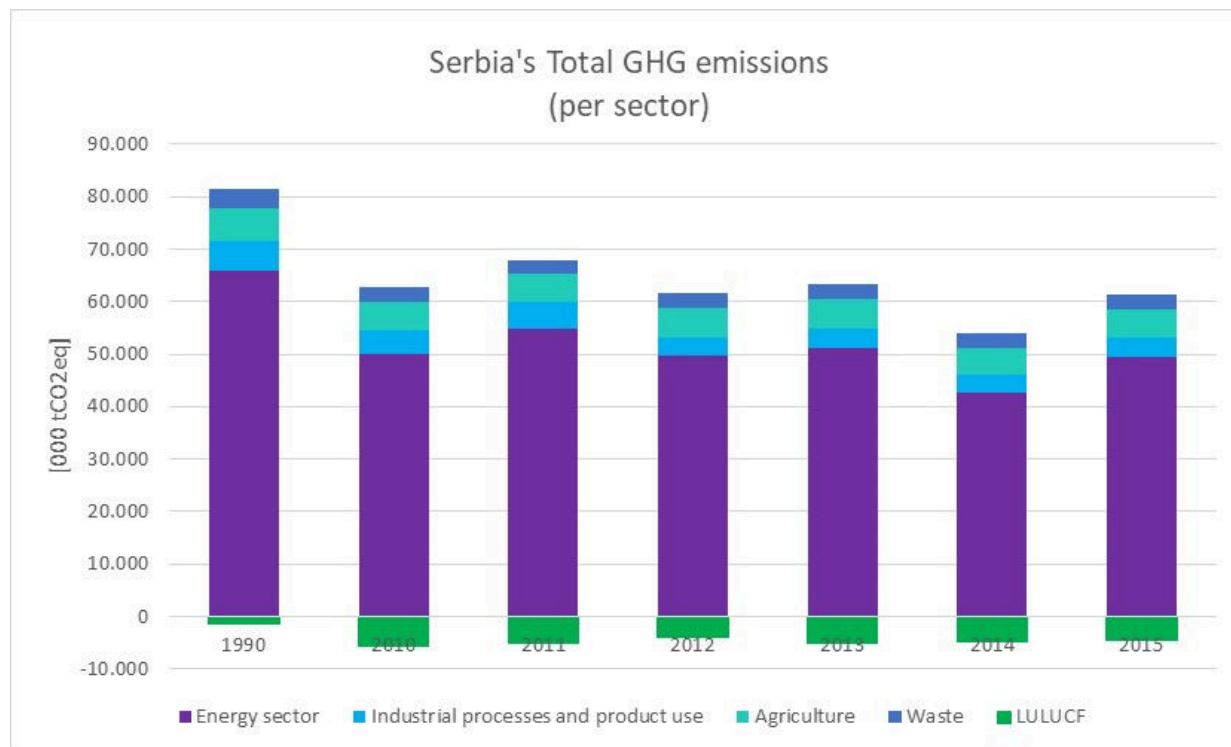


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2.3. GHG emission historical trends

Total GHG emissions in 2015⁷ (without LULUCF) amounted to 61.233 kt CO₂eq, which represents 2,3% decrease of emissions compared to the year 2010 and 24,9% compared to 1990. In 2015, the CO₂ removed from the atmosphere in the LULUCF sector amounted to 4.533 ktCO₂, which represents 19,4% decrease from 2010 and a 216,6% increase compared to 1990 (Figure 1).

Figure 1: Serbia's total GHG emissions (1990-2015)⁸ (kt CO₂eq)



Energy is by far the biggest GHG emitting sector in Serbia accounting for 80,6% of overall emissions, of which, the sub-sector Energy Industries that contains public electricity and heat production, refineries and manufacturing of fuels is the most important (representing 70% of the emissions of the energy sector and 56% of the national totals). Decreasing trend since 1990 (21,4%) can be attributed more to lower production than to structural changes in the sector. Compared to 2010, emissions have decreased by 5% in 2015.

GHG emissions in sub sectors/categories of the energy sector in 2015 were:

- In Transport sector 31,4% higher than in 1990 and 11,1% below the 2010.
- Emissions from Manufacturing Industries and Construction were 46,2% lower than in 1990⁹ and 19,3% lower compared to 2010. This trend is due to decrease in manufacturing industries activity and, to some extent, to the increase of biomass consumption for 137% since 2010.

⁷ 2015 has been used as the most recent year for which historical data has been input into the model. This means that GHG emissions until 2015 are based on actual GHG emissions estimated based on the national GHG emissions inventory prepared by SEPA and that emissions from 2016 onwards are a result of the modelling exercises.

⁸ Source: Result 2 Report: National Greenhouse Gas Emissions Baseline Scenarios for 2020, 2030 and 2050 (IPA Project Climate Strategy and Action Plan) based on information provided by SEPA.

⁹ Industrial auto-producers are included under the energy industries.



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- Emissions in the “Other sectors”, (commercial, residential and other institutional buildings and fuel combustion in agricultural stationary equipment) were 61,5% lower compared to 1990 and 22% lower compared to 2010.
- Fugitive emissions from mining and post-mining activities and oil and gas production and processing (the main source of CH₄ emissions in the Energy sector) were 4,7% higher than in 2010 and 34,3% lower than in 1990.

GHG emissions in the Industrial Process and Product Use (IPPU) sector closely follow the economic activities. In 2015, these emissions were 28,8% lower than in 1990 and 16,7% lower than in 2010. Product use as substitutes for ozone depleting substances have increased by 72% by 2015 compared to 2010¹⁰. The trend is dominated by the stationary refrigeration and air conditioning using HFC-125, HFC-134a and HFC-143 and by mobile refrigeration using HFC-134a.

Agriculture emissions accounted for 8,6% of total emissions in 2015 and were 15% below 1990 and 0,9% below 2010 levels.

Emissions of CH₄ from enteric fermentation were 42% lower compared to 1990 levels and 2,5% compared to 2010. The main driver for the observed decrease is in the population of the dairy cattle. Emissions from manure management have decreased by 38,3% compared to 1990 and 5,5% compared to 2010. Direct N₂O emissions, have increased, by 2015, 51,8% compared to 1990 and 0,4% compared to 2010. Indirect N₂O emissions, which are caused by atmospheric deposition of volatilized Nitrogen (N) and by leaching/runoff of N compounds into water, have increased 47,2% compared to 1990 and 1,7% compared to 2010.

In the Land Use, Land Use Change and Forestry (LULUCF) sector, negative emissions mean that CO₂ sequestration¹¹ (removal from the atmosphere through, for example, photosynthesis or deposition in soils through organic matter) is larger than the GHG emissions in each land use category, such as forest land, cropland, grassland, wetlands, settlements, and other land. Carbon content of harvested wood products (such as furniture) is also accounted for in this sector.

In 2015, the CO₂ removed from the atmosphere in the whole LULUCF sector amounted to 4 533 ktCO₂, which represents a 19,4% decrease from 2010 and a 216,6% increase compared to 1990. The net negative emissions (sinks), are mostly a result of the positive ratio between gains and losses (increase of forest biomass / commercial harvest, deforestation, wildfires...) in the forestry sector (which is only one of the sectors of the LULUCF). Nonetheless, the net sink of the forest sector in the period 2010-2015 has decreased by 19%, due to increased consumption of the solid biomass (fuel wood) and increased use of technical wood.

The GHG emissions from waste sector have declined since 1990 by 29,9%, and since 2007, 0,7%, mainly due to the decrease in the degradable industrial waste disposal on land and reduction of emissions from wastewater. Specifically, wastewater emissions have decreased 29,9% since 1990 and 3,9% compared to 2010, mostly due to the reduction of emissions from industrial wastewater.

2.4. Vision

Current situation as previously described as well as the Paris Agreement's requirements on the GHG balance between global emissions and global sinks in the second half of the century (long

¹⁰ First use of F-gases is reported, for Serbia, in 1997.

¹¹ Sequestration is also referred to as sinks or removals





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term), and the EU accession process are backbones for Serbian **long-term climate neutral and climate resilient vision**.

Thus the main purpose of the Strategy is the establishment of the low carbon development pathway up to 2050 for the achievement of the vision in a socially fair and cost-effective way, which will also create new jobs and strengthen competitiveness.

Moreover, the vision and the Strategy enshrine Serbia's sustainable development approach to combating the causes and the impacts of climate change, in which a fairer and more equal society will be built; the economy will successfully compete with other economies under the same conditions; and the environment will be protected for the benefit of future, but also the current generations.

3. GHG EMISSIONS SCENARIOS

For the Strategy purposes and achievement of the climate vision, six GHG emission scenarios have been analysed¹²: B1 and B2 Baseline scenarios (meaning without the introduction of any new measures aimed at reducing GHG emissions) and four mitigation scenarios (aimed at reducing GHG emissions, including through the implementation of the EU *acquis*).

B1 and B2 scenarios assume there will be no climate policies and measures then those adopted by 2015, while B1 do not consider full implementation of the Energy Efficiency Action Plan (EEAP) and National Renewable Energy Action Plan (NREAP), that are obligations under the Energy Community Treaty. Therefore, B1 scenario will not be considered as relevant for the Strategy.

All scenarios are developed using models¹³ that are also used for definition of the EU targets and pathways up to 2020, 2030 and 2050 and respective policies and measures, while national circumstances were taken into account. All scenarios are developed using models that are also used for definition of the EU targets and pathways up to 2020, 2030 and 2050 and respective policies and measures, while national circumstances were taken into account. The base year used for expression of the GHG emission reduction is 2010. Therefore, the GHG emission reduction efforts are shown compared to the GHG emission level in 2010. In addition, in order to compare the GHG emission reduction with the first NDC, these efforts are shown also compared to 1990., however achievement of the goals will be monitored and reported compared to 2010.

3.1. B2 - Baseline Scenario

The B2 Baseline Scenario¹⁴, assumes that no other policies and measures with impact on GHG emissions will be adopted up to 2050¹⁵ than those in 2015 plus full implementation of Energy Efficiency Action Plan (EEAP) and National Renewable Energy Action Plan (NREAP) as committed.

¹² Scenario analysis is a process of analysing possible future events by considering alternative possible outcomes (sometimes called "alternative worlds"). Thus, scenario analysis does not try to show one exact picture of the future. Instead, it presents several alternative future developments. In contrast to prognoses, the scenario analysis is not based on extrapolation of the past or the extension of past trends and does not expect past observations to remain valid in the future. *Aaker, David A. (2001). Strategic Market Management. New York: John Wiley & Sons. pp. 108 et seq. ISBN 978-0-471-41572-5. / Bea, F.X., Haas, J. (2005). Strategisches Management. Stuttgart: Lucius & Lucius. pp. 279 and 287 et seq.*

¹³ For the preparation of the Strategy GEM-E3, PRIMES and CAPRI models were used

¹⁴ The Baseline Scenario B2 has been selected as a basis against which mitigation scenarios will be compared

¹⁵ Please refer to the chapter on GHG mitigation scenarios of this strategy (below) for a description of the scenarios analysed.

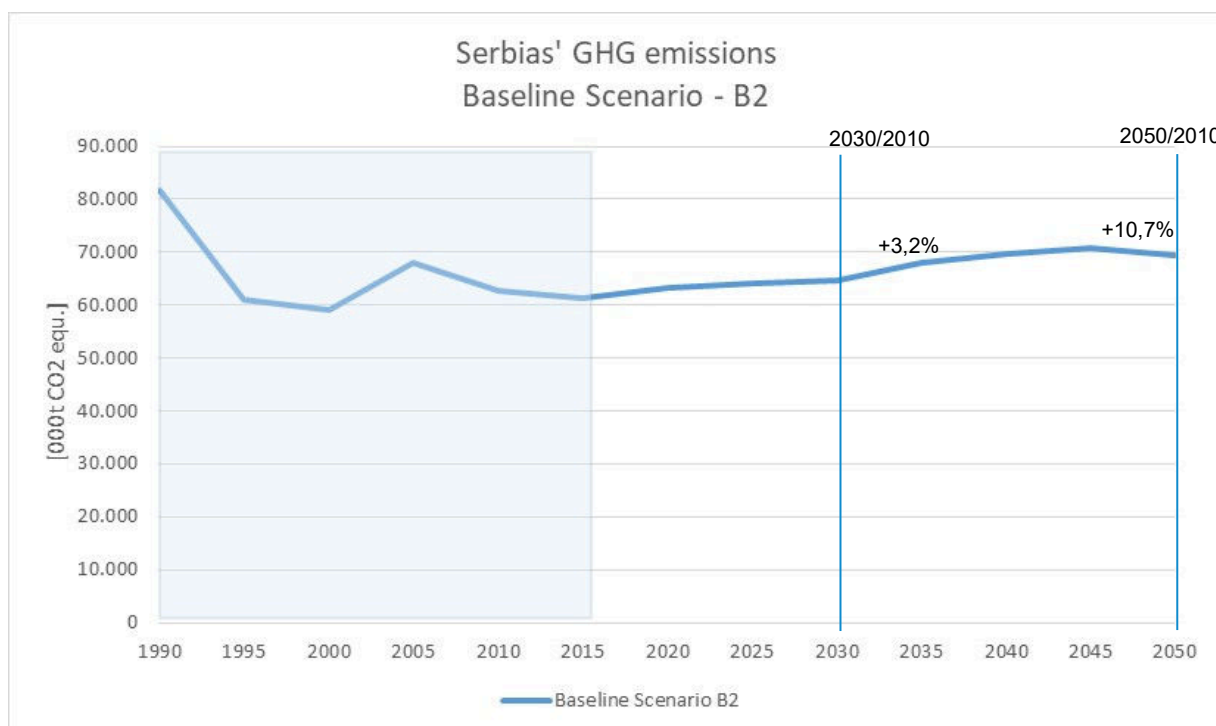


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According to the B2 scenario, emissions will increase by 0,9% in 2020; 2,5% by 2025; 3,2% by 2030; and 10,7% by 2050 compared to 2010 (Figure 2). For 2030, the disaggregation¹⁶ of emissions by sector shows a projected increase of emissions in energy industries, transport, fugitive emissions and IPPU (Industrial Processes and Product Use). Manufacturing industries and construction, Other sector (residential and commercial), agriculture and waste show the GHG emission decrease for the same period. For 2050, manufacturing industries, Other sectors and waste will decrease emissions. Emissions from all other sectors will increase.

Compared to 2005, emissions are projected to decrease by 5,1% by 2030 and increase by 1,9 % by 2050, while compared to 1990, emissions are projected to decrease by 20,7% until 2030 and by 14,9% up to 2050.

Figure 2: GHG emissions in the Baseline Scenario B2 (kt CO_{2eq})



B2 scenario shows an expected steady increase of GHG emissions from 2020 through 2030 until 2045 which is followed by a temporary decrease of emissions until 2050. The temporary decreasing trend is the result of the expected decommissioning¹⁷ of the existing major lignite power plants and due to absence of climate policies and lack of measures for deployment of renewable energy sources, their gradual replacement with new ones with the higher efficiency standards, throughout period 2040-2050.

3.2. GHG mitigation scenarios

All GHG emissions mitigation scenarios considerably deviate Serbia emissions trajectory from the B2 baseline scenario, starting the GHG emissions reductions from 2020s. Those are:

- **M1 scenario:** B2 Baseline scenario plus implementation of the EU-Emission Trading Scheme (EU-ETS)

¹⁶ Detailed decomposition of Baseline Scenario is available in Appendix D: sectoral breakdown of emissions scenarios.

¹⁷ Based on data received from JP-EPS



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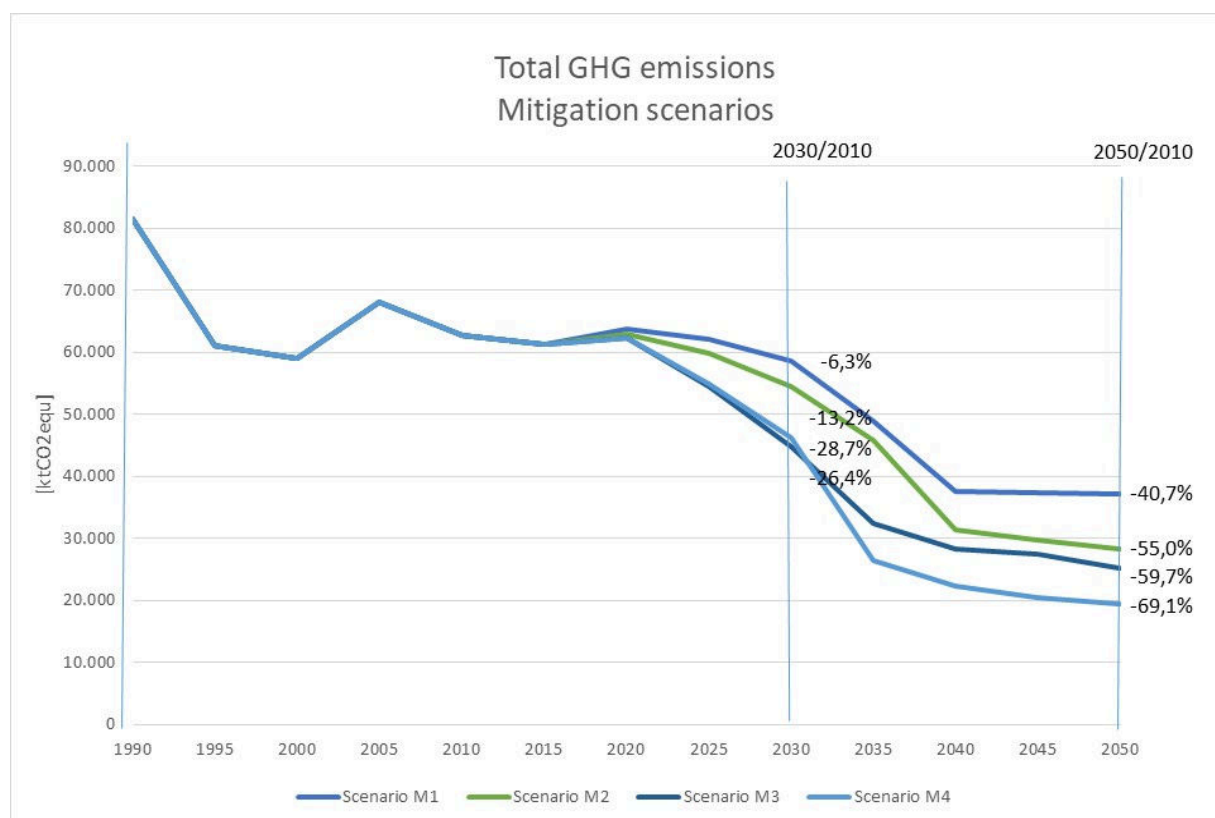
- **M2 scenario:** Implementation of all EU *acquis* in whole is transposed and implemented, achieving 33% GHG emissions compared to 1990; 28,9% RES¹⁸ by 2030 and 24,5% enhanced energy efficiency¹⁹, as the Serbian contribution to the EU target

With a goal to increase its ambitious and contribute to 1,5°C goal, two additional scenarios are developed:

- **M3 scenario:** Serbia individually achieves the EU 2030 targets (meaning -40% GHG emissions compared to 1990; 32% RES by 2030 and 32,5% enhanced energy efficiency)
- **M4 scenario:** Serbia achieves 80% GHG cuts in 2050 compared to 1990 levels (aligned with the European Commission communication on climate neutrality).

Figure 3 below shows the emissions pathways in the four mitigation scenarios.

Figure 3 - GHG emissions scenarios up to 2050



The M1 scenario shows that the ETS alone is not sufficient to promote the penetration of renewable energy sources, by 2030, even to the level of the current commitment under the Energy Community, which is set at 27% of gross final consumption by 2020. Therefore, this scenario is excluded from further consideration under the Strategy. In regard to the ETS, possibility of use of equivalent measures shall be considered, in order to ensure smooth implementation of the EU-ETS and safeguard the adaptation of the stakeholders (energy industry, manufacturing industries and households) to climate constrained environment.

In the M2 scenario, the modelling results show that the transposition of the full EU *acquis* reduces GHG emissions by 13,2% by 2030 and by 55% by 2050 compared to 2010. This

¹⁸ Share of RES in Total Final Energy Consumption as determined in accordance with provisions of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources

¹⁹ Energy efficiency improvement as determined in accordance with provision of the Energy Efficiency Directive (2012/27/EU) relative to EU 2007 modelling projections for 2030



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scenario represents the likely contribution to the EU 2030 GHG emissions reductions, penetration of RES and improvement of energy efficiency targets.

Taking into account that M2 scenario assumes the GHG emission reduction of 33% compared to 1990 by 2030, while the first Serbian NDC expressed potential for the GHG emission reduction of 9.8%, this scenario shows significantly increased ambition of the Republic of Serbia, as recommended by the Paris Agreement. The both commitments are without the LULUCF sector.

Scenario M3 includes additional measures and represents an increase of ambition by 2030, on 40% compared to 1990, that is 28,7% emission reductions compared to 2010; and 59,7% by 2050 compared to 2010 and at the same time 45,2% compared to 1990. A higher contribution to the EU 2030 targets, lie on an increase of efforts being required in the energy, agriculture and waste sectors, compared to the M2 scenario.

At the end, the most ambitious M4 scenario assumes reduction of GHG emissions by 80% compared to 1990 up to 2050. However, with currently available technologies and in a cost-effective manner, it is virtually impossible to achieve such deep emission cuts in the next 30 years. With currently available technologies the GHG emissions reductions could reach 76,2% compared with 1990, by 2050.

Modelling results show that the M4 scenario's cost-effective (optimal) pathway towards achieving 80% emission reduction has, by 2030, a similar pathway to that in the M3 scenario. Both scenarios, achieve cost-effectively the same RES potential in 2030, that is 32,5%. Therefore, 32,5% RES potential by 2030 is the limit for achieving emissions reduction in a cost-effective manner.

In general, the GHG emission reduction that could be achieved by different scenarios is presented in the **Table 1**.

Table 1: GHG emission reduction potential by different scenarios

Scenario	Target year/Year for Comparison	GHG emission reduction (%)	Target year/Year for Comparison	GHG emission reduction (%)	Target year/Year for Comparison	GHG emission reduction (%)
M2	2030/2010	13,2	2030/2005	20,1	2030/1990	33,3
	2050/2010	55	2050/2005	58,6	2050/1990	65,4
M3	2030/2010	28,7	2030/2005	34,4	2030/1990	45,2
	2050/2010	59,7	2050/2005	62,9	2050/1990	69
M4	2030/2010	26,4	2030/2005	32,2	2030/1990	43,4
	2050/2010	69,1	2050/2005	71,6	2050/1990	76,2

Depending on mitigation scenario level of the GHG emissions in 2070 will be 22,917 Mt CO₂eq with M1, 17,309 Mt CO₂eq with M2, 9,222 Mt CO₂eq with M3 and 7,627 Mt CO₂eq with M4, while it will be at 48,002 Mt CO₂eq if there will be no measures (B2 Baseline scenario).

3.3. Costs, and key social, economic and environmental indicators

3.3.1. Costs

All emission pathways/GHG emission scenarios are associated with certain costs.

Modelling shows that, **the costliest** scenario for Serbia is to ignore the climate related costs in its strategic decisions, **continuing an emissions pathway as assumed under the B2**



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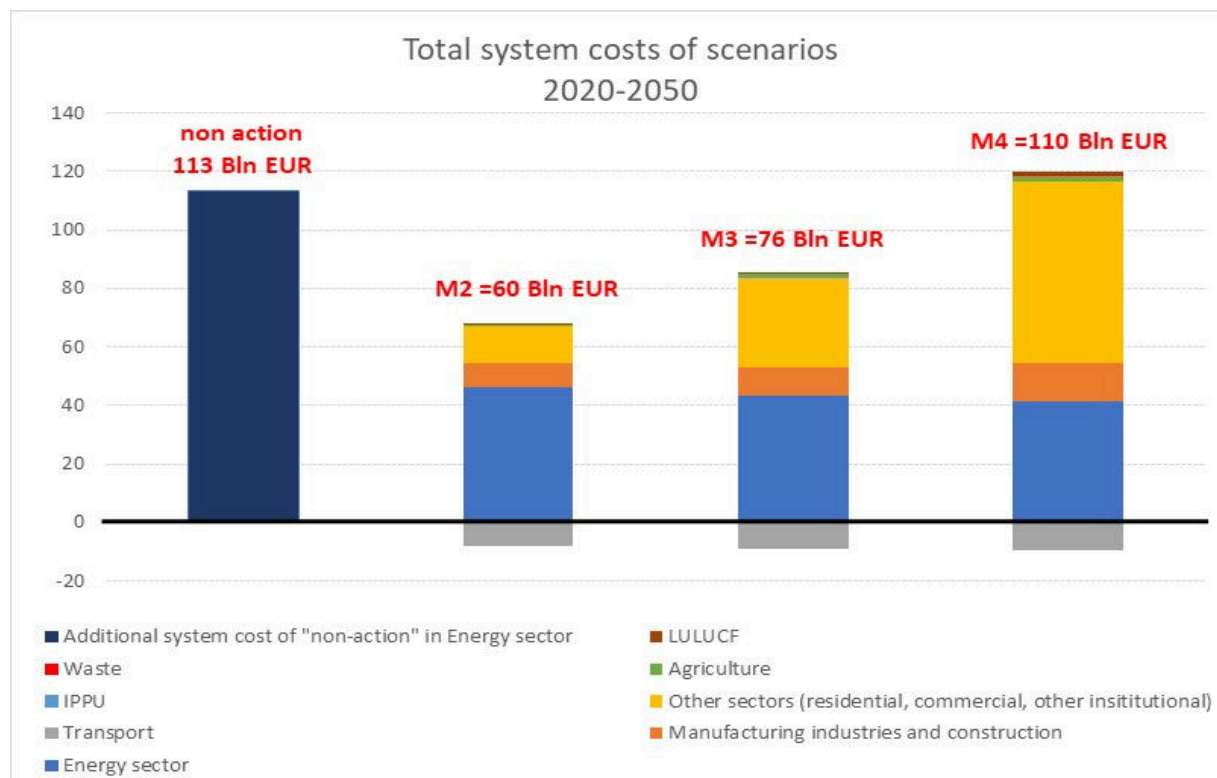
Baseline scenario. In such case of “non-action,” the total additional system costs²⁰ for the energy sector are estimated at the level of 113Bln EUR in the period 2020-2050. The EU-ETS costs of carbon are applied from the assumed date of accession to the EU (2025).

Figure 4 shows that these **system costs of “non-action” are higher than the additional system costs of action under any mitigation scenario**. The additional system costs in the energy sector alone, in case of non-action (B2 Baseline scenario), are **53Bln EUR higher than the additional system costs of acting (in all sectors) under M2, 37Bln EUR higher than in M3 and 3Bln EUR higher than the costs of the M4 scenario, over the period 2020-2050** (Table 2).

Table 2: System costs of non-action compared to total energy system costs and investment costs for non-energy sectors in the different GHG emission scenarios for the period 2020-2050

Scenario	B2	M2	M3	M4
Costs of “non-action”	113	-	-	-
Additional energy system costs and investment costs in non-energy sectors	-	60	76	110
Difference from “non-action” (Bln EUR)		-53	-37	-3

Figure 4: System costs of non-action and costs²¹ of mitigation scenarios additional to baseline scenario costs (Bln EUR)



²⁰ Total system costs include all costs incurred by the operators (such as annuity payments for capital and for direct energy efficiency investments, variable costs for operation and maintenance, fuel, electricity and distributed steam/heat purchasing costs - which reflect all costs incurring by energy suppliers, including taxes, ETS, etc; direct tax payments and disutility costs - income compensating variation of utility applicable for residential, services and transport of individuals), as well as the costs incurred by the rest of the economy in order to get the required energy services. Total additional system costs are estimated in comparison with the baseline scenario.

²¹ For the energy sector, total system costs are included.



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The majority of additional system costs in the M2 scenario, are the additional system costs of Energy sector (46,2Bln EUR), which can fully or in part be passed to consumers taking into account market conditions.

The Other sectors (residential, institutional and commercial) with 12,7Bln EUR and Manufacturing industry and construction with 8,3Bln EUR follow.

The additional system cost of all remaining sectors (IPPU, Agriculture, Forestry, Waste) is estimated at 0,9Bln EUR, while transport sector is having a negative additional system costs²² in the period 2020-2050, due to future fuel savings imbedded in EU climate *acquis*.

With increasing ambition (as in the M3 and M4 scenarios) in the period 2020 - 2050, the additional system costs of Energy sectors slightly decrease (due to higher penetration of renewables, which, for example, have no running costs associated with carbon and many of them have no costs associated with fuel – such as hydro, wind, solar), while the additional costs of residential and commercial sector are increasing (namely due to the increase of the price of electricity). In the remaining sectors (IPPU, Agriculture, Forestry and Waste) additional costs increase from 0,9Bln EUR in M2 to 1,8Bln EUR in M3 and 3,4Bln EUR in M4, due to increase in intensity of measures and of introduction of additional measures (in particular in the agriculture sector).

3.3.2. Social, Economic and Environmental Impacts

Identification of the most appropriate GHG emissions reduction pathway depends on costs, as well as on social, economic and environmental impacts. Therefore, in order to define the socially fair and cost-effective trajectory of the GHG emission reductions curve: effects on GDP growth, on employment and on the share of energy costs in household expenditure were assessed for different mitigation scenarios.

The impact of scenarios M2, M3 and M4 on GDP growth is very limited. In the period 2020-2050, the yearly average GDP growth rate in Serbia is projected²³ to be: 3,77% in B2, 3,68% in M2, 3,68% in M3 and 3,64% in M4, while effects on GDP growth are: -1,0% in M2, -3,5% in M3 and -3,4% in M4 by 2030, while these effects are -1,6% in M2, -1,8% in M3 and -3,9% in M4 up to 2050. Taking into account the GDP growth such effects are slight.

In all scenarios there is a small net job loss²⁴: -1,4% in M2, -2% in M3, and -2,1% in M4 in 2030 and -2% in M2, -1,7% in M3, and -2,5% in 2050. This net job loss is mainly due to the reduction of jobs in the sectors related to fossil fuels and, to a certain extent, in agriculture²⁵. However, these losses could be compensated by job gains in sectors related to renewable energy sources, energy efficiency, construction, in the forestry and forestry related sectors.

If investments are financed through loans, while revenues of ETS auctioning²⁶ are used to support the implementation of climate change measures and, for example, to reduce labor costs²⁷ instead of use to reduce public debt, effects on GDP can be slightly positive in M2 and M3 and impacts on employment positive (meaning that net jobs are created). Other impacts of

²² This means that system costs for the transport sector are lower in M2 than on B2.

²³ The macro-economic scenarios have been modelled using the GEM-E3 model, which is an applied general equilibrium model that provides details on the macro-economy and its interaction with the environment and the energy system.

²⁴ Net jobs equal jobs created minus jobs lost in a given period.

²⁵ The reduction of labour needs in the agriculture sector is much more significant in the baseline scenario due to structural reforms and efficiency gains in the sector, than in the mitigation scenarios due to the implementation of climate change measures.

²⁶ Auctioning is the default method of allocating allowances within the EU emissions trading system. This means that businesses have to buy, through auctions, an increasing proportion of allowances in an amount equal to that of their yearly respective GHG emissions.

²⁷ This is usually referred to as recycling of ETS revenue.



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relevance for assessment of the most cost effective and socially fair transition of the Serbian society are presented in the Table 3 below.

Table 3: Key social, economic and environmental impacts of the mitigation scenarios in comparison with the baseline scenario B2

Indicator	2030			2050		
	M2	M3	M4	M2	M3	M4
GHG emission reduction [ktCO _{2e} compare to B2]	10.254	19.958	18.510	41.195	44.105	50.009
Cumulative additional energy system cost [Mio€]	2.397	7.403	5.344	58.999	74.436	106.942
Exposure to ETS prices [Mio€]	3.910	3.207	3.397	34.937	28.177	28.817
Effects on GDP growth [%]	-1,0%	-3,5%	-3,4%	-1,6%	-1,8%	-3,9%
Share of energy costs in household expenditure (change from B2)	1,1	2,3	2,0	2,7	2,8	5,3
Environmental impacts (PM _{2,5}) [%]	-7,0%	-26,7%	-23,5%	-28,7%	-49,1%	-39,7%

The environmental impacts of climate action could be expressed through relation between GHG and PM_{2.5} emissions²⁸. In general, the greater the reduction of GHG emissions through the replacement of solid fuels are, the greater the reduction of emissions of PM_{2.5} is. An exception is, for example, the use of biomass in households that reduces GHG emissions, but increases emissions of PM_{2.5}. This is the reason behind the greater emissions of PM_{2.5} in M4 than in M3, by 2050. Also, the environmental impacts (expressed in emission of PM_{2.5}), are positive in all scenarios.

Based on previous, data in **Table 3**, it is evident that the scenario M2, can be considered “inevitable” when Serbia joins the EU, represents the smoother emissions reductions pathway and has the least additional costs for the Serbian economy and society, and effects on GDP growth, on employment and on the share of energy costs in household expenditure especially by 2030.

However, by 2050, the M2 and M3 scenario achieve comparable emission reductions using two different pathways. While M3 achieves deeper emission reductions in the short term (up to 2030), the M2 scenario starts with a slower pace and increases the depth of emissions reductions in the period 2030-2040. Reducing emissions in a faster pace (as M3), compared to the same emissions reductions in a slower pace (M2) over the same time period, requires additional resources and intensifies the socio-economic impacts. Thus, M3 scenario, would entail, by 2030, additional system costs of about 5Bln EUR compared to the M2 scenario.

Scenario M4 presents the highest emissions reductions by 2050. and requires the highest additional costs. By that it has the greater impacts on GDP and on employment than M2 and M3. Scenario M4 also results in the highest increase of the share of energy costs in household expenditure, both in 2030 and in 2050.

The whole M3 and M4 pathway (from 2020 to 2050) could be achieved with significant financial and technological support of the international community and the EU, in addition to that required for the implementation of M2.

²⁸ Emissions of particles that have aerodynamic diameters less than or equal to 2.5 µm



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4. GENERAL AND SPECIFIC OBJECTIVES

Based on results, the GHG emission pathway as defined by the M2 up to 2030 (a medium-term that coincides with the end of the Action plan period) and a range of options as in M2 to M4 scenario until 2050 are recommended as the cost effective and socially fair pathways to the climate vision

Based on previous results (potential for the GHG emission reduction, impacts on social, economic and environmental parameters) the M2 scenario is recommended scenario up to 2030.

From 2030 to 2050, the range of the mitigation pathways between the M2 and the M4 scenarios, leave the options open for future decision, for which experience with implementation of this strategy can be beneficial.

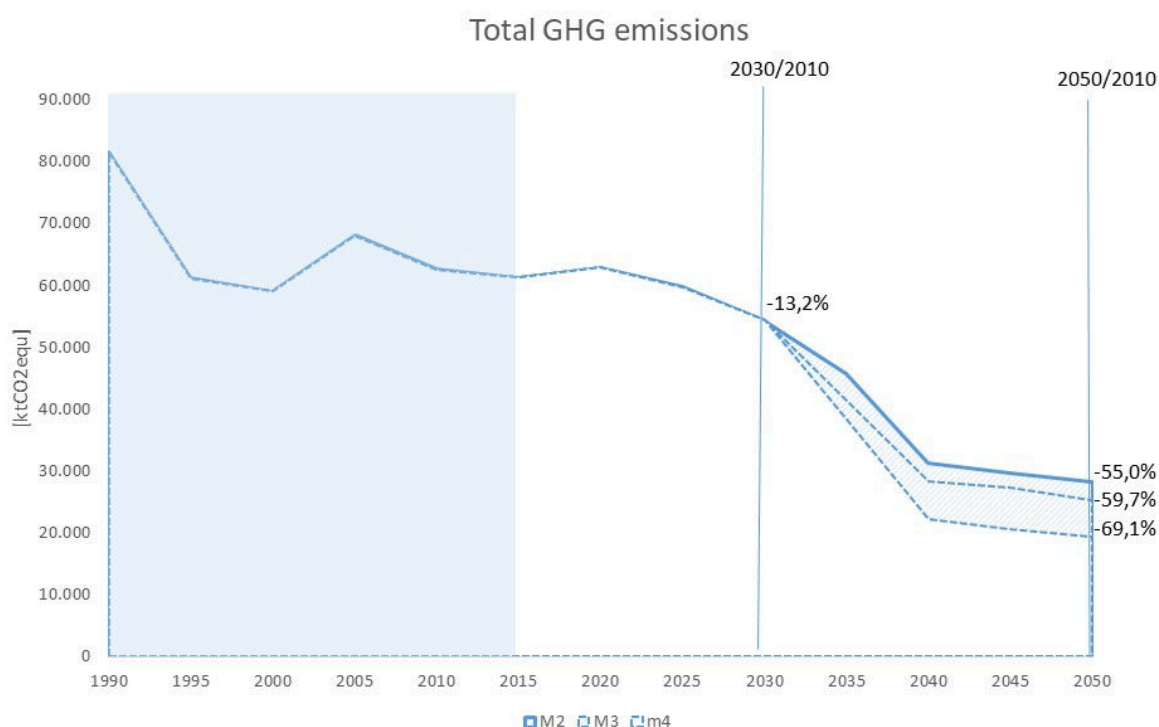
In addition, this approach is in line with the result of Strategic Environmental Impact Assessment, whose report mentions that “scenarios M3 and M4 have by far the greatest positive environmental impact, but their realistic feasibility must be valued through other analyses as well (above all economic, but also social)” as well as principles of the Paris Agreement (increasing ambition over time).

Starting from this approach the general objective of this strategy is:

Reduction of national GHG emissions (excluding LULUCF) by 13%, up to 2030, and at least 55% to 69% by 2050 compared to 2010.

These GHG emissions reduction (excluding LULUCF) are equivalent to emission reductions of 20% in 2030, and at least 59% to 72% in 2050 compared to 2005 and to emissions reduction of 33% in 2030, and at least 65% to 76% by 2050 compared to the GHG emissions in 1990.

Figure 5: Greenhouse gas emissions targets and pathways enshrined in the general objective



Such national GHG emission reduction without the LULUCF, contains reduction of GHG



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emissions in electricity and heat production by 17% by 2030 and between 78%-89% by 2050, compared with 2010 and throughout increase of energy efficiency and RES, in the industrial sector by 15% by 2030 and between 37%-55% by 2050, and in the residential and commercial sectors by 40% by 2030 and between 70%-78% by 2050, compared with 2010. Contribution of the other sectors is presented through specific objectives.

Total reduction of the GHG emissions rely on the GHG emission reduction in different economic sectors and its absorption by forests. In order to be compliant with the EU legislation and practices **specific objectives** for fulfilment of the general objective of the Strategy could be defined as:

Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15,0% in 2030 and between 66,4% and 76,8% by 2050 compared to 2010²⁹

This specific objective is equivalent to reducing GHG emissions covered by the EU-ETS by 24,4% in 2030 and between 70,1% and 79,4% by 2050 compared to 2005.³⁰

Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030 and between 33,5% and 54,5% by 2050 compared to 2010.

This specific objective is equivalent to reducing GHG emissions not covered by the EU-ETS by 11,2% in 2030 and between 34,6% and 55,2% by 2050 compared to 2005.

Under this specific objective, the following sectoral targets, compared with 2010, are defined:

- Reduce emissions, through the increase of energy efficiency and use of RES, in the industrial sector³¹ by 15% by 2030 and between 37%-55% by 2050, and in the residential and commercial sectors by 40% by 2030 and between 70%-78% by 2050;
- Limit GHG emissions growth in the transportation sector by 10% by 2030 and reduce emissions by 30%-54% by 2050;
- Limit GHG emissions growth from Industrial Processes and Product Use³² by 7% and retain emissions between the range of +3% to -3 by 2050;
- Reduce GHG emissions in agriculture by 15% by 2030 and retain emissions between the range of +2% to -24% by 2050;
- Reduce GHG emission in the waste sector by 13% by 2030 and between 29%-69% by 2050; compared with 2010

Emissions and removals from LULUCF are not included in the emissions covered by the specific objectives 1 and 2. In this context, a specific objective is created, focused on forestry:

Specific objective 3: Increase the carbon sink in the Serbian Forest by 17% by 2030 and between 22% and 132% by 2050, compared to 2010

Specific objective 4: Preserve the potential of mitigation measures, determined for 2030 and 2050, by increasing the resilience to climate change of the priority sectors³³.

The following adaptation measures and options up to 2030/2050 for each of the three sectors, are identified as the most important:

²⁹ Due to the market-based nature of the EU-ETS, the target included in this specific objective is indicative.

³⁰ Emission reductions are compared to 2005 since this is a base for splitting national GHG emission to emissions covered by the EU-ETS Directive and emissions covered by EU Effort sharing decision (non-ETS)

³¹ Part of the manufacturing industries not covered by the EU-ETS

³² Produce used to replace ozone depleting substances

³³ The priority sectors selected are: agriculture – food production; forest – bioenergy production; and water resources – hydroelectricity production.



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1. Agriculture – food production:
 - ☐ New irrigation systems construction and efficient use of existing ones
 - ☐ Multipurpose small accumulation lakes, ponds and reservoirs for water supply, irrigation, erosion control, ecosystem services
 - ☐ Adaptation of cultivation technologies (selection of species and agro technical measures)
2. Forestry – bioenergy:
 - ☐ Afforestation of new land using site mapping and climate change adapted tree species
 - ☐ Change of forest management practices toward close to nature forest management approach
 - ☐ Introduction of a "climate smart forestry" approach
3. Hydrology and Water Resources – hydro-electric production:
 - ☐ Construction of flooding/torrential barriers and additional measures in the basin
 - ☐ Improvement of the system for observation, data collection and early warning systems for extreme climate and hydrological events
 - ☐ Increase in water storage capacity

Specific objective 5: Promote transition to climate neutral and climate resilient economy and society

Activities regarding promotion are horizontal activities and will be realized, among else, through education, training for new skills, capacity buildings and awareness raising.

List of different measures which realization will ensure fulfilment of specific and by that general objective of the Strategy is developed. These measures, their effects, impacts, responsible institutions, timelines and other information ensuring monitoring and reporting of measures are described in the Action plan, in details, while basic information are provided in the following chapters of the Strategy.

5. MEASURES AND THEIR IMPACTS

5.1. Measures

Specific measures that ensure achievement of the Strategy vision, throughout fulfilment of specific and general objective are presented in **Table 4**. This table also includes the identification of the stakeholders that have an interest in or are under the effect of the measure³⁴.

Table 4: Measures to achieve the goals and identification of stakeholders

Specific Objective	Measure	Stakeholders Affected
Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15,0% in 2030 and between	Implementation of the ETS Directive (and implementation of equivalent measures)	Public Utility Companies and the respective value chain (namely the mining sector); independent producers; transmission and distribution system operator; industrial companies covered by ETS; consumers of electricity and
	Increasing the use of RES in electricity production	

³⁴ This identification excludes the public administration (at national, provincial or local level) that have responsibility for the implementation and/or monitoring of such measures as they are conveniently identified in the action plan.



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Specific Objective	Measure	Stakeholders Affected
66,4% and 76,8% by 2050 compared to 2010		other products subject to carbon price
	Improving energy efficiency and increasing use of CHP and RES in district heating systems	
Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030 and between 33,5% and 54,5% by 2050 compared to 2010.	CO ₂ tax and excise duties on energy	All final energy consumers of the industrial ³⁵ , household and tertiary sectors
	<i>Industrial sector</i>	
	Improving the energy efficiency and Increasing use of RES in industry	Industrial companies; consumers
	<i>Households and tertiary sector</i>	
	Improving the efficiency in electrical appliances for households ³⁶	Consumers
	Improving the thermal integrity ³⁷ of households	Construction entities and respective value chain (suppliers of materials); consumers (household owners)
	Energy efficiency improvement of heating and cooling infrastructure and promotion of use of RES in households	Suppliers of equipment; installation entities; consumers
	Improving energy efficiency and use of RES in the Tertiary sector	Tertiary sector private entities; consumers
	Improving the thermal integrity in the tertiary sector	Tertiary sector private entities; construction entities and respective value chain (suppliers of materials); consumers
	<i>Transport sector</i>	
	Renewal of the passenger fleet and promotion of sustainable passenger transport (Efficiency improvements of vehicle stock and usage of vehicles; Promotion of public transport and non-motorized transport; Promotion of usage of alternative fuels and biofuels)	Automobile industry, including production, import and sales; consumer
	Renewal of the freight fleet and promotion of sustainable freight transport	Heavy and light duty vehicle industry, including production, import and sales; consumer (freight companies)
	<i>Industrial Process and Product Use</i>	
	Implementation of the F-gas regulation and MACs directive	Manufacturing industry, producers of equipment containing F-gases, equipment maintenance providers

³⁵ Excluding industry covered by the ETS

³⁶ The measure "Improving the efficiency in electrical appliances for households" is not included in the action plan, as the Energy Labelling Directive 2009/125/EC is already transposed into Serbian legislation and the transposition of the Eco-Design Directive is already included in other measures.

³⁷ Set of measures addressing the energy demand needed for heating or cooling of buildings



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Specific Objective	Measure	Stakeholders Affected
	<i>Agriculture</i>	
	Winter cover crops	Farmers, (seed) suppliers; consumers
	Increase legume share in fodder area	
	Breeding for higher milk yields	Livestock producers; (additive) suppliers; consumers
	Linseed as feed additive for cattle (after 2030)	
	Additional measures after 2030 if mitigation pathway is to be consistent with scenarios M3 or M4: Precision farming and anaerobic digestion.	
	Additional measures after 2030 if mitigation pathway is to be consistent with scenario M4: anti-methanogenic vaccination; breeding for ruminant efficiency; nitrification inhibitors; and nitrate as a feed additive.	
	<i>Waste sector</i>	(After 2030, if M3 or M4 pathways are chosen: local self-governments, public utility companies; private entities; consumers)
	(No additional measures beyond current policy framework for the waste sector until 2030 and in the period 2030-2050 if the emission pathway is to be consistent with M2)	
	Measures where additional effort will be required compared to B2/M2, after 2030 if mitigation pathway is to be consistent with scenarios M3 or M4: construction of sanitary landfills; Source separation and construction of material recovery facilities; Construction of biological treatment facilities (composting plants); construction of thermal treatment (incineration) plant;	
	Measures where additional effort will be required compared to B2/M2, after 2030 if mitigation pathway is to be consistent with scenario M4: construction of biological treatment facilities (anaerobic digestion); Enhanced waste prevention.	
Specific objective 3: Increase the carbon sink in the Serbian Forests by 17% by 2030 and between 22% and 132% by 2050; compared with 2010	Afforestation	Forest public enterprises (SE "Srbijašume" and SE "Vojvodinašume"); private forest owners (in particular, the Serbian Orthodox Church); Universities
	Close to Nature Forest Management and Climate Smart Approach to Forestry	
	Conversion of coppice to high forest	
	Short Rotation Plantations	
	Regeneration of over mature stands	
	Definition of guidelines for the reduction of negative abiotic and biotic factors	
	Research, training and awareness raising programme for the enhancement of the carbon sink and of the resilience of the Serbian forest to climate change	



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Specific Objective	Measure	Stakeholders Affected
Specific Objective 4: preserve the potential of mitigation measures by increasing the resilience to climate change of priority sectors	Construction of flooding/torrential flood barriers and additional measures in the basin ³⁸	Public Utility Companies
	Improvement of the system for observation, data collection and early warning systems for extreme climate and hydrological events ³⁸	
	Increase in water storage capacity (integrated with the mitigation measure) "Increasing the use of RES in electricity and heat production [Penetration of RES]"	
	Construction of new irrigation systems and increased efficiency in the use of existing ones ³⁹	Construction entities; building and irrigation material suppliers; farmers, seed and agri-technology suppliers;
	Construction of multipurpose small accumulation lakes, ponds and reservoirs for water supply, irrigation, erosion control and ecosystem services ⁴⁰	
	Adaptation of cultivation technologies to a changing climate (selection of species and agrotechnical measures)	
	Afforestation using site mapping and tree species adapted to climate change (integrated with the mitigation measure on afforestation)	Forest public enterprises (SE "Srbijašume" and SE "Vojvodinašume"); private forest owners (in particular, the Serbian Orthodox Church);
	Introduction of a "climate smart forestry" approach (integrated with the mitigation measure Close to Nature Forest Management and Climate Smart Approach to Forestry)	
Specific objective 5: Promote transition to climate neutral and climate resilient economy and society	Climate change education, training for new skills and awareness raising.	Universities; schools; adult training centres; companies; workers, in particular in the value chain of the carbon intensive sectors.

³⁸ This measure is not included in the Action Plan as its goals are to be met through the implementation of the National Disaster Risk Management Programme and the Action Plan for the Implementation of the National Disaster Risk Management Programme (2016-2020), in particular measures 3.1., 4.1 and 4.2

³⁹ This measure is not included in the Action Plan as its goals are to be met through the implementation of the National Agriculture and Rural Development Strategy of Republic of Serbia 2014-2024 and of the Strategy on water management in Republic of Serbia until 2034.

⁴⁰ This measure is not included in the Action Plan as its goals are to be met through the implementation of the Strategy on Water Management in the Republic of Serbia and of the Law on Agricultural Land



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5.2. Impacts of measures

Impacts of the measures as foreseen in the M2 scenario up to 2030. and in the range between M2 to M4 from 2030 to 2050. could be presented throughout:

5.2.1. Social impacts

The social impacts are presented as impacts on:

(1) Employment

The net jobs (jobs created minus jobs lost) in the baseline scenario are: 2 462 in 2020, 2 473 in 2030 and 2 438 in 2050 (Table 5).

The impact of the implementation of the measures is insignificant or close to insignificant. In 2030, an impact of -1.4% on net jobs created is expected (this means in 2030, Serbian economy will create 2 438 net jobs, compared to 2 473 in the B2 baseline scenario). For 2050, the impact on net jobs created is of 2% in the M2 scenario, 1.7% in the M3 scenario and of 2.5% in the M4 scenario.

However, there is possibility even to reduce such insignificant impacts on employment⁴¹, if the investments required for the implementation of this strategy are financed through loans, while the revenues of ETS auctioning are used to support the implementation of climate change measures (50%), to reduce costs of labor (40%) and transferred directly to poorer households⁴² (10%) instead to be used to reduce public debt (Table 5), while *Table 8* presents the impacts on GDP in such case⁴³.

Table 5: Impacts on employment⁴⁴

	Impacts on Employment (%)			
	2020	2025	2030	2050
B2 (net jobs)	2 462	2 468	2 473	2 483
M2 (%)	0,0 [0,14%]	-1,3 [0,74%]	-1,4 [0,84%]	-2,0 [0,93%]
M3 (%)	-	-	-	-1,7 [0,80%]
M4 (%)	-	-	-	-2,5 [0,93%]

The greatest transformations, could be expected in the “Mining and Quarrying” and in the “Electricity, Gas and Steam Supply”⁴⁵, where a net job loss is expected⁴⁶. On the other hand, an important job growth is expected to take place in the “Agriculture and Forestry” sectors, in particular in the forestry and the forestry related sectors (for example, wooden products)⁴⁷.

As such, negative impacts on employment can be expected in sectors dominated by large companies, and the positive in sectors with the micro and small.

In addition, two measures: Implementation of ETS and Afforestation can be assumed as measures with particular effects on men, because the first will reduce jobs in the mining sector,

⁴¹ The values in the square brackets [] in Table 5.

⁴² For example, through fiscal benefits.

⁴³ This alternative scenario also has positive impacts on GDP, which are described in chapter 5.2.2.

⁴⁴ The value in the square brackets [] represent the impact on employment in case investments are financed through loans and revenues of ETS auctioning are used to support the implementation of climate change measures and, for example, to reduce costs of labor instead of used to reduce public debt.

⁴⁵ In these two sectors, respectively, 77% and 89% of employees work at large companies, in accordance with the Statistical Office of the Republic of Serbia

⁴⁶ This means that more jobs will be lost than new jobs will be created.

⁴⁷ In this sector, 64% of employees work at micro, small and medium enterprises, in accordance with the Statistical Office of the Republic of Serbia



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and the second increase in the forest and forest related sectors that are traditionally sectors that employ men.

(2) Share of energy costs in household expenditure

The share of energy in household expenditures slightly fluctuates from 18% in 2020 to 15% in 2050 in the B2 baseline scenario. The implementation of the measures of the Strategy would imply an increase of the share to 19.1% in 2030. By 2050, the share of energy costs in household expenditure are projected to increase (compared to the same year in the baseline) for additional 2,7% (to 17,7%) in the M2 scenario, 2,8% in M3 (to 17,8%) and 5,3% (to 20,3%) in the M4 scenario. This increase in energy costs is associated with the internalization of the costs of carbon and with the investments in low carbon technologies in the energy price paid by the households.

However the comparison of the share of costs in 2050 with those in 2020 (in B2) shows that the share of energy costs in household expenditure will decrease (0,2-0,3%) with implementation of M2 and M3, and increase (2,33) with implementation of and M4 scenario.

Table 6: Share of energy costs in household expenditure

	Share of energy costs in household expenditure			
	2020	2025	2030	2050
B2(%)	18	19	18	15
M2 (change from B2)	+0,3%	+0,8%	+1,1%	+2,7%
M3 (change from B2)	-	-	-	+2,8%
M4 (change from B2)	-	-	-	+5,3%

If assumed⁴⁸ that women have a particular role in using energy in the households (lighting, heating, cooking, cleaning, ironing), then measures that affect the price and the consumption of energy will affect women more than man. With such assumption measures that increase energy price (such as Implementation of ETS or Penetration of Renewables) tend to have a negative impact on women, while measures that reduce energy consumption (such as improving the efficiency in electrical appliances for households and Heating and cooling infrastructure for households) tend to have a positive impact. At the same way, measures related to biomass use as household energy source, namely for cooking and heating (such as Promotion of proper use of wood) may positively affect women. However, the poorest population will be affected the most with increase of energy price.

5.2.2. Economic impacts

Economic impacts of the mitigation measures could be presented through impacts on:

(1) GDP

Implementation of the measures have a negligible impact on Serbia's long-term GDP growth rates.

Table 7: Average annual growth rate of the GDP in the period 2020-2050

	B2	M2	M3	M4
GDP	3,77%	3,68%	3,68%	3,64%

Table 8 includes the projected impact of the implementation of the measures included in this strategy on GDP, compared to the GDP in the B2 scenario. The impact on GDP is of -1,4% by 2030 and -2,7% in M2; -2,6% in M3 and -3,8% in M4 by 2050 compared to B2. The figures in

⁴⁸ Government of the Republic of Serbia and United Nations Country Team in Serbia (in May, 15th 2019)
<http://rs.one.un.org/content/unct/serbia/en/home/publications/gender-equality-and-climate-change.html>



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square brackets in **Table 8** reflect the impacts on GDP in case of recycling and use of loans for investments.

Table 8 Impacts on GDP compared to B2 Baseline scenario

	2020	2025	2030	2050
M2	0,0 % [0,1%]	-1,0% [0,11%]	-1,4% [-0,12%]	-2,7% [-0,76%]
M3	-	-	-	-2,6% [-0,93%]
M4	-	-	-	-3,8% [-0,15%]

This means that GDP will continue to grow in all scenarios, but at a slightly slower than in B2 (presented in *Table 7*).

If investments through loans and recycling ETS auction revenues back to the economy are assumed, as described previously, the impacts on GDP will be reduced significantly.

(2) Household consumption

Household consumption, expenditure or spending represent how much each family spends and it represents the largest component of GDP in developed economies.

As a result of the implementation of this strategy, household consumption can be affected mainly via the impacts on employment and on the price of energy. On the one hand, to the extent the implementation of this strategy has an impact on the creation of net jobs, so is the household consumption affected. On the other hand, increasing energy costs reduce households' disposable income for consumption of non-energy products.

Compared to the Baseline, household consumption will decrease by 2,5% in 2030 and by 5% in the M2 and M3 scenarios and by 5,4% in the M4 scenario by 2050 (*Table 9*). Regardless of this impact, household consumption will, in the 2020-2050 period, almost triple, which indicates that the impacts of the implementation of the measures are expected to be negligible.

Table 9: Impact on household consumption

	Household consumption			
	2020	2025	2030	2050
B2 (MEUR)	25,980	31,085	36,635	60,732
M2	0,0%	-2,3%	-2,5%	-5,0%
M3				-5,0%
M4				-5,4%

5.2.3. Environmental impacts

Environmental impacts of the mitigation measures could be presented through impacts on:

(1) Emissions of PM2.5

The biggest negative impacts on climate change are result of the combustion of solid and liquid fuels for power generation, domestic heating and in vehicle engines. During such combustion particulate matters are emitted, that have harmful effects on human health.

Measures assumed by the Strategy will bring reduction of PM2.5 emissions for 7% in 2030. After 2030, the reduction of emissions of PM2.5 intensify, reaching 28,7% in the M2 scenario and 39,7% in the M4 scenario by 2050⁴⁹ (*Table 10*) Therefore, even it is not its goal, implementation

⁴⁹ Reduction of PM2.5 is higher in the M3 than in the M4 scenario, due to greater use of biomass in M4.



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of this strategy, will contribute to cleaner air and to a reduction of health problems associated with air pollution.

Table 10: Impacts on Emissions of PM2.5

	Air quality: Emissions of PM2.5			
	2020	2025	2030	2050
B2 (kt)	29,7	28,6	27,0	27,5
M2	8,8%	0,5%	-7,0%	-28,7%
M3	-	-	-	-49,1%
M4	-	-	-	-39,7%

(2) N Balance

N Balance (Nitrogen balance) is a measure of nitrogen input (from fertilizer, manure, crop residues, etc.) minus nitrogen output (from gaseous loss, run off mineral, etc.). Nitrogen is a vital nutrient that helps plants and crops grow, but high concentrations are harmful to people and nature. The closer to zero the N Balance is, the more environmentally friendly is respective activity.

Table 11, represent the actual value of the N Balance (kt) in the B2 Baseline scenario, which shows decrease trend from 2020 to 2050. This trend is intensified with the implementation of the measures of the Strategy. In 2030, the N Balance is in M2 reduced by 1.3% in addition to the baseline scenario, while by 2050 N Balance reduction amount to 3.1%, 18% and 33.7% in the M2, M3 and M4 scenarios respectively.

Table 11: Impacts of scenarios on the N Balance

	Soil and Water Protection (N Balance)			
	2020	2025	2030	2050
B2 (kt)	238	208	178	186
M2	-0,3%	-0,7%	-1,3%	-3,1%
M3	-	-	-	-18,0%
M4	-	-	-	-33,7%

5.2.4. Administrative impacts

The implementation of the strategy will require an enhanced inter-sectorial cooperation National Climate Change Committee could have important role in that regard.

Moreover, implementation of the Strategy does not require, for the majority of the measures, new technical skills to be introduced in the relevant sectoral ministers and institutions.

The most notable exception is the EU-ETS measure, which requires a set of technical skills and the definition and application of administrative procedures (such as issuing GHG permits and defining National Implementation Measures, allocation of free EU allowances to industrial installations. management of the revenues of the EU-ETS auctioning and of the equivalent measures etc) currently not existing in the Serbian administration. Mechanism for the management of the revenues of the EU-ETS auctioning and of the equivalent measures needs to be established to ensure the effective support to the implementation of the measures included in this strategy. This mechanism needs to be supported by the appropriate institutional set up that ensures the highest fiduciary standards and the capacity to process the expected volume of applications for support for implementation of the measures.

Implementation of measures contained in the Strategy will require additional administrative capacities, which translated in the number of full-time employees (FTE) is between 33 and 61



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for M2 and M4 scenarios respectively. This is between 330.000 EUR and 610.000 EUR for yearly wages from the Government budget. (*Table 12*).

Table 12: Additional FTE required for the implementation of this strategy and associated estimated government spending

	Additional FTE		Estimated government spending (000 EUR)	
	M2	M4	M2	M4
Energy	19	28	190	280
Agriculture	3	8	30	80
Forestry	11	15	110	150
Waste	-	10	-	100
TOTAL	33	61	330	610

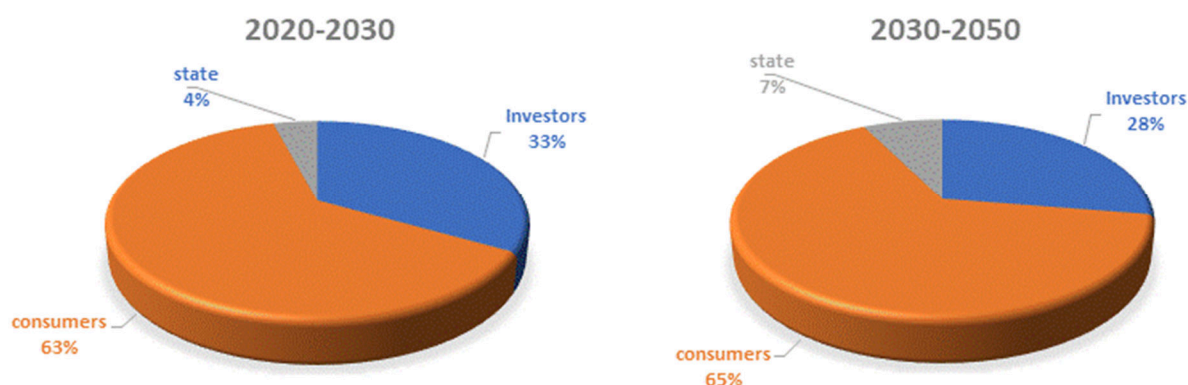
6. COSTS AND POTENTIAL RESOURCES FOR IMPLEMENTATION

6.1. Costs of implementation

Measures proposed by the Strategy require additional investments across different sectors than those in a case of "no-action" (B2 Baseline scenario). These **additional** investment costs are estimated at 6,5Bln EUR for the period 2020-2030 and between 37,8 and 76,8Bln EUR for the period 2030-2050.

Such additional investment costs will be shared among consumers/households (for example in buying more efficient cars and electrical appliances or by isolating their dwellings), investors/companies (new trucks, renewable energy sources) and the state (e.g. renewal of the public transportation system and afforestation in state owned lands). Consumers and investors will bear most of the investments/costs (respectively, 63% and 33% up to 2030; and 65% and 28% in the period 2030-2050)⁵⁰. The state bears the remaining 4% and 7% of investment costs in the periods 2020-2030 and 2030-2050 respectively.

Figure 6: Share of investment cost in the period 2020-2030 and 2030-2050



⁵⁰ For the purpose of these estimates, costs have been allocated to the one who makes the investment, irrespective of its capacity to pass the costs of the investment down the value chain to consumers and irrespective of any public subsidies or incentives it received. Investors have been considered to represent companies, public or private and farmers; consumers represent households and state represents state investments from state budget.



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The State will have an additional role to support the implementation of the measures in the Strategy, though the definition of the regulatory, fiscal and incentive schemes. In this context, the revenues from the EU-ETS auctioning shall be treated by the State as an important source of financing of state incentives, because that will allow positive impact on the state budget.

Generally, the highest additional investments costs, as usually, are associated with the energy sector. As a result of the implementation of the EU-ETS, a series of additional investments are triggered, but particular focus will be on additional investment on the power grid, due to respond to the penetration of RES. Additional investments in the power grid are estimated at 160Mio EUR up to 2030, and in a range between 2,7Bln EUR and 4,3Bln EUR in the period 2030-2050. Total additional investments triggered by the EU ETS in the 2030-2050 period, (between 2,3Bln EUR and 3.6Bln EUR), are actually lower than the power grid investment, due to the lower investments needs in the thermal power plants compared to the B2 Baseline scenario.

This means that, because of the EU-ETS implementation, in the long-term, investments in thermal power plants will be lower than in the Baseline scenario (up to -1,4Bln EUR in the period 2030-2050), while investments will be realized in the GHG emissions reductions.

Also, additional investments in RES amount to 635 Mio EUR up to 2030 and to range between 5,3Bln EUR and 14,1Bln EUR between 2030 and 2050. The greatest additional investment is in solar photovoltaic, with 459 Mio EUR up to 2030, compared to 133 Mio EUR in wind, 38 Mio EUR in hydro and 6 Mio EUR in biomass. In the long-term, the order of additional investment remains largely unchanged, with additional investment in solar photovoltaic ranging between 727 Mio EUR to 8,3Bln EUR.

According to the M2 scenario, additional investments in the improvement of the thermal integrity of households, that is energy efficiency of the household buildings itself including transmission and ventilation losses or gains, and renewal of passenger fleet, will together require the largest share of additional investments up to 2030 (63%) and in the period 2030-2050 (65,9% in M2 and 63,2% in M4)⁵¹. Figure 7 presents the share of additional investments costs for the M2 scenario, for the period 2030-2050⁵².

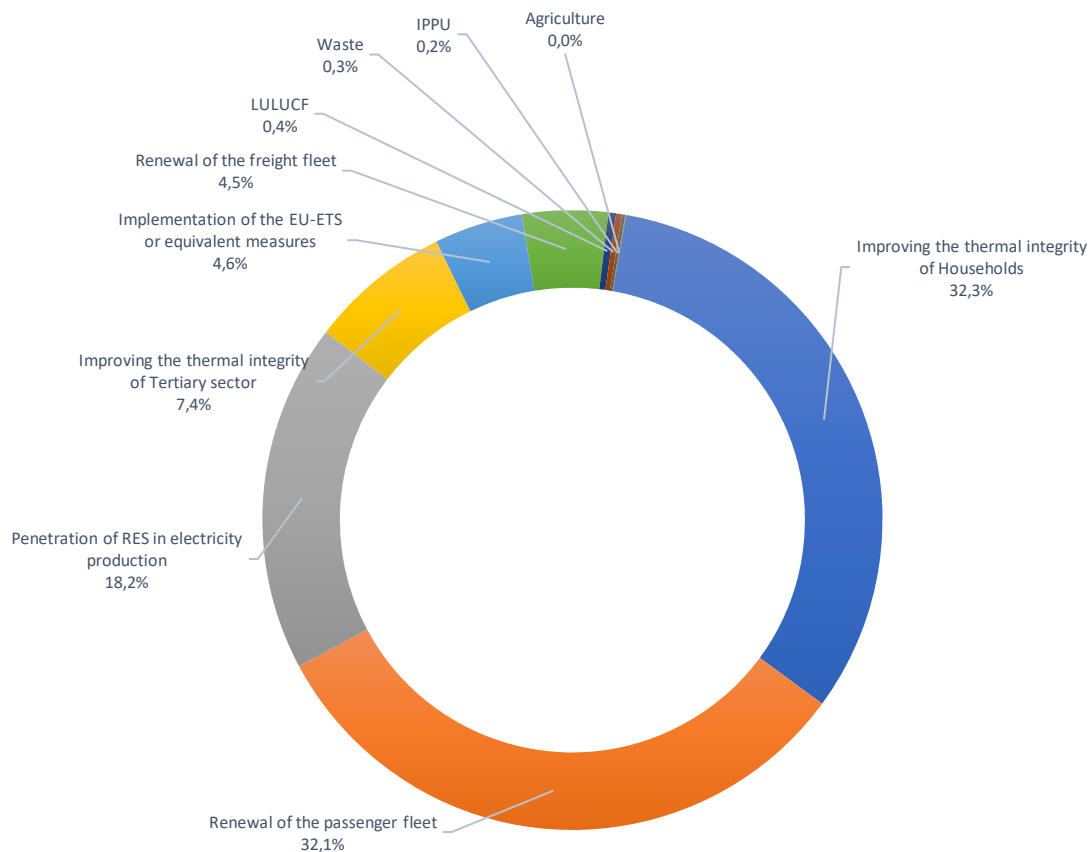
⁵¹ For these shares, the sectors with investment needs lower than in the baseline are not included.

⁵² The shares do not change significantly in the other scenarios, therefore the long-term M2 share is presented for illustrative purposes.



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Figure 7: Shares of additional investment costs (%) for the M2 Scenario in the period 2030-2050, excluding measures in sectors⁵³ with investment needs lower than in the baseline



Up to 2030, additional 1,85Bln EUR should be invested in the improvement of household thermal integrity. These investments increase to 7,44Bln (M2) to 24,98Bln EUR (M4) in the 2030-2050 period. The additional investment in thermal integrity of households has a great impact on the investment needs in Heating and Cooling Infrastructure, which are, in the long-term, lower than in the baseline scenario. The reduction of investment needs in infrastructure ranges between 37Mio EUR and 760Mio EUR in the period 2030-2050, as a result of increased energy efficiency from thermal integrity.

The same is the case for the Improvement of Energy Efficiency and RES in the Industrial Sector, where additional investment needs are, in the long-term, lower compared to the B2 baseline (between 559Mio EUR in the M2 scenario and 213 Mio EUR in the M4 scenario), and for Improving the Efficiency of Electrical Appliances for Households, with lower investment needs in the short and long terms.

The renewal of the passenger fleet will require additional investments up to 2,3Bln EUR up to 2030, ranging from 18,2Bln EUR and 24,8Bln EUR in the period between 2030 and 2050.

⁵³ Such as: Improving the Energy efficiency and RES in the Industrial sector, Improving the efficiency in Electrical Appliances for Households, Heating and Cooling infrastructure for Households, Improving energy efficiency in the Tertiary sector



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The additional investment for the IPPU sector represents the costs associated with compliance with the EU regulations on F-gases and Mobile Air Conditioning Directive, which are covered by equipment producers. Additional investments by 2030 are estimated at 5 Mio EUR, while additional investment for the period 2030-2050 is expected to amount between 82 Mio EUR and 129 Mio EUR.

In the agriculture sector, additional investment needs (80 Mio EUR by 2030) are mostly related to best practices that enhance carbon sink in the soil, namely through winter cover crops. The additional investment needs in the agriculture sector increase significantly in the long-term and in the most ambitious scenarios (M3 and M4) and amount between 469-1585 Mio EUR in the period 2030-2050, when emissions reductions can only be achieved through expensive measures such as linseed as feed additive, nitrification inhibitors and precision farming.

The additional investment costs in the waste sector are limited to the period 2030-2050 and in the M3 and M4 scenarios, given that the baseline scenario already includes the investments required for the transposition of the EU *acquis* for the sector.

The investments in the forestry sector amount to 92 Mio EUR in the period up to 2030 and mostly represent the effort required to meet the afforestation targets foreseen in this strategy. In the long-term, the level of investment needs remains constant, except for M4, where the target for afforestation is extremely ambitious, requiring significant investments (621 Mio EUR in the period 2030 – 2050). Table 13 includes the additional investment costs required for the implementation of the Strategy, by sector, with additional detail for the energy sector due the highest additional investments costs.

Table 13: Additional investment costs required⁵⁴ for the implementation of Strategies' low carbon development pathways (in comparison with the baseline scenario) (Mio. EUR)

	2030 M2	2030-2050	
		upper	lower
Energy total	6.335	37.088	74.219
Implementation of the emissions trading system (and implementation of equivalent measures)	279	2.330	3.568
Power grid investment	160	2.715	4.305
Thermal Plants	104	-1.179	-1.390
Steam Boilers	15	794	653
Increasing the use of RES in electricity production	635	5.266	14.063
Solar	459	727	8.333
Wind	133	3.839	3.787
Biomass	6	393	607
Hydro	38	307	1.335
Improving Energy efficiency and Increasing use of RES in Industry	694	-559	-213
Improving thermal integrity of Households	1.852	7.438	24.983
Improving the efficiency in electrical appliances for households	-122	-101	-383
Energy efficiency improvement of heating and cooling infrastructure and promotion of use of RES in households	81	-37	-760

⁵⁴ The measure "Taxes and excise duties on energy and CO₂ tax" is not included in the table as there are no investment costs associated with it (as for the ETS, this measure triggers the investments in RES and energy efficiency presented in this table). Furthermore, improving energy efficiency and increasing use of CHP and RES in district heating systems is included under the implementation of the ETS and increasing the use of RES in electricity production



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	2030 M2	2030-2050	
		upper	lower
Improving energy efficiency and use of RES in the Tertiary sector	94	-391	-1.011
Improving thermal integrity of Tertiary sector	169	2.842	5.714
Renewal of the passenger fleet and promotion of sustainable passenger transport	2.263	18.214	24.799
Renewal of the freight fleet and promotion of sustainable freight transport	388	2.086	3.458
IPPU	5	82	129
Agriculture	80	469	1585
Waste	0	0	239
LULUCF	92	183	621
Grand TOTAL additional costs (compared to Baseline)	6.511	37.822	76.792

The costs associated with the implementation of the EU-ETS in Serbia are of a different nature to those associated with other measures. Direct costs of the EU-ETS are the costs of the acquisition of allowances for emissions and those related to equivalent measures, that may be implemented in the period up to the entry into force of the EU-ETS. These equivalent measures are aimed at providing price signals equivalent to those of the EU-ETS in a gradual manner, thus allowing for a smoother preparation for the participation of operators of installations in the EU-ETS. These costs are considered running costs and, therefore, are not included in the table above. However, given the importance of the measure and the magnitude of costs of exposure to the EU-ETS and to equivalent measures, these are presented in the *Table 14* below, *together with the additional investment costs in the energy sector, for context purposes.*

Table 14: Costs of exposure to EU-ETS carbon price and to equivalent measures

	2020-2030	2030-2050		
	M2	M2	M3	M4
Cost of exposure to ETS equivalent measures (2021-2025)	1578	-	-	-
Cost of exposure to ETS carbon price (after 2025)	3.910	31.027	24.969	25.420
Total ETS and equivalent measures compliance costs	5.489	31.027	24.969	25.420

6.2. Financing options of the strategy

Some of the financing options for implementation of the Strategy are described in the following sub-chapters.

6.2.1. Polluter pays principle

The polluter pays-principle is set out in the Treaty on the Functioning of the European Union (Article 191(2) TFEU) and has been a dominant EU concept in the combating climate change and in financing long-term sustained emissions reductions. This principle helps consumers to recognize the true costs of things.

Two options of polluter pay principle are available for the financing of the Strategy:

(1) Use of auctioning revenues from implementation of the EU-ETS

In compliance with the rules of the EU ETS, least 50% of the revenues generated from the auctioning of allowances should be used for financing policies and measures of this strategy such as:



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- develop renewable energies
- improve energy efficiency, district heating systems and insulation, or to provide financial support in order to address social aspects in lower- and middle-income households
- encourage a shift to low-emission and public forms of transportation
- promote skill formation and reallocation of labour in order to contribute to the fairness of the effort to reduce emission across the economy and the society, in particular in regions most affected by the transition of jobs, in close coordination with the social partners

Auctioning revenues can amount up to 23,4Bln EUR in the period 2025-2050, in the M2 scenario.

(2) Implementation of carbon tax on fuels for finale consumption⁵⁵

Implementation of carbon tax has to be gradually implemented in sectors not covered by the EU-ETS in order to reflect the true costs of GHG emissions and therefore lower the emissions and contribute to Serbia's future obligation under the Effort Sharing Regulation.

Carbon taxation on fuels used in final consumption (excluding transport) can generate additional 1Bln EUR in the period 2020-2050, as for the M2 scenario.

It has to be noted that gradual carbon taxation could be also considered as temporary solution for the ETS sector for the period 2020-2025 (or the year of entrance in the EU ETS), in order to ensure competitiveness and smooth transition of the energy intensive industries into the carbon constrained environment. Such approach can generate additional 1,6Bln EUR in the period 2021-2025.

In total, the implementation of these two "polluter pays" principles, in the period 2020-2050, can generate as much as 26,0Bln EUR.

This strategy foresees that at least 50% of revenues from auctioning are recycled (used) to support the implementation of emission reduction measures. The remaining 50% are to be used to reduce social security costs for employers (4/5) and to be transferred directly to poorer households (1/5). This will mitigate the impacts of the implementation of this strategy on GDP, employment and energy poverty.

6.2.2. Public financing

Public financing is the catalyst of the implementation of the climate strategy and, in consequence, the long-term transition to a low carbon economy. As a catalyst, it will not finance the implementation alone and it is not necessarily the greatest financier of each measure. Public finance can provide the seed money to mobilize other sources of financing, namely that from the private sector and or from international partners, such as the EU, the UNFCCC or other bilateral and multilateral organizations.

Available budgetary funds for financing of energy efficiency measures, enhancement of carbon sinks and emission reductions and budgets dedicated in 2018 are:

- Budgetary fund for energy efficiency (125 Mio RSD)
- Budgetary Forest Fund (750 Mio RSD)/ Budget Fund for Forests of the Autonomous Province (135 Mio RSD)
- Green Fund (70 Mio RSD)
- Budget Fund for Water of the Republic of Serbia (3,304 Bln RSD) / Budget Fund for Water of the Autonomous Province (4,650 Bln RSD)

⁵⁵ Final consumption consists of a fuel used by final consumer such as households, transport commercial and institutional sector and industry not covered by the ETS.



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Aggregate financing in 2018 was 9,034Bln RSD that is app. 75-77 Mio EUR, which currently represents just a fraction (3-5%) of resources needed.

A upgrading and streamlining of these instruments may be required, so as to ensure the effective management of the future revenues to be generated and their timely use for supporting the implementation of the measures included in this strategy.

6.2.3. Private sector financing

The private sector, including companies held by state, will take up a share of the required investments to increase energy efficiency and reduce GHG emissions. In order to support and promote such private sector investments, a set of “green finance” instruments have been developed, which are available at European level and are expected to be available to Serbian players. Such instruments include: Green bonds; Green loans; Sustainable investment funds; Impact funds / impact investments, and Blended finance.

6.2.4. International financing

EU Financing

Serbia is expected to use IPA funds until 2027⁵⁶, making use of the mechanism that allows funds to be used up to two years after allocation.

The key sources of financing from the EU are:

- Instrument for Pre-Accession - IPA
- IPARD
- Western Balkan Investment Framework
- European Social Fund
- Cohesion Fund
- European Fund for Regional Development - ERDF
- Horizon 2020 / Horizon Europe
- LIFE - Programme for the Environment and Climate Action
- investEU
- Connecting Europe Facility
- Innovation and Modernisation Fund (EU-ETS)
- EU Territorial Cooperation Programmes (INTERREG)
- Action Plan: Financing Sustainable Growth (COM (2018) 97 Final)

Bilateral and Multilateral funds and partners

The key sources of bilateral and multilateral financing for Serbia are

- The Green Climate Fund
- The Global Environment Facility
- The World Bank
- The European Investment Bank (EIB)
- The European Bank for Reconstruction and Development (EBRD)
- The Council of Europe Development Bank (CEB)
- KfW (German Development Bank)
- AFD (French Development Agency)

⁵⁶ After entry in the EU, Serbia would use IPA funds for two additional years, being included in the EU budget from 2028 onwards.



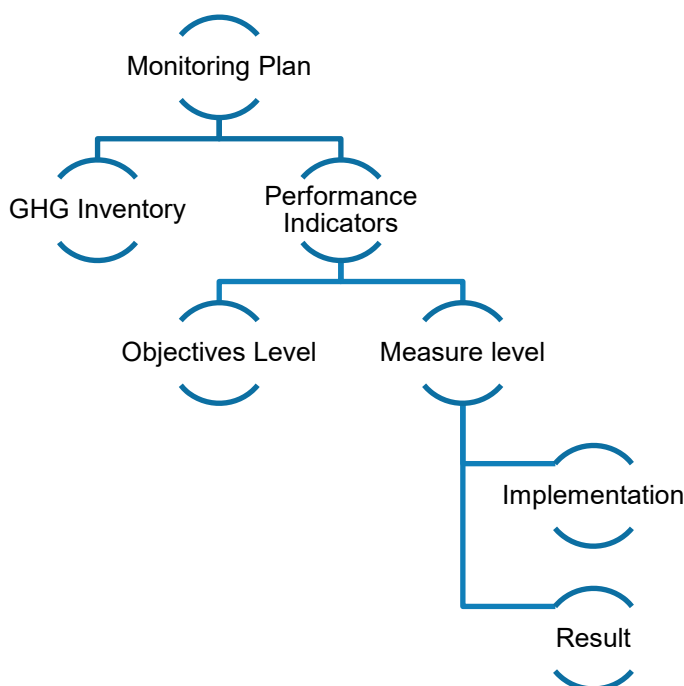
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7. FRAMEWORK FOR MONITORING AND REPORTING

In compliance with the Article 64 of the [Draft] Law on Climate Change, Official Gazette RS [...] responsible authorities and organisations shall be obliged to carry out an assessment of effects of their policies and measures on the GHG emissions level and shall report to the Ministry of Environmental Protection.

In this context, monitoring of implementation of specific measure will be done by the responsible institution and report to the Ministry. in accordance with the procedures to be determined by the Law. Implementation of the measure will be monitored by the GHG inventory and a set of indicators. (Figure 8)

Figure 8: Monitoring framework



In accordance with the Article 43 of the Law on the Planning System of the Republic of Serbia (Official Gazette of RS, No 30/18), MEP will report to the Government, on results of the implementation of the Strategy, no later than 120 days upon the expiry of every third calendar year from its adoption, and by means of the final report submitted no later than six months from the expiry of its validity.

The performance indicators at the level of the vision, general and specific objectives are presented in the *Table 15* and will also fulfil requirements of the Paris agreement.



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Table 15: Key performance indicators at the level of the Vision and of the general and specific objectives

Elements of the Strategy	Indicator	Baseline Value	Target Value				Source of verification
		2015	2030	2050			
				upper	-	lower	
Vision: (Establishment of the pathway up to 2050 for achievement of the vision on a socially fair and cost-effective way)	Emissions per capita tCO _{2e} /capita	8,6	8,0	9,1	-	9,0	National GHG Inventory (emissions without LULUCF) and Population statistics of SORS ⁵⁷
	Carbon intensity of the economy tCO _{2e} /GDP(MioEUR'13)	2020	1074	321	-	221	National GHG Inventory (emissions without LULUCF) and yearly national accounts - SORS
	Energy related CO ₂ intensity of GDP tCO ₂ /GDP(MioEUR'13)	1524,3	576,7	96,1	-	49,4	National GHG Inventory report (IPCC category - 1A; CO ₂) and yearly national accounts-SORS
General Objective: Reduction of national GHG emissions (excluding LULUCF) by 13%, up to 2030, and at least 55% to 69% by 2050 compared to 2010.	Total GHG emissions (without LULUCF) (ktCO _{2e})	61.233	54.396	28.180	-	19.366	National GHG Inventory report (CRF ⁵⁸ _emissions; without LULUCF)
	[Total GHG emissions (with LULUCF) (ktCO _{2e})]	[56.700]	[47.820]	[23.766]	-	[6.284]	National GHG Inventory report (CRF_emissions; with LULUCF)

⁵⁷ Statistical Office of Republic of Serbia

⁵⁸ Common Reporting Format - CRF



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Elements of the Strategy	Indicator	Baseline Value	Target Value				Source of verification
		2015	2030	2050			
				upper	-	lower	
Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15,0% in 2030 and between 66,4% and 76,8% by 2050 compared to 2010	GHG Emissions in the ETS Sector (ktCO _{2e})	40.874	34.806	13.743	-	9.486	Verified Annual ETS Emissions Report (SEPA)
	Carbon intensity of electricity and heat production (t of CO ₂ /MWh)	0,73	0,56	0,12	-	0,06	National GHG Inventory report /EB of Serbia
Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030 and between 33,5% and 54,5% by 2050 compared to 2010.	GHG Emissions in the non-ETS Sector (ktCO _{2e})	20.359	19.590	14.436	-	9.880	National GHG Inventory (emissions without LULUCF) and Verified Annual ETS Emissions Report (SEPA)
	GHG Emissions in Manufacturing industry (ktCO _{2e})	3.452	3.651	2.691	-	1.917	National GHG Inventory report (IPCC category - 1A2)
	GHG Emissions in Other sector (ktCO _{2e})	2.711	2.089	1.035	-	772	National GHG Inventory report (IPCC category - 1A4 and 1A5)
	Carbon intensity of the industry tCO ₂ /toe	1,89	1,44	0,80	-	0,58	National GHG Inventory report (IPCC category - 1A2) / EB of Serbia
	Carbon intensity of the residential tCO ₂ /toe	0,51	0,28	0,09	-	0,04	National GHG Inventory report (IPCC category - 1A4b) / EB of Serbia



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Elements of the Strategy	Indicator	Baseline Value	Target Value				Source of verification
		2015	2030	2050			
				upper	-	lower	
	GHG Emissions in Transport Sector (ktCO ₂ e)	5.995	7.433	4.731	-	3.091	National GHG Inventory report (IPCC category - 1A3)
	Carbon intensity of road transport (tCO ₂ /toe)	3,0	2,9	2,7	-	2,5	National GHG Inventory report (1A3-CO ₂ passenger transport)/ EB of Serbia
	Freight transport efficiency (toe/Mtkm)	25,4	22,6	19,0	-	15,6	Statistical office of Republic of Serbia - Freight Transport statistics
	Average Global Warming Potential of F-gases in product used	2.790	2.440	2.320	-	1.998	National GHG Inventory report (IPCC category - 2F)
	GHG Emissions in Agriculture Sector (ktCO ₂ e)	3.883	4.994	4.539	-	4.787	National GHG Inventory report (IPCC category - 3)
	GHG Emissions in Waste Sector (ktCO ₂ e)	2.709	2.371	1.936	-	845	National GHG Inventory report (IPCC category - 5)
	Food and garden waste landfilling (%)	85	55	35	-	0	Ministry of Environmental Protection/SEPA
Specific objective 3: Increase the carbon sink in the Serbian Forests by 17% by 2030 and between 22% and 132% by 2050; compared with 2010	Net GHG Emissions in LULUCF Sector (ktCO ₂ e)	-4.533	-6.576	-4.414	-	-13.082	National GHG Inventory report (IPCC category - 4)





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Elements of the Strategy	Indicator	Baseline Value	Target Value			Source of verification	
		2015	2030	2050			
				upper	-		lower
Specific objective 4: To preserve the potential of mitigation measures by increasing the resilience to climate change of priority sectors	Agricultural land under irrigation (%)	1,5	7	10	-	15	Statistical office of the republic of Serbia
	Technical works for protection from water erosion and torrential water (Mio m³)	0,35	1,00	1,00	-	1,00	Republic Directorate for water/Monitoring of the implementation of Water Strategy
	Forest land (ktCO ₂)	-5.150	-6.626	-4.439	-	-13.106	National GHG Inventory report (IPCC category - 4A)
Specific objective 5: Promote transition to climate neutral and climate resilient economy and society	National plan on climate change education, training for new skills and awareness raising.	-	National plan adopted	-		-	Ministry of Environmental Protection
	[Number of jobs in carbon intensive sectors upgraded with new skills and reformed to jobs in Environmental Economy]	-	200	9000	-	20000 ⁵⁹	Statistical Office of Republic of Serbia; employment statistics

⁵⁹ Preliminary numbers for 2030 and 2050 subject to update in line with key performance indicators of the National plan on climate change education, training for new skills and awareness raising.



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8. ACTION PLAN

8.1. Measures with main descriptions, gases affected, emission savings and implementing entities and partners

Table 16: List of measures with main descriptions, gases affected, emission savings and implementing entities

Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15,0% by 2030 compared with 2010				
No.	Name of measure/activity: <u>Implementation of the emissions trading system (and implementation of equivalent measures):</u>			
1	<p>Type of the measure: Regulatory, Financial</p> <p>Description of a measure: ETS works on the 'cap and trade' principle. A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Implementation of the monitoring, reporting and verification (MRV) aspects of EU-ETS in Serbia is expected to take place by 2025, in line with the planned EU accession year after which the full implementation of the EU ETS can commence. The gradual introduction of CO₂ tax (as equivalent measure) in the ETS sector in the period before entering the EU (2021-2025), is important to ensure smooth transition toward the full internalisation of the climate cost into the price of electricity. This measure is together with increasing of the RES in electricity production aiming to increase competitiveness of the power sector in the fully integrated carbon constrained electricity market and achieve decarbonisation of the power sector (expected reduction of 4,3TWh by 2030 from fossil fuels compared to 2015 levels) through penetration of wide range of renewable energy sources and to some extent the use of less carbon intensive fuels such as natural gas.</p> <p>Additional objectives to which the measure contributes:</p> <p><i>Specific objective 2, Sectoral target:</i> Reduce emissions, through the increase of energy efficiency and use of RES, in the industrial sector by 15% by 2030, and in the residential and commercial sectors by 40% by 2030, compared with 2010</p> <p><i>Specific objective 2, Sectoral target:</i> Limit GHG emissions growth from industrial processes and product use by 7%, compared with 2010</p> <p>EU Accession Negotiation Process: Chapter 27 - Environment</p>			
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Environmental Protection, Ministry of Finance (for implementation of equivalent measures)	Environmental Protection Agency, Civil Aviation Directorate, Accreditation Body of the Republic of Serbia, Ministry of Mining and Energy	ETS	CO ₂ , N ₂ O 11055



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No.	Name of measure/activity: <u>Increasing the use of RES in electricity production</u>				
2	<p>Type of the measure: Incentive, Financial, Regulatory</p> <p>Description of a measure: The feed in tariff system currently in place in Serbia needs to be updated so that it will be aligned with European Commission State Aid Guidelines from 2015. In the new system, projects will be approved at auctions and support will be provided in the form of feed-in premiums.</p> <p>By 2030 installed RES capacity in Serbia is to reach at least 5037MW of which 3409MW of hydroelectricity, 869 MW in photovoltaic, 723MW in wind and at least 36MW of biomass. No substantial increase in small hydro power capacity is needed.</p> <p>These numbers are indicative and represent the least cost mix of additional RES potential deployment for Serbia to meet RES target compatible with the general objective and the specific objective 2 of the Strategy.</p> <p>Taking into account that the future 2030 RES target for Serbia under the Energy Community (EnC) is not set yet, the above-mentioned capacities might be subject to change. Once the new RES target for Serbia by the EnC is set, the Ministry of Mining and Energy and Ministry for Environmental Protection are to prepare the National Energy and Climate Action plan for the period 2021-2030 and potentially adjust the capacities in order to correspond to agreed RES share in 2030.</p> <p>It has to be noted that in order to promote the implementation of this measure, it is necessary to remove administrative barriers, increase permitting capacities at the level of relevant competent authorities (local and governmental level) and provide long-term investment environment to achieve needed increase of RES capacity.</p> <p>EU Accession Negotiation Process: Chapter 15 – Energy</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Mining and Energy	Ministry of Environmental Protection	ETS	CO ₂	<u>i.e.</u>
No.	Name of measure/activity: <u>Improving energy efficiency and increasing use of CHP and RES in district heating systems</u>				
3	<p>Type of the measure: Incentive, Financial, Regulatory</p> <p>Description of a measure: There is a large potential for CHP in district heating systems and in industry. The National energy efficiency action plan and the Programme for the implementation of the energy strategy contain information on plans for installation of 860 MW of CHP on gas in district heating system in Pančevo, Belgrade and Niš.</p> <p>The feed in tariff system currently in place that supports CHP with electric capacity below 10 MW, will have to be updated to be aligned with European Commission State Aid Guidelines from 2015.</p> <p>The Energy Efficiency Directive will have to be fully transposed and, based on it, a comprehensive assessment of the national potential of cogeneration and district heating and cooling will need to be carried out. Additionally, the cost-benefit analysis of the potential for using cogeneration will also have to be conducted, when there are plans to build or substantially refurbish units of thermal input higher than 20 MW.</p>				





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To promote use of RES in CHP, support should be provided in the form of subsidies for new wood biomass district heating systems.				
EU Accession Negotiation Process: Chapter 15 – Energy				
Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
Ministry of Mining and Energy	Municipalities, Local Communities	ETS	CO ₂	<u>i.e.</u>

Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030

Sectoral target: Reduce emissions, through the increase energy efficiency and use of RES, in the industrial sector by 15%, and in the residential and commercial sectors by 40% by 2030 compared to 2010

No.	Name of measure/activity: <u>CO₂ tax and excise duties on energy</u>			
4	<p>Type of the measure: Regulatory/Financial</p> <p>Description of a measure: The introduction of CO₂ tax and of appropriate levels of excise duties as a policy instrument, enables implementation of the polluter pays principle in the non-ETS sector. The purpose of this, is to make fossil fuels less competitive for use by final consumers, compared to sustainable biomass or other less carbon intensive fuels. In the medium-term, appropriate carbon taxation is an important driver for consumer to redirect investment to low or zero carbon technologies and in energy efficiency. Recycling of funds collected from CO₂ tax should be used to support implementation of measures reducing GHG emissions by final consumers such as households, commercial and institutional sector and industry.</p> <p>Furthermore, the excise duties on energy products need to be fully harmonized with Directive 2003/96/EC, so that the Excise Duty Law includes excise duties for coke and coal. In addition, further harmonization of the excise policies on petroleum products with Directive 2003/96/EC is necessary, in the part concerning minimum amounts of excise taxes in various applications (such as motor fuel for industrial and commercial purposes, for agriculture, forestry, fish farming, public works, stationary engines, etc.).</p> <p>Such instrument can be combined with taxation exemptions for SME, subject to contractual emission reductions arrangements where SME are investing in GHG emission reduction measures.</p> <p>EU Accession Negotiation Process: Chapter 16 – Taxation</p>			
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected
	Ministry of Finance	Ministry of Environmental Protection, Ministry of Mining and Energy	non-ETS	CO ₂
Emission savings by 2030 [kt CO ₂ eq.]				
161				



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No.	Name of measure/activity: <u>Improving energy efficiency in industry</u>				
5	<p>Type of the measure: Regulatory, Incentive, Financial</p> <p>Description of a measure: Improving energy efficiency in the energy intensive industrial sector is crucial to enhance competitiveness. The industrial sector will have to promote and implement energy efficiency projects and employ best available technology (BAT) to retain its competitive advantage.</p> <p>Energy efficiency improvement in the industry will be achieved with a bundle of instruments. Based on 3rd National for energy efficiency action plan from 2016 the instruments are:</p> <ul style="list-style-type: none"> • Improvement of energy efficiency in particularly non-SME companies by providing financial and informational support to engage in energy audit and implementation of proposed measures from the energy audit. • Support for installation of CHP (through amended feed in system). • Standards for minimum energy efficiency requirements for heat boilers or CHP (valid from 2017) <p>Furthermore, an energy efficiency obligation scheme (or alternative measures) is envisaged to be established, as defined by the Energy Efficiency Directive (2012/27/EU). Through the scheme companies that sell energy to final consumers are obliged to achieve energy savings at the final consumers through different measures that they support. Measures are financed by the companies themselves and they have to report yearly on achieved savings.</p> <p>In addition to the above, the Electric motor regulation and the Eco-design Directive, needs to be transposed.</p> <p>EU Accession Negotiation Process: Chapter 15 – Energy</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Mining and Energy	Ministry of Economy, Chamber of Commerce and Industry of Serbia	ETS, non- ETS	CO ₂	715
No.	Name of measure/activity: <u>Increasing use of RES in the industry</u>				
6	<p>Type of the measure: Incentive, Financial</p> <p>Description of a measure: Use of renewable energy in industry should more than double compared to 2015, increasing from 126 ktoe in 2015 to 282 ktoe in 2030. For the industry included in the ETS, high prices of CO₂ allowances are going to be an important driver for switch from fossil fuels to RES. For non-ETS industries, this role will be played by the CO₂ tax. However, additional measures are needed in the form of subsidies for new wood boilers or for use of waste heat with heat pumps provided for instance by Energy efficiency fund.</p> <p>EU Accession Negotiation Process: Chapter 15 – Energy</p>				



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	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Mining and Energy	Ministry of Economy, Chamber of Commerce and Industry of Serbia	ETS, non-ETS	CO ₂	i.e.
No.	Name of measure/activity: <u>Improving thermal integrity of households</u>				
7	<p>Type of measure: Regulatory, Incentive, Financial, informational-educational; Organizational-governance-institutional</p> <p>Description of a measure: Improving thermal integrity households reduces heating and cooling needs, consequently reducing energy costs as well as investment costs in heating and cooling infrastructure. There is an estimate that 85% of current buildings do not fulfil minimum energy efficiency requirements⁶⁰.</p> <p>Renovation of a building is financially very demanding, therefore financial support to households for these measures is crucial. However, to support the most appropriate investment decision for households, an independent advice network of energy experts should be established which would, free of charge, provide advice to citizens on energy efficiency measures and use of RES in households. The advice network should be financed by the Government (through energy efficiency fund) so that independence from equipment producers is assured. Furthermore, building codes for new buildings and renovations have to be updated so that they are aligned with EU New Energy performance of buildings directive 2018/844/EU entered into force in 2018. Full transposition of Energy efficiency directive is also needed. It has to be noted that Article 4 of the Directive 2018/844/EU requires the preparation of the Long-term strategy for mobilising investment and facilitating the renovation of national building stock.</p> <p>EU Accession Negotiation Process: Chapter 15 – Energy</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Construction, Transport and Infrastructure	Ministry of Mining and Energy, Chamber of Commerce and Industry of Serbia	non-ETS	CO ₂	220
No.	Name of measure/activity: <u>Energy efficiency, improvement of heating and cooling infrastructure and promotion of use of RES in households</u>				
8	<p>Type of the measure: Regulatory, Incentive, Financial, informational-educational</p> <p>Description of a measure: A large share of single-family houses predominantly uses old inefficient boilers on coal and wood biomass. Coal combustion causes high specific CO₂ emissions, while coal and biomass use in inefficient boilers also cause high emissions of PM 2.5, which has adverse effects on health. More efficient boilers reduce fuel use, while also decreasing emissions since they have better efficiency. The EU has, in 2015, adopted Eco-design Regulations for solid fuel boilers and solid fuel local space heaters that will take effect from 1. January 2020 and 1. January 2022. The regulations set minimum requirements for seasonal space heating energy efficiency</p>				

⁶⁰ IPA Project "Climate Change Strategy with Action Plan"; Annex I of Result 1 Report: Assessment of Current Serbian Climate Change Policy Framework - Energy sector



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and emissions of particulate matter (PM), volatile organic compounds (VOC), carbon monoxides (CO) and nitrogen oxides (NOx). With transposition and implementation of the above-mentioned regulations, customers will not be able to buy devices that do not comply with the minimum requirements set.

Serbia has to transpose these revised labelling regulations for solid fuel boilers and solid fuel local space heaters to its legal system as soon as possible, since it will take a long time to substitute all the devices used.

To support substitution of old inefficient solid fuel boilers especially on coal, subsidies should be provided to households for the purchase of new boiler on wood which meets Eco-design regulations requirements or, alternatively, heat pumps. Connection to local district heating systems should also be supported, especially in agglomerations with recorded exceedance of PM2.5 emissions.

Another important measure for higher penetration of RES for heating in buildings is the definition of minimum requirements for use of RES in new and renovated buildings. This requirement should also be included in the legislation on energy efficiency in buildings.

EU Accession Negotiation Process: Chapter 15 – Energy

Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
Ministry of Mining and Energy	Ministry of Economy, Ministry of Construction, Transport and Infrastructure, Chamber of Commerce and Industry of Serbia Ministry of Environmental Protection	non-ETS	CO ₂	i.e.

No. Name of measure/activity: Improving energy efficiency and use of RES in the Tertiary sector

9	<u>Type of the measure:</u> Regulatory, Incentive, Financial
	<u>Description of a measure:</u> Commercial and institutional buildings represent important opportunities for the application of energy efficiency measures, as they are professionally managed and their respective owners and/or managers are sensitive to energy costs, which are projected to increase (through the inclusion of the carbon price in electricity and of the CO ₂ tax in fuels).
	<p>This measure targets at reducing energy consumption in the governmental/ services/ commercial buildings. The objective of measure is to improve mainly the way heating and cooling needs in the tertiary sector are served, including the improvement of electrical appliance used in the services sector. The objective of the measure is to reduce consumption of energy (including electricity) and replacing fuels with zero or lower emitting fuels for heating purposes.</p> <p>The public sector has in the public procurement process defined minimum requirements for some energy using equipment (office information technology, cooling appliances, air conditioning, lighting). The scope of products and services will have to be broadened in line with the EU green public procurement criteria. The public sector, through this instrument, also provides support to the market of energy efficient products.</p>





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EU Accession Negotiation Process: Chapter 15 – Energy					
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO₂ eq.]
	Administration for Joint Services of the Republic Bodies, Ministry of Mining and Energy	Ministry of Construction, Transport and Infrastructure, Ministry of Finance, Municipalities, Local communities and other Institutional and Commercial entities	non-ETS	CO ₂	365
No.	Name of measure/activity: <u>Improving thermal integrity in the Tertiary sector</u>				
10	<p><u>Type of the measure:</u> Regulatory, Incentive, Financial</p> <p><u>Description of a measure:</u> Improving thermal integrity (insolation) of the tertiary sector buildings, reduces heating and cooling needs, contributing significantly to energy efficiency gains. Consequently, energy costs as well as investment costs in heating and cooling infrastructure are reduced. In Serbia an important share of buildings in the tertiary sector, in particular public buildings, are connected to district heating systems, which leaves the building managers without options to manage the energy supply side, which is covered by the measure “Improving energy efficiency and use of RES in the Tertiary sector”. This is the main reason these two measures are separate, given that, in many cases, tertiary building managers do not influence the efficiency of heat production.</p> <p>For all buildings, the priority shall be in improving the thermal integrity. Buildings that have heating infrastructures (boilers), shall invest in them in parallel or only after the investments in the thermal integrity are completed. The development of energy services market is foreseen in the National Energy Efficiency Action Plans and Serbia has already included ESCO⁶¹ approach in the primary and secondary legislation. The situation needs to be improved by support schemes combining ESCO financing with budgetary grants for public buildings. This approach should be rolled out immediately, as financing of energy efficiency projects in the public sector can more efficiently be done through energy performance contracting (EPC).</p> <p><u>EU Accession Negotiation Process: Chapter 15 – Energy</u></p>				

⁶¹ ESCO is a company or other legal entity or entrepreneur registered for the provision of energy services which by providing energy services increases the energy efficiency of the facility, technological process and service and which to some extent accepts the financial risk for the energy services provided, by collecting its services, in whole or in part, on the basis of the savings achieved on the basis of the measures implemented and the fulfillment of other agreed performance criterias



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	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Administration of Joint Services of the Republic Bodies, Ministry of Mining and Energy,	Ministry of Construction, Transport and Infrastructure, Ministry of Finance, Local communities and other Institutional and commercial entities	non-ETS	CO ₂	i.e.
Sectoral target: Limit GHG emissions growth in the transportation sector by 10% by 2030 compared to 2010					
No.	Name of measure/activity: Renewal of the passenger fleet and promotion of sustainable passenger transport – Efficiency improvement of vehicle stock and usage of vehicles				
11	<p>Type of the measure: Regulatory, Financial, Incentive, informational-educational</p> <p>Description of a measure: New vehicles are becoming more efficient based on CO₂ standards that are in effect in EU, of which Serbia benefits indirectly. The EU has adopted Regulation 443/2009 defining targets for CO₂ emissions of 130 gCO₂/km in 2015 and 95 gCO₂/km in 2021. In 2019, the EU targets for 2030 have been agreed, emissions have to decrease by 37.5 % by 2030 compared to 2021 levels for cars and by 30 % for vans. The EU, for the first time in 2019, agreed also on the reduction target for trucks and buses, for which the average emissions of new vehicles in 2030 will have to be 30 % lower than in 2019. Based on these targets, vehicles in Serbia will become more efficient even if Serbia is not part of the EU, since the same vehicles are sold in Serbia as in EU. Serbia needs to align its legislation to the EU legislation no later than by 2021.</p> <p>For the improvement of efficiency of vehicles, it is important that Serbia controls the import of used cars and their use, especially for very old vehicles. There is a risk that, due to upcoming electrification, even more old vehicles from the EU will be imported to Serbia, limiting the effects of the legislation on new vehicles. That is why the legislation on yearly taxation has to change in the way that it will stimulate buying vehicles that are more efficient and emits less CO₂ per km. The Law on taxes on the use, possession and carrying goods (Official Gazette of the Republic of Serbia no. 26/01, 80/02, 43/04, 132/04, 112/05, 114/06, 118/07, 114/08 and 31/09) defines yearly tax for vehicles that is dependent on the volume of the engine and age of the vehicle. Discount for older cars needs to be gradually removed, since they have much greater negative impact on the environment than new cars. To support low CO₂ emissions vehicles, CO₂ emissions should be included in the calculation of level of the yearly registration tax, with lower taxes for lower emitting cars. For a faster penetration of electric vehicles, subsidies would need to be offered, at least in the early stage of market development. Furthermore, the Public Procurement Directive, aligned with the Directive on the Promotion of Clean and Energy Efficient Road Transport Vehicles, recognizes that public procurement can be a powerful market mover for the introduction of new technologies, including of clean and high energy efficient vehicles. This is not because it can have direct large impact on emissions reduction, but because of its large demonstration effect. Serbia will have to invest in charging infrastructure for electric vehicles and also for other alternative fuels (natural gas). This will, partially, have to be supported by the Government (through energy efficiency fund).</p> <p>EU Accession Negotiation Process: Chapter 27 - Environment</p>				





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	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Environmental Protection, Ministry of Finance	Ministry of Construction, Transport and Infrastructure	non-ETS	CO ₂	752
No.	Name of measure/activity: Renewal of the passenger fleet and promotion of sustainable passenger transport – Promotion of public transport and non-motorized transport				
12	<p>Type of the measure: Regulatory, Organizational-Governance-Institutional, Informational-Educational</p> <p>Description of a measure: Increase of use of public transportation (33 % until 2030 compared to 2010), is fundamental to limit the emissions growth up to 2030. In that regard, a bundle of measures is needed, including improved planning, investments enabling competitive different means of transport and changing commuting habits. Those measures should build on a revised Transport strategy which should include climate change aspects of transport and mobility development. Furthermore regional/local low-carbon transport strategies and sustainable mobility urban plans are to be developed with the focus on improvement of non-motorised transport infrastructure. Investments in infrastructure (railway) have already started and need to continue in accordance with national plan for public railway infrastructure.</p> <p>EU Accession Negotiation Process: Chapter 14 – Transport policy</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Construction, Transport and Infrastructure	Municipalities, Local communities, Public transport companies, National railway company, Ministry of Public Administration and Local Self Government, Ministry of Environmental protection	non-ETS	CO ₂	i.e.
No.	Name of measure/activity: Renewal of the passenger fleet and promotion of sustainable passenger transport - Promotion of usage of alternative fuels and biofuels				



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13	<p>Type of the measure: Regulatory, Incentive</p> <p>Description of a measure: Directive 2009/28/EU and 2015/1513/EC has been partially transposed in the Energy Law (Official Journal of RS, 145/14) and with the following by-laws:</p> <ul style="list-style-type: none"> • Regulation on technical and other requirements for liquid fuels with bio origin (Official Gazette RS, 24/14) • Regulation on guarantee of origin (Official Gazette RS, 82/17) <p>Support schemes for production of RES II biofuels (from wastes, residues, non-food cellulosic material, and ligno-cellulosic material) does not exist, thus there is almost no production. Therefore, it is necessary to prepare Directive specific implementation plan for transposition and implementation of Fuel Quality Directive and implement updated RES directive in order to allow 2nd generation of biofuels to penetrate into Serbia's transport fuel market and set up of support schemes for production of biofuels (from wastes, residues, non-food cellulosic material, and ligno-cellulosic material).</p> <p>EU Accession Negotiation Process: Chapter 15 – Energy</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Mining and Energy	Ministry of Construction, Transport and Infrastructure, Ministry of Economy, Chamber of Commerce and Industry of Serbia	non-ETS	CO ₂	i.e.
No.	Name of measure/activity: Renewal of the freight fleet and promotion of sustainable freight transport				
14	<p>Type of the measure: Regulatory, Organizational-Governance-Institutional</p> <p>Description of a measure: Freight transport is necessary for economic growth and normally witnessing higher growth rates than GDP. As such, in a context where Serbia's GDP will continue to grow and freight more than the GDP, it is important to find modalities to limit from this source, without necessarily limiting freight and growth. Serbia lies on X. and XI. Corridors experiencing high freight flows also from abroad. These will heavily increase when Serbia joins the EU, as has also been experienced by other countries joining EU, due to free trade and movement of goods.</p>				
	<p>Therefore, in order to support promotion of sustainable freight transport it is important to implement modulation of yearly infrastructure charges for HDVs according to CO₂ emission performance standards and implement road charging for freight vehicles based on EURO emission standard.</p> <p>Furthermore, the updates of Strategy of railway, road, inland waterway, air and intermodal transport development of Republic of Serbia 2008-2015 has to be prepared to assess different aspects of transport development and Serbia's needs and possibilities to define optimal infrastructure development path for the future in order to ease the future pressure on road infrastructure.</p> <p>EU Accession Negotiation Process: Chapter 14 – Transport policy</p>				



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	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry of Construction, Transport and Infrastructure	Ministry of Finance, Putevi Srbije, Ministry of Environmental protection	non-ETS	CO ₂	156
Sectoral Target: Limit GHG emissions growth from industrial processes and product use by 7% by 2030 compared to 2010					
No.	Name of measure/activity: <u>Implementation of the F-gas Regulation and MACs directive</u>				
15	<p>Type of the measure: Regulatory, informational-educational</p> <p>Description of a measure: The European Union has adopted revised F-gas regulation (517/2014), replacing the previous version (842/2006), which entered into force on 1st January 2015. The regulation is designed to reduce emissions of fluorinated greenhouse gases (F-gases) by two thirds of 2017's levels by 2030. The Regulation retains many important and successful features of the previous F-Gas Regulation related to leak prevention, F-gas recovery and technical training; key additional instruments that have to be transposed and implemented are:</p> <ul style="list-style-type: none"> Product and equipment ban: restrictions on the placing on the market (bans) of certain refrigeration and air conditioning equipment, foams and propellants using F-gases, and of SF₆ in small magnesium foundries. Service and maintenance bans: Limits on the use of higher GWP gases, such as R404A and R507A, in existing refrigeration equipment from 2020. Cap and phase down: Reductions on the placing on the market of F-gases via a cap and phase down on the supply of HFCs. <p>Based on the Law on Air Protection (Official Gazette RS, no 36/2009 and 10/2013), in 2013 a national Regulation on fluorinated greenhouse gases management, as well as on conditions for license issuance to import and export of such gases (Official Gazette RS, No 120/13) was adopted. This by-law transposed some of the requirements of EU Regulations 842/2006/EC, 1493/2007/EC, 1494/2007/EC, 1497/2007/EC, 1516/2007/EC and Directive 2006/40/EC in the national legal system of Serbia. However, the EU Regulation transposition into Serbian national legislation is in initial stage. The national Regulation is not yet fully harmonized with the provisions referring to training and certification of technical persons, control of the use of fluorinated greenhouse gases, establishing and allocation of quotas for placing of fluorinated greenhouse gases on the market</p> <p>Serbia is to transpose F-gas regulation with some derogations as follows</p> <ul style="list-style-type: none"> Service and maintenance bans: Limits on the use of higher GWP gases, such as R404A and R507A, in existing refrigeration equipment with a charge size of 40 tonnes of CO₂ equivalent or more by 2020. If charge size is lower than 40 tonnes of CO₂ equivalent R404A is allowed to be used. For Equipment with a charge size of 40 tonnes of CO₂ equivalent a regenerated R404A can be used by 2030. Equipment retrofit is allowed for switching to R448A, R449A and R452A in accordance with restrictions as contained in f-gas regulation <p>Furthermore F-gas emissions from mobile air conditioning (MACs) in EU are regulated through Directive 2006/40/EC on mobile air conditioners. It is being enforced over three phases, starting in 2008. Second stage was that air conditioning systems in new vehicle types had to be filled with gases with a GWP lower than 150. From 2017 onwards, this applies to all new air-conditioned vehicles put on the EU market. Despite the fact that MACs Directive has not been yet transposed into Serbian legal system, it is being in practice implemented by EU automotive industry operating in Serbia in order to ensure conformity of its products with EU standards.</p>				





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EU Accession Negotiation Process: Chapter 27 - Environment					
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO₂ eq.]
	Ministry of Environmental Protection	Ministry of Economy, Chamber of Commerce and Industry of Serbia	non-ETS	HFC, SF ₆	114
Sectoral Target: Reduce GHG emissions in agriculture by 15% by 2030 compared to 2010					
No.	Name of measure/activity: <u>Winter cover crops</u>				
16	<p>Type of the measure: Incentive; Informational-Educational</p> <p>Description of a measure: The planting of winter cover crops is generally assessed as having positive effects for the management of soil erosion, soil fertility, soil quality, water, and weeds, as well as for biodiversity and the mitigation of GHG emissions. The area for cover crops is limited to the area not covered by regular crops during the winter season. Winter cover crops do not produce a market output, but have costs for machinery, other inputs and seed. If winter cover crops are legumes, the bio-fixation will reduce fertilizer demand of the main future crops.</p> <p>Having in mind the positive effects regarding fertilization and phytosanitary functions, this measure is beneficial to farmers, however knowledge about the positive effects of winter cover crops, as well as provision of financial support (e.g. direct payments) need to be increased through enhanced activities of the Agriculture Advisory Service. In parallel the promotion of sustainable land use (greening) is to be promoted through green direct payments for crop diversification, maintenance of permanent grasslands and allocation of 5% of arable land to areas beneficial for biodiversity: Ecological Focus Areas (EFA), for example trees, hedges or land left fallow that improves biodiversity and habitats</p>				
	EU Accession Negotiation Process: Chapter 11 – Agriculture and Rural Development				
	Key Implementing entity	Implementation partners	ETS/ nonETS	Main gases affected	Emission savings by 2030 [kt CO₂ eq.]
	Ministry of Agriculture, Forestry and Water Management,	Agricultural Advisory Service, Directorate for Agrarian Payments, Farmers	non-ETS	CO ₂ , N ₂ O	579,05
No.	Name of measure/activity: <u>Increased legume share in fodder area</u>				
17	Type of the measure: Incentive; Informational-Educational				



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	<p>Description of a measure: Legumes on temporary grassland increase bio-fixation and, therefore, reduce fertiliser needs. It is assumed that the legume share on temporary grassland can be increased to a maximum of 20%, which is equivalent to a nitrogen fixation rate of 15%.</p> <p>This measure saves costs for fertilizer and provides nutritious fodder, so it is beneficial to farmers. The precondition is increasing knowledge of farmers and implementation of environmental standards regarding use of fertilizers, as well as provision of financial support.</p> <p>EU Accession Negotiation Process: Chapter 11 – Agriculture and Rural Development</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings [kt CO ₂ eq.]
	Ministry of Agriculture, Forestry and Water Management,	Agricultural Advisory Service, Directorate for Agrarian Payments, Farmers	non-ETS	CO ₂ , N ₂ O	14,6
No.	Name of measure/activity: <u>Breeding for higher milk yields</u>				
18	<p>Type of the measure: Incentive; Informational-Educational; organizational-governance-institutional</p> <p>Description of a measure: A genetic selection for cows with higher milk yields may reduce overall emissions if the cow herd is reduced due to limited market outlets. An increase in milk yields per cow will also increase emissions per cow but this may be overcompensated by reduced cow numbers, basically because the maintenance requirements of the cow herd are reduced. A precondition for this approach is that health problems may be avoided therefore, the breeding targets will combine productivity and robustness indicators. The necessity to improve milk yield and increase efficiency and competitiveness of the Serbian dairy producers is recognized in the Serbian Strategy for Agriculture and Rural Development as well as in the IPARD and National Programme for Agriculture 2018-2020.</p> <p>EU Accession Negotiation Process: Chapter 11 – Agriculture and Rural Development</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings [kt CO ₂ eq.]
	Ministry for Agriculture, Forestry and Water Management	Directorate for Agrarian payments, Research institutions	non-ETS	CH ₄	i.e. ⁶²
Specific objective 3: Increase the carbon sink in the Serbian Forests by 17% by 2030 compared with 2010					
No.	Name of measure/activity: <u>Afforestation</u>				

⁶² The emission savings of breeding measures are considered in the total savings, but CAPRI model used for assessment of emission reductions in agriculture sector cannot assign them to the single breeding measures



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19	<p>Type of the measure: Regulatory, Incentive</p> <p>Description of a measure: This measure prescribes the afforestation of 5.000 ha every year up to 2030 (and should be continued up to 2050). This requires the additional afforestation of 2952 ha, compared to the current average level of 2048 ha.</p> <p>In order to enhance the resilience of the new forest to the impacts of climate change, and as a novelty compared to what is foreseen in the draft Forestry Development Programme, site mapping is to be used in order to identify the tree species that should be planted in each site. Based on the results of the mapping, only adapted tree species should be planted.</p> <p>A bucket of instruments should be used for the implementation of this measure, where the most important are financial, regulatory and informational/educational.</p> <p>Dialog among different forest related policies and institutions (forestry, cadastre units, agriculture, water management, and nature protection) should be started in order to minimize conflicts between land use categories, especially in the Autonomous Province of Vojvodina. Public enterprises for forest management and others should have capacities to prepare enough seedlings or seeds to support afforestation.</p> <p>The update of cadastre regarding land use category is a precondition for successful afforestation in addition to the removal of the legal barriers for afforestation of the class V to class VIII agriculture land. This measure will decrease transaction cost and create attractive opportunities for more afforestation especially by private entities.</p> <p>EU Accession Negotiation Process: Chapter 27 - Environment</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO₂ eq.]
	Ministry for Agriculture, Forestry and Water Management,	Research institutions, Directorate for Agrarian payments, Organizations responsible for the forest management, Private forest owners	non-ETS	CO ₂	259,1
No.	Name of measure/activity: <u>Close to Nature Forest Management and Climate Smart Approach to Forestry</u>				
20	<p>Type of the measure: Informational-educational</p> <p>Description of a measure:</p> <p>Close to nature forest management is one of the components of sustainable forest management and means that, in the present, measures are implemented that will ensure a constant productivity, vitality and service provision in the future. In addition, this includes measures that will be implemented in the future for the purposes of adaptation to climate change.</p> <p>This measure also considers fulfilment of multiple forest functions on different spatial scales. In the most basic approach, close to nature forest management means that site adapted tree species are used and forest ecosystems are composed of mixed stands of coniferous or broadleaved tree species, constructed in several layers. In addition, regeneration based on natural regeneration is the dominant approach in forest management, by focusing on the best and most vital tree species in the stand, systematic pest management etc.</p>				



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Climate smart forestry approach, as an adaptation measure, is a forest management approach that optimally uses forest sites to increase forest growth. It means that an optimal silvicultural approach in combination with proper forest road network and active management is used, in order to provide fuel wood for substitution of fossil fuels for energy production. The result of improvement of forest stands using guidelines for forest management as part of implementation of close to nature forest management, will be the production of more technical wood used for furniture and packaging production, with long term carbon storage. This technical wood, at end of the useful life period, can, following the principles of circular economy, be converted into renewable material for biomass powerplants.						
EU Accession Negotiation Process: Chapter 27 - Environment						
Key Implementing entity		Implementation partners		ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
Ministry for Agriculture, Forestry and Water Management		Research institutions, Organizations responsible for the forest management, Private forest owners		non-ETS	CO ₂	4,19
No.	Name of measure/activity: <u>Conversion of coppice to high forest</u>					
21	Type of the measure: Regulatory, Incentives, Educational-Informational					
	Description of a measure: This measure prescribes the annual conversion of 7.000 ha of coppice forest to high forests, in particular oak and beech coppice forests for conversion into high forest. At the present, the government is financing amelioration of forests, which also includes direct conversion of coppice forests. Direct conversion of coppice forests is a process consisting of clear cut of certain areas and then artificial planting. This measure is available for both State and private forests.					
	Improvement of coppice and devastated forests on good sites by redefining productivity parameters and extension of rotation period, followed by adequate tending intervention, will generate products with higher diameter which leads to products that will have long-term CO ₂ storage (furniture, doors and other wood products with long term storage capacity). Surplus of the fuel wood that results from these activities can be used as a source of energy for boilers in local communities or in individual heating systems.					
	The quantity of wood which will be felled during this process will, in the short term, increase emissions (during the burning process), but due to the higher average increment in high forests (3.0 m ³ /ha higher, compared to increment in coppice forests), the total balance will result in an increase in CO ₂ sink.					
	Production of sufficient planting material where direct and indirect conversion is not successful, needs to be planned in advance, in order to be able to secure enough planting material of site adapted tree species. Increasing of harvesting and tending operations will produce demand for sufficient number of qualified forest workers and machinery.					
EU Accession Negotiation Process: Chapter 27 - Environment						
Key Implementing entity		Implementation partners		ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
Ministry for Agriculture, Forestry and Water Management,		Research institutions, Organizations responsible for the forest management, State Enterprises of National parks, Private forest owners		non-ETS	CO ₂	458,4



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No.	Name of measure/activity: <u>Short Rotation Plantations (SRP)</u>				
22	<p>Type of the measure: Regulatory, Incentives, Educational-Informational</p> <p>Description of a measure: This measure proposes an area of additional 1500 hectares annually to be established using poplars and willows as the main tree species. Annual increment in SRP is 10 m³/ha up to age 10, and 18 m³/ha after that. The biomass from short rotation plantation will serve as a source of bioenergy for combined heat and power plants.</p> <p>As for the afforestation measure, the update of the cadastre and land use harmonization among different land users and owners is a precondition for successful establishment of SRP and removal of all cross-sectoral barriers regarding the implementation of the SRP on agricultural land.</p> <p>EU Accession Negotiation Process: Chapter 27 – Environment</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry for Agriculture, Forestry and Water Management,	Research institutions, Directorate for Agrarian payments, Organizations responsible for the forest management, Private forest owners	non-ETS	CO ₂	654,9
No.	Name of measure/activity: <u>Regeneration of over mature stands</u>				
23	<p>Type of the measure: Regulatory, Incentives, Educational-Informational</p> <p>Description of a measure: The objective is to remove over mature trees from the forest stands which have low production capacity (even negative CO₂ effects) and establish naturally or artificially new forest stands with high productivity (group mixture where is possible). This is of significant importance for the forestry and climate change sectors, since the annual increment of over matured stands is only 3 m³/ha and their absorption capacity is negligible, compared to increment of young stands of 8 m³/ha.</p> <p>Production of sufficiently planting material for afforestation of areas where natural regeneration is not successful, is needed in order to secure enough planting material of site adapted tree species. Increasing of harvesting and tending operations will produce demand qualified forest workers and machinery.</p> <p>EU Accession Negotiation Process: Chapter 27 - Environment</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry for Agriculture, Forestry and Water Management,	Organizations responsible for the forest management, Private forest owners	non-ETS	CO ₂	545,74
No.	Name of measure/activity: <u>Definition of guidelines for the reduction of negative biotic and abiotic factors</u>				



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24	<p>Type of the measure: Informational-educational; organizational-governance-institutional</p> <p>Description of a measure: This measure foresees the adoption of a set of technical and management guidelines to decrease the area of forest affected by negative biotic and abiotic factors⁶³. These guidelines will provide forest managers at different levels on how to act in matters of prevention or remediation of such factors.</p> <p>Guidelines for the following issues are required:</p> <ul style="list-style-type: none"> • improvement of the observation system and early warning of the occurrence of forest fires; • definition of the degree of vulnerability of forest areas to fire; • definition of proper equipment for forest fire fighting teams, including for quick intervention. • definition of instructions for the construction and maintenance of forest roads and forest lines against fire, • Instruction for prevention and remediation against insects. <p>Instruction for management of such vulnerable forests at national level with intensive training of the responsible staff in forest management companies and private forest owner's organization for prevention measures against all abiotic and biotic negative factors in forest ecosystems should be created.</p> <p>EU Accession Negotiation Process: Chapter 27 - Environment</p>				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
	Ministry for Agriculture, Forestry and Water Management,	Ministry of Environmental Protection, Research institutions, Public companies responsible for the forest management, Private forest owners	non-ETS	CO ₂	n.a
No.	<p>Name of measure/activity: <u>Research, training and awareness raising programme for the enhancement of the carbon sink and of the resilience of the Serbian forest to climate change</u></p>				
25	<p>Type of the measure: Informational-educational</p> <p>Description of a measure: In order to reduce the vulnerability of the Serbian forest to climate change impacts and to be able to explore the full mitigation potential of the measures included in this action plan, the whole forestry system in Serbia needs to be considerably strengthened.</p> <p>The implementation of these measures needs to be supported by a training and awareness raising programme that builds both general knowledge on climate change and forest management and the specific technical skills required to successfully implement each measure. Additionally, there is a need to strengthen scientific knowledge and to base the techniques used in the implementation of the measures on such knowledge, so as to ensure the full integration of the current and future circumstances of the Serbian forest in such techniques.</p>				

⁶³ Abiotic factors are the non-living parts of an environment. These include elements such as sunlight, temperature, wind, water, soil and naturally occurring events such as storms, fires and volcanic eruptions. Biotic factors are the living parts of an environment, such as plants, animals and micro-organisms.



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The training and awareness programme should be designed taking into account the specific requirements of each measure and the different stakeholders addressed by the training.

The following topics shall, at a minimum, be included in the programme:

- For the afforestation measure: site preparation, afforestation and forest tending. Additional research on potential productivity for afforestation on salty soils, especially in Vojvodina.
- Close to nature forest management and climate smart approach to forestry: training on the specific methods and approaches to forest management.
- Conversion of coppice to high forest: different techniques for regeneration of forests, as well as for forest tending after conversion
- Short rotation plantations: site preparation, afforestation and forest tending in SRP
- Regeneration of over mature stands: different techniques for regeneration of forests, as well as for forest tending after regeneration.
- Prevention and implementation measures under risk forest management condition
- For all measures:
 - project preparation and management (to promote application and management of projects funded by national and/or international financing schemes)
 - Establishing permanent research and demonstration plots (for monitoring climate change impacts on forest management and monitoring of different forest management objectives and measures towards climate change mitigation and adaptation)
 - Promotion of proper and increased use of wood, targeting the different uses of wood and respective users: households (wood for energy), construction sector (use of wood as construction material) and other sectors using wood
 - Improving management of private forests: promote the association of private forest owners through and with a view to increasing forest management knowledge.

EU Accession Negotiation Process: Chapter 27 - Environment

Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq.]
Ministry for Agriculture, Forestry and Water Management	Research institutions, Organizations responsible for the forest management, Private forest owners, forestry related sector and construction sector.	non-ETS	CO ₂	n.a

Specific objective 4: to preserve the potential of mitigation measures by increasing the resilience to climate change of priority sectors

No. Name of measure/activity: Adaptation of cultivation technologies (selection of species and agrotechnical measures)



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26	Type of the measure: Informational-Educational; organizational-governance-institutional Description of a measure: <p>Measure can be achieved, inter alia, through proper choice of hybrids and varieties, introduction of new crops and fruits for growing, crop shading for water savings and sunburn injury protection, cooling the crops, stables, hencoops and fishponds, determination of suitable sowing dates, soil water conservation, new pest or disease control, etc. This measure is aligned with the Draft Code of Agriculture Practice (2010) and requires a) Research & Development and b) dissemination / awareness raising / capacity building.</p> <p>For the R&D part, several faculties (such as Faculties of Agriculture in Novi Sad and Zemun) and research institutes (such as Institute for Field and Vegetable Crops in Novi Sad, Institute for Corn in Zemun Polje, Fruit Research Institute in Čačak) have important research areas dedicated to agriculture and even to agriculture and climate change.</p> <p>For the dissemination part, the Agricultural Advisory Service (AAS) is the key instrument for transfer of knowledge in agriculture through informal education. Only 5-10 % of agricultural holdings are covered by the AAS. There is a clear need to increase the number of AAS stations and of specialists. The National Agriculture and Rural Development Strategy sets as target increasing the client group of the Serbian Agriculture Advisory Service to 30% until 2024. It is fundamental that this target is achieved in order to facilitate the implementation of this measure</p>				
	EU Accession Negotiation Process: Chapter 11 – Agriculture and Rural Development				
	Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings [kt CO₂ eq.]
	Ministry of Agriculture, Forestry and Water Management	Agricultural Advisory Service, Research Institutions	n.a.	n.a.	n.a.
Specific objective 5: Promote transition to climate neutral and climate resilient economy and society					
No.	Name of measure/activity: <u>Climate change education, training for new skills and awareness raising</u>				
27	Type of the measure: Informational-educational Description of a measure: Combating climate change requires change in behaviour of all actors in society: from top level decision making at public and private levels, to daily consumption patterns. Change is best operated through a multitude of stimulus, which can effectively be provided through education, training for new skills and awareness raising. <p>The implementation of the measures included in this action plan and the achievement of the general and specific objectives inscribed in the Strategy will determine the reduction of activities in some sectors and increase of activities in others. This means, that sectors with reduction in activities will have labour surplus, while sectors with increased activities could face labour shortage. This plan is to dedicate special focus into the development of activities aimed at promoting the acquisition of skills relevant for sectors with increased activities, by workers of the sectors where labour surplus is expected. The implementation of this measure, will contribute to the social fairness of the transition to a low carbon economy.</p>				



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The proposed national plan shall include three areas:

- Education: focused on kindergarten to 12th grade (kindergartens, primary and secondary schools), with a view to identifying opportunities and issuing recommendations for integration of climate change issues in school curricula; recommendations on university studies may also be integrated in the plan.
- Training to gain new skills needed for transition into carbon constrained economy: focused on adult learning, aims at identifying technical needs required to fight climate change, in particular for the implementation of the measures included in this action plan.
- Awareness raising aimed at reaching the widest audience possible, focusing on the key aspects / behaviours that can contribute to the successful implementation of the measures included in this strategy.

EU Accession Negotiation Process: Chapter 27 - Environment

Key Implementing entity	Implementation partners	ETS/ non-ETS	Main gases affected	Emission savings by 2030 [kt CO ₂ eq]
Ministry of Environmental Protection	Ministry of Education, Science and Technological Development Ministry of Labour, Employment, Veteran and Social Affairs	ETS, non-ETS	CO ₂ , CH ₄ , N ₂ O, F-gases	n.a





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8.2. Costs, financing and timeline for the implementation of measures and its activities by 2030

Table 17: Detailed table of costs, financing and timeline for the implementation of measures and its activities by 2030

Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15% by 2030, compared with 2010									
No.	Name of measure/activity	Investment Costs [Mio EUR]			Add. budget revenues [Mio EUR]	Source of finance [Mio EUR]		Note	Deadline for implement ation
		Investors	consumers	State		EU and other funds	National resources		
1	Implementation of the emissions trading system [and implementation of equivalent measures]	279,3 ⁶⁴			3910,3 ⁶⁵	1,6		Investment cost for investors presented here are additional investment cost for power grid and EE measures. (RES investments triggered by ETS are allocated under measure No.13. In addition to 3910 Mio€ collected in the period 2025-2030. 1578 Mio€ could be collected in the period 2021-2025 with implementation of equivalent measures and gradual increase of carbon price from 0€ in 2021 to 28€/tCO ₂ in 2025	2020-2022
A ⁶⁶	Adjustment of the draft law on Climate Change to integrate changes as contained in the revised ETS directive from 2018 and its implementing acts					0,1		EU Policy and legal advice centre (PLAC 3 project), EU TAIEX support instrument	2020
A	Adoption of Law on Climate Change and accompanying by-laws for the full functioning of the monitoring, reporting and verification (MRV) of the ETS								2020

⁶⁴ Additional costs for Power grid investment needed for RES deployment and non-RES related improvements triggered by the implementation of the ETS or equivalent measures in Serbia

⁶⁵ For the period 2025-2030 cost for GHG emissions are integrated into the price of electricity and heat and are passed to consumers. If costs cannot be passed to consumers operator needs to adjust its production and therefore reduce its emissions for the benefit of the other operator which has lower carbon intensity of the electricity produced and can pass the carbon cost to consumers. If rules for auctioning of allowance as set in Article 10 of the EU-ETS Directive would be fully applied for Serbia this amount is to be reduced to approximately 2600Mio€.

⁶⁶ A= Administrative activity linked to transposition of relevant EU legislation



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No.	Name of measure/activity	Investment Costs [Mio EUR]			Add. budget revenues [Mio EUR]	Source of finance [Mio EUR]		Note	Deadline for implem- entation
		Investors	consumers	State		EU and other funds	National resources		
	Institutional enforcement of MEP in order to preform activities of the ETS Competent Authority					1		EU Twinning, TAIEX support instruments	2021
	Establishment of fully functioning MRV to ensure timely and smooth implementation of the ETS								2022
	Ministry for Environmental Protection and Ministry of finance should consider implementation of equivalent measures for the period between 2021 and full implementation of the EU-ETS in order to ensure smooth adaptation of the stakeholders (energy industry) to climate constrained environment				1578,3	0,5		Implementation of equivalent measures in ETS sector and gradual increase of carbon price from 0€ in 2021 to 28€/tCO ₂ in 2025 and use of revenues for decarbonisation of the power sector	2021
2	Increasing the use of RES in electricity production	635,5				2,0	160,6	Funds needed for feed in premiums to support additional RES production for the period 2020-2030. Premiums are financed through surcharge paid by electricity consumers in the total amount of 120,6 Mio€ assuming current levels of support for solar and wind will gradually be reduced by 2030. After that period the main purpose of the FIP is to ensure investment stability rather than providing the premiums high above the spot market electricity price. Additional 40 Mio€ is allocated to cover the infrastructural elements of the large hydropower plants for the period 2026-2030.	2020-2026
A	Upgrade current feed-in system to support RES in order to be fully aligned with European Commission State Aid Guidelines from 2015					1,0	120.6	EU IPA or Twinning support instruments	2020





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		Investors	consumers	State		EU and other funds	National resources		
	Remove administrative barriers in order to increase permitting capacities at the competent authorities					1,0		EU IPA or Twinning support instruments	2020
	Provide support to investors in large hydro power plants (infrastructure)						40,0	Infrastructure segments of HPP (i.e. reallocation or construction of new transport infrastructure, investments related to reservoirs, or nature conservation) to be financed from the Energy efficiency fund	2026
3	Improving energy efficiency and increasing use of CHP and RES in district heating systems	IE (No.1) and (No.2)				1,5	111,0	Funds needed for premiums to support additional CHP production until 2030 amount 88,2 Mio€. Support premiums are financed through surcharge paid by electricity consumers. Additional funds for support of new biomass district heating systems in the period are needed in the amount of 22,9 Mio€. (Energy efficiency fund)	2020- 2022
A	Full transposition and implementation of the Energy Efficiency Directive (EED)					0,5	88,2	Funds needed for premiums to support additional CHP production until 2030 amount 88,2 Mio€. Support premiums are financed through surcharge paid by electricity and heat consumers in the amount of RSD 0.093 per kWh. Transposition and implementation are to be supported by EU Twinning, TAIEX support instruments	2020
	Comprehensive assessment of the national potential of cogeneration and district heating and cooling					1,0		EU IPA support instrument	2022





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		Investors	consu- mers	State		EU and other funds	National resources		
	Provision of subsidies for new biomass district heating systems (Energy Efficiency Fund)						22,9	Support for biomass district heating systems Energy efficiency fund (EEF)	2022
Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030 and between 33,5% and 54,5% by 2050 compared to 2010.									
Sectoral target: Reduce emissions, through the increase of energy efficiency and use of RES, in the industrial sector by 15% by 2030, and in the residential and commercial sectors by 40% by 2030, compared with 2010									
4	CO ₂ tax and excise duties on energy				275,6	1,0		Additional costs from higher taxes and CO ₂ tax will be borne by the final users.	2021
A	Harmonisation of relevant fuel taxation legislation with EU legal framework				10,5			Gradual introduction of excise duty of 0,3€/GJ for coal for "non-business use"	2021
	Introduction of the CO ₂ taxation based on carbon intensity of the fuel				265,2	1,0		Gradual implementation of CO ₂ tax from 0€/tCO ₂ in 2021 to 28€/tCO ₂ in 2025 and maintaining the tax level after 2025 at level Expected use of EU Twinning, TAIX support instruments for "green tax reform"	2021
5	Improving the energy efficiency in the industry	694,2				2,5	15,0	Funds for implementation of energy efficiency and RES measures will come from company funds, international financial institutions, Energy efficiency fund and from commercial bank loans and other sources.	2021-2022
A	Transposition and implementation of Electric motor regulation					0,5		EU IPA support instrument	2021
A	Transposition and implementation of Ecodesign directive					1,0		EU IPA support instrument	2021
	Provide financial and informational support to engage non-SME companies in energy audit and financial support for implementation of proposed measures from the audit						15,0	Energy audits for manufacturing industries and construction sector and financial support for the implementation of proposed measures to be financed from EEF	2022





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		Investors	consumers	State		EU and other funds	National resources		
	Establishment of energy efficiency obligation scheme or other alternative policy measures to achieve energy savings among final consumers					1,0		EU IPA support instrument	2022
6	Increasing the use of RES in the industry	IE (No.5)					14,4	Financing through Energy Efficiency Fund for use of RES and Waste heat in industry	2021
	Subsidies for fuel switch from fossil fuels in industry to RES and use of waste heat						14,4	Financing through Energy Efficiency Fund for use of RES and Waste heat in industry	2021
7	Improving thermal integrity of Households		1730,1			3,0	308,6	Funds will come from private investors, private banks, international financial institutions and from budget (Energy Efficiency Fund). Energy efficiency fund will between 2020 and 2030 for the subsidies for renovation of existing buildings and subsidies for new buildings being built better than the current standard requires funds in the amount of 307,1 Mio€. addition contribution of 1,5 Mio€ form EEF for institutional upgrade of EEF and setting up an advice network for citizens is needed	2021-2022
A	Updating of building codes for new buildings and renovation. Full transposition of Energy Efficiency directive (Long-term strategy for mobilising investment and facilitating the renovation of national building stock)					1,0		EU IPA support instrument	2021
	Institutional upgrade energy efficiency fund in order to serve as public fund for subsidies for households						1	EU Twinning, support instruments and Energy Efficiency Fund	2021



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		Investors	consumers	State		EU and other funds	National resources		
	Provide Subsidies for energy efficiency measures in the residential buildings						307,1	Funds for renovation of buildings and for new buildings will mainly come from investors but passed to consumers Energy efficiency fund should provide funds for renovation and new buildings built above standards in the amount of 25 % of the investment, while in the case of social homes subsidy could reach higher percentages.	2022
	Setup and financing of independent advice network for citizens on energy efficiency measures and use of RES in households					2,0	1,5	EU IPA support instrument, other donors, Energy efficiency fund	2021
8	Energy efficiency improvement of heating and cooling infrastructure and promotion of use of RES in households		81,4			2,0	51,3	Energy efficiency fund will require funds for subsidising replacement of old inefficient boiler in the period 2020-2030 need funds in the amount of 51,3 Mio€.	2022
A	Full transposition and implementation of Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers and revised labelling regulation					1,0		EU IPA support instrument	2021
A	Full transposition and implementation Regulation (EU) 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel local space heaters					1,0		EU IPA support instrument	2021
	Include required RES share for new and renovated buildings in regulation on energy efficiency of buildings						IE (No.7)	EU IPA support instrument (included under measure No.7)	2022
	Provide financial incentives to promote high efficient low carbon heating and cooling equipment						51,3	Funds for replacement of inefficient boilers will mainly come from investors but to promote substitutions subsidies should be provided by Energy Efficiency Fund in the	2022





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		Investors	consu- mers	State		EU and other funds	National resources		
								amount of 25 % of the investment. For social housing the level of support could be much higher.	
9	Improving energy efficiency and use of RES in the Tertiary sector			94,4		1,0	62,4	Funds will come from private investors, private banks, international financial institutions and from budget (Energy Efficiency Fund). - Energy efficiency fund will require funds for subsidising measures in the public service sector, in the period 2021-2030 needed funds amount of 64Mio EUR.	2021
A	Update building codes for new buildings and renovation, to include requirements on use of RES (by 2021)						i.e.	EU IPA support instrument for updating building codes for households	2021
	Establish the list of public buildings and their energy efficiency performance status, including detailed description of the heating and cooling system, lighting system and of other electric equipment, as well as identification of opportunities for use of RES (by 2021)						0,5	Support for the preparation of the list of public buildings with the information of the energy efficiency performance status (status is used for prioritisation of building eligible for the energy audits and investments in energy efficiency)	2021
	Provide financial incentive for energy audits for buildings in tertiary sector (by 2021)						0,5	Support for conduction energy audits in public sector buildings for building on the list of public buildings	2021
	Full streamline of public procurement with the EU green public procurement criteria (by 2021)					1,0		EU IPA support instrument	2021
	Provide support to use of RES and to energy efficiency in heating and cooling infrastructure in tertiary sector buildings (by 2022)						61,4	Support provided on the basis of the energy audit reports and efficiency performance status	2022
10	Improving thermal integrity in the Tertiary sector			168,7		1,0	133,1	Funds will come from private investors, private banks, international financial institutions and from budget (Energy Efficiency Fund). - Energy efficiency fund will in the period 2021-2030 require funds for	2022





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		Investors	consu- mers	State		EU and other funds	National resources		
								subsidising measures in the public service sector, at the amount of 133 Mio€.	
	Financing of renovation of public buildings through Energy Performance Contracting (ESCO). Prepare support scheme combining ESCO financing with budgetary grants for deep public buildings renovation.						133,1	Funds for improvement of buildings envelop and heating systems will mainly come from investors, but Energy efficiency fund should provide funds in the amount of 25 % of the total investment needed.	2022
Sectoral target: Limit GHG emissions growth in the transportation sector by 10% by 2030 compared to 2010									
11	Renewal of the passenger fleet and promotion of sustainable passenger transport - Efficiency improvement of vehicle stock and usage of vehicles		2262,9			3,1	57,8	Funds for new vehicles and charging infrastructure will be private funds, combined with loans, international finance institutions are also one of the options, Subsidies will be financed through energy efficiency fund at the level of 57,5 Mio€ in the period 2020-2025 for subsidies for electric vehicles. For promotion of eco-driving 0,3Mio€ is to be funded form Energy efficiency fund (EEF)	2020-2022
A	Transposition and implementation of Regulation setting CO ₂ emission performance standards for new passenger cars and for new light commercial vehicles (vans)					0,1		EU Policy and legal advice centre (PLAC 3 project)	2021
A	Transposition and implementation of the Clean Vehicles Directive					1,0		EU IPA support instrument	2021
A	Full implementation of the Directive 1999/94/EC — availability of consumer information on fuel economy and CO ₂ emissions in respect of the marketing of new passenger cars							Transposition of Directive 1999/94/EC is contained in the draft Law on Climate Change	2020 ⁶⁷

⁶⁷ Transposition is already included in the draft Law on climate change



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		Investors	consu- mers	State		EU and other funds	National resources		
	Preparation of the action plan for alternative fuels in transport sector					1,0	57,5	27Mio € is allocated for subsidies for electric busses and 29,1Mio€ for battery electric cars subject to market conditions after 2025 subsidies should be gradually phased out and 1,4mio€ is to be allocated for the support for charging stations EU IPA support instrument is expected for the preparation of the action plan for alternative fuels in transport sector;	2021
	Upgrade cars yearly registration tax in order to favour new and low CO ₂ emitting cars and vans						0	Change in taxation is to be designed to be budgetary neutral	2022
	Introduction of passenger car tax for all cars first time registered in Serbia based on CO ₂ performance of the car.						0	Change in taxation is to be designed to be budgetary neutral	2022
	Promotion of Eco-driving					1,0	0,3	Promotion activities to be funded from energy efficiency fund and EU funds and other donors	2021
12	Promotion of public transport and non-motorised transport					2,0	555,0		2022-2023
	Preparation of revised Transport strategy with inclusion of climate change aspects					1,0		EU IPA support instrument	2022
	Preparation of regional/local low-carbon transport strategies and sustainable mobility urban plans					1,0		EU IPA support instrument	2023
	Additional support for the use of public transport						517	For additional promotion of public transport (funds for infrastructure - park and ride, additional priority lanes and infrastructure, public transport interchange. smart choices, workplace travel plans...)	2023





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		Investors	consumers	State		EU and other funds	National resources		
	Investments in infrastructure (railway) have already started and need to continue in accordance with national plan for public railway infrastructure						i.e.	Funds for investments in infrastructure (railway) are ensured through National Programme for railway infrastructure	On going
	Improvement of non-motorised transport infrastructure						38	Average cost of 0,15 Mio€/km of bike infrastructure is taking into account	2022
13	Renewal of the passenger fleet and promotion of sustainable passenger transport - Promotion of usage of alternative fuels and biofuels					(2,0)	67,4	Cumulative funds for subsidies for alternative fuels and biofuels is estimated to 67,4 Mio EUR.	2021-2025
A	Prepare Directive specific implementation plan for transposition and implementation of Fuel Quality Directive					(2,0)		EU IPA support instrument (ongoing IPA EAS3 project)	2021
A	Transpose and implement updated RES directive in order to allow 2nd generation of biofuels to penetrate into Serbia's transport fuel market								2021
	Set up of support schemes for production of biofuels (from wastes, residues, non-food cellulosic material, and ligno-cellulosic material)						67,4	Support for production of 2nd generation of biofuels (Energy Efficiency Fund)	2025
14	Renewal of the freight fleet and promotion of sustainable freight transport	388,4				1,2	0,0	Savings in the freight transport is including efficiency improvement of trucks Funds for investments (new lines, reconstruction, maintenance) in railway infrastructure are ensured in the National Programme for railway infrastructure	2021-2023
	Transposition and implementation of Regulation on the monitoring and reporting of CO ₂ emissions from and fuel consumption of new heavy-duty vehicles					0,2		EU Policy and legal advice centre (PLAC 3 project)	2021
	Update Strategy of railway, road, inland waterway, air and intermodal transport development in the Republic of Serbia 2008-2015					1,0		EU IPA support instrument	2023





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		Investors	consumers	State		EU and other funds	National resources		
	Implement modulation of yearly infrastructure charges for HDVs according to CO ₂ emission performance standards						0,0	Changes in infrastructure charging is to be budgetary neutral	2022
	Implement road charging for freight vehicles based on EURO emission standard						0,0	Changes in road charging is to be budgetary neutral	2022
Sectoral target: Limit GHG emissions growth from industrial processes and product use by 7% by 2030 compared to 2010									
15	Implementation of the F-gas regulation and MACs directive		4,6			0,5		Bans are to be conducted in parallel with incentives for installation of new equipment with low GWP refrigerants. Implementation of the MACs directive is expected to have limited effects due to the fact the EU is already a main trading partner of Serbia	2020-2021
	Implementation of Restrictions on the placing on the market (bans) of certain refrigeration and air conditioning equipment, foams and propellants using F-gases, and of SF ₆ in small magnesium foundries.		4,6					At the EU level cost are covered by investors and are partially passed on consumers Restrictions applied with derogations.	2020
	Service and maintenance bans: Limits on the use of higher GWP gases, such as R404A and R507A, in existing refrigeration equipment from 2020.							The ban on servicing and maintenance is to be implemented in conjunction with incentives for installation of new equipment (Energy Efficiency Fund) taking into account derogations	2020
A	Transposition of the EU MACs directive					0,5		Effects of transposition and Implementation of the MACs directive in Serbia's is limited since the EU is Serbia's main trading partner and therefore producers need to respect the legislation applicable in the EU.	2021
Sectoral target: Reduce GHG emissions in agriculture by 15% by 2030, compared with 2010									
16	Winter cover crops	76,2				38,1		Financial stimulations for planting of winter cover crops combined with awareness raising through the Agriculture Advisory Services	2021



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		Investors	consu- mers	State		EU and other funds	National resources		
								Financing through EU funds (IPARD, CAP)	
	Increasing knowledge about the positive effects of winter cover crops						i.e.	Increasing knowledge about benefits of winter cover crops through the Agriculture Advisory Services	2021
	Promote use of sustainable land use (greening)						i.e.	Promotion of crop diversification, maintenance of permanent grassland and allocation of 5% of arable land to to areas beneficial for biodiversity: Ecological Focus Areas (EFA) through green direct payments	2022
	Introduce financial incentives for winter cover crops	76,2				38,1		Preparation of a Rulebook for subsidies is part of a regular activities of the Directorate for agrarian payments Financial incentive to be distributed through regular tendering procedures of Directorate for agrarian payments	2023
17	Increase legume share in fodder area	3,6				1,8		Financial stimulations for increase share of legumes combined with awareness raising through the Agriculture Advisory Services Financing through EU funds (IPARD, CAP)	2021-2023
	Raise awareness and knowledge about the benefits of increased legume share on soil fertility					0,3		Awareness and knowledge about the benefits of increased legume share in fodder area is to be implemented by Agriculture Advisory Services	2021
	Introduce financial incentives for increasing legume share					1,5		The implementation of the measure is to be funded through IPARD funds	2023
18	Breeding for higher milk yields					1,4		Effects of measures are indirectly included in the projection of dairy cattle population,	2022-2025





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		Investors	consu- mers	State		EU and other funds	National resources		
	Support for the establishment of dairy cattle breeding organisations					1,0		EU IPA support instrument	2022
	Study on options with a view to issuing recommendations for genetic selection of cows for higher milk yields, including dissemination of recommendations from study via the Agricultural Advisory Services					0,4		Study can be also financed through potential donors' funds	2025
Sectoral target: Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010									
	No specific measures included in this action plan	-	-	-	-	-	-	Included elsewhere (IE). All measures related to waste sector are covered through Waste sector directive specific implementation plans (DSIP)	NA
Specific objective 3: Increase the carbon sink in the Serbian Forest by 17% by 2030, compared with 2010									
19	Afforestation	35,0					25,0	Afforestation of 5000ha/year up to 2030. This requires additional forestation of 2952ha/year compared to current levels of afforestation – Budgetary forest fund (BFF), replenished with innovative sources of financing such as ETS revenues) This measure includes the update of the cadastre and land use harmonization among different land users and owners	2021-2030
	Selection of the lots suitable for afforestation and selection of appropriate tree species for selected lots (afforestation plan)						1	Selection of forest lots is necessary for afforestation can take place. Selection of plots is to be prepared at the national or regional by relevant research institutions.	2021
	Establishment of adequate monitoring mechanism for afforestation						0,5	Monitoring mechanism for afforestation is to be established at the level of Ministry responsible for forestry	2022





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		Investors	consu- mers	State		EU and other funds	National resources		
	Education and training for proper afforestation technique at selected lots						0,5	A year before the implementation of afforestation at selected plots, Chamber of forest engineers is to coordinate the education and training activities for relevant stakeholders and afforestation experts at the demonstration lots	Every year until 2030
	Production of sufficient planting material for selected lots and implementation of afforestation						23	Tree planting nurseries are be informed through the afforestation plan about the annual planting material needs until 2030	Every year until 2030
20	Close to Nature Forest Management and climate smart approach to forestry	1,3						State forest companies' budget, private investment (BFF, replenished with innovative sources of financing such as ETS revenues)	2022-2025
	Preparation of all management guidelines for all management types					IE		Funding is secured and the preparation ongoing	2022
	Establishment of demonstration and experimental plots in all management types						0,6	Demonstration and experimental plots for all forest management types (currently 27 management types) across the whole territory of Republic of Serbia is necessary infrastructure for training activities for implementation of close to nature forest management.	2023
	Systematic training activities to smooth implementation of the close to nature and smart forest management						0,7	Chamber of Forest engineers is to coordinate training activities on demonstration and experimental forest plots	2025





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		Investors	consu- mers	State		EU and other funds	National resources		
21	Conversion of coppice to high forest	33,5					18,5	State budget, State forest companies' budget, (BFF, replenished with innovative sources of financing such as ETS revenues)	2023-2030
	Selection of coppice sites suitable for conversion into high forests (coppice conversion plan)						0,3	State forest management companies are to create coppice conversion plan	2023
	Monitoring mechanism for follow up of implementation						0,7	Monitoring mechanism for afforestation is to be established at the level of State forest management companies and supervised by the Ministry responsible for forestry	2024
	Provision of the planting material where natural conversion is not successful						5,5	Based on success coppice conversion rates, state forest management companies can plan the necessary planting material to compensate for unsuccessful natural conversion	every year until 2030
	Implementation of conversion of coppice into high forests						12	Activities are to be coordinated by State forest management companies	every year until 2030
22	Short Rotation Plantations (SRP)	18,0				0,2	5,4	The incentive required for this measure amounts to 5,4Mio EUR (BFF, replenished with innovative sources of financing such as ETS revenues)	2021-2030
	Selection of the lots and tree species/clones suitable for SRP (plan for implementation of SRP)						0,4	Selection of forest lots is necessary for SRP can take place. Selection of lots is to be prepared at the national or regional by relevant research institutions.	2021
	Identification and proposal for removing legal and administrative barriers for implementation of SRP					0,2		Activities to be supported by international funds	2022





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		Investors	consu- mers	State		EU and other funds	National resources		
	Implementation of SRP and establishment of adequate SRP monitoring mechanism						4,6	Monitoring mechanism for SRP is to be established at the level of Ministry responsible for forestry	2023
	Education and training for proper SRP technique at selected lots						0,3	A year before the implementation of SRP at selected plots, Chamber of forest engineers is to coordinate the education and training activities for relevant industry, stakeholders and SRP experts at the demonstration lots	2030
	Production of sufficient planting material for selected lots and implementation of afforestation						0,1	Tree planting nurseries are to be informed through the SRP plan about the annual planting material needs until 2030	every year until 2030
23	Regeneration of over mature stands	IE					IE	Cost already included in state forest companies' budget,	2020- 2025
	Selection of forest areas with over mature stands							State forest management companies are to identify areas with over mature stands for regeneration	2020
	Establishment of adequate monitoring mechanism for following the results of regeneration of over mature stands							Monitoring mechanism for regeneration of over matured stands is to be established at the level of state forest companies supervised by the Ministry responsible for forestry	2021
	Regeneration of over mature stands							Regeneration of over matured stands is to be coordinated by State forest management companies.	2025
	Production of sufficient planting material and planting of seedlings in unsuccessfully natural regenerated lots							Based on success of natural regeneration, state forest management companies are to ensure sufficient planting material for unsuccessful natural regeneration	2025



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		Investors	consu- mers	State		EU and other funds	National resources		
	Education and training for proper regeneration of over mature stands							Chamber of forest engineers is to coordinate the education and training activities for State forest management companies for proper regeneration of over mature stands.	2025
24	Definition of guidelines for the reduction of abiotic and biotic factors						0,5	Costs associated with this measure can be financed by the BFF (replenished with innovative sources of financing such as ETS revenues). Support from EU pre-accession support instruments can also be expected for this measure	2021-2030
	Prepare prevention management guidelines						0,1	Management guidelines (describing forest management strategies to prevent biotic and abiotic hazards) are to be prepared by relevant research institutions	2021
	Establishment of adequate monitoring mechanism for monitoring of abiotic and biotic factors						0,1	Monitoring mechanism for monitoring of abiotic and biotic factors and their effects on forest ecosystem is to be established at the level of state forest companies supervised by the Ministry responsible for forestry	2022
	Education and training on practical implementation of the prevention management guidelines						0,3	Chamber of forest engineers is to coordinate the education and training activities on practical implementation of the prevention management guidelines for relevant stakeholders	from 2023-2030
25	Research, training and awareness raising programme for the enhancement of the carbon sink and of the resilience of the Serbian forest to climate change			3,3				Costs associated with this measure can be financed by the BFF (replenished with innovative sources of financing such as ETS revenues) and/or by multilateral support such as Global Environmental facility and Green Climate fund.	2021-2030





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No.	Name of measure/activity	Investment Costs [Mio EUR]			Add. budget revenues [Mio EUR]	Source of finance [Mio EUR]		Note	Deadline for implemen- tation
		Investors	consu- mers	State		EU and other funds	National resources		
	Prepare and implement climate change mitigation and adaptation research agenda for forestry sector						2,6	The agenda should include set of relevant research projects contributing to the enhanced climate change mitigation and adaptation capacity of the forestry sector. Agenda is to be prepared by 2021 while implementation of projects should be concluded by 2025	2021-2025
	Integrate research results into systematic dissemination and training						0,7	Integration of the project results into forest management praxis is continuous process. Implementation is to be coordinated by Chamber of Forest engineers in close cooperation with research institutions. End users are institutions responsible for forest management.	2023-2030
Specific objective 4: Preserve the potential of mitigation measures by increasing the resilience to climate change of priority sectors									
26	Adaptation of cultivation technologies			0,2		0,2		EU IPA support instrument	2025-2026
	Study on cultivation technologies			0,2		0,2		EU IPA support instrument	2025
	Disseminated of recommendations from study by the Agriculture Advising Service			-		-		Dissemination through the regular activities of the agriculture advising Service	2026
Specific objective 5: Promote the transition through education, training for new skills and awareness raising									
27	Climate change education, training for new skills and awareness raising			5,0		5,0		EU IPA support instrument	2023
	Preparation of national plan for climate change education, training for new skills and awareness raising			5,0		5,0		Preparation of the plan is to be support from EU support mechanisms. The main objective of the plan is to enhance the flexibility of the labour market through awareness raising, education and trainings for new skills needed for transition to low carbon economy	2023





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No.	Name of measure/activity	Investment Costs [Mio EUR]			Add. budget revenues [Mio EUR]	Source of finance [Mio EUR]		Note	Timeframe for implement ation
		Investors	consumers	State		EU and other funds	National resources		
	TOTAL	2164,9	4079,0	266,9	(5764,2)	68,9	1586	<p>National resources (1586Mio€) are coming from funds needed for premiums which are financed through surcharge paid by electricity consumers. (208,8Mio€), and fund where the share of revenues from auctioning and equivalent measures are collected and recycled back to the economy (1377,2Mio€)</p> <p>Additional budget revenues are estimated at 5764,2Mio€ of which 1,578,3Mio€ is coming from implementation of EU-ETS equivalent measures. and 3910,3Mio€ from revenues from auctioning in the period 2025-2030. The remaining 275,6mio€ is coming from CO₂ taxation of fossil fuels in the non-ETs sector and from minimum excise duties on certain fuels. In case Serbia will not being able to join EU_ETs in the period 2025-2030 the same amount of revenues could be collected through extension of the equivalent measures until 2030.</p> <p>If rules for auctioning of allowance as set in Article 10 of the EU-ETS Directive would be fully applied for Serbia this amount is to be reduced to approximately 2600Mio€.</p>	-





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8.3. Framework for Monitoring and reporting on the results of implementation of Action Plan

Monitoring of the results of the implementation of the action plan is part of the System for the Reporting of Policies, Measures and Projections as defined by the Article 64 of the Law on climate change.

According to the Law on Climate Change ministries in charge of energy, mining, transport, economy, agriculture, forestry, spatial planning, construction and waste management shall by 1 January 2021 and every two years thereafter⁶⁸, send to the Ministry responsible for environment information on the implementation of policies and measures from their area of responsibility as contained in the action plan by using the format from Annex 1 to the Regulation laying down the National system for the compilation of the GHG inventory and System for the Reporting of Policies, Measures and Projections (hereinafter Regulation) including output indicators as contained in **Table 18: Monitoring for implementation of measures**.

Ministry responsible for the environment is based on Articles 43 of the Law on the Planning System of the Republic of Serbia (Official gazette, 30/2018) obliged to prepare, yearly report on implementation of this Action Plan by the end of April (each calendar year from the date of its adoption until expiry) shall report to the Government, through the public administration authority competent for public policy coordination. Therefore, the ministries mentioned above are obliged by 1 January 2021 and every year thereafter to report information on indicators used to monitor and evaluate the progress and additional information relevant for implementation of measures using format from Annex 1 of the Regulation.

In the addition to the information requested by the Article 69 of the Regulation on the methodology of public policy management, impact assessment of public policies and regulations, and the content of individual public policy documents (Official Gazette of RS, No 8/19) the report on implementation of the action plan prepared by the Ministry responsible for the environment has to include the following content:

- 1) Estimates of achieving overall and sectoral targets for GHG emission reductions set in this Action Plan
 - a) Comparison of overall GHG emissions trend compared to the linear trajectory between reference year (2015) and target value for 2030
 - b) Comparison of sectoral GHG emission trends compared to the linear trajectory between reference year (2015) and target values for 2030
- 2) Analysis of implementation of measures by:
 - a) Provision of information on implementation of measures (i.e. adoption of legislation, provision of resources, provision of subsidies and stimulated investments, etc.)
 - b) Comparison of indicator values and linear trajectory between base year for indicator and target value as presented in the **Table 18**: below.
- 3) Recommendations for improvement of Action Plan (can be in the form of additional measures or changes to existing measures) if appropriate.

⁶⁸ Integrated Reporting on greenhouse gas policies and measures on every odd year is prescribed in the governance on the Energy Union and Climate Action regulation 2018/199/EU





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For the single adaptation measure to be monitored under this Action Plan (Adaptation of cultivation technologies), only 2a) and 3 above are applicable.

While this action plan does not include measures for the waste sector, it is important for the evolution of implementation of the biodegradable waste target to be monitored in the scope of this monitoring framework, so as to assess progress towards achievement of the relevant specific objective. As such, the indicator Share of biodegradable waste disposed on landfills is included in the table below.

For analysis of implementation of Action Plan indicators presented in the table below at the level of measures and activities will be used while for the reporting to the EU and UNFCCC reporting will be conducted at the level of measures⁶⁹.

⁶⁹ Reporting at the level of specific objectives and general objective is contained in the Chapter 7 (Monitoring plan of the implementation of the Climate change strategy)





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Table 18: Monitoring for implementation of measures

No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
Specific objective 1: Reduce GHG emissions covered by the EU-ETS by 15% by 2030, compared with 2010						
1	Implementation of emission trading system and implementation of equivalent measures	Adopted legislation (Climate law, by-laws), MRV system setup, institutional setup (additional employments)	ETS emissions	Verified emissions in the yearly emission reports (source: SEPA)	40.874 ktCO ₂ [2015]	35.768 ktCO ₂ [2030]
	Adjustment of the draft law on Climate Change to integrate changes as contained in the revised ETS directive from 2018 and its implementing act	-	-	Law on climate change amended	-	Legal framework adjusted [2020]
	Adoption of Law on Climate Change and accompanying by-laws for the full functioning of the monitoring, reporting and verification (MRV) of the ETS	-	-	Law and by-laws on climate change adopted	-	Law and by-laws adopted and implemented [2020]
	Institutional enforcement of MEP in order to perform activities of the ETS Competent Authority	-	-	Additional experts appointed and trained	-	CA enforced with additional experts appointed and full functioning MRV established [2021]
	Establishment of fully functioning MRV to ensure timely and smooth implementation of the ETS	-	-		-	
	Ministry for Environmental Protection and Ministry of finance should consider implementation of equivalent measures for the period between 2021 and full implementation of the EU-ETS in order to ensure smooth adaptation of the stakeholders (energy industry) to climate constrained environment	-	-	Additional revenues if equivalent measures implemented: Ministry of finance	0 Mio EUR [2021]	1578,3 Mio EUR [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
2	Increasing the use of RES in electricity production	RES in electricity production	Additional RES electricity capacity	RES capacity (Energy Balance)	3087MW of which 3038MW Hydro, 11MW PV, 25MW in Wind and 13MW BMS [2015]	at least 5037MW of which 3409MW of hydroelectricity, 869 MW in photovoltaic, 723MW in wind and at least 36MW of biomass [2030]
	Upgrade current feed-in system to support RES in order to be fully aligned with European Commission State Aid Guidelines from 2015	-	-	Alignment of the legislation with the EU acquis	-	Serbia's legislation aligned with state aid guidelines [2020]
	Remove administrative barriers in order to increase permitting capacities at the competent authorities	-	-	Permitting capacities increased	-	Administrative barriers removed, permitting capacities increased, permits issued in 30 days [2020]
	Provide support to investors in large hydro power plants (infrastructure)	-	-	Support provided for infrastructure segments of large HPP	0 Mio € [2015]	40Mio € of support provided [2026]
3	Improving energy efficiency and increasing use of CHP and RES in district heating systems	Level of transposition of the Energy efficiency directive and subsidies provided for biomass district heating systems	Share of electricity production from CHP in gross electricity production	Gross CHP electricity production / Gross electricity production (Sum of Gross electricity production from all units)	4.0 % [2015]	5.5 % [2030]
A	Full transposition and implementation of the Energy Efficiency Directive (EED)	-	-	Status of transposition and implementation of EED	-	EED Transposed and Implemented [2020]
	Comprehensive assessment of the national potential of cogeneration and district heating and cooling	-	-	Potential for CHP heating and cooling assessed	-	Assessment of CHP for heating and cooling conducted [2022]
	Provision of subsidies for new biomass district heating systems (Energy Efficiency Fund)	-	-	New biomass district heating systems and new biomass boilers in existing heating systems	-	49 systems/ boilers installed [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
Specific objective 2: Reduce GHG emissions not covered by the EU-ETS by 9,7% in 2030 and between 33,5% and 54,5% by 2050 compared to 2010.						
Sectoral target: Reduce emissions, through the increase of energy efficiency and use of RES, in the industrial sector by 15% by 2030, and in the residential and commercial sectors by 40% by 2030, compared with 2010						
4	CO₂ tax and excise duties on energy	Level of harmonisation of excise duty la with EU legislation and implementation of the CO ₂ taxation based on carbon intensity of the fuels	Additional revenue from excise duty and CO ₂ tax	Ministry of Finance	0 Mio € [2015]	275,5 Mio € [2030]
A	Harmonisation of relevant fuel taxation legislation with EU legal framework	-	-	Ministry of Finance	0 Mio € [2015]	10,4 Mio € [2030]
	Introduction of the CO ₂ taxation based on carbon intensity of the fuel	-	-	Ministry of Finance	0 Mio € [2015]	265,1 Mio € [2030]
5	Improving the energy efficiency in the industry	Status of the instruments supporting improvement of energy efficiency in industry	Energy intensity industry (energy use in manufacturing industry and construction/Value added)	Energy use in manufacturing industry and construction (source SORS – energy balance) / value added from manufacturing industry and construction (fixed prices 2013) – source SORS National Balances	Absolute value: 483 ktoe /MEUR'13	Absolute value: 358 ktoe /MEUR'13 [2030]
A	Transposition and implementation of Electric motor regulation	-	-	Status of transposition and level of implementation of directive and regulation	-	Regulation transposed and implemented [2021]
A	Transposition and implementation of Ecodesign directive	-	-	-	-	Ecodesign directive transposed and implemented [2021]
	Provide financial and informational support to engage non-SME companies in energy audit and financial support for implementation of proposed measures from the audit	-	-	Annual report of the Energy efficiency fund	0 Mio€ [2015]	15 Mio€ [2030]
	Establishment of energy efficiency obligation scheme or other alternative policy measures to achieve energy savings among final consumers	-	-	Status of establishment of obligatory energy efficiency schemes or of alternative policy measures	-	energy efficiency obligation schemes established or alternative policy measures [2022]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
6	Increasing the use of RES in the industry	Support of RES and waste heat projects in industry	RES consumption in industry	Use of RES in industry sector (manufacturing industry and construction; source: SORS – energy balance)	133 ktoe [2015]	275 ktoe [2030]
	Subsidies for fuel switch from fossil fuels in industry to RES and use of waste heat	-	-	New biomass and heat pumps installed in industry through subsidies	-	240 boilers and heat pumps supported [2030]
7	Improving thermal integrity of households	Upgrading of the Rulebook on energy efficiency of the buildings and preparation of national strategy for renovation of existing buildings. Transformation of the EEF to be capable for providing subsidies for citizens. Setting up energy advise network for citizens	Energy consumption in households excluding electricity per m ² of housing stock	Energy consumption in households excluding electricity divided by households building stock area (census data + new built household buildings) (source: energy balance, construction statistics – statistical pocketbook; SORS)	90 kWh/m ² [2015]	81 kWh/m ² [2030]
A	Updating of building codes for new buildings and renovation. Full transposition of Energy Efficiency directive (Long-term strategy for mobilising investment and facilitating the renovation of national building stock)	-	-	Status of updates of the building codes Status of preparation of Long-term strategy for renovation of national building stock	-	building codes updated Long-term strategy for renovation of national building stock adopted and implemented [2021]
	Institutional upgrade Energy Efficiency Fund in order to serve as public fund for subsidies for households	-	-	Status of transition of the EEF from budget fund to public fund	-	Energy efficiency fund as public fund established and functioning [2021]
	Provide Subsidies for energy efficiency measures in the residential buildings	-	-	Surface area of renovated residential buildings through subsidies by EE fund Surface area of new residential buildings subsidised for being more efficient than according to standard by EE fund (Annual report of the Energy efficiency fund)	-	14.4 Mio m ² (cumulative number for 2020-2030 period) 1.0 Mio m ² (cumulative number for 2020-2030 period)



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	Setup and financing of independent advice network for citizens on energy efficiency measures and use of RES in households	-	-	Status of implementation of advice network for citizens	-	Advise network established and maintained [2021]
8	Energy efficiency, improvement of heating and cooling infrastructure and promotion of use of RES in households	Level of transposition of the Ecodesign requirements including inclusion of minimum renewable energy share in buildings regulations and subsidies provided for replacement of inefficient heating equipment, use of biomass and heat pump	Average CO ₂ emission per amount of fuel used in households excluding electricity	CO ₂ emissions from households divided by energy use in households excluding electricity (source: CO ₂ emissions – emission inventory; energy use – SORS, energy balance)	16.3 tCO ₂ /TJ [2015]	11.3 tCO ₂ /TJ [2030]
A	Full transposition and implementation of Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers and revised labelling regulation	-	-	Status of transposition and implementation of Ecodesign requirements	-	Ecodesign requirements transposed and implemented [2021]
A	Full transposition and implementation Regulation (EU) 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC with regard to ecodesign requirements for solid fuel local space heaters	-	-			
	Include required RES share for new and renovated buildings in regulation on energy efficiency of buildings	-	-	Status of inclusion of required RES share for new and renovated buildings	-	Requirements for RES share included in relevant legislation [2021]
	Provide financial incentives to promote high efficient low carbon heating and cooling equipment	-	-	Number of wood boilers and heat pumps supported by the EE fund in the residential buildings (Annual report of the Energy efficiency fund)	-	41 000 boilers and heat pumps supported in the 2020-2030 period
9	Energy efficiency and use of RES in the Tertiary sector	Implementation of EPC and ESCO in Serbia for renovation of public buildings, providing subsidies for renovation of	CO ₂ emissions from service sector per services	CO ₂ emissions from service sector (1.A.4.a) [t CO ₂] divided by gross value added of service sector (NACA codes G-S) [mio EUR chain linked volumes 2005]	49 gCO ₂ /Mio€ [2015]	24 gCO ₂ /Mio € [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
		public buildings at the level of 20-25% of the investment and full transposition of green procurement system in Serbia	gross value added in constant prices	(source: CO ₂ emissions – emission inventory; value added – SORS, National accounts / EUROSTAT)		
	Update building codes for new buildings and renovation, to include requirements on use of RES (by 2021)			Status of updates of the building codes		Building codes updated [2021]
	Establish the list of public buildings and their energy efficiency performance status, including detailed description of the heating and cooling system, lighting system and of other electric equipment, as well as identification of opportunities for use of RES (by 2021)	-	-	List of public buildings energy efficiency performance status (ministry of mining and energy)	-	List prepared and regularly updated [2021]
	Provide financial incentive for energy audits for buildings in tertiary sector (by 2021)	-	-	Number of supported energy audits conducted (EEF)	0	200 [2030]
	Full streamline of public procurement with the EU green public procurement criteria (by 2021)	-	-	Status of transposition and level of implementation of EU green procurement system	-	EU green procurement system transposed and implemented [2021]
	Provide support to use of RES and to energy efficiency in heating and cooling infrastructure in tertiary sector buildings (by 2022)			Surface area of renovated buildings in public sector by the EE fund (Annual report of the Energy efficiency fund)	Solid fuels 95ktoe (2015) biomass 54 ktoe (2015)	Solid fuels 63 ktoe biomass 72 ktoe [2030]
10	Improving thermal integrity in the Tertiary sector	Implementation of EPC and ESCO in Serbia for renovation of public buildings, providing subsidies for renovation of public buildings at the level of 25% of the investment and full transposition of green procurement system in Serbia	CO ₂ emissions from service sector per services gross value added in constant prices	Area of tertiary buildings renovated (Energy Efficiency Fund)	0 Mio m ² [2015]	5,8 Mio m ² [2030]
	Financing of renovation of public buildings through Energy Performance Contracting (ESCO). Prepare support scheme combining	-	-	Surface area of completely renovated buildings in public sector by the EE fund	-	5,8 Mio m ² (cumulative value for 2020-2030 period)



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	ESCO financing with budgetary grants for deep public buildings renovation.					
Sectoral target: Limit GHG emissions growth in the transportation sector by 10% by 2030, compared with 2010						
11	Renewal of the passenger fleet and promotion of sustainable passenger transport - Efficiency improvement of vehicle stock and usage of vehicles	Changes to Law on taxes on the use, possession and carrying goods to remove discount for old cars and include CO ₂ emissions	Average CO ₂ emissions per kilometre of cars in Serbia	Average CO ₂ emissions of cars per kilometre in Serbia based on COPERT data (CO ₂ emissions from cars/driven kilometres of cars)	196 gCO ₂ /km [2015]	142 gCO ₂ /km [2030]
A	Transposition and implementation of Regulation setting CO ₂ emission performance standards for new passenger cars and for new light commercial vehicles (vans)	-	-	Status of transposition and level of implementation of legal document		EU acquis on CO ₂ in vehicles transposed and implemented [2021]
A	Transposition and implementation of the Clean Vehicles Directive (CVD)	-	-	Status of transposition and level of implementation of legal document		CVD transposed and implemented [2021]
A	Full implementation of the Directive 1999/94/EC — availability of consumer information on fuel economy and CO ₂ emissions in respect of the marketing of new passenger cars	-	-	Level of implementation of legal document		Directive 1999/94/EC transpose and implemented [2020]
	Preparation of the action plan for alternative fuels in transport sector	-	-	Number of supported electric vehicles in Serbia per vehicle type (cars, light duty vehicles, buses) (EE fund) Additional indicator: Number of electric vehicles in Serbia (database on the vehicle fleet, Ministry of Internal Affairs)	-	Plan prepared [2021] 9900 electric cars subsidised (cumulative value for 2021-2025, after 2025 it is assumed that electric car prices are aligned with IC cars) 1500 charging stations supported in total 31000 BEV registered [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
						90 subsidised busses [2020-2025 period].
	Upgrade cars yearly registration tax in order to favor new and low CO ₂ emitting cars and vans	-	-	Status of the changes to the law on tax on the use, possession and carrying of good	-	Changes to the law on tax on the use, possession and carrying of good implemented [2022]
	Introduction of passenger car tax for all cars first time registered in Serbia based on CO ₂ performance of the car.					
	Promotion of Eco-driving	-	-	Status of promotion activities regarding the Eco-driving	-	Eco-driving trainings completed [2021]
12	Renewal of the passenger fleet and promotion of sustainable passenger transport - Promotion of public transport and non-motorised transport	Updating of national transport strategy and preparation of regional/local low carbon strategies and building of a new infrastructure for non-motorised transport	Passenger transport with public transport (buses and trains)	Passenger kilometres done in public transport with buses and trains (source SORS – Transport)	13.4 Gpkm [2017]	14.4 Gpkm [2030]
	Preparation of revised Transport strategy with inclusion of climate change aspects	-	-	Status of preparation and implementation of transport strategy	-	Revised transport strategy with action plan prepared [2022] and under implementation [2030]
	Preparation of regional/local low-carbon transport strategies and sustainable mobility urban plans	-		Status of preparation and implementation of local strategies and urban plans	-	Regional/local low-carbon transport strategies and sustainable mobility urban plans prepared [2023] and under implementation [2030]
	Additional support for the use of public transport	-		Support for public transport provided (Annual report of the Energy Efficiency fund)	0 Mio € [2020]	517 Mio € [2030]
	Investments in infrastructure (railway) have already started and need to continue in accordance with national plan for public railway infrastructure	-		Status of investments in the railway infrastructure	-	Investments in the railway infrastructure in accordance with national public railways



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
						infrastructure development plan [on going]
	Improvement of non-motorised transport infrastructure	-		Additional new biking infrastructure (km) (Annual report of the Energy efficiency fund)	0km [2020]	250km [2030]
13	Renewal of the passenger fleet and promotion of sustainable passenger transport - Promotion of usage of alternative fuels and biofuels	Transposition and implementation of RES II Directive and setting up support schemes for 2nd generation of biofuels	Use of liquid and gaseous biofuels in transport	Liquid and gaseous biofuels use in transport sector (source – SORS energy balance)	0 ktoe [2017]	44 ktoe [2030]
				Level of support	0 €/litre [2017]	0,5€/litre [2030]
A	Prepare Directive specific implementation plan for transposition and implementation of Fuel Quality Directive	-	-	Status of transposition (National programme for adoption of the acquis (NPAA))		Fuel Quality Directive transposed and implemented [2021]
A	Transpose and implement updated RES directive in order to allow 2nd generation of biofuels to penetrate into Serbia's transport fuel market	-	-	Status of transposition (National programme for adoption of the acquis (NPAA))		RES directive transposed and implemented [2021]
	Set up of support schemes for production of biofuels (from wastes, residues, non-food cellulosic material, and ligno-cellulosic material)	-	-	Amount of 2nd generation of biofuels put on the market	0 ktoe [2017]	44 ktoe [2030]
				Level of support for biofuels	0€/litre [2017]	0,35€/litre [2030]
14	Renewal of the freight fleet and promotion of sustainable freight transport	Preparation of transport strategy, MRV for CO ₂ for HDV, infrastructure and road charges according to CO ₂ performance	To maintain the share of freight transport on railways and waterways in total freight transport	Freight transport on railways and waterways in tkm divided by total freight transport (source: SORS transport statistics – monthly bulletin)	45 % [2017]	45% [2030]
	Transposition and implementation of Regulation on the monitoring and reporting of CO ₂ emissions from and fuel consumption of new heavy-duty vehicles	-	-	Status of preparation of the MRV for CO ₂ from HDV; Ministry responsible for transport	-	System for reporting of CO ₂ from HDV prepared, approved and implemented [2021]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	Update Strategy of railway, road, inland waterway, air and intermodal transport development in the Republic of Serbia 2008-2015	-	-	Status of preparation of the updated transport strategy; Ministry responsible for transport	-	Transport strategy updated, adopted and implemented [2023]
	Implement modulation of yearly infrastructure charges for HDVs according to CO ₂ emission performance standards	-	-	Ministry of Finance	-	Infrastructure charging prepared, adopted and implemented [2022]
	Implement road charging for freight vehicles based on EURO emission standard	-	-	Ministry of Finance, Putevi Srbije	-	Road charging for freight vehicles based on EURO emission standard prepared, adopted, implemented [2022]
Sectoral Target: Limit GHG emissions growth from industrial processes and product use by 7% by 2030 compared to 2010						
15	Implementation of the F-gas regulation and MACs directive	Transposition and implementation of f-gas regulation and MACs directive and setting up a system for training and certification of service providers and implementation and inspections of the ban certain F-gasses	HFC emissions from stationary sources and mobile sources	Level of HFC emissions in industrial processes- 2.F (source: GHG emission inventory)	404 kt CO ₂ eq [2015]	675 kt CO ₂ eq [2030]
A	Implementation of Restrictions on the placing on the market (bans) of certain refrigeration and air conditioning equipment, foams and propellants using F-gases, and of SF ₆ in small magnesium foundries. Service and maintenance bans: Limits on the use of higher GWP gases, such as R404A and R507A, in existing refrigeration equipment from 2020.	-	-	Status of transposition and level of implementation of the F-*gasses regulation; (Ministry for Environment protection)	-	New f-gas regulation transposed and implemented, restrictions and bans inspected [2020]
	Transposition of the EU MACs directive	-	-	Status of transposition of MACs directive; (Ministry for Environment Protection)	-	MACs Directive transposed and implemented [2021]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
Sectoral target: Reduce GHG emissions in agriculture by 15% by 2030, compared with 2010						
16	Winter cover crops (financial stimulation for planting winter cover crops)	Introduction of direct payments for greening, educational campaign implemented	Number of ha under winter cover crops	National statistics	0 kha [2017]	1919 kha [2030]
	Increasing knowledge about the positive effects of winter cover crops	-	Preparation of brochure on positive effects of winter cover crops	Agriculture Advisory Services	-	Brochure on positive effects of winter cover crops prepared and disseminated [2021]
	Promote use of sustainable land use (greening)	-	Promotion of crop diversification, maintenance of permanent grassland and dedication of arable land beneficial for biodiversity	Agriculture Advisory Services	-	Brochure on crop diversification, maintenance of permanent grassland and dedication of arable land beneficial for biodiversity prepared and disseminated [2022]
	Introduce financial incentives for winter cover crops	-	Amount of subsidies for winter cover crops distributed	Directorate for Agrarian Payments	0 Mio€ [2017]	38,1Mio€ [2023]
17	Increase legume share in fodder area	Introduction of financial support scheme (e.g. direct payments for sustainable managing natural resources), educational campaign implemented	Number of ha under additional legumes on temporary grassland	National statistics	0 kha [2017]	33 kha [2030]
	Raise awareness and knowledge about the benefits of increased legume share on soil fertility	-	Preparation of brochure related to benefits of increased legume share in fodder areas	Agriculture Advisory Services	-	Brochure related to benefits of increased legume share in fodder areas prepared and disseminated [2021]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	Introduce financial incentives for increasing legume share	-	Amount of financial incentives for increasing legume share in fodder areas	Directorate for Agricultural payments	0 Mio€ [2017]	1,8 Mio€ [2023]
18	Breeding for higher milk yields	Continuation and expansion of the support for the breeding programmes	Average milk yield	No. of liters per milked cow (Statistical yearbook of Republic of Serbia, Chapter 9.10)	3477 l/milked cow [2017]	4115 l/milked cow [2030]
	Support for the establishment of dairy cattle breeding organisations	-	-	Status of establishment of milk breeding organisations; Ministry responsible for Agriculture	-	Milk breeding organisations established [2022]
	Study on options with a view to issuing recommendations for genetic selection of cows for higher milk yields, including dissemination of recommendations from study via the Agricultural Advisory Services	-	-	Status of the preparation of options with a view to issuing recommendations for genetic selection of cows for higher milk yields	-	Study conducted and results disseminated [2025]
Specific objective 3: Increase the carbon sink in the Serbian Forest by 17% by 2030, compared with 2010						
19	Afforestation	Yearly Funds for Afforestation in the Budget Forest Fund	Yearly Land area subject to afforestation (ha)	New forest land (ha) (Statistical office of RS)	2048 ha [2019]	50000 ha [2030]
	Selection of the lots suitable for afforestation and selection of appropriate tree species for selected lots (afforestation plan)	-	-	Ministry responsible for Forestry	-	Afforestation plan prepared [2021]
	Establishment of adequate monitoring mechanism for afforestation	-	-	Ministry responsible for Forestry	-	Adequate monitoring mechanism for afforestation established [2022]
	Education and training for proper afforestation technique at selected lots		Number of qualified workers trained	Chamber of forest engineers	-	At least 100 qualified forestry workers to be educated and trained [2030]
	Production of sufficient planting material for selected lots and implementation of afforestation	Yearly Funds for Afforestation in the Budget Forest Fund	Yearly Land area subject to afforestation (ha)	New forest land (ha) (Source: Statistical office of RS)	2048 ha [2019]	50000 ha [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
20	Close to Nature Forest Management and climate smart approach to forestry	Inclusion of CFM and CSAF in the forest management plans	Yearly new area of conifers in broadleaved forests (ha) Area of forest using management guidelines for close to nature forest management and CSAF (ha)	Verified data on area of additionally planted conifers (Source: Statistical office of RS, SE for forest management); Number of Forest management plans using management guidelines for CFM and CSAF	0 ha [2015]	3000 ha [2030]
	Preparation of all management guidelines for all management types	-	-	Ministry responsible for Forestry	-	Management guidelines for all management types prepared [2022]
	Establishment of demonstration and experimental plots in all management types	-	-	Ministry responsible for Forestry	-	Demonstration and experimental plots in all management types established [2023]
	Systematic training activities to smooth implementation of the close to nature and smart forest management	-	-	Chamber of forest engineers	-	At least 1000 qualified forest experts to be educated and trained [2025]
21	Conversion of coppice to high forest	Number of ha converted from coppice to high forest	Yearly area of coppice forests converted to high forests	Number of Forest management plans including conversion from coppice to high forest; Verified data on area of converted coppice forests (Source: Statistical office of RS, SE for forest management)	300 ha [2017]	70000 ha [2030]
	Selection of coppice sites suitable for conversion into high forests (coppice conversion plan)	-	-	Annual business plan of State Forest Management Companies	-	coppice conversion plan prepared [2023]
	Monitoring mechanism for follow up of implementation	-	-	Annual business plan of State Forest Management Companies	-	Monitoring mechanism for follow up of implementation established [2024]
	Provision of the planting material where natural conversion is not successful	-	-	Annual business plan of State Forest Management Companies	-	Sufficient planting material available [2030]
	Implementation of conversion of coppice into high forests	-	-	Annual business plan of State Forest Management Companies	300 ha [2017]	70000 ha [2030]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
22	Short Rotation Plantations (SRP)	Inclusion of SRP in Forest management plans	Yearly new area of SRP (ha)	Verified data on area of new SRP (Source: Statistical office of RS.)	0 ha [2017]	15000 ha [2030]
	Selection of the lots and tree species/clones suitable for SRP (plan for implementation of SRP)	-	-	Ministry responsible for Forestry	-	Plan for implementation of SRP prepared [2021]
	Identification and proposal for removing legal and administrative barriers for implementation of SRP	-	-	Ministry responsible for Forestry	-	Proposal for removing legal and administrative barriers prepared and implemented [2022]
	Implementation of SRP and establishment of adequate SRP monitoring mechanism	-	-	Ministry responsible for Forestry and Statistical office of RS	-	SRP monitoring mechanism established and maintained [2023]
	Education and training for proper SRP technique at selected lots	-	-	Chamber of forest engineers	-	At least 100 representatives of relevant stakeholders or potential end users of SRP to be educated and trained [2030]
	Production of sufficient planting material for selected lots and implementation of afforestation	-	-	Source: (Statistical office of RS, Annual bulletin for forestry: section afforestation)	0 ha [2017]	15000 ha [2030]
23	Regeneration of over mature stands	Inclusion of regeneration of over mature stands in Forest management plans	Yearly area of regeneration of over matured beech stands (ha)	Verified data on area of regenerated over matured stands (Source: Statistical office of RS, SE for forest management)	0 ha [2017]	42000 ha [2030]
	Selection of forest areas with over mature stands	-	-	Annual business plan of State Forest Management Companies	-	Areas with over mature stands selected [2020]
	Establishment of adequate monitoring mechanism for following the results of regeneration of over mature stands	-	-	Annual business plan of State Forest Management Companies	-	Monitoring mechanism for following the results of regeneration of over mature stands established [2021]
	Regeneration of over mature stands	-	-	Annual business plan of State Forest Management Companies	-	Regeneration of over mature stands conducted [2025]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	Production of sufficient planting material and planting of seedlings in unsuccessfully natural regenerated lots	-	-	Annual business plan of State Forest Management Companies	-	Sufficient amount of planting material produced [2025]
	Education and training for proper regeneration of over mature stands	-	-	Chamber of forest engineers	-	At least 300 qualified forest experts to be educated and trained [2025]
24	Definition of guidelines for the reduction of abiotic and biotic factors	Adoption of guidelines, training and practical implementation of guidelines	Losses due to disturbances [m³/y]	Data on losses due to disturbances (Source: Statistical office of republic of Serbia)	156.795 m³ [Average 2005-2015]	125.000 m³ [average 2020-2030]
	Prepare prevention management guidelines	-	-	Ministry responsible for Forestry	-	Prevention management guidelines prepared [2021]
	Establishment of adequate monitoring mechanism for monitoring of abiotic and biotic factors	-	-	Ministry responsible for Forestry	-	monitoring mechanism for monitoring of abiotic and biotic factors established [2022]
	Education and training on practical implementation of the prevention management guidelines	-	-	Chamber of forest engineers	-	At least 500 qualified forest experts to be educated and trained [2030]
25	Research, training and awareness raising programme for the enhancement of the carbon sink and of the resilience of the Serbian forest to climate change	Preparation, implementation of agenda and integration of research results	Research programs finalised and implemented	Ministry responsible for Forestry	-	Research program prepared, adopted [2021], implemented [2025] and integrated into dissemination and training activities [2030]
	Prepare and implement climate change mitigation and adaptation research agenda for forestry sector	-	-	Ministry responsible for Forestry	-	climate change mitigation and adaptation research agenda prepared [2021] and implemented [2025]



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No.	Name of measure/activity	Monitoring implementation	Monitoring effect of measure	Source of data	Base value [base year]	Target value [year]
	Integrate research results into systematic dissemination and training	-	-	Chamber of forest engineers	-	Research results integrated into dissemination and training activities [2025-2030]
Specific objective 4: Preserve the potential of mitigation measures by increasing the resilience to climate change of priority sectors						
26	Adaptation of cultivation technologies	Research programme or project	Agriculture crops affected by (extreme) weather events	National Communication, Agriculture statistics	-	At least one research project / programme prepared, adopted and implemented
	Study on cultivation technologies	-	-	National communication/BTR	-	At least one study conducted [2025]
	Disseminated of recommendations from study by the Agriculture Advising Service	-	-	National communication/BTR	-	Results of the study disseminated [2026-2030]
Specific objective 5: Promote transition to climate neutral and climate resilient economy and society						
27	Climate change education, training for new skills and awareness raising	Draft Plan Subject to Public Consultation	CC present in school curricula, CC relevant adult training programmes, CC in awareness campaign	National Communication to the UNFCCC	-	National plan prepared, adopted and implemented
	Preparation of national plan for climate change education, training for new skills and awareness raising	-	-	Ministry of Environmental Protection	-	National plan prepared and adopted [2023] and implemented [2030]



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APPENDIX A: OBSERVED CLIMATE CHANGE AND PROJECTIONS OF FUTURE CLIMATE FOR SERBIA

In accordance with the studies produced in the scope of the elaboration of Serbia's third national communication to the UNFCCC, during the period 1961-2017, the temperature increased by an average of 0.36°C/decade, and during the period 1981-2017 this trend of temperature rise was 0.60 °C per decade. The analysis of the spatial change in accumulated annual and seasonal precipitation for both selected periods (1998-2017 and 2008-2017) shows an increase of up to 10%.

The Intergovernmental Panel on Climate Change has developed two scenarios of future climate, which have been downscaled to Serbia. The RCP 4.5 (which is stabilization scenario, which envisions the stabilization of emissions from 2040 onwards) and the RCP 8.5 (which is scenario of constant increase).

In accordance with the results of the scenario downscaling to Serbia, in the scenario RCP4.5, to increase by about 0,5°C in the period 2016-2035; about 1,5°C for the period 2046-2065 and about 2°C in the period 2081-2100, compared to the reference period (1986-2005).

For the scenario RCP8.5 temperature is to increase by 1°C in the period 2016-2035; 2°C for the period 2046-2065 and over 4.3°C in the period 2081-2100, compared to the reference period (1986-2005).

With regards to precipitation, in the scenario RCP4.5, the yearly value is projected to increase by about 0,7% in the period 2016-2035; and to decrease by about 1,4% for the period 2046-2065 and increase about 2% in the period 2081-2100, compared to the reference period (1986-2005).

In the scenario RCP8.5, yearly precipitation it is projected to decrease by about 1% in the period 2016-2035; increase by about 3,8% for the period 2046-2065 and decrease by about 4,5% in the period 2081-2100, compared to the reference period (1986-2005)⁷⁰.

Extreme weather

Heat waves

The heat wave is a period not shorter than 6 days during which the maximum daily temperature was higher than the expected maximum temperature during the year in which the heat wave was observed.

During the period 1998-2017, the number of days during which the heat wave has been observed is larger in most of the territory for 15 to 25 days, with peaks over 25 days in eastern and western Serbia.

During the last ten years (2008-2017), the number of days with the observed heat wave has increased by more than 20 days, with the maximum in western and eastern Serbia where the number of days of heat waves has increased by 30.

During the period of the near future the number of days during which a heat wave is to be observed increases for 26 and 32 days (average for the territory of Serbia) in the RCP4.5 and RCP8.5 scenarios, respectively, and in the mid-century period, in 58 and 70 days. Towards the

⁷⁰ In both scenarios, variations in temperature and precipitation are different in the different regions of the country and in the different periods of the year.



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end of the century, the RCP4.5 is expected to stabilize the climate, but the anomalies reach in the RCP8.5, an average value of 66 days.

Droughts

The frequency of droughts was analysed using the SPEI index⁷¹. The SPEI index, in addition to the precipitation measure, which is the prerequisite for drought during the selected period, also takes into account the increased evapotranspiration of moisture from the soil due to the appropriate air temperature. SPEI index values of less than -1 indicate dry periods / years. The SPEI index values below are related to the whole territory of Serbia for the month of August (ie for the period from March to August) from 1950 to 2017. These six-month values have been selected due to the fact that the analyses of accumulated seasonal precipitations showed deficits during the last twenty years precisely during these months, on the other hand these are the months when agricultural production depends precisely on the available precipitation, so that during the years when there is a precipitation deficit over these months Agricultural yields usually have less value than expected. After 2000, the frequency of drought has become somewhat higher. Years in which the index was less than -1 were 2000, 2003, 2007, 2011, 2012 and 2015 and 2017. Prior to 2000, only three years had an index of less than -1.

Regarding future climate scenario, the indicator used as a proxy for drought is the TSD – Period with successive dry days.

The change in the longest non-precipitation period over the course of the year (TSD) shows a slight increase in of about 1, 2 and 3 days for the three future periods (2016-2035; 2046-2065; 2081-2100), according to RCP4.5. A significant increase is only foreseen at the end of the century by RCP8.5: 6 days.

Extreme precipitation

For purpose of providing a snapshot of observed extreme precipitation, days with precipitation over 40 mm expressed as the average number of days in the last ten and twenty years compared to the average number of days during the period 1961-1990 are used as an indicator.

The number of days with precipitation of over 40 mm in the period 2008-2017, are less than one in a greater part of central Serbia, but in the west and the east of the country an increase of more than 4 times is observable.

Maximum precipitation accumulated during one day (Pmax1) shows an increase in the territory of Serbia in the future. In the near future, the change is up to 5% for both scenarios. In the mid-century period, anomalous increase is seen, and according to the RCP8.5 scenario, in some parts of southern and central Serbia, the value exceeds 10%, as well as in Vojvodina. By the end-century, in RCP4.5, the anomaly exceeds these values in some parts of Vojvodina and in some other smaller locations in the rest of Serbia, while in the RCP8.5, the increase in can be as high as 20% in some parts of Vojvodina.

Maximum precipitation accumulated for five consecutive days (Pmax5) also shows an increase in the territory of Serbia in the future. In the near future, changes are similar to Pmax1. In the middle of the century, a significant change was obtained in the RCP8.5, where values exceeded 15% in Vojvodina and even 20% in smaller areas of southern Serbia. By the end-century, the anomalies of this index are somewhat higher than Pmax1. In localized areas, the value exceeds 15% for RCP4.5, and in RCP8.5, the anomalies exceed 15%, and even over 20% in some areas of southern Serbia and eastern Vojvodina.

⁷¹ SPEI index - Standardized Precipitation Evapotranspiration Index



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APPENDIX B: INFORMATION ON CONSULTATIONS PROCESS IN THE PREPARATION OF THE STRATEGY

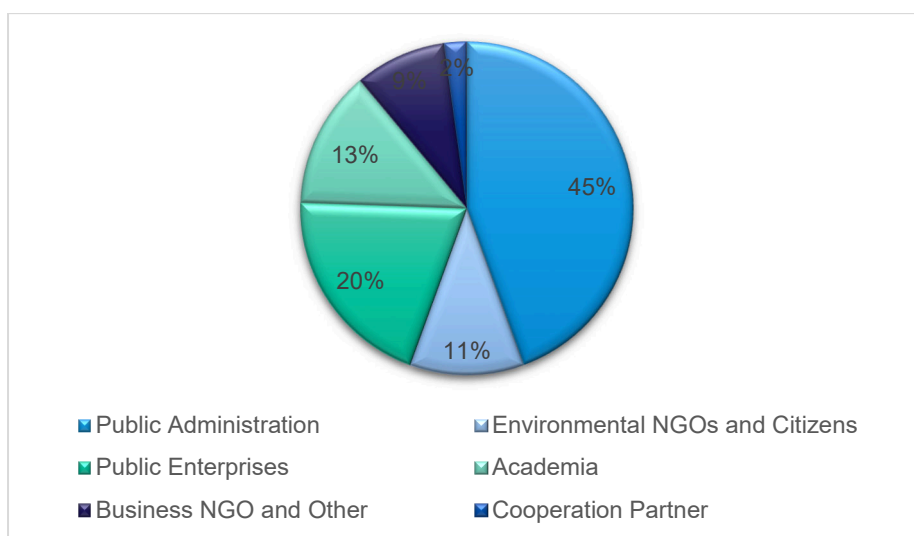
The preparation of the Low carbon development strategy included intense stakeholder engagement. A working group was established aimed at providing regular feedback to MEP on the analytical results and proposals. In addition, a wider set of stakeholders has been engaged in specific moments, such as the definition of mitigation scenarios and the risk assessment associated with climate change impacts in the priority sectors.

The key stakeholder engagement initiatives during the preparation of the strategy include

- kick off meeting: Conference *Combating Climate Change: Where does Serbia stand*, Launch of the Project Climate Strategy and Action Plan (13.09.2016.);
- seven meetings of the Project Working Group for the project of the Climate Strategy and Action Plan project (1st meeting held on 25.11.2016., 2nd -20.03.2018., 3rd -28.09.2018., 4th -22.04.2019., 5th -09.05.2019., 6th -25.10.2019 and 7th -12.11.2019);
- three sectoral technical working group meetings for the identification and evaluation of adaptation options (24th – 25th October 2017.);
- workshop on *Adaptation to Climate Change in priority sectors*, Result 5 (26.09.2018.);
- one technical working group session for definition of two mitigation scenarios, preceded by an online survey on the “Vision for Serbia by 2050” (20.12.2018.);
- SEA – draft Scoping Report public hearing (15.04.2019.) and public consultation (in the period of 29.03. – 29.04.2019.);
- the weighing of the economic, social and environmental impacts of the four mitigation scenarios through an online survey (in the period of 13.05. – 17.05.2019.); and
- discussion of the draft strategy, including a public presentation event and online commenting period [....].

The following chart describes the composition of the stakeholders participating at Working Group meetings, showing a diversified structure dominated by public administration organizations.

Figure 9: Types of Stakeholders present at the Working Group meetings





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The engagement of stakeholders throughout the process for elaboration of the strategy allowed to identify the key issues for the different types of stakeholders, both public and private. This allowed for the inclusion of the key asks of each stakeholder in the analytical work performed and the definition of proposals which take, to the extent possible, the specific interests into account.

As such, the regular engagement of key stakeholders allowed for the broad acceptance of the proposals included in the strategy.

The following is a summary of the key issues raised by stakeholders in the online public consultation process and how they have been addressed.

[PLACEHOLDER FOR INFORMATION ON COMMENTS RECEIVED DURING PUBLIC CONSULTATION AND HOW THEY WERE ADDRESSED.]



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APPENDIX C: INFORMATION ON REGULATIONS TO BE ADOPTED OR AMENDED

The following list includes only the changes in legislation needed for the full implementation of this strategy which are not driven by the transposition of EU legislation.

Law on climate change (and by laws)

- inclusion of provisions for implementation of equivalent measures for the period from 2021 to 2025 and full implementation of the EU-ETS as of 2026 onwards or the continuation of the equivalent measures if full implementation of the EU-ETS as of 2026 would not be possible.
- Introduction of CO₂ tax based on carbon intensity of the fuel

Law on Efficient Use of Energy (the Official Gazette of the Republic of Serbia no. 25/2013)

- Inclusion of provision for the setup and operation of technical advisory network for citizens
- Upgrading the operation of the Energy efficiency fund (Additional funds and broadening the types of support provided)

The Law on Energy (the Official Gazette of the Republic of Serbia no. 145/2014)

Support for production of heat from RES by final consumers

Law on Tax on the Use, Possession and Carrying of Goods (the Official Gazette of the Republic of Serbia no. 26/01, 80/02, 43/04, 132/04, 112/05, 114/06, 118/07, 114/08 and 31/09)

- Upgrade cars yearly registration tax in order to favour new and low CO₂ emitting cars and vans
- Introduction of passenger car tax for all first-time registered cars in Serbia based on CO₂ performance of the car

Law on Traffic Safety (the Official Gazette of the Republic of Serbia no. 41/2009, 53/2010, 101/2011, 32/2013 – decision US, 55/2014, 96/2015 – other law, 9/2016 – decision US, 24/2018, 41/2018, 41/2018 – other law, 87/2018 and 23/2019)

- Inclusion of Eco driving in the curriculum for personal cars drivers and in regular trainings for professional drivers

Law on the Planning and Construction (the Official Gazette of RS, No. 72/09, 81/09 (Corrigendum), 64/10 (CC), 24/11, 121/12, 42/13 (CC), 50/13 (CC), 98/13 (CC), 132/14, 145/14, 83/18, 31/19 and 37/19– other law)

- Preparation of national sustainable transport strategy
- Inclusion of preparation of sustainable regional/local transport strategies in the law

Law on Fees for Usage of Public Goods (the Official Gazette RS No. 95/2018)

- Implementation of road charging for freight vehicles based on EURO emission standard



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Forestry

Forestry Development Programme

- Amendments of the draft programme to including the measures and targets foreseen in the Strategy





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APPENDIX D: SECTORAL BREAKDOWN OF EMISSIONS SCENARIOS

The following tables present the detailed sectoral breakdown of emissions up to 2050 in the scenarios M1, M2, M3 and M4, with comparisons between the years 2030 and 2050 with 2010, 2005 and 1990.

B2	1990	2005	2010	2015	2020	2025	2030	2050	2030/ 2010	2050/ 2010	2030/ 2005	2050/ 2005	2030/ 1990	2050/ 1990
Energy industries	44.146	35.557	33.050	34.700	34.451	34.188	34.590	37.472	4,7%	13,4%	-2,7%	5,4%	-21,6%	-15,1%
Manufacturing industries and construction	6.418	6.064	4.278	3.452	3.898	4.062	4.014	3.837	-6,2%	-10,3%	-33,8%	-36,7%	-37,5%	-40,2%
Transport	4.564	6.702	6.742	5.995	7.197	7.822	8.354	9.518	23,9%	41,2%	24,6%	42,0%	83,0%	108,6%
Other sectors	7.048	3.029	3.477	2.711	2.627	2.660	2.677	2.532	-23,0%	-27,2%	-11,6%	-16,4%	-62,0%	-64,1%
Fugitive emissions	3.841	2.973	2.409	2.523	2.406	2.474	2.221	1.750	-7,8%	-27,3%	-25,3%	-41,1%	-42,2%	-54,4%
IPPU	5.455	4.729	4.660	3.883	4.736	5.384	5.671	6.608	21,7%	41,8%	19,9%	39,7%	4,0%	21,2%
Agriculture	6.186	6.238	5.305	5.259	5.133	5.046	4.752	5.721	-10,4%	7,8%	-23,8%	-8,3%	-23,2%	-7,5%
Waste	3.868	2.800	2.730	2.709	2.755	2.582	2.371	1.936	-13,1%	-29,1%	-15,3%	-30,9%	-38,7%	-49,9%
Total B2 (without LULUCF)	81.526	68.091	62.650	61.233	63.204	64.218	64.650	69.374	3,2%	10,7%	-5,1%	1,9%	-20,7%	-14,9%
LULUCF	-1.432	-5.627	-5.627	-4.533	-6.532	-5.451	-5.050	-4.161	-10,3%	-26,1%	-10,3%	-26,1%	-10,3%	-26,1%
Totals with LULUCF	80.094	62.464	57.023	56.700	56.672	58.767	59.600	65.213	4,5%	14,4%	-4,6%	4,4%	4,5%	14,4%





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M2	1990	2005	2010	2015	2020	2025	2030	2050	2030/ 2010	2050/ 2010	2030/ 2005	2050/ 2005	2030/ 1990	2050/ 1990
Energy industries	44.146	35.557	33.050	34.700	34.548	31.164	27.426	7.596	-17,0%	-77,0%	-22,9%	-78,6%	-37,9%	-82,8%
Manufacturing industries and construction	6.418	6.064	4.278	3.452	3.842	4.101	3.651	2.691	-14,7%	-37,1%	-39,8%	-55,6%	-43,1%	-58,1%
Transport	4.564	6.702	6.742	5.995	7.096	7.406	7.433	4.731	10,2%	-29,8%	10,9%	-29,4%	62,9%	3,7%
Other sectors	7.048	3.029	3.477	2.711	2.393	2.267	2.089	1.035	-39,9%	-70,2%	-31,0%	-65,8%	-70,4%	-85,3%
Fugitive emissions	3.841	2.973	2.409	2.523	2.429	2.279	1.938	220	-19,6%	-90,9%	-34,8%	-92,6%	-49,5%	-94,3%
IPPU	5.455	4.729	4.660	3.883	4.736	5.178	4.994	4.539	7,2%	-2,6%	5,6%	-4,0%	-8,4%	-16,8%
Agriculture	6.186	6.238	5.305	5.259	5.132	4.813	4.493	5.432	-15,3%	2,4%	-28,0%	-12,9%	-27,4%	-12,2%
Waste	3.868	2.800	2.730	2.709	2.755	2.582	2.371	1.936	-13,1%	-29,1%	-15,3%	-30,9%	-38,7%	-49,9%
Total M2 (without LULUCF)	81.526	68.091	62.650	61.233	62.931	59.790	54.396	28.180	-13,2%	-55,0%	-20,1%	-58,6%	-33,3%	-65,4%
LULUCF	-1.432	-5.627	-5.627	-4.533	-6.766	-6.323	-6.576	-4.414	16,9%	-21,6%	16,9%	-21,6%	16,9%	-21,6%
Totals with LULUCF	80.094	62.464	57.023	56.700	56.165	53.467	47.820	23.766	-16,1%	-58,3%	-23,4%	-62,0%	-16,1%	-58,3%
M3	1990	2005	2010	2015	2020	2025	2030	2050	2030/ 2010	2050/ 2010	2030/ 2005	2050/ 2005	2030/ 1990	2050/ 1990
Energy industries	44.146	35.557	33.050	34.700	34.287	27.051	20.843	6.286	-36,9%	-81,0%	-41,4%	-82,3%	-52,8%	-85,8%
Manufacturing industries and construction	6.418	6.064	4.278	3.452	3.856	4.175	3.109	2.334	-27,3%	-45,4%	-48,7%	-61,5%	-51,6%	-63,6%
Transport	4.564	6.702	6.742	5.995	6.924	7.011	6.613	4.228	-1,9%	-37,3%	-1,3%	-36,9%	44,9%	-7,4%
Other sectors	7.048	3.029	3.477	2.711	2.409	2.130	2.081	1.134	-40,1%	-67,4%	-31,3%	-62,5%	-70,5%	-83,9%
Fugitive emissions	3.841	2.973	2.409	2.523	2.417	2.166	1.667	210	-30,8%	-91,3%	-43,9%	-92,9%	-56,6%	-94,5%
IPPU	5.455	4.729	4.660	3.883	4.731	5.167	4.641	5.104	-0,4%	9,5%	-1,9%	7,9%	-14,9%	-6,4%
Agriculture	6.186	6.238	5.305	5.259	5.132	4.691	4.249	5.056	-19,9%	-4,7%	-31,9%	-19,0%	-31,3%	-18,3%
Waste	3.868	2.800	2.730	2.709	2.601	2.134	1.488	917	-45,5%	-66,4%	-46,8%	-67,2%	-61,5%	-76,3%
Total M3 (without LULUCF)	81.526	68.091	62.650	61.233	62.357	54.525	44.692	25.269	-28,7%	-59,7%	-34,4%	-62,9%	-45,2%	-69,0%
LULUCF	-1.432	-5.627	-5.627	-4.533	-6.725	-6.672	-7.274	-5.720	29,3%	1,7%	29,3%	1,7%	29,3%	1,7%
Totals with LULUCF	80.094	62.464	57.023	56.700	55.632	47.853	37.418	19.549	-34,4%	-65,7%	-40,1%	-68,7%	-34,4%	-65,7%





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M4	1990	2005	2010	2015	2020	2025	2030	2050	2030/ 2010	2050/ 2010	2030/ 2005	2050/ 2005	2030/ 1990	2050/ 1990
Energy industries	44.146	35.557	33.050	34.700	34.537	27.995	22.824	3.767	-30,9%	-88,6%	-35,8%	-89,4%	-48,3%	-91,5%
Manufacturing industries and construction	6.418	6.064	4.278	3.452	3.851	4.112	3.134	1.917	-26,7%	-55,2%	-48,3%	-68,4%	-51,2%	-70,1%
Transport	4.564	6.702	6.742	5.995	6.944	7.006	6.396	3.091	-5,1%	-54,1%	-4,6%	-53,9%	40,1%	-32,3%
Other sectors	7.048	3.029	3.477	2.711	2.392	2.115	1.996	772	-42,6%	-77,8%	-34,1%	-74,5%	-71,7%	-89,0%
Fugitive emissions	3.841	2.973	2.409	2.523	2.424	2.168	1.709	171	-29,1%	-92,9%	-42,5%	-94,2%	-55,5%	-95,5%
IPPU	5.455	4.729	4.660	3.883	4.731	5.167	4.625	4.787	-0,7%	2,7%	-2,2%	1,2%	-15,2%	-12,2%
Agriculture	6.186	6.238	5.305	5.259	5.132	4.691	4.249	4.015	-19,9%	-24,3%	-31,9%	-35,6%	-31,3%	-35,1%
Waste	3.868	2.800	2.730	2.709	2.317	1.551	1.207	845	-55,8%	-69,1%	-56,9%	-69,8%	-68,8%	-78,2%
Total M4 (without LULUCF)	81.526	68.091	62.650	61.233	62.328	54.804	46.140	19.366	-26,4%	-69,1%	-32,2%	-71,6%	-43,4%	-76,2%
LULUCF	-1.432	-5.627	-5.627	-4.533	-7.273	-8.424	-9.746	-13.082	73,2%	132%	73,2%	132,5%	73,2%	132,5%
Totals with LULUCF	80.094	62.464	57.023	56.700	55.055	46.380	36.394	6.284	-36,2%	-89,0%	-41,7%	-89,9%	-36,2%	-89,0%

