



“EU for Better Environment”

Project:

ADDITIONAL DEVELOPMENT OF EU ENVIRONMENT APPROXIMATION FOR AIR, CHEMICALS AND HORIZONTAL ACQUIS

(EuropeAid/138598/IH/SER/RS)

Programme of Air Protection of the Republic of Serbia for the period 2022- 2030 with Action plan

Draft

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List of Abbreviations

Acronyms	Meaning
BC	Black carbon
DSIP	Directive specific Implementation Plan
EB	Executive Body
EEA	European environmental agency
EMEP	European Monitoring and Evaluation Programme
GNFR	Gridded aggregated NFR sector data
HCBs	Hexachlorobenzene
IIR	Informative Inventory Report
LPS	Large Point Sources
LRTAP	Long-range transboundary air pollution
NEC	National emission ceiling
NFR	Nomenclature for Reporting
NH ₃	Ammonia
NMVOC	Non-Methanic volatile organic compounds
NO _x	Nitrogen oxides
PAHs	Polycyclic aromatic hydrocarbons
PaMs	Policies and measures
PCBs	Polychlorinated biphenyls
PM ₁₀	particulate matter 10 micrometers or less in diameter
PM _{2,5}	particulate matter 2,5 micrometers or less in diameter
RISP	Regulation specific Implementation Plan
SO ₂	Sulphur dioxide
SO _x	Sulphur oxides
TSP	Total suspended particles
UNECE	UN Economic Commission for Europe
VOC	Volatile organic compounds
WAM	Scenario with additional measures
WM	Scenario with measures



Revision LOG

Version /Revision	Date	Issues addressed
V0/R0	31/03/2021	0 draft chapters 1,2,3 prepared
V1/R0	15/09/2021	0 draft chapters 1-9, prepared
V2/R0	23/09/2021	0 draft chapter 10 prepared
V3/R0	04/10/2021	0 draft chapter 11 prepared
V4/R0	24/10/2021	revisions of RSPP addressed for chapters 1-10

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), Article 27 and Article 29 of the Law on Air Protection (Official Gazette of RS No. 36/2009 and No. 10/2013),

Government adopts,

AIR QUALITY PROGRAMME FOR THE PERIOD 2022-2030 OF THE REPUBLIC OF SERBIA

1 INTRODUCTION

Harmful effects of air pollution are well known and ambient Air pollution is a major environmental risk to health. The pollution is a mix of chemicals, particulate matter, and biological materials that react with each other to form tiny hazardous particles. The concentration of particulate matter (PM) is a key air quality indicator since it is the most common air pollutant that affects short term and long-term health. The smaller particles are more concerning since they don't stop in the upper airways but rather penetrate deep into the cardiopulmonary system. A 2013 assessment by WHO's International Agency for Research on Cancer (IARC) concluded that outdoor air pollution is carcinogenic to humans, with the particulate matter component of air pollution most closely associated with increased cancer incidence, especially lung cancer. Furthermore, poor air quality contributes to breathing problems, chronic diseases, increased hospitalization, and premature mortality. In addition to particulate matter, exposure to even short period of high concentration SO₂ can harm the human respiratory system and make breathing difficult. People with asthma, particularly children, are sensitive to these effects of SO₂.

Ozon at ground level which is mainly formed during the summer months by the reaction with sunlight (photochemical reaction) of pollutants such as nitrogen oxides (NO_x) from vehicle and industry emissions and volatile organic compounds (VOCs) can cause breathing problems, trigger asthma, reduce lung function and cause lung diseases. In addition to the above-mentioned pollutants the symptoms of bronchitis in asthmatic children increase in association with long-term exposure to NO₂.

In order to respond to the persisting problem of air pollution numerous local communities and cities in Serbia already prepared or initiated the preparation of the local Air Quality Plans, furthermore at the national level Government of Serbia adopted [National plan to reduce emissions of major pollutants from old large combustion plants](#). (Official Gazette of Republic of Serbia No 10/2021 of 6th February 2020) in order to address the emissions from the biggest air pollution source in the country, however since additional actions are needed both at the national and local level are needed Serbia for the first time prepared the Air Quality Programme and the action plan for its implementation.

The National Environmental Protection Programme has expired, and was adopted back in 2009, so listing the short-term and medium-term goals defined therein is not recommended. However, it should be stated in the introduction that in the previous period goals and measures related to air protection have been planned through the National Environmental Protection Programme (*"improved air quality pursuant to prescribed requirements for air quality through reduction of emissions from the energy, industry, transport sectors and so on"*, and *"adopted and implemented international agreements in the area of air protection, climate change and ozone layer protection"*), but that no reporting has been provided regarding the progress in achieving the set goals.

The Program among others setting the National Emission Ceilings for SO₂, NO_x, NH₃ and PM_{2.5} and thus represents the contribution of Serbia to the improved air quality in the context of the approximation to the EU legal framework in particularly to the transposition and the implementation of the National Emission Ceilings directive, which requires Members states to reduce its emissions of air pollutants and to prepare national programs and adopt appropriate policies and measures in order to achieve its target for emission levels in 2030 and beyond. Furthermore, this document will allow Republic of Serbia to engage in the negotiation for ratification of the Gothenburg protocol to Abate Acidification, Eutrophication and Ground-level Ozone under the Convention on long-range Transboundary Air pollution (CLRTAP).

In order to prepare the future emission reduction pathways taking into account Serbia's national circumstances different modelling tools were used in the context of the EU IPA project - Additional Development of EU Environment Approximation for Air, Chemicals and Horizontal Acquis building upon the climate scenarios prepared in the context of the EU IPA project - Preparation of the Climate Change Strategy and Action plan.

For the mentioned purposes and in order to evaluate different mitigation options, three air quality emission scenarios are developed, while the Programme determines the pathway until 2030.

While modified RAIN model was used to assess the future effects of the mitigation potential of proposed policies and measure and to determine national emission ceilings for 2030 and beyond. Those results than served as an input to CHIMERE multi-scale chemistry-transport model for atmospheric composition analysis and forecast which allows to translate future reduced emissions of air pollutants from different sectors and sources into the expected future ambient air quality.

The results regarding the ambient air quality than allows for further adjustment and indenisation of policies and measures to the level at which the modelling results show the acceptable level of air quality by 2030 and beyond.

An Action plan, that is integral part of the Strategy, is determining the activities for implementation of measures and achievement of goals set by the Programme and is prepared for the period of 5 years (up to 2026).

Development of the Programme and its Action plan was led by the Ministry of Environmental Protection as responsible institution with a close cooperation and permanent consultations with relevant stakeholders (governmental, public, private and CSOs organizations¹).

¹ Appendix 1 Information on consultations process in the preparation of the Programme

2 PLANNING AND REGULATORY FRAMEWORK OF RELEVANCE FOR THE PROGRAMME

2.1 EU and International policy framework

EU and International policy framework have been strengthening over the last decade when negative effect of air pollution to the environment and human health have been even more scientifically substantiated and confirmed. The focus of the last decade was on small particulate matter resulting from emissions from households, cars, trucks, industrial estates and power sector. In order to address deteriorating air quality especially in the agglomerations caused by increased emissions from expanding diesel vehicle fleet and road freight transport, industry and power sector the Clean Air For Europe Programme (CAFÉ) was established to support European Commission's development of the Thematic Strategy on air pollution, the Directive on Ambient Air Quality and Cleaner Air for Europe and its Impact Assessment. On that basis EU action has focused on establishing minimum quality standards for ambient air and tackling the problems of acid rain and ground level ozone. Polluting emissions from large combustion plant and mobile sources have been reduced; fuel quality improved and environmental protection requirements integrated into the transport and energy sectors.

At the EU level both top-down emission reductions as well as bottom-up measures were implemented. The new National Emissions Ceilings Directive (2016/2284/EU) which entered in force at end of 2016.

The Directive establishes the emission reduction commitments for the Member States' anthropogenic atmospheric emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC), ammonia (NH₃) and fine particulate matter (PM_{2.5}), with a view to moving towards achieving levels of air quality that do not give rise to significant negative impacts on and risks to human health and the environment. All emission reductions are compared with year 2005. Member states shall also take the necessary measures aimed at limiting their 2025 anthropogenic emissions of sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and fine particulate matter. The indicative levels of those emissions shall be determined by a linear reduction trajectory established between their emission levels defined by the emission reduction commitments for 2020 and the emission levels defined by the emission reduction commitments for 2030.

Furthermore, Member States shall draw up, adopt and implement their respective national air pollution control programmes in order to limit their annual anthropogenic emissions. The national air pollution control programmes should also contribute to the successful implementation of air quality plans established under Article 23 of Directive 2008/50/EC on ambient air quality and cleaner air for Europe. To that effect, Member States should take account of the need to reduce emissions, in particular of nitrogen oxides and fine particulate matter, in zones and agglomerations affected by excessive air pollutant concentrations and/or in those zones and agglomerations that contribute significantly to air pollution in other zones and agglomerations, including in neighbouring countries.

When drawing up, adopting and implementing the programme, Member States shall:

- assess to what extent national emission sources are likely to have an impact on air quality in their territories and neighbouring Member States using, where appropriate, data and methodologies developed by the European Monitoring and Evaluation Programme (EMEP) under the Protocol to the

LRTAP Convention on long-term financing of the cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe;

- take account of the need to reduce air pollutant emissions for the purpose of reaching compliance with air quality objectives in their territories and, where appropriate, in neighbouring Member States;
- prioritise emission reduction measures for black carbon when taking measures to achieve their national reduction commitments for fine particulate matter;
- ensure coherence with other relevant plans and programmes established by virtue of the requirements set out in national or Union legislation.

The directive introduces a number of new reporting requirements for Member States and require from member states to report emissions from air pollutants. These are defined in Annex I of the directive and include annual information on emissions of a number of pollutants:

- the five main air pollutants NO_x, NMVOCs, SO₂, NH₃ and PM_{2.5} as well as carbon monoxide (CO);
- in addition to PM_{2.5}, also PM₁₀ particulate matter and, if available, black carbon (BC) and total suspended particulate matter (TSP);
- heavy metals cadmium (Cd), lead (Pb) and mercury (Hg) and, if available, the additional heavy metals arsenic, chromium, copper, nickel, selenium and zinc);
- persistent organic pollutants (POPs) including selected polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB).

In addition, Member states are also obliged to report on projections prepared in a harmonised manner with climate legal framework and gridded countries emissions.

Since in many agglomerations around the EU has issues with air quality the Legal framework also prescribed the obligatory content of the Local Air quality plans and is monitoring.

In parallel with the limitation of emission of air pollutants from sources the EU legal framework also strengthen the monitoring of ambient air through the amendments of the Directive 2008/50/EC on ambient air quality and cleaner air for Europe. This Directive defines and establish objectives for ambient air quality designed to avoid, prevent or reduce harmful effects on human health and the environment as a whole. To this end, it sets out measures for the assessment of ambient air quality in Member States on the basis of common methods and criteria as well as for obtaining information on ambient air quality in order to help combat air pollution and nuisance and to monitor long-term trends and improvements resulting from national and Community measures and ensuring that such information is available to the public. Amendments amending several annexes of the Directive 2008/50/EC of the European Parliament and of the Council are laying down the updated rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality. In addition, the cooperation between the Member States in reducing air pollution is increased.

Furthermore, the EU legal framework is also addressing the concentrations of heavy metals through Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (known as 4th Daughter Directive). The directive objectives are to establish a target value for the concentration of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air so as to avoid, prevent or reduce harmful effects of arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons on human health and the environment as a whole; to ensure that ambient air quality is maintained where it is good and that it is improved in other cases, to determine common methods and

criteria for the assessment of concentrations and to ensure that relevant information is available to the public.

Since the air pollutants know no borders, international coordination of air pollution policy remains indispensable. UNECE Convention on Long-range Transboundary Air Pollution initiated due the public outcry against the detrimental impacts of Acid Rain in Europe is a cornerstone of the international efforts to reduce key harmful pollutants in the atmosphere. Gothenburg protocol was amended in 2012. The revised Protocol is also the first binding agreement to include emission reduction commitments for fine particulate matter. The protocol also introduced some flexibilities to facilitate accession of new Parties, mainly countries in Eastern and South-Eastern Europe, the Caucasus and Central Asia.

Amendment sets out new national emission reduction commitments for 2020 onwards. In particular, the amendment includes: emission reductions for black carbon, an update of the emission limit values set in the annex to the protocol and new standards on the content of non-methane VOC's in products. Furthermore, the amendments require each party to apply the limit values for the fuels and new mobile sources (introduction of EURO5 and EURO6 for passenger cars and EURO V and EURO VI for heavy duty vehicles, and emission standard for other modes of transport such as motorcycles and mopeds, locomotives, railcars, waterway weasels, recreational crafts and non-road machinery).

2.2 National policy framework

The main building block of the national policy framework regarding the air quality is the Law on Air protection (Official Gazette of the Republic of Serbia, Nos. 36/09 and 10/13). The Law regulates and the relevant bylaws regulate air quality management and determines the measures, method of organization and control of the implementation of protection and improvement of air quality as a natural value of general interest that deserves special protection.

It controlling of the air quality is conducted through identifications of zones and agglomerations and prescribed actions for the assessment of the air quality in such zones and agglomerations for the selected air pollutants. The law also provides legal background for the air quality monitoring system at the state and local level and defines responsibilities for the institutions involved. Furthermore, it defines and specifies requirements for air quality, air quality categories, timelines for exceedance and exceptions and provide for procedures for informing the public in the event of threshold exceedance. In addition, the law also defines pollutions form natural sources and exceedances because of road sanding or salting.

Special chapter in the law is dedicated to Instruments of National Policy and planning namely: Air Protection Programme, Air Quality Plans, Short-term action plans, National programme for gradual decrease of annual national emission ceilings of the pollutants, National plan for decreasing the emissions from the existing combustion installations and Operator's plans for decreasing emissions from stationery installations, for which the Law prescribes relevant content.

In addition, a chapter on Measures for Air quality improvements defines measures for preventing and decreasing the air pollution from stationary sources, Emission of volatile organic compounds, national emission ceilings, prescribing the allowed amounts of individual pollutants in specific products (in fossil fuels and in paints and polishes), gradual decrease of the use of substances that deplete the ozone layer and other measures for pollution preventing and decreasing.

The law is also regulating the matters of measurement the emissions and level of the pollutants in the air and issues relating to the Informing and reporting and on the content of the air quality information system and funding the protection and improvement of the air quality. Funds for financing protection and improvement of air quality shall be provided from the budget of the Republic of Serbia and through the operator's obligations pursuant to the Law.

On the basis of the Law on air protection multiple by-laws are for the purpose of management and improvement of the ambient air quality in detail defining zones and agglomerations², defining the categories of air quality in zones and agglomerations.

Furthermore Regulation on monitoring conditions and air quality requirements determines criteria for determining the minimum number of measuring points and locations for sampling in the case of fixed measurements and in the case when fixed measurements are supplemented by indicative measurements or modelling procedures; air quality measurement and assessment methodology (reference measurement methods and concentration assessment criteria); data requirements used to assess air quality; method of data quality assurance for air quality assessment (according to the requirements of SRPS ISO / IEC 17025); scope and content of information on air quality assessment in accordance with the Law on Air Protection. In additions the regulation also sets air quality requirements such as limit values for the level of pollutants in the air; upper and lower limits for assessing the levels of air pollutants; tolerance limits and tolerance values; concentrations hazardous to human health and concentrations reported to the public; critical levels of air pollutants; target values and (national) long-term targets for air pollutants and deadlines for reaching the limit and / or target values, in cases when they are exceeded. In order achieve the established limit values or target values and deadline and to harmonise the approach the Rulebook on the content of the Air Quality Plans and Rulebook on the content of the Air Quality Plans which in more detail the content of air quality plans and short-term action plans adopted by the competent authorities of the Autonomous Province and / or the competent authority of the local self-government unit. Responsible body of the autonomous province and the responsible body of an LSG unit to prepare the Air Quality Plan in zones and agglomerations at their territory where the air quality is in the 3rd category. By the end of 2020 there were Air quality plans prepared for Belgrade, Bor, Novi sad, Pančevo Smederevo and Užice, while plans were under preparation for Valjevo, Kragujevac, Kraljevo, Kosjerić, Niš, Subotica and Sremska Mitrovica.

Where, in a given zone or agglomeration, there is a risk that the levels of pollutants will exceed one or more of the alert thresholds the Responsible body of the autonomous province and the responsible body of an LSG unit shall draw up action plans indicating the measures to be taken in the short term in order to reduce the risk or duration of such an exceedance. Short term action plans and information on the manner of their implementation must be available for the public and interested organisations. Such plans are prepared for Užice, Bor and are under preparation for Subotica, Kosjerić, Sremska Mitrovica, Bеојin, Kruševac and Kragujevac, while short term actions are for Belgrade included in the updated air quality plan.

In order to ensure the appropriate level of the air quality measurement within the state network the governments adopted Regulation on determining the Air Quality Control Program in the state network. However, since not all of the measurements of ambient air quality and emissions form stationary sources are conducted by the state authorities the Rulebook on conditions for issuing a license for measuring air

² Serbia is having the three zones: Srbija, Vojvodina and zone Kosovo and Metohija and eight agglomerations: Belgrade, Novi Sad, Niš, Bor, Užice, Kosjerić, Smederevo and Pančevo

quality and a license for measuring emissions from stationary pollution sources prescribes detailed conditions for issuing permits for measuring air quality and permits for measuring emissions from stationary sources of pollution, as well as conditions to be met by a legal entity established by the competent authority of the Autonomous Province, ie the competent authority of the local self-government unit, to conduct the air quality monitoring, monitor the operation of automatic stations, and to collect and process data obtained by air quality control in the local network.

Since the information on air quality received from local network and state network is essential for the proper assessment of the ambient air quality in Serbia a Rulebook on the manner of exchange of information on measuring points in the state and local network, measurement techniques, as well as on the manner of exchange of data obtained by monitoring air quality in the state and local networks was adopted in order to enable the reporting and its content to be conducted in electronic manner, ensuring the integrity of the Air quality Information system which is an integral part of the unique environmental protection information system.

Sectoral air quality related legislation

Energy and Manufacturing industries

When it comes to sectoral legislation and programmes that significantly contribute to the general objective of the Law on air protection it has to be noted the significance of the Regulation on limit values of emissions of pollutants into the air from combustion plants (OGRS n°6/16) adopted on the Law on air protection. This regulation prescribes: limit values for the emission of pollutants into the air from a combustion plant; methods and deadlines for submission of data; the procedure for determining the total annual emission from the combustion plant. Provisions of this Regulation shall apply to combustion plants, which can be large, medium and small combustion plants. Emissions of air pollutants from combustion plants shall be determined by measuring and/or calculating the emission parameters based on measurement results.

On the basis of provisions of this regulation the Government of the Republic of Serbia, as part of its obligation as contracting Party of the Energy Community, adopted National Emission Reduction programme. The implementation of the programme will by 2027 result in significant reduction³ of air pollutants from the combustion in large combustion plants⁴, since all the existing plants will by 2027 comply with limit values for emissions of air pollutants.

Furthermore Law on Integrated Pollution Prevention and Control (IPPC) which was adopted in December 2004 and amended in December 2015 (Official Gazette of the Republic of Serbia No. 135/04, 25/15) lays down the conditions and procedure for issuing an integrated permit for plants and activities that may have negative impacts on human health, the environment or material goods, types of activities and plants, supervision and other issues of importance for preventing and controlling environmental pollution. According to the preliminary list of existing facilities created on the basis of the Regulation on types of activities and facilities that require issuance of the integrated permit ("Official Gazette of the RS", No 84/2005), there are 227 facilities in the Republic of Serbia covered by the Law however only 39

³ It is expected that SO₂ emissions will be in 2027 at the national level be reduced for 84%, NO_x for 34% and for dust for 1% compared to 2015

⁴ NERP applies for old large combustion plants with a total rated thermal input equal to or greater than 50 MW

integrated permits were issued by the end of 2020. The Law sets for division of competencies regarding the issuing the integrated permits (national level, provincial level and local level)

The law sets for numerous by-laws, among others also the Decree on criteria for determination of best available techniques, for implementation of quality standards, as well as for determination of emission limit values in the integrated permit - (Official Gazette of the RS, No. 84/2005)⁵ and decree on the content of the measures for bringing of the existing installation or activities in compliance with the provisions of the Law on IPPC (Official Gazette of the RS, No. 84/2005) - description of: the measures for bringing of the installation in compliance with the provisions prescribed by the Law on IPPC, the time schedule of the planned measures together with the commencement and termination of the measures, the expected results, monitoring (control) of the measures, expected costs of the measures.

In addition to the secondary legislation mentioned above additional by-laws are adopted defining the type of activities and installations that the integrated permit shall be granted for (Official Gazette of the RS, No. 84/2005), defining the content, appearance and method of filling in the application for granting of the integrated permit (Official Gazette of the RS, No. 30/2006) and defining the content and appearance of the integrated permit (Official Gazette of the RS, No. 30/2006).

Furthermore, Regulation on limit values of emissions of air pollutants from stationary pollution sources⁶, excluding combustion plants (*Official gazette of the republic of Serbia, no. 111/15*)⁷ prescribes limit values for the emission of pollutants into the air from stationary sources of pollution, except for combustion plants; the content of the emission balance report and method of submission of emission data for the purposes of the information system and deadlines for data submission. Measurement of pollutant emissions from stationary sources of pollution shall be carried out in accordance with the provisions of the regulations governing the measurement of pollutant emissions into the air from stationary sources of pollution. For new and existing stationary sources of pollution emission limit values shall apply as of the date of entry into force of this Regulation; Emissions from the existing stationary sources must comply with the emission limit values for new stationary sources of pollution within a period of five years as from the date of entry into force of this Regulation (from 6.1.2016). For the existing stationary sources of pollution that are subject to integrated permitting the deadlines for attainment of the limit values for air pollutants shall apply until the issuing of the integrated permit.

Transport sector

In Republic of Serbia, in the field of motor vehicles in general, standards are prescribed by the Rulebook on division of motor vehicles and towed vehicles, and technical requirements for vehicles in road traffic (Official Journal of RS, 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78/2015, 111/2015, 14/2016, 108/2016, 7/2017, corr. 63/2017, 45/2018, 70/2018, 95/2018, 104/2018 i 93/2019). There are different requirements for domestically produced and imported new vehicles with regard to the exhaust gases since for busses and heavy-duty vehicles produced in Serbia at least EURO⁸ 4 for and at least EURO

⁵ Recast of Annexes III and IV of the IPPC Directive, including in addition requirements referring to environmental quality standards and emission limit values

⁶ Stationary sources of pollution, in the context of this Regulation, are industrial plants, technological processes, certain activities and devices from which pollutants are released into the air.

⁷ The provisions of this regulation do not apply to thermal waste treatment processes. The provisions of this Regulation shall not apply to activities and installations using volatile organic compounds.

⁸ In the European Union, emissions of nitrogen oxides (NO_x), total hydrocarbon (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO) and particulate matter (PM) are regulated for most vehicle types, including cars, trucks (lorries),

5 standards are required if busses are assembled in Serbia. For used imported vehicles at least EURO 3⁹ standard is required.

Households

Emission limit values from households are regulated through provisions of the Regulation on limit values of emissions of pollutants into the air from combustion plants (OGRS n°6/16) relevant for small combustion plants which are plants that produce thermal energy for heating households and sanitary water for households and whose thermal input is less than 1 MW_{th} when using solid fuels, 5 MW_{th} when using liquid fuels and 10 MW_{th} when using gaseous fuels. However, it has to be noted that operational monitoring of emissions of air pollutants from small combustion plans is not defined or established.

While Eco-design which is in the EU regulating environmental characteristics of more than 20 sets of products and among these, there are two EU regulations impacting small appliances in domestic heating which are of high interest for reducing PM from small domestic appliances using biomass or fossil solid fuels, for which transposition is according to NPAA¹⁰ planned for after December 2021, or rather, after the accession to the EU, when delegated regulations will apply directly.

Agriculture sector

Since agriculture is a predominant source of Ammonia (NH₃) emissions, emission from agriculture is to some extent regulated through law on Law on integrated Pollution Prevention and Control which regulates emission from installations for the intensive rearing of poultry and pigs that require integrated permit (91 of such installations in Serbia).

One of the important segments of the ammonia emissions is also nitrogen fertilisers which are applied to land. Those emissions are indirectly regulated through the Law on Water ("Official Gazette of the RS", No. 30/10, 93/12, 101/16, 95/18). The Republic Directorate for Water (RDW), Ministry of Agriculture, Forestry and Water Management (MAFWM) are authorities responsible for determining the Nutrient Vulnerable Zones (NVZ) and their boundaries, proposing Action Programmes with mandatory measures for protected areas designated as vulnerable zones, proposing the Code of Good Agricultural Practice in order to achieve a general level of water protection against pollution by nitrates from agricultural sources of all bodies of surface water and groundwater. Code of Good Agricultural Practice (CGAP)¹¹ have been developed in 2016, but still need to be officially adopted.

Horizontal legislation to reduce air pollution

Emissions of some pollutants (such as SO₂ and VOC) are due to their nature best regulated through quality of fuel or the content pollutant released from the production process, product or material.

locomotives, tractors and similar machinery, barges, but excluding seagoing ships and aeroplanes. For each vehicle type, different standards apply. Compliance is determined by running the engine at a standardized test cycle.

⁹ For all new registration of vehicles in the EU EURO 3 standard enters into force in January 2001.

¹⁰ National Programme for adoption of the acquis – 3rd revision, February 2018

¹¹ The draft Code of Good Agricultural Practice (CGAP) has been developed, through implementation of project: "Preparations for negotiations related to Serbia's EU accession process, Phase 2, Environment Accession Project (ENVAP 2) - Designation of Sensitive Areas and Vulnerable Zones According to the EU Nitrates and Urban Wastewater Treatment Directives (ENVAP 2 Project 2014-2016)".

Therefore, SO₂ emissions from liquid fuels are best regulated through limitation of Sulphur content in fuels. While Sulphur content in solid fuels is not regulated, Sulphur content in liquid fuels is regulated through the Rulebook on Technical and Other Requirements for Liquid Fuels of Petroleum Origin (Official Gazette of RS No 150/20) which prescribes technical and other requirements that must be met by liquid fuels of petroleum origin used as fuels for internal combustion engines and as energy fuels placed on the market of the Republic of Serbia, as well as method of assessing the conformity of liquid fuels. Sulphur content in heavy fuel oil is from 1. January 2021 reduced from 3% to a maximum of 1%, in gas oil Sulphur content is set at 0,1% and in Evro diesel at as low as 10 parts per million (ppm).

For reduction of VOC emissions, (taking into account the nature of the emissions where emissions are not necessary caused by combustion of fuel and/or material but rather from evaporation) a specific set of legal frameworks is being set in place such as:

Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (Official gazette of Serbia No 100/11) which provides for a list of industrial installations and activities in which volatile organic compounds emissions are controlled, the emission values of volatile organic compounds at a given solvent consumption, and the total permissible emissions of volatile organic compounds from installations and activities, as well as schemes for reducing emissions of volatile organic compounds.

Furthermore, emissions of volatile organic compounds where source of emissions is transportation, storage and distribution of motor fuels are regulated by the Law on Air Protection ("Official Gazette of the Republic of Serbia", No. 36/09 and 10/13) and by the Rulebook on technical measures and requirements in relation to allowed emission factors for volatile organic compounds resulting from the storage and transport of petrol ("Official Gazette of the Republic of Serbia", No. 01/12, 25/12, 48/12 and 96/19) which lays down technical measures and requirements pertaining to the permitted emission factors for volatile organic compounds originating from the process of storage and transport of petrol, that is, for storage, loading and unloading installations at terminals and for mobile tanks, loading and unloading installations in retail objects.

Since certain paints, varnishes and vehicle refinishing products are significant sources of volatile organic compounds, emissions from those sources are regulate through Law on Chemicals ("Official Gazette of Republic of Serbia", No. 36/09, 88/10, 92/11, 93/12 and 25/15) and Rulebook on Bans and Restrictions of Production, placing on the Market and Use of Chemicals ("Official Gazette of the Republic of Serbia", No. 90/13, 25/15, 2/16, 44/17 and 36/18) which prescribes restrictions and prohibitions¹² on the production, placing on the market and use of chemicals, prohibited or permitted uses, as well as other conditions for the production, placing on the market and use of substances, mixtures or products unacceptable risk to human health and the environment.

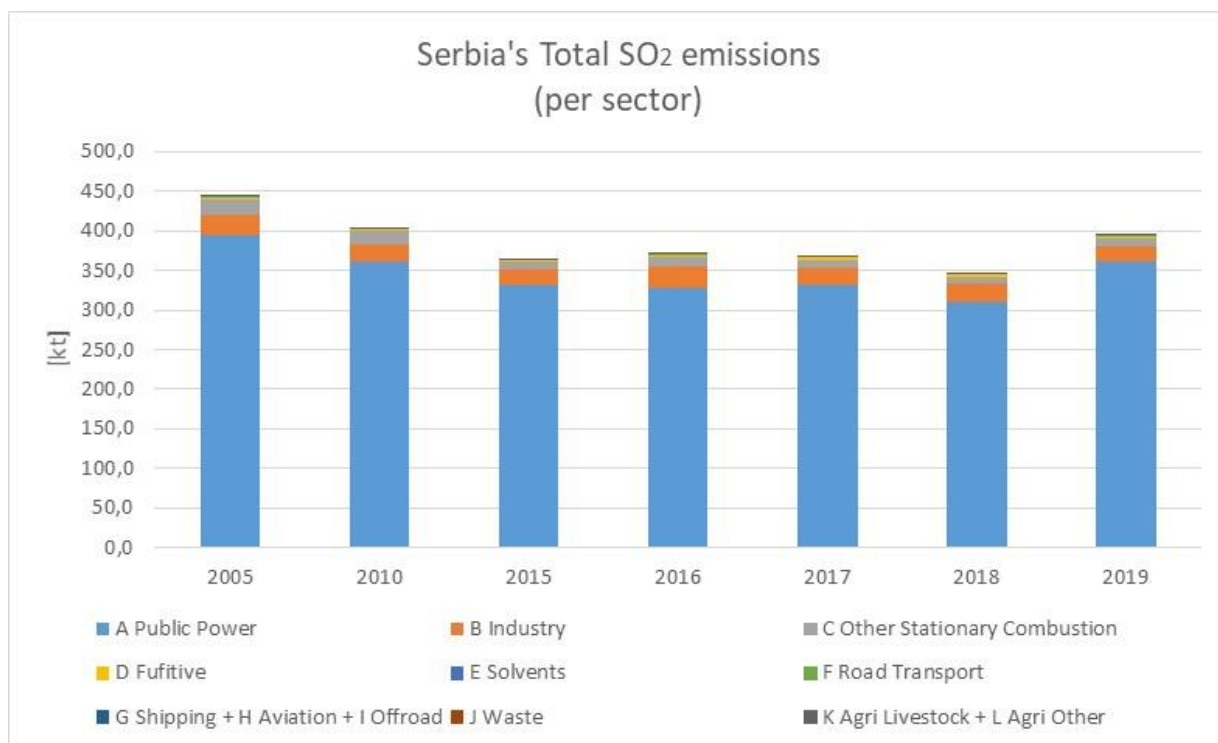
¹² Restrictions and prohibitions referred to certain dangerous substances, mixtures or products; long-lasting organic pollutants; the total content of volatile organic compounds in certain coatings (paints and varnishes) applied to buildings, their equipment and fittings, as well as in certain means and coatings for repair of road vehicles or their parts during repair, conservation or decoration outside production facilities

3 CURRENT SITUATION REGARDING AIR QUALITY

3.1 Historical emissions of air pollutants

Total emissions of SO₂ in 2019 amounted to 395,4 kt SO₂, which represents 8,6% increase of emissions compared to the year 2015 and decreased for 11,2% compared to 2005. (Figure 1).

Figure 1 :Serbia's total SO₂ emissions (2005-2019)

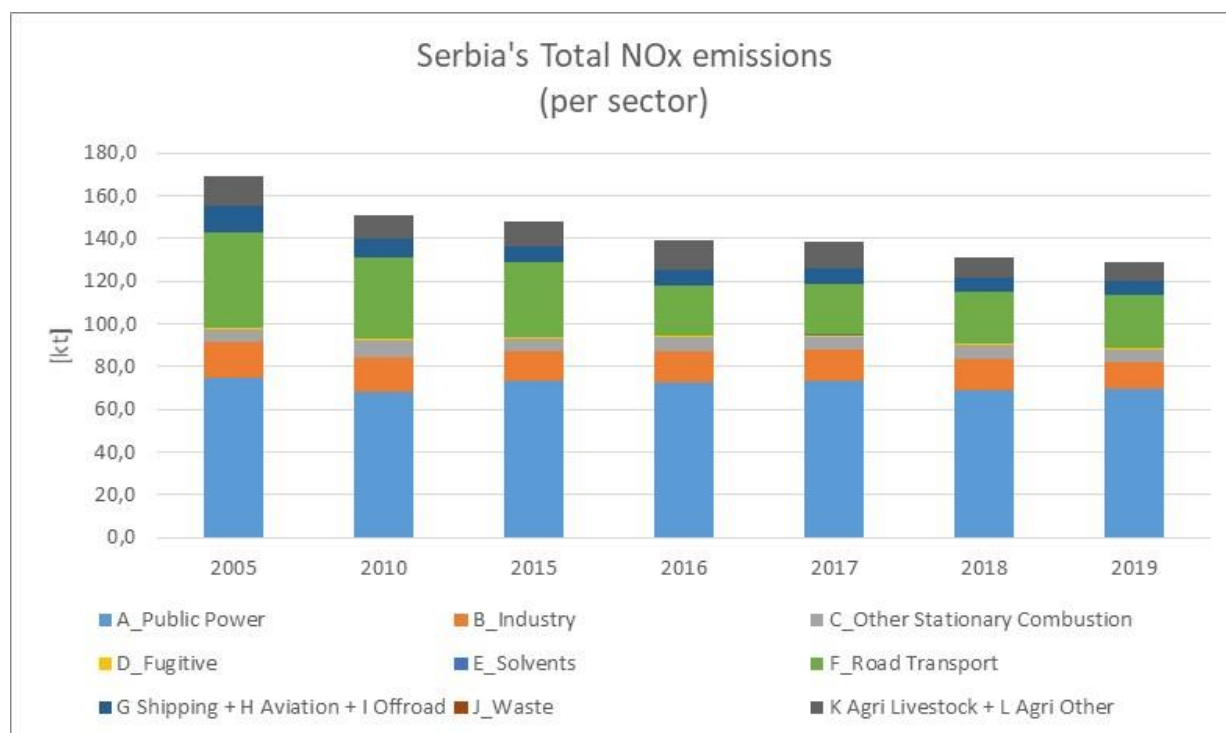


Public electricity and heat production is by far the biggest source of SO₂ emissions accounting for 91,5% of the overall emissions. SO₂ emissions are driven by the consumption of domestic lignite in thermo-power plants and the sulphur content of the domestic lignite. It has to be noted that according to NERP emissions in 2018 and 2019 should already be significantly lower; in 2018 and 2019 54,6kt instead of 310,3kt and 361,8kt respectively.

The remaining 4,9% of the SO₂ emissions is coming from Industry, predominantly from lignite (66%) followed by heavy fuel oil (33%) the remaining SO₂ emission in industry are coming from other fuels.

Total emissions of NO_x in 2019 amounted to 128,9 kt NO_x, which represents 13,0% decrease of emissions compared to the year 2015 and 23,8% compared to 2005. Total emissions are in having a steady declining trend driven by reduction of emissions in transport sector (29,6% reduction compared to 2015) and to some extent from industry (7,9% reduction compared to 2015) (Figure 2).

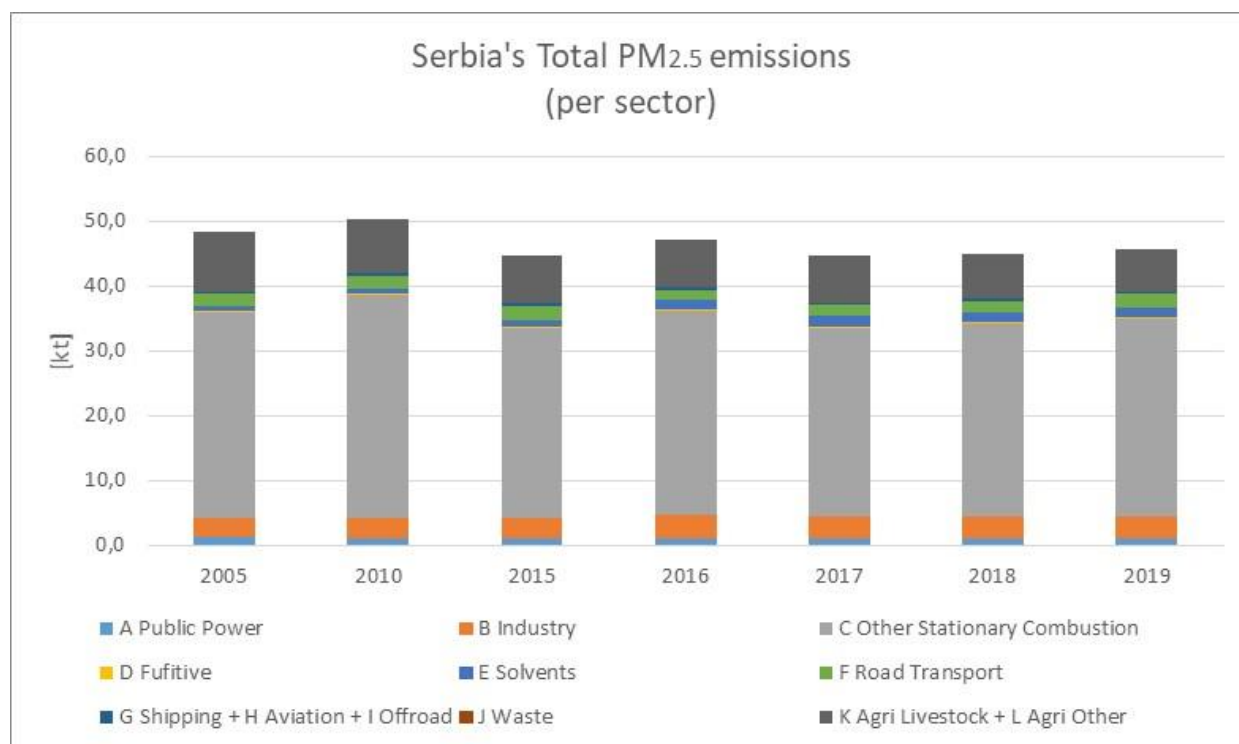
Figure 2 :Serbia's total NOx emissions (2005-2019)



When it comes to NOx emissions in Serbia, Public Electricity and Heat production is with 53,8% share a predominant source of emissions. The share is increasing since 2015 when it was 49,5%. Transport sector is with 19,2% the next significant source of emissions, however the share of transport sector is since 2015 decreasing, due to renewal of vehicle fleet with better emission standards, despite the increase in road fuel consumption. Within the Road Transport sector 52,8% of NOx emissions from are accounted for heavy duty vehicles and busses, 36,3% for passenger cars and 10,9% for light duty vehicles. It has to be noted that since 2016 NOx emission from road transport have an increasing trend.

Emissions of PM_{2.5} in 2019 amounted to 45,6 kt PM_{2.5}. which represents 2,3% increase since 2015 and 5,7% decrease since 2005. Total PM_{2.5} Emission have an increasing trend since 2015. Predominant source of emission of PM_{2.5} is Other stationary combustion with 67,4% of emissions (where emission of PM_{2.5} from biomass and lignite burning in households represents 99,3% of PM_{2.5} emissions), followed by Agriculture waste burning (field burning) with 14,2% and Industry with 7,3%. (Figure 3). The increasing trend of emissions since 2016 is driven by Road Transportation sector where emission of PM_{2.5} have since 2016 increased for as much as 23,7% driven by increase in diesel fuel sales and on increased old diesel vehicle fleet in Serbia. Due to increased total mileage driven by cars vans and heavy-duty vehicles PM_{2.5} emissions from tyre and break wear is also steadily increasing (since 2005 those emissions are increasing in average for 4,6% a year and between 2005 and 2019 therefore increased for as much as 187,5%).

Figure 3 :Serbia's total PM_{2.5} emissions (2005-2019)



PM_{2.5} Emission from households' biomass burning show no significant improvement since 2005, which reflects poor technology improvement regarding the biomass and other solid fuels burning, which can be attributed also to the lack of relevant legislation stimulating producers of biomass boilers, cookers and other appliances using solid fuels to improve emission performance through improved design of their products dedicated to domestic market.

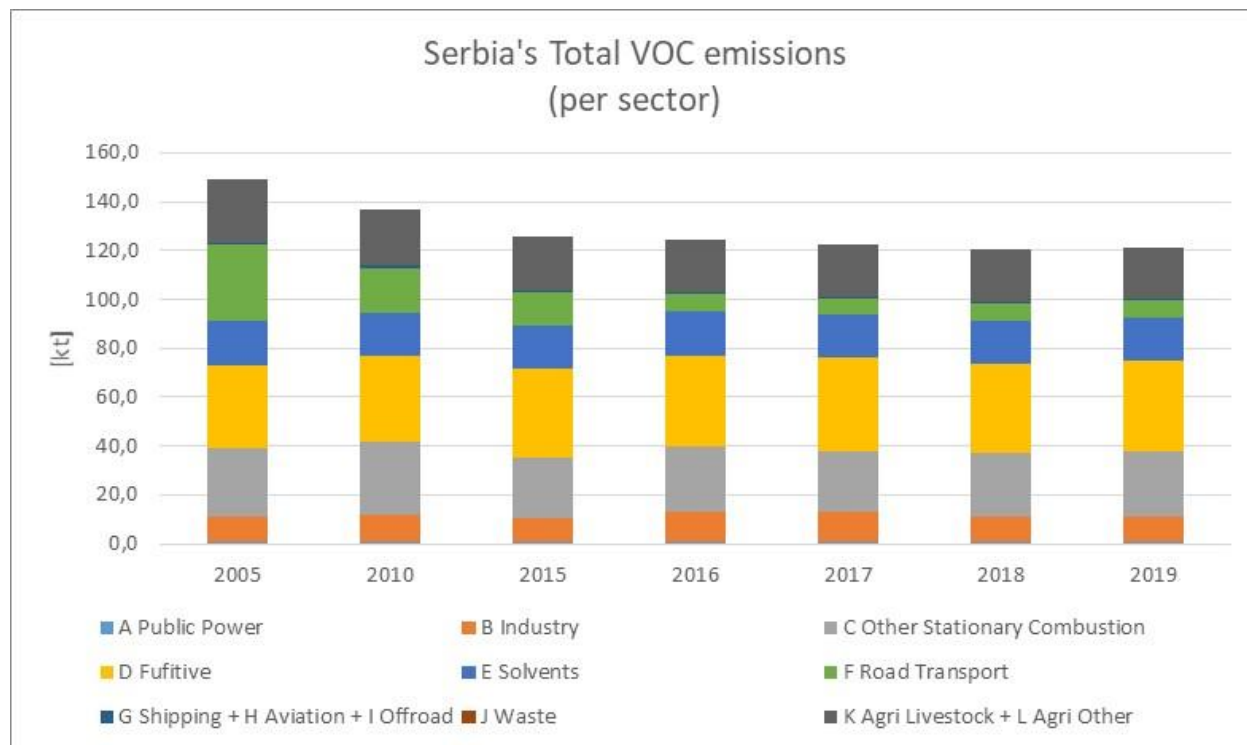
Furthermore, it has to be noted that Agriculture field burning is also one of the significant contributors to the PM_{2.5} emissions in particularly since those emissions are concentrated to the period of few months. It has to be noted that field burning in Serbia is occurring despite being formally banned by both Fire Protection Act and Law on Agriculture land.

VOC emissions in Serbia in 2019 amounted for 121,3 kt VOC, which represents 18,8% decrease compared to 2005 and 3,6% decrease compared to 2015. Most notable VOC emission reduction is observed in the road transportation sector where VOC emissions compared to 2005 decreased for 77,2% and compared to 2015 for 49,7%, mainly due to environmental improvements of gasoline powered passenger cars and vans. VOC emissions in Fugitive sector¹³ which represents 30,8% of all emissions have since 2015 increased for 3,2% mainly due to increase in Fugitive emission from solid fuels: Coal mining and handling (+1,9%) and increase in distribution of oil products (+11,9%).

VOC emissions in Fugitive sector is followed by Other Stationary Combustion (with biomass burning in households) with 21,9% of overall VOC emissions. Since 2015 VOC emissions from this sector have been increased for 6,5%, mainly due to the increase of biomass burning in households.

¹³ Includes Fugitive emission from solid fuels (Coal mining and handling, transformation) and fugitive emissions from Oil and Gas (exploration, production, processing, transmission, storage, distribution and other such as venting and flaring)

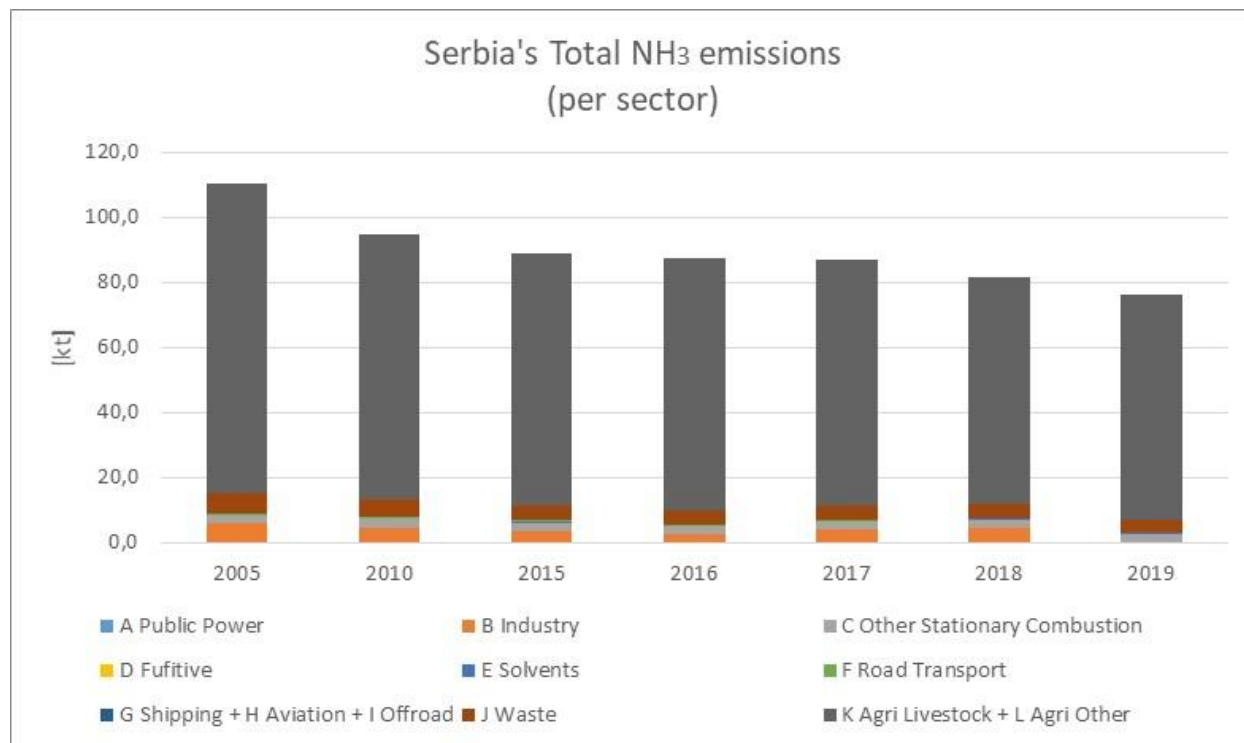
Figure 4 :Serbia's total VOC emissions (2005-2019)



VOC emission from Agriculture account for 17,5% and have decreased for 3,7% since 2015. The main source of VOC emissions from Agriculture sector remains manure management with 83,3% and VOC from Cultivated crops account for 14,1% and field burning for 2,6% of overall VOC emissions. Within the manure management VOC form of dairy cattle accounts for 42,8%, from non-dairy cattle for 23,9%, from swine 12,2% and 21,2% for other animals such as sheep, goats, laying hens and broilers.

Ammonia emissions in Serbia in 2019 amount to 76,1 kt NH₃ which since 2005 represents a decrease of emissions for since 2005 for 31,2% and since 2015 a decrease for 14,5%. Predominant driver for trends of ammonia emissions is agriculture sector which represents 90,7% of all national totals. The remaining 9,3 % accounts for waste sector 5,1% and Industry 3,4% and all other sectors 0,7%. The main source activity for ammonia production is manure management which account for 85,5% of agriculture emissions, 10,6% accounts for emission from Inorganic N-fertilizer (including urea applications), remaining 3,8% of ammonia emissions are coming from field burning. The declining trend in ammonia emissions is driven mainly driven by reduced activities in pigs breeding in Serbia.

Figure 5 :Serbia's total NH₃ emissions (2005-2019)



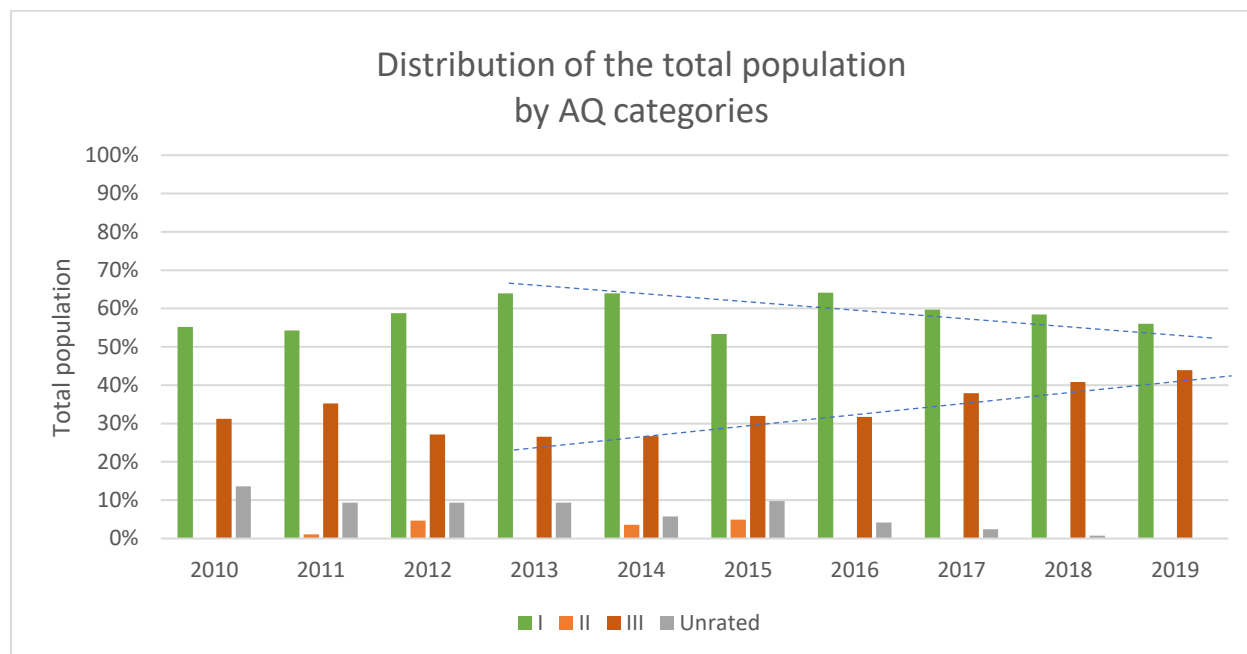
Furthermore, it can be noted that NH₃ emissions in Industry in 2019 decreased significantly. The reduction of NH₃ emissions is due to stoppage of production of ammonium nitrate due to non-compliance with environmental legislation and market conditions.

3.2 Historical situation regarding the Air quality in zone and agglomerations in Serbia

Automatic and systematic air quality monitoring in Serbia is dated back to 2002 where first automatic monitoring in the Republic of Serbia started in Pančevo municipality and Belgrade PHI in 2002. Shortly after establishment of SEPA, in 2006 SEPA monitoring stations were installed and put into operation. The state network for automatic air quality monitoring in the Republic of Serbia operated by SEPA was expanding and was completed in 2009-2010 through an EU project. In parallel awareness of the availability of the information on air quality grow also at the local communities and agglomerations. By the end of 2020 state network has [34] locations. Different locations measure different air quality parameters such as SO₂, NO₂, PM₁₀, PM_{2.5}, O₃, CO, BTX, different heavy metals and Polycyclic aromatic hydrocarbons. In 2019 air quality monitoring network with fixed measurements cover 47,6% of total populations. Air quality in Serbia is classified in three categories. Air quality Category I is ambient air which is pure or slightly polluted air where the limit values of none of the pollutants are exceeded. While Category II is reserved for moderately polluted air where limit values of one or more pollutants are exceeded, but tolerant¹⁴ values of none of the pollutants are not exceeded, Category III describes for ambient air which is too polluted and where tolerant values for one or more pollutants are exceeded. In Serbia the number of inhabitants exposed to poor air quality is increasing since 2013 (Figure 6)

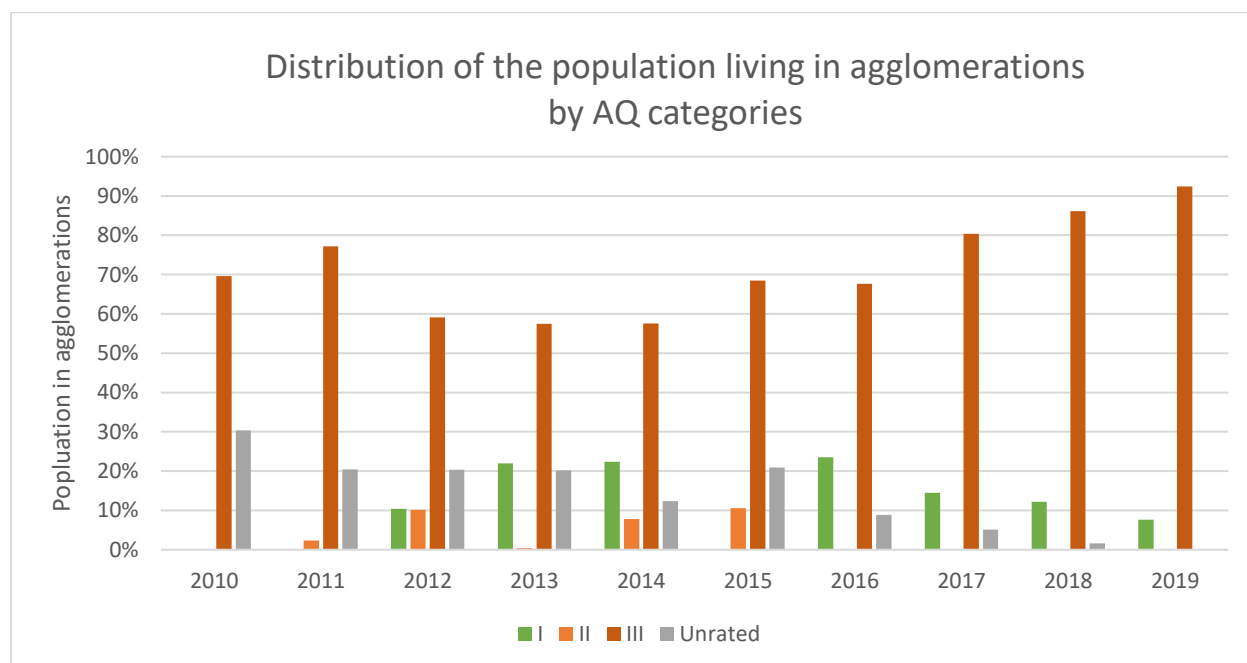
¹⁴ In event of a pollutant not having a prescribed tolerance limit, its limit value shall be taken as the tolerant one

Figure 6 : Distribution of total population of Serbia by air quality categories (2010-2019)



The number of cities in Zone of Serbia and Vojvodina and agglomerations with poor air quality is increasing since 2013 when 26,7% of all the populations lived in cities and agglomerations with category III air quality, while in 2019 this number has increased to 44%. When observing only agglomerations and cities with AQ measurements in zone Serbia and zone Vojvodina it can be observed that air quality is deteriorating.

Figure 7 : Distribution of the population living in agglomerations¹⁵ by air quality categories (2010-2019)

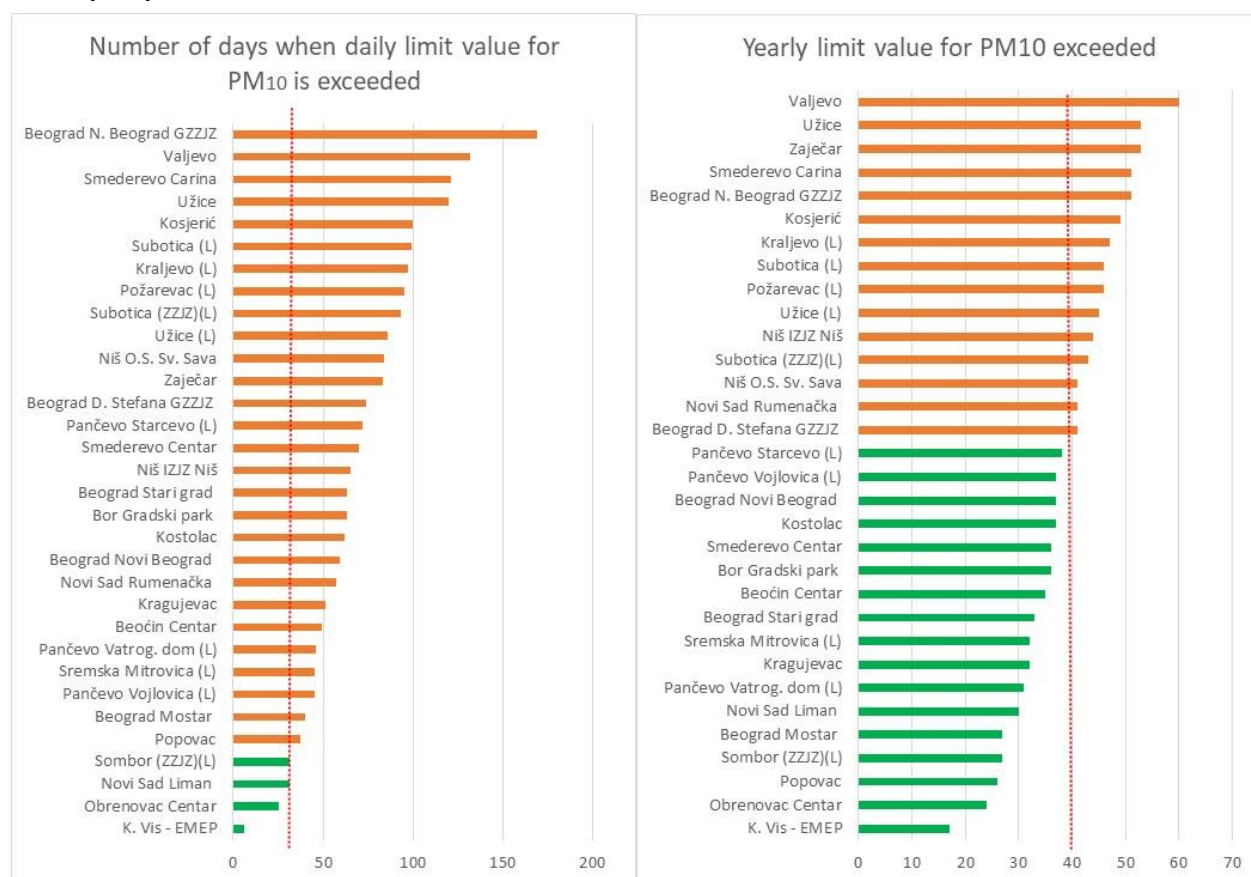


¹⁵ Note: including cities with air quality measurements that belong to Zone Serbia and Zone Vojvodina

In 2019 92,4% of the population living in those agglomeration (3,053 Mio.) where ambient air was too polluted and where tolerant values for one or more pollutants are exceeded, where in 2014 this share was 57,5%.

The assessment of the composition of the exceedances of limit values show that the main source of exceedances is due to exceedances in PM₁₀. Number of calendar days where limit values for the protection of human health of 50 µg/m³ can be exceeded is 35. This requirement was exceeded in 28 out of 32 locations included in the national network where this parameter is measured (Figure 8)

Figure 8 : Air quality measuring point with number of days where daily limit value of 50 µg/m³ was exceeded and where yearly limit value for PM₁₀ is exceeded



Furthermore, PM₁₀ has a yearly for the protection of human health a limit value of 40 µg/m³ which has not to be exceeded in a calendar year, however in 2019 in Serbia out of 32 locations this limit value was exceeded in 15 and in total there is 16 locations of air quality monitoring where both parameters are exceeded.

Significant exceedances are observed also for the PM_{2.5} where target value of PM_{2.5} for a calendar year is set at 25 µg/m³. Target value was in 2019 exceeded at 12 out of 16 measuring points. In addition, it has to be noted that Average Exposure Indicator (AEI) in Serbia for the 3 years (2017,2018,2019) period is estimated¹⁶ in the range between 31-34 µg/m³ which is well above the 20 µg/m³ threshold as set for 2017

¹⁶ In principle urban background stations should be used but suburban background stations may be included as well if there is no urban background station and it is considered as representative of PM_{2.5} levels in the city. It is not possible to provide a precise estimate of the AEI because: There is currently no established list of PM_{2.5} measurement points for the purpose of calculating the AEI. Furthermore, in 2017 and 2018, few valid statistics were available for PM_{2.5} compared to 2019. So only an estimate can be provided, based on annual statistics for fixed measurements available in SEPA annual reports.

in Annex 13 of the Regulation on conditions for air quality monitoring and requirements ("Official Gazette of the RS", No 11 of 5 March 2010, 75 of 20 October 2010, 63 of 19 July 2013) as deadline for reaching the allowable level of exposure.

In addition to exceedances of PM₁₀ and PM_{2.5} for two locations (Belgrade-D.Stefana and Belgrade-Mostar) in 2019 exceedances of the NO₂ yearly limit values were observed. It has to be noted that both stations are characterised as urban traffic stations which indicates that emissions from transport are also an issue in dense agglomerations such as Belgrade is.

Exceedances of the SO₂ daily limit values are in 2019 isolated to only three measuring stations, all in agglomeration of Bor, where main source of SO₂ emission are processes emissions from copper mining and smelting complex located on the eastern outskirts of city of Bor.

Territory exposed to ozone exceedances of the target value for the protection of vegetation was in the reference year, as calculated by the CHIMERE model, amount to 1.440.288 km², which is 38,7% of the totals surface area.

The current effects on the health impacts of air pollution in Serbia have been assessed by Alpha-RiskPoll (ARP) which is using the updated model analysis methods which have been applied to cost-benefit analyses of policies proposed by the EC (European Commission) and the United Nations Economic Commission for Europe (UN/ECE), in particular for setting the emission reduction objectives of the Gothenburg Protocol of the UN/ECE Air Convention and the objectives of the EU National emission ceilings (NEC/ 2016/2284/EU) Directive.

The quantification of health effects is specific to age groups for which exposure-response functions have been developed on the basis of epidemiological studies. Some health effects indicators are calculated specifically for more fragile populations, such as children and the elderly.

The health impacts quantified for the preparation of this programme are chronic and acute effects of population exposure to concentrations of fine particles (PM_{2.5}), tropospheric ozone (O₃) and nitrogen dioxide (NO₂), in terms of morbidity and mortality. Effects are qualified as "acute" when they are due to an increase in ambient exposures of a few days (e.g. hospital admissions), and as "chronic" when they are due to ambient exposures of a longer term, sometimes life-long duration (e.g. mortality). The results of the assessment of the current situation are presented in the Table 3-1 below.

Table 3-1 Estimated health impact due to current ambient air quality in Serbia

Health impacts in Serbia	Unit	Pollutant	REF
			2015
Acute Mortality (All ages)	Premature deaths	O ₃	461
Respiratory hospital admissions (>64)	Cases		242
Cardiovascular hospital admissions (>64)	Cases		2 061
Minor Restricted Activity Days (MRADs all ages)	Days		1 415 555



Health impacts in Serbia	Unit	Pollutant	REF
			2015
Chronic Mortality (All ages)	Life years lost	PM _{2.5}	92 013
Chronic Mortality (30yr +) deaths	Premature deaths		9 773
Infant Mortality (0-1yr)	Premature deaths		9
Chronic Bronchitis (27yr +)	Cases		5 934
Bronchitis in children aged 6 to 12	Added cases		22 762
Respiratory Hospital Admissions (All ages)	Cases		4 261
Cardiac Hospital Admissions (All ages)	Cases		5 144
Restricted Activity Days (all ages)	Days		8 656 749
Asthma symptom days (children 5-19yr)	Days		186 041
Lost working days (15-64 years)	Days		2 132 518
Bronchitis in children aged 5 to 14	Added cases	NO ₂	2 395
Respiratory Hospital Admissions (All ages)	Cases		2 113
Chronic Mortality (All ages)	Life years lost		6 530
Chronic Mortality (30yr +) deaths mean VSL	Premature deaths		694

By far the highest impact on health are observed due to PM_{2.5}, where for the modelling reference year 2015 the estimated premature deaths amount to 9773 premature deaths and more than 92 thousand life years lost. Due to PM_{2.5} concentrations in ambient air it is estimated that Serbia in 2015 lost over 2.1 million working days. Considering the fact that ambient air quality has been deteriorating since 2015 the negative effects of air pollution in Serbia are even higher. It also has to be noted that the numbers as presented in the Table 3-1 above does not contain the transboundary effects of pollutants emitted in Serbia on health in the neighbouring countries.

3.3 PROJECTIONS OF EMISSIONS BASED ON THE EXISTING MEASURES FOR YEARS 2020-2030 ANY BEYOND

The Baseline Scenario or with existing measures scenarios (WEM), assumes that no other policies and measures with impact on air pollutants will be adopted up to 2030 than those in adopted by the end of 2020. The WEM scenario also envisage that measure that policies and measures have been adopted by the end of 2020 will also be fully implemented in the scope and timing as envisaged by the relevant policy documents. It has to be noted that one of the most important policy documents which is included in the WEM scenario is National Emission reduction program which targets the biggest single source polluters in the power sector in Serbia. The implementation of the program in the scope and dynamics as envisaged will have a significant effect in the reduction of national emissions or air pollutants but will not necessarily have significant effect on the concentrations of air pollutants in cities and agglomerations since the impact of emissions reductions are to be dispersed on the large proportion of the Serbia's territory which is not necessarily covered by dense agglomerations.

According to the baseline scenario, emissions of air pollutants will are projected to be as presented below (Table 3-2)

Table 3-2 Projection of air pollutants in accordance with WEM scenario

Year	NO _x	SO ₂	VOC	PM ₁₀	PM _{2.5}	NH ₃
	kt	kt	kt	kt	kt	kt
2015	144.1	365.96	126.8	71.0	50.0	83.8
2020	140.0	365.99	120.1	73.4	51.8	84.3
2025	79.1	42.9	116.0	61.0	44.8	78.6
2030	72.0	38.4	111.7	58.3	42.9	79.4
2035	64.4	29.3	103.7	57.1	42.4	76.3

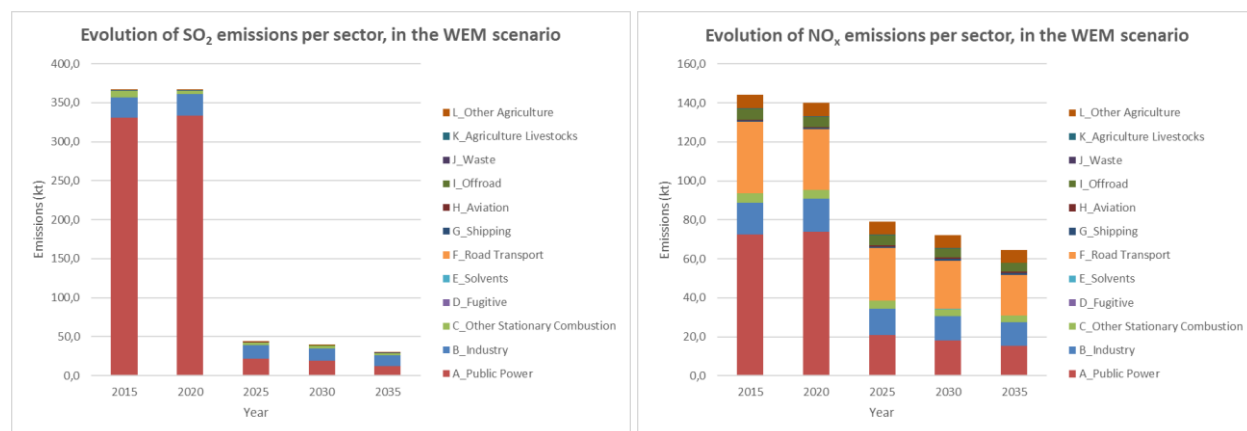
The implementation of several existing regulations and measures selected in the WEM scenario, enables the reduction of pollutant emissions in 2030, compared with 2015 emission levels, by: 89% for SO₂, 50% for NO_x, 12% for VOC, 18% for PM₁₀, 14% for PM_{2.5} and 5% for NH₃ and, in 2035, by: 92% for SO₂, 55% for NO_x, 18% for VOC, 20% for PM₁₀, 15% for PM_{2.5} and 9% for NH₃.

Table 3-3 Projected emission reductions of air pollutants in accordance with WEM scenario

Emission evolution compared with 2015 (%)	NO _x	SO ₂	VOC	PM ₁₀	PM _{2.5}	NH ₃
2020	-3%	0%	-5%	3%	3%	1%
2025	-45%	-88%	-9%	-14%	-10%	-6%
2030	-50%	-89%	-12%	-18%	-14%	-5%
2035	-55%	-92%	-18%	-20%	-15%	-9%

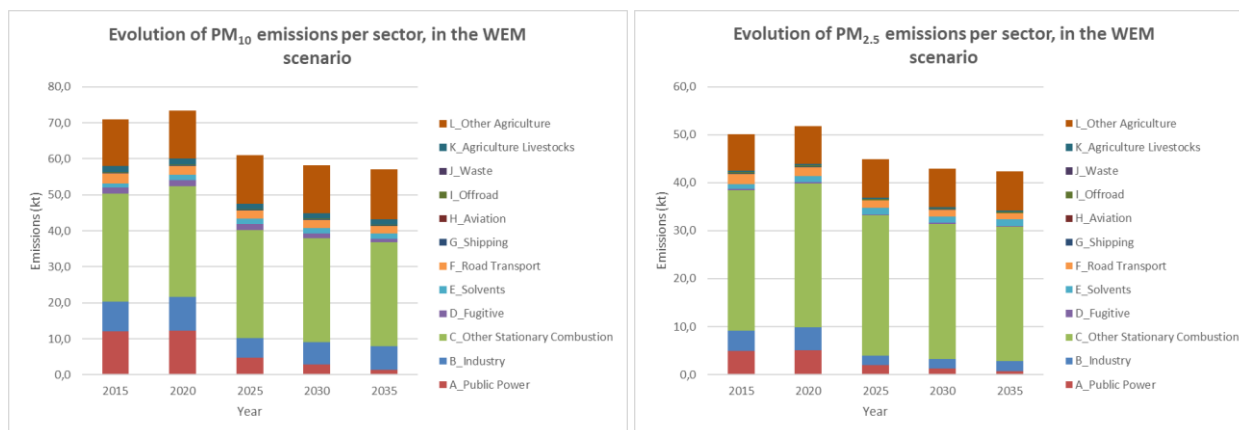
The largest emission reductions are obtained for SO₂ and NO_x, with 92% and 55% respectively in 2035 compared with 2015 emissions. The largest SO₂ and NO_x emission reductions per sector, are achieved in the public electricity and heat production (GNFR A), and to a lesser extent in the Industry (GNFR B). For NO_x, the Road transport (GNFR F) also has a significant contribution to the achieved emission reductions. These remarkable results highlight the efficiency of the existing measures considered in the WEM scenario in particularly timely and effective implementation of NERP, "Regulation on limit values of emissions of pollutants into the air from combustion plants (OGRS N°6/16)" and "Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)".

Figure 9 : Evolution of SO₂ and NO_x emissions in the WEM Scenario



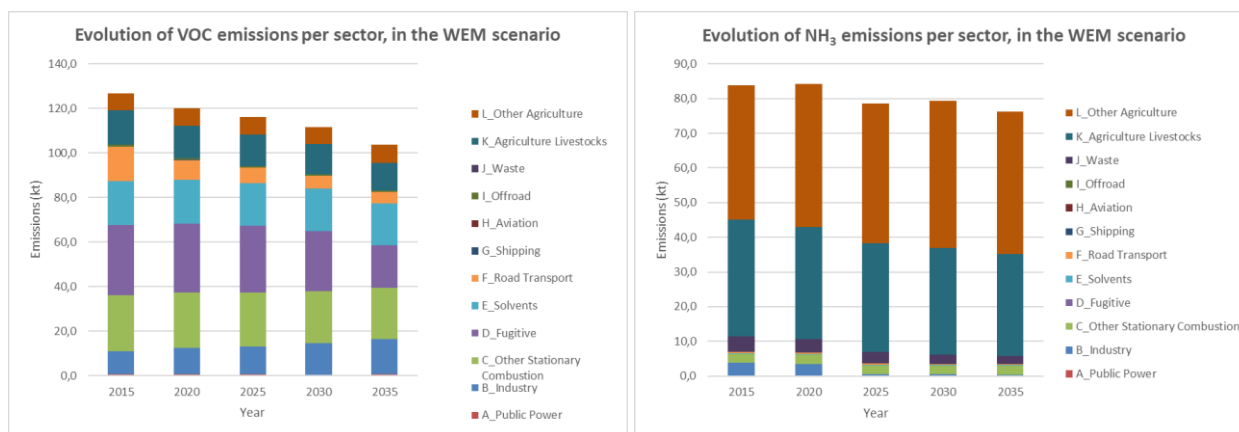
For PM₁₀ and PM_{2.5} emissions, the reductions are lower than for SO₂ and NO_x (20% and 15% in 2035, respectively). Indeed, in the scenario WEM, no existing measures enable to tackle PM emissions from the residential combustion which are predominant in 2015¹⁷ and remain predominant in the period from 2020 to 2035. PM emissions will not be reduced significantly without such measures addressing this large number of small emitters.

Figure 10 : Evolution of PM₁₀ and PM_{2.5} emissions in the WEM Scenario



VOC emissions are slightly reduced (18% by 2035, compared with 2015). For this air pollutant, emission reductions will be larger when measures will be considered for reducing the imports of old second-hand vehicles (accounted in GNFR F) and for reducing emissions from solvent uses in industry (included in GNFR E) not considered in the WEM scenario. Other sectors such as the residential wood combustion (in GNFR C), the use of domestic solvents (in GNFR E) or the food and beverage industries (in GNFR B) are also large contributors of national VOC emissions where emissions are driven by the evolution of the activity data.

Figure 11 : Evolution of VOC and NH₃ emissions in the WEM Scenario

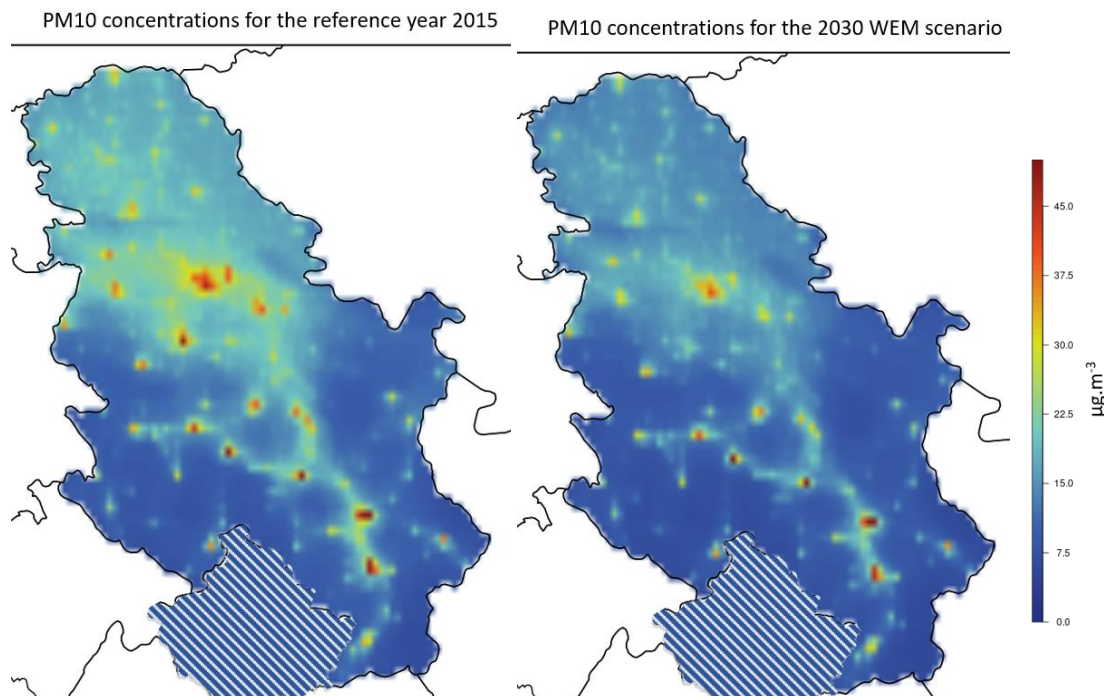


For NH₃, the reduction of emissions is mainly due to the reduction of the activities considered, and particularly the decrease of the livestock (i.e., GNFR K), as well as the application of the Regulation OGRS N°111/15 for urea and ammonium nitrate productions.

¹⁷ See report 3.3.1 "Description of the baseline scenario (WEM) and methodologies for emission projection scenarios", chapter 2

Impacts of the WEM scenario on air quality will be assessed through a modelling exercise carried out with the Chimère model, considering the WEM 2030 emissions.

Figure 12 : Comparison of the PM₁₀ concentrations between reference year 2015 and WEM scenario in 2030



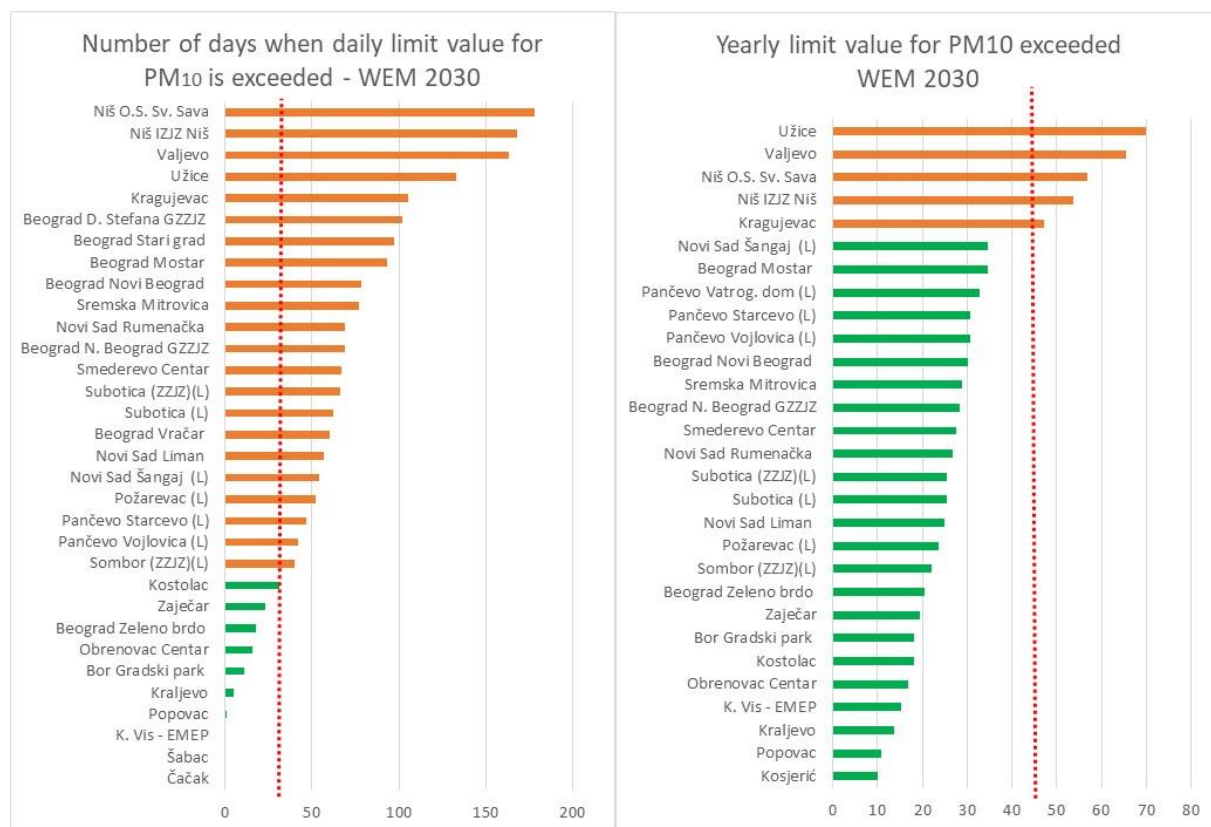
The comparison shows that for PM₁₀ and also for PM_{2.5} hotspots will with baseline (WEM) scenario maintain to be present in 2030. Despite the reductions of air pollutants in the power sector due to implementation of the NERP, which primarily target emissions of SO₂ and NO₂ will contribute to the improvement of the air quality in Serbia, but will not have a significant effect on air quality in the cities and agglomerations.

Average annual concentration of PM_{2.5} is with the WEM scenario expected to drop from 31-34 µg/m³ in 2019 to 21 µg/m³ in 2030 which is still above the threshold. The significant emission reductions in the WEM scenario which are occurring mainly due to implementation of NERP will still not be sufficient to address the exceedances of PM₁₀ concentrations in the ambient air in Serbia. According to the modelling result in 22 out of 32 PM₁₀ air quality measuring points exceedances of the daily limit values will in 2030 still occur in scenario with existing measure.

As a consequence, if no additional measure will be taken will, it is expected that in 2030 almost 3,135 million inhabitants of Serbia will be exposed to poor air quality, of which 94,8% of inhabitants living in zones and agglomerations which is more than six times more than the EU-28 population exposed to concentrations above EU standards¹⁸ (15% of urban population).

¹⁸ <https://www.eea.europa.eu/publications/air-quality-in-europe-2020-report>

Figure 13 : Air quality measuring point with number of days where daily limit value of $50 \mu\text{g}/\text{m}^3$ was exceeded and where yearly limit value for PM_{10} is exceeded in 2030 – WEM Scenario



Due to some progress in the emission reductions which is expected to be achieved with implementation of existing policies and measures, it is expected that the number of premature deaths due to exposure to $\text{PM}_{2.5}$ concentrations in the ambient air will in 2030 still amount to 7.373 per year which is 24.6% reduction compared to 2015 numbers. By 2030 health impacts expressed in life years lost are also expected to decrease from over 92 thousand in 2015 to 60 thousands in 2030 which is a 34,4% reduction.

In comparison with the EU-28 it is expected that even with implementation of WEM scenarios Serbia will in 2030 still have 39% more premature deaths¹⁹ than the EU-28 was having back in 2018.

Expected noncompliance of ambient air quality with the EU standards, high share of inhabitants still exposed to poor air quality and well above average health impacts of poor air quality on the Serbian population call for Serbia to prepare a comprehensive Programme to ensure that its inhabitant in the future will not be exposed to such harmful effect of the poor ambient air quality.

As highlighted in Figure 10 above the main contributors to the poor air in Serbia in 2030 are C_Other stationary combustion (dominating by residential heating) which in 2030 contributed 54,1% of the PM_{10} and 69,2% of the $\text{PM}_{2.5}$ emissions, followed by Agriculture field burning contributing 20,9% of the PM_{10} and 15,7% of the $\text{PM}_{2.5}$ emissions, followed by industry and transport with 12,9% of PM_{10} and 7,0% of $\text{PM}_{2.5}$.

¹⁹ Serbia will according to WEM Scenario in 2030 have 1038 premature deaths/Mio inhabitants do to $\text{PM}_{2.5}$ exposure while the EU average for 2018 is 757 premature deaths/Mio inhabitants

4 VISION

Previously described current situation, public health crisis due to air pollution, raising awareness of the negative effects of the ambient air pollution, the long-term requirements of the Convention on Long Range Transboundary Air Pollution and its Gothenburg protocol, as well as the EU accession process are the basis for a long-term vision of the program. The Vision enshrined in this Programme is that:

Serbia is to ensure that by 2030 everybody should be able to enjoy a clean ambient air.

This vision provides the short/medium-term perspective required for policy planning and implementation, as well as the long-term ambition that is required by the nature of the policy issue and of the international requirements, namely at the level of the United Nations Convention on Long range transboundary air pollution and of the EU upcoming EU Clean Air Package.

This vision means that, by 2030, the changes introduced in the Serbian air quality relevant policy framework, will allow the country to enter a smooth pathway towards achieving clean ambient air for everyone, minimizing the costs and maximizing the health benefits accruing from such transformational change in the country which is also stipulated by the national climate change framework with which vision of this programme is aligned.

5 AIR QUALITY MITIGATION SCENARIOS

For the programme purposes and achievement of the air quality vision, in addition to baseline scenario, three air quality mitigation scenarios have been analysed²⁰: All scenarios are developed using models²¹ that are also used for definition of the EU targets and pathways up to 2020, 2030 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 reduction of air pollutants reduction is 2015. Therefore, the reduction in emissions of Air pollutants efforts are shown compared to the GHG emission level in 2015. In addition, in order to compare the emission reduction with the base year as used in for the compliance with National Emission Ceilings Directive and Gothenburg protocol, these efforts are shown also compared to 2005, however achievement of the goals will be monitored and reported compared to 2015.

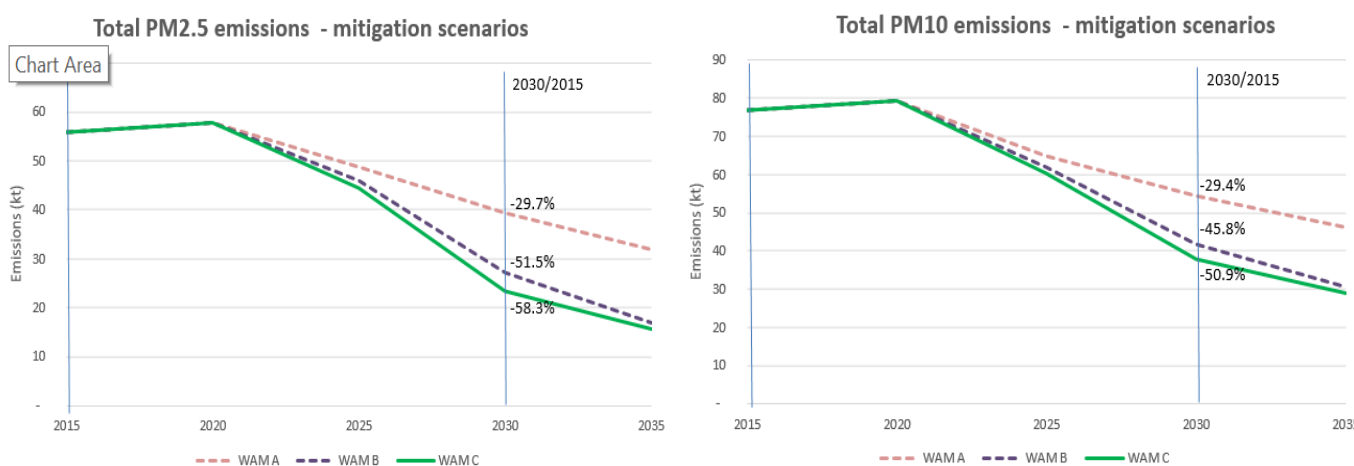
²⁰ Scenario analysis is a process of analysing possible future events by considering alternative possible outcomes (sometimes called "alternative worlds"). Thus, scenario analysis does not try to show one exact picture of the future. Instead, it presents several alternative future developments. In contrast 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.

²¹ For the preparation of the Programme modified GAINS, CHIMERE and Alpha-RiskPoll (ARP) models were used

All the air quality mitigation scenarios are building on M2 climate scenario²² as prepared in the process of preparation of the Serbia's Low carbon development strategy and considerably deviate Serbia emissions trajectory from the WEM baseline scenario, starting the air pollution emissions reductions from 2020s. Those are:

- **WAM A Scenario:** Full implementation of all relevant EU directives and regulations related to ambient air quality not yet fully transposed and implemented²³.
- **WAM B Scenario:** It is intensive control scenario. In addition to WAM A, introduction in some cases, of stricter emission limit values and introduction of national financial and fiscal policies and measures in key emission source categories (such as scrapping and promotion schemes for passenger cars and household wood/coal appliances).
- **WAM C Scenario:** Full control scenario. In addition to WAM B, all necessary measures including local specific measures (such as incentives, restrictions and bans) aiming to ensure compliance with limit values as defined in Directive 2008/50/EC regarding particles (PM_{2.5} and PM₁₀), NO_x, SO₂ and O₃.

Figures below shows the air pollutants emissions pathways in the three WAM scenarios



²² **M2 scenario:** Implementation of all EU *acquis* in whole is transposed and implemented, achieving 33,3% GHG emissions compared to 1990; 28,9% RES²² by 2030 and 24,5% enhanced energy efficiency as the Serbian contribution to the EU target

²³ Detailed report on WAM A, WAM B and WAM C scenario set-up is available at <https://www.ekologija.gov.rs>

Figure 14 : The evolution of emissions of PM_{2.5} and PM₁₀ by 2030 and beyond

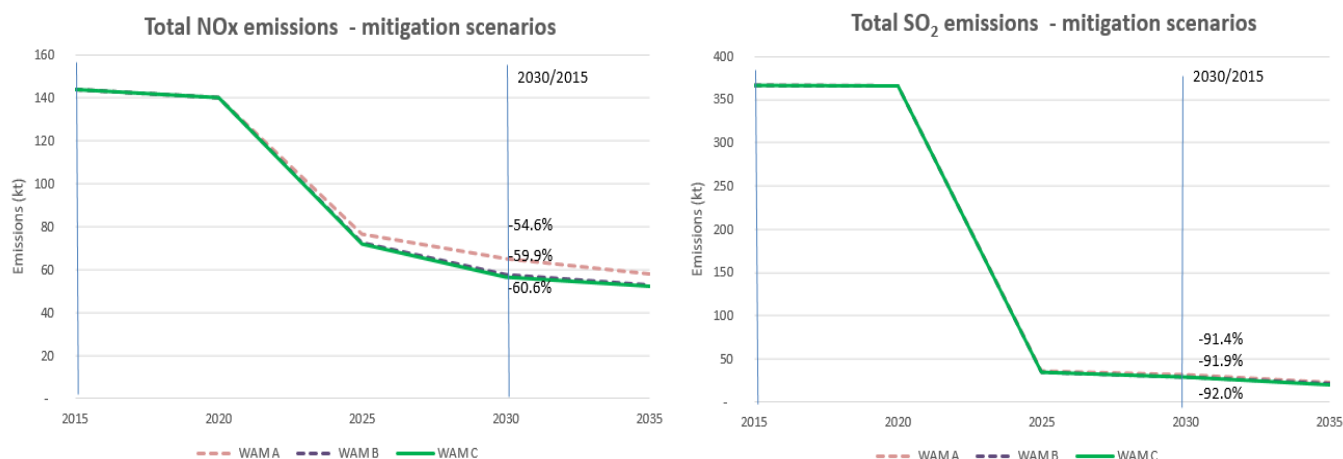


Figure 15 : The evolution of emissions of NO_x and SO₂ by 2030 and beyond

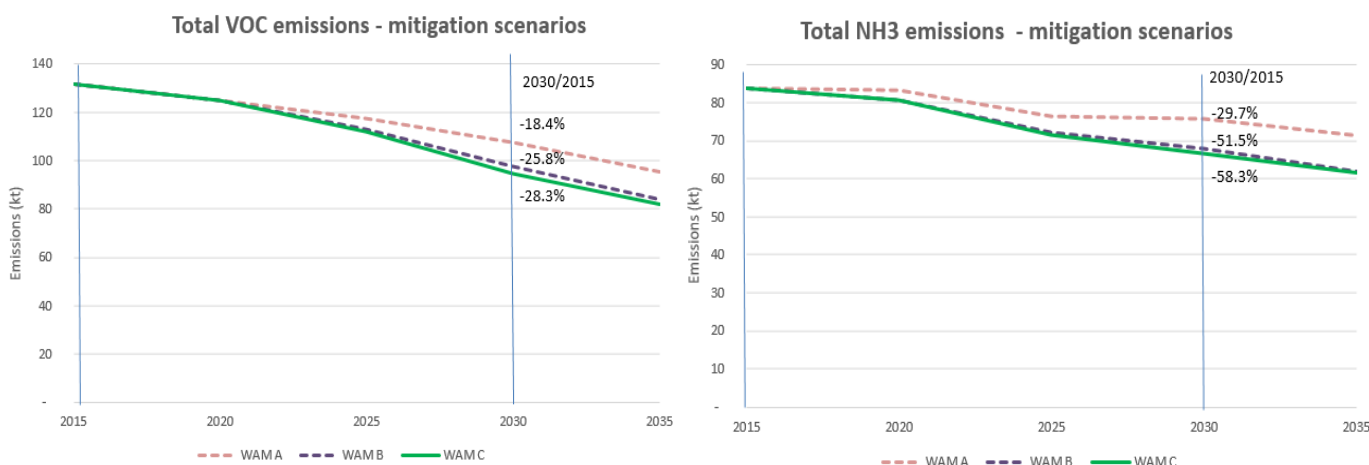


Figure 16 : The evolution of emissions of VOC and NH₃ by 2030 and beyond

The main focus of the Scenarios and its emission reduction efforts was ensuring the compliance with the EU regulatory framework in the field of air quality policies and measures and implementation of good practices in agriculture sector while stepping up the necessary measures to reduce PM₁₀ and PM_{2.5} emissions where the assessment of current situation indicates that Serbia has to make significant improvements in its policy implementation.

WAM A Scenario

Therefore, in the WAM A scenario, all relevant EU Directives or Regulations are considered to be applied from a given date depending on activities. When, in some cases, the existing national regulations may set up stricter ELVs than the EU Directives or Regulations, the stricter obligations are considered such as for Regulation on limit values of emissions of pollutants into the air from combustion plants (OGRS n° 6/2016) which can define stricter emission limit values for medium and small plants than the medium combustion plan directive (MCPD) for some fuels or some sizes of installations. WAM A scenario foresees the compliance with MCPD in 2025 for existing installations with the rated thermal input larger than 5MW and in 2030 for those installations where the rated thermal input larger than 1MW. For small domestic

appliances using solid fuels the implementation of the EU Eco-design Directive and Regulations 2015/1189 and Regulation 2015/1185 will apply from year 2025 with assumption that 30% of the appliances will be replaced by 2030 and 55% by 2035 mainly through the natural substitution. When it comes to liquid fuels WAM A scenario assumes that heavy fuel oil with less than 1% sulphur will be available for consumers starting from 2021. When it comes to industrial processes only the less strict upper level of the best available technique associated emission levels can be applied and full compliance with IED chapter II provisions is envisaged by 2025, except for installations requiring extended implementation period. Activities using solvents as covered by Industrial emission directive Chapter V and Annex VII are in WAM A scenario aligned with Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (OGRS N°100/11) with the full compliance expected in 2025. Compliance of the Petrol terminals and service station with Directive 1994/63/EC on the control of VOC resulting from the storage of petrol and its distribution from terminals to service stations and Directive 2009/126/EC on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations is foreseen only by 2030. WAM A scenario in road transport envisages the stepping up of the EURO standards for imported second hand vehicles. According to WAM A scenario the minimum EURO 4 requirement for imported second hand passenger cars will enter into force in 2023, EURO 5 in 2025 and EURO 6 in 2030. The same timeline is envisaged for EURO IV, EURO V and EURO VI light and heavy duty vehicles. For new off road machinery Regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery is expected to be in force only for new machinery from 2025 onwards.

In the Republic of Serbia, NH₃ emissions from agriculture sector could be substantially reduced through consistent use of good nitrogen management practices at all stages of the farming process: livestock diet, housing, manure storage, spreading. Ideally, measures to reduce ammonia emissions should be applied to all stages of the farming process. Otherwise, nitrogen retained at one stage (for example at storage with a cover) could be lost at the next stage as ammonia (for example at spreading if there is no reduction technique). Policies and measures applicable in the WAM A scenario in the agriculture sector are focusing on introduction of best practices at spreading for slurry application by trailing hose and incorporation within 4 hours and 12 hours (pig and cattle manure) and incorporation of urea into soil through where the level of incorporation should steadily increase to 25% in 2035.

Through the implementation of policies and measures as contained in the WAM A scenario as elaborated above the PM_{2.5} emissions will decrease for 29.7% by 2030 compared to 2015 (additional 16.4% compared to WEM), while PM₁₀ is expected to decrease for 29.4% in the same period (additional 12.6% compared to WEM). Those reductions in PM₁₀ and PM_{2.5} emissions in WAM A scenario would ensure the compliance of the bottom up sectoral measures with the EU environmental framework, however the reduction is not sufficient to ensure the compliance with requirements arising from Ambient Air Quality Directive 2008/50/EC. The dispersion modelling shows that with implementation of WAM Scenario Serbia can still expect that number of allowed days when PM₁₀ concentrations exceed 50 µg/m³ will be exceeded in all major agglomerations and cities such as Belgrade, Novi Sad, Subotica, Smederevo, Pančevo, Sremska Mitrovica, Kragujevac, Niš, Užice and Valjevo where we can expect as much as 131 daily exceedances of PM₁₀. In addition to daily exceedances it is expected that in Užice, Valjevo, Niš and Kragujevac (on the borderline) annual mean PM₁₀ concentrations limit values which are set at 40 µg/m³ will also be exceeded. In addition to the issues related to the PM₁₀ and PM_{2.5} pollutions in the WAM A scenario the

SO₂ emissions in Bor will still cause the exceedance of SO₂ limit values on daily mean concentrations (not more than three exceedances of the 120 µg/m³).

WAM B Scenario

The WAM B is scenario in an intensive control scenario building on WAM A Scenario. In addition to WAM A, introduction in some cases, of stricter emission limit values and introduction of national financial and fiscal policies and measures in key emission source categories (such as scrapping and promotion schemes for passenger cars and household wood/coal appliances). It intensifies the old technology phase out and penetration of new clean technologies since natural technology replacement as envisaged in WAM A scenario is not sufficient to by 2030 ensure clean air to everybody in Serbia. The main focus of the WAM B scenario is therefore on medium level of the Best Available Techniques associated emissions levels for the large combustion plants and industrial processes and to the acceleration of the replacement of the small domestic appliances using solid fuels through financial incentives with the view to achieve 55% of appliances to be replaced by the end of 2030 and 80% by 2035. Since the road transport is a significant contributor to the PM₁₀ and PM_{2.5} emissions it is envisaged to ban all second hand vehicles without PM traps (e.g. EURO 4 and older) starting from 2023 and to step up this ambition to ban second hand EURO 5 from 2025 onwards, which will still allow for importing up to 10y old second hand cars into Serbia which in Scenario WAM B represent a balance between the increased mobility requirements of population and protection of environment. The same concept is applied also for light duty vehicles, heavy duty vehicles and busses. In parallel the WAM B scenario is in the period from 2024 to 2026 envisaging the scrapping programme targeting up to 140 000 of oldest diesel passenger cars and light duty vehicles (pre-euro to Euro 3) and diesel buses (pre-euro to Euro III) that still might be in a circulation. In Agriculture sector WAM B scenarios from 2024 envisages the more intensive penetration of slurry application by injection, which is an important measure for protection of ground water which in many locations in Serbia represent the main source of drinking water, partial substitution from urea to ammonium nitrate fertilizer, covering the slurry storages and reducing excesses in the protein supply (for animal feeding) for decreasing nitrogen excretion. Furthermore, full ban of agriculture field burning is to be enforced by 2035.

Implementation of measures listed in the WAM B scenario will further significant decrease emission of PM₁₀ for 45.8% by 2030 compared to 2015 (additional 16.4% compared to WAM A), while PM_{2.5} emissions are to decrease for 51.5% in the same period, which is additional 21.8% compared to WAM A Scenario. The implementation of measure will significantly improve the ambient air quality in Serbia and will ensure that cities zones and agglomerations such as Vojvodina, Subotica, Smederevo, Sremska Mitrovica, Novi Sad and Pančevo will be in compliance with Ambient Air quality requirements. However, several hot spots such as Belgrade and Kragujevac will still face with poor air quality regarding the attainment of the PM₁₀ limit values, while Niš, Valjevo and Užice will in addition to problems with PM₁₀ concentrations also exceed limit values on annual mean concentrations of PM_{2.5} which is set at 25 µg/m³. The attainment of the medium level of the best available techniques associated emission levels will significantly improve the air quality in Bor, however it is expected that limit values on daily mean concentrations will still be exceeded more than three times.

WAM C Scenario

WAM C Scenario is a full control scenario. It is building on the WAM B Scenario and adding all necessary policies and measures targeting the remaining ambient air quality hot spots and intensifies the

implementation milestones for implementation of measures at the local level to ensure the full compliances with Directive 2008/50/EC regarding particles (PM_{2.5} and PM₁₀), NO_x, SO₂ and O₃. In the WAM C, it was assessed that, to obtain further PM emission reductions in the five cities, the use of pellet stoves and boilers and heat pumps was necessary. The WAM C based on multiple runs of the CHIMERE chemistry transport model by 2030 envisages the replacement rate of old domestic appliances using solid fuels with new heating appliances compliant with Eco design regulations, is as follows:

- Kragujevac (requirement for additional 15% PM emission reductions compared to WAM B in 2030): 58% of domestic appliances are replaced in 2030 with eco-design appliances considering a high proportion of wood pellet appliances, 25%.
- Beograd (requirement for additional 20% PM emission reductions compared to WAM B in 2030): 58% of domestic appliances are replaced in 2030 with only eco-design pellet stoves or boilers.
- Valjevo and Niš (requirement for additional 50% PM emission reductions compared to WAM B in 2030): 74% of domestic appliances are replaced in 2030 with 50% of eco-design pellet stoves or boilers and 50% of heat pumps.
- Užice (requirement for additional 65% PM emission reductions compared to WAM B in 2030): 80% of domestic appliances are replaced in 2030 with 15% of eco-design pellet stoves or boilers and 85% of heat pumps.

Furthermore, in Agriculture sector, the phase out of agriculture waste burning is considered to be fully enforced in 2030 instead of 2035 in the WAM B. While the remaining issue with SO₂ concentrations in Bor is WAM C scenario addressing through implementation of the lower BAT associated emission levels.

Implementation of measures included in WAM C scenario will further decrease emissions of PM₁₀ and PM_{2.5} at the national level. Since the WAM C scenario is targeting specific local level hot spots the additional the additional emission reduction on national level is limited. Emission of PM₁₀ is expected to decrease for 50.9% by 2030 compared to 2015 which is additional 5.1% compared to WAM B, while emissions of PM_{2.5} is projected to decrease for 58.3% in the same period, which is 6.8% more compared to WAM B. With implementation of WAM C scenarios the air quality in Serbia is expected to be in compliance with EU legislative framework.

Results of the CHIMERE model regarding the effects of the mitigation scenarios WAM A, WAM B and WAM C for PM₁₀ and PM_{2.5} are presented in the Figure 17 and Figure 18 below.

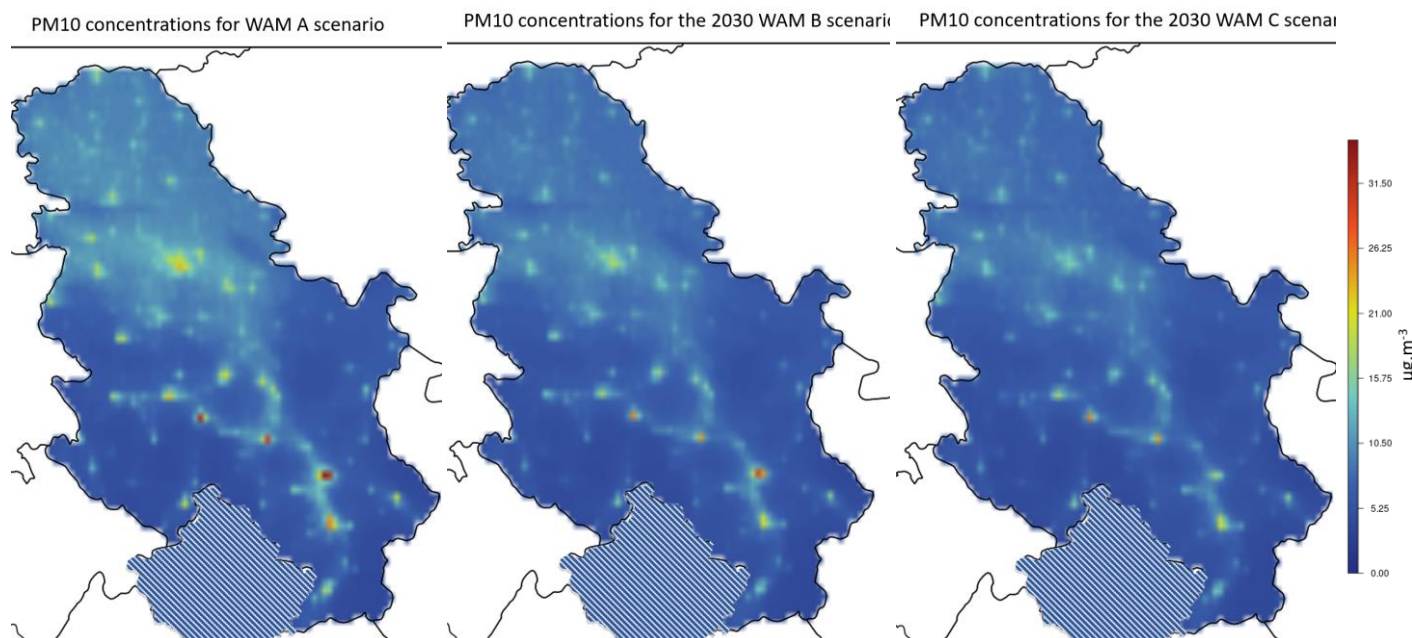


Figure 17 : Results of the CHIMERE chemistry transport model for PM10 for WAM A, WAM B and WAM C Scenario

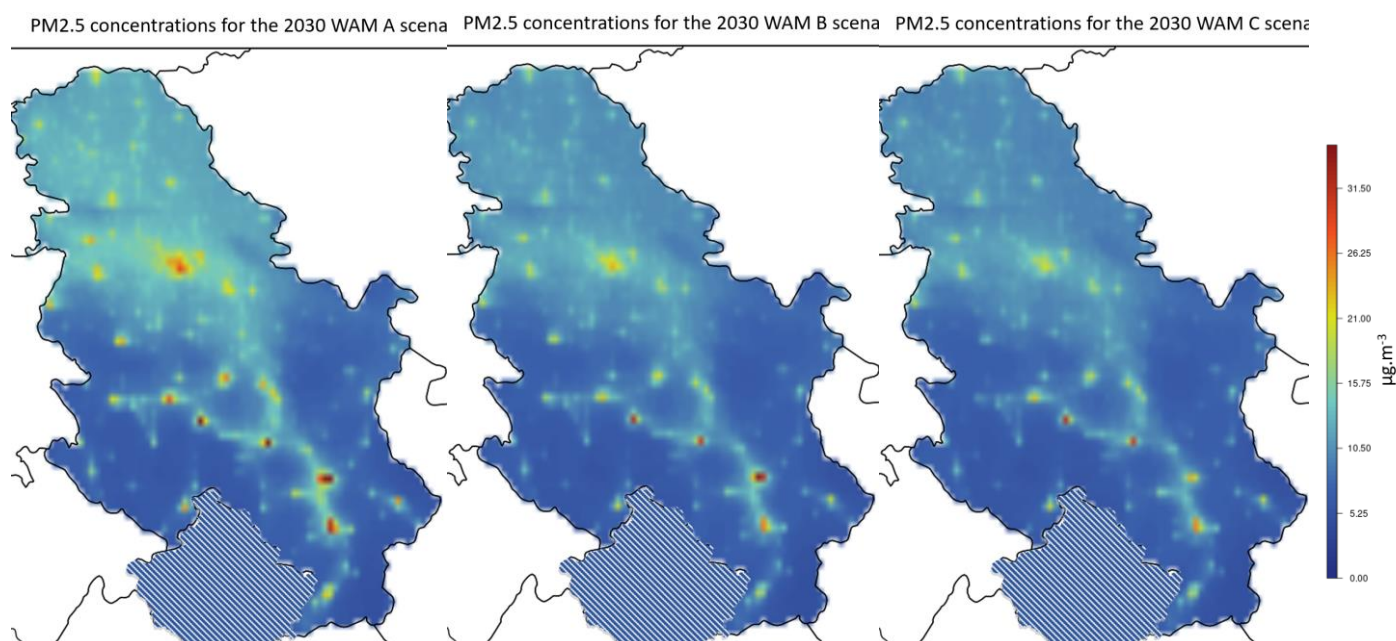


Figure 18 : Results of the CHIMERE chemistry transport model for PM2.5 for WAM A, WAM B and WAM C Scenario

The overview of the emission reductions of all pollutants for all scenarios are presented in the
Table 5-1 below.

Table 5-1 Projected emission reductions of air pollutants in accordance with WAM scenarios

Scenario	Target year/year for Comparison	SO ₂ emission reduction [%]	NO _x emission reduction [%]	PM ₁₀ emission reduction [%]	PM _{2.5} emission reduction [%]	VOC emission reduction [%]	NH ₃ emission reduction [%]
WAM A	2030/2015	-91,4%	-54,6%	-29,4%	-29,7%	-18,4%	-9,7%
	2030/2005	-92,9%	-60,7%	-3,1%	-5,0%	-27,7%	-29,7%
WAM B	2030/2015	-91,9%	-59,9%	-45,8%	-51,5%	-25,8%	-18,9%
	2030/2005	-93,3%	-65,3%	-25,6%	-34,4%	-34,4%	-36,8%
WAM C	2030/2015	-92,0%	-60,6%	-50,9%	-58,3%	-28,3%	-20,5%
	2030/2005	-93,4%	-65,9%	-32,6%	-43,6%	-36,6%	-38,1%

5.1 COST and HEALTH & ENVIRONMENTAL IMPACTS OF MITIGATION SCENARIOS

Costs

All pollution reduction pathways resulted from different scenarios are associated with certain costs. The costs addressed in this programme are additional cost compared to WEM scenario, since the cost of implementation of the WEM scenario is already covered through the financing mechanisms of existing policies and measures. For the purpose of investment cost estimates, costs have been allocated to who makes the investments, 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 may receive. Therefore, three groups of investors have been identified. Investors: who represent public or private companies, and farmers. Investors have to invest in the case of most measures in industrial plants, in combustion plants, for non-road mobile machineries, agricultural sectors, in petrol distribution and service stations. The second group are “Consumers”: they are concerned by measures aiming to replace the old domestic heating appliances, buy a more recent second-hand vehicle, replace the oldest vehicles. The “State” as a third group also include local governments. No measures consider would require major investment costs by the state budget with exception of the preparatory of the regulatory framework and policy implementation infrastructure needed from implementation of some measures mainly related to financial incentives. However, when it comes to financing of the investment costs significant support from the state budget is envisaged.

Investment costs have been estimated for each cluster of measure:

- In industrial plants, in combustion plants, for service stations... investments for reduction techniques are estimated. The reduction techniques are most often pollutant-specific such as a scrubber to remove SO₂ emissions, an electrostatic precipitator to remove PM emissions, a low-NO_x burners to remove NO_x emissions.
- In mobile sources such as road transport vehicles, non-road mobile machineries, the reduction of emissions is achieved through the use of new vehicles compliant with EU standards (Euro 6 as example for road vehicles, stage V for NRMM). When an Euro standard is implemented as example, several pollutants may be reduced simultaneously, such PM, VOC, NO_x...
- In domestic heating appliances using solid fuels for which PM emissions have to be reduced, end of pipe techniques are not available. New appliances, more energy efficient and with lower emissions if they are compliant with EU standards from the EU eco-design directive and its regulations are used. These

appliances reduced both PM and VOC emissions but may tend to increase NO_x emissions due to larger temperature, larger residence time...

- In agriculture, the development of the use of best practices require investment in some techniques with better efficiencies or using resources.

Cost for implementation of specific policies and measures is presented as annual total costs, which are the sum of annualised capital cost + Operating costs. Annualised investment for the equipment ready to operate is taking into consideration the investment (in €), the annualization period corresponding to the lifetime of the equipment, the annualization rate of 4% is used and is consistent with the rate used by GAINS²⁴ model. Annual operating costs constituted of fixed operating costs (maintenance, insurance...) and variable operating costs (reagents, electricity, waste disposal...).

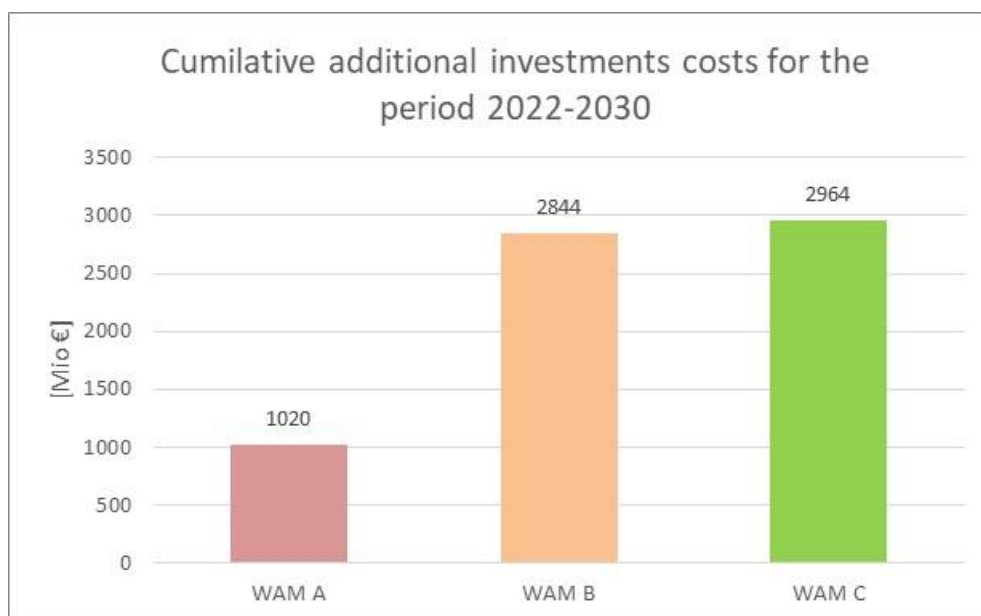


Figure 19 : cumulative additional investment costs for WAM A, WAM B and WAM C Scenario

The assessment of the cumulative investment cost (**Figure 19**), shows that WAM C scenario requires almost three times the investment costs compared to WAM A and only 4,2% more than WAM B scenario and amounts to 2964 Mio€ for the period 2022-2030.

The comparison among the mitigation scenarios, when annualizing the investment cost and adding the operating cost shows that the gap among the scenarios widens. The difference in annualized total costs of WAM A scenario amount to 57 Mio€/y, while the annualized total costs of WAM B scenario is 118 Mio€ higher and amounts to 175mio€/y. The highest annualized total costs are estimated for the implementation of WAM C scenario, where costs amount to 195Mio€/y, which is additional 21Mio€/y compared to the WAM B scenario. The comparison is show in the Figure 21 below.

²⁴ GAINS: "GHG and air pollutants synergies and interactions" model developed by IIASA and used by the EU and UNECE for the EU directive 2284/2016 on emission reductions of certain pollutants and the Gothenburg protocol as amended

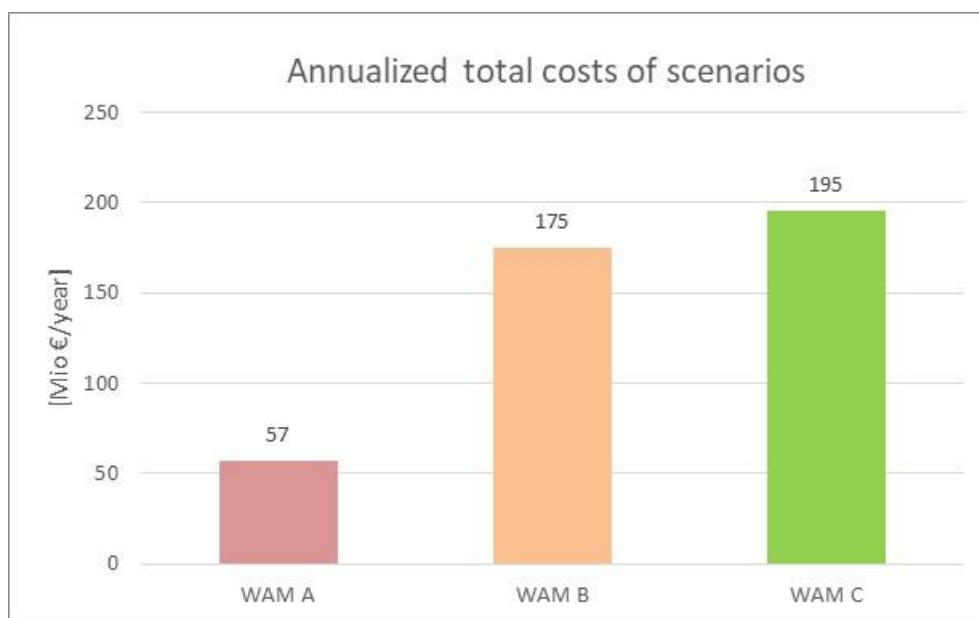


Figure 20 : Annualized total costs of WAM A, WAM B and WAM C Scenarios

Health impacts

In order to evaluate the health impacts due to ambient air pollution two alternative approaches to the quantification and monetary valuation of mortality impacts from air pollution. Premature deaths and years of life lost. For chronic mortality, the indicator of years of life lost is monetised by the value of a VOLY (Value of Life Year), the indicator of premature death is monetised by the value of a VSL (Value of Statistical Life). These values are obtained by willingness-to-pay (WTP) studies²⁵. The VSL is a damage cost estimate based on the amount people are willing to pay for a reduction in their risk of dying from a health problem. VOLY is a damage cost estimate based on the loss of life expectancy (expressed in potential years of life lost). This measure accounts for the age at which death occurs.

The modelling of the health impacts using Alpha-RiskPoll model shows that the costliest scenario for Serbia is to ignore the health related cost of poor air quality and not to take any actions.

²⁵ For early examples of contingent valuation studies used to assess willingness to pay to reduce the risk in premature mortality from air pollution cf. chapters 4.2.1 and 4.3.2 in Hurley et al. (2005). The VSL used in the present study is the result of a meta-analysis carried out by OECD (2012). Recommended values are presented in its chapter 6.1. This source also provides additional information on willingness to pay studies. Hurley, F., et al., 2005, *Methodology for the Cost-Benefit analysis for CAFE: Volume 2: Health Impact Assessment*, Service Contract for Carrying out Cost-Benefit Analysis of Air Quality Related Issues, in particular in the Clean Air for Europe (CAFE) Programme (https://ec.europa.eu/environment/archives/cafe/pdf/cba_methodology_vol2.pdf) accessed 9 February 2021. OECD, 2012, *Mortality Risk Valuation in Environment, Health and Transport Policies*, OECD Publishing, Paris, France (<http://dx.doi.org/10.1787/9789264130807-en>).

Table 5-2 Annual health impacts by scenario, in respective units and year

Health impacts in Serbia	Unit	Pollutant	REF	WEM	WAM A	WAM B	WAM C
			2015	2030	2030	2030	2030
Acute Mortality (All ages)	Premature deaths	O ₃	461	365	358	352	352
Respiratory hospital admissions (>64)	Cases		242	225	221	218	217
Cardiovascular hospital admissions (>64)	Cases		2 061	1 922	1 887	1 854	1 852
Minor Restricted Activity Days (MRADs all ages)	Days		1 415 555	1 082 884	1 063 011	1 044 761	1 043 670
Chronic Mortality (All ages)	Life years lost	PM _{2.5}	92 013	60 363	54 075	46 918	44 221
Chronic Mortality (30yr +) deaths	Premature deaths		9 773	7 373	6 605	5 731	5 401
Infant Mortality (0-1yr)	Premature deaths		9	4	3	3	3
Chronic Bronchitis (27yr +)	Cases		5 934	4 564	4 089	3 548	3 344
Bronchitis in children aged 6 to 12	Added cases		22 762	14 431	12 928	11 217	10 572
Respiratory Hospital Admissions (All ages)	Cases		4 261	3 103	2 780	2 412	2 273
Cardiac Hospital Admissions (All ages)	Cases		5 144	3 746	3 356	2 912	2 744
Restricted Activity Days (all ages)	Days		8 656 749	6 371 784	5 707 963	4 952 499	4 667 841
Asthma symptom days (children 5-19yr)	Days		186 041	117 950	105 662	91 677	86 408
Lost working days (15-64 years)	Days		2 132 518	1 503 675	1 347 020	1 168 739	1 101 563
Bronchitis in children aged 5 to 14	Added cases	NO ₂	2 395	1 348	1 226	1 094	1 075
Respiratory Hospital Admissions (All ages)	Cases		2 113	1 380	1 255	1 120	1 100
Chronic Mortality (All ages)	Life years lost		6 530	3 843	3 495	3 118	3 063
Chronic Mortality (30yr +) deaths mean VSL	Premature deaths		694	469	427	381	374

As presented in the Table 5-2 above the implementation of the WEM scenario will have a major health benefits for Serbia, which indicates the importance of the timely implementation of the National Emission reduction Programme and M2 climate scenario. Chronic mortality is expected to decrease for 34.4% by 2030 compared to 2015. Further decrease in chronic mortality is expected through the implementation of WAM A (-41,2%), WAM B (49,0%) and WAM C (-51,9%) scenarios. Furthermore, asthma symptom days with children (5y-19y) is expected to decrease by 2030 compared to 2015 with implementation of WAM A, WAM B and WAM C scenarios for 43,2%, 50,7% and 53,6% respectively. Implementation of policies and measures contained in the WAM A, WAM B and WAM C scenarios will also save significant amount of working days compared to 2015. WAM A scenario is to save 0,79Mio working days, WAM B 0,96 Mio working days and WAM C as much as 1,03million working days in 2030. When monetising all the health impacts in Serbia as listed in the Table 5-2 above, the aggregated annual health damage expressed in value of life year in 2030 in WAM A scenario is expected to be reduced by 1845Mio€ compared to 2015 damage. Implementation of WAM B scenario would bring additional 385Mio€ of savings in damage compared to WAM A scenario (in total 2.204Mio€ compared to 2015), while for WAM C the total savings in annual health damage would amount to 2335Mio€ which is additional 132Mio€ compared to WAM B Scenario.

Details on aggregated annual health damage expressed both in Value of Statistical Life (VSL) and value of life year (VOLY) are presented in Figure 21 below.

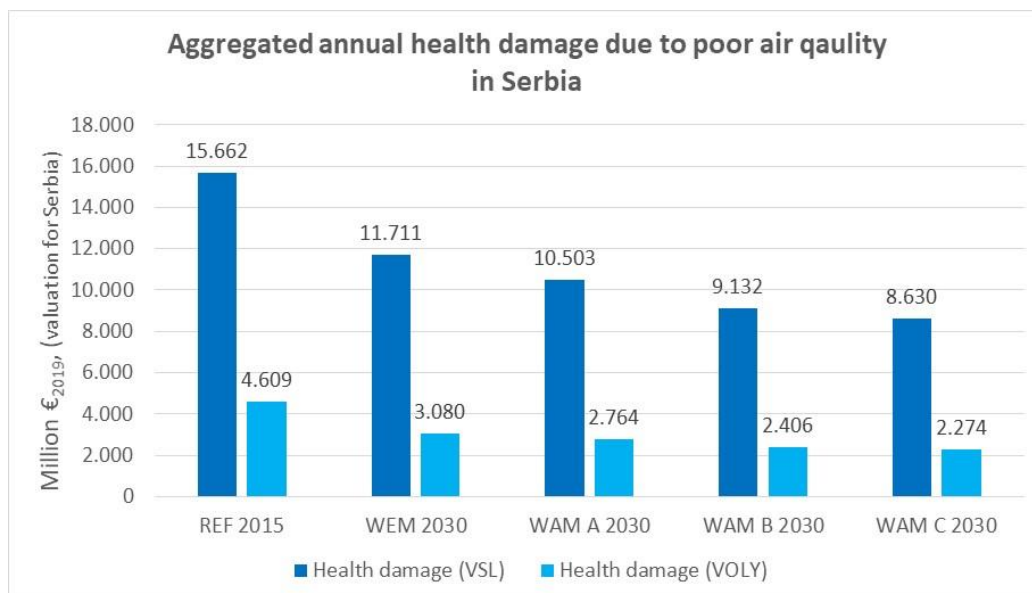


Figure 21 : Aggregated annual health damage due to poor air quality in Serbia

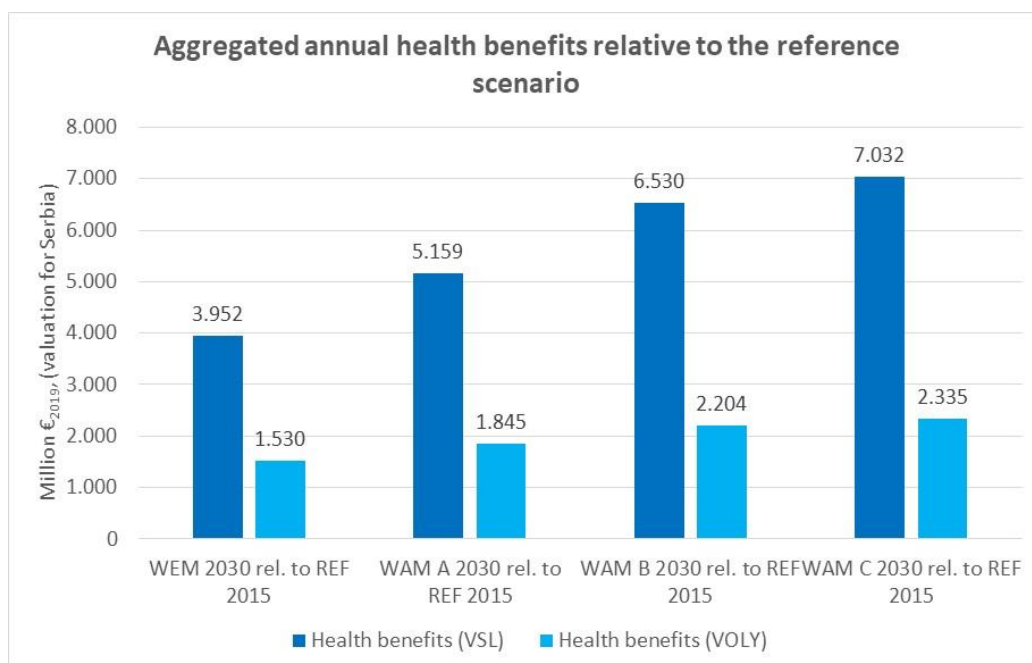


Figure 22 : Aggregated annual health benefits due implementation of different mitigation scenarios

Cost benefit assessment of the scenarios

In principle the cost benefits assessment provides guidance whether health benefits of better ambient air quality outweigh the additional investments need for implementation of policies and measures as contained in the Scenario. In order to get better perspective for the comparison of scenarios the benefits and costs of mitigation scenarios are compared with WEM scenario

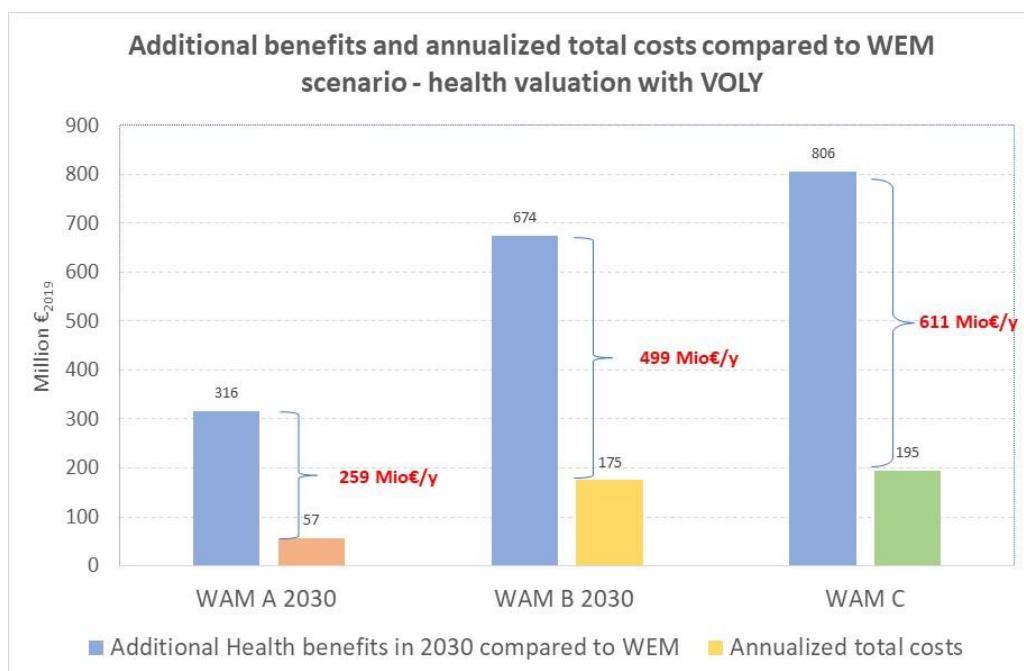


Figure 23 : Cost benefit assessment of mitigation scenarios with VOLY health valuation.

The cost benefit assessment of WAM A, WAM B and WAM C scenarios (Figure 23) show that for all the scenarios the health benefit are on order of magnitude higher than annualised total cost of measures included in scenarios, therefore implementation of any of the scenarios is economically sound and justifiable. The best benefits/cost ratio is for WAM A scenario 5.5, followed by WAM C scenario with ratio of 4.1 and WAM B scenario where benefit/cost ratio is 3.9. In absolute terms the WAM C scenario created the highest net benefits of 611Mio€/y, followed by WAM B scenario with 499Mio€/y and WAM A scenario with 259Mio€/y.

Environmental impacts

Air quality standards for the protection of vegetation, are defined in the EU Ambient Air Quality Directive for NO_x and SO₂ concentrations. Critical levels of respectively 30 µg.m⁻³ and 20 µg.m⁻³ for annual NO₂ and SO₂ concentrations should not be exceeded on rural measurement sites²⁶. For the year 2015 in Serbia, 5 stations were classified as rural background sites but only two did measure SO₂ concentrations and none for NO₂. For the two rural stations measuring SO₂, annual concentrations lower than 10 µg.m⁻³ were measured in 2015, and very low concentrations were simulated for the year 2030. Concerning NO₂, in 2015, 5 stations over 29 showed concentrations higher than 30 µg.m⁻³, but all those stations were classified as traffic, urban or industrial. No peri-urban stations measured concentrations higher than 30 µg.m⁻³. This number is reduced to 2 traffic stations in 2030 for WEM and WAM A and one for WAM B and WAM C.

Thus, although few stations measured rural background concentrations in 2015, the simulations show that critical levels for vegetation will not be exceeded in rural areas in 2030 under any scenario.

²⁶ Sampling points targeted at the protection of vegetation and natural ecosystems shall be sited more than 20 km away from agglomerations or more than 5 km away from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50 000 vehicles per day (Annex III.B.2 of the 2008 Directive).

Territory exposed to ozone exceedances of the target value for the protection of vegetation

The target value of the EU Ambient Air Quality Directive for the protection of vegetation was set to a limit on crops AOT40 of 18000 $\mu\text{g}\cdot\text{m}^{-3}\cdot\text{h}^{-1}$. Crops AOT40²⁷ is defined as the AOT40 measured or simulated at a height of 1m and accumulated over the period May to July. The number of km^2 in exceedances for the reference year and the year 2030, as calculated by the model is given in Table 5-3. It is also expressed in % of the territory.

Table 5-3 Surface in exceedances of the AOT40 target value for vegetation in Serbia

Surface in exceedances of the AOT40 target value in Serbia	Ref (2015)	WEM (2030)	WAM A (2030)	WAM B (2030)	WAM C (2030)
In km^2	1.440.288	53.377	7.237	664	664
In % of the total surface	38,73%	1,44%	0,19%	0,02%	0,02%

The reduction of the area in exceedance between the reference year and the year 2030 with the WEM scenario is spectacular, since it goes from almost 40% of the territory in exceedance to less than 2%. It has mainly to do with the important reduction of NO_x (-50% compared to 2015). VOC emissions reductions also probably played a role, but this reduction is more substantial (-10%). With the most restrictive scenario on pollutant emissions (WAM C) which reduces NO_x and VOC by 60% and 26% respectively compared to the reference year 2015, only 0.02% of the territory still exceeds the target value.

5.2 Stakeholder-led multicriteria analysis to support the selection of the optimum scenario for improvement of air quality in Serbia

A stakeholder-led multicriteria analysis (MCA) was performed through an online questionnaire, which was accompanied by a technical document providing simplified information, so as to be accessible to a wide range of stakeholders, on the three with additional measures scenarios (WAM A, WAM B and WAM C) prepared in the context of the elaboration of this Programme.

The following is a summary of the key results. A detailed analysis of the results of the MCA can be found in Appendix 1.

Three criteria were used, with stakeholders attributing the highest weigh (relative importance) to health (4,36 out of 5), followed by environment (4,27) and economic (4,04).

For the Environment Criterion, three questions were posed:

1. How satisfied are you with the PM10 emissions reductions achieved with scenario WAM A, WAM B and WAM C?
2. How satisfied are you with the number of exceedances of PM10 estimated in WAM A, WAM B and WAM C?
3. How satisfied are you with the number of exceedances of any air pollutants in your city (or the one closest to you) estimated in WAM A, WAM B and WAM C?

For the Health Criterion, one question was posed:

²⁷ AOT40 is an indication of accumulated ozone exposure, expressed in $\mu\text{g}\cdot\text{m}^{-3}\cdot\text{hours}^{-1}$, over a threshold of 40 ppb. It is the sum of the differences between hourly concentrations > 80 $\mu\text{g}\cdot\text{m}^{-3}$ (40 ppb) and 80 $\mu\text{g}\cdot\text{m}^{-3}$ accumulated over all hourly values measured between 08:00 and 20:00 (Central European Time).

1. How satisfied are you with the number of premature deaths associated with air pollution estimated in WAM A, WAM B and WAM C?

For the Economic Criterion, two questions were posed:

1. How satisfied are you with the additional costs estimated for the implementation of WAM A, WAM B and WAM C?
2. How satisfied are you with the net benefits (benefits-costs) estimated in WAM A, WAM B and WAM C?

For all the questions above, without exception, stakeholders showed greater satisfaction with WAM C, followed by WAM B and WAM A.

To illustrate stakeholder's preference for WAM C compared to the other scenarios, Figure 24 shows the results to the question on Satisfaction with the PM10 emissions reductions achieved in each scenario.

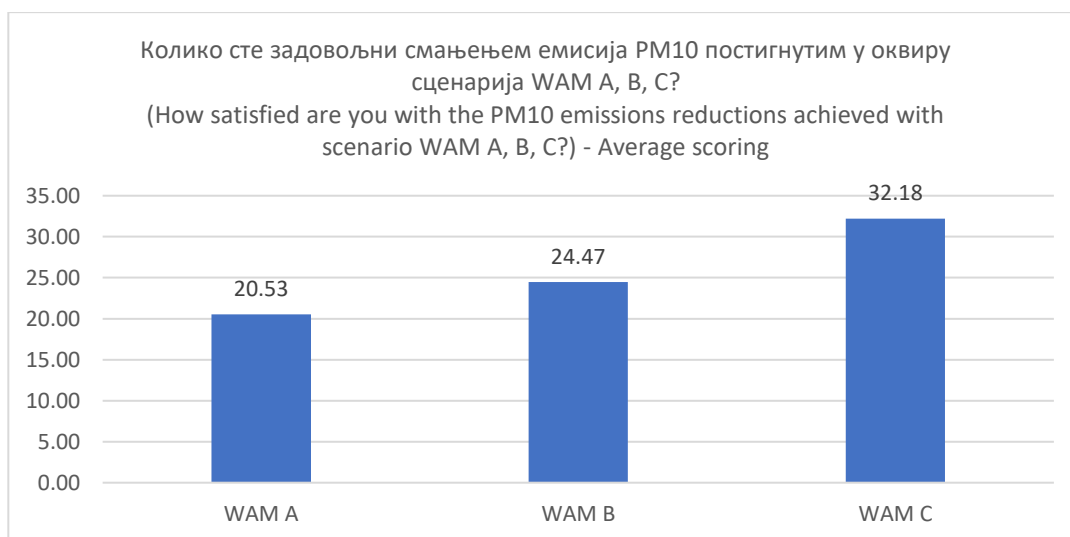


Figure 24 - How satisfied are you with the PM10 emissions reductions achieved with scenario WAM A, B, C? - Average scoring

The results of the stakeholder-led MCA show very clearly that stakeholders want all options to improve ambient air quality to be explored, with a view to ensuring that all Serbians enjoy improved health conditions compared to the current situation. Even when faced slightly with higher costs that will benefit cities with the poorest air quality, stakeholders showed a great sense of solidarity stating very clearly that no Serbian is to be left behind. As such, and while noting that the results of the stakeholder-led MCA are not prescriptive, they support the adoption of WAM C to fulfil the Vision of enshrined in this Programme.

6 GENERAL OBJECTIVE AND SPECIFIC OBJECTIVES

On the basis of the assessment of cost and health and environmental impacts of mitigation scenarios and inputs from the stakeholders, a WAM C scenario is recommended as cost effective and socially fair pathway to the ambient air quality vision for Serbia.

WAM C scenario as a full control scenario has by far the greatest positive environmental impact and health benefit as well as principles follow the principles that citizens are entitled to clean air, while focusing on fine particles which have most damaging effects on human health. Furthermore, the most ambitious WAM C scenario will also have the greatest positive effects not only during the winter inversions but also during the summer heatwaves when air pollution concentrations are also elevated and during which hot temperatures and air pollutants act in synergy to produce more serious health effects than expected from heat or pollution alone.

Additionally, the WAM C is ambitious to support sustainable development and clean energy production within Serbia, and it aims to promote competitiveness through the strengthening of the national competitive profile aligned with the goals and directions in the air quality sector

Starting from these principles the general objective of this program is:

To reduce up to 2030 the health damage due to poor air quality by half compared to 2015 by reducing exposure to air pollution while also limiting the damage on ecosystems

In order to achieve general objective Serbia will need to significantly reduce emissions of SO₂ by 92%, NO_x emissions by 60.6%, PM₁₀ by 50.9 PM_{2.5} by 58.3% VOC by 28.3% and NH₃ by 20% by 2030, compared to 2015 as presented in **Figure 25**

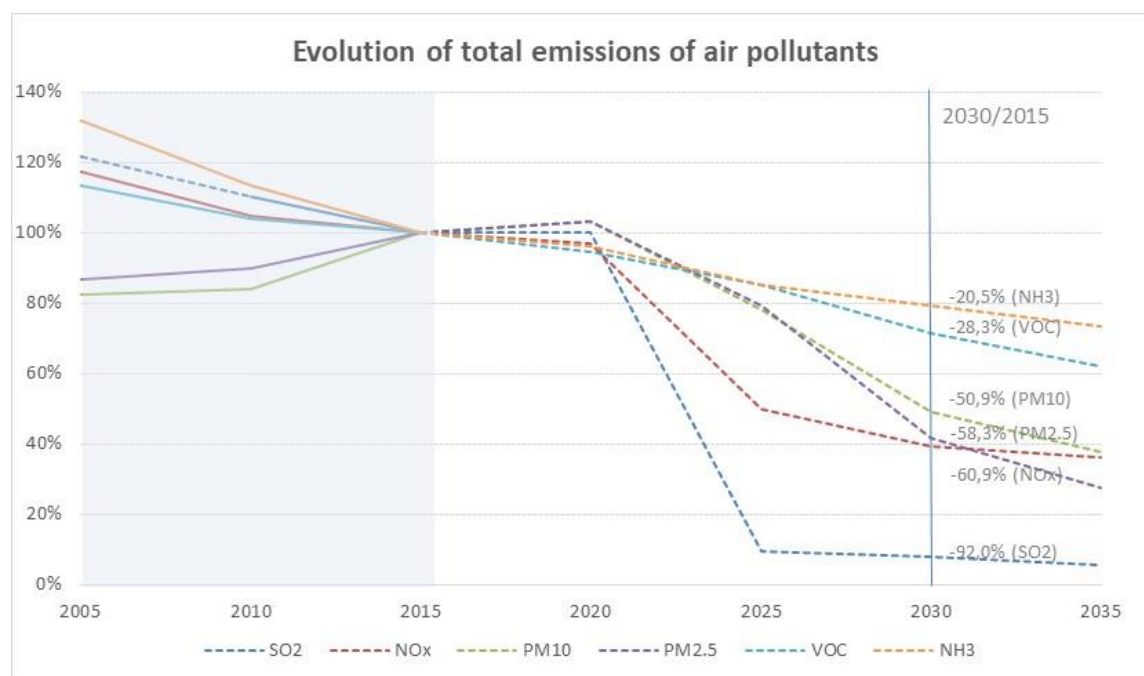


Figure 25 : Air pollutants emission targets enshrined in the general objective

Such reduction of air pollutants at the national level rely on the reduction in different economic sectors. In order to be compliant with the EU legislation and practices **specific objectives** for fulfilment of the general objective of the programme could be defined as:

Specific objective 1: Reduce emissions of SO₂ by 92% and fine particles PM_{2.5} by 58.3% from Energy sector in 2030 compared to 2015

This specific objective the following sectoral targets which have the most important contribution to achievement of the specific objective, compared with 2015 are defined:



- Reduce SO₂ emission from A_Public Power sector by 2030 by 94% and PM_{2.5} by 76%
- Reduce PM_{2.5} from C_Other stationary combustion sector by 2030 by 50%
- Reduce PM_{2.5} from F_Road Transport Sector by 2030 by 44%

Specific objective 2: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels

For ensuring the compliance with the specific and overall objective the following sectoral target is defined:

- Enforcement of the chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor

Specific objective 3: Reduce ammonia emissions from Agriculture sector by 20.5% Compared to 2015

Under this specific objective, the following sectoral targets compared to 2015 are defined

- Reduce NH₃ emissions from manure management by 2030 by 9% compared to 2015
- Reduce NH₃ emissions from animal manure applied to soils by 2030 by 31% compared to 2015

Specific objective 4: Promote transition to clean air for everyone

Activities regarding promotion are horizontal activities and will be realized, among else, through education, training for the implementation of best practices, capacity buildings and awareness raising. List of different measures which realization will ensure fulfilment of specific and by that general objective of the Programme 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 Programme

7 MEASURES AND THEIR ENVIRONMENTAL IMPACTS

Specific measures that ensure achievement of the Programme vision, throughout fulfilment of specific and general objective are presented in Table 3-1. This table also includes the identification of the stakeholders that have an interest in or are under the effect of the measure²⁸.

Table 7-1 Measures to achieve the goals and identification of stakeholders

Specific Objective	Measure	Stakeholders Affected
<i>Specific objective 1: Reduce emissions of SO₂ by 92% and fine particles PM_{2.5} by 58.3% from</i>	Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs	Public electricity and heat producers, Operators of Large industrial installations

²⁸ 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.



Specific Objective	Measure	Stakeholders Affected
<i>Energy sector in 2030 compared to 2015</i>	Enforcement of the EU Directive 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants	Operators of medium sized combustion plants
	Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)	Operators of small and medium enterprises
	Enforcement of minimum Euro standards for second-hand imported vehicles: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	Consumers (road vehicles owners), Road transport services providers Vehicles Imports and sales providers
	Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.	Consumers (road vehicles owners), road transport service providers
	Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery	Suppliers of equipment, Construction companies
	Financial incentives to faster the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	Local communities, households
	Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the sulphur content of certain liquid fuels	Liquid fuel producers and providers
	Limit VOC emissions through enforcement of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)	Petrol storage and distribution infrastructure, petrol transportation companies
<i>Specific objective 2: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels</i>	Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor	Copper smelting company
	Enforcement of the IED Chapter V, Annex VII for VOC or chapter 2 for plants with a consumption of solvents larger than 200 t per year	Companies performing surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating,
<i>Specific objective 3: Reduce ammonia</i>	Implementation of best practices for slurry storage	Operators of Pigs and cattle farms eligible for IPCC permit



Specific Objective	Measure	Stakeholders Affected
<i>emissions from Agriculture sector in 2030 by 20.5% Compared to 2015</i>	Substitution of Urea with ammonium nitrate fertilizer	Farmers and Agricultural land owners
	Introduction of the best practices at spreading for solid manure application by faster incorporation of manure in the soil	Operators of Pig and Poultry farms
	Introduction of best practices at spreading for pig and cattle slurry	Agricultural land owners
	Limitation of the burning of agricultural residues (0% in 2030)	Farmers and Agricultural land owners
<i>Specific objective 4: Promote transition to clean air for everyone</i>	Education on air quality, training for implementation of best practices and awareness raising.	Universities; schools; adult training centres; local communities, households, companies; workers, in particular in the value chain of the sectors with the greatest impact on air quality.

Regarding the environmental impact of specific policies and measures the highest contribution to the achievement of Specific objective 1 has by far Financial incentives for faster replacement of existing domestic heating appliances with Eco-design compliant and heat pumps with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice, which will contribute 63,9% to the PM_{2.5} and as much as 90,6% to the PM₁₀ part of the general objective. This measure is followed by the limitation of the burning of agriculture residues on agriculture lands which contribute 30,8% to the PM_{2.5} related general objective. Enforcement of minimum standards for second-hand vehicles will contribute 63,5% of total necessary NO_x²⁹ emission reductions.

Specific objective 2 is targeting the Industrial processes and product use (mainly use of solvents). The Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor is contributing 33,4% to the total SO₂ emission reductions and 17,3% of the NO_x reduction. It has to be noted that in WAM C scenario this measure is among others also in particularly targeting the SO₂ emissions limit values from copper smelting activities in Bor in order to ensure the compliance of the ambient air in Bor with the SO₂ limit values as contained in the Air quality directive 2008/50/EC.

Measures in specific objective 3 are targeting primarily ammonia emissions, where by far the most important measure is the substitution of urea with ammonium nitrate fertilizer, contributing 70% toward the total NH₃ emission reductions followed by Introduction of best practices at spreading for pig and cattle slurry with 21,4% and Introduction of the best practices at spreading for solid manure application by incorporating the manure in the soil faster with 8.1%.

Detail environmental impacts of measures are presents in Table 7-2 below.

²⁹ NO_x is together with SO₂, VOC and NH₃ a precursor pollutant for PM_{2.5} formation



Table 7-2 Environmental impacts of the measure per pollutant and measure

No.	Measure	Pollutant and its environmental impacts [%]					
		NOx	SO2	VOC	PM10	PM2,5	NH3
1	Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs	4,5%	6,6%		0,3%	0,1%	
2	Enforcement of the EU Directive 2015/20193 Medium Combustion plants	0,9%	54,5%		1,8%	1,5%	
3	Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16)	2,2%			0,0%	0,0%	
4	Enforcement of minimum Euro standards for second-hand vehicles imported: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	56,5%		4,7%	0,6%	0,6%	0,1%
5	Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.	1,4%		0,1%	0,1%	0,1%	0,0%
6	Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery	7,1%		0,5%	0,3%	0,3%	
7	Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	-4,2%	0,5%	49,7%	62,8%	64,0%	2,4%
8	Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the sulphur content of certain liquid fuels		2,7%				
9	Limit VOC emissions through enforcement of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)			3,0%			
10	Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor	15,4%	31,9%	0,6%	3,6%	2,6%	0,1%
11	Enforcement of the IED Chapter V, Annex VII for VOC or chapter 2 for plants with a consumption of solvents larger than 200 t per year			19,0%			
12	Implementation of best practices for slurry storage						0,3%
13	Substitution of Urea with ammonium fertilizers						51,1%
14	Introduction of the best practices at spreading for solid manure application by faster incorporation the manure in the soil						5,9%
15	Introduction of best practices at spreading for pig and cattle slurry						15,6%
16	Limitation of the open burning of agricultural residues on agriculture land (0% in 2030)	16,3%	3,7%	22,4%	30,5%	30,8%	24,5%
	Total	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%



7.1 Measures with main descriptions, pollutants affected, emission savings and implementing entities and partners

Table 7-3 below contains list of measures included in WAM C scenario with information on the type of measures, description of measure, short textual description of the main elements or conceptual approach of the measure including important milestones (expected timing for implementation of the measure), additional objectives to which the measure contributes and Chapter of the EU accession negotiation process under which specific measure is allocate. Each measure also contains the information on key implementing entity, implementation partners, main air pollutants affected and emission reduction potential of the measure by 2025, 2030 and 2035 together with indicator on cost-effectiveness of the measure attributed to one of the main air pollutants.

Table 7-3: List of measures with main descriptions, pollutants affected, emission savings and implementing entities

Specific objective 1: Reduce emissions of SO ₂ by 92% and fine particles PM _{2.5} by 58.3% from Energy sector in 2030 compared to 2015	
WAM-B1	Name of measure/policy: Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs Type of the measure: Regulatory Description of the measure: This measure consists in the enforcement of the directive 2010/75/EU on industrial emissions and especially its chapter II for large combustion plants except NERP installations. Chapter II of the industrial emissions Directive requires an integrated environmental approach to the regulation of certain industrial activities. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. The permit conditions have to be set up in order to achieve a high level of protection for the environment as a whole, based on the use of the best available techniques (BAT). The chapter II of IED requires compliance with BAT Associated Emission Levels (BAT AELs). These BAT AELs are defined in a series of BAT Conclusion Decisions implemented by the EU. When the permit is granted for a plant, the imposed ELVs must be set up to ensure that the emissions of the plant will remain in the range of the BAT AELs. This measure considers that for Large Combustion Plants (LCPs), the ELVs implemented enable the LCPs to comply with the average value between the upper and the lower values of BAT AELs. The recently published Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants applies. The national "Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)" and national "Regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21), were considered in the scenario WEM. In the scenarios WAM A , WAM B and WAM C, the IED impacts the reduction of emissions when the emission limit values (ELVs) are stricter than the existing national ELVs. Monitoring of this measure is to be conducted through Serbian Environmental Protection Agency (SEPA) as responsible for data collection for the National Register of Polluters and issues environmental performance reports. EU related objective: Energy Supply: efficiency improvement in the energy and transformation sectors Energy Consumption: efficiency improvement in industrial end-use sectors Industrial processes: installation of abatement technologies Additional objectives to which the measure contributes: Reduction of total emissions of Serbia to comply with EU directive 2284/2016 Improvement of air quality in Serbia to avoid exceedances of air quality limit values EU Accession Negotiation Process: Chapter 27 – Environment

	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt [air pollutant]]		
	Ministry of Environmental Protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units Competences for issuance of the integrated permits SEPA	NOx	3,8	0,67	0,68	0,85
			SO ₂	1,3	0,59	0,60	0,43
			PM ₁₀	PM are reduced through DeSOx implementation	0,09	0,04	0,06
			PM _{2,5}	PM are reduced through DeSOx implementation	0,04	0,04	0,03
WAM A2.	Name of measure/policy: Enforcement of the EU Directive 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants						
2	<u>Type of the measure:</u> Regulatory						
	<u>Description of the measure:</u> This measure considers the enforcement of the Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCPD) with a thermal power from 1 to 50 MW. The MCPD is not yet fully transposed in the national legislation. The dates of compliance with emission limit values (ELVs) are as follows: ➤ Combustion plants with a thermal power from 5 to 50 MW must comply with ELVs from 2025. ➤ Combustion plants with a thermal power from 1 to 5 MW must comply with ELVs from 2030. A national regulation on emission limit values of pollutants in the air from combustion plants (“Official Gazette of the Republic of Serbia”, No. 6/16) already introduced ELVs for plants in this range of thermal power (The enforcement of the national regulation on emission limit values of pollutants in the air from combustion plants (“Official Gazette of the Republic of Serbia”, No. 6/16) has been considered in the With Exiting Measures scenario (WEM). The MCPD may implement stricter ELVs for some pollutants and for some ranges of thermal power than the national regulation. ELVs are stricter in MCPD for existing plants for SO ₂ and PM in case of solid fuels, for SOx in case of liquid fuels and gaseous fuels other than natural gas. However, the national existing Regulation prescribes ELVs that are more stringent for NOx for all plants with liquid fuels other than gas oil, for plants between 1 and 5 MW with natural gas and for plants larger than 5 MW with gaseous fuels other than natural gas. ELVs for SO ₂ and NOx are stricter in MCPD for new plants using solid fuels, and for SOx, NOx and PM for all liquid fuels and gaseous fuels other than natural gas. Also, according to MCPD, only new plants become objects of aggregation, while in national Regulation all plants become objects of aggregation. Finally, MCPD does not prescribe ELVs for CO, N ₂ O and Total Organic Carbon (TOC), as is the case with the national Regulation. The MCPD will have impacts on SO ₂ , NOx and PM emissions, when it prescribes limit values stricter than the existing national regulation on emission limit values of pollutants in the air from combustion plants (“Official Gazette of the Republic of Serbia”, No. 6/16)						



EU related objective:

Energy Consumption: efficiency improvement in industrial end-use sectors

Energy Consumption: efficiency improvement in services/tertiary sector

Energy Consumption: efficiency improvement in buildings

Industrial processes: installation of abatement technologies

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016

Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 – Environment]

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Environmental Protection	Ministry of Mining and Energy SEPA Ministry of construction, transport and Infrastructure	NOx	2,7	0,09	0,15	0,16
		SO ₂	1,1	4,64	4,99	4,34
		PM ₁₀	1,9	0,18	0,47	0,48
		PM _{2,5}		0,16	0,39	0,40

WAM A3 Name of measure/policy: **Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)**

Type of the measure: Regulatory

Description of the measure:

This measure considers the enforcement of the limit values from the national Regulation on limit values of emissions of pollutants into the air from combustion plants (official gazette of the republic of Serbia, no. 6/16) for combustion plants with a rated thermal capacity lower than 1 MW using solid fuels, liquid fuels or natural gas. Combustion plants from 1 to 5 MW using liquid fuels and from 1 to 10 MW using natural gas, considered as small combustion plants in the current national regulation are now subject of the MCPD (Measure No.2)).

These combustion plants are subject to construction permit mainly.

All combustion small plants are assumed to be compliant with emission limit values from 2025.

EU related objective: :

Energy Consumption: efficiency improvement in industrial end-use sectors

Energy Consumption: efficiency improvement in services/tertiary sector



Energy Consumption: efficiency improvement in buildings
Industrial processes: installation of abatement technologies

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016

Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 – Environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Environmental Protection	Ministry of Mining and Energy, SEPA, Ministry of construction, transport and Infrastructure	NOx	0,8	0,36	0,33	0,31
		PM ₁₀	7,8	0,01	0,01	0,02
		PM _{2,5}		0,01	0,01	0,01

WAM
B4

Name of measure/policy: **Enforcement of minimum Euro standards for second-hand imported vehicles: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025**

Type of the measure: Regulatory

Description of the measure:

The measure aims at reducing emissions of pollutants from road traffic (predominantly NOx and PM) by improvement of the characteristics of the fleet of vehicles.

It considers that minimum standards are imposed to second-hand vehicles imported:

Euro 5 for passenger cars and light duty vehicles and Euro V for heavy duty vehicles and busses from 1st January 2024

Euro 6 for passenger cars and light duty vehicles and Euro VI for heavy duty vehicles and busses from 1st January 2025

4

EU related objective:

Transports - efficiency improvement of vehicles

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016

Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 – Environment



	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt [air pollutant]]		
	Ministry of Construction, Transport and Infrastructure	Road Traffic Safety Agency (RTSA), Ministry of Environmental Protection, Ministry of Finance	NOx	12,0	3,03	8,65	4,80
			PM ₁₀		0,06	0,15	0,06
			PM _{2.5}		0,06	0,15	0,06
			VOC		0,47	1,03	0,73
WAM B5	Name of measure/policy: Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.						
5	Type of the measure: Financial						
	Description of a measure:						
	The measure aims at reducing emissions, especially PM, from road traffic by eliminating the oldest vehicles which complies with significantly lower environmental standards. The measure focusses on the old diesel vehicles such as:						
	passenger cars and light duty Euro 1, Euro 2 and Euro 3 vehicles and Euro I, Euro II and Euro III diesel busses						
	The measure considers that financial incentives will enable the scrapping of the oldest vehicles in the vehicle fleet. The target number of vehicles removed through the scrapping programme, is as follows:						
		2024	2025	2026			
	Diesel Passenger cars	68 300	39 300	16 300			
	Diesel light duty vehicles	7 700	5 100	1 200			
	Diesel buses	1 200	700	400			
	Total	77 200	45 100	17 900			
The financial incentives represent 35 % of the costs of second hand Euro 6 or EURO VI vehicles. This measure is associated to the measure No 4.							
The proposed financial incentives are as follows:							
Diesel passenger car: 2100 €							
Light duty diesel vehicles: 2500 €							
Busses: 2900 €							
EU related objective:							
Transports - efficiency improvement of vehicles							



Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016
Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 – Environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Construction, Transport and Infrastructure	Road Traffic Safety Agency (RTSA), Ministry of Environmental Protection, Ministry of Finance Recyclers association of Serbia	NOx	33,0	0,852	0,215	0,059
		PM ₁₀		0,060	0,016	0,004
		PM _{2.5}		0,058	0,015	0,004
		VOC		0,050	0,014	0,004
		NH ₃		-0,004	-0,001	0,000

WAM A6 Name of measure/policy: **Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery**

Type of the measure: Regulatory

Description of a measure:

This measure is the enforcement of limit values for main pollutants of the EU Directive 2016/1628 for new non road mobile machineries (NRMM).

There is a large variety of non-road mobile machinery included in the scope of the legislation. It covers among other:

- Construction machinery (e.g. excavators and bulldozers)
- Agricultural machinery (e.g. self-propelled sprayers and harvesting equipment)
- Material handling machinery (e.g. cranes and industrial trucks)
- Garden machinery (e.g. lawnmowers and hedge trimmers)
- Municipal equipment (e.g. road sweepers and winter maintenance equipment)
- Mobile generator sets
- Engines in vessels...

The impact of the measure is taken in account for construction machinery and agriculture machinery.

EU related objective:

Transport: efficiency of vehicles

Additional objectives to which the measure contributes:



*Reduction of total emissions of Serbia to comply with EU directive 2284/2016
Improvement of air quality in Serbia to avoid exceedances of air quality limit values*

EU Accession Negotiation Process: Chapter 27, environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Construction, Transport and Infrastructure	Road Traffic Safety Agency (RTSA), Ministry of Environmental Protection	NOx	2,5	0,213	1,083	1,780
		PM ₁₀		0,013	0,076	0,125
		PM _{2.5}		0,013	0,076	0,125
		VOC		0,021	0,107	0,176

WAM C1 Name of measure/policy: **Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice**

Type of the measure: Regulatory, Financial

Description of a measure:

This measure considers the enforcement of the EU Eco-design Directive and its two associated regulations 2015/1185 and 2015/1189:

- Regulation 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel boilers.
- Regulation 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel local space heaters

Compared to the natural rate of replacement of 5% per year, the rate is at least doubled with the financial incentives from 2026.

New appliances put on the market must satisfy the requirements of the two regulations implementing emission limit values for a set of pollutants (PM, NOx, VOC) and energy efficiency parameters for new appliances. Consequently, new appliances produced or imported in Serbia must at minimum be compliant with the new limit values. These limit values are controlled at the level of the production process, not on sites where they are used.

The measure assumes that all the necessary amendments to existing regulations are in place before 2025, in order to enable this replacement from 2024.

The measure considers that financial incentives will enable a faster replacement of domestic heating appliances using solid fuels.

Public financial support is developed for ensuring a faster replacement of old appliances in the whole Serbia. Moreover, a specific emphasis is given to 5 cities to accelerate the changes compared to rest of Serbia, in order to ensure compliance with PM₁₀ and PM_{2.5} air quality limit values in 2030. In these five cities, the level of PM emission reduction must be larger than in the rest Serbia. The reductions of PM necessary to ensure the compliance with air quality limit values are as follows, compared to 2015 emissions:

Beograd: -56%; Kragujevac: -54%; Niš: -73%; Valjevo: -73%; Užice: -81%; Rest of the territory: -46%

Since such reductions in the agglomerations listed above cannot be achieved with natural substitution of appliances using coal and firewood, the planned incentives should achieve the following substitution. The measure considers a larger penetration of pellet appliances in the five agglomerations/cities with most severe air quality issues and the use of heat pumps not emitting directly PM in Nis, Valjevo and Užice.

In Kragujevac at least 58% of the appliances shall be replaced with Eco-label appliances of which at least 25% of pellet appliances

In Belgrade at least 58% of the appliances shall be replaced by only pellet appliances

In Valjevo and Nis at least 74% of the appliances shall be replaced by up to 50% of pellet appliances and 50% or more of heat pumps and

In Užice at least 80% of appliances shall be replaced by 85% or more of heat pumps and up to 15% with pellet appliances

The level of financial subsidies is as follows: 50 % in the whole territory of Serbia excepted Beograd, Kragujevac, Nis, Valjevo and Užice where subsidies at the level of of 80% of investment are considered.

In absolute values the following support is considered for the WAM C scenario.

- Eco-labelled log wood stove: 240 € to 380 €; Eco-labelled pellet stove: 400 € to 640 €. Heat pump (simple heat pump for heating and cooling+ LPG stove) replacing a firewood stove: 440 € to 700 €
- Eco-labelled boiler: 800 € to 1300 €; Eco-labelled pellet boiler: 1200 € to 1900 €.
- Heat pump (heat pump for heating and cooling) replacing a solid fuels boiler: 1860 € to 3000 €

In order to contribute to the general objective of M2 climate change scenario, no subsidies are considered for Eco-labeled coal stoves or other coal appliances or boilers.

Starting with a low rate of replacement from 2024 to 2025 (2 and 4%), the target replacement rate of 10% per year from 2026 to 2030 (compared to a natural rate of 5%) is envisaged. After 2030, the natural rate of replacement is considered. Overall the implementation of this measure is expected to achieve that 57% of appliances using solid biomass and coal will be replaced by 2030 and 82% of such appliances by 2035.

For implementation of this support measure additional 15FTE is estimated to be needed, of which 7 at MEP for Zone Serbia, 3 for Agglomeration Belgrade, 2 for Niš, 1 for Kragujevac, 1 for Valjevo and 1 for Niš

EU related objective:

Energy Consumption: efficiency improvement in buildings

Additional objectives to which the measure contributes:

Reduction of pollutant emissions especially PM₁₀ and PM_{2.5}.

Crucial measures to reduce emissions of PM and improve air quality in terms of PM concentrations

EU Accession Negotiation Process: Chapter 27 – Environment



	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt [air pollutant]]		
	Ministry of Mining and Energy	Ministry of Finance Ministry of Environmental Protection Cities of Kragujevac, Beograd, Nis, Valjevo and Užice Conformity Assessment Bodies (CABs)	PM ₁₀	2,1	1,780	16,480	23,653
			PM _{2.5}		1,734	16,048	23,028
			VOC		0,393	10,861	15,505
			NO _x		-0,059	-0,641	-0,933
			SO ₂		0,008	0,050	0,053
			NH ₃		0,008	0,050	0,053
WAM A7	Name of measure/policy: <u>Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the sulphur content of certain liquid fuels</u>						
8	<u>Type of the measure:</u> Regulatory <u>Description of a measure:</u> The Directive (EU) 2016/802 of the European Parliament and of the Council of 11 May 2016 relating to a reduction in the Sulphur content of certain liquid fuels introduces the maximum content of Sulphur for certain fuels: heavy fuel oil: 1%; gas oil: 0,1%; marine fuels: 0,5%; marine fuels used at berth: 0,1%. The Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC, applies to petrol, diesel and biofuels used in road transport and gasoil used in non-road-mobile machinery. Sulphur content in fuels for mobile non-road vehicles (including mobile machinery, agricultural and forestry tractors, as well as inland waterway vessels and recreational crafts) was limited to 1000 ppm from 2008, and 10 ppm from 2011. The measure considers the limitation of S concentrations in fuels used in the non-road mobile machineries used in construction and industry, in agriculture and forestry and in vessels. The reduction of the Sulphur content of heavy fuel is considered in industry and LCPs but it has to be reminded that the limit values implemented with the IED and MCPD are stricter than what the fuel with 1 % S can bring. Full compliance can be assumed to be obtained in 2021 for stationary combustion and by 2025 when fuels with sulphur content less than 0,5% will be available for vessels for river navigation. <u>EU related objective:</u> 8: other: improvement of the fuel quality <u>Additional objectives to which the measure contributes:</u>						

	Reduce SO₂ emissions Contribute to the improvement of air quality in Serbia EU Accession Negotiation Process: Chapter 27 – Environment						
	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt [air pollutant]]		
	Ministry of Mining and Energy	Ministry of Construction, Transport and Infrastructure (Sector for Water Transport and Safety of Navigation) Ministry of Finance	SO ₂	0,2	0,24	0,24	0,26
WAM A8	Name of measure/policy: <u>Limit VOC emissions through enforcement of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)</u>						
9	Type of the measure: Regulatory Description of a measure: The measure aims at limiting VOC emissions from all the petrol distribution from the terminals, the intermediate stationary tanks and petrol stations by implementing the requirements of Directive 94/63/EC on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations (VOC Petrol Stage I) and Directive 2009/126/EC on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations (VOC Petrol Stage II). The emissions of VOC are limited at terminal by several means such as tanks with external floating roofs with primary and secondary seals and loading and unloading equipment are designed to reduce the total annual losses of VOC as required by the EU directive 94/63/EC. The displaced vapours are returned through a vapour tight connection line to a vapour recovery unit for regeneration at the terminal. Mobile containers are designed and operated to remain vapours returned from storage installations. At the service station level, the loading and storage equipment are designed to reduce VOC losses as required by the EU directive 94/63/EC. The stage II petrol vapour recovery involves recovering the petrol vapour displaced from the fuel tank of a vehicle during refuelling and transferring that petrol vapour to the underground storage. The minimum efficiencies to be achieved are provided by the two directives. It has been considered the full petrol distribution chain will be compliant with the requirement of the two directives in 2028 as described in the DSIP for the implementation of the two directives (version August 2021). EU related objective: 8 Other: limit fugitive VOC emissions from the petrol distribution						



Additional objectives to which the measure contributes:

Reduce VOC emissions

Contribute to the improvement of air quality in Serbia

EU Accession Negotiation Process: Chapter 27 – Environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt [air pollutant]]		
Ministry of Environmental Protection	Ministry Mining and Energy, SEPA	VOC	9,4	0,118	0,657	0,568

Specific objective 2: Reduce emission of air pollutants from industrial processes and product use through compliance with BAT associated emission levels

WAM C2	Name of measure/policy: <u>Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor</u>
10	<u>Type of the measure:</u> Regulatory <u>Description of a measure:</u> This measure consists in the enforcement of the directive 2010/75/EU on industrial emissions and especially its Chapter II for large industrial processes covered by its Annex I. Chapter II of the industrial emissions Directive requires an integrated environmental approach to the regulation of certain industrial activities listed in the Annex I. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. The permit conditions have to be set up in order to achieve a high level of protection for the environment as a whole, based on the use of the best available techniques (BAT). The Chapter II of IED requires compliance with BAT Associated Emission Levels (BAT AELs). These BAT AELs are defined in a series of BAT Conclusion Decisions implemented by the EU. When the permit is granted for a plant, the imposed ELVs must be set up to ensure that the pollutant emissions of the plant will remain in the range of the BAT AELs. This measure considers that for large industrial plants, the ELVs implemented enable the plants to comply with the average value between the upper and the lower values of BAT AELs (it was only the upper level in the WAM A scenario).

Most of industrial plants will be compliant with the mean level of the BAT AELs range from 2025, except for those asking for an implementation extension period to be compliant by 2030 as the Project "IED Serbia: Further Implementation of the Industrial Emissions Directive"³⁰, BAT Conclusion decisions which provide the BAT AEL ranges for each industrial sector covered by the directive, have been published by the EU³¹.

In addition in this measure, stricter limit values are considered for plants in the city of Bor since mid AEL values were not sufficient to ensure compliance with air quality limit values for SO₂ in the city of Bor. In order to comply to the SO₂ related air quality limit values, the SO₂ emissions have to be additionally reduced. This reduction can be achieved by enforcing the lower values of the BAT AELs for the production of copper of 50 mg/Nm³ (the range of BAT AELs is 50 to 500 mg/Nm³) and 100 mg/Nm³ for the Sulphuric Acid production (the BAT AELs range from 30 to 680 mg/Nm³).

EU related objective:

Industrial processes :

- installation of abatement technologies,
- improved control of fugitive emissions from industrial processes,

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016

Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 - Environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Environmental Protection:	Provincial Secretariat for Construction and Environmental Protection and local self-government units Autonomous Province of Vojvodina	NOx	2,68	0,6	2,4	2,5
		SO ₂	0,79	2,8	2,9	3,0
		PM ₁₀	4,01	0,6	0,9	1,0
		PM _{2.5}		0,4	0,6	0,7
		VOC	1,70	0,1	0,1	0,1

³⁰ Project was supported through Swedish International Development and Cooperation and (<https://www.iedserbia.org/>)

³¹ <https://eippcb.jrc.ec.europa.eu/reference/>

WAM-B6	Name of measure/policy: Name of measure/policy: Enforcement of the IED Chapter V, Annex VII for VOC or chapter 2 for plants with a of solvents consumption larger than 200 t
11	Type of the measure: Regulatory Description of a measure: This measure consists in the enforcement of the directive 2010/75/EU on industrial emissions and especially its chapter V for the use of solvents in certain activities. Some installations may have a consumption of solvents larger than 200 t/year. In that case, the Chapter II applies and installations require an integrated environmental permit. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. The permit conditions have to be set up in order to achieve a high level of protection for the environment as a whole, based on the use of the best available techniques (BAT). The Chapter II of IED requires compliance with BAT Associated Emission Levels (BAT AELs). The recently published Commission Implementing Decision (EU) 2020/2009 of 22 June 2020 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for surface treatment using organic solvents including preservation of wood and wood products with chemicals, define the BAT AELs for the different activities. When the permit is granted for a plant, the imposed ELVs must be set up to ensure that the emissions of the plant will remain in the range of the BAT AELs. For other installations, not consuming more than 200 t solvent per year, the limit values of annex V apply. The Republic of Serbia developed a “Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)” and Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (OGRS N°100/11) which are consistent with the previous EU Directive 1999/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations. This regulation was not yet fully enforced. Currently, the Royal Norwegian Embassy in Belgrade financially supports implementation of a project to close this gap. The project implementation period is 4 years, starting from 1 December 2018, and closing on 30 November 2022. The component of the project covers the following items: Activity 1: full transposition of Chapter V of the Industrial Emissions Directive (IED). Activity 2: the project provides the competent Ministry and the Environmental Protection Agency of the Republic of Serbia (SEPA) with complete technical support for the implementation of legal framework prepared under Activity 1. Technical support includes preparation of a preliminary list of VOC operators, as well as development, testing and start-up of the electronic registration and reporting system for entities classified as VOC operators. Activity 3: capacity building. Activity 4: information and communication related to VOC regulations. The measure considers the implementations of the limit values or BAT AELs by 2025. EU related objective: 4. Industrial processes - Installation of abatement techniques 4. Industrial processes - Improved control of fugitive emissions from industrial processes

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016

Improvement of air quality in Serbia to avoid exceedances of air quality limit values

EU Accession Negotiation Process: Chapter 27 - Environment

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt [air pollutant]]		
Ministry of Environmental Protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units, SEPA	VOC	1,22	4,21	4,15	4,10

Specific objective 3: Reduce ammonia emissions from Agriculture sector by 20.5% Compared to 2015

WAM-B9

Name of measure/policy: Introduction of best practices for slurry storage

Type of the measure: Education, Information

Description of a measure:

The measure aims at covering slurry storage, with a specific cover (pigs) or with a natural crust (cattle).

For pig manure, a flexible cover can be fitted to pig slurry storage, giving 60% emission reduction. This measure has been implemented only for a share of the pigs IPCC farms.

For cattle, slurry stores are assumed to develop a natural surface crust, which is an effective cover giving an emission reduction of 40%. It is important to note that the crust will only form if the dry matter is high enough (> 7%) and stirring can be minimized. The crust should cover the whole surface area of the manure. The store should be filled from below the crust to avoid breaking it up. Efficiency of crusts depends on how fully they cover the manure surface, which depends on their thickness, completeness, and duration. This measure has been implemented only for dairy cows.

Target values for implementation of this measure is to ensure that by 2030 1,9% of Pig manure will be covered and 3.3% dairy cows manure – Natural crust will be covered.

EU related objective:

Agriculture - improved animal waste management systems;

Additional objectives to which the measure contributes:

Reduction of total emissions of Serbia to comply with EU directive 2284/2016



_Improvement of air quality in Serbia to avoid exceedances of air quality limit values (less secondary PM)						
EU Accession Negotiation Process: [Chapter 27 – Environment]						
Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
				[kt (air pollutant)]		
Ministry of Environmental Protection	Ministry of Agriculture, Forestry and Water Management , Autonomous Province of Vojvodina Local self-government units, SEPA	NH ₃	2,7	0,02	0,03	0,05
WAM-B8	Name of measure/policy: <u>Substitution of urea with ammonium nitrate fertilizer</u>					
13	Type of the measure: Education, Information					
	Description of a measure: NH ₃ emissions from urea-based fertilizers (typically 5%–40% N loss as NH ₃) are much larger than those emitted with ammonium nitrate (typically 0,5%–5% N loss as NH ₃). Switching from urea to ammonium nitrate fertilizer is a rather easy way to reduce NH ₃ emissions, with a good efficiency as it can reduce emissions by around 90%. In Serbia, urea is the only urea-based fertilizers consumed, there is no nitrogen solutions. This measure aims at decreasing the share of urea in the mix of mineral nitrogen spread, replacing it by ammonium nitrate. By 2030 Share of urea in total mineral nitrogen should drop to 21,6%, while share of ammonium nitrate in total mineral nitrogen in the same period shall increase to 57,8%.					
	EU related objective: Agriculture - low-emission application of fertilizer/manure on cropland and grassland					
	Additional objectives to which the measure contributes: Reduction of total emissions of Serbia to comply with EU directive 2284/2016 Improvement of air quality in Serbia to avoid exceedances of air quality limit values (less secondary PM)					
	EU Accession Negotiation Process: [Chapter 27 – Environment]					
	Key Implementing entity	Implementation partners			Absolute emission avoided 2025, 2030, 2035	



			Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	[kt (air pollutant)]		
	Ministry of Agriculture, Forestry and Water Management Ministry of Environmental Protection (for IPPC farms)	Agricultural Advisory Service, Directorate for Agrarian Payments, Administration for Agricultural land, Chamber of Commerce of Republic of Serbia, Farmers	NH ₃	0,76	3,80	6,56	7,15
WAM A11	Name of measure/policy: Introduction of the best practices at spreading for solid manure application by faster incorporation of manure in the soil						
14	Type of the measure: Education, Information Description of a measure: Rapid incorporation of solid manure (within 4 hours, 12 hours and 24 hours) reduces NH ₃ emissions at spreading. The shorter the delay of incorporation, the higher the reduction obtained. For pig and poultry manure, this measure aims at developing rapid incorporation within 4 hours and 12 hours. It applies to IPPC farms but also to part of other pigs and poultry farms not included in the IPPC perimeter. For cattle manure, this measure aims at developing rapid incorporation within 4 hours, 12 hours and 24 hours. EU related objective: Agriculture - low-emission application of fertilizer/manure on cropland and grassland Additional objectives to which the measure contributes: Reduction of total emissions of Serbia to comply with EU directive 2284/2016 Improvement of air quality in Serbia to avoid exceedances of air quality limit values EU Accession Negotiation Process: [Chapter 27 – Environment]						
	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt (air pollutant)]		
	Ministry of Agriculture, Forestry and Water Management	Agricultural Advisory Service, Directorate for Agrarian Payments, Administration for	NH ₃	3,09	0,45	0,76	1,04

	Ministry of Environmental Protection (for IPCC farms)	Agricultural land, Chamber of Commerce of Republic of Serbia, Farmers					
WAM B7.	Name of measure/policy: <u>Introduction of best practices at spreading for pig and cattle slurry</u>						
15	<u>Type of the measure:</u> Source-based pollution control						
	<u>Description of a measure:</u> In order to reduce NH ₃ emissions from manure spreading, there are systems for application of liquid manure using surface band-spreading or injection methods as compared with the traditional broadcast surface spreading. The UNECE Code estimates that these spreading methods typically reduce NH ₃ emissions by around 80% (injection), 30% to 60% (trailing shoe) or 30% (trailing hose). Furthermore, rapid incorporation of slurry (within 4 hours and 12 hours) reduces NH ₃ emissions at spreading. The shorter the delay of incorporation, the higher the reduction obtained. Low NH ₃ emission manure spreading can become part of an overall strategy of farmers to improve nitrogen management, which improves efficiency, and either reduces costs or increases harvest revenue. This measure aims at developing pig and cattle slurry application by injection and trailing hose followed by an incorporation within 4 hours and 12 hours. For pigs, it applies to IPPC farms but also to part of other pig farms.						
	<u>EU related objective:</u> Agriculture - low-emission application of fertilizer/manure on cropland and grassland						
	<u>Additional objectives to which the measure contributes:</u> Reduction of total emissions of Serbia to comply with EU directive 2284/2016 Improvement of air quality in Serbia to avoid exceedances of air quality limit values (less secondary PM)						
	<u>EU Accession Negotiation Process: [Chapter 27 – Environment]</u>						
	Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035		
					[kt [air pollutant]]		
	Ministry of Agriculture, Forestry and Water Management Ministry of Environmental Protection (for IPCC farms)	Agricultural Advisory Service, Directorate for Agrarian Payments, Administration for Agricultural land, Chamber of Commerce of Republic of Serbia, Farmers	NH ₃	1,30	1,20	2,01	2,72
WAM-C3	Name of measure/policy: <u>Limitation of the burning of agricultural residues (0% in 2030)</u>						

16	Type of the measure: Regulatory																																									
	Description of a measure: This measure aims at developing the incorporation of crop residues into soils instead of burning. Field burning of agricultural residues is legally restricted in Serbia but it is spread and tolerated despite being forbidden by the Law on Agriculture Land and by Law on fire Protection. Open burning of agricultural residues produces all pollutants emissions but is mainly pointed out regarding PM _{2,5} emissions. Multiple co-benefits are associated to the incorporation of crop residues into soils (for example: nutrients such as carbon and nitrogen returning to soil).																																									
	EU related objective: Agriculture - other agriculture.																																									
	Additional objectives to which the measure contributes: Reduction of total emissions of Serbia to comply with EU directive 2284/2016 Improvement of air quality in Serbia to avoid exceedances of air quality limit values (less secondary PM)																																									
	EU Accession Negotiation Process: [Chapter 27 – Environment]																																									
	<table> <tr> <th rowspan="2">Key Implementing entity</th><th rowspan="2">Implementation partners</th><th rowspan="2">Main air pollutants affected</th><th rowspan="2">Cost effectiveness [€/kg (air pollutant)]</th><th colspan="3">Absolute emission avoided 2025, 2030, 2035</th></tr> <tr> <th colspan="3">[kt [air pollutant]]</th></tr> <tr> <td rowspan="6">Ministry of Agriculture, Forestry and Water Management</td><td rowspan="6">Ministry of Interior</td><td>NOx</td><td rowspan="6">1,17</td><td>1,245</td><td>2,490</td><td>2,586</td></tr> <tr> <td>SO₂</td><td>0,169</td><td>0,338</td><td>0,351</td></tr> <tr> <td>PM₁₀</td><td>4,008</td><td>8,017</td><td>8,325</td></tr> <tr> <td>PM_{2,5}</td><td>3,864</td><td>7,729</td><td>8,026</td></tr> <tr> <td>VOC</td><td>2,451</td><td>4,902</td><td>5,090</td></tr> <tr> <td>NH₃</td><td>1,576</td><td>3,152</td><td>3,273</td></tr> </table>						Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035			[kt [air pollutant]]			Ministry of Agriculture, Forestry and Water Management	Ministry of Interior	NOx	1,17	1,245	2,490	2,586	SO ₂	0,169	0,338	0,351	PM ₁₀	4,008	8,017	8,325	PM _{2,5}	3,864	7,729	8,026	VOC	2,451	4,902	5,090	NH ₃	1,576	3,152
Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035																																						
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		PM ₁₀		4,008	8,017	8,325																																				
		PM _{2,5}		3,864	7,729	8,026																																				
		VOC		2,451	4,902	5,090																																				
		NH ₃		1,576	3,152	3,273																																				

Specific objective 4: Promote transition to clean air for everyone

WAM-C4	Name of measure/policy: <u>Education on air quality, training for implementation of best practices and awareness raising</u>
17	Type of the measure: Information,-education



Description of a measure: Combating ambient air pollution 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, capacity building and awareness raising.

The implementation of the measures included in this action plan and the achievement of the general and specific objectives inscribed in the Programme will the increase of activities, in particular in energy related services to households (replacing the heating system, old boiler, installation of new Eco-label devices and clean technology solutions).

The proposed promotion activities shall include at least the following 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 the health effects of air pollution in school curricula; recommendations on university studies may also be integrated in the plan.
- Capacity building, awareness raising campaigns and counselling to the households about the proper use of small appliances using solid fuels and conducting the assessment of the moisture content of the wooden biomass.
- Establishing of the mobile demonstration centre (or equivalent) for knowledge sharing regarding the proper use of biomass in small appliances and boilers
- Awareness raising and education of farmers regarding the implementation of good practices to mitigate ammonia emissions, prevent excessive nitrogen intake and to protect the underground water.
- Other 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 programme.
- Awareness campaigns to stimulate the old polluting technologies phase out and replacement with clean energy sources

EU related objective:

Other – Awareness raising activities;

Additional objectives to which the measure contributes:

Improving the energy efficiency of final energy consumption

Reduction of GHG emissions

EU Accession Negotiation Process: [Chapter 27 – Environment]

Key Implementing entity	Implementation partners	Main air pollutants affected	Cost effectiveness [€/kg (air pollutant)]	Absolute emission avoided 2025, 2030, 2035
				[kt [air pollutant]]



	Ministry of Environmental Protection	Ministry of Education, Science and Technological Development, Ministry of Health, Local self-government units, Autonomous Province of Vojvodina, Serbian Environmental Protection Agency, Chamber of Commerce of Republic of Serbia, Research Institutions	PM ₁₀ , PM _{2.5} , NO _x	n.a.	n.a.	n.a.	n.a.
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7.2 Costs, financing and timeline for the implementation of measures and its activities by 2030

7.2.1 Cost of implementation

Measures proposed by the Programme require additional investments across different sectors compared to with existing measures scenario. These additional investment costs are estimated at 2964Mln EUR for the period 2022-2030.

Such additional investment costs will be shared among consumers/households (for example in buying more efficient and less polluting cars and heating appliances or switching the fuel used for heating), investors, e.g. public or private companies and farmers (new end of pipe technologies to meet BAT AELs, new slurry storage techniques) and the State. Since the measures for achieving the set goals do not require State investment costs, it is planned that State budget will contribute to the financing of the measures implemented mainly by consumers³². It is envisaged that Consumers will bear 65,9% of the investment costs and Investors the remaining 34.1%.

Out of the total investment costs 91,6% or 2715 Mln€ of the costs is to be dedicated for implementation of measures under Specific objective 1 (of which 763,6Mln€ or 28,1% is to be covered by investors), 195,6 Mln€ (6,6%) for implementation of Specific objective 2 (all to be covered by investors) and 52,7Mln€ (1.8%) for implementation of measures under Specific objective 3 (all to be covered by investors-farmers).

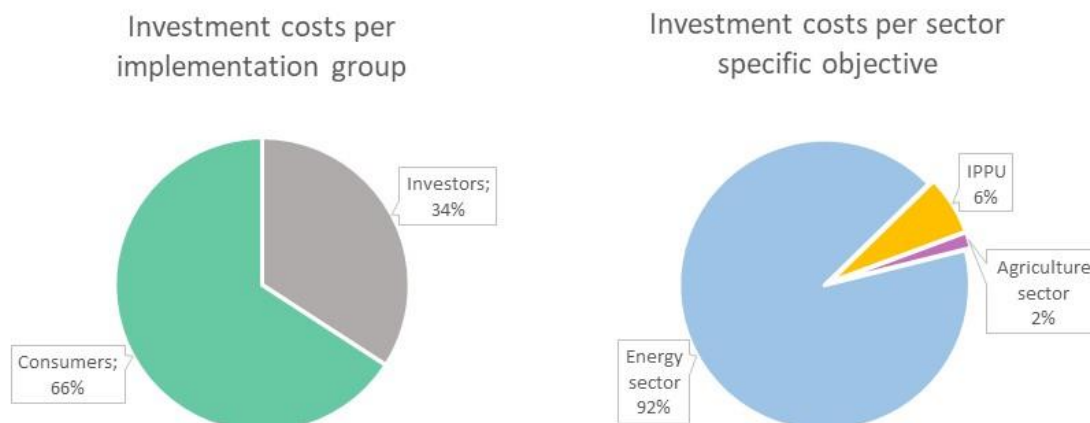


Figure 26: Share of investment cost in the period 2022-2030

The State will have an additional role to support the implementation of the measures in the Programme, though the definition of the regulatory, fiscal and incentive schemes. In this context, the revenues from the currently applied polluters pay principle³³ shall be treated by the State as an important source of

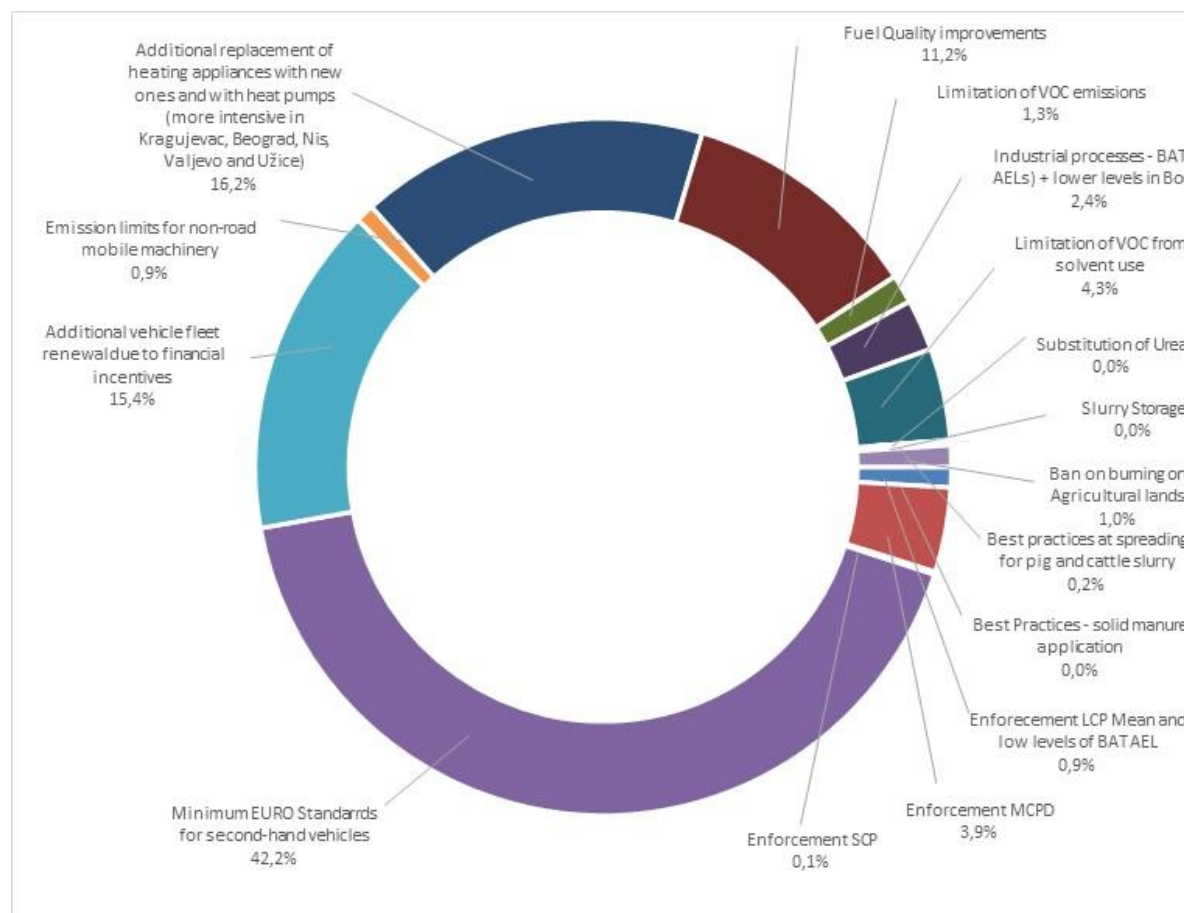
³² Direct co-financing of measures to the public or private companies is subject to State aid rules

³³ Currently the polluters pay principle is implemented by Regulation on types of pollution, criteria for environmental pollution and payers, amount and manner for the calculation and payment, where polluters need to pay for emissions of SO₂, NO₂ and PM emissions and disposed waste. Through this mechanism was according to publication "Report on economic instruments for environment protection in the Republic of Serbia, 2019 indicators review", Belgrade 2021, p.11 collected 6,27BlnRSD (cca 53Mio€) of which it is estimate that around 30Mio€ comes from air pollution

financing of state incentives. However, this source of financing is expected to dry out by 2030 due to implementation of National Emission Reduction Plan, therefore alternative approaches, building on the same principle, will need to be considered.

For implementation of WAMC up to 2030 additional 1243Mln € should be invested (cumulatively by 2030) in the renewal of vehicle fleet driven by setting higher EURO standards for second hand vehicles first time registered in Serbia. Additional 453,1Mln € is expected to be invested due to financial incentives for scrappage schemes where the most polluting vehicles are to be replaced with those complying with at least Euro 5 or higher. For additional replacement of the heating appliances, supported by subsidies, with Eco-label compliant ones and also with of heat pumps in Kragujevac, Niš, Valjevo Užice and Belgrade, should be invested 476,9Mln €. The most resources from investors will be required to ensure compliance with amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the sulphur content of certain liquid fuels, where investments (330Mln €) are already ongoing. Additional 125,4Mln € will be required for compliance with VOC limitations due to solvent use in certain installations.

Figure 27: Shares of additional investment costs (%) for the WAM C Scenario in the period 2022-2030



The compliance of medium combustion plants with Industrial emission directive will require 115,8mio €, while enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor will require 70,2 Mln € of cumulative investments in the period 2022-2030.

Agriculture sector will in total require 52,7Mln € of investments, the majority in the limitation of open burning of agricultural residues, which can be achieved through improvements in agricultural machinery, implementation of good practices and stricter enforcement.

7.2.2 Expected resources need for financing support of the measures

Two main measures primarily targeting PM₁₀, PM_{2.5} and NO_x emissions do envisage subsidies since the natural phase out of old technology and replacement with a new one would take much more time, and therefore the vision of the programme would be endangered. Furthermore in some cases the old technologies need to be replaced with a specific green technology with no direct emissions of air pollutants (e.g. heat pumps) in order to achieve general and specific objective of the program, which can be achieved with the targeted subsidies. Financial incentives needed for implementation of WAM C scenario are presented in **Table 7-4** below.

Table 7-4 Financial incentives needed to implement WAM C scenario

No.	Specific objective	Measure	Financial incentive needed 2022-2030 [Mln€]
5	S.O.1	Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.	159
7	S.O.1	Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	258
Total			417

In Total it is envisaged that cumulative incentives given to consumers in the period 2022-2030 should reach 417Mln €, of which the 62% is to go for Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps. Furthermore it has to be ensured that five cities that are considered as fine particles hot spots has a sufficient resources available for the financial incentives as listed in **Table 7-5** below

Table 7-5 Cumulative financial incentives needed for specific zone and agglomeration

Zone/Agglomeration	Minimum finance incentive [Mio€]
Kragujevac	5,6
Belgrade	39,6
Niš	25,9
Valjevo	13,9
Užice	13,6
Serbia	159,8
TOTAL	258,4

7.2.3 Financing models of the program

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

7.2.3.1 Polluter pays principle (PPP)

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 considered for the financing of the Programme:

(1) Use of revenues collected by Regulation on types of pollution, criteria for environmental pollution and payers, amount and manner for the calculation and payment

In compliance with the state aid rules the revenues generated from the auctioning of allowances should be used for financing policies and measures of this programme such as:

- Financial incentives to faster the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps
- Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)

Total amount of revenues collected annually (cca 52Mln €) by the Regulation is expected to reduce after the 2025 when it is expected that the majority of the abatement measures contained in the NERP will be completed, however cumulatively it is expected that revenues can **amount up to 300Mio €** in the period 2022-2030.



Figure 28: Financial incentives needed to implement WAM C vs expected revenues available from current PPP mechanisms (Regulation)

In order to ensure the sustainable financing of the implementation of WAM C scenario at least 117Mio€ would need or ensured through public financing or the expand the polluters pay principle to categories which are currently not covered by this principle, such as road transport sector.

(2) Implementation of environmental taxation on vehicles

Implementation of environmental tax can to be in principle gradually implemented in the road transport taking into account that accelerated vehicle fleet renewal and the significant share of the costs for incentives (38.1%) for the implementation of WAM C scenario.

Two options for taxation based on environmental performance are widely used in the EU.

- Taxation applicable when vehicle is registered in the country for the first time³⁴
- Annual tax applied for annual car registration

Those two options could be considered separately or combined.

In order to close the gap of 117Mio€ which is missing for If the taxation would be applied on diesel passenger cars on annual basis on PM performance based on EURO standards 1g/km would need to be taxed by 441€ which would require the additional cost ranging from 88€/year for pre-EURO diesel cars 44€/y for EURO 3 diesel cars down to 2€/y for EURO 6 diesel cars. The yearly revenues collected through such mechanism would in 2023 be at the level of 32.3Mio€ and declining to 5.3Mio€ in 2030.

One of the options would also to fully cover necessary subsidies (159 Mio€) for implementation of this measure through the environmental taxation of vehicles. In such case 1g of PM would need to be taxed at the level of 600€/y, which would require for owners of EURO 3 passenger cars additional 60€/y, EURO 4 owners 30€/y and EURO 5 owners 15€/y.

This approach can also be combined with passenger cars performance regarding the specific NOx emissions. In such an event the taxation base would expand to all passenger cars (with internal combustion engine). If NOx would be taxed at the level of 40€ and PM at the level of 165€. Diesel car owner would need to pay in addition between 71€/y and 4€/y of additional tax per year depend on the EURO standard of the car, while the petrol/LPG car owners would need to pay between 40€/y and 2,5€/y of additional tax in order to ensure 159Mio€ of revenues would be collected in the period 2023-2030.

7.2.3.2 Public financing

Public financing is the catalyst of the implementation of the program and, in consequence, the long-term transition to a clean air for everyone in Serbia. As a catalyst, it will not directly finance the implementation alone and it is not necessarily the greatest financer 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 WorldBank or other bilateral and multilateral organizations.

Since measures related to energy efficiency, transition to low carbon economy and activities under the Green agenda contributes to the improvement in air quality all those fund could be considered as one to contribute to achieving the general objective of this program. The budget dedicated in 2021 are. Available budgetary funds for financing of measures for ensuring the clean ambient air, enhancement of carbon sinks and emission reductions and budgets dedicated in 2020 are:

- Budgetary fund for energy efficiency (500,5 Mio RSD)
- Green Fund (4343 Mio RSD)

³⁴ This option in principle ensures the same outcome as banning the import of second-hand cars, since bans of the import of products already put on the EU market are not in line with the EU concept of free movements of goods.

Aggregate available financing in 2020 was 4843,5 Bln RSD that is app. 41 Mio EUR, which currently represents just a fraction (9,8%) 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 programme.

7.2.3.3 Private sector financing

The private sector, including companies held by state, will take up a share of the required investments to increase energy efficiency, reduce GHG emissions and therefore also reduce emissions of air pollutants. 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.

7.2.3.4 International financing

EU Financing

The key sources of financing from the EU for the purpose of economic convergence by less-developed regions, employments, social inclusion and good governance, agriculture, regional and urban development, research, innovation and modernisation and sustainable development are:

- EU Instrument for Pre-Accession – IPA
- EU Twinning programme
- IPARD (until accession), after accessions
 - the European agricultural guarantee fund (EAGF),
 - the European agricultural fund for rural development (EAFRD). – regional and urban development
- LIFE Strategic Integrated Projects (SIPs) and Strategic Nature Projects (SNAPs)
- EU Territorial Cooperation Programmes (INTERREG)
- Horizon 2020 / Horizon Europe

Bilateral and Multilateral funds and partners

The key sources of bilateral and multilateral financing for Serbia are

- 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)

Detailed table of costs, financing and timeline for the implementation of measures and its activities by 2030 are presented in *Table 7-6* below

Table 7-6: Detailed table of costs, financing and timeline for the implementation of measures and its activities by 2030

No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
Specific objective 1: Reduce emissions of SO ₂ by 92% and fine particles PM _{2.5} by 58.3% from Energy sector in 2030 compared to 2015										
No.1 (WAM B1)	Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs	27,9					0,4	3,24	Investments in reduction techniques for SO ₂ , NOx and PM	2025
[A] ³⁸	Ensure the full alignment of the national legislation with the IED (as defined in the DSIP for the directive 2010/75/EU): Law on the amendments to the Law on IPPC Regulation on types of activities and installations that integrated permit is to be issued for Rulebook on the contents, layout and completing the application for integrated permit Rulebook on the content and format of integrated permit Law on the amendments to the Law on air protection Amendments to the Regulation on emission limit values for air pollutants from combustion plants Amendments to the Regulation on the list of industrial installations and activities controlling emission of volatile organic compounds, emission values of volatile organic compounds during the certain consumption of solvents and total allowed emission, and emission reduction scheme Amendments to the Law on waste management Amendments to the Regulation on types of thermally treated waste, requirements and criteria for determining location, technical and technological requirements for design, construction, equipping and operation of plants for								The project IED Serbia "Further implementation of the Industrial Emission Directive in Serbia" has identified amendments necessary to upgrade correctly the current national legal framework and ensure full implementation of the IED Directive. According to the DSIP, the amendments to the existing national legal framework was scheduled by 2021. No additional work programme is proposed at this level.	2022

³⁵ For the purpose of these estimates, costs have been allocation to 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 budget

³⁶ This column is applicable only if the beneficiary is to express the intention to introduce polluter pays principle supported by the relevant policy framework (taxation/ recycling of the environmental taxes)

³⁷ EIU IPA funds are primarily dedicated to institutional harmonization and investments into infrastructure (note - AQ monitoring stations are deemed as infrastructure),.... Investments to be conducted by private investors and or industry are subject to state aid rules in principle limited to de-minimis rule (in principle 200.000 € in 3 consecutive years)

³⁸ Notation key "A"= Administrative activity linked to transposition of relevant EU legislation



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	thermal waste treatment, treatment of residue after combustion of waste, and other issues relevant for the operation of the plant for thermal waste treatment Amendments to the Rulebook on management of waste from titanium-dioxide, surveillance and monitoring of environment on the site Amendments to the Regulation on emission limit values of pollutants into the air from stationary pollution sources, except from combustion plants									
	Ensure that the increase of human resources of Serbian institutions in order to deal with issuing IPPC permits, has been done as this was established in the DSIP for the IED (Project IED Serbia) : MEP - Department for integrated permits : 4 working places, permit writers, fulfilment vacant positions; 6 working places with technical competences (gradual increase of number of employees within this unit in mid-term perspective) and 1 working place with legal competences Autonomous Province of Vojvodina (Provincial Secretariat for Urban Planning and Environmental Protection): 2 working places, permit writers, 1 working place with legal competences MEP (Dept. for Air and Ozone Layer Protection): IED Chapter III : 1 working place with specialization in LCP IED chapter IV: 1 full time working place specialized for waste incineration chapter IED chapter V: 1 working place, officer with a background in chemical engineering SEPA: IED chapter V: 1 officer with a background in chemical engineering							3,24	The project IED Serbia "Further implementation of the Industrial Emission directive in Serbia" has identified the additional human resources to ensure that permits are issued correctly and on time. According to the DSIP for the IED developed by the Project IED Serbia, the level of additional resources needed has been identified (18 working places). No additional requirements have been identified at this level, however the costs for these additional human resources are provided.	2022
	Ensure that all large combustion installations and large industrial installations covered by annex I of the IED, have their IPPC permits set up.	27,9 ³⁹								2025

³⁹ Total costs estimated by the project IED Serbia are not reproduced at this level of the Air pollution action plan, as these costs are covered by the DSIP for the Industrial Emission Directive. The costs of reduction of emissions from IED plants are only additional costs compared to the scenario WEM are considered, in which costs of compliance with national regulation are already taken in account. Indeed, it has to be noted, that the current national "Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants" (Official gazette of the



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	Ensure that all IED plants report to the National Register of Pollution Sources (which fills the E-PRTR). Set up a programme for checking the quality and consistency of air emission reports to the National Register of Pollution Sources (The consistency and accuracy of emission reports need to be checked by local inspectors and then also controlled by SEPA, before being published and made public. Moreover, the data reported could be used as input data for the emission inventory to increase its accuracy (higher tier methods used instead of default limit values)).						0,4		EU Technical assistance (IPA support instrument)	2022-2024
No.2 (WAM A2)	Enforcement of the EU Directive 2015/20193 Medium Combustion plants	115,81					0,8	0,54	Investments in reduction techniques for SO ₂ , NO _x and PM in order to make all medium combustion plants compliant with the emission limit values of Directive	2025 for plants larger than 5 MWth and 2030 for plants between 1 and 5 MW
[A]	Finalise of the work programme for full alignment of the national legislation with the MCPD, by: - Amend the Law on Air Protection; - Adopt a Regulation on emission limit values of pollutants in the air from medium combustion plants. This regulation will need to merge the requirements of the MCPD and of the national regulation on emission limit values of pollutants in the air from combustion plants ("Official Gazette of the Republic of Serbia", No. 6/16). When the national regulation implements stricter ELVs than the MCPD, they must be kept. The stricter limit values of the MCPD must be transposed as well as any stricter requirement.						0,8		EU Technical assistance (IPA support instrument)	2023
	In order to ensure implementation of the requirements of the MCPD: - Continue analysing current available data on MCPs;						i.e.		EU Technical assistance (IPA support instrument)	2023

republic of Serbia, no. 111/15) implements ELVs which are not always so far from the BAT AELs. Moreover, the costs considered in the IED Serbia are total costs for plants to comply with all limit values and requirements for air, waste, energy efficiency, noise, water.



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	Complete a database to contain the total number of MCPs; Establish a reporting system and database (Art. 11) ⁴⁰ .									
	Compliance of medium combustion plants with BAT AELs (mid-range)	115,81							Medium combustion plants need to ensure that in next investment cycle they will be able to reach the mid-range of the BAT associated emission levels (AELs)	2025
	Ensure an increase of human resources of Serbian institutions in order to deal with the MCPD (but also other size of installations such as SCP and domestic appliances: MEP : 1 working place with specialization in MCPD (but also SCP and domestic appliances) Autonomous Province of Vojvodina (Provincial Secretariat for Urban Planning and Environmental Protection): 1 working place with specialization in MCPD (but also SCP and domestic appliances) SEPA: MCPD : 1 officer to deal with MCPs (but also SCPs and domestic heating appliances)							0,54	Three additional civil servants in the institution to deal with MCP, SCP and domestic heating appliances	2022
No.3 (WAM A3)	Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)	3,77					0,1	IE	Investments to make the combustion compliant with limit values for PM and NOx	2030
[A][4]	Update emission limit values for small combustion installations with a capacity of less than 1 MW (boilers or stationary engines)						0,1		EU Twinning light /EU TAIEX support mechanism	2022- 2023
	Ensure compliance with stricter emission limit values for small combustion installations	0,38								2025- 2030
No.4 (WAM B4)	Enforcement of minimum Euro standards for second-hand vehicles imported: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	140,64	1102,76				0,01	0	The costs are due to additional costs for buying new vehicles compliant with Euro 6/VI from 2025	2024
A	Amend the Regulation on the import of motor vehicle (Official Journal of RS, no 23/2010 and 5/2018) standards for imported passenger cars, light duty vehicles, heavy duty vehicles and busses. The minimum standards are Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025.						0,01		EU Taiex support mechanism	2022- 2023

⁴⁰ In the scope on the ENVAP 3 project (funded by the Swedish International Development Cooperation Agency (SIDA) and carried out by the Swedish Environmental Protection Agency for the period 2016-2021) assisting Serbia and MEP in preparing to negotiate and comply with Chapter 27 Environment requirement, a preliminary assessment of current situation regarding total number of medium combustion plants in the Republic of Serbia has been made. This assessment needs to be consolidated and the database established.



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	Compliance with updated minimum requirements for passenger cars, light duty vehicles, heavy duty vehicles and busses	140,64	1102,76					i.e. (additional veivle fleet nnrenewal)	This measure work in combination with the measure WAM B5)	2024
No.5 (WAM B5)	Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.	80,91	372,20		at least 117		1,5	158,6	The oldest vehicles are replaced by newer ones (younger vehicles compared to the Euro 1 to Euro 3 vehicles replaced). The costs are due to additional costs for buying new vehicles (which can be second hand vehicles) compliant with Euro 6/VI as this measure is associated with the measure WAM B4 which imposes stricter standards to imported second hand vehicles, Euro VI or 6 from 2025 and beyond.	2024
	Prepare and adopt an end-of life vehicle management plan and enhance the vehicles recycling centers						1,0		EU IPA support mechanism to prepare end-of life vehicle management plan and enhance the vehicles recycling centers	2023
	Set up and implement the public financial support mechanism for the scrapping of old diesel passenger cars, light duty vehicles and busses (respectively Euro 1, Euro 2, Euro 3 and Euro I, Euro II and Euro III).	80,91	373,20				0,5	158,6	EU Twinning light instrument to set up a financial support schemes for scrapping of old diesel vehicles	2024
	Set up a polluters pay principle for the registration of passenger cars based on environmental standards (environmental taxation of vehicles				At least 117				Taxation of passenger cars based on PM and NOx performance	2023
No.6 (WAM A6)	Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No167/2013, and amending and repealing Directive 97/68/EC	25,39					0,4	i.e.	Costs due to introduction of new reduction equipment on new machines	2025



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
A	Finalise the work programme for full alignment of the national legislation with the regulation 2016/1628 through the Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery).						0,3		PLAC3 support instrument	2022
	Ensure an increase of human resources of Serbian institutions in order to deal with the NRMM (but also road traffic and other traffic modes): MCTI: 1 working place with specialization in NRMM (but also road traffic and other traffic modes) RTSA: 1 officer to deal with NRMM (but also road traffic and other traffic modes)							0,36		2025
	Implementation of on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery	25,39								2022-2025
No.7 (WAM C1)	Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	0	476,90	0			1,0	260,76	Costs due to renewal of domestic appliances with new eco-labelled appliances or heat pumps	2022-2025
A	Finalise the work for full alignment of the national legislation with the Eco-design directive and work in order the two following regulations are transposed: Regulation 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel boilers. Regulation 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel local space heaters.						0,5		EU IPA support instrument or Possibly addendum to the Project "EU4Energy Labelling and Eco-design" ⁴¹	2022

⁴¹ . The Project "EU4Energy Labelling and Eco-design" (<https://energy-labelling-eco-design.euzatebe.rs/en/about-project>) for the implementation of Energy Labelling 2010/30/EU Directive and Eco-design 125/2009/EC Directive - (financed from IPA 16 programme for Republic of Serbia) runs from September 2019 to February 2022. An addendum to the project could be develop to focus in-depth of solid fuel boilers and space heaters.



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
-	Implement awareness building and education campaign across the country for promoting efficient domestic heating appliances, use of boilers and space heater in the best combustion conditions and use of dry wood (incorrect use of solid fuel boilers or space heaters and use of humid wood, may reduce the efficiency of emission reductions allowed by Eco-design compliant appliances and even more, increase them).						0,5		EU IPA support mechanism or similar to target awareness raising, do capacity building regarding proper use of fuelwood at local level, promote Eco-design appliances and to produce brochures/leaflets related to the use of boilers and space heaters using solid fuels, use of dry wood, correct installation of appliances	2023
	Establish and implement a mechanism for financial incentives for replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps.		476,90					258,36	A mechanism should be established in cooperation of the Recyclers association of Serbia or to ensure that replaced appliances are not returned to the marked in Serbia or in the neighboring countries.	2023-2024
	Facilitate the mechanism of financial incentives by ensuring additional 15 FTE in the aim to inform the public on how to reduce emissions from domestic heating appliances and facilitate the access to financial support. Out of 15FTE at least 2 FTE could be located in Beograd, 1FTE in Nis and 1FTE in Kragujevac, Valjevo and Užice.							2,7	It is estimated that 15 additional FTE are needed to facilitate the implementation of the financial incentives at national and local level.	2023-2025
No.8 (WAM A7)	Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the Sulphur content of certain liquid fuels	330,00					1	0,72		2025
A	Finalise the work programme for full alignment of the national legislation with the fuel quality Directive 2009/30/EC (FQD) and Directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels ⁴² .						1		EU IPA support mechanism	2023
	Investments needed to ensure compliance with Fuel quality Directive and on the reduction of the Sulphur content of certain liquid fuels.	330,00							Estimated investment by refineries in Serbia	2025
	Increase the human resources of institutions: 4 FTE for monitoring of directive implementation							0,72	4 FTE are needed to ensure the compliance with the FQD and Sulphur content of certain liquid fuels	2022

⁴² Two DSIPs in the scope of the EAS3 project, have been developed and detail list of the Laws, Regulations and Rulebooks to be amended.



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
No.9 (WAM A8)	Enforcement of directives 94/63/EC (stage I) and 2009/126/EC (stage II)	39,22					0,2	0,238	Equipment of service station with techniques to avoid VOC emissions from station tank loading (Stage I) and from vehicle tank loading (stage II)	2028- 2030
A	Finalise of the legal transposition plan for the Directives 1994/63/EC and 2009/126/EC ⁴³						0,2		EU IPA support mechanism.	2023
	Increase human resources in SEPA and MEP for implementation of the Directives.							0,238	Total administrative costs by the end of 2028 for new employee salaries and training of these persons and inspectors, workplace equipping, establishing SEPA register and accreditation costs	2023
	Implement vapour capture in the gasoline supply, distribution and transport system	39,22							Compliance with the Stage I and Stage II will require a vapor recovery systems to be implemented along the gasoline supply chain	2028- 2030
Specific objective 2: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels										
No.10 (WAM C2)	Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and Sulphuric acid production in Bor	70,21					i.e.	i.e.	Investments in reduction techniques for SO ₂ , NOx, PM, VOC and NH ₃ , alignment of national legislation is covered through implementation of measure No.1	2025 (2030 for those asking for period extension)
	Ensure that all large industrial plants covered by annex I of the IED, have their IPPC permits issued. In Bor, revise the permit conditions to implement the strictest ELVs enabling the compliance with the lower values of BAT AELs for copper production and sulfuric acid production plants.						IE (No.1)		With additional human resources set up, the programme of issuing permits for all the plants considered under Annex I can be fulfilled. The human resources for that have been extended, see above.	2024

⁴³ Legal transposition will require amendments to the Law on Air Protection; Rulebook on technical measures and requirements in relation to allowed emission factors for volatile organic compounds resulting from the storage and transport of petrol (Hereinafter: VOC Petrol Rulebook); Rulebook on methodology for preparation of national and local register of pollution sources, as well as methodology for types, methods and deadlines of data collection (National Register of Pollution Sources- NRPS) (Hereinafter: Rulebook of NRPS)



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	Ensure compliance with lower values of the BAT AELs for the production of copper of 50 mg/Nm ³ (the range of BAT AELs is 50 to 500 mg/Nm ³) and 100 mg/Nm ³ for the Sulphuric Acid production (the BAT AELs range from 30 to 680 mg/Nm ³)	70,21							Attainment of the limit values for copper production and sulfuric acid production can ensure the compliance of the air quality in Bor with the SO ₂ related limit values.	2025
No.11 (WAM B6)	Enforcement of the IED Chapter V, Annex VII for VOC or chapter II for plants with a consumption of solvents larger than 200 t	130,7					0,4	i.e.	Costs of installations of reduction techniques and use of low solvent content products	2022
A	Amend Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)" and Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (OGRS N°100/11) and enforce its implementation						IE (activity below)		Amendments and full implementation of the directive is envisaged through the support The Royal Norwegian Embassy in Belgrade.	2022
	Continue the assessment of the situation of Serbia in terms on emission of VOC from the use of solvents in industry and the preparation of a list of VOC operators, as well as development, testing and start-up of the electronic registration and reporting system for entities classified as VOC operators. Continue capacity building of administration and especially, the training of local inspectors as well as the improvement of knowledge about VOC among operators and consultants.						0,43		The Royal Norwegian Embassy in Belgrade financially supports implementation of a project with the grant amounting to € 430,000, while the Environmental Protection Agency of the Republic of Serbia (SEPA) contributes with € 15,000. The project implementation period is 4 years, starting from 1 December 2018, and closing on 30 November 2022.	2022
	Implement the BAR AELs for plant with consumption of solvents larger than 200t	125,411					IE (activity above)			
Specific objective 3: Reduce ammonia emissions from Agriculture sector by 20.5% Compared to 2015										
No.12 (WEM B9)	Introduction of best practices for slurry storage:	0,8					0,8	3,5	The cost estimated relates to the investments for covers for pig storage only. There is no cost associated to natural crust.	2030 and beyond



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for impleme ntation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
A	Transpose the six principles of nitrogen management presented in the Annex III, part 2 of Directive 2284/2016 which are also listed in the Annex IX of the Gothenburg Protocol into national legal framework								While amending national legal framework due to compliance with NEC directive make sure that measures to control ammonia emissions as contained in the Annex III, Part 2.A of the Directive will be transposed in the national legal framework.	2022
A(H)	Prepare a National Advisory Code of Good Agricultural Practices to control ammonia emissions (EU directive 2284/2016 obligation, annex III, part 2), by complementing and extending the existing national Code of Good Agricultural Practices of 2016 to better consider measures to reduce ammonia emissions in line with the UN ECE and EU requirements									2023
A(H)	Establish a national nitrogen budget to monitor the changes in overall losses of reactive nitrogen from agriculture, including ammonia, nitrous oxide, ammonium, nitrates and nitrites, based on the principles set out in the UNECE Guidance Document on Nitrogen Budgets ⁴⁴						0,8		EU IPA support mechanism (including for measure No13, No.14 and No.15)	2022-2024
(H)	Reinforce human resources of the Ministry of Agriculture, Forestry and Water Management (3 FTE are needed to develop the National advisory Code, organise agricultural advisory services and disseminate the good practices in an integrated approach) and of Agricultural advisory services (10 FTE for dissemination of ammonia reduction measures and protection of underground water bodies)							2,34	13 additional FTE is estimated to be needed for implementation of this measure and measure (including for measure No13, No.14 and No.15)	2023
(H)	Inform and disseminate the National Advisory Code of Good Agricultural Practices and develop awareness raising campaigns regarding the impact of NH ₃ on air quality and measures to reduce them (through multiple events (5 in Serbia per year from 2024), communication materials ((flyers, videos...): 10) , web site (1))							0,355	Public events done every year in different Serbian regions, communication materials and web site (including for measure No13, No.14 and No.15)	2024-2030
	Implement best practices for slurry storage	0,8								

⁴⁴ UN ECE Executive Body Decision 2012/10/EC, ECE/EB.AIR/113/Add 1.



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
(H)	Enhance technical capacity of farmers on best practices at spreading and other best practices (demonstration farm (1), special training for farmers (15 per year from 2024), development of specific guidance's)							0,778	Training sessions, one demonstration farm, specific guidance (including for measure No13, No.14 and No.15)	2024-2030
(H)	Ensure the finalization of the issuance of integrated permits for IPPC farms based on the use of BAT.							IE (No.1)	Costs included in Measure No.1	2024
No.13 (WAM B8)	Substitution of urea with ammonium nitrate fertilizer	NA					IE (No.12)	IE (No.12)	There is no investment cost for this measure: only the price difference by type of fertilizer is considered to estimate the cost efficiency of the measure. Annual total cost are in estimated at 5 Mio€	2030 and beyond
	See horizontal activities marked with (H) under the Measure No.12						IE(No.12)	IE(No.12)		IE (No.12)
	Implementation of substitution of urea with ammonium nitrate fertilizers	NA [5,0]							Share of urea in the total mineral nitrogen to decrease by to 21,6% while the share of ammonium nitrate in total mineral nitrogen is to increase to 57,8%	2023-2030
No.14 (WAM A11)	Introduction of the best practices at spreading for solid manure application by faster incorporation of manure in the soil	NA					IE (No.12)	IE (No.12)	For this measure, no investment costs are considered. However, operation costs have been estimated, because contractors will need to be mobilized to incorporate solid manure in many situations, as employed labour and machinery will be fully utilized on other tasks. Therefore annual total cost in year 2030 are estimated at 2.4 Mio€	2030 and beyond
	See horizontal activities marked with (H) under the Measure No.12						IE(No.12)	IE(No.12)		IE (No.12)
	Implement the solid manure application by faster incorporation of manure in the soil	NA [2,4]							For Pig and poultry farms: rapid incorporation within 4 hours and 12 hours For cattle manure: rapid incorporation within 24 hours, 12 hours or 4 hours	2023-2030
No.15 (WAM B7)	Introduction of best practices at spreading for pig and cattle slurry :	5,7					IE (No.12)	IE (No.12)	The cost estimated relates to the investments for injectors and trailing hose machines. Extra-	2030 and beyond



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
									operational costs are also associated to this measure, but are not presented here.	
	See horizontal activities marked with (H) under the Measure No.12						IE(No.12)	IE(No.12)		IE (No.12)
	Implementation of best practices at spreading for pig and cattle slurry through upgrade of agriculture machinery (injection and trailing hose)	5,7							Strong development of injection and residual application by trailing hose followed by an IE incorporation within 4 hours or 12 hours through upgrade in Agriculture machinery supported by IPARD Programme	2023- 2030
No16 (WAM C3)	Limitation of the burning of agricultural residues (0% in 2030)	46,23						0,16	The cost estimated relates to the investment for machinery in order to incorporate crop residues. Associated operational costs have also been estimated but are not presented here.	2022- 2030 and beyond
[A]	Inform and disseminate the Code for good practices for agricultural residues and develop awareness raising campaigns regarding the agricultural waste burning on air quality and measures to avoid this burning (through multiple events (1 in Serbia per year from 2023), communication materials ((flyers, videos...): 5) , web site (1)).							0,09	Public events done every year in different Serbian regions, communication materials and web site	2024- 2030
	Limitation of the open burning of agricultural residues through investment in agriculture machinery in order to incorporate crop residues.	46,23							Upgrade in Agriculture machinery could be additionally supported by IPARD Programme	2024- 2030
	Enhance technical capacity of farmers on best practices at harvesting and other best practices (special training for farmers (2 per year from 2024),							0,07	Training sessions, one demonstration farm, specific guidance	2024- 2030
Specific objective 4: Promote transition to clean air for everyone										
No.17	Education on air quality, training for implementation of best practices and awareness raising	NA						1,0		2023- 2025



No.	Name of measure/activity	Investment Costs ³⁵ [Mio EUR]			Add. budget revenues ³⁶ [Mio EUR]	Source of finance [Mio EUR]			Note	Deadline for imple- mentation
		Investors	Consumers	State		Private sector	EU and other funds ³⁷	National Budget		
	Education: focused on kindergarten to 12 th grade (kindergartens, primary and secondary schools), with a view to identifying opportunities and issuing recommendations for integration of the health effects of air pollution in school curricula; recommendations on university studies may also be integrated.	NA					0,5		Upgrade of the activities in kindergartens and curriculums for primary and secondary education to raise awareness about the health impacts of air pollution. Such activity can be supported by EU IPA mechanism or other donors	2023
	Capacity building, awareness raising campaigns and support given to the households about the proper use of small appliances using solid fuels and conducting the assessment of the moisture content of the wooden biomass.	NA					IE(activity below)		Awareness raising media campaigns for households is an important element of the behavior changing process. Activities could be financed through IPA technical assistance or other donors	2023-2025
	Establishing of the mobile demonstration centre (or equivalent) for knowledge sharing regarding the proper use of biomass in small appliances and boilers	NA					0,5		EU IPA technical assistance for dissemination and knowledge sharing regarding the proper use of biomass	2023-2025

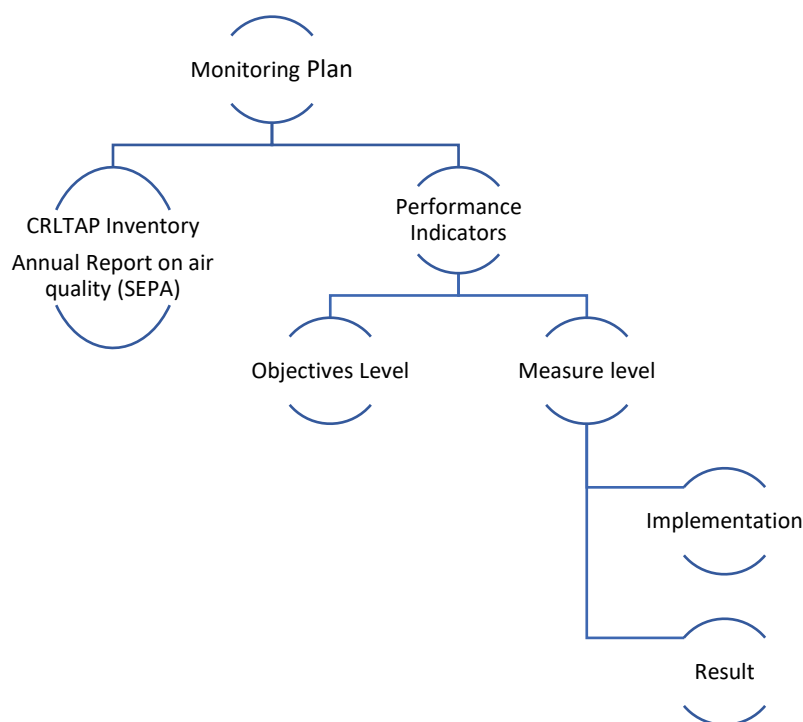
No.	Name of measure/activity	Investment Costs [Mio EUR]			Add. budget revenues [Mio EUR]	Source of finance [Mio EUR]		
		Investors	Consumers	State		Private sector	EU and other funds	National Budget
	Total costs	1012,0	1951,9	0,0	117,0	0,0	8,1	427,7
	of which Specific objective 1	763,6	1951,9	0,0	0,0	0,0	5,8	424,0
	of which Specific objective 2	195,6	0,0	0,0	0,0	0,0	0,4	0,0
	of which Specific objective 3	52,7	0,0	0,0	0,0	0,0	0,8	3,7
	of which Specific objective 4	0,0	0,0	0,0	0,0	0,0	1,0	0,0
	Cumulative investment costs 2022-2030	2963,8						

8 FRAMEWORK FOR MONITORING AND REPORTING THE POLICIES AND MEASURES

Responsible authorities and organisations shall be obliged to carry out an assessment of effects of their policies and measures on the air pollutant 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. Implementation of the measure will be monitored by the CRLTAP inventory, Air Quality Monitoring Network and a set of indicators. (Figure 29)

Figure 29: 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 Programme, 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 th general and specific objectives are presented in the

Table 8-1 while the monitoring of the measures at the level of activities are presented in **Table 8-2**.

Table 8-1: Key performance indicators at the level of the general and specific objectives (this table is still under development)

Elements of the Strategy	Indicator	Baseline Value	Target Value	Source of verification
		2015	2030	
General Objective: <i>To reduce up to 2030 the health damage due to poor air quality by half compared to 2015 by reducing exposure to air pollution while aligning Serbia with the European Union's regulatory limits to air pollution and limiting the damage on ecosystems</i>	Number of air quality measuring points with number of days where daily limit value of 50 µg/m ³ was exceeded	22	0	Annual report on Air Quality in Serbia (SEPA)
	Air quality measuring points where yearly limit value for PM ₁₀ is exceeded	5	0	Annual report on Air Quality in Serbia (SEPA)
	No. of exceedances of SO ₂ limit values on daily mean concentrations in Bor	139	<3	Annual report on Air Quality in Serbia (SEPA)
	Average annual concentration level (AEL) of PM _{2.5}	23,3	<20	Air Quality in Europe (EEA) Annual report on Air Quality in Serbia (SEPA)
	Premature deaths due to PM _{2.5} exposure, as one of the environmental risk factors	9773	5401	Air Quality in Europe (EEA) Annual report on Air Quality in Serbia (SEPA)
Specific objective 1:	Total SO ₂ emissions from Energy sector (ktSO ₂)	331	27	National CRLTAP Inventory report - SEPA (NFR code A to D and F to I)



Elements of the Strategy	Indicator	Baseline Value	Target Value	Source of verification
		2015	2030	
<i>Specific objective 1: Reduce emissions of SO₂ by 92% and fine particles PM_{2.5} by 58.3% from Energy sector in 2030 compared to 2015</i>	Total PM _{2.5} emissions from Energy sector (ktPM _{2.5})	36,2	15,1	National CRLTAP Inventory report - SEPA (NFR code A to D and F to I)
Specific objective 2: <i>Specific objective 2: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels</i>	No. of Industrial processes Installations in full compliance with mid-range BAT associated emission levels (AELs)	(15%)	100%	Ministry of Environmental protection (IPCC permits data)
	Copper smelting installation compliant with lower values of the BAT AELs for the production of copper of 50 mg/Nm ³	No	Yes	Ministry of Environmental protection (IPCC permits data)
	Sulphuric acid production installation compliant with lower values of the BAT AELs of 100 mg/Nm ³	No	Yes	Ministry of Environmental protection (IPCC permits data)
Specific objective 3: <i>Specific objective 3: Reduce ammonia emissions from Agriculture sector in 2030 by 20.5% Compared to 2015</i>	Total NH ₃ emissions from Agriculture sector	77,6	61,7	National CRLTAP Inventory report - SEPA (NFR code K and L)
Specific objective 4: <i>Promote transition to clean air for everyone (through awareness projects)</i>	Stakeholders aware of air pollution and its potential implications for the society	No	Yes	Monitoring and evaluation plan of the awareness Project
	Share of households informed on proper use of	-	80% of households using biomass	Monitoring and evaluation plan of the awareness Project



Elements of the Strategy	Indicator	Baseline Value	Target Value	Source of verification
		2015	2030	
	fuelwood in small appliances			
	Percentage of zones and agglomeration visited by mobile demonstration centre (or equivalent demonstration concept)	-	100%	Monitoring and evaluation plan of the awareness Project

Table 8-2: Monitoring for implementation of measures

No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
Specific objective 1: Reduce emissions of SO₂ by 92% and fine particles PM_{2.5} by 58.3% from Energy sector in 2030 compared to 2015						
No.1 (WAM B1)	Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs	Amended national legislation (Law on IPCC, Law on waste management, Air Protection), and relevant by laws, capacity building (additional employments)	NO _x , PM ₁₀ , PM _{2.5} , SO ₂ under the BAT AELs	IPCC permit statistics	-	All LCP installations have permits aligned with BAT AELs [2030]
[A] ⁴⁵	Ensure the full alignment of the national legislation with the IED (as defined in the DSIP for the directive 2010/75/EU): Law on the amendments to the Law on IPPC Regulation on types of activities and installations that integrated permit is to be issued for Rulebook on the contents, layout and completing the application for integrated permit Rulebook on the content and format of integrated permit Law on the amendments to the Law on air protection Amendments to the Regulation on emission limit values for air pollutants from combustion plants Amendments to the Regulation on the list of industrial installations and activities controlling emission of volatile organic compounds, emission values of volatile organic compounds during the certain consumption of solvents and total allowed emission, and emission reduction scheme Amendments to the Law on waste management Amendments to the Regulation on types of thermally treated waste, requirements and criteria for determining location, technical and technological requirements for design, construction, equipping and operation of plants for thermal waste treatment, treatment of residue	-	Law on IPCC and listed bylaws and Rulebooks amended	DSIP 2010/87/EU implementation plan	-	Law on IPCC and listed bylaws and Rulebooks amended [2023]

⁴⁵ Notation key "A"= Administrative activity linked to transposition of relevant EU legislation



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	after combustion of waste, and other issues relevant for the operation of the plant for thermal waste treatment Amendments to the Rulebook on management of waste from titanium-dioxide, surveillance and monitoring of environment on the site Amendments to the Regulation on emission limit values of pollutants into the air from stationary pollution sources, except from combustion plants					
	Ensure that the increase of human resources of Serbian institutions in order to deal with issuing IPPC permits, has been done as this was established in the DSIP for the IED (Project IED Serbia) : MEP - Department for integrated permits : 4 working places, permit writers, fulfilment vacant positions; 6 working places with technical competences (gradual increase of number of employees within this unit in mid-term perspective) and 1 working place with legal competences Autonomous Province of Vojvodina (Provincial Secretariat for Urban Planning and Environmental Protection): 2 working places, permit writers, 1 working place with legal competences MEP (Dept. for Air and Ozone Layer Protection): IED Chapter III : 1 working place with specialization in LCP IED chapter IV: 1 full time working place specialized for waste incineration chapter IED chapter V: 1 working place, officer with a background in chemical engineering SEPA: IED chapter V: 1 officer with a background in chemical engineering	-	Administrative Capacity at MEP and Autonomous Province of Vojvodina enhanced	DSIP 2010/87/EU implementation plan	0	11 additional administrative capacities at MEP and 2 at AP Vojvodina established [2025]
	Ensure that all large combustion installations and large industrial installations covered by annex I of the IED, have their IPPC permits set up.	-	Number of permit issued	DSIP 2010/87/EU implementation plan		All LCP installations have permits aligned with BAT AELs [2030]



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	Ensure that all IED plants report to the National Register of Pollution Sources (which fills the E-PRTR). Set up a programme for checking the quality and consistency of air emission reports to the National Register of Pollution Sources (The consistency and accuracy of emission reports need to be checked by local inspectors and then also controlled by SEPA, before being published and made public. Moreover, the data reported could be used as input data for the emission inventory to increase its accuracy (higher tier methods used instead of default limit values)).	-	QA/QC for linking E-PRTR and CRLTAP inventory	CRLTAP inventory report	-	E-PRTR linked with CRLTAP inventory [2027]
No.2 (WAM A2)	Enforcement of the EU Directive 2015/20193 Medium Combustion plants	Amended national legislation (Law on Air protection), institutional enforcement (additional employments)	NOx, PM ₁₀ , PM _{2.5} , SO ₂ under the BAT AELs	Annual emission reports	-	All MCP installations have emissions aligned with mid-range BAT AELs [2030]
[A]	Finalise of the work programme for full alignment of the national legislation with the MCPD, by: - Amend the Law on Air Protection; - Adopt a Regulation on emission limit values of pollutants in the air from medium combustion plants. This regulation will need to merge the requirements of the MCPD and of the national regulation on emission limit values of pollutants in the air from combustion plants ("Official Gazette of the Republic of Serbia", No. 6/16). When the national regulation implements stricter ELVs than the MCPD, they must be kept. The stricter limit values of the MCPD must be transposed as well as any stricter requirement.	-	Law on air protection and Regulation on emission limit values of pollutants in the air from medium combustion plants amended	Annual Progress monitoring report	-	National legal framework amended [2025]
	In order to ensure implementation of the requirements of the MCPD: - Continue analysing current available data on MCPs; - Complete a database to contain the total number of MCPs; - Establish a reporting system and database (Art. 11) ⁴⁶ .	-	Establish a reporting system and database	Ministry of Environmental protection	-	MRV system for Medium combustion plants established [2023]

⁴⁶ In the scope on the ENVAP 3 project (funded by the Swedish International Development Cooperation Agency (SIDA) and carried out by the Swedish Environmental Protection Agency for the period 2016-2021) assisting Serbia and MEP in preparing to negotiate and comply with Chapter 27 Environment requirement, a preliminary assessment of current situation regarding total number of medium combustion plants in the Republic of Serbia has been made. This assessment needs to be consolidated and the database established.



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	Compliance of medium combustion plans with BAT AELs (mid-range)	-	Yearly inspection of MCP in Belgrade, Kragujevac, Niš, Valjevo, Užice	MEP Annual Report of Inspectorate of Environment	-	All MCP in Belgrade, Kragujevac, Niš, Valjevo, Užice inspected [2025-2030]
	Ensure an increase of human resources of Serbian institutions in order to deal with the MCPD (but also other size of installations such as SCP and domestic appliances): MEP : 1 working place with specialization in MCPD (but also SCP and domestic appliances) Autonomous Province of Vojvodina (Provincial Secretariat for Urban Planning and Environmental Protection): 1 working place with specialization in MCPD (but also SCP and domestic appliances) SEPA: MCPD : 1 officer to deal with MCPs (but also SCPs and domestic heating appliances)	-	Administrative Capacity at MEP, SEPA and Autonomous Province of Vojvodina enhanced	Ministry of Environmental protection	0	1 additional administrative capacity at MEP, 1 at AP Vojvodina and 1 at SEPA established [2025]
No.3 (WAM A3)	Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, 67/21)	Amended national legislation to lower emission limit values for small combustion plants	NO _x , PM ₁₀ , PM _{2.5} , SO ₂ emission limit values	Inspectorate of Ministry of Environmental protection	-	All SCP installations have emissions aligned with lower emission limit values [2030]
[A][4]	Update emission limit values for small combustion installations with a capacity of less than 1 MW (boilers or stationary engines)	-	Regulation on emission limit values of pollutants in the air from combustion plants amended	MEP Annual Progress monitoring report	-	Regulation on emission limit values of pollutants in the air from combustion plants amended [2023]
	Ensure compliance is stricter emission limit values for small combustion installations	-	Yearly monitoring of emissions MCP by accredited institutions	Annual MCP emission reports	-	All MCP in Belgrade, Kragujevac, Niš, Valjevo, Užice assessed for compliance and inspected [2025-2030]
No.4 (WAM B4)	Enforcement of minimum Euro standards for second-hand vehicles imported: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	Amendments to the national legal framework, number of cars scrapped, and revenues collected through environmental taxation of vehicles	No. of second hand EURO 3/III and Euro 4/IV vehicles imported in Serbia	SEPA COPERT vehicles database	Euro 3/III – 127.325 [2015] Euro 4/IV – 55.701 [2015]	Euro 3/III - 0 [2024] Euro 4/IV – 0 [2025]



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
A	Amend the Regulation on the import of motor vehicle (Official Journal of RS, no 23/2010 and 5/2018) standards for imported passenger cars, light duty vehicles, heavy duty vehicles and busses. The minimum standards are Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025.		Regulation on Regulation on the import of motor vehicle amended	MEP Annual Progress monitoring report	-	Regulation on Regulation on the import of motor vehicle amended [2023]
	Compliance with updated minimum requirements for passenger cars, light duty vehicles, heavy duty vehicles and busses		No. of second hand EURO 3 vehicles first time registered in Serbia	SEPA COPERT vehicles database	Euro 3/III – 127.325 [2015] Euro 4/IV – 55.701 [2015]	Euro 3/III - 0 [2024] Euro 4/IV – 0 [2025]
No.5 (WAM B5)	Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses.	Financial incentive for phasing out vehicles with poor environmental performance	Number of vehicles scrapped through the incentive scheme	Ministry of finance	0 vehicles scrapped and no incentives delivered	139.400 vehicles scrapped and 453Mio€ distributed
	Prepare and adopt an end-of life vehicle management plan and enhance the vehicles recycling centers		Number of vehicles scrapped	Recyclers association of Serbia	0 vehicles scrapped	139.400 EURO 3/III and older vehicles scrapped
	Set up and implement the public financial support mechanism for the scrapping of old diesel passenger cars, light duty vehicles and busses (respectively Euro 1, Euro 2, Euro 3 and Euro I, Euro II and Euro III).		The amount of incentive distributed	Ministry of Finance	0 Mio€	453 Mio€ in total for the period 2024-2026 [2026]
	Set up a polluters pay principle for the registration of passenger cars based on environmental standards (environmental taxation of vehicles)		Revenues collected through environmental taxation of passenger cars	Ministry of Finance	0 Mio€	117Mio€-159Mio€ [2030]
No.6 (WAM A6)	Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No167/2013, and amending and repealing Directive 97/68/EC	Amend the national legislations for non-road machinery and phasing out of old non-road mobile machinery (NRMM)	NOx, PM ₁₀ , PM _{2.5} , VOC emission limit values	SEPA COPERT Database (for registered tractors), IPARD programme monitoring plan	0% of Agricultural and industrial NRMM compliant [2015]	40% of Agricultural and industrial NRMM compliant with the Directive 2016/1628/EU
A	Finalise the work programme for full alignment of the national legislation with the regulation 2016/1628 through the Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery).		Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for	MEP Annual Progress monitoring report	-	Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
			off-road mobile machinery amended			road mobile machinery amended [2023]
	Ensure an increase of human resources of Serbian institutions in order to deal with the NRMM (but also road traffic and other traffic modes): MEP: 1 working place with specialization in NRMM (but also road traffic and other traffic modes) SEPA: 1 officer to deal with NRMM (but also road traffic and other traffic modes)		Administrative Capacity at MEP and SEPA	Ministry of Environmental protection	0	1 additional administrative capacity at MEP and 1 at SEPA established [2025]
	Implementation of on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery		Natural phasing out of older agriculture machinery and other non-road mobile machinery	SEPA COPER Database (for registered tractors), IPARD programme monitoring plan	0% of Agricultural and other NRMM compliant [2015]	40% of Agricultural and other NRMM compliant with the Directive 2016/1628/EU [2030]
No.7 (WAM C1)	Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	Transposition and implementation of ECO-design Regulation 2015/1189/EU and Regulation 2015/1185/EU and setting up incentive support infrastructure for delivering incentives for penetration of Eco-design devices and heat pumps	Penetration of Eco-design appliances and heat pumps into the Serbian market	Ministry of finance through the incentives statistics	-	479,90 Mio€ of financial incentives delivered of which to Kragujevac 5,6Mio€, Belgrade 36,6Mio€, Niš 25,9mio€, Valjevo 13,9Mio, Užice 13,6Mio€, and to zone Serbia 159.8Mio€
A	Finalise the work for full alignment of the national legislation with the Eco-design directive (see report 3.1, chapter 3.4.2) and work in order the two following regulations are transposed: Regulation 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel boilers. Regulation 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Eco-design requirements for solid fuel local space heaters.		Transposition of ECO-design Regulation 2015/1189/EU and Regulation 2015/1185/EU	Annual Progress monitoring report	-	ECO-design Regulation 2015/1189/EU and Regulation 2015/1185/EU transposed [2022]



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	Implement awareness building and education campaign across the country for promoting efficient domestic heating appliances, use of boilers and space heater in the best combustion conditions and use of dry wood (incorrect use of solid fuel boilers or space heaters and use of humid wood, may reduce the efficiency of emission reductions allowed by Eco-design compliant appliances and even more, increase them).	-	awareness building and education campaign across the country for promoting efficient domestic heating appliances	Awareness campaign evaluation plan	-	Awareness campaign to reach a least 80% of households using biomass in Kragujevac, Beograd, Nis, Valjevo and Užice
	Establish and implement a mechanism for financial incentives for replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps.	-	Phasing out of old technology and replacing old technology with ECO-label devices and heat pumps	-	-	- Kragujevac at least 58% of the appliances shall be replaced with Eco-label appliances of which at least 25% of pellet appliances - Belgrade at least 58% of the appliances shall be replaced by only pellet appliances - Valjevo and Nis at least 74% of the appliances shall be replaced by up to 50% of pellet appliances and 50% or more of heat pumps - Užice at least 80% of appliances shall be replaced by 85% or more of heat pumps and up to 15% with pellet appliances
	Facilitate the mechanism of financial incentives by ensuring additional 15 FTE in the aim to inform the public on how to reduce emissions from domestic heating appliances and facilitate the access to financial support. Out of 15FTE at least 3 FTE could be located in Beograd, 2FTE in Nis and FTE in Kragujevac, Valjevo and Uzice.	-	Administrative Capacity at MEP, Belgrade, Niš, Kragujevac, Valjevo, Užice	Ministry of Environment and local self-governments	0	7 additional administrative capacities at MEP and 3 at Belgrade. 2 for Niš, and for Valjevo, Kragujevac, Užice, 1 additional capacity for each agglomeration [2023]
No.8 (WAM A7)	Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the Sulphur content of certain liquid fuels	Transposition and implementation of Directive 2009/30/EU as amended	Penetration of ultra-low sulfur liquid fuels into the Serbian market	MME Annual Progress	No ultra low sulfur liquid fuels available on Serbian market -	100% liquid fuels put on the market compliant with directive requirements



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
				monitoring report		[2025]
A	Finalise the work programme for full alignment of the national legislation with the fuel quality Directive 2009/30/EC (FQD) and Directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels ⁴⁷ .		Transposition of Directive 2009/30/EC (FQD) and directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels	MME Annual Progress monitoring report	-	Directive 2009/30/EC (FQD) and Directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels [2022]
	Investments needed to ensure compliance with Fuel quality Directive and on the reduction of the Sulphur content of certain liquid fuels.		Investment in deep processing unit in Pančevo Oil Refinery	DSIP_FQD monitoring plan	0 Mio€	330Mio€
	Increase the human resources of institutions: 2 FTE for monitoring of directive implementation		Administrative Capacity at MME	Ministry of Mining and Energy	-	Additional administrative capacity (2FTE) at Ministry of Mining and Energy [2025]
No.9 (WAM A8)	Enforcement of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)	Transposition and implementation of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)	Reduction of VOC emissions through the	MME Annual Progress monitoring report	Chain of petrol distribution not compliant with directives requirements	100% service-stations covered by the EU directives and petrol storage facilities compliant; the whole chain of petrol distribution compliant [2028]
A	Finalise of the legal transposition plan for the Directives 1994/63/EC and 2009/126/EC ⁴⁸		Transposition of Directives 1994/63/EC and 2009/126/EC	MME Annual Progress monitoring report	-	Directive 2009/30/EC (FQD) and Directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels [2022]

⁴⁷ Two DSIPs in the scope of the EAS3 project, have been developed and detail list of the Laws, Regulations and Rulebooks to be amended.

⁴⁸ Legal transposition will require amendments to the Law on Air Protection; Rulebook on technical measures and requirements in relation to allowed emission factors for volatile organic compounds resulting from the storage and transport of petrol (Hereinafter: VOC Petrol Rulebook); Rulebook on methodology for preparation of national and local register of pollution sources, as well as methodology for types, methods and deadlines of data collection (National Register of Pollution Sources- NRPS) (Hereinafter: Rulebook of NRPS)



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	Increase human resources in SEPA and MEP for implementation of the Directives		Administrative Capacity at MEP	Ministry of Environmental protection		Additional administrative capacity (1FTE) at Ministry of Environment protection and 1 FTE at SEPA [2025]
	Implement vapour capture in the gasoline supply, distribution and transport system		Implementation of Directives 1994/63/EC and 2009/126/EC			100% petrol transport, distribution and storage facilities compliant with legal framework [2028]
Specific objective 2: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels						
No.10 (WAM C2)	Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and Sulphuric acid production in Bor	ELVs based on BAT AELs of BAT Conclusions (IED chapter II) For plants not covered by IED Chapter II	Reduction of SO ₂ emissions from specific industrial processes	Annual report on continuous emission measurements	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³ [2015]	the BAT AELs for the production of copper of 50 mg/Nm ³ and 100 mg/Nm ³ for the Sulphuric Acid production implemented [2029]
	Ensure that all large industrial plants covered by annex I of the IED, have their IPPC permits issued. In Bor, revise the permit conditions to implement the strictest ELVs enabling the compliance with the lower values of BAT AELs for copper production and sulfuric acid production plants.		-Amendments to the Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)	MEP Annual Progress monitoring report		Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants amended [2023g]
	Ensure compliance with lower values of the BAT AELs for the production of copper of 50 mg/Nm ³ (the range of BAT AELs is 50 to 500 mg/Nm ³) and 100 mg/Nm ³ for the Sulphuric Acid production (the BAT AELs range from 30 to 680 mg/Nm ³)		SO ₂ concentrations in exhaust air from copper and Sulphuric Acid production	Annual report on continuous emission measurements	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³ [2015]	the BAT AELs for the production of copper of 50 mg/Nm ³ and 100 mg/Nm ³ for the Sulphuric Acid production implemented [2029]



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
No.11 (WAM B6)	Enforcement of the IED Chapter V, Annex VII for VOC or chapter II for plants with a consumption of solvents larger than 200 t	ELVs based on BAT AELs of BAT Conclusions (IED chapter V) For plants not covered by IED Chapter V	Reduction of VOC emissions from specific industrial processes	Electronic registration and reporting system	0	VOC emission reduction by 2030 for 4,15kt of VOC
A	Amend Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15) and Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (OGRS N°100/11) and enforce its implementation		-Amendments to the Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)	MEP Annual Progress monitoring report	-	Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants amended [2023]
	Continue the assessment of the situation of Serbia in terms on emission of VOC from the use of solvents in industry and the preparation of a list of VOC operators, as well as development, testing and start-up of the electronic registration and reporting system for entities classified as VOC operators. Continue capacity building of administration and especially, the training of local inspectors as well as the improvement of knowledge about VOC among operators and consultants.		Setting up electronic registration and reporting system	MEP Annual Progress monitoring report	-	Electronic registration and reporting system establish [2023]
	Implement the BAR AELs for plant with consumption of solvents larger than 200t		Reduction of VOC emissions from specific industrial activities	Electronic registration and reporting system	0 [2015]	Achieved VOC emission reduction by 2030 for 4,15kt of VOC
Specific objective 3: Reduce ammonia emissions from Agriculture sector by 20.5% Compared to 2015						
No.12 (WEM B9)	Introduction of best practices for slurry storage:	Pig manure cover storage and Dairy cows natural crust	Share of the pig manure covered storage and share of natural crust in the total dairy cow slurry	Annual survey by agriculture advisory service	0,5% pig manure covered storage and 0,7% of natural crust in total dairy cow slurry	1,9% pig manure covered storage and 3.3% of natural crust natural crust in total dairy cow slurry



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
A	Transpose the six principles of nitrogen management presented in the Annex III, part 2 of Directive 2284/2016 which are also listed in the Annex IX of the Gothenburg Protocol into national legal framework		Status of transposition of the NEC directive	MEP Annual Progress monitoring report		NEC Directive transposed and implemented [2023]
A(H)	Prepare a National Advisory Code of Good Agricultural Practices to control ammonia emissions (EU directive 2284/2016 obligation, annex III, part 2), by complementing and extending the existing national Code of Good Agricultural Practices of 2016 to better consider measures to reduce ammonia emissions in line with the UN ECE and EU requirements		Status of development of the National Advisory Code of Good Agricultural Practices to control ammonia emissions	MEP Annual Progress monitoring report		National Advisory Code of Good Agricultural Practices to control ammonia emissions adopted and implemented [2023]
A(H)	Establish a national nitrogen budget to monitor the changes in overall losses of reactive nitrogen from agriculture, including ammonia, nitrous oxide, ammonium, nitrates and nitrites, based on the principles set out in the UNECE Guidance Document on Nitrogen Budgets ⁴⁹		Setting up national Nitrogen budgets	Ministry of Agriculture, Forestry and Water Management		National nitrogen budgets established and maintained
(H)	Reinforce human resources of the Ministry of Agriculture, Forestry and Water Management (MAFWM) - 3 FTE are needed to develop the National advisory Code, organise agricultural advisory services and disseminate the good practices in an integrated approach) and of Agricultural advisory services (10 FTE for dissemination of ammonia reduction measures and protection of underground water bodies)		Administrative Capacity at MAFWM and at Agricultural advisory services	Ministry of Agriculture, Forestry and Water Management	0	3 additional administrative capacities at MAFWM and 10 at Agricultural advisory service [2023]
(H)	Inform and disseminate the National Advisory Code of Good Agricultural Practices and develop awareness raising campaigns regarding the impact of NH ₃ on air quality and measures to reduce them (through multiple events (5 in Serbia per year from 2024), communication materials ((flyers, videos...): 10) , web site (1))		Upgrade the National Advisory Code of Good Agricultural Practices	Capacity building and dissemination of good practices		The programme of events fulfilled: 5 events per year from 2024 to 2030 Communication materials ((flyers, videos...): 10 developed from 2024 to 2030 1 web site in 2024
	Implement best practices for slurry storage					

⁴⁹ UN ECE Executive Body Decision 2012/10/EC, ECE/EB.AIR/113/Add 1.



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
(H)	Enhance technical capacity of farmers on best practices at spreading and other best practices (demonstration farm (1), special training for farmers (15 per year from 2024), development of specific guidance's)		Establish a demonstration farm to disseminate good practices at spreading and other best practices	Demonstration farm yearly report		A demonstration farm created in 2024 ensure that more than 80% of farmers have been informed, trained. The program of training for farmers fulfilled (15 per year from 2024 to 2030) A programme of development of specific guidance's (a guidance on best practices for spreading manure and slurry developed in 2024)
(H)	Ensure the finalization of the issuance of integrated permits for IPPC farms based on the use of BAT.		Progress in issuing IPPC permit to Farms	IPCC permit statistics		IPCC permits updated with BAT values relevant for IPPC farms [2025]
	Conduct a survey every year on the use of best practices in farms		Conduct Annual survey on the use of best practices in farms (to be combined with practices to reduce GHG emissions)	Agriculture advisory service		Annual survey on the use of best practices in farms conducted [2025]
No.13 (WAM B8)	Substitution of urea with ammonium nitrate fertilizer	Phasing out of nitrate fertilizers	Share of urea and ammonium nitrate in the total mineral nitrogen spread	Annual survey of best practices by	Share of urea in the total mineral nitrogen spread: 29,2% Share of ammonium nitrate in the total mineral nitrogen spread: 50,2% [2022]	Share of urea in the total mineral nitrogen spread: 21,6% Share of ammonium nitrate in the total mineral nitrogen spread: 57,8%
	See horizontal activities marked with (H) under the Measure No.12	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)
	Implementation of substitution of urea with ammonium nitrate fertilizers		Share of urea and ammonium nitrate in the	Annual survey of	Share of urea in the total mineral nitrogen spread: 29,2%	Share of urea in the total mineral nitrogen spread: 21,6%



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
			total mineral nitrogen spread	best practices by	Share of ammonium nitrate in the total mineral nitrogen spread: 50,2% [2022]	Share of ammonium nitrate in the total mineral nitrogen spread: 57,8%
No.14 (WAM A11)	Introduction of the best practices at spreading for solid manure application by faster incorporation of manure in the soil	Reduction of NH ₃ emissions through best practices of manure application by faster incorporation of manure in the soil spreading	Share of solid manure per animal type (pig, poultry, cattle) incorporated respectively within 4 hours, 12 hours and 24 hours.	Survey on all Serbian farms every two years from 2024	-	Increase in Pig and poultry farms: rapid incorporation within 4 hours and 12 hours Cattle manure: rapid incorporation within 24 hours, 12 hours or 4 hours [2024]
	See horizontal activities marked with (H) under the Measure No.12	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)
	Implement the solid manure application by faster incorporation of manure in the soil		Share of solid manure per animal type (pig, poultry, cattle) incorporated respectively within 4 hours, 12 hours and 24 hours.	Survey on all Serbian farms every two years from 2024	The following percentages are expressed as % of total solid manure per livestock category (includes also the animals raised in IED farms) : - Pig manure - Incorporation within 12 hours : 1,6% - Pig manure - Incorporation within 4 hours : 7,7% - Poultry manure Incorporation within 12 hours : 5,7% -Poultry manure Incorporation within 4 hours : 7,7% - Cattle manure - Incorporation within 24 hours : 7,7% - Cattle manure - Incorporation within 12 hours : 7% -Cattle manure - Incorporation within 4 hours : 0,7%	The following percentages are expressed as % of total solid manure per livestock category (includes also the animals raised in IED farms) : - Pig manure - Incorporation within 12 hours : 6,2% - Pig manure - Incorporation within 4 hours : 18,3% - Poultry manure - Incorporation within 12 hours : 21,5% - Poultry manure - Incorporation within 4 hours : 18,3% - Cattle manure - Incorporation within 24 hours : 18,3% - Cattle manure - Incorporation within 12 hours : 15% - Cattle manure - Incorporation within 4 hours : 3,3%
No.15 (WAM B7)	Introduction of best practices at spreading for pig and cattle slurry :	Reduction of NH ₃ emissions through best practices at spreading for pig and cattle slurry	Share of slurry per animal type (pig, cattle) spread by injection and trailing hose followed by an incorporation within 4 hours or 12 hours.	Survey on all Serbian farms every two years from 2024	0-	Reduction of 2kt of NH ₃ by 2030 by increase in injection and trailing hose & incorporation [2030]
	See horizontal activities marked with (H) under the Measure No.12	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)	IE(No.12)



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
	Implementation of best practices at spreading for pig and cattle slurry through upgrade of agriculture machinery (injection and trailing hose)		Share of slurry per animal type (pig, cattle) spread by injection and trailing hose followed by an incorporation within 4 hours or 12 hours.	Annual survey on all Serbian farms to be implemented	The following percentages are expressed as % of total slurry per livestock category (includes also the animals raised in IED farms) : - Pig manure - Injection : 9,7% - Pig manure - Trailing hose & incorporation within 4 hours : 2,1% - Pig manure - Trailing hose & incorporation within 12 hours : 0,7% - Cattle manure - Injection: 7% - Cattle manure - Trailing hose & incorporation within 4 hours: 6,3% - Cattle manure - Trailing hose & incorporation within 12 hours: 6,3%	The following percentages are expressed as % of total slurry per livestock category (includes also the animals raised in IED farms): Pig manure - Injection: 28,3% Pig manure - Trailing hose & incorporation within 4 hours: 9,6% Pig manure - Trailing hose & incorporation within 12 hours: 3,5% Cattle manure - Injection: 15% Cattle manure - Trailing hose & incorporation within 4 hours: 11,7% Cattle manure - Trailing hose & incorporation within 12 hours: 11,7%
No16 (WAM C3)	Limitation of the burning of agricultural residues (0% in 2030)	Implementation of banning of burning of agriculture residues	Share of maize and wheat residues that are burnt	Annual survey on all Serbian farms to be implemented	Share of maize residue burned : 17,0% Share of wheat residues burned : 9,1%	Share of maize residue burned : 0% Share of wheat residues burned : 0%
[A]	Inform and disseminate the Code for good practices for agricultural residues and develop awareness raising campaigns regarding the agricultural waste burning on air quality and measures to avoid this burning (through multiple events (1 in Serbia per year from 2023), communication materials ((flyers, videos...): 5) , web site (1)).		Upgrade the National Advisory Code of Good Agricultural Practices	A yearly programme of events status of the dedicated web site		The programme of events fulfilled: 1 event per year from 2023 to 2030 Communication materials ((flyers, videos...): 5 developed from 2024 to 2030 1 web site in 2024
	Limitation of the open burning of agricultural residues through investment in agriculture machinery in order to incorporate crop residues.		Upgrading the agriculture machinery	IPARD programme statistics	0 Mio€	46,23 Mio€
	Enhance technical capacity of farmers on best practices at harvesting and other best practices (special training for farmers (2 per year from 2024),		Enhance technical capacity of farmers	A programme of training for farmers		Ensure that more than 80% of farmers have been informed, trained. The programme of training for farmers fulfilled (2 per year from 2024 to 2030)



No.	Name of measure/activity	Monitoring of policy implementation	Monitoring effect of measure	Source of data	Base value [2015]	Target value [year]
No.17	Education on air quality, training for implementation of best practices and awareness raising	Awareness rising on the negative effects of air pollution	Air pollution (AP) present in school curricula, AP relevant adult training programmes, AP in awareness campaign	Ministry of Environment protection	-	Recommendation of health impacts prepared, 80% of households informed and the knowledge on proper use of appliances using solid waste disseminated
	Education: focused on kindergarten to 12 th grade (kindergartens, primary and secondary schools), with a view to identifying opportunities and issuing recommendations for integration of the health effects of air pollution in school curricula; recommendations on university studies may also be integrated.			Ministry of Environment protection	-	Recommendations for integration of the health effects of air pollution in school curricula prepared [2024]
	Capacity building, awareness raising campaigns and support given to the households about the proper use of small appliances using solid fuels and conducting the assessment of the moisture content of the wooden biomass.			Ministry of Environment protection		80% of households using biomass informed about the proper use of small appliances using solid fuels [2024]
	Establishing of the mobile demonstration centre (or equivalent) for knowledge sharing regarding the proper use of biomass in small appliances and boilers			Ministry of Environment protection		Mobile demonstration center active and awareness campaign in Belgrade, Niš Kragujevac, Valjevo, Užice and zone Serbia conducted [2024]



Republic of Serbia
Ministry of Environmental Protection
Ministry of Finance
Department for Contracting and Financing
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9 ACTION PLAN

Action plan is prepared in standardised form for the period 2022-2026.

Table 9-1: Action plan (standardised form) - to be further improved

Action plan:	Action plan for implementation of Programme of Air Protection of the Republic of Serbia						
Proposer:	Ministry of Environmental Protection						
Coordination and reporting:	Ministry of Environmental Protection						
General goal 11: <i>To reduce up to 2030 the health damage due to poor air quality by half compared to 2015 by reducing exposure to air pollution while aligning Serbia with the European Union’s regulatory limits to air pollution and limiting the damage on ecosystems</i>							
Institution responsible for monitoring and controlling of implementation: Ministry of Environmental Protection							
Indicator(s) at general objective level (effect indicator)	Unit of measure	Source of verification	Initial value [2015]	Base year [2022]	Target value in last year of AP	Last year of AP validity	
Average annual concentration level (AEL) of PM _{2.5}	µg.m ⁻³	Annual report on Air Quality in Serbia (SEPA)	NE	23,3	<20	2026	
Premature deaths due to PM _{2.5} exposure	Number of Premature deaths	Annual report on Air Quality in Serbia (SEPA)	NE	9773	5401	2026	



Specific goal 1.1: Specific objective 1: Reduce emissions of SO₂ by 92% and fine particles PM_{2.5} by 58.3% from Energy sector in 2030 compared to 2015							
Institution responsible for monitoring and controlling of implementation: Ministry of Environmental Protection							
Indicator(s) at specific objective level (<i>outcome indicator</i>)	Unit of measure	Source of verification	Initial value [2015]	Base year [2023]	Target value in year t+1 [2024]	Target value in year t+2 [2025]	Target value in the last year of AP [2026]
Total SO ₂ emissions from Energy sector	(ktSO ₂)	National CRLTAP Inventory report - SEPA	366	167,1	100,7	34,4	33,4
Total PM _{2.5} emissions from Energy sector	(ktPM _{2.5})	National CRLTAP Inventory report - SEPA	55,8	49,7	47	44,3	40,1



Measure 1.1.1: Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs							
Institution responsible for the implementation: Ministry of Environmental Protection							
Implementation period: 2022-2030	Type of measure: Regulatory						
Regulations that need to be amended/adopted to implement the measure:	Law on the Integrated Prevention and Control of Environmental Pollution Regulation on types of activities and installations that integrated permit is to be issued for Rulebook on the contents, layout and completing the application for integrated permit Rulebook on the content and format of integrated permit Law on the amendments to the Law on air protection Amendments to the Regulation on emission limit values for air pollutants from combustion plants Amendments to the Regulation on the list of industrial installations and activities controlling emission of volatile organic compounds, emission values of volatile organic compounds during the certain consumption of solvents and total allowed emission, and emission reduction scheme Amendments to the Law on waste management Amendments to the Regulation on types of thermally treated waste, requirements and criteria for determining location, technical and technological requirements for design, construction, equipping and operation of plants for thermal waste treatment, treatment of residue after combustion of waste, and other issues relevant for the operation of the plant for thermal waste treatment						
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of the Chapter II of the EU Directive Industrial emissions for Large Combustion Plants with consideration of the mean of upper and lower levels of BAT AELs	No of IPCC permits amended	No. of amended Permits issued (Ministry of Environment)	No LCP installation AEL's aligned with BAT AEL's	No LCP installation AEL's aligned with BAT AEL's	No LCP installation AEL's aligned with BAT AEL's	No LCP installation AEL's aligned with BAT AEL's	All LCP installations have permits aligned with BAT AELs

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD ⁵⁰		
		In year t+1	In year t+2	In year t+3

⁵⁰ Financial resources are assessed at the level of the measure, it is not necessary to assess them at the level of activities.



Budget revenues	0404-560-0002-411	25.850*	25.850*	25.850*
EU financial assistance	IPA	-	-	47.000*

Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing ⁵¹	Link to program budget ⁵²	Total estimated financial resources by sources in 000 RSD ⁵³		
						In year t+1	In year t+2	In year t+3
1.1.1.1 Ensure the full alignment of the national legislation with the IED (as defined in the DSIP for the directive 2010/75/EU)	Ministry of Environmental Protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units Competences for issuance of the integrated permits SEPA	2023	-	-	-	-	-
1.1.1.2 Ensure that the increase of human resources of Serbian institutions in order to deal with issuing IPPC permits, has been done as this was established in the DSIP for the IED (Project IED Serbia)	Ministry of Environmental Protection	-	2025	budget	0404-560-0002-411	25.850	25.850	25.850
1.1.1.3 Set up a programme for checking the quality and consistency of air emission reports to the National Register of Pollution Sources	SEPA	Ministry of Environmental Protection	2027	IPA	-	-	-	47.000

⁵¹ List one of the sources of funding: budget funds, loans, donor funds, IPA, etc. In the case of donor funds, it is mandatory to indicate the specific donor.

⁵² Code of the program and program activity or project within which the funds are provided

⁵³ An asterisk indicates funds that are not fully secured



Republic of Serbia
Ministry of Environmental Protection
Ministry of Finance
Department for Contracting and Financing
of EU Funded Programmes

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Measure 1.1.2: Enforcement of the EU Directive 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants							
Institution responsible for the implementation: Ministry of Environmental Protection							
Implementation period: 2022-2030				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Amend the Law on Air Protection; Adopt a Regulation on emission limit values of pollutants in the air from medium combustion plants. This regulation will need to merge the requirements of the MCPD and of the national regulation on emission limit values of pollutants in the air from combustion plants ("Official Gazette of the Republic of Serbia", No. 6/16).			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of the EU Directive 2015/20193 Medium Combustion plants	No of installations	SEPA MCE registry	No MCP installation AEL's aligned with BAT AEL's	No MCP installation AEL's aligned with BAT AEL's	-	-	All MCP installations have emissions aligned with mid-range BAT AELs

Source of financing of measures ⁵⁴	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0404-560-0002-411	2350*	2350*	2350*
Budget revenues	0404-560-0007-411	2350*	2350*	2350*

⁵⁴ List one of the sources of funding: budget funds, loans, donor funds, IPA, etc. In the case of donor funds, it is mandatory to indicate the specific donor.



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing ⁵⁵	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.2.1 Finalise of the work programme for full alignment of the national legislation with the MCPD	Ministry of Environmental Protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units Competences for issuance of the integrated permits SEPA	2022	-	-	-	-	-
1.1.2.2. Establish a reporting system and database for MCPs	SEPA	Ministry of Environment	2023	-	-	-	-	-
1.1.2.3. Compliance of medium combustion plans with BAT AELs (mid-range)	Ministry of Environmental Protection	SEPA	2025-2030	-	-	-	-	-
1.1.2.4. Ensure an increase of human resources of Serbian institutions in order to deal with the MCPD (but also other size of installations such as SCP and	Ministry of Environmental Protection	-	2025	budget	0404-560-0002-411	2.350	2.350	2.350

⁵⁵ List one of the sources of funding: budget funds, loans, donor funds, IPA, etc. In the case of donor funds, it is mandatory to indicate the specific donor.



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing ⁵⁵	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
domestic appliances: MEP : 1 working place with specialization in MCPD (but also SCP and domestic appliances) Autonomous Province of Vojvodina (Provincial Secretariat for Urban Planning and Environmental Protection): 1 working place with specialization in MCPD (but also SCP and domestic appliances) SEPA: MCPD : 1 officer to deal with MCPs (but also SCPs and domestic heating appliances)	SEPA		2025	budget	0404-560-0007-411	2.350	2.350	2.350



Measure 1.1.3: indicate Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)							
<i>Institution responsible for the implementation:</i> Ministry of Environmental Protection							
Implementation period:2022-2030				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Amend the Law on Air Protection; Adopt a Regulation on emission limit values of pollutants in the air from medium combustion plants.			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of limit values for smallest combustion plants (lower than 1 MW) of the national regulation on emission limit values of pollutants in the air from combustion plants (OGRS, No 6/16, No. 67/21)	No of SCP installations not subject to ECO design Directive	Yearly monitoring of emissions MCP by accredited institutions	No SCP installations have emissions aligned with lower emission limit values	No SCP installations have emissions aligned with lower emission limit values			All SCP installations have emissions aligned with lower emission limit values

Source of financing of measures ⁵⁶	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues				
EU financial assistance	IPA/Taiox	17.500*		

⁵⁶ List one of the sources of funding: budget funds, loans, donor funds, IPA, etc. In the case of donor funds, it is mandatory to indicate the specific donor.



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.3.1. Update emission limit values for small combustion installations with a capacity of less than 1 MW (boilers or stationary engines)	Ministry of Environmental Protection	Ministry of Mining and Energy SEPA Ministry of construction, transport and Infrastructure	2023	IPA/Taiex		17.500		



Measure 1.1.4: Enforcement of minimum Euro standards for second-hand vehicles imported: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025							
Institution responsible for the implementation: Ministry of Construction, Transport and Infrastructure							
Implementation period: 2022-2026				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Regulation on import of motor vehicles Goods (the Official Gazette of the Republic of Serbia no. 23/2010, 5/2018)			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of minimum Euro standards for second-hand vehicles imported: Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	Second hand vehicles first time registered in Serbia	MEP Annual Progress monitoring report	Second hand EURO 3/III and EURO 4/IV vehicles allowed to be registered	Second hand EURO 3/III and EURO 4/IV vehicles allowed to be registered		Only EURO 5/V or newer vehicles allowed for first time registration in Serbia	Only EURO 6/VI vehicles allowed for first time registration in Serbia

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues				
EU financial assistance	IPA/Taiox	-	1.175*	-



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.4.1 Amend the Regulation on the import of motor vehicle (Official Journal of RS, no 23/2010 and 5/2018) standards for imported passenger cars, light duty vehicles, heavy duty vehicles and busses. The minimum standards are Euro 5/V from 1st January 2024 and Euro 6/VI from 1st January 2025	Ministry of Construction, Transport and Infrastructure	Ministry of Environmental Protection	2023	IPA/Taiox		1.175		



Measure 1.1.5: Additional vehicle fleet renewal due to financial incentives for scrapping oldest Euro 1, 2 and 3 diesel passenger cars and light duty vehicles and for EURO I, II and III diesel busses							
<i>Institution responsible for the implementation:</i> Ministry of Construction, Transport and Infrastructure							
Implementation period:2024-2026				Type of measure: Financial incentive			
Regulations that need to be amended/adopted to implement the measure:				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)			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Number of vehicles scrapped through the incentive scheme	No. of vehicles scrapped	Recyclers association of Serbia and Ministry of Finance	0	0	77.200	45.100	17.900

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues (environmental taxation)	[...]	-2.753.696*	-2.059.528*	-1.428.542*
Budget revenues	[...]	11.985.000*	5.170.000*	1.527.500*



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.5.1 Prepare and adopt an end-of life vehicle management plan and enhance the vehicles recycling centers (in line with waste management strategy)	Ministry of Environmental Protection	Recyclers Association of Serbia	2023	-	-	-	-	-
1.1.5.2 Set up and implement the public financial support mechanism for the scrapping of old diesel passenger cars, light duty vehicles and busses (respectively Euro 1, Euro 2, Euro 3 and Euro I, Euro II and Euro III).	Ministry of Construction, Transport and Infrastructure	Ministry of Environmental Protection	2026	budget	[...]	11.985.000	5.170.000	1.527.500
1.1.5.3. Set up a polluters pay principle for the registration of passenger cars based on environmental standards (environmental taxation of vehicles)	Ministry of Construction, Transport and Infrastructure	Ministry of finance, Ministry of Environmental Protection	2023	budget (revenues)	[...]	-2.753.696	-2.059.528	-1.428.542



Measure 1.1.6: Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No167/2013, and amending and repealing Directive 97/68/EC							
<i>Institution responsible for the implementation:</i> Ministry of Construction, Transport and Infrastructure							
Implementation period: 2022-2030				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of regulation (EU) 2016/1628 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No167/2013, and amending and repealing Directive 97/68/EC	Share of vehicles compliant with NRMM	IPARD programme monitoring plan	0% of Agricultural and industrial NRMM compliant	0% of Agricultural and industrial NRMM compliant	0% Agricultural and industrial NRMM compliant	7% Agricultural and industrial NRMM compliant	40% of Agricultural and industrial NRMM compliant with the Directive 2016/1628/EU

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0701-450-0001-411	4700*	4700*	4700*



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.6.1 Finalise the work programme for full alignment of the national legislation with the regulation 2016/1628 through the Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery).	Ministry of Construction, Transport and Infrastructure (MCTI),	Road Traffic Safety Agency (RTSA), Ministry of Environmental Protection	2022	-	-	-	-	-
1.1.6.2. Ensure an increase of human resources of Serbian institutions in order to deal with the NRMM (but also road traffic and other traffic modes): MCTI: 1 working place with specialization in NRMM (but also road traffic and other traffic modes) RTSA: 1 officer to deal with NRMM (but also road traffic and other traffic modes)	Ministry of Construction, Transport and Infrastructure (MCTI),	Road Traffic Safety Agency (RTSA),	2025	budget	0701-450-0001-411	4700	4700	4700



Measure 1.1.7: Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice

Institution responsible for the implementation: Ministry of Mining and Energy

Implementation period: 2022-2030

Type of measure: Regulatory, Financial

Regulations that need to be amended/adopted to implement the measure:

Regulation on Eco-design requirements for solid fuel boilers.

Regulation on Eco-design requirements for solid fuel local space heaters.

Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Additional the replacement of existing domestic heating appliances with new appliances Eco-Design compliant and heat pumps due to financial incentives, with larger share of replacement in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice	No. of appliances replaced	Ministry of Mining and Energy through the incentives statistics	0	0	9,20 Mio€ of financial incentives delivered of which to Kragujevac 0,2Mio€, Belgrade 1,46Mio€, Niš 0,74mio€, Valjevo 0,25Mio, Užice 0,33Mio€, and to zone Serbia 6.2Mio€	20,5 Mio€ of financial incentives delivered of which to Kragujevac 0,6Mio€, Belgrade 4,35Mio€, Niš 2,95mio€, Valjevo 1,61Mio, Užice 1,81Mio€, and to zone Serbia 9.2Mio€	48,90 Mio€ of financial incentives delivered of which to Kragujevac 0,99Mio€, Belgrade 7,1Mio€, Niš 4,64mio€, Valjevo 2,53Mio, Užice 2,44Mio€, and to zone Serbia 30.3Mio€

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0501-430-0001-411	16.450*	35.250*	35.250*
Budget revenues	0502-430-0001-463	1.080.729*	2.412.941*	5.641.307*
EU financial assistance	IPA	117.500*	-	-



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.7.1 Finalise the work for full alignment of the national legislation with the Eco-design directive and work in order the two following regulations are transposed: Regulation 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC and Regulation 2015/1185 of 24 April 2015 implementing Directive 2009/125/EC	Ministry of Mining and Energy	Ministry of Environmental Protection of Cities of Kragujevac, Beograd, Nis, Valjevo and Užice Conformity Assessment Bodies (CABs)	2022	IPA		58.750	0	0
1.1.7.2 Implement awareness building and education campaign across the country for promoting efficient domestic heating appliances, use of boilers and space heater in the best combustion conditions and use of dry wood (incorrect use of solid fuel boilers or space heaters and use of humid wood, may reduce the efficiency of emission reductions allowed by Eco-design compliant appliances and even more, increase them).	Ministry of Mining and Energy	Ministry of Environmental Protection of Cities of Kragujevac, Beograd, Nis, Valjevo and Užice Conformity Assessment Bodies (CABs)		IPA		58.750	0	0
1.1.7.3 Establish and implement a mechanism for financial incentives for replacement of existing domestic heating appliances with new appliances	Ministry of Mining and Energy	Local communities: Belgrade, Kragujevac, Niš, Valjevo, Užice	2025	budget	0502-430-0001-463	1.080.729	2.412.941	5.641.307



Eco-Design compliant and heat pumps.								
1.1.7.4 Facilitate the mechanism of financial incentives by ensuring additional 15 FTE in the aim to inform the public on how to reduce emissions from domestic heating appliances and facilitate the access to financial support. Out of 15FTE at least 2 FTE could be located in Beograd, 1FTE in Nis and 1FTE in Kragujevac, Valjevo and Užice.	Ministry of Mining and Energy	Local communities: Belgrade, Kragujevac, Niš, Valjevo, Užice	2025	budget	0501-430-0001-411	16.450	35.250	35.250



Measure 1.1.8: Enforcement of the amended fuel quality Directive 2009/30/EC and Directive 2016/802/EC on the reduction of the Sulphur content of certain liquid fuels							
Institution responsible for the implementation: Ministry of Mining and Energy							
Implementation period: 2022-2025				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Rulebook on emission limit values of gaseous and particulate pollutants and homologation of internal combustion engines for off-road mobile machinery			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Penetration of ultra-low sulfur liquid fuels into the Serbian market	% of ultra low sulphur liquid fuels put on the market	MME Annual Progress monitoring report	No ultra low sulfur liquid fuels available on Serbian market	No ultra low sulfur liquid fuels available on Serbian market	50% liquid fuels put on the market compliant with directive requirements	100% liquid fuels put on the market compliant with directive requirements	100% liquid fuels put on the market compliant with directive requirements

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0701-450-0001-411	9400*	9400*	9400*
EU financial assistance				



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.8.1 Finalise the work programme for full alignment of the national legislation with the fuel quality Directive 2009/30/EC (FQD) and Directive 2016/802/EU on the reduction of the Sulphur content of certain liquid fuels ⁵⁷ .	Ministry of Mining and Energy	Ministry of Construction, Transport and Infrastructure (Sector for Water Transport and Safety of Navigation) Ministry of Finance	2025	-	-	-	-	-
1.1.8.2 Increase the human resources of institutions: 4 FTE for monitoring of directive implementation	Ministry of Mining and Energy	Ministry of Construction, Transport and Infrastructure (Sector for Water Transport and Safety of Navigation) Ministry of Finance	2023	budget	0701-450-0003-411	9400	9400	9400

⁵⁷ Two DSIPs in the scope of the EAS3 project, have been developed and detail list of the Laws, Regulations and Rulebooks to be amended.



Measure 1.1.9: <u>Limit VOC emissions through enforcement of Directives 94/63/EC (stage I) and 2009/126/EC (stage II)</u>							
Institution responsible for the implementation: Ministry of Environmental Protection							
Implementation period: 2022-2030				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:				Amend the Law on Air Protection; Amend the Rulebook on technical measures and requirements in relation to allowed emission factors for volatile organic compounds resulting from the storage and transport of petrol (Hereinafter: VOC Petrol Rulebook); Amend the existing Rulebook on methodology for preparation of national and local register of pollution sources, as well as methodology for types, methods and deadlines of data collection (National Register of Pollution Sources- NRPS)			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
% of stations compliant with VOC Stage II	% of stations compliant with VOC Stage II	Monitoring plan of DSIP VOC	20% of stations Compliant with VOC Stage 1 4% of stations Compliant with VOC Stage II	40% of stations Compliant with VOC Stage 1 20% of stations Compliant with VOC Stage II	50% of stations Compliant with VOC Stage 1 28% of stations Compliant with VOC Stage II	60% of stations Compliant with VOC Stage 1 36% of stations Compliant with VOC Stage II	70% of stations Compliant with VOC Stage 1 65% of stations Compliant with VOC Stage II

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0404-560-0002-411	9400*	9400*	9400*
EU financial assistance	IPA	23500*		



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.1.9.1 Finalise of the legal transposition plan for the Directives 1994/63/EC and 2009/126/EC	Ministry of environmental Protection	Ministry of Construction, Transport and Infrastructure SEPA	2023	IPA	[...]	23500	-	-
1.1.9.2 Increase human resources in SEPA and MEP for implementation of the Directives	Ministry of environmental Protection	SEPA	2023	budget	0404-560-0002-411	9400	9400	9400



Specific goal 1.2: <i>Specific objective 1: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels</i>							
Institution responsible for monitoring and controlling of implementation: Ministry of Environmental Protection							
Indicator(s) at specific objective level (<i>outcome indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
No. of Industrial processes Installations in full compliance with mid-range BAT associated emission levels (AELs)	No.	Ministry of Environmental protection (IPCC permits data)	15%	15%	15%	20%	100%
Copper smelting installation compliant with lower values of the BAT AELs for the production of copper of 50 mg/Nm ³	mgSO ₂ /Nm ³	Ministry of Environmental protection (IPCC permits data)	>50 mg/Nm ³	>50 mg/Nm ³	>50 mg/Nm ³	>50 mg/Nm ³	50 mg/Nm ³
Sulphuric acid production installation compliant with lower values of the BAT AELs of 100 mg/Nm ³	mgSO ₂ /Nm ³	Sulphuric acid production installation compliant with lower values of the BAT AELs of 100 mg/Nm ³	>100 mg/Nm ³	>100 mg/Nm ³	>100 mg/Nm ³	>100 mg/Nm ³	100 mg/Nm ³



Measure 1.2.1: Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs and the lower levels for the plants of copper production and sulphuric acid production in Bor

Institution responsible for the implementation: Ministry of Environmental Protection

Implementation period: 2022-2029

Type of measure: Regulatory

Regulations that need to be amended/adopted to implement the measure:

See measure 1.1.1.

Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Reduction of SO ₂ emissions from specific industrial processes	Concentration of SO ₂ in mg/Nm ³	Annual report on continuous emission measurements	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³ [2015]	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³	Limit value for the production of copper of 350 mg/Nm ³ And sulphuric acid production of 120 mg/Nm ³	the BAT AELs for the production of copper of 50 mg/Nm ³ and 100 mg/Nm ³ for the Sulphuric Acid production implemented

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues		IE (Measure 1.1.1.)	IE (Measure 1.1.1.)	IE (Measure 1.1.1.)
EU financial assistance				



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.2.1.1. Enforcement of the Chapter II of the EU Directive Industrial emissions for industrial processes with consideration of the mean of upper and lower levels of BAT AELs	Ministry of Environmental protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units Autonomous Province of Vojvodina	2024	-	-	-	-	-



Measure 1.2.2: Enforcement of the IED Chapter V, Annex VII for VOC or chapter 2 for plants with a of solvents consumption larger than 200 t							
<i>Institution responsible for the implementation: Ministry of Environmental protection</i>							
Implementation period: 2022-2029				Type of measure:Regulatory			
Regulations that need to be amended/adopted to implement the measure:				See Measure 1.1.1.			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Enforcement of the IED Chapter V, Annex VII for VOC or chapter 2 for plants with a of solvents consumption larger than 200 t	tonnes of VOC reduced	Electronic registration and reporting system	0	0	2808 t VOC	4213 t VOC	4201 t VOC

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Donors funds by Royal Norwegian Embassy	NO	50.525	NO	NO



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.2.2.1 Amendments to the Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (OGRS N°111/15)	Ministry of Environmental protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units Autonomous Province of Vojvodina	2023	-	-	-	-	-
1.2.2.2. testing and start-up of the electronic registration and reporting system for entities classified as VOC operators and capacity building	Ministry of Environmental protection	Provincial Secretariat for Construction and Environmental Protection and local self-government units, SEPA	2023	Donors funds by Royal Norwegian Embassy	-	50.525	-	-



Specific goal 1.3: *Specific objective 1: Reduce emission of air pollutants from Industrial processes and product use through compliance with BAT associated emission levels*

Institution responsible for monitoring and controlling of implementation: Ministry of Environmental Protection

Indicator(s) at specific objective level (<i>outcome indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Total NH ₃ emissions from Agriculture sector	kt NH ₃	SEPA CRLTAP Inventory	77,7	75,2	73,3	71,5	70,5



Measure 1.3.1: Introduction of best practices for slurry storage							
<i>Institution responsible for the implementation:</i> Ministry of Environmental Protection							
Implementation period: 2022-2030				Type of measure: Information, Education			
Regulations that need to be amended/adopted to implement the measure:				Amend Law on air quality Amend existing national Code of Good Agricultural Practices of 2016			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Share of the pig manure covered storage and share of natural crust in the total dairy cow slurry	%	Annual survey by agriculture advisory service	0,5% pig manure covered storage and 1,0% of natural crust in total dairy cow slurry	0,7% pig manure covered storage and 2,0% of natural crust in total dairy cow slurry	0,9% pig manure covered storage and 1,3% of natural crust in total dairy cow slurry	1,2% pig manure covered storage and 1,7% of natural crust in total dairy cow slurry	1,3% pig manure covered storage and 2,0% of natural crust in total dairy cow slurry

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0101-420-0001-411	23.500*	23.500*	23.500*
EU financial assistance	IPA	94000*	0	0
EU financial assistance/budget	IPA /0102-420-0003-423	47.588*	5875*	91415*



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.3.1.1 Prepare a National Advisory Code of Good Agricultural Practices to control ammonia emissions (EU directive 2284/2016 obligation, annex III, part 2), by complementing and extending the existing national Code of Good Agricultural Practices of 2016 to better consider measures to reduce ammonia emissions in line with the UN ECE and EU requirements	Ministry of Agriculture, Forestry and Water Management	Ministry of Environment Protection, Autonomous Province of Vojvodina Local self-government units, SEPA	2023	-				
1.3.1.2 Establish a national nitrogen budget to monitor the changes in overall losses of reactive nitrogen from agriculture, including ammonia, nitrous oxide, ammonium, nitrates and nitrites, based on the principles set out in the UNECE Guidance Document on Nitrogen Budgets	SEPA	Ministry of Environment Protection		IPA	[....]	94.000		
1.3.1.3 Reinforce human resources of the Ministry of Agriculture, Forestry and Water Management (3 FTE are needed to develop the National advisory Code, organise agricultural advisory services and disseminate the good practices in an integrated approach) and of Agricultural advisory services (10	Ministry of Agriculture, Forestry and Water Management	Agricultural advisory services	2024	budget	0101-420-0001-411	23.500	23.500	23.500

Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
FTE for dissemination of ammonia reduction measures and protection of underground water bodies)								
1.3.1.4 Inform and disseminate the National Advisory Code of Good Agricultural Practices and develop awareness raising campaigns regarding the impact of NH ₃ on air quality and measures to reduce them (through multiple events (5 in Serbia per year from 2024), communication materials ((flyers, videos...): 10) , web site (1))	Ministry of Agriculture, Forestry and Water Management	Agricultural advisory services	2024	IPA or budget	0102-420-0003-423	41713	0	0
1.3.1.5. Enhance technical capacity of farmers on best practices at spreading and other best practices (demonstration farm (1), special training for farmers (15 per year from 2024), development of specific guidance's)	Ministry of Agriculture, Forestry and Water Management	Agricultural advisory services	2024	IPA or budget	0102-420-0003-423	5875	5875	91415



Measure 1.3.2: Substitution of urea with ammonium nitrate fertilizer							
Institution responsible for the implementation: Ministry of Agriculture, Forestry and Water Management							
Implementation period: 2023-2030				Type of measure: Information Education			
Regulations that need to be amended/adopted to implement the measure:				NA			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Share of urea in the total mineral nitrogen (%)	%	Annual survey of best practices by advisory service	29,2%	28,6%	28,1%	27,5%	26,4%
Share of ammonium nitrate in the total mineral nitrogen (%)	%	Annual survey of best practices by advisory service	50,2%	50,7%	51,3%	51,8%	53%

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)
EU financial assistance				



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
Included under Measure 1.3.1	IE	IE	IE	IE	IE	IE	IE	IE



Measure 1.3.3: Introduction of the best practices at spreading for solid manure application by faster incorporation of manure in the soil							
Institution responsible for the implementation: Ministry of Agriculture, Forestry and Water Management							
Implementation period: 2023-2030				Type of measure: Information, Education			
Regulations that need to be amended/adopted to implement the measure:				NO			
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Pig manure - Incorporation within 12 hours	% of total pig solid manure	Annual survey of best practices by advisory service	1,6%	2,2%	2,8%	3,4%	3,9%
Pig manure - Incorporation within 4 hours	% of total pig solid manure		7,7%	9,0%	10,3%	11,7%	13,0%
Poultry manure - Incorporation within 12 hours	% of total poultry livestock		5,7%	7,7%	9,6%	11,6%	13,6%
Poultry manure - Incorporation within 4 hours	% of total poultry livestock		7,7%	9,0%	10,3%	11,7%	13,0%
Cattle manure - Incorporation within 24 hours	% of total cattle solid manure		7,7%	9,0%	10,3%	11,7%	13,0%
Cattle manure - Incorporation within 12 hours	% of total cattle solid manure		7,0%	8,0%	9,0%	10,0%	11,0%
Cattle manure - Incorporation within 4 hours	% of total cattle solid manure		0,7%	1,0%	1,3%	1,7%	2,0%



Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)
EU financial assistance				

Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
Included under Measure 1.3.1	IE	IE	IE	IE	IE	IE	IE	IE



Measure 1.3.4: Introduction of best practices at spreading for pig and cattle slurry : E							
Institution responsible for the implementation: Ministry of Agriculture, Forestry and Water Management							
Implementation period: 2023-2030				Type of measure: Information, Education			
Regulations that need to be amended/adopted to implement the measure:				NO			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Pig manure - Injection	% of total pig slurry	Annual survey of best practices by advisory service	9,7%	12,0%	14,3%	16,7%	19,0%
Pig manure - Trailing hose followed by an incorporation within 4 hours	% of total pig slurry		2,1%	3,0%	4,0%	4,9%	5,8%
Pig manure - Trailing hose followed by an incorporation within 12 hours	% of total pig slurry		0,7%	1,1%	1,4%	1,8%	2,1%
Cattle manure - Injection	% of total cattle slurry		7,0%	8,0%	9,0%	10,0%	11,0%
Cattle manure - Trailing hose followed by an incorporation within 4 hours	% of total cattle slurry		6,3%	7,0%	7,7%	8,3%	9,0%
Cattle manure - Trailing hose followed by an incorporation within 12 hours	% of total cattle slurry		6,3%	7,0%	7,7%	8,3%	9,0%



Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)	IE (Measure 1.3.1.)
EU financial assistance				

Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
Included under Measure 1.3.1	IE	IE	IE	IE	IE	IE	IE	IE



Measure 1.3.5: Limitation of the burning of agricultural residues							
<i>Institution responsible for the implementation:</i> Ministry of Agriculture, Forestry and Water Management							
Implementation period: 2023-2030				Type of measure: Regulatory			
Regulations that need to be amended/adopted to implement the measure:							
Indicator(s) at the level of the measure (<i>result indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Burning of maize residues ()	% of total maize residues		17,0%	15%	12%	9,8%	7,9%
Burning of wheat residues ()	% of total wheat residues		9,1%	8%	7%	5,2%	4,2%

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
Budget revenues	0102-420-0003-423	18.800*	0	0
EU financial assistance				

Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.3.5.1 Inform and disseminate the Code for good practices for agricultural residues and develop awareness raising campaigns regarding the agricultural waste burning on air quality and measures to avoid this burning (through multiple events (1 in Serbia per year from 2023), communication materials ((flyers, videos...): 5) , web site (1)).	Ministry of Agriculture, Forestry and Water Management	Agricultural advisory services	2024	budget	0102-420-0003-423	10.575	0	0
1.3.5.2 Enhance technical capacity of farmers on best practices at harvesting and other best practices (special training for farmers (2 per year from 2024),	Ministry of Agriculture, Forestry and Water Management	Agricultural advisory services	2024	budget	0102-420-0003-423	8.225	0	0



Specific goal 1.4: <i>Specific objective 1: Promote transition to clean air for everyone</i>							
Institution responsible for monitoring and controlling of implementation: Ministry of Environmental Protection							
Indicator(s) at specific objective level (<i>outcome indicator</i>)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Stakeholders aware of air pollution and its potential implications for the society	Awareness Project conducted	Monitoring and evaluation plan of the awareness Project	no	no	Yes	yes	yes
No. of households informed on proper use of fuelwood in small appliances	% of households	Monitoring and evaluation plan of the awareness Project	0%	0%	20%	60%	80%
Percentage of zones and agglomeration visited by mobile demonstration centre (or equivalent demonstration concept)	% of zones and agglomeration	Monitoring and evaluation plan of the awareness Project	0	0%	10%	50%	100%



Measure 1.4.1: Education on air quality, training for implementation of best practices and awareness raising							
Institution responsible for the implementation: Ministry of Environmental Protection							
Implementation period: 2023-2030				Type of measure: Information, Education			
Regulations that need to be amended/adopted to implement the measure:				NA			
Indicator(s) at the level of the measure (result indicator)	Unit of measure	Source of verification	Initial value	Base year	Target value in year t+1	Target value in year t+2	Target value in the last year of AP
Recommendation of health impacts prepared, 80% of households informed and the knowledge on proper use of appliances using solid waste disseminated	YES/NO	Ministry of Environment protection	NO	NO	NO	YES	YES

Source of financing of measures	Link to programme budget	Total estimated financial resources in 000 RSD		
		In year t+1	In year t+2	In year t+3
EU financial assistance	IPA	0	117.500*	0



Title of activity:	Authority implementing the activity	Partner authorities in the implementation of activities	Deadline for completion of activities	Source of financing	Link to programme budget	Total estimated financial resources by sources in 000 RSD		
						In year t+1	In year t+2	In year t+3
1.4.1.1 Education: focused on kindergarten to 12 th grade (kindergartens, primary and secondary schools), with a view to identifying opportunities and issuing recommendations for integration of the health effects of air pollution in school curricula; recommendations on university studies may also be integrated.	Ministry of Environmental Protection	Ministry of Education, Science and Technological Development, Ministry of Health, Local self-government units, Autonomous Province of Vojvodina, Serbian Environmental Protection Agency, Chamber of Commerce of Republic of Serbia, Research Institutions	2025	IPA	[....]	0	58750	0
1.4.1.2. Capacity building, awareness raising campaigns and support given to the households about the proper use of small appliances using solid fuels and conducting the assessment of the moisture content of the wooden biomass.	Ministry of Environmental Protection		2025	IPA	[....]	0	58750	0
1.4.1.3 Establishing of the mobile demonstration centre (or equivalent) for knowledge sharing regarding the proper use of biomass in small appliances and boilers	Ministry of Environmental Protection							

.....

Appendix 1 Information on consultations process in the preparation of the Programme

1 Introduction

This appendix presents the results of the stakeholder-led, online questionnaire-based, multicriteria analysis (MAC) of the three additional measures scenarios (WAM A, WAM B and WAM C) produced for the Programme of Air Protection of the Republic of Serbia with Action Plan.

The questionnaire was open for answering from 13 September to 13 October 2021.

The results of this questionnaire provide input to the decision making on the preparation of the draft Programme of Air Protection of the Republic of Serbia with Action Plan, but they do not constitute an obligation to be followed or adhered to both technically or politically. The results of this questionnaire are a mere tool to support, not determine, policy decisions.

The stakeholder engagement at this stage of the technical process, follows international best practice for public participation. It does not replace additional public consultation procedures to be implemented in accordance with Serbian law.

To support stakeholder participation in the MCA, a brochure with key information on the three criteria (environment, health and economic) regarding the three additional measures scenarios (WAM A, WAM B and WAM C) was made available. Stakeholders were asked to read the brochure before answering the questionnaire. It was estimated that a minimum of 30 minutes would be required for the effective and informed participation in this stakeholder-led MCA.

The technical information included in the brochure was intended to be understood by a wide range of stakeholders, with very different backgrounds, interests, and experiences. As such, it represents only a very small fraction of the technical information produced by the project and is described in the simplest terms possible.

2 Respondents' Categorization

The largest group of the respondents to the questionnaire (27%) were representatives of Local Self-Governments, followed by stakeholders responding on their own behalf (Citizens), 19%, the same percentage as stakeholders identifying with any Other category. Representatives of public companies accounted for 15% of the answers and Working Group members 8%. National Government representatives, NGOs and Academia represented each represented 4% of the respondents.

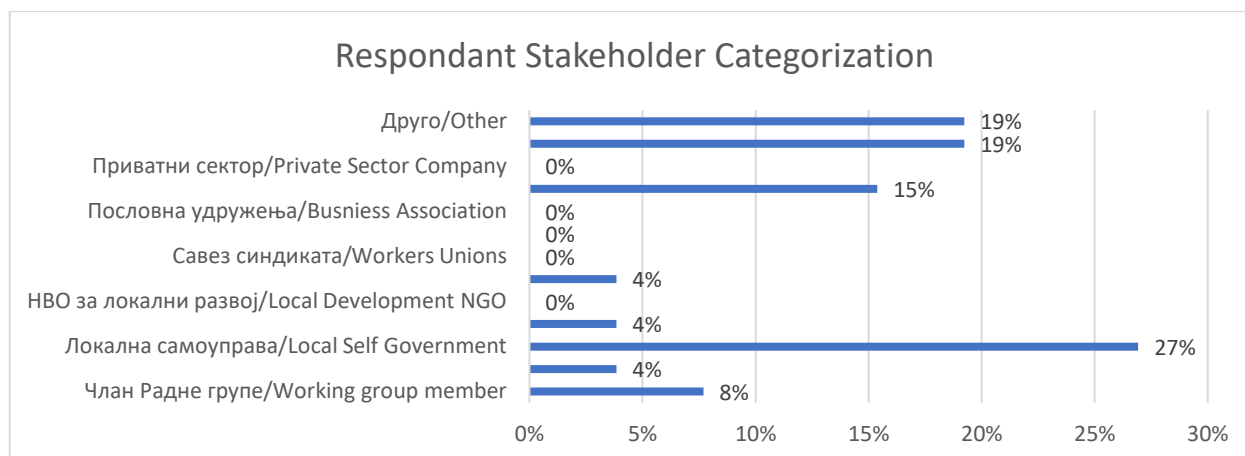


Figure 30 - Respondents' Categorization

The three with additional measures scenarios of the draft Programme of Air Protection of the Republic of Serbia with Action Plan, have localized impacts, namely in terms of benefits. It was therefore important to understand how much the results of different scenarios on the city the respondents lived or worked influenced their respective decision. An overwhelming majority of respondents (69%) declared that their answer was not influenced by results of the scenarios for their city, while 31% acknowledge that to be the case.

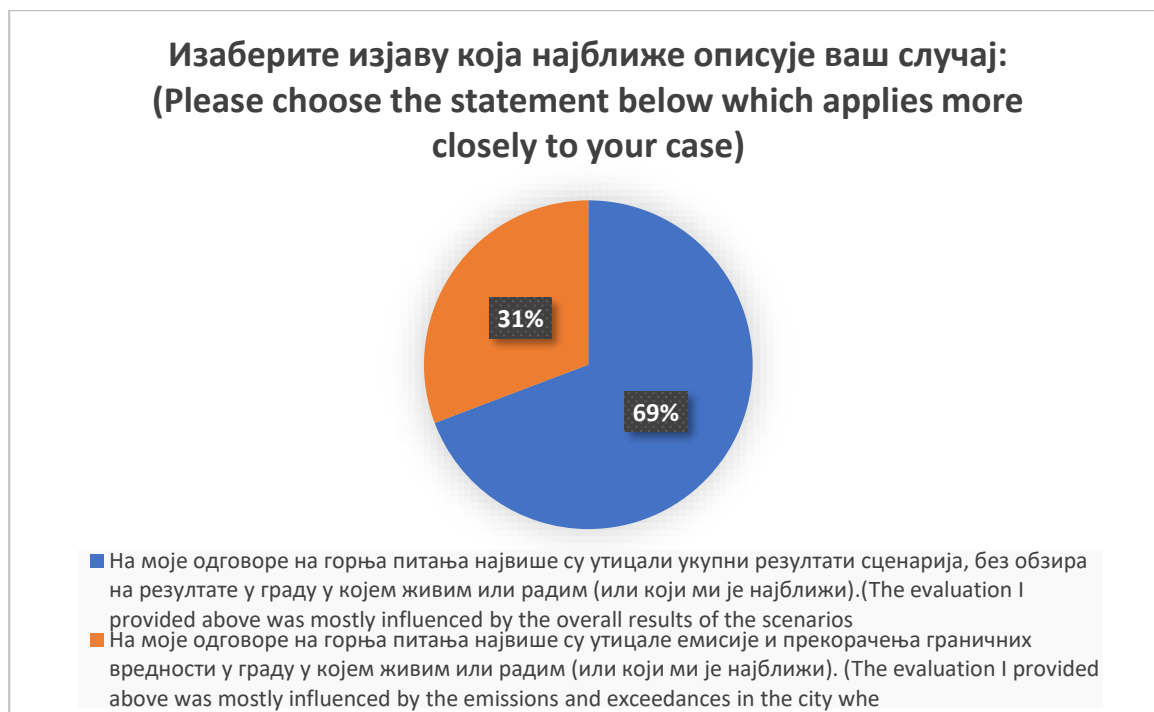


Figure 31 - Influence of the impacts of the scenarios in the respondent's city on the respondent's answer to the questionnaire

3 The weight of the environmental, health and economic criteria used in the multicriteria analysis

An important element of an MCA is the weighing of the criteria: it is important to assess the importance stakeholders attribute to each criterion. This will ensure that the analysis of the evaluation of the different indicators take into consideration the relative importance (weight) stakeholders attribute to each criterion.

In this MCA, three criteria were used: environment, health and economic.

The indicator related to benefits and costs is a mix between health and economic criteria.

As can be seen in the table below, **stakeholders attributed higher importance to health** (4,36), followed by **environment** (4,27) and, lastly, to the **economic criteria** (4,04)⁵⁸.

The evaluation of each indicator is multiplied by the respective criterion weight, to ensure a correct understanding of the results.

The evaluation of the Benefits and costs have been multiplied by a weight which has been estimated as the average weight of the health and economic criteria.

The evaluation of each indicator presented in the next section is already multiplied by the weight of each criterion.

Table 2 - Weight attributed by stakeholders to each criterion

	Environment	Health	Economic	(Benefits and costs)
Average	4,27	4,36	4,04	(4,20)
Median	5	5	4	(4,5)

4 Questions based on technical information provided in the accompanying document

4.1 Environmental Criteria

How satisfied are you with the PM10 emissions reductions achieved with scenario WAM A, WAM B and WAM C?

Respondents are **more satisfied** with the PM10 emissions reductions achieved **with WAM C** (weighed average scoring of 32,18), followed by WAM B (24,47) and finally WAM A (20,53).

⁵⁸ The median weight is show here for reference only, even though the median evaluation of the indicators is also multiplied by the median weight of the respective criterion.

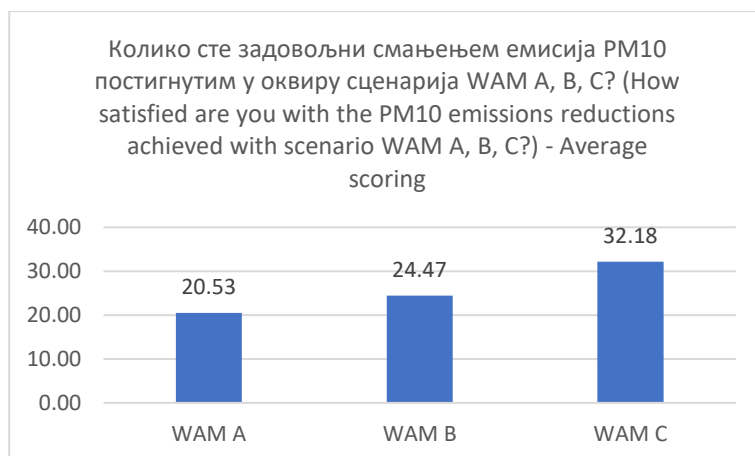


Figure 32 - How satisfied are you with the PM10 emissions reductions achieved with scenario WAM A, B, C? - Average scoring

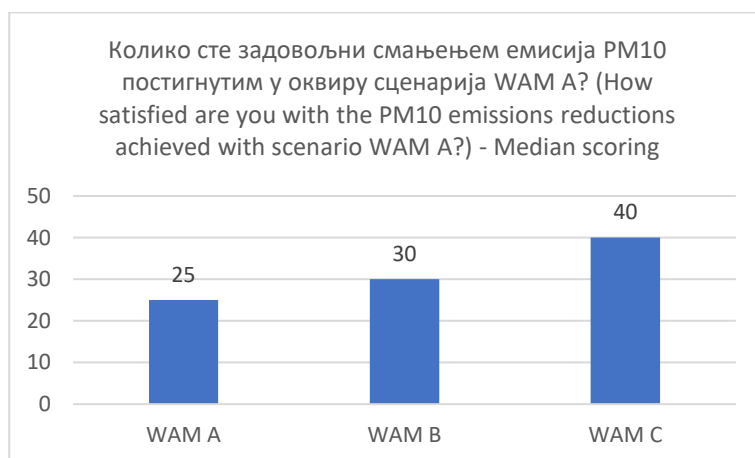


Figure 33 - How satisfied are you with the PM10 emissions reductions achieved with scenario WAM A, B, C? - Median scoring

How satisfied are you with the number of exceedances of PM10 estimated in WAM A. WAM B and WAM C?

Respondents are **more satisfied** with the number of exceedances of PM10 achieved **with WAM C** (weighed average scoring of 30,87), followed by WAM B (21,84) and finally WAM A (18,39).

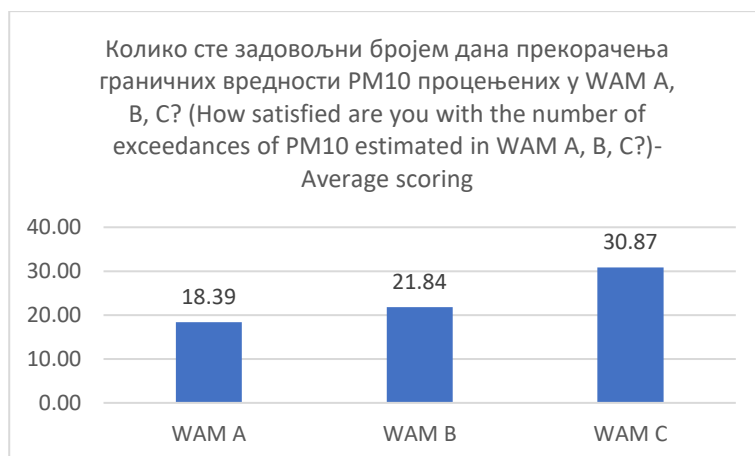


Figure 34 - How satisfied are you with the number of exceedances of PM10 estimated in WAM A, B, C? - Average scoring

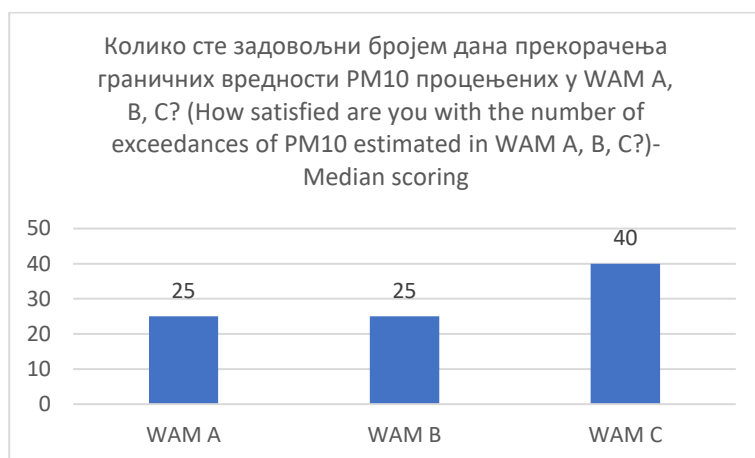


Figure 35 - How satisfied are you with the number of exceedances of PM10 estimated in WAM A, B, C? - Median scoring

How satisfied are you with the number of exceedances of any air pollutants in your city (or the one closest to you) estimated in WAM A, WAM B and WAM C?

Respondents are **more satisfied** with the number of exceedances any air pollutants in their respective city achieved **with WAM C** (weighed average scoring of 30,87), followed by WAM B (24,63) and finally WAM A (22,5).

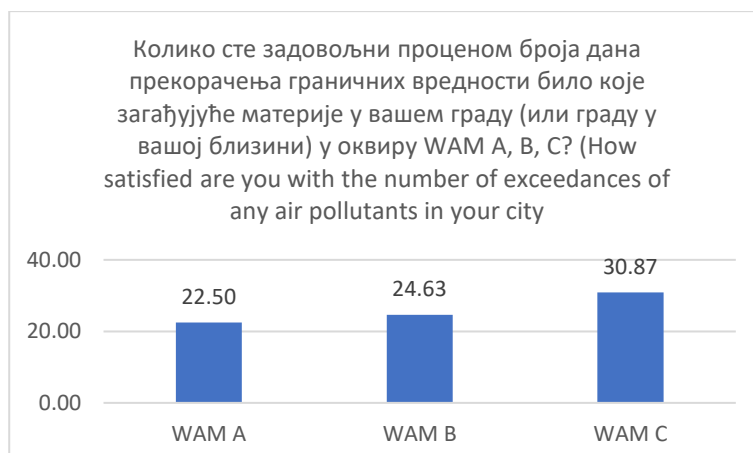


Figure 36 - How satisfied are you with the number of exceedances of any air pollutants in your city (or the one closest to you) estimated in WAM A, WAM B and WAM C? - Average Scoring

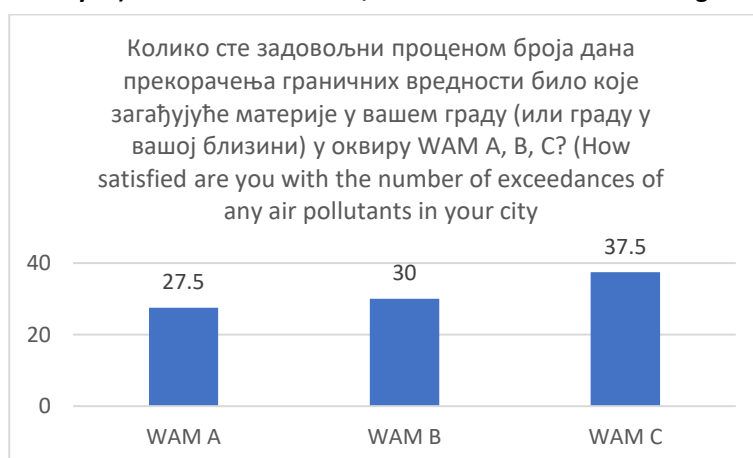


Figure 37 - How satisfied are you with the number of exceedances of any air pollutants in your city (or the one closest to you) estimated in WAM A, WAM B and WAM C? - Median Scoring

In summary, for the three indicators assessed under the environmental criteria, **WAM C was always rated more favourably by stakeholders**, followed by WAM B and WAM A.

4.2 Health Criteria

How satisfied are you with the number of premature deaths associated with air pollution estimated in WAM A, WAM B and WAM C?

Respondents are **more satisfied** with the number of premature deaths associated with air pollution estimated **with WAM C** (weighed average scoring of 25,82), followed by WAM B (22,30) and finally WAM A (17,44).

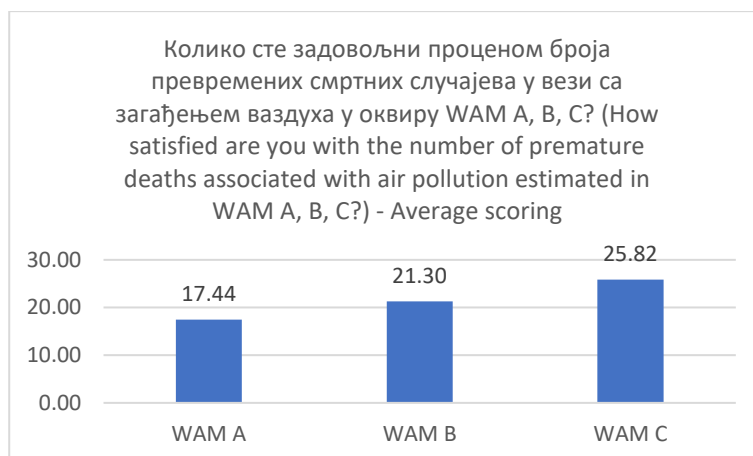


Figure 38 - How satisfied are you with the number of premature deaths associated with air pollution estimated in WAM A, WAM B and WAM C? – Average scoring

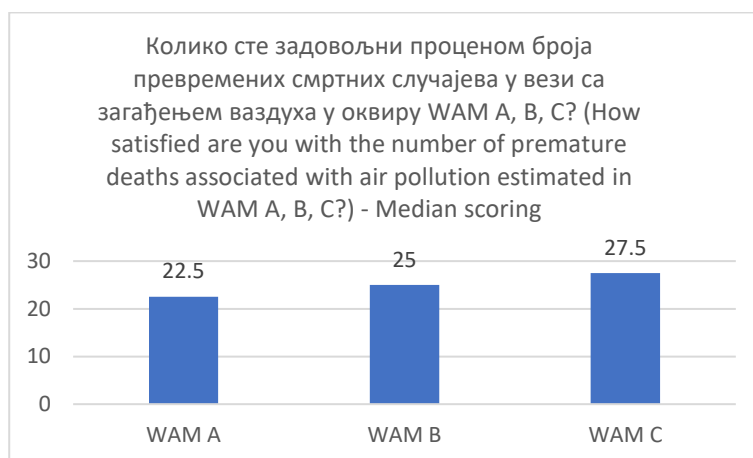


Figure 39 - How satisfied are you with the number of premature deaths associated with air pollution estimated in WAM A, WAM B and WAM C? – Median scoring

For the indicator assessed under the health criteria, **WAM C** was always rated more favourably by stakeholders, followed by WAM B and WAM A.

4.3 Economic Criteria

How satisfied are you with the additional costs estimated for the implementation of WAM A, WAM B and WAM C?

Respondents are **more satisfied** with the additional costs estimated with the implementation of **WAM C** (weighed average scoring of 28,58), followed by WAM B (24,54) and finally WAM A (23,14).

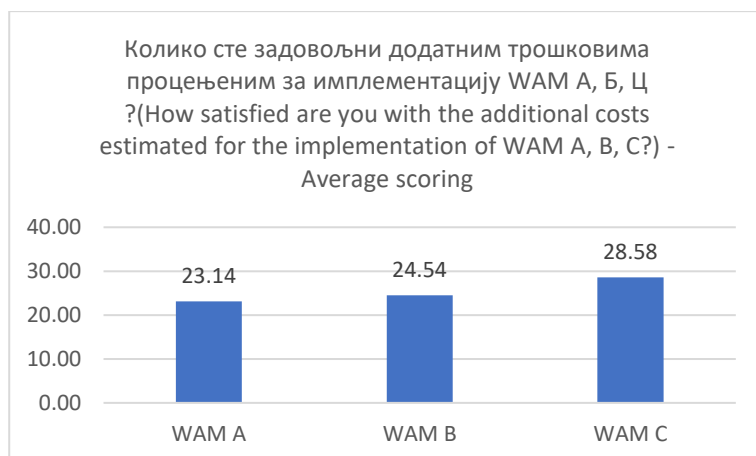


Figure 40 - How satisfied are you with the additional costs estimated for the implementation of WAM A, WAM B and WAM C? - Average scoring

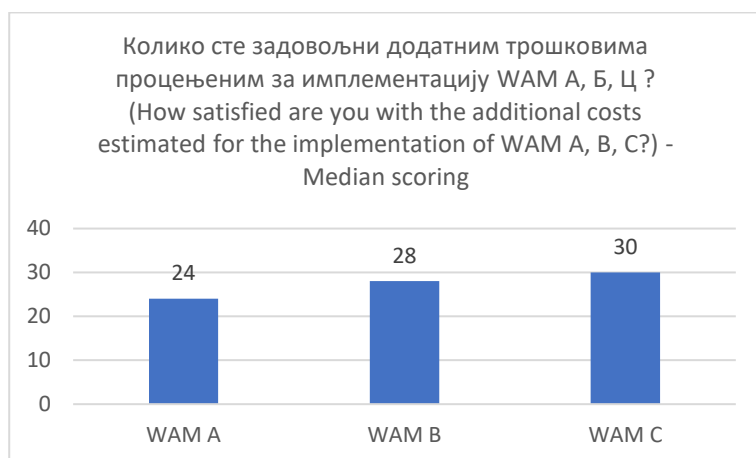


Figure 41- How satisfied are you with the additional costs estimated for the implementation of WAM A, WAM B and WAM C? - Median scoring

How satisfied are you with the net benefits (benefits-costs) estimated in WAM A, WAM B and WAM C?

Respondents are **more satisfied** with the net benefits estimated in **WAM C** (weighed average scoring of 29,93), followed by WAM B (25,03) and finally WAM A (22,45).

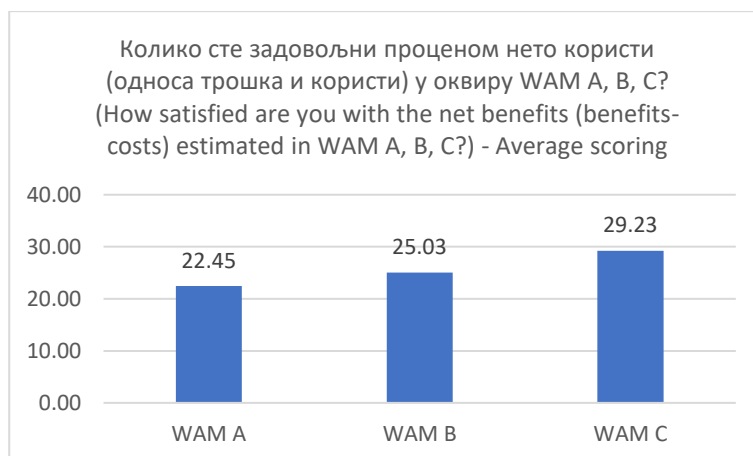


Figure 42 - How satisfied are you with the net benefits (benefits-costs) estimated in WAM A, WAM B and WAM C? - Average scoring

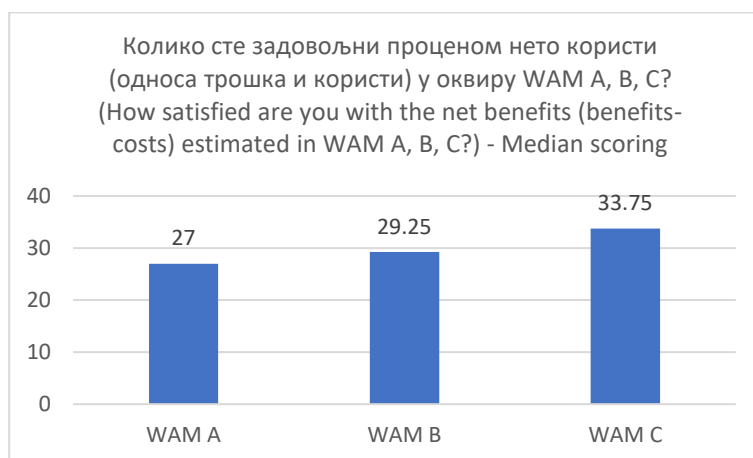


Figure 43- How satisfied are you with the net benefits (benefits-costs) estimated in WAM A, WAM B and WAM C? - Median scoring

In summary, for the two indicators assessed under the economic criteria, **WAM C** was always rated more favourably by stakeholders, followed by WAM B and WAM A.

5 Other questions based on stakeholders' perception

Which scenario do you think best contributes to the fight against climate change?

69% of the respondents believe **WAM C** best contributes to the fight against climate change, followed by **All the same** (15%) and **Don't know** (12%).

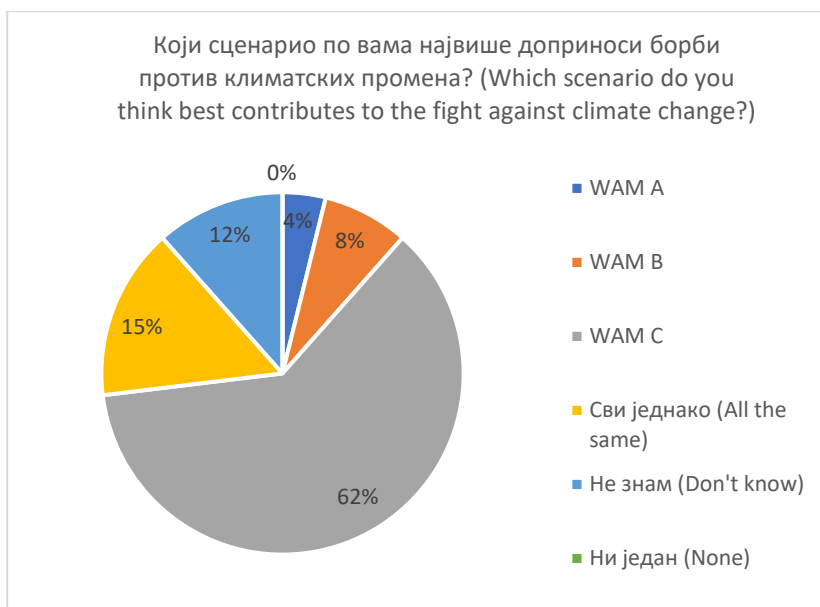


Figure 44 - Which scenario do you think best contributes to the fight against climate change?

Which scenario do you think best contributes to the protection of biodiversity?

44% of the respondents believe **WAM C best contributes to the protection of biodiversity**, followed by Don't know (32%) and by WAM A and All the Same (12% each).

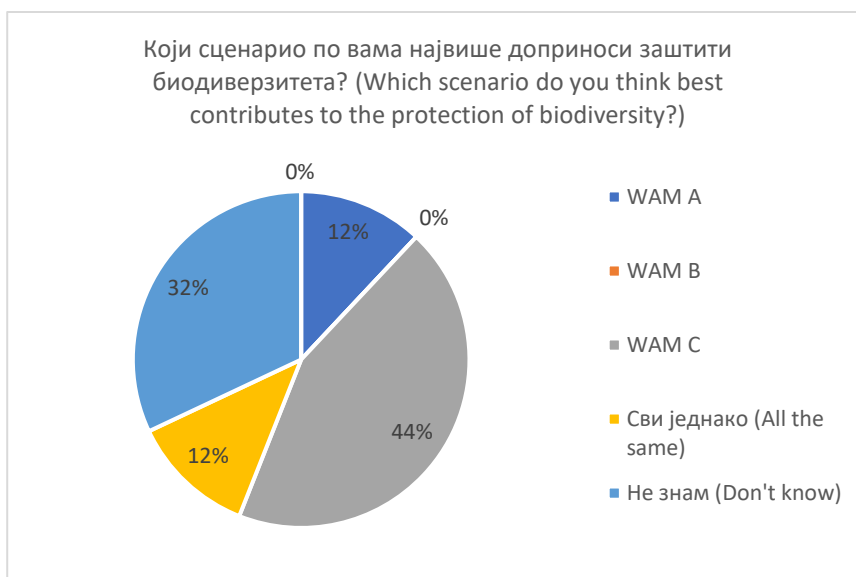


Figure 45 - Which scenario do you think best contributes to the protection of biodiversity?

Which scenario do you think best contributes to poverty eradication?

27% of respondents believe that none of the scenarios will best contribute to poverty eradication, followed by 23% that Don't know which of the scenarios best contributes to poverty eradication. These two answers are followed by 19% of respondents that believe WAM C can best contribute to poverty eradication.

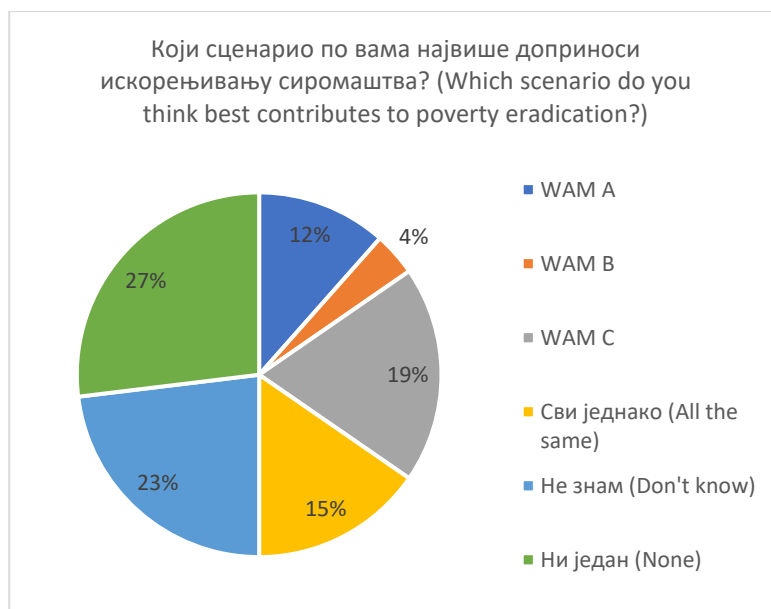


Figure 46 - Which scenario do you think best contributes to poverty eradication?

Which scenario do you think best contributes to gender equality?

31% of respondents believes that None of the scenarios will contribute to gender equality, followed by 27% of believe All the same and 23% that Don't know.

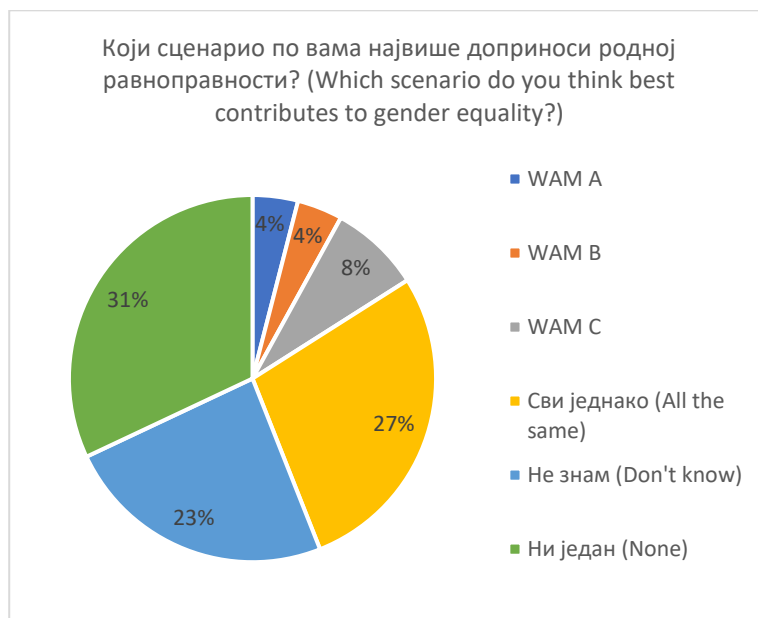


Figure 47 - Which scenario do you think best contributes to gender equality?

Which scenario do you think best contributes to improvement of rural livelihoods?

31% of respondents believes that WAM C will best contribute to the improvement of rural livelihoods, followed by WAM B and All the same (19% each).

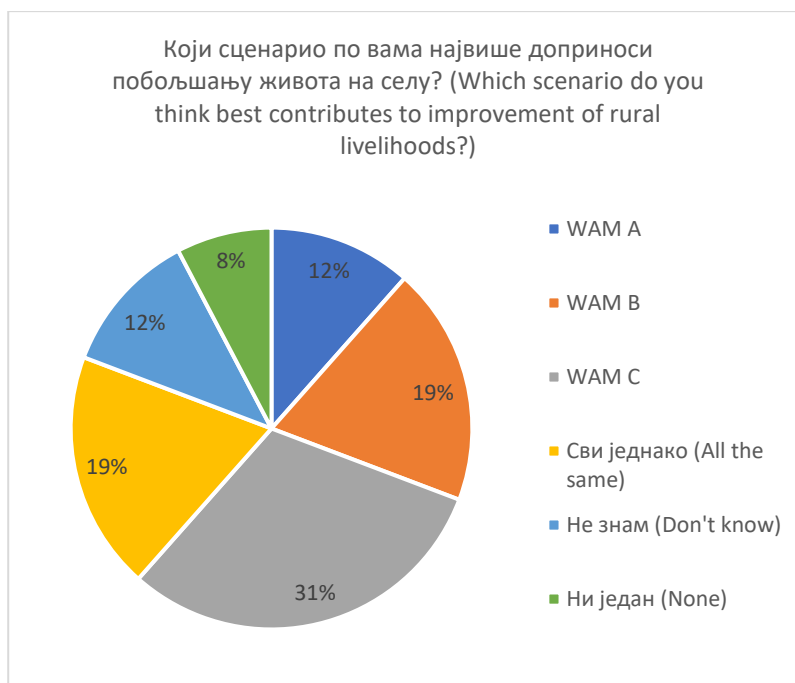


Figure 48 - Which scenario do you think best contributes to improvement of rural livelihoods?

Which scenario do you think best contributes to improvement of urban livelihoods?

54% of respondents believe that WAM C best contributes to the improvement of urban livelihoods, followed by 27% of respondents that believe All the Same, and finally by WAM B and Don't Know (8% each).

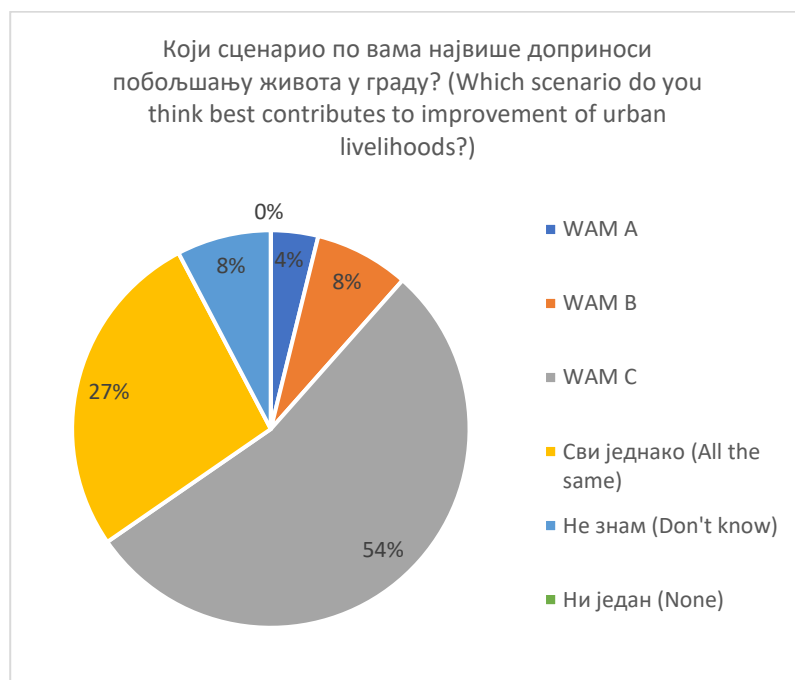


Figure 49 - Which scenario do you think best contributes to improvement of urban livelihoods?

Which scenario do you think best contributes to job creation?

54% of respondents believe that WAM C will best contribute to job creation, followed by All the Same (27%) and Don't know (23%).

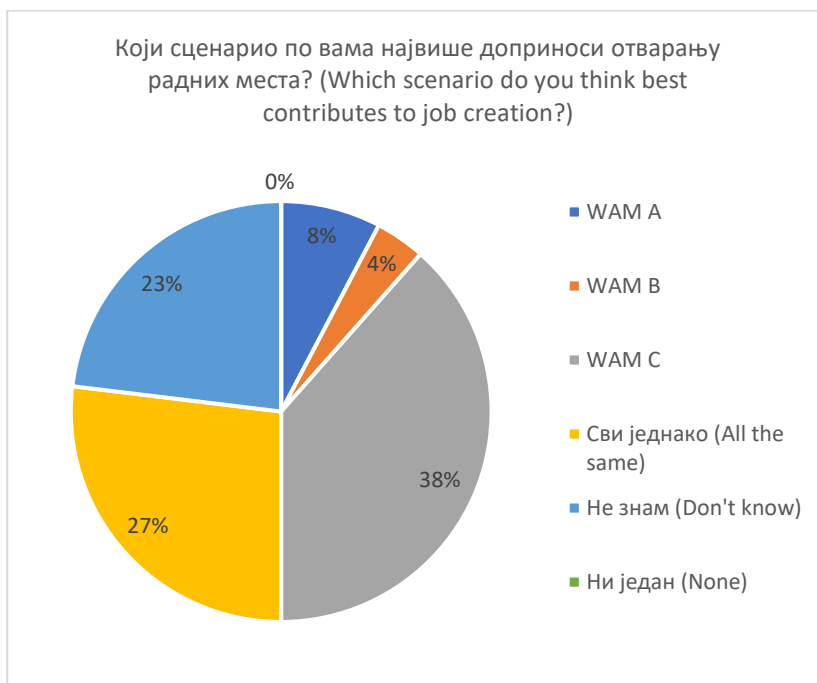


Figure 50 - Which scenario do you think best contributes to job creation?

Which scenario do you think best contributes to Serbia's energy security?

35% of respondents think WAM C will best contribute to Serbia's energy security, followed by 31% that think All the Same and 15% each for WAM A and Don't Know.

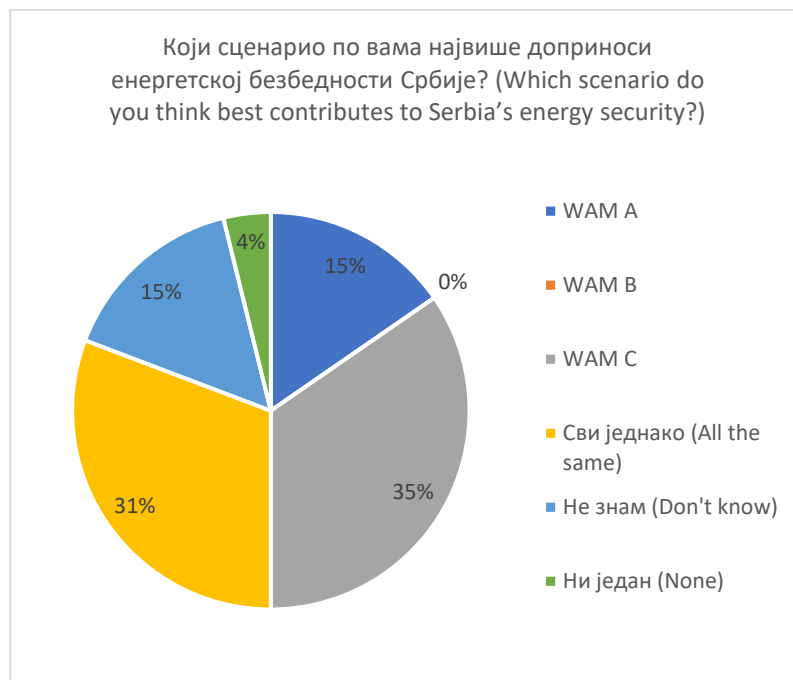


Figure 51 - Which scenario do you think best contributes to Serbia's energy security?

Which scenario do you think is best for your city?

62% of respondents think WAM C is the best scenario for their city, followed by All the same (19%) and WAM A and Don't Know (8% each).

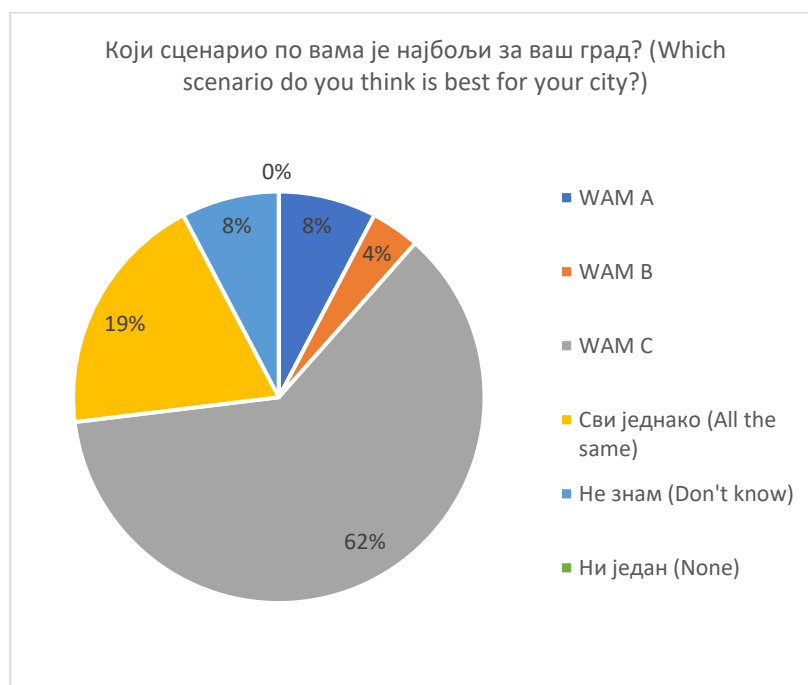


Figure 52 - Which scenario do you think is best for your city?

In summary, for the questions (which were not mandatory to be answered) which were based on the stakeholders' perception (meaning that the accompanying document did not provide technical information on the matter), one can note a greater dispersion of answers, with answers such as All the Same and Don't Know having a higher proportion than in the answer to the indicators for which the accompanying document provided technical information. In this context, WAM C was always the scenario most voted among the three scenarios.

Appendix 2 Information on Legal framework 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.

Regulation 2015/1189 implementing Eco-design directive for solid fuels boilers and Regulation 2015/1185 for solid fuels local space heaters to be:

- transposed in the Serbian legal framework by the beginning of 2022
- from the 1st January 2025, appliances placed on the market, will comply with the limit values of the two regulations 2015/1185 and 2015/1189

Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (the Official Gazette of the Republic of Serbia no. N°111/15)”

- Full compliance with IED chapter II provisions (medium level of the BAT AELs range) will be achieved by 31st December 2024, except for installations requiring extended implementation period

Regulation on the list of industrial installations and activities in which volatile organic compounds emissions are controlled, values of emission of volatile organic compounds under specific consumption of solvents and total permissible emissions, as well as emission reduction scheme (OGRS N°100/11)

- Average value between the upper and the lower BAT AELs compliance by 31st December 2024, except for installations requiring extended implementation period

Regulation on emission limit values of pollutants in the air from combustion plants (the Official Gazette of the Republic of Serbia no. No 6/16 and No. 67/21)

- Dates of compliance assumed to be consistent with MCPD:
- 1st January 2025 for existing plants with a rated thermal input larger than 5 MW,
- 1st January 2030 for exiting plants with a rated thermal input equal to or greater than 1 MW but smaller than 5 MW.
- Full compliance with IED chapter II provisions by 31st December 2024, except for installations requiring extended implementation period (Average value between the upper and the lower BAT AELs considered)

Regulation on import of motor vehicles Goods (the Official Gazette of the Republic of Serbia no. 23/2010, 5/2018)

- Amend the minimum requirements for imported cars to Euro 4, Euro 5 and Euro 6

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 passenger cars with better environmental (PM [and] NOx) performance
- Introduction of passenger car tax for all first-time registered cars in Serbia based on environmental (PM [and] NOx) performance of the passenger cars

Rulebook on technical measures and requirements in relation to allowed emission factors for volatile organic compounds resulting from the storage and transport of petrol (OGRS, No. 01/12, 25/12, 48/12 and 96/19).

- Equipment of petrol terminals and service-stations assumed to continue and be finalised by the 1st January 2030.

Law on air quality (the Official Gazette of the Republic of Serbia no. 36/09, 10/13, 26/21)

- Six following principles of nitrogen management presented in the Annex III, part 2 of Directive 2284/2016 which are also listed in the Annex IX of the Gothenburg Protocol:
 - (a) nitrogen management, taking into account the whole nitrogen cycle;
 - (b) livestock feeding strategies;
 - (c) low-emission manure spreading techniques;
 - (d) low-emission manure storage systems;
 - (e) low-emission animal housing systems;
 - (f) possibilities for limiting ammonia emissions from the use of mineral fertilisers.

to be transposed and Serbian Code of Good Agricultural Practices -2016 to be updated by 2023.

Appendix 3 Sectoral breakdown of air emission scenarios

This appendix provides a detailed background information for air pollutant projection by 2030 for each pollutant and for each scenario. Emissions of Air pollutants are disaggregated at the level of GNFR sectors. In tabular format emissions for 2005, 2015, 2020, 2025, 2030 and 2035 are presented together with percentages of reduction of air pollutants between 2030 and 2015 and between 2030 and 2005.

NOx Emissions

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	74,5	72,5	73,7	21,1	18,1	15,2	-75,1%	-75,8%
B_Industry	17,2	16,4	17,1	13,5	12,6	12,3	-23,0%	-26,9%
C_Other Stationary Combustion	6,0	4,9	4,4	3,8	3,6	3,4	-26,3%	-39,8%
D_Fugitive	0,7	0,0	0,0	0,0	0,0	0,0	5,6%	-99,9%
E_Solvents	0,0	0,1	0,1	0,1	0,1	0,1	20,8%	132,7%
F_Road Transport	44,8	36,5	31,1	27,0	24,7	20,7	-32,2%	-44,9%
G_Shipping	1,3	0,7	0,8	0,9	1,1	1,2	49,3%	-21,0%
H_Aviation	0,3	0,5	0,5	0,5	0,6	0,6	20,1%	80,7%
I_Offroad	10,6	5,7	5,2	5,3	4,6	4,3	-18,2%	-56,2%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,2	0,3	0,3	0,3	0,3	0,3	-8,7%	26,2%
L_Other Agriculture	10,5	6,7	6,7	6,6	6,5	6,4	-3,9%	-38,5%
Total	166,3	144,1	140,0	79,1	72,0	64,4	-50,0%	-56,7%

NOx Emissions

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	74,5	72,5	73,7	20,9	17,9	15,1	-75,3%	-75,9%
B_Industry	17,2	16,4	17,1	13,3	11,7	11,3	-28,7%	-32,3%
C_Other Stationary Combustion	6,0	4,9	4,4	3,6	3,7	3,9	-23,5%	-37,5%
D_Fugitive	0,7	0,0	0,0	0,0	0,0	0,0	5,6%	-99,9%
E_Solvents	0,0	0,1	0,1	0,1	0,1	0,1	20,8%	132,7%
F_Road Transport	44,8	36,5	31,1	25,2	20,1	16,6	-45,0%	-55,3%
G_Shipping	1,3	0,7	0,8	0,9	1,1	1,2	49,3%	-21,0%
H_Aviation	0,3	0,5	0,5	0,5	0,6	0,6	20,1%	80,7%
I_Offroad	10,6	5,7	5,2	5,1	3,5	2,5	-37,3%	-66,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,2	0,3	0,3	0,3	0,3	0,3	-8,7%	26,2%
L_Other Agriculture	10,5	6,7	6,7	6,6	6,5	6,4	-3,9%	-38,5%
Total	166,3	144,1	140,0	76,5	65,4	58,0	-54,6%	-60,7%



NOx Emissions

WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	74,5	72,5	73,7	20,5	17,5	14,4	-75,8%	-76,5%
B_Industry	17,2	16,4	17,1	12,8	9,9	9,5	-39,2%	-42,3%
C_Other Stationary Combustion	6,0	4,9	4,4	3,6	4,1	4,3	-15,5%	-30,9%
D_Fugitive	0,7	0,0	0,0	0,0	0,0	0,0	5,6%	-99,9%
E_Solvents	0,0	0,1	0,1	0,1	0,1	0,1	20,8%	132,7%
F_Road Transport	44,8	36,5	31,1	23,1	15,8	15,9	-56,5%	-64,7%
G_Shipping	1,3	0,7	0,8	0,9	1,1	1,2	49,3%	-21,0%
H_Aviation	0,3	0,5	0,5	0,5	0,6	0,6	20,1%	80,7%
I_Offroad	10,6	5,7	5,2	5,1	3,5	2,5	-37,3%	-66,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,2	0,3	0,3	0,3	0,3	0,3	-8,7%	26,2%
L_Other Agriculture	10,5	6,7	6,7	5,8	4,8	3,8	-28,6%	-54,3%
Total	166,3	144,1	140,0	72,6	57,8	52,6	-59,9%	-65,3%

NOx Emissions

WAM C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	74,5	72,5	73,7	20,5	17,5	14,4	-75,8%	-76,5%
B_Industry	17,2	16,4	17,1	12,8	9,9	9,5	-39,2%	-42,3%
C_Other Stationary Combustion	6,0	4,9	4,4	3,5	3,9	4,0	-20,0%	-34,6%
D_Fugitive	0,7	0,0	0,0	0,0	0,0	0,0	5,6%	-99,9%
E_Solvents	0,0	0,1	0,1	0,1	0,1	0,1	20,8%	132,7%
F_Road Transport	44,8	36,5	31,1	23,1	15,8	15,9	-56,5%	-64,7%
G_Shipping	1,3	0,7	0,8	0,9	1,1	1,2	49,3%	-21,0%
H_Aviation	0,3	0,5	0,5	0,5	0,6	0,6	20,1%	80,7%
I_Offroad	10,6	5,7	5,2	5,1	3,5	2,5	-37,3%	-66,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,2	0,3	0,3	0,3	0,3	0,3	-8,7%	26,2%
L_Other Agriculture	10,5	6,7	6,7	5,4	4,0	3,8	-40,9%	-62,2%
Total	166,3	144,1	140,0	72,1	56,7	52,3	-60,6%	-65,9%



SO₂ emission

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	394,3	330,9	333,5	21,3	19,3	11,9	-94,2%	-95,1%
B_Industry	26,1	25,4	27,5	17,3	15,5	14,2	-39,2%	-40,8%
C_Other Stationary Combustion	20,2	9,0	4,3	3,5	3,0	2,4	-67,3%	-85,4%
D_Fugitive	1,9	0,0	0,0	0,0	0,0	0,0	4,6%	-100,0%
E_Solvents	-	-	-	-	-	-	-	-
F_Road Transport	1,7	0,0	0,0	0,0	0,1	0,0	31,0%	-97,0%
G_Shipping	0,3	0,2	0,2	0,2	0,3	0,3	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,1	0,1	0,1	20,1%	80,7%
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-24,6%	99,6%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	-	-	-	-	-	-	-	-
L_Other Agriculture	0,1	0,3	0,3	0,3	0,3	0,4	5,7%	129,0%
Total	444,8	366,0	366,0	42,9	38,4	29,3	-89,5%	-91,4%

SO₂

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	394,3	330,9	333,5	21,1	19,0	11,7	-94,2%	-95,2%
B_Industry	26,1	25,4	27,5	11,7	9,5	8,7	-62,7%	-63,7%
C_Other Stationary Combustion	20,2	9,0	4,3	3,1	2,4	2,0	-72,9%	-87,9%
D_Fugitive	1,9	0,0	0,0	0,0	0,0	0,0	4,6%	-100,0%
E_Solvents	-	-	-	-	-	-	-	-
F_Road Transport	1,7	0,0	0,0	0,0	0,0	0,0	25,6%	-97,1%
G_Shipping	0,3	0,2	0,2	0,1	0,1	0,2	-25,3%	-60,5%
H_Aviation	0,0	0,0	0,0	0,1	0,1	0,1	20,1%	80,7%
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-90,5%	-74,8%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	-	-	-	-	-	-	-	-
L_Other Agriculture	0,1	0,3	0,3	0,3	0,3	0,4	5,7%	129,0%
Total	444,8	366,0	366,0	36,4	31,5	23,0	-91,4%	-92,9%



SO₂

WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	394,3	330,9	333,5	20,8	18,8	11,6	-94,3%	-95,2%
B_Industry	26,1	25,4	27,5	10,5	8,2	7,4	-67,9%	-68,8%
C_Other Stationary Combustion	20,2	9,0	4,3	3,1	2,4	2,0	-72,9%	-87,9%
D_Fugitive	1,9	0,0	0,0	0,0	0,0	0,0	4,6%	-100,0%
E_Solvents	-	-	-	-	-	-	-	-
F_Road Transport	1,7	0,0	0,0	0,0	0,0	0,0	23,8%	-97,2%
G_Shipping	0,3	0,2	0,2	0,1	0,1	0,2	-25,3%	-60,5%
H_Aviation	0,0	0,0	0,0	0,1	0,1	0,1	20,1%	80,7%
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-90,5%	-74,8%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	-	-	-	-	-	-	-	-
L_Other Agriculture	0,1	0,3	0,3	0,2	0,1	-	-64,8%	-23,7%
Total	444,8	366,0	366,0	34,9	29,8	21,2	-91,9%	-93,3%

SO₂

WAM_C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	394,3	330,9	333,5	20,8	18,8	11,6	-94,3%	-95,2%
B_Industry	26,1	25,4	27,5	10,1	7,8	7,1	-69,1%	-70,0%
C_Other Stationary Combustion	20,2	9,0	4,3	3,1	2,4	1,9	-73,5%	-88,1%
D_Fugitive	1,9	0,0	0,0	0,0	0,0	0,0	4,6%	-100,0%
E_Solvents	-	-	-	-	-	-	-	-
F_Road Transport	1,7	0,0	0,0	0,0	0,0	0,0	23,8%	-97,2%
G_Shipping	0,3	0,2	0,2	0,1	0,1	0,2	-25,3%	-60,5%
H_Aviation	0,0	0,0	0,0	0,1	0,1	0,1	20,1%	80,7%
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-90,5%	-74,8%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	-	-	-	-	-	-	-	-
L_Other Agriculture	0,1	0,3	0,3	0,2	-	-	-100,0%	-100,0%
Total	444,8	366,0	366,0	34,4	29,3	20,8	-92,0%	-93,4%



PM₁₀ emission

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	2,6	12,1	12,2	4,7	2,9	1,4	-75,6%	14,0%
B_Industry	6,4	8,2	9,3	5,5	6,0	6,5	-26,8%	-6,3%
C_Other Stationary Combustion	32,6	35,9	36,9	36,0	34,6	34,5	-3,6%	6,1%
D_Fugitive	1,7	1,7	1,7	1,6	1,4	1,0	-16,2%	-15,8%
E_Solvents	0,8	1,1	1,5	1,5	1,5	1,5	30,5%	97,5%
F_Road Transport	2,5	2,8	2,6	2,4	2,2	2,1	-21,7%	-11,6%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,2	-21,4%	311,3%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	2,0	1,6	1,6	1,6	1,6	1,5	-2,9%	-20,0%
L_Other Agriculture	7,3	13,0	13,4	13,4	13,4	13,9	2,7%	82,9%
Total	56,0	76,9	79,5	66,9	64,0	62,8	-16,8%	14,2%

PM₁₀

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	2,6	12,1	12,2	4,6	2,9	1,3	-76,3%	10,9%
B_Industry	6,4	8,2	9,3	4,9	4,9	5,4	-40,1%	-23,3%
C_Other Stationary Combustion	32,6	35,9	36,9	34,5	26,3	19,3	-26,9%	-19,5%
D_Fugitive	1,7	1,7	1,7	1,6	1,5	1,0	-13,7%	-13,3%
E_Solvents	0,8	1,1	1,5	1,5	1,5	1,5	30,5%	97,5%
F_Road Transport	2,5	2,8	2,6	2,3	2,1	2,0	-25,5%	-15,8%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,5%	174,4%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	2,0	1,6	1,6	1,6	1,6	1,5	-2,9%	-20,0%
L_Other Agriculture	7,3	13,0	13,4	13,4	13,4	13,9	2,7%	82,9%
Total	56,0	76,9	79,5	64,7	54,3	46,1	-29,4%	-3,1%



PM₁₀

WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	2,6	12,1	12,2	4,6	2,8	1,3	-76,5%	9,8%
B_Industry	6,4	8,2	9,3	4,8	4,6	5,1	-43,6%	-27,8%
C_Other Stationary Combustion	32,6	35,9	36,9	34,5	19,3	12,3	-46,2%	-40,7%
D_Fugitive	1,7	1,7	1,7	1,6	1,5	1,0	-13,5%	-13,2%
E_Solvents	0,8	1,1	1,5	1,5	1,5	1,5	30,5%	97,5%
F_Road Transport	2,5	2,8	2,6	2,2	2,0	2,0	-27,6%	-18,2%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,5%	174,4%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	2,0	1,6	1,6	1,6	1,6	1,5	-2,9%	-20,0%
L_Other Agriculture	7,3	13,0	13,4	10,7	8,0	5,6	-38,3%	9,8%
Total	56,0	76,9	79,5	61,8	41,7	30,5	-45,8%	-25,6%

PM₁₀

WAM_C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	2,6	12,1	12,2	4,6	2,8	1,3	-76,5%	9,8%
B_Industry	6,4	8,2	9,3	4,8	4,6	5,1	-43,6%	-27,8%
C_Other Stationary Combustion	32,6	35,9	36,9	34,2	18,1	10,8	-49,7%	-44,6%
D_Fugitive	1,7	1,7	1,7	1,6	1,5	1,0	-13,5%	-13,2%
E_Solvents	0,8	1,1	1,5	1,5	1,5	1,5	30,5%	97,5%
F_Road Transport	2,5	2,8	2,6	2,2	2,0	2,0	-27,6%	-18,2%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,5%	174,4%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	2,0	1,6	1,6	1,6	1,6	1,5	-2,9%	-20,0%
L_Other Agriculture	7,3	13,0	13,4	9,4	5,4	5,6	-58,8%	-26,7%
Total	56,0	76,9	79,5	60,1	37,7	29,0	-50,9%	-32,6%



PM_{2.5} emission

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	1,2	5,0	5,0	1,9	1,2	0,7	-75,1%	6,3%
B_Industry	3,0	4,2	4,8	2,0	2,1	2,1	-50,8%	-29,8%
C_Other Stationary Combustion	31,8	35,0	35,9	35,1	33,7	33,6	-3,7%	6,0%
D_Fugitive	0,3	0,2	0,2	0,2	0,1	0,1	-48,0%	-55,3%
E_Solvents	0,7	1,1	1,4	1,4	1,4	1,4	27,8%	105,8%
F_Road Transport	2,0	2,1	1,8	1,5	1,4	1,2	-36,2%	-32,5%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,2	-21,5%	316,3%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,5	0,3	0,3	0,3	0,3	0,3	-14,5%	-42,5%
L_Other Agriculture	1,8	7,5	7,9	7,9	7,9	8,2	5,2%	338,0%
Total	41,3	55,8	57,7	50,6	48,4	47,9	-13,3%	17,1%

PM_{2.5}

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	1,2	5,0	5,0	1,9	1,2	0,6	-76,0%	2,4%
B_Industry	3,0	4,2	4,8	1,5	1,2	1,3	-70,8%	-58,2%
C_Other Stationary Combustion	31,8	35,0	35,9	33,6	25,6	18,7	-27,0%	-19,6%
D_Fugitive	0,3	0,2	0,2	0,2	0,2	0,1	-13,1%	-25,3%
E_Solvents	0,7	1,1	1,4	1,4	1,4	1,4	27,8%	105,8%
F_Road Transport	2,0	2,1	1,8	1,5	1,3	1,2	-41,2%	-37,8%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,8%	177,1%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,5	0,3	0,3	0,3	0,3	0,3	-14,5%	-42,5%
L_Other Agriculture	1,8	7,5	7,9	7,9	7,9	8,2	5,2%	338,0%
Total	41,3	55,8	57,7	48,7	39,2	32,0	-29,7%	-5,0%



PM_{2.5}

WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	1,2	5,0	5,0	1,9	1,2	0,6	-76,2%	1,4%
B_Industry	3,0	4,2	4,8	1,5	1,0	1,1	-75,4%	-64,9%
C_Other Stationary Combustion	31,8	35,0	35,9	33,6	18,8	12,0	-46,2%	-40,8%
D_Fugitive	0,3	0,2	0,2	0,2	0,2	0,1	-11,0%	-23,6%
E_Solvents	0,7	1,1	1,4	1,4	1,4	1,4	27,8%	105,8%
F_Road Transport	2,0	2,1	1,8	1,4	1,2	1,2	-44,0%	-40,8%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,8%	177,1%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,5	0,3	0,3	0,3	0,3	0,3	-14,5%	-42,5%
L_Other Agriculture	1,8	7,5	7,9	5,4	2,8	0,2	-63,1%	53,6%
Total	41,3	55,8	57,7	45,9	27,1	17,0	-51,5%	-34,4%

PM_{2.5}

WAM_C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	1,2	5,0	5,0	1,9	1,2	0,6	-76,2%	1,4%
B_Industry	3,0	4,2	4,8	1,5	1,0	1,1	-75,4%	-64,9%
C_Other Stationary Combustion	31,8	35,0	35,9	33,3	17,6	10,5	-49,7%	-44,6%
D_Fugitive	0,3	0,2	0,2	0,2	0,2	0,1	-11,0%	-23,6%
E_Solvents	0,7	1,1	1,4	1,4	1,4	1,4	27,8%	105,8%
F_Road Transport	2,0	2,1	1,8	1,4	1,2	1,2	-44,0%	-40,8%
G_Shipping	0,1	0,1	0,1	0,1	0,1	0,1	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	0,1	0,3	0,3	0,3	0,2	0,1	-47,8%	177,1%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	13,3%	30,5%
K_Agriculture Livestocks	0,5	0,3	0,3	0,3	0,3	0,3	-14,5%	-42,5%
L_Other Agriculture	1,8	7,5	7,9	4,1	0,2	0,2	-97,3%	-88,6%
Total	41,3	55,8	57,7	44,3	23,3	15,5	-58,3%	-43,6%



NMVOC emission

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	0,5	0,5	0,5	0,5	0,4	0,5	-4,5%	-7,3%
B_Industry	10,5	10,6	12,1	12,7	14,2	15,8	34,7%	35,7%
C_Other Stationary Combustion	28,3	29,8	29,6	29,0	27,8	27,6	-6,7%	-1,8%
D_Fugitive	33,9	31,6	30,9	29,9	27,1	19,2	-14,3%	-20,1%
E_Solvents	17,1	19,6	19,6	19,1	18,9	18,7	-3,7%	10,1%
F_Road Transport	30,9	15,6	9,0	6,9	5,9	5,1	-62,2%	-80,9%
G_Shipping	0,0	0,0	0,0	0,0	0,0	0,0	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	1,1	0,7	0,7	0,7	0,6	0,5	-19,9%	-50,1%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	21,3%	-21,2%
K_Agriculture Livestocks	22,1	15,6	14,7	14,1	13,4	12,6	-14,2%	-39,4%
L_Other Agriculture	3,3	7,6	7,9	7,9	7,9	8,2	2,7%	141,7%
Total	147,8	131,7	125,0	120,7	116,2	108,3	-11,7%	-21,4%

NMVOC

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	0,5	0,5	0,5	0,5	0,4	0,5	-4,5%	-7,3%
B_Industry	10,5	10,6	12,1	12,6	14,2	15,7	34,2%	35,2%
C_Other Stationary Combustion	28,3	29,8	29,6	28,1	22,8	18,5	-23,6%	-19,6%
D_Fugitive	33,9	31,6	30,9	29,8	26,4	18,6	-16,4%	-22,1%
E_Solvents	17,1	19,6	19,6	17,1	16,9	16,8	-13,7%	-1,3%
F_Road Transport	30,9	15,6	8,9	6,4	5,0	4,4	-68,1%	-83,9%
G_Shipping	0,0	0,0	0,0	0,0	0,0	0,0	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	1,1	0,7	0,7	0,6	0,5	0,4	-34,8%	-59,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	21,3%	-21,2%
K_Agriculture Livestocks	22,1	15,6	14,7	14,1	13,4	12,6	-14,2%	-39,4%
L_Other Agriculture	3,3	7,6	7,9	7,9	7,9	8,2	2,7%	141,7%
Total	147,8	131,7	124,9	117,3	107,5	95,7	-18,4%	-27,3%



NMVOG

WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	0,5	0,5	0,5	0,5	0,4	0,5	-4,5%	-7,3%
B_Industry	10,5	10,6	12,1	12,5	14,1	15,6	33,4%	34,4%
C_Other Stationary Combustion	28,3	29,8	29,6	28,1	18,6	14,3	-37,6%	-34,4%
D_Fugitive	33,9	31,6	30,9	29,8	26,4	18,6	-16,4%	-22,1%
E_Solvents	17,1	19,6	19,6	14,9	14,7	14,6	-24,9%	-14,1%
F_Road Transport	30,9	15,6	8,9	6,3	4,8	4,3	-68,9%	-84,3%
G_Shipping	0,0	0,0	0,0	0,0	0,0	0,0	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	1,1	0,7	0,7	0,6	0,5	0,4	-34,8%	-59,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	21,3%	-21,2%
K_Agriculture Livestocks	22,1	15,6	14,7	14,1	13,4	12,6	-14,2%	-39,4%
L_Other Agriculture	3,3	7,6	7,9	6,2	4,6	3,1	-40,0%	41,2%
Total	147,8	131,7	124,9	113,2	97,6	84,1	-25,8%	-33,9%

NMVOG

WAM_C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	0,5	0,5	0,5	0,5	0,4	0,5	-4,5%	-7,3%
B_Industry	10,5	10,6	12,1	12,5	14,1	15,6	33,4%	34,4%
C_Other Stationary Combustion	28,3	29,8	29,6	27,8	17,0	12,1	-43,1%	-40,1%
D_Fugitive	33,9	31,6	30,9	29,8	26,4	18,6	-16,4%	-22,1%
E_Solvents	17,1	19,6	19,6	14,9	14,7	14,6	-24,9%	-14,1%
F_Road Transport	30,9	15,6	8,9	6,3	4,8	4,3	-68,9%	-84,3%
G_Shipping	0,0	0,0	0,0	0,0	0,0	0,0	49,3%	-21,0%
H_Aviation	0,0	0,0	0,0	0,0	0,0	0,0	20,1%	80,7%
I_Offroad	1,1	0,7	0,7	0,6	0,5	0,4	-34,8%	-59,5%
J_Waste	0,0	0,0	0,0	0,0	0,0	0,0	21,3%	-21,2%
K_Agriculture Livestocks	22,1	15,6	14,7	14,1	13,4	12,6	-14,2%	-39,4%
L_Other Agriculture	3,3	7,6	7,9	5,4	3,0	3,1	-61,4%	-9,1%
Total	147,8	131,7	124,9	112,1	94,4	82,0	-28,3%	-36,2%



NH₃ emission

WEM Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	-	-	-	-	-	-	-	-
B_Industry	6,1	3,8	3,3	0,4	0,4	0,4	-89,4%	-93,4%
C_Other Stationary Combustion	2,4	2,5	2,8	2,7	2,6	2,6	4,9%	10,8%
D_Fugitive	0,0	0,0	0,0	0,0	0,0	0,0	8,6%	-70,5%
E_Solvents	0,1	0,1	0,2	0,2	0,2	0,2	20,7%	128,9%
F_Road Transport	0,2	0,4	0,4	0,3	0,3	0,3	-30,8%	13,3%
G_Shipping	-	-	-	-	-	-	-	-
H_Aviation	-	-	-	-	-	-	-	-
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-21,0%	-35,5%
J_Waste	6,3	4,6	3,9	3,3	2,8	2,3	-40,4%	-55,9%
K_Agriculture Livestocks	79,5	33,7	32,4	31,4	30,7	29,4	-8,9%	-61,4%
L_Other Agriculture	13,0	38,6	41,3	40,3	42,5	41,2	10,1%	227,6%
Total	107,5	83,8	84,3	78,6	79,4	76,3	-5,2%	-26,1%

NH₃

WAM_A Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	-	-	-	-	-	-	-	-
B_Industry	6,1	3,8	3,3	0,4	0,4	0,4	-89,6%	-93,5%
C_Other Stationary Combustion	2,4	2,5	2,8	2,7	2,6	2,6	4,9%	10,8%
D_Fugitive	0,0	0,0	0,0	0,0	0,0	0,0	8,6%	-70,5%
E_Solvents	0,1	0,1	0,2	0,2	0,2	0,2	20,7%	128,9%
F_Road Transport	0,2	0,4	0,4	0,3	0,3	0,2	-34,7%	6,9%
G_Shipping	-	-	-	-	-	-	-	-
H_Aviation	-	-	-	-	-	-	-	-
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-21,0%	-35,5%
J_Waste	6,3	4,6	3,9	3,3	2,8	2,3	-40,4%	-55,9%
K_Agriculture Livestocks	79,5	33,7	32,4	31,4	30,7	29,4	-8,9%	-61,4%
L_Other Agriculture	13,0	38,6	40,3	38,1	38,8	36,1	0,4%	198,5%
Total	107,5	83,8	83,3	76,3	75,6	71,3	-9,7%	-29,7%



NH₃

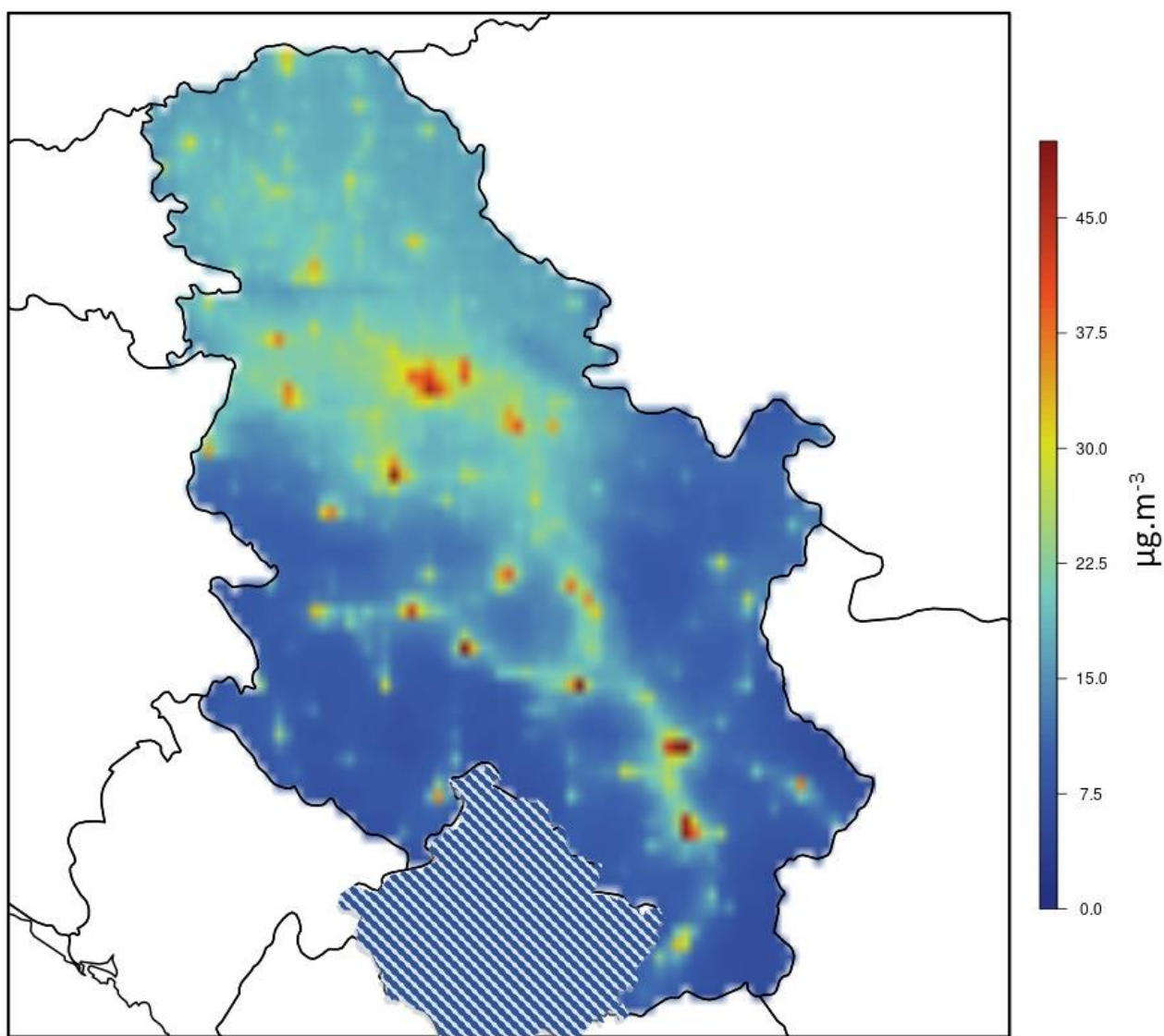
WAM_B Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	-	-	-	-	-	-	-	-
B_Industry	6,1	3,8	3,3	0,4	0,4	0,4	-89,7%	-93,6%
C_Other Stationary Combustion	2,4	2,5	2,8	2,7	2,6	2,6	4,9%	10,8%
D_Fugitive	0,0	0,0	0,0	0,0	0,0	0,0	8,6%	-70,5%
E_Solvents	0,1	0,1	0,2	0,2	0,2	0,2	20,7%	128,9%
F_Road Transport	0,2	0,4	0,4	0,3	0,3	0,2	-34,5%	7,1%
G_Shipping	-	-	-	-	-	-	-	-
H_Aviation	-	-	-	-	-	-	-	-
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-21,0%	-35,5%
J_Waste	6,3	4,6	3,9	3,3	2,8	2,3	-40,4%	-55,9%
K_Agriculture Livestocks	79,5	33,7	32,4	31,4	30,6	29,4	-9,0%	-61,5%
L_Other Agriculture	13,0	38,6	37,8	33,8	31,1	27,0	-19,5%	139,5%
Total	107,5	83,8	80,7	72,0	67,9	62,0	-18,9%	-36,8%

NH₃

WAM_C Scenario	2005	2015	2020	2025	2030	2035	2030/2015	2030/2005
A_Public Power	-	-	-	-	-	-	-	-
B_Industry	6,1	3,8	3,3	0,4	0,4	0,4	-89,7%	-93,6%
C_Other Stationary Combustion	2,4	2,5	2,8	2,7	2,3	2,2	-7,3%	-2,1%
D_Fugitive	0,0	0,0	0,0	0,0	0,0	0,0	8,6%	-70,5%
E_Solvents	0,1	0,1	0,2	0,2	0,2	0,2	20,7%	128,9%
F_Road Transport	0,2	0,4	0,4	0,3	0,3	0,2	-34,5%	7,1%
G_Shipping	-	-	-	-	-	-	-	-
H_Aviation	-	-	-	-	-	-	-	-
I_Offroad	0,0	0,0	0,0	0,0	0,0	0,0	-21,0%	-35,5%
J_Waste	6,3	4,6	3,9	3,3	2,8	2,3	-40,4%	-55,9%
K_Agriculture Livestocks	79,5	33,7	32,4	31,4	30,6	29,4	-9,0%	-61,5%
L_Other Agriculture	13,0	38,6	37,8	33,2	30,1	27,0	-22,2%	131,5%
Total	107,5	83,8	80,7	71,5	66,6	61,6	-20,5%	-38,1%

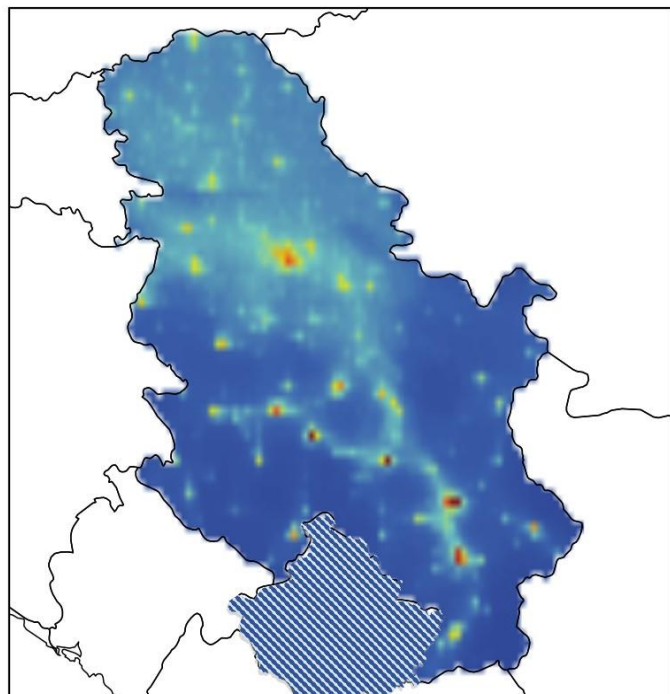
Appendix 4 Results of the dispersion modelling of the effects of WAM-A, WAM-B and WAM-C scenario

PM10 concentrations for the reference year 2015

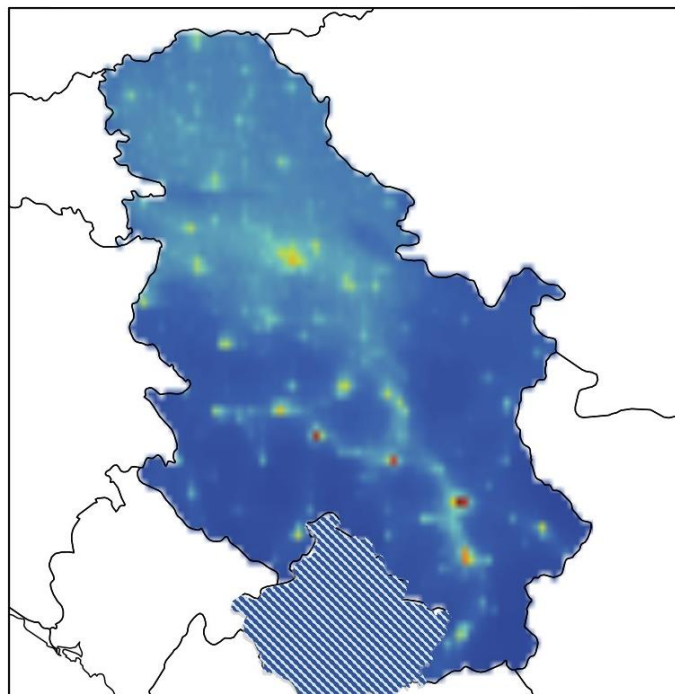




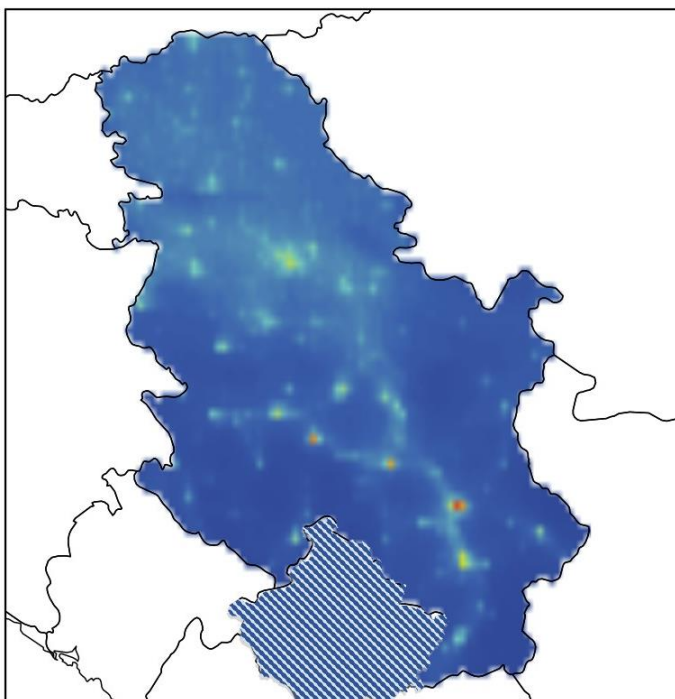
PM10 concentrations for the 2030 WEM scenario



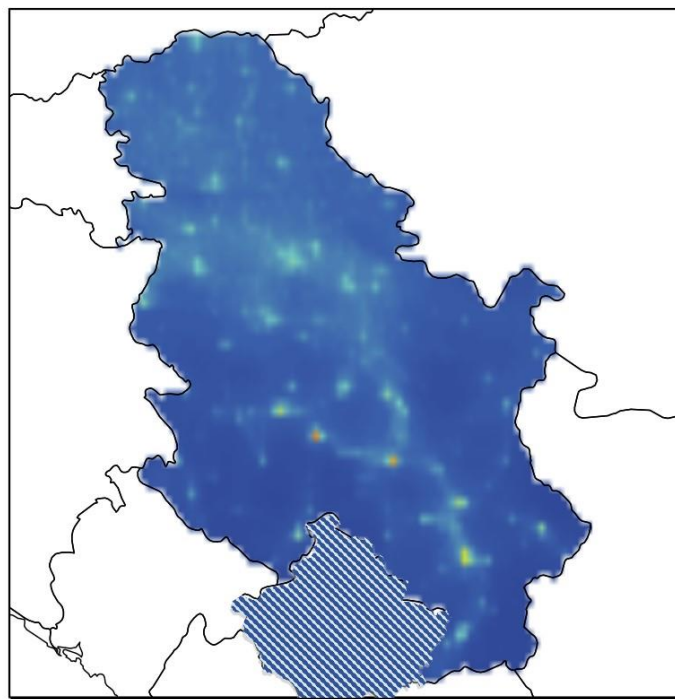
PM10 concentrations for the 2030 WAM A scenario



PM10 concentrations for the 2030 WAM B scenario

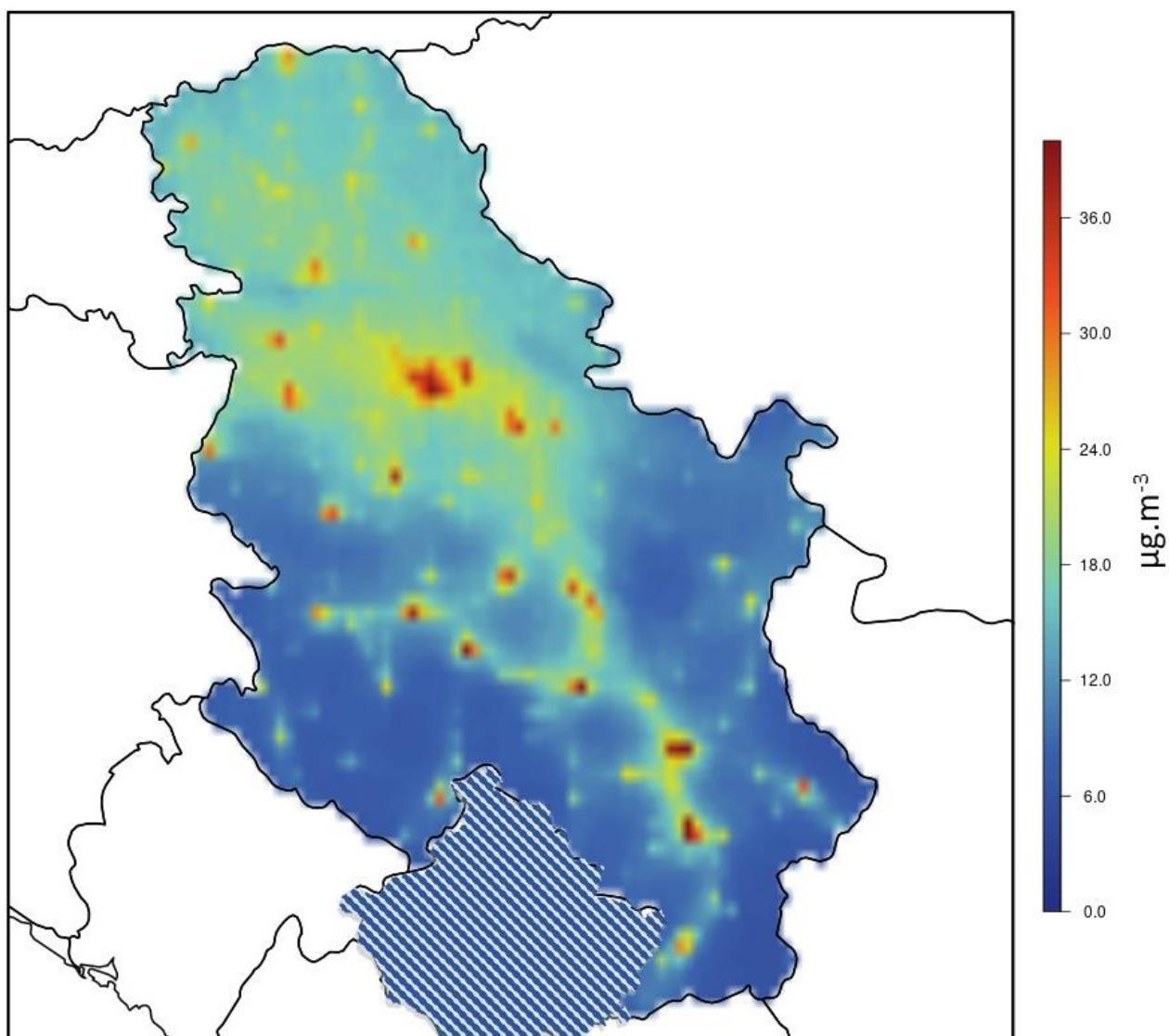


PM10 concentrations for the 2030 WAM C scenario



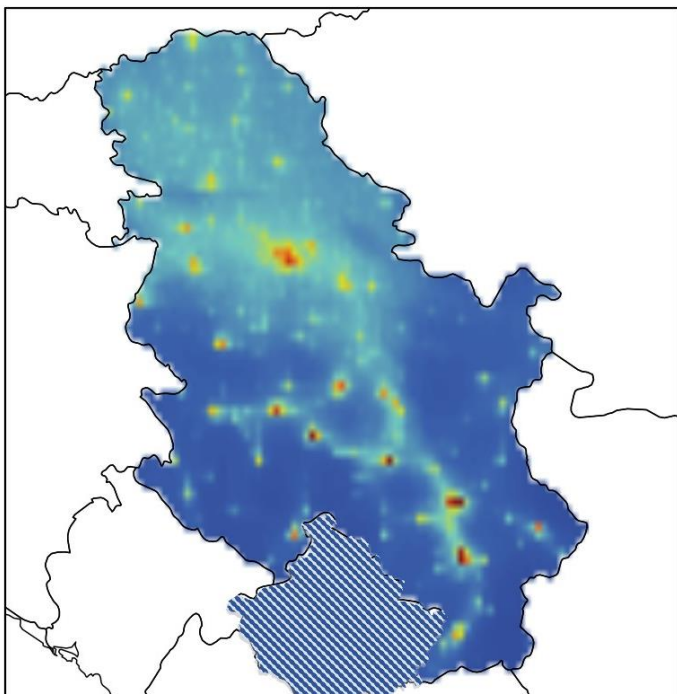


PM2.5 concentrations for the reference year 2015

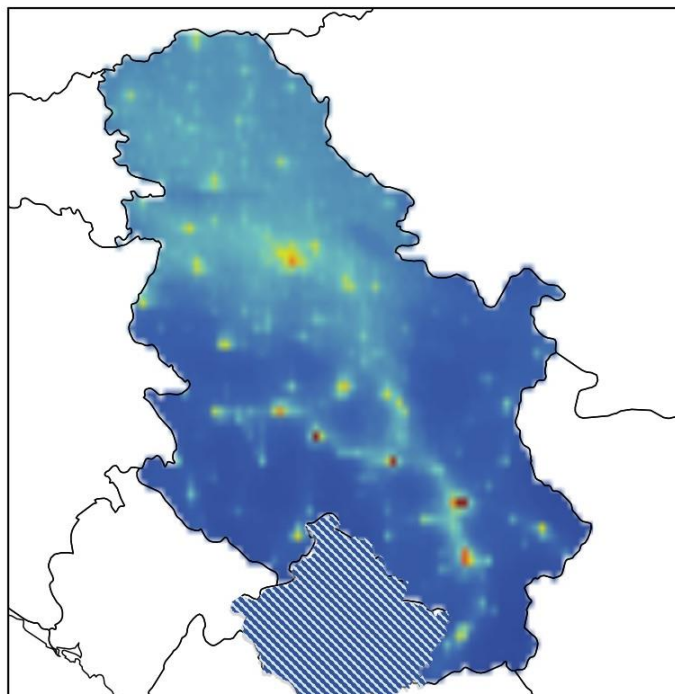




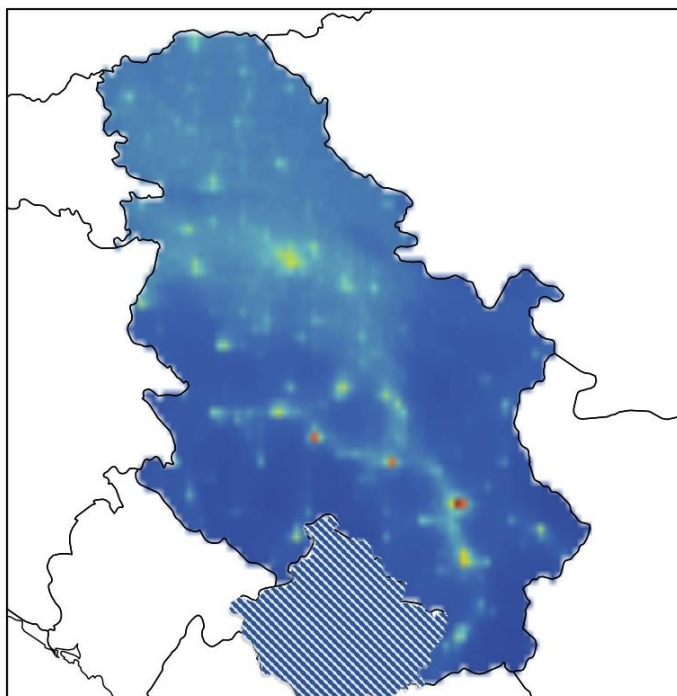
PM2.5 concentrations for the 2030 WEM scenario



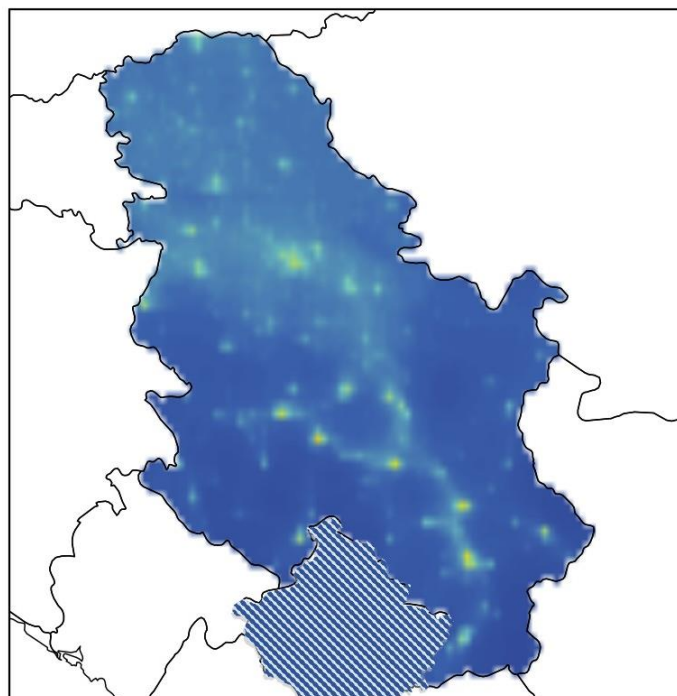
PM2.5 concentrations for the 2030 WAM A scenario



PM2.5 concentrations for the 2030 WAM B scenario

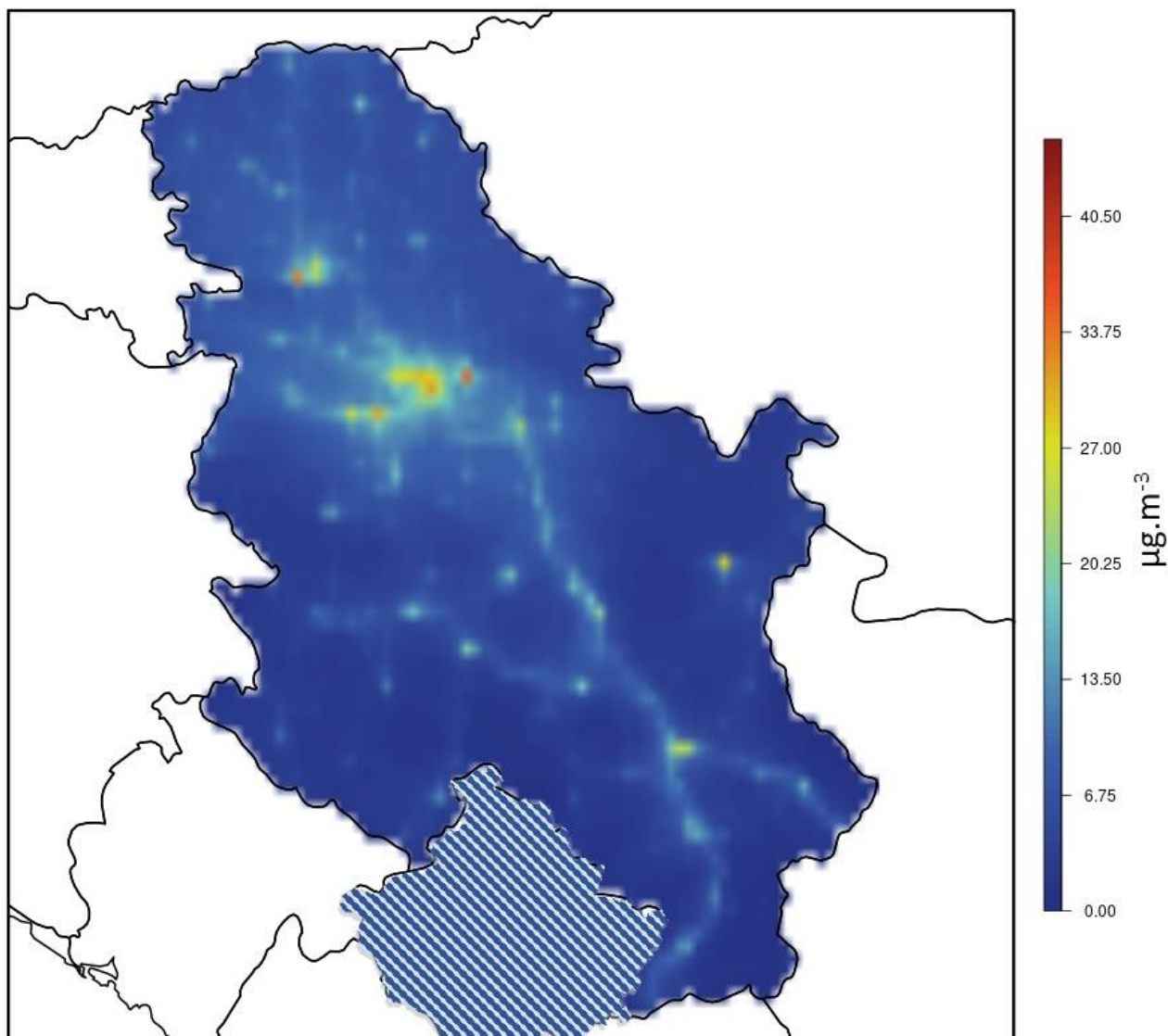


PM2.5 concentrations for the 2030 WAM C scenario



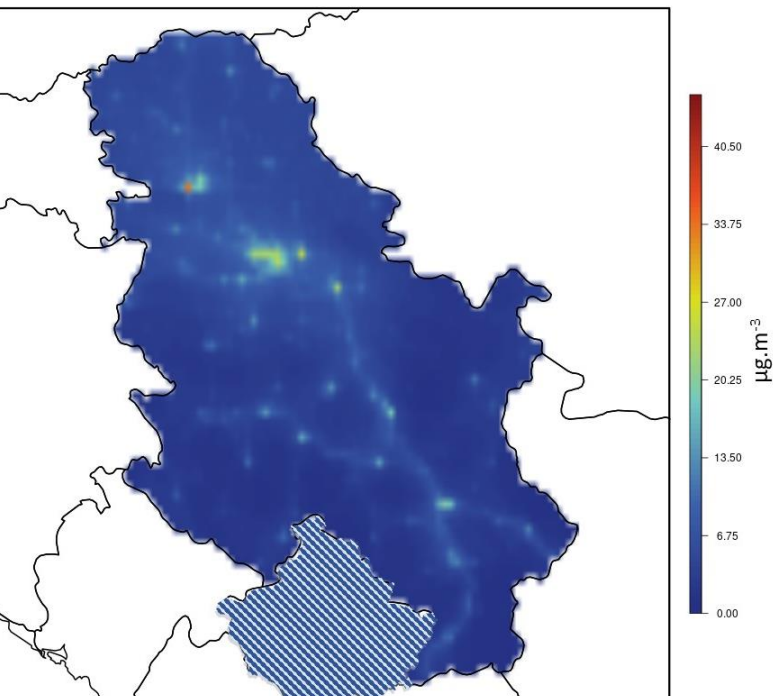


NO₂ concentrations for the reference year 2015

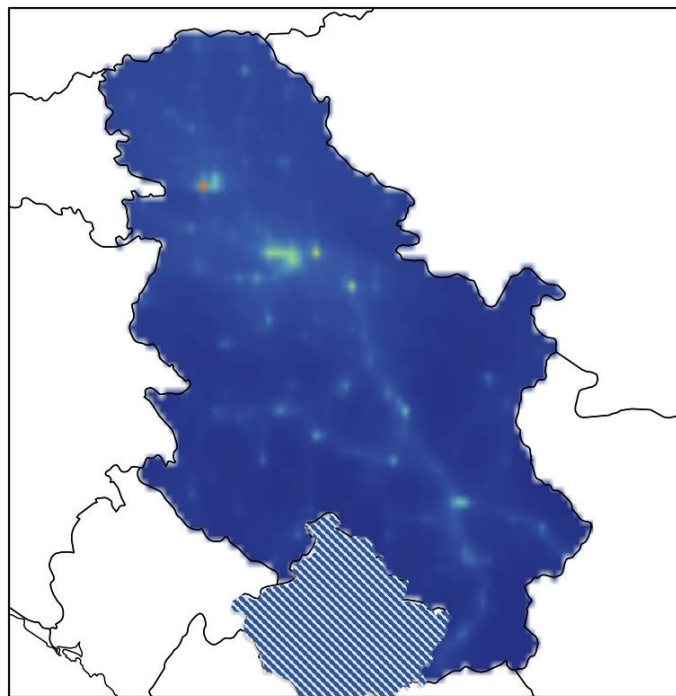




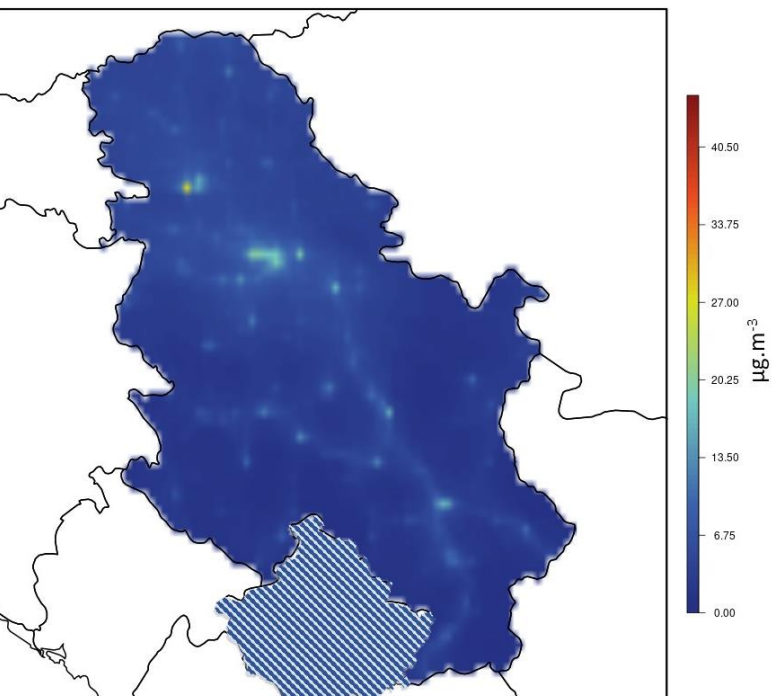
NO₂ concentrations for the 2030 WEM scenario



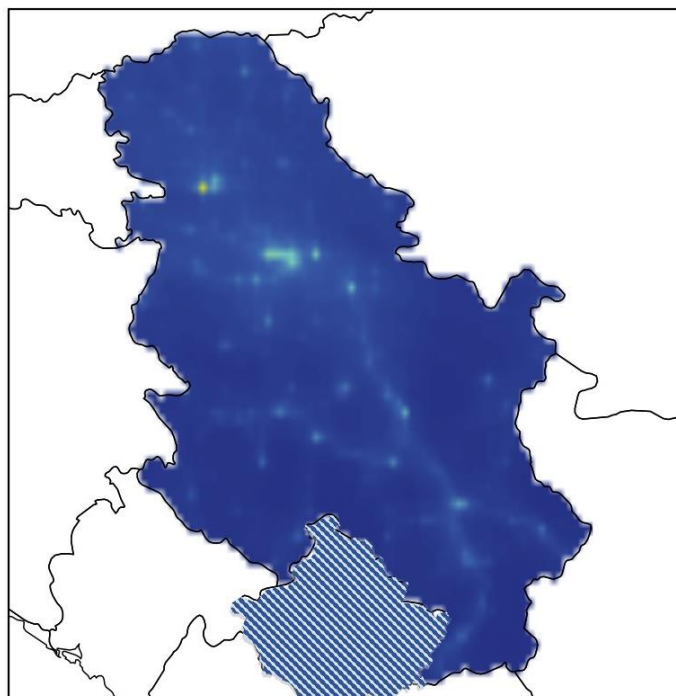
NO₂ concentrations for the 2030 WAM A scenario



NO₂ concentrations for the 2030 WAM B scenario

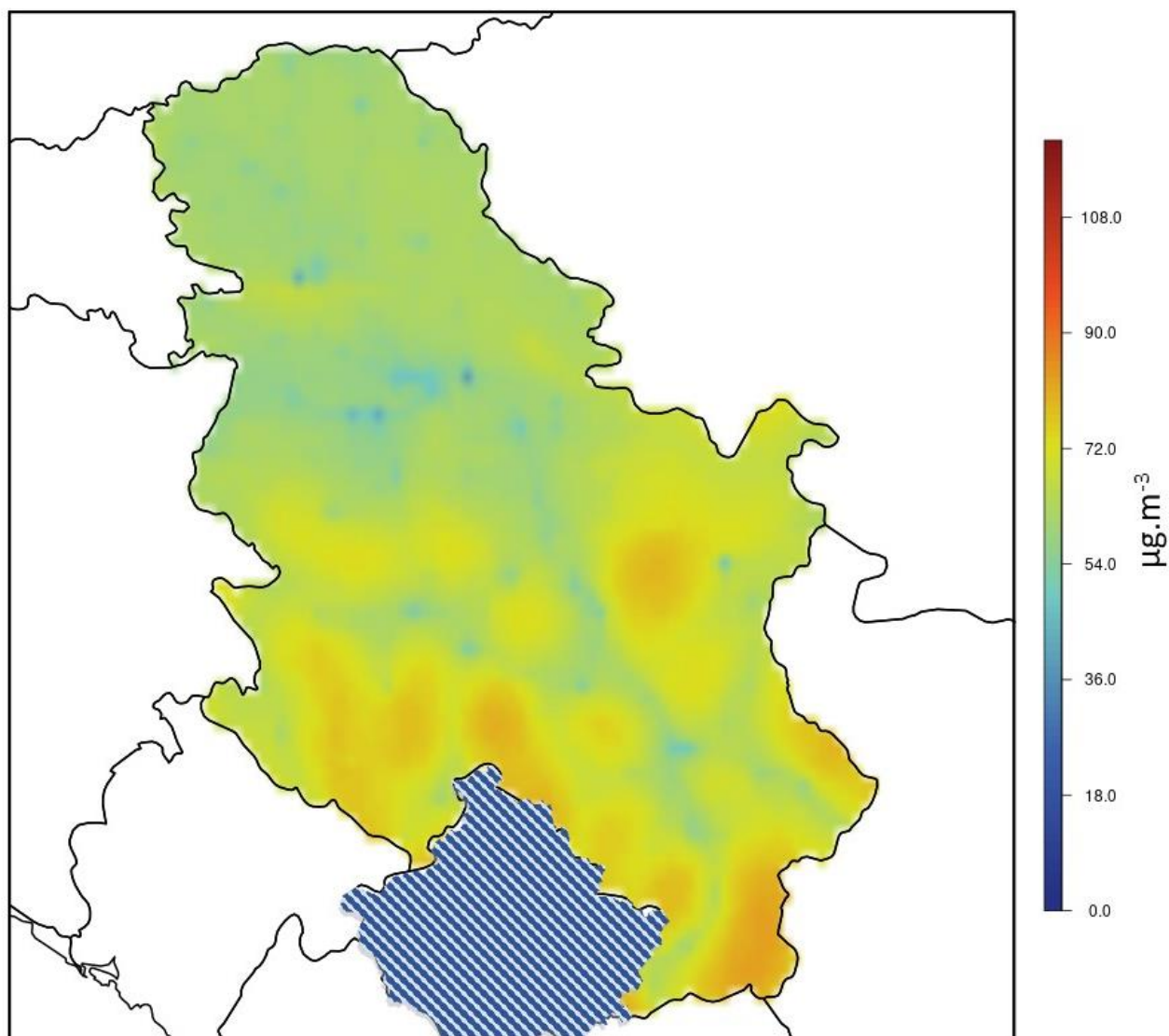


NO₂ concentrations for the 2030 WAM C scenario



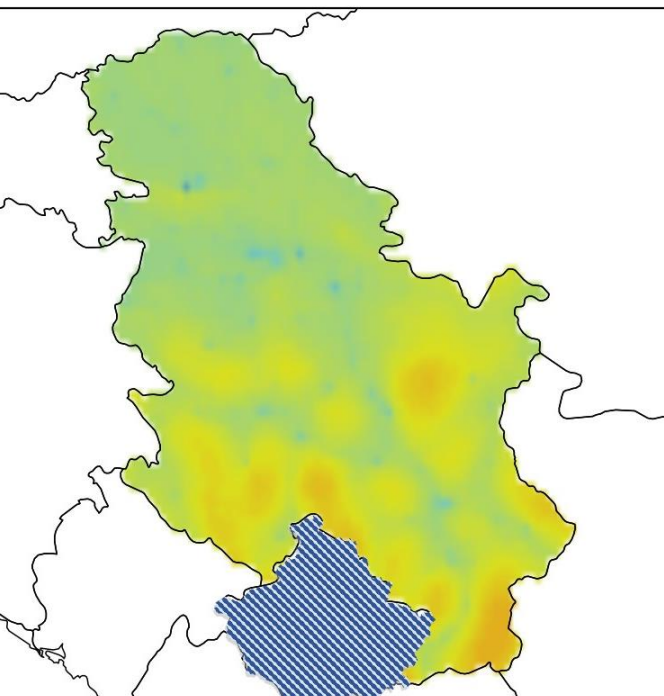


O₃ concentrations for the reference year 2015

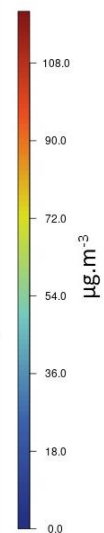
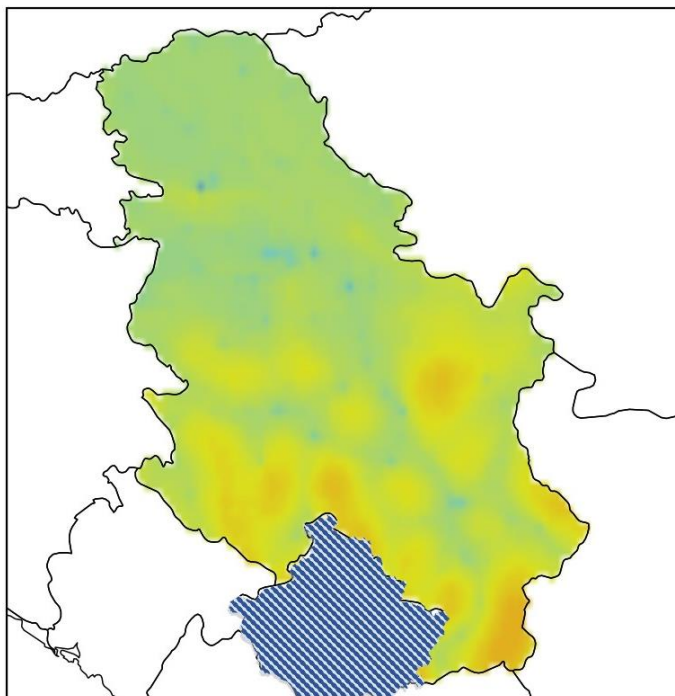




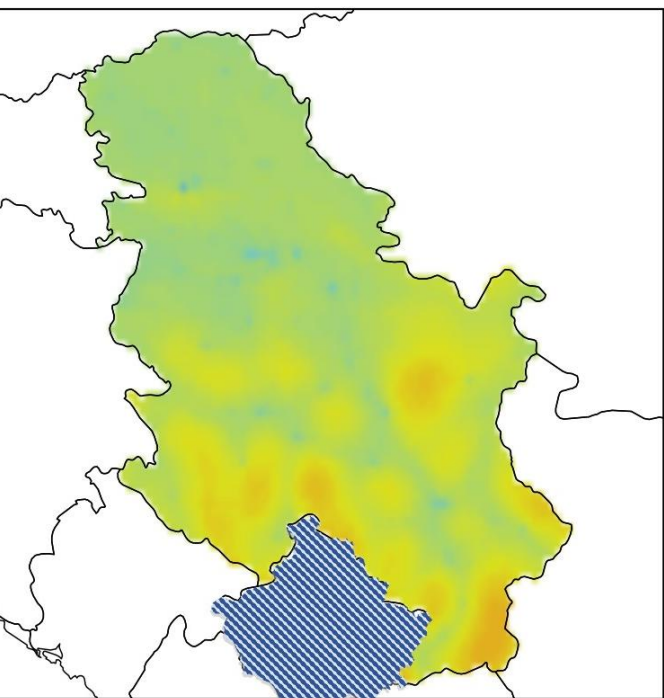
O₃ concentrations for the 2030 WEM scenario



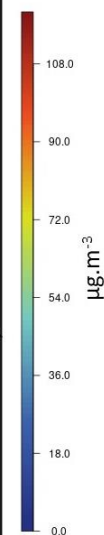
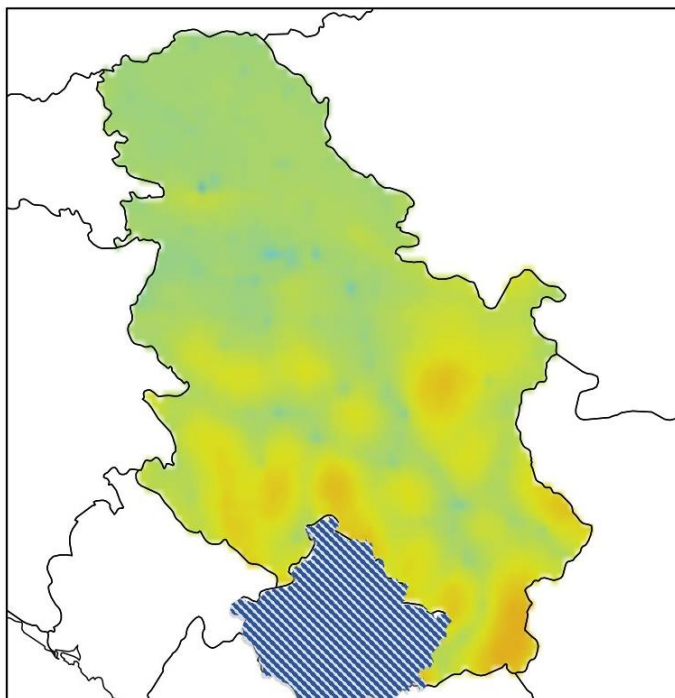
O₃ concentrations for the 2030 WAM A scenario



O₃ concentrations for the 2030 WAM B scenario

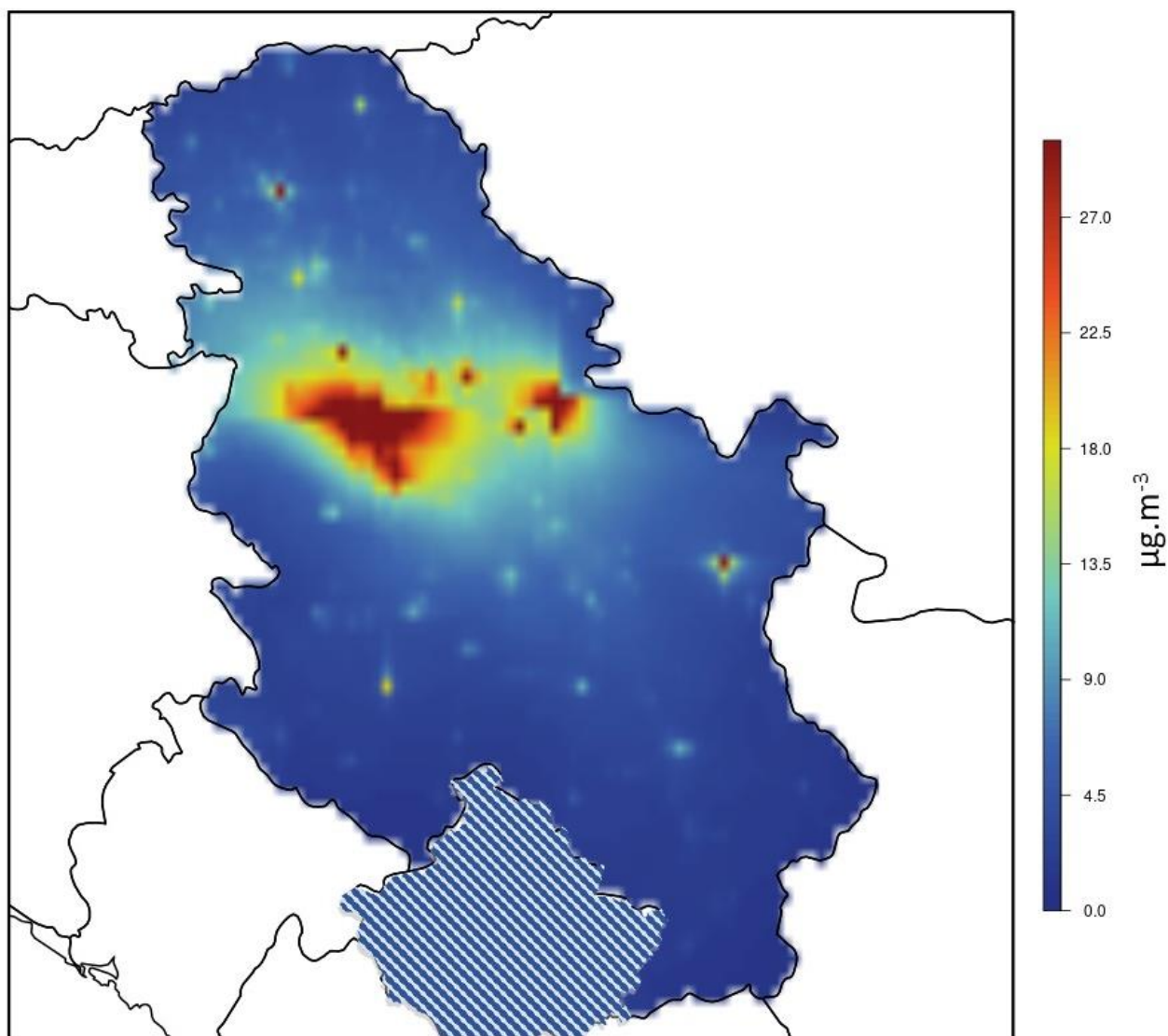


O₃ concentrations for the 2030 WAM C scenario



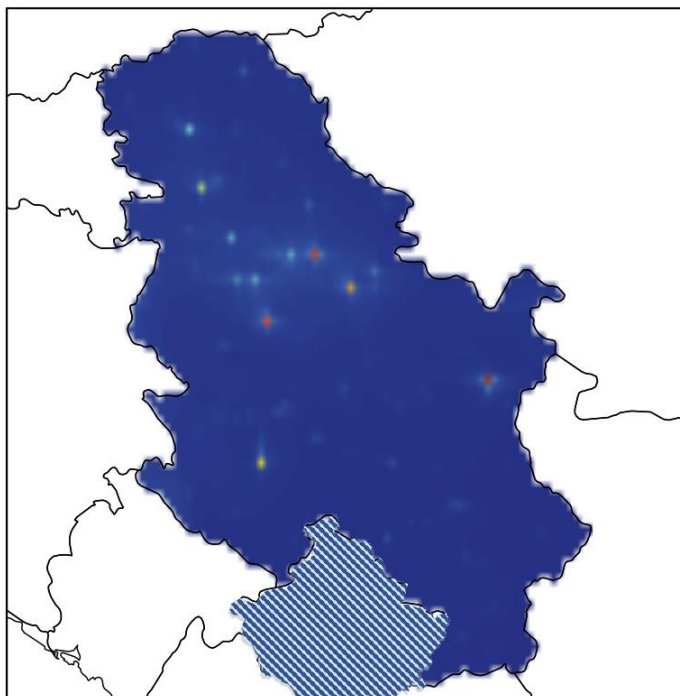


SO₂ concentrations for the reference year 2015

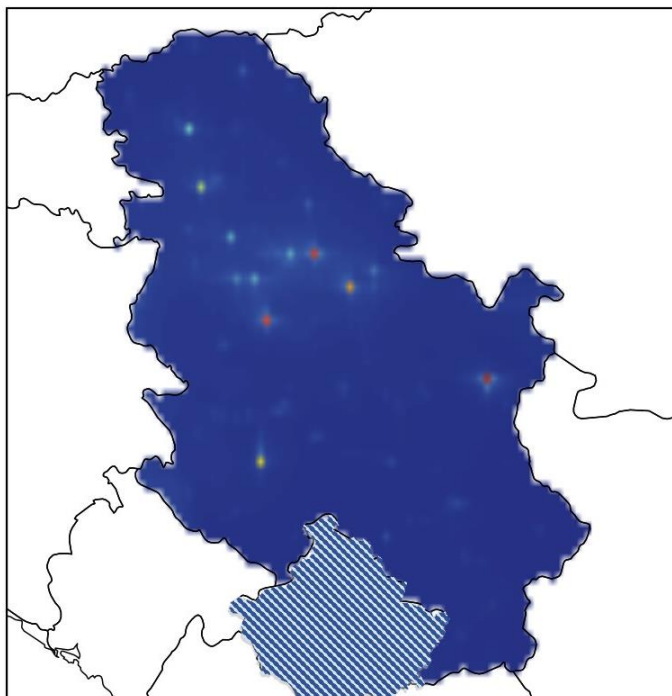




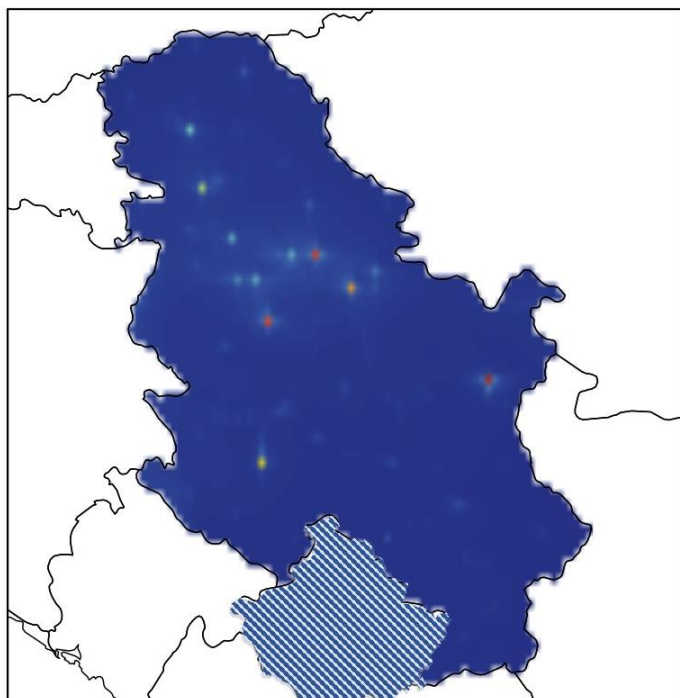
SO₂ concentrations for the 2030 WAM A scenario



SO₂ concentrations for the 2030 WEM scenario



SO₂ concentrations for the 2030 WAM B scenario



SO₂ concentrations for the 2030 WAM C scenario

