



Case Study on EECCAs: Technological Pathway toward the Amended Gothenburg Protocol Ratification

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Overview



- Approach used
- Case study 1: Serbia
- Case study 2: Georgia
- Case study 3: Kazakhstan
- Case study 4: Moldova
- General conclusions

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- Approach used

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- Assessment of air quality
- Assessment of the main sources of SO₂, PM, NO_x and VOC
- Assessment of current regulations implemented for activities covered by annexes IV, V, VI and X (mobile sources will be added later)
- Assessment of programmes to reduce air pollution and to develop policies and measures related to activities covered by Annex IV (SO₂), Annex V (NO_x), Annex VI (VOC) and annex X (PM)
- Discussions with the country experts from the Ministries of environment
- Recommendations for technological pathways

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Activities covered by the technical annexes IV, V, VI and X



IV: Limit values for emissions of sulphur from stationary sources

1. Limit values for SO₂ emissions from **combustion plants**
2. Limit values for the **sulphur content of gas oil**
3. Limit value expressed as a minimum sulphur recovery rate of **sulphur recovery units**
4. Limit values for SO_x emissions released from **titanium dioxide production**

V: Limit values for emissions of nitrogen oxides from stationary sources

1. Limit values for NO_x emissions released from **combustion plants**
2. Limit values for NO_x emissions released from **onshore combustion turbines** (including Combined Cycle Gas Turbine CCGT)
3. Limit values for NO_x emissions released from **cement clinker production**
4. Limit values for NO_x emissions released from **new stationary engines**
5. Limit values for NO_x emissions released from **iron ore sinter plants**
6. Limit values for NO_x emissions from **nitric acid production** excluding acid concentration units

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Activities covered by the technical annexes IV, V, VI and X



X: Limit values for emissions of particulate matter from stationary sources

1. Limit values for dust emissions from **combustion plants**
 2. Limit values for dust emissions released from **mineral oil and gas refineries**
 3. Limit values for dust emissions released from **cement production**
 4. Limit values for dust emissions released from **lime production**
 5. Limit values for dust emissions released from **primary iron and steel production**
 6. Limit values for dust emissions released from **iron foundries**
 7. Limit values for dust emissions released from **non-ferrous metals production and processing**
 8. Limit values for dust emissions released from **glass production**
 9. Limit values for dust emissions released from **pulp production**
 10. Limit values for dust emissions released from **waste incineration**
 11. Limit values for dust emissions released from **titanium dioxide production**
- Recommended limit values for dust emissions released from:
12. **New solid fuel combustion installations with a rated thermal input < 500 kWth** to be used with product standards
 13. **Boilers and process heaters with a rated thermal input of 100 kWth–1 MWth**
 14. **Boilers and process heaters with a rated thermal input of 1 MWth–50 MWth**

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Activities covered by the technical annexes IV, V, VI and X

VI: Limit values for emissions of volatile organic compounds from stationary sources

1. Limit values for VOC emissions from **storage and distribution of petrol**, excluding the loading of seagoing ships (stage I)
2. Limit values for VOC emissions for **car refueling at service station** (stage II)
3. Limit values for **adhesive coating**
4. Limit values for **wood and plastic lamination**
5. Limit values for **coating activities in the vehicle industry**
6. Limit values for **coating activities in various industrial sectors**
7. Limit values for **leather and winding wire coating**
8. Limit values for **coil coating**
9. Limit values for **dry cleaning**
10. Limit values for **manufacturing of coatings, varnishes, inks and adhesives**
11. Limit values for **printing activities**
12. Limit values for **manufacturing of pharmaceutical products**
13. Limit values for **conversion of natural or synthetic rubber**
14. Limit values for **surface cleaning**
15. Limit values for **extraction of vegetable and animal fat and refining of vegetable oil**
16. Limit values for **impregnation of wood**

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Overview

- Approach used
- Case study 1: Serbia

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EU directive 2008/50 on ambient air quality and cleaner air for Europe is applied in Serbia
The balance is as follows for 2020:

In terms of SO₂: still exceedances of limit values in some cities:

- Annual limit value of 50 µg/m³: exceedance in 2020 occurred at one station in the **city of Bor** (74 µg/m³) (a coper plant still emitting large quantity of SO₂ emissions)
- Daily limit value (125 µg/m³) not to be exceeded more than 3 days/year: exceedances in 2020 registered in **Bor** (at stations Bor_Gradski park for 58 days, Bor_Brezonik for 17 days, at Bor_Institut for 10 days), but also at Obrenovac_Centar for two days and at 3 stations in Beograd for one day
- Hourly limit value (350 µg/ m³) not to be exceeded more than 24 hours/year: exceedances more than 24 hours at 3 stations in **Bor**

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The balance is as follows for 2020:

In terms of NO₂:

- During 2020, no exceedance of the annual limit value for nitrogen dioxide of 40 µg/m³ (impact of the Covid pandemy?)
- Hourly limit value (200 µg/m³) nowhere exceeded more than 18 times.

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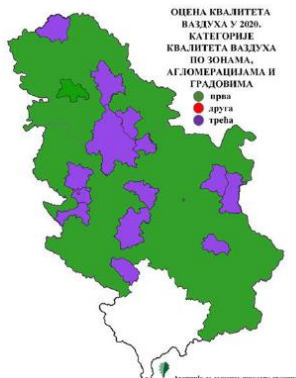
In terms of PM10: still exceedances of limit values in several cities

- **Exceedances of the daily limit values of 50 µg/m³ (not to be exceeded more than 35 days/year) at a large number of measuring points** and their number was from two days at the station Kamenicki V up to 148 days recorded at the station Smederevo_Radinac.
- **Exceedances of the annual limit value for PM10 (40 µg/m³) in 18 stations distributed in 13 cities:** (Smederevo_Radinac (66 µg/m³), Valjevo (63 µg/m³), Zajecar (63 µg/m³), Uzice (59 µg/m³), Kosjeric (56 µg/m³), Smederevo_Carina (52 µg/m³), Novi Pazar (52 µg/m³), Pancevo_Narodna basta (L) (51 µg/m³), Nis_OS Sveti Sava (49 µg/m³), Kraljevo_Policijska uprava (48 µg/m³), Nis_IZJZ Nis (47 µg/m³), Uzice (L) (46 µg/m³), Smederevo (L) (46 µg/m³), Beograd_Despota Stefana GZZJZ (46 µg/m³), Beograd_Obrenovac GZZJZ (45 µg/m³), Zrenjanin (L) (42 µg/m³), Kragujevac (42 µg/m³) and Popovac (41 µg/m³))

In terms of PM2.5: still exceedances of limit values in several cities

- **Exceedances of annual limit value for PM2.5 (25 µg/m³) recorded in 15 stations distributed in 13 cities** (Valjevo 42 µg/m³, Novi Pazar 41 µg/m³, Nis_IZJZ Nis 40 µg/m³, Kosjeric 38 µg/m³, Pancevo_Narodna basta (L) 37 µg/m³, Uzice 33 µg/m³, Smederevo_Centar 32 µg/m³, Beograd_Veliki Crljeni 32 µg/m³, Nis_O.S. „Sveti Sava” 31 µg/m³, Beograd_Stari grad 30 µg/m³, Kraljevo_Policijska uprava 30 µg/m³, Beograd_Obrenovac Ušće 30 µg/m³, Pancevo_Vojlovica 29 µg/m³, Beograd_Novi Beograd 28 µg/m³ and Subotica (ZZJZ) (L) 28 µg/m³))

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Category I: clean or slightly polluted air

Category III: over-polluted air

Category I :

Zone Serbia, except for the city of Kragujevac, Valjevo, Kraljevo, Zajecar, Novi Pazar and Popovac,

In the zone Vojvodina except for the city of Subotica and Zrenjanin,

Category III :

In the agglomerations **Beograd, Nis, Smederevo, Pancevo, Uzice and Kosjeric** air, due to concentrations that exceeded limit values of **PM10 and PM2.5**

In the cities **Valjevo, Kraljevo and Novi Pazar** due to concentrations that exceeded limit values of **PM10 and PM2.5**

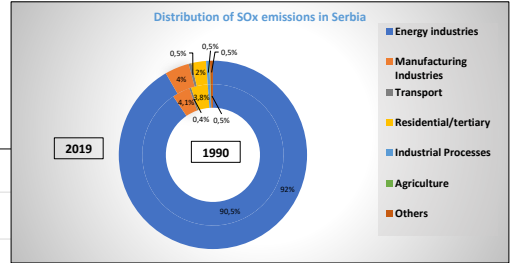
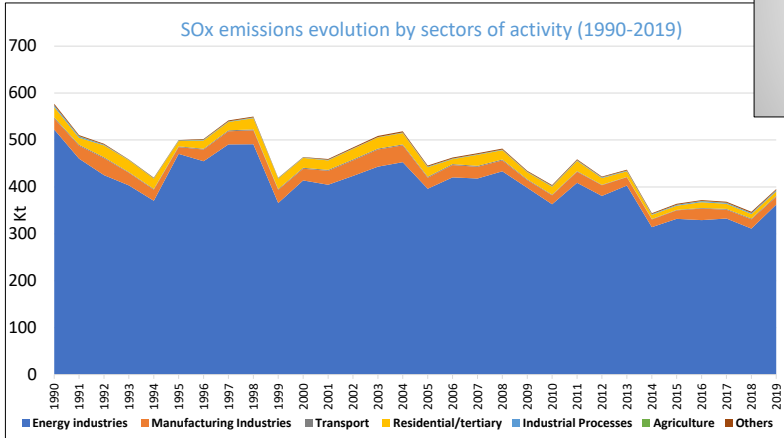
In **Kragujevac, Zajecar, Popovac and Zrenjanin** due to concentrations that **exceeded limit value of PM10**

In **Subotica** due to concentrations that **exceeded limit value of PM2.5**

In **Bor** due to concentrations of **SO2**

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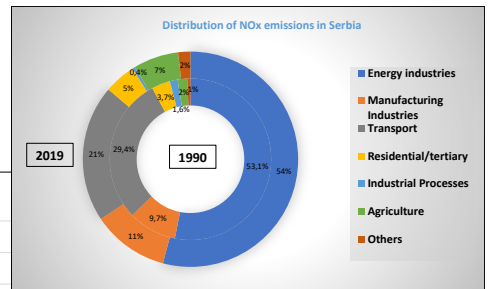
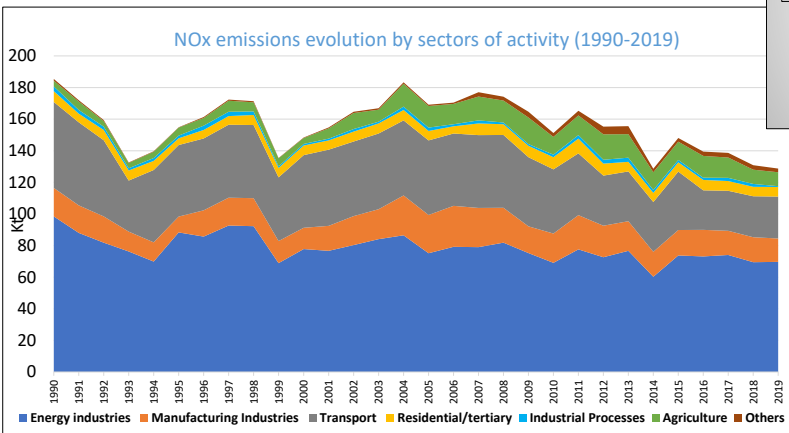
Serbia: Main sources of SO₂



- A reduction of emission of 31% from 1990
- Energy production the predominant source of emissions

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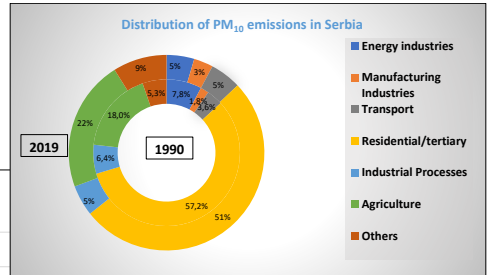
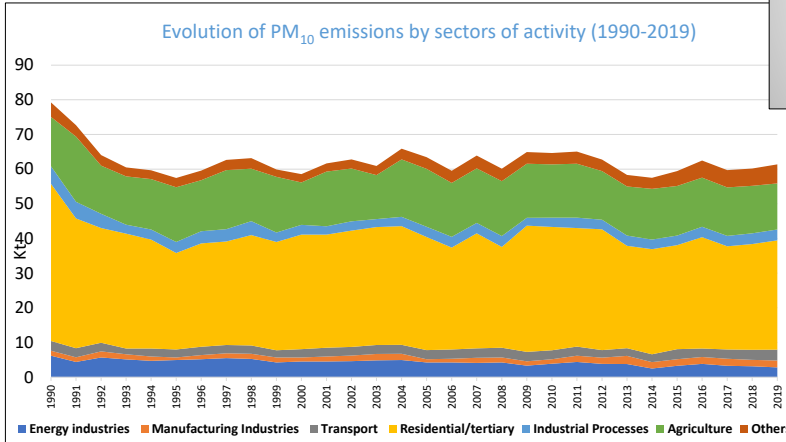
Serbia: Main sources of NO_x



- A reduction of emission of 30% from 1990
- Energy production still a predominant source of emissions followed by road traffic and combustion in industry

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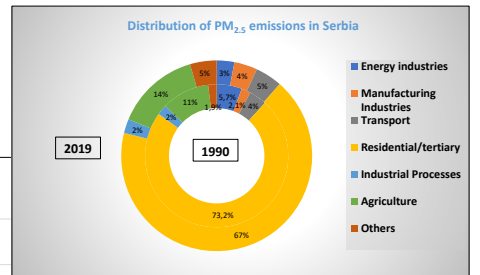
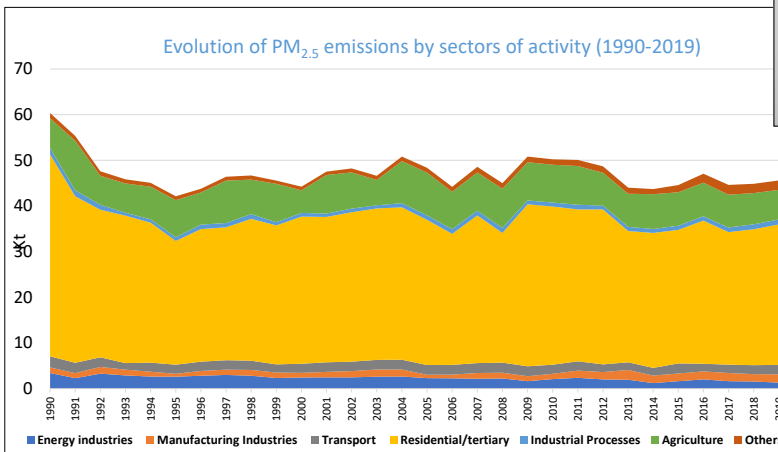
Serbia: Main sources of PM10



- Stable emissions stable from 2000
- Residential and tertiary activities are the predominant source of emissions

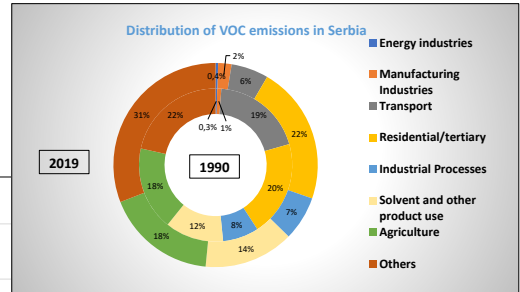
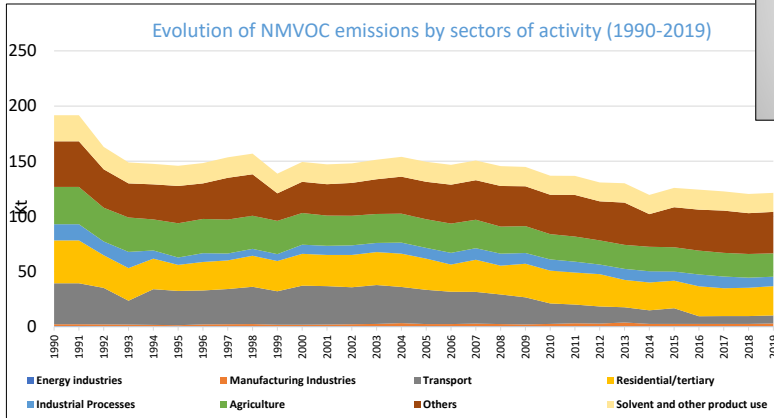
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Serbia: Main sources of PM2.5



- Stable emissions stable from 2000
- Residential and tertiary activities are the predominant source of emissions

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- A reduction of 36 % from 1990 and 22% from 2000
- The category “other” including fugitive emissions from coal mining is the largest source of emissions. Residential and tertiary activities are a large source of VOC as solvent uses

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Currently, as set of regulations relates to most of the sources of emissions considered in annex IV SO₂, Annex V NO_x, Annex VI VOC and X PM

Large old power plants:

A National Emission Reduction Plan (NERP) developed in accordance with requirements of the Guidelines of Energy Community Secretariat

NERP implementation and “opt-out” mechanism in the Republic of Serbia started on 1 January 2018 in accordance with the deadline prescribed by the relevant Ministerial Council Decision of the Energy Community. NERP will be in use up to 31 December 2027 at the latest

kt/y	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	reduction /2018
SO ₂	54,6	54,6	54,6	54,6	54,6	54,6	44,7	34,9	25,1	25,1	-54%
NO _x	62,3	55,3	48,2	41,2	34,2	27,1	26,4	25,7	25,0	25,0	-60%
Dust	6,4	6,4	6,4	6,4	6,4	6,4	5,1	3,8	2,5	2,5	-61%

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Industrial activities and other sources of emissions

Regulation on limit values of emissions of air pollutants from stationary pollution sources, excluding combustion plants (Official gazette of the republic of Serbia, no. 111/15)

This regulation prescribes:

- 1) limit values for the emission of pollutants into the air from stationary sources of pollution, except for combustion plants;
- 2) the content of the emission balance report;
- 3) method of submission of emission data for the purposes of the information system and deadlines for data submission.

Combustion installations (from small installations to largest ones):

Regulation on limit values of emissions of pollutants into the air from combustion plants (official gazette of the republic of Serbia, no. 6/16)

This regulation partially transposes chapter III/annex V of the IED for large combustion plants but prescribes emission limit values for plants with a thermal power lower than 50 MW.

The implementation of chapter III is still in the initial phase,

Comments

ELVs implemented are not totally the same, as in the technical annexes IV, V and X for processes concerned

For LCP: SO₂, NO_x and PM ELVs prescribed are similar to ELVs of annex IV, V and X of the AGP (ELVs in annexes of the AGP were based on the same reference)

Use of solvents in industry

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)

This Regulation provides for a list of industrial installations and activities in which VOC emissions are controlled:

- The emission values of VOC at a given solvent consumption,
- The total permissible emissions of VOC from installations and activities,
- The schemes for reducing emissions of VOC.

The list of activities covered, and limit values are the same as in the Directive 1999/13/EC now in annex VII (linked to chapter 5) of the IED directive

Comments

The list of activities covered is the same as in annex VI of the AGP. The limit values are the same to annex VI VOC except for plants consuming more than 200 t solvent per year

According to the project IED Serbia, "Further implementation of the Industrial Emissions Directive in Serbia" carried out by Serbia with Norway, the status of implementation of the chapter V and annex VII of IED and consequently of regulation 100/2011, was still very poor in 2017 (see hereafter current programmes of Serbia).

Distribution of petrol (Stage I and Stage II)

Limit values for VOC emissions from storage and distribution of petrol, excluding the loading of seagoing ships (stage I)

Limit values for VOC emissions for car refueling at service station (stage II)

Directive 1994/63/EC on the control of VOC emissions resulting from the storage of petrol and its distribution from terminals to service stations (Stage I Petrol vapour recovery) and Directive 2009/126/EC on on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations (Stage II Petrol vapour recovery) have been transposed and regulated (Law on Air Protection, amended on 30 January 2013 and by the Rulebook on technical measures and requirements in relation to allowed emission)

Comments

Status of implementation of the limit values was still poor in 2017 (see hereafter current programmes of Serbia to improve the situation)

Sulphur content of gas oil

Limit values for the Sulphur content (per cent by weight)

- Gas oil < 0.10%

Comments

This S content limit value applied for gas-oil in Serbia is the same as in annex IV of the AGP

Serbia: Programmes for aligning the Serbian regulations with EU Directives



From 2019 to 2021, within an EU funded project, a draft Programme of Air Protection of the Republic of Serbia for the period 2022-2030 with Action plan was developed.

- This programme identifies measures to be implemented to reduce air pollutant emissions in order to avoid exceedances of limit values in ambient air

Recently, the Republic of Serbia continued work programmes to align its own policies and regulations with EU regulations, with the aim of being fully aligned as soon as possible (possible transitional periods foreseen that will be subject of negotiation with the EU) in particular in reference with the following EU Directives:

- Industrial Emission Directive (IED)
- Directive 1994/63/EC on Stage I Petrol vapour recovery and Directive 2009/126/EC on Stage II Petrol vapour recovery
- EU Fuel Quality Directive 2009/30/EC and Directive 2016/802 on reduction in the Sulphur content in fuels

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Serbia: Programmes for developing Integrated permits and reinforce limit values in industrial activities



For both for **IED and integrated permits**, a new project, funded by Sweden, was set up “**Green Transition - Implementing Industrial Emissions Directive in Serbia 2021-2025**”.

This project for the years 2021 to 2025, aims to assist Serbia for enhanced prevention and control of industrial pollution. On the first years, the programme is based on:

- Enhancing the quality of the negotiating position on IED;
- Increasing the efficiency of the integrated permitting process;
- Promoting the compliance with the BATs requirements and assessment of costs;
- Raising awareness and knowledge on industrial pollution prevention and control.

An “Info Centre on BAT implementation” will be set up, with the aim of increasing the level of knowledge of operators and competent authorities about IPPC and its implementation.

A new Law on IPPC is planned to be developed by the end of 2024 in order to be harmonized with IED.

The draft IED implementation plan will be completed and finalised.

The project also aimed to assist Serbia in the negotiation process.

This project follows another project “IED Serbia” also funded by Sweden, carried out in 2018-2021.

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Serbia: Programmes for developing Integrated permits and reinforce limit values in industrial activities

No		Total number of IPPC installations	Number of issued valid IPPC permits per installation by end of 2021
1.	Energy industries	30	2
2.	Production and processing of metals	22	6
3.	Mineral industry	25	10
4.	Chemical industry	11	5
5.	Waste management	13	2
6.	Other activities (6.1; 6.4; 6.5; 6.6a,b,c; 6.7)	119	18
	TOTAL	220	43

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Serbia: Programmes for developing Integrated permits and reinforce limit values in industrial activities

Annex VI VOC from solvents

The project “Further implementation of the EU regulation on Volatile Organic Compounds” financially supported by the Royal Norwegian Embassy in Belgrade is extended to the end of this year.

This **project aimed to improve the implementation of the IED Directive for solvents used in industry and developed capacity building activities related to the solvent management plan and reduction of emissions**. According to the initial estimation done within the project, the number of plants concerned is in between 500 to 700 but all sectors will not be covered but most relevant specific sectors in republic of Serbia.

The **New Project, funded by Sweden, “Green Transition - Implementing Industrial Emissions Directive in Serbia 2021-2025” also assists the completion of studies for the compliance with Chapter V and annex VII of the IED**. The draft of the Directive implementation plan for the IED including VOC operators will be prepared.

During this year technical and financial analysis of compliance with the Directive will be completed, while the chapter of the Directive Specific Implementation plan related to VOC operators will be prepared during the next year of the project implementation.

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Serbia: Programmes for Stage I and Stage II for service stations

Recently, through an EU funded project in 2019-2021, the Republic of Serbia continued work programmes to align its own policies and regulations with the Directive 1994/63/EC on Stage I Petrol vapour recovery and Directive 2009/126/EC on Stage II Petrol vapour recovery which are the basis of limit values in annex VI of the AGP.

Additional work in 2022 and 2023 is being carried out to finalise to adapt the national regulations.

Currently, improvement of the draft Directive Specific Implementation Plan for VOC Petrol Directives is in progress.

2025 is planned for the transposition deadline and the end of 2026 is the proposed estimated deadline to achieve full implementation (but there is a possibility of a later date)

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Serbia: Programmes for small domestic appliances using wood and coal

The **Draft Programme of Air Protection of the Republic of Serbia for the period 2022-2030** with Action plan envisages specific measures and activities to reduce PM emissions from domestic heating:

- Faster replacement of existing household heating appliances with new Eco-Design compliant appliances with financial incentives
- Higher percentage of replacement of old appliances in the cities of Kragujevac, Beograd, Nis, Valjevo and Užice (5 considered as PM hot spots)

In the draft programme, the following activities are foreseen:

- Complete the work on full harmonisation of national legislation with the Eco-design Directive and work on the transposition of the two regulations Regulation 2015/1189/EU and Regulation 2015/1185/EU
- Set up a mechanism for financial incentives for the replacement of existing heating radiators in households with new appliances Eco-Design compliant and heat pumps

The Ministry of Mining and Energy is the institution responsible for the implementation of this measure

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Serbia: Technological Pathway to comply with the AGP technical provisions

SO_x Annex IV:

Large combustion plants, the key sector for action and industrial plants (especially in Bor)

The following secondary measures can be used

- boiler sorbent injection
- dry sorbent injection (DSI)
- spray dry absorber (SDA)
- wet flue-gas desulphurisation (FGD)

possibly associated with the use of low Sulphur content solid or liquid fuels

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Serbia: Technological Pathway to comply with the AGP technical provisions

NO_x Annex V

Large combustion plants, the key sector for action and industrial plants

A combination of primary and secondary measures

- combustion optimisation
- combination of primary techniques for NO_x reduction such as air or fuel staging, flue-gas recirculation, low-NO_x burners (LNB)
- selective non-catalytic reduction (SNCR)
- selective catalytic reduction (SCR)

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Serbia: Technological Pathway to comply with the AGP technical provisions

PM (Annex X)

In all large combustion plants and industrial sectors covered:

Fabric filters and electrostatic precipitators are the techniques recommended to able compliance with limit values implemented by the Annex

- Fabric filters
- Electrostatic precipitators

When desulphurisation is also conducted, the following techniques are also available:

- wet flue-gas, desulphurisation (FGD),
- dry or semi-dry FGD system.

The proper sizing of the equipment is essential.

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Serbia: Technological Pathway to comply with the AGP technical provisions

PM (Annex X)

The key sector in Serbia, for which only recommended limit values are proposed in the AGP, is the **domestic heating** with solid fuels.

- Development of the use of efficient appliances, based on the Code of good practices developed by UNECE

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Serbia: Technological Pathway to comply with the AGP technical provisions

VOC (Annex VI)

Industrial plants using solvents

Depending on activities using solvents, primary measures and end of pipe techniques such as adsorption, oxidation

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Serbia: Main conclusions

- Air quality: PM concentrations still very high and main concern in term of air quality, large SO₂ concentrations in one city
- Emissions: large impact of LCP for SO₂ and NO_x emissions. For PM, domestic heating is the largest source of emissions
- Many programmes to align the national regulations with EU Directives in the Republic of Serbia, especially the IED and a national programme for air protection and its action plan developed
- A technological pathway quite common for combustion plants and industrial plants covered by the technical annexes
- For small domestic appliances, the reduction techniques are known. The Code of good practices for wood burning and small combustion installations developed by UNECE should be used. The difficulty will come from the capacity of Serbia to accelerate the use of efficient appliances

By the implementation of the provisions in key EU Directives, the Republic of Serbia would be in the condition to comply with the requirements of the four AGP technical annexes IV, V, VI and X, in particular their ELVs, tentatively around 2030-35

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Useful links

Reports on emission inventory: IIR and NFR tables of 2021
<https://www.ceip.at/status-of-reporting-and-review-results/2021-submission>

English summary of the report on air quality in Serbia of 2020
(КВАЛИТЕТ ВАЗДУХА У РЕПУБЛИЦИ СРБИЈИ 2020. ГОДИНЕ)

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Thank you very much
for your attention!

Questions?

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