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## EUROPEAN COMMISSION

## COMMUNICATION FROM THE COMMISSION

**Guidance for the development of National Air Pollution Control Programmes under Directive (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants**

(2019/C 77/01)

**Glossary**

<b>Term or acronym</b>	<b>Meaning or definition</b>
AAQD	Ambient Air Quality Directives
BC	Black Carbon
CAP	Common Agricultural Policy
CLRTAP	Convention on Long-range Transboundary Air Pollution
EEA	European Environment Agency
EFs	Emission Factors
EMEP	European Monitoring and Evaluation Programme
E-PRTR	European Pollutant Release and Transfer Register
EU	European Union
GAINS	Greenhouse Gas-Air Pollution Interactions and Synergies model <sup>(1)</sup>
GHG	Greenhouse Gas
IED	Industrial Emissions Directive (Directive 2010/75/EU of the European Parliament and of the Council <sup>(2)</sup> )
IIASA	International Institute for Applied Systems Analysis
IIR	Informative Inventory Report
MRR	Regulation (EU) No 525/2013 of the European Parliament and of the Council <sup>(3)</sup> on a Mechanism for Monitoring and Reporting (MRR) greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change
NAPCP	National Air Pollution Control Programme
NECD	National Emission Ceilings Directive (Directive (EU) 2016/2284 of the European Parliament and of the Council <sup>(4)</sup> )
NFR	Nomenclature for Reporting
NH <sub>3</sub>	Ammonia
NMVO	Non-methane volatile organic compounds
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
O <sub>3</sub>	Ozone
PaMs	Policies and Measures
PM	Particulate Matter
PM <sub>2.5</sub>	Fine Particulate Matter
RDP	Rural Development Programme
SEA	Strategic Environmental Assessment
SO <sub>2</sub>	Sulphur Dioxide
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
WAM	With additional measures
WM	With measures

**DISCLAIMER:**

*This guidance document is intended to assist national authorities in the preparation of national air pollution control programmes. It reflects the views of the European Commission and as such is not legally binding. The binding interpretation of EU legislation is the exclusive competence of the Court of Justice of the European Union (CJEU). The views expressed in this guidance document cannot prejudge the position that the Commission might take before the CJEU.*

<sup>(1)</sup> Run by the International Institute for Applied Systems Analysis (IIASA).

<sup>(2)</sup> OJ L 334, 17.12.2010, p. 17

<sup>(3)</sup> OJ L 165, 18.6.2013, p. 13.

<sup>(4)</sup> OJ L 344, 17.12.2016, p. 1.

## 1. INTRODUCTION

Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, also called the new National Emission Ceilings Directive (NECD) — (referred to in this document as ‘the Directive’) <sup>(5)</sup> is designed to further reduce air pollution and its associated risks to the environment and human health (Article 1). The Directive includes, for each Member State, future reduction commitments for nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), ammonia (NH<sub>3</sub>), non-methane volatile organic compounds (NMVOC), and fine particulate matter (PM<sub>2.5</sub>) emissions. Compliance with these commitments is also expected to contribute to the Union’s long-term objective of achieving levels of air quality in line with the air quality guidelines of the World Health Organisation (WHO).

Articles 6 and 10 of the Directive require Member States to establish, by 1 April 2019 at the latest, an initial National Air Pollution Control Programme (NAPCP) which must be regularly updated, at least every four years (‘NAPCP updates’). The content of the NAPCP is stipulated by the Directive principally in Article 6 and Annex III Part 1. In accordance with Article 6(10) of the Directive, the Commission has specified the format of the NAPCPs in Commission Implementing Decision (EU) 2018/1522 <sup>(6)</sup>. This guidance, developed in accordance with Article 6(9) of the Directive, aims to support Member States in developing the initial NAPCP to be submitted to the Commission by 1 April 2019. It addresses the format of the NAPCP, the monitoring of progress in its implementation, the consultations on the NAPCP and its dissemination in four corresponding chapters. A toolkit to support consideration and selection of additional policies and measures to comply with emission reduction commitments is set out in the appendix. This guidance may be amended as necessary to support the updates of NAPCPs.

## 2. COMMON FORMAT FOR THE NATIONAL AIR POLLUTION CONTROL PROGRAMME

### Layout of this chapter

For ease of use, this chapter follows the numbering of the sections of the NAPCP format set out in the annex to Commission Implementing Decision (EU) 2018/1522. The mandatory minimum content for each section of the format, as well as further optional content, is outlined within the relevant section of this chapter in grey shaded boxes with headings in bold, as follows:

#### **Requirements under the NAPCP format**

The content for each requirement is outlined within the relevant section. The format sets out the minimum content specified in Article 6 and Annex III to the NECD as **mandatory content**, distinguishing where information is required **where appropriate or relevant** only. It also includes further **optional content**. Member States are encouraged to provide the optional content while keeping the flexibility to develop and provide data that is most useful and appropriate for their respective policies and priorities.

### 2.1. Title of the programme, contact information and websites

This section of the format is self-explanatory and no further guidance is provided.

### 2.2. Executive summary

This section of the format is self-explanatory and no further guidance is provided.

### 2.3. The national air quality and pollution policy framework

#### 2.3.1. Policy priorities and their relationship to priorities set in other relevant policy areas

See Article 6(1) and(2), and Annex III, Part 1 (1)(a)(i)

The policy context for the initial NAPCP must clearly define policy objectives and priorities for the programme. These should reflect the emission reduction commitments for each Member State stipulated in Annex II to the NECD.

When defining the policy context, Member States should recognise the wider EU air quality challenges resulting from NO<sub>x</sub> and PM emissions, as well as specific sectoral challenges for air quality arising from agricultural production with respect to NH<sub>3</sub> and PM<sub>2.5</sub> emissions.

<sup>(5)</sup> Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December on the reduction of national emissions and of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\\_.2016.344.01.0001.01.ENG](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.344.01.0001.01.ENG)

<sup>(6)</sup> Commission Implementing Decision (EU) 2018/1522 of 11 October 2018 laying down a common format for national air pollution control programmes under Directive (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants (OJ L 256, 12.10.2018, p. 87). <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1542283677547&uri=CELEX:32018D1522>

### 2.3.1 Policy priorities and their relationship to priorities set in other relevant policy areas

#### **Mandatory content:**

The content for this section includes:

- a) The national policy objectives and priorities for the NAPCP.
- b) The national emission reduction commitments (by NECD pollutant, for 2020-2029 and for the period from 2030): as a percentage reduction from the 2005 base year emissions, as stipulated by the Directive.
- c) The air quality priorities: National policy priorities in relation to EU or national air quality objectives (limit values for air quality concentrations, target values and exposure concentration obligations (?)). Purpose is to identify challenges and provide/extract information related to key air quality pollutants.  
Member States may also refer to the WHO recommended limits as an indication of long-term air quality objectives.
- d) The climate change and energy policy priorities: National Energy and Climate Plans with non-ETS GHG reduction target; Renewable Energy Sources objective; Energy Efficiency objective, identifying reduction targets for 2020 and 2030 — and 2050 where available, and Member State challenges with meeting them.
- e) When appropriate, identify additional other relevant policies and the respective priorities relevant to the NAPCP, e.g. Rural Development Programmes under the European Agriculture Fund for Rural Development.

### 2.3.2. Responsibilities attributed to national, regional and local authorities

See Annex III, Part 1 (1)(a)(ii)

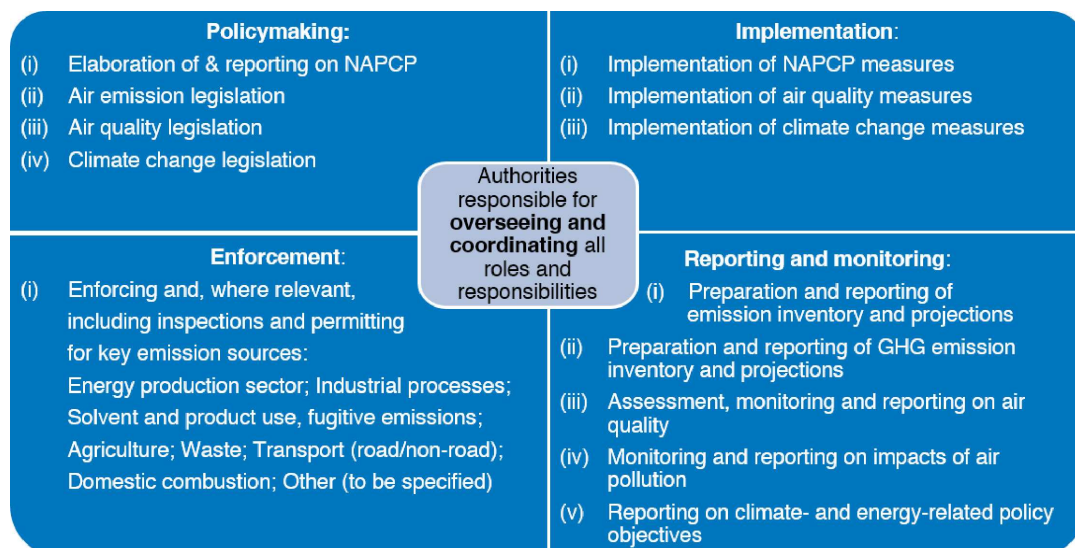
Member States shall identify the relevant governmental agencies, ministries and regional or local authorities involved in the elaboration and implementation of the NAPCP and shall set out the attributed responsibilities accordingly (Annex III, Part 1 (1)(a)(ii)).

The attribution of responsibilities should consider how best to ensure that local and sectoral concerns are adequately understood and reflected in the design and implementation of the NAPCP. Authorities across different policy areas and sectors have to be involved in the elaboration and implementation of the NAPCP and they and their roles should be reflected. This includes, for example, the interaction between the policymaking and implementation roles of authorities responsible for air quality and climate change. While involvement of a wide range of authorities is expected to be required, in most cases the national government authority should take overall responsibility for the policymaking.

If possible, the NAPCP should cover the attribution of the roles and responsibilities set out in the figure below.

Figure 1

#### **Roles and responsibilities associated with the elaboration and reporting of the NAPCP**



(?) See also the definition of 'air quality objectives' in Article 3.4 of the Directive.

Additional responsibilities may be relevant in different Member States and these should be listed in the NAPCP accordingly along with the responsible national, regional or local authorities/agencies in charge.

It is also important to consider scale when attributing responsibilities to authorities. The level of authority required may vary depending on the nature of the responsibility; for example, national authorities are generally considered more appropriate in the preparation of the NAPCP while local authorities are typically more involved with the implementation of measures and enforcement (particularly from an air quality perspective). In addition, Member States should identify which authority is responsible for overseeing and coordinating all roles and responsibilities, although, unless there are compelling reasons to the contrary, this would usually be the national competent authority, i.e. the government of the Member State.

### **2.3.2. Responsibilities attributed to national, regional and local authorities**

#### **Mandatory content:**

— A description of the type, and where appropriate the name, of the respective authority, the scale at which it operates (i.e. national, regional, local) and their attributed responsibilities in the areas of air quality and air pollution.

#### **Optional content:**

— Identification of source sectors under the responsibility of the listed authorities;

Authorities across different policy areas and sectors have to be involved in the elaboration and reporting of the NAPCP and they and their roles would be reflected in the information provided here. This includes, for example, the interaction between the policymaking and implementation roles of authorities responsible for air quality and climate change.

### **2.4. Progress made by current Policies and Measures (PaMs) in reducing emissions and improving air quality, and the degree of compliance with national and Union obligations, compared to 2005**

See Articles 6(1), (2)(a) and Annex III, Part 1 (1)(a)(iii) and Part 2

#### **2.4.1. Progress made by current PaMs in reducing emissions, and the degree of compliance with national and Union emission reduction obligations**

For existing measures designed to contribute towards the achievement of the NECD emission reduction commitments, the achieved impact of the measure should be expressed in terms of the reduction in emission that has been delivered over a given timescale up to date.

As required by the Directive, good quality emission inventories should be available at the national level supported by spatially disaggregated inventory data, on which this section could be based.

Emission reduction measures targeting NH<sub>3</sub>, PM<sub>2,5</sub> and black carbon in the agricultural sector set out in Part 2 of Annex III to the NECD, as well as measures having equivalent effect (Article 6(2), last sentence), that Member States have already put in place should also be reported in this section. To that end Member States might include a table equivalent to the table set out in section 2.6.4 of the format by which additional measures from Part 2 of Annex III to the NECD are to be reported.

#### **2.4.2. Progress made by current PaMs in improving air quality, and the degree of compliance with national and Union air quality obligations**

There are a number of factors that influence the relationship between air pollutant emissions and concentrations, including meteorology, topography and atmospheric chemistry. However, this relationship can be better understood with the aid of modelling.

Historic trends in selected air pollutant concentrations should be provided in different locations and types of location. Data should be available from national ambient air monitoring networks.

An *ex post* review of the progress made by adopted PaMs will give an indication of whether they have been as effective as initially estimated, and provides information on 'lessons learned' with regards to barriers and solutions identified. These backward-looking assessments are intended to be undertaken after implementation of a policy or measure and based on data collected during the time the PaM was implemented.

Understanding the successes and shortcomings of historic PaMs from *ex post* analysis provides valuable information in designing future PaMs. However, it can be challenging to accurately determine the extent to which details (such as speed of roll-out, level of ambition, conflict with emerging priorities, information dissemination etc.) were each instrumental in the level of policy success, as well as disaggregating the impacts of multiple policies on a single sector and/or pollutant.

Various studies have looked at methods for undertaking *ex post* analysis and generally a fairly bespoke approach is required for each PaM. Designing and integrating appropriate indicators for tracking progress and impacts of individual PaMs prior to their implementation can support future *ex post* evaluations.

For additional guidance on how to assess and report the impacts of past, current and planned measures on air quality along with examples of maps and histograms, see section 6.1.

#### 2.4.3. *Current transboundary impact of domestic emission sources*

The overall impact of national emissions from one Member State on concentrations in another was taken into account in the design of the national emission reduction commitments in Annex II to the NECD. Thus, measures taken to achieve the reduction commitments will normally contribute to the reduction of transboundary pollution (see for example the TSAP 12 Report <sup>(8)</sup> for the expected impact of the NECD on the proportion of PM<sub>2,5</sub> concentrations derived from transboundary emissions).

Impacts can be reported in quantitative or qualitative terms.

Where a qualitative assessment is made, it should outline the pollutants affected, the timeframe for action and estimated progress made — such information can be sourced from any joint air quality plan, as established under Article 25 of the AAQD.

Where a quantitative assessment is made, Member States are invited to specify the data and the methodology used.

### 2.4. The progress made by current PaMs in reducing emissions and improving air quality, and the degree of compliance with national and Union obligations

#### Mandatory content:

The content for this section includes complete references to supporting publically available datasets along with a description of current progress achieved, as follows:

- a) Progress made by current PaMs in reducing emissions, and the degree of compliance with emission reduction legislation.
- b) Progress made by current PaMs in improving air quality, and the degree of compliance with national and Union obligations in terms of the number of compliant air quality zones <sup>(9)</sup> out of all zones, including by means of providing a reference to existing data.
- c) Where relevant, describe the current transboundary impact of domestic emission sources. Progress may be reported in quantitative or qualitative terms.

#### Optional content:

When reporting current progress for improvements to air quality including maps or histograms of current ambient air concentrations for AAQD pollutants, that can show, for instance, the number of zones (out of all zones) in non-compliance in a base year and currently, is helpful.

Where problems are identified in (an) air quality zone(s), a description of how progress was made in reducing the maximum concentrations can be reported.

### 2.5. Projected further evolution assuming no change to already adopted PaMs

See Article 6(1) and Annex III, Part 1 (1)(a)(iv)

#### 2.5.1. *Projected emissions and emission reductions (WM scenario)*

Emission inventories and projections should be used to assess air emission reductions related to PaMs and provide detail on emission reductions for 'with measures' (WM) scenario assessments. They provide an indication of the extent to which a Member State is projecting compliance with emission reduction commitments on the basis of currently adopted PaMs, or whether there remains a compliance gap that requires the introduction of additional PaMs.

<sup>(8)</sup> [http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/TSAP\\_12\\_final\\_v1.pdf](http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/TSAP_12_final_v1.pdf)

<sup>(9)</sup> In line with the definition set out in the AAQD, 'zone' shall mean part of the territory of a Member State, as delimited by that Member State for the purposes of air quality assessment and management.

In line with the UNECE reporting guidelines for reporting under the CLRTAP (2015) <sup>(10)</sup> and Chapter 8 of the EMEP/EEA Guidebook 2016, the WM scenario represents the events or conditions most likely to occur with 'currently implemented and adopted PaMs'. It does not include PaMs (or a package of PaMs) that are being assessed for future implementation. The WM scenario should also incorporate recently adopted (source-based air pollution control) EU legislation, even if not implemented yet <sup>(11)</sup>.

### Definition of implemented and adopted PaMs

Implemented PaMs (Para 11; UNFCCC, 2016; as quoted in Chapter 8 of the EMEP/EEA Guidebook 2016):

- a) national legislation is in force;
- b) OR one or more voluntary agreements have been established;
- c) OR financial resources have been allocated;
- d) OR human resources have been mobilised.

Adopted PaMs: an official government decision has been made and there is a clear commitment to proceed with implementation (Para 11; UNFCCC, 2016; as quoted in Chapter 8 of the EMEP/EEA Guidebook 2016).

This WM or 'baseline' scenario depends on assumptions related to key emission drivers over the assessment period. Drivers include other policies or actions that have been implemented or adopted, as well as non-policy drivers, such as economic conditions, projected fuel use and energy prices, and technological development. The drivers and assumptions used should be aligned with those used to determine the GHG projections in the Climate and Energy Plans context. When estimating 'baseline' emissions, at a minimum all sources expected to change between the WM scenario and the 'With Additional Measures' (WAM) scenario should be estimated.

Data needs for projecting the evolution of emissions: The following metrics should be considered when assessing the future evolution of emissions: projected trends in emissions based on adopted PaMs, the emissions savings under different scenarios, and any defined targets.

This will require a range of datasets and preferably modelling tools, but also expert-judgement-based assumptions for specific activity datasets (as is already done for some sectors when data is not available to calculate climate projections), appropriate emission factors (based on representative samples and measurements), information on the share of activity controlled by a given PaM (and associated costs). Furthermore, the projections will need to be compiled at a detailed enough level to be able to quantify the impact of specific policy interventions.

Extensive guidance and literature has already been developed on these topics within the greenhouse gas emissions technical area <sup>(12)</sup>, and it is sensible not only to draw from this, but also to ensure consistency between the two technical areas.

For additional guidance on how to assess and report the impacts of past, current and planned measures on air quality along with examples of maps and histograms, see section 6.1.

#### 2.5.2. Projected improvement in air quality (WM) and degree of compliance

To support the consideration and selection of PaMs which would be most beneficial for air quality, it is important to consider and link projections of the NECD pollutants with projected concentration trends of key pollutants under the AAQD.

Projected concentrations can be derived from the projected emissions through use of atmospheric dispersion modelling, although this requires some detailed considerations and typically involves also modelling emission sources not regulated by the NECD (e.g. international shipping or emissions from third countries).

Modelling capability to assess impacts of national level policies and measures on air quality may not always exist in a Member State, or may exist only for selected pollutants (e.g. PM<sub>2.5</sub>, ozone).

<sup>(10)</sup> See paragraph 13 for guidance on how to define the WM scenario: <https://www.unece.org/fileadmin/DAM/env/documents/2015/AIR/EB/English.pdf>

<sup>(11)</sup> See for a full overview of EU source-based air pollution control legislation: <http://ec.europa.eu/environment/air/reduction/legislation.htm>

<sup>(12)</sup> [https://ec.europa.eu/clima/policies/strategies/progress/monitoring\\_en](https://ec.europa.eu/clima/policies/strategies/progress/monitoring_en)

Where modelling of the air quality impacts under the WM scenario cannot be conducted, the initial NAPCP should include the following information:

- For the zones non-compliant with air quality limit values at the time of NAPCP elaboration, Member States should estimate, based on justified information, the year these zones are expected to come into compliance under already adopted PaMs, and estimate the maximum concentrations of concerned pollutants in these zones. This information should be readily available from the air quality plans established for these zones under the AAQD across all Member States. If this is the case, a web-link to the publicly available information can be provided.
- Evidence from any existing studies that zones compliant with the AAQD at the time of NAPCP elaboration could become non-compliant with the limit values in the future years (e.g. concentrations of pollutants in these zones are expected to increase in the future years under current PaMs).

This information should be used by Member States to estimate how many zones are expected to be non-compliant with the AAQD limit values in 2020, 2025 and 2030 under already adopted PaMs.

For additional guidance on how to assess and present the impacts of past, current and planned measures on air quality along with examples of maps and histograms, see Appendix 1.

Member States who project compliance with some or all of their emission reduction commitments on the basis of the WM projections may also decide to include additional PaMs in the NAPCP to contribute to other objectives specified in Article 1(2), though not required by the NECD.

For example, if the NECD emission reduction commitment for PM<sub>2.5</sub> is expected to be met under the WM scenario but some air quality zones are expected to remain non-compliant with the PM<sub>2.5</sub> or PM<sub>10</sub> AAQD limit values, Member States are encouraged to use the NAPCP as a tool to introduce additional PaMs to help meet their AAQD obligations.

Even if a Member State is compliant with all EU legal obligations, it may wish to use the NAPCP to pursue further action towards the long-term objective of the 7<sup>th</sup> EAP of no significant risk to human health and the environment, including achieving the WHO guideline values for air pollution.

## 2.5. Projected further evolution assuming no change to already adopted PaMs

### **Mandatory content:**

#### Projected emissions and emission reductions (WM scenario)

To demonstrate projected attainment of emission reduction commitments under a WM scenario, the content for this section includes the following information at NAPCP level:

- a) National emission reduction commitments (as reported in the Directive)
- b) Emissions (kt), for the 2005 base year, for the latest inventory year used for the development of projections, and projected emissions for 2020, 2025, and 2030
- c) Projected progress (emission reductions as a percentage of the base year 2005 emissions) for 2020, 2025 and 2030 to compare with emission reduction commitments

#### Projected improvement in air quality (WM scenario)

To demonstrate projected improvement in air quality under a WM scenario, the content for this section includes:

- qualitative projected improvement in air quality (WM) and degree of compliance by 2020, 2025 and 2030

### **Optional content:**

#### Uncertainties for projected emissions to air (WM):

- An outline of the associated uncertainties for the WM projections to meet the emission reduction commitments for 2020, 2025 and 2030 onwards.

#### Projected improvement in air quality (WM):

- Projected number of non-compliant and compliant air quality zones for the years 2020, 2025, and 2030.

## 2.6. Policy options considered to comply with the emission reduction commitments for 2020 and 2030, intermediate emission levels for 2025

See Article 6(1) and (2), Annex III Part 1(b), (c) and (d), Annex III Part 2

This section covers consideration of policy options and the selection of additional (planned) PaMs to comply with the emission reduction commitments for 2020 and 2030, and the intermediate emission levels for 2025, and to contribute to further improving air quality. Note that the term 'policy options' is used here and in the Commission Implementing Decision establishing the NAPCP format because this is the term used in Annex III Part 1, point 1(b) of the Directive. However, the term is used interchangeably with the term 'policies and measures' elsewhere in this guidance.

Consideration of additional policy options (PaMs) is most relevant for Member States that projected non-compliance or risk of non-compliance with one or more of the emission reduction commitments on the basis of the WM projections.

Member States who project compliance with all of their emission reduction commitments on the basis of the WM projections may also decide to include additional PaMs in the NAPCP to contribute to achieving other objectives specified in Article 1(2) of the Directive. These are:

- the air quality objectives (including long-term objectives) specified in the national, EU and international policies and guidelines;
- the Union's biodiversity and ecosystem objectives in line with the 7<sup>th</sup> EAP; and
- enhanced synergies between the Union's air quality policy and other Union policies, specifically related to climate and energy.

Even if a Member State is compliant with all EU legal obligations, it may wish to use the NAPCP to pursue further action towards the long-term objective of the 7<sup>th</sup>EAP of no significant risk to human health and the environment, including achieving the WHO guideline values for air pollution.

Key requirements informing the consideration and the selection of additional PaMs, as specified in the Directive, include:

- a) policy options considered to comply with the emission reduction commitments and intermediate emission levels (Annex III, Part 1, point 1(b));
- b) prioritisation of emission reduction measures for black carbon when taking measures to reduce PM<sub>2.5</sub> (Article 6.2(c));
- c) uptake of additional measures for agriculture (Annex III, Part 2);
- d) consultation with the public and competent authorities (Article 6(5));
- e) transboundary consultation on additional PaMs where relevant (Article 6(6));
- f) projected individual or combined impacts of the PaMs on emission reductions, where available on air quality in own territories and neighbouring Member States and on the environment, as well as the associated uncertainties (Article 6(2)(a); Annex III, Part 1, point 1(b));
- g) initial NAPCP dissemination (Article 14(1)).

### The 'Policies and Measures web-tool':

The information required under section 2.6 of the format shall be reported using the 'Policies and Measures web-tool' ('PaM tool') available on the EEA web-site.

A separate manual will be provided by the EEA which will explain the use of the PaM tool.

#### 2.6.1. The policy options considered to comply with the emission reduction commitments

The process for evaluating and selecting additional PaMs for inclusion in the NAPCP is set out below.

##### Step 1: Prioritise pollutants and key emission sources

Additional PaMs are required for those pollutants for which Member States project non-compliance or the risk of non-compliance with their emission reduction commitments. In addition, Member States may wish, at their own discretion, to use the NAPCP to pursue action on other pollutants in order to achieve compliance with other EU obligations or progress towards the 7<sup>th</sup> EAP objectives.

For each pollutant selected in the NAPCP, key sources contributing to emissions of the selected pollutant should be identified. Sectors may in addition be prioritised for action based on further criteria such as:

- Sectors known to be contributing to exceedances of air quality limit values:
  - For point emission sources this should consider their geographical location and whether they are located in zones non-compliant with the AAQD. National spatially disaggregated emission inventories and large point source inventories (E-PRTR) could provide supporting data for this analysis.
  - For diffuse emission sources, such as road transport, this should consider contribution of the emissions from the sector across the zones non-compliant with the AAQD limit values using source apportionment data for the zones.
- Sectors that contribute to emissions of more than one shortlisted pollutant for which non-attainment of emission reduction commitments are projected.

#### *Step 2: Identify available additional PaMs*

For each sector, the WAM scenario should first consider those PaMs planned for implementation to improve air quality, and under the climate and energy obligations or other related policies (e.g. transport, agriculture, industrial emissions). In addition, Member States should consider whether any PaMs beyond environmental policy could impact on the NAPCP, for instance by affecting the feasibility of introducing additional measures. Examples include PaMs and plans and programmes targeted at improving international competitiveness of industry, ensuring energy or food security, developing infrastructure etc.

If the PaMs identified are not sufficient to achieve the defined emission reduction commitments, Member States should identify additional PaMs. Examples of potential PaMs are listed in the section 6.2. Performance of these measures in terms of emission reductions achieved and the most suitable administrative level at which they should be implemented (national, regional or local) depend on the specific circumstances of the Member State, including its policy and administrative framework and the extent to which these measures have already been adopted and implemented.

When identifying PaMs, Member States should consider lessons learnt from the implementation of measures under Directive 2001/81/EC<sup>(13)</sup>. In particular, in case of non-compliance with one or more of the 2010 ceilings, Member States should take into account reasons for such failure, and identify and address shortcomings in PaMs adopted to date.

The analysis done by IIASA in the context of the Clean Air Outlook<sup>(14)</sup>, and the sensitivity analysis summarised in the document 'Methodological and technical information underpinning the Presidency proposal for a revised Annex II'<sup>(15)</sup> on the national emission reduction commitments, can provide useful reference points for the identification of additional measures. Moreover, the optimisation-based modelling used in the IIASA analysis is a technique that Member States may wish to consider applying. It should be borne in mind, however, that the Member States will of course have a much broader range of measures open for consideration, as the GAINS model<sup>(16)</sup> used for the Clean Air Outlook only considered available technical measures and did not include structural changes.

#### *Step 3: Evaluate identified additional PaMs and delivery mechanisms*

When evaluating the impacts of individual PaMs on emission reductions and their costs, it is important to consider co-benefits across different pollutants and sectors. A number of measures listed in section 6.2 would have an impact on more than one pollutant.

A range of tools and methods are available to assist Member States in their decision-making on the selection of additional PaMs.

The European Commission's Better Regulation Toolbox, though not directly addressed to Member States, provides a useful general reference, and examples of analytical methods for impact assessments, stakeholder consultations and

<sup>(13)</sup> Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (OJ L 309, 27.11.2001, p. 22).

<sup>(14)</sup> [http://ec.europa.eu/environment/air/clean\\_air/outlook.htm](http://ec.europa.eu/environment/air/clean_air/outlook.htm)

<sup>(15)</sup> <http://data.csisilium.europa.eu/doc/document/ST-11265-2016-INIT/en/pdf>

<sup>(16)</sup> <http://www.iiasa.ac.at/web/home/research/researchPrograms/air/GAINS.html>

analytical methods to compare options or assess performance <sup>(17)</sup> as well as methods to assess costs and benefits which can be useful. Examples of analytical methods for determining additional PaMs required to meet emission reduction commitments are described in section 6.3.

When evaluating PaMs, Member States should consider how each PaM could be implemented, through which delivery mechanisms and whether there exists any constraints that undermine its feasibility. These considerations include:

- Does any existing legislation impede implementation of the PaM in any way?
- At what level should the measure be implemented — national, regional or local level? This could also consider whether any potentially cost-effective measures should be referred for discussion to the EU level.
- Which instrument would be best suited for the implementation of the PaM (regulatory, non-regulatory, economic instruments, information sharing)?
- Who will be responsible for implementation and enforcement of the PaM?
- When are the emission reductions associated with the PaM planned to be attained?
- How will the PaM be financed?
- How will progress in implementation of the PaM be monitored? What indicators will be used and what intermediate targets should be put in place?

#### *Step 4: Prioritise PaMs*

Independently from the choice of the evaluation method, in line with the requirements of the Directive, when selecting PaMs for inclusion in the NAPCP, Member States shall:

- take into account, when prioritising them, whether the PaMs have a positive impact on air quality and would contribute to achieving compliance with air quality objectives in their territories and in neighbouring Member States (Article 6(2)(a) and (b)). In so doing Member States should take into account best practices in addressing the most harmful pollutants with respect to sensitive population groups (recital 20).
- prioritise PaMs which reduce black carbon, when considering measures for abatement of PM<sub>2,5</sub> emissions (Article 6(2)(c)). The main sectors which contribute to PM<sub>2,5</sub> emissions (e.g. domestic solid fuel combustion, road transport and non-road mobile machinery) are also those which contribute most to black carbon emissions.

In selecting measures, Member States should consider the scope for shifting investment to clean and efficient technologies (recital 24). Other things being equal, it would be natural to prioritise those PaMs that contribute to attaining emission reduction commitments for more than one pollutant. Measures which do not have a direct impact on emissions but enable successful implementation of other measures may also be required (e.g. changes to the legal framework).

Next to the results obtained through the evaluation process (step 3), the final decision on which PaMs to adopt will be influenced by social and political factors which may not be fully captured by the methods described in this guidance. However, Member States could shape the evaluation methodologies to account for these factors, possibly by including them as additional evaluation criteria. Where social or political acceptability is a potential problem, Member States are encouraged to identify options for more effective communication and cooperation with relevant stakeholders and for mitigation of the consequences for the most affected groups. Given the range of considerations to be taken into account, multi-criteria and SWOT analysis could be useful to prioritise measures for adoption in the NAPCP <sup>(18)</sup>. Examples of analytical methods supporting such prioritisation are set out in section 6.4.

Section 2.6.1 of the format covers both PaMs considered that have been selected and PaMs considered that have not been selected as the underlying reasons for discarding a PaM may be important for further analysis and as a PaM may become appropriate at a later stage. Since section 2.6.1 requires the quantification of the expected emission reductions of the PaMs considered, only the reporting of PaMs considered, but discarded that reached the stage of quantification, is mandatory. Member States are however free to include PaMs considered for which no quantification was undertaken.

<sup>(17)</sup> [https://ec.europa.eu/info/files/better-regulation-toolbox-57\\_en](https://ec.europa.eu/info/files/better-regulation-toolbox-57_en)

<sup>(18)</sup> Social acceptability can be one of the criteria used in a Multi-Criteria Analysis.

To facilitate the quantification of expected emission reductions of PaMs considered, those may also be assessed as a package of PaMs.

As regard the consultation of the public and competent authorities concerned during the process of evaluating possible measures, please see Chapter 4.

### 2.6.2. *Impacts on air quality and the environment*

Section 2.6.2 of the format allows Member States to provide information where available regarding the impacts of the additional PaMs on air quality and the environment. Section 2.5.2 of this guidance document provides more information on the assessment of air quality impacts, as does section 6.1.

### 2.6.3. *Estimation of costs and benefits*

Member States are encouraged to report projected cost-benefit estimates on a voluntary basis. Where done, this should be in line with reporting under the MRR to support climate mitigation, as follows:

- Costs in EUR per tonne of abated pollutant
- Absolute costs and benefits per year in EUR
- Qualitative description, and ratio, of the cost and benefit estimates
- Price year for the costs reported
- Year for which the estimates have been calculated

See also section 6.3.

## **2.6. Policy options (Policies and Measures) considered to comply with the emission reduction commitments for 2020 and 2030, intermediate emission levels for 2025**

Member States should conduct a comprehensive analysis of all additional PaMs considered in the development of their initial NAPCP. This analysis must

consider the period between 2020 and 2029, and 2030 onwards, and the intermediate emission levels determined for 2025.

This analysis will form the evidence which will enable Member States to evaluate the most appropriate PaMs for selection in their initial NAPCP.

### **Details concerning the PaMs considered to comply with the emission reduction commitments, and impacts on air quality and the environment**

#### **Mandatory content:**

This section is designed to maximise synergies with reporting under the Monitoring and Reporting Regulation (MRR). It includes the following information (information concerning impacts should ideally be at PaM level or by PaM package):

- a) Details concerning the additional PaM (including the name and a brief description)
- b) Affected NECD pollutant(s) for 2020, 2025 and 2030
- c) Objectives of individual PaM/package of PaMs
- d) Type of PaMs
- e) Primary sector affected and additional sector(s) affected
- f) Implementation period (mandatory only for measures selected for implementation)
- g) Authority responsible for implementation (mandatory only for measures selected for implementation)
- h) Details of the methodology/model(s) used to determine estimates
- i) Quantified expected emission reductions for individual PaM/package of PaMs
- j) Where available, description of uncertainties
- k) Where available, impacts on air quality and the environment of the different packages of PaMs considered for inclusion in the NAPCP.

#### **Optional content:**

Estimation of costs and benefits

### 2.6.4. *Additional details for policy options targeting agriculture*

Section 2.6.4 of the format is dedicated specifically to those measures listed in Annex III Part 2 of the Directive that constitute 'additional measures'. If relevant, it should be indicated what modifications have been made to any of those measures. Those measures in Annex III Part 2 that have already been implemented or adopted should be included in section 2.4.

#### 2.6.4. Additional information for policy options targeting agriculture only

##### **Mandatory content:**

— Provide additional information pertaining to the mandatory measures listed in Annex III, Part 2 of the Directive.

##### **Optional content:**

— Provide additional information pertaining to the optional measures listed in Annex III, Part 2 of the Directive or equivalent measures as per Article 6(2), last sentence of the Directive.

### 2.7. The policies selected for adoption by sector, including a timetable for their adoption, implementation and review and the competent authorities responsible

#### 2.7.1. Individual PaMs or packages of PaMs selected for adoption and the competent authorities responsible

Based on the results of the analysis of effectiveness of measures in reaching emission reduction commitments, costs and feasibility of implementation, prioritisation and response to the consultation process, Member States should select the most promising PaMs for inclusion in the NAPCP and provide the information identified in the box below.

Feedback received from the consultation relevant for the selection or design of PaMs may be set out in the NAPCP. Member States are furthermore encouraged to specify interim targets and indicators for monitoring the implementation of the selected PaMs with a view to sharing best practise.

#### 2.7.1. PaMs selected for adoption, and the competent authorities responsible

##### **Mandatory content:**

Based on the outcome of the analysis undertaken previously, Member States are required to report information on the additional PaMs selected for inclusion in the NAPCP, as follows:

At the level of individual PaM or package of PaMs:

- a) Name and brief description of the PaM/package
- b) Planned year for adoption and timetable for implementation (year(s))
- c) Planned timetable for review (year)
- d) Competent authorities responsible for implementing and regulating the PaM

##### **Optional content:**

- a) Relevant comments arising from the consultation in relation to the individual PaM or package of PaMs
- b) Information on interim targets and indicators selected to monitor progress in implementation of the selected PaMs — see chapter 3 for more detail on this content and how it may be elaborated.

#### 2.7.2. Explanation of the choice of selected PaMs and an assessment of how selected PaMs ensure coherence with plans and programmes set up in other relevant policy areas

Once the additional PaMs have been selected for inclusion in the initial NAPCP, Member State authorities should conduct an overarching coherence assessment to ensure the NAPCP is coherent with other plans and programmes set up in other relevant policy areas, in line with Article 6(2)(d) and Annex III Part 1 point 1(f) of the Directive. The aim of

ensuring coherence in planning and programming is to identify and maximise potential synergies, as well as to avoid that conflicting PaMs are adopted under different policy areas. Coherence includes for example assessing the potential impacts of PaMs on climate policy in terms of GHG emissions or energy consumption.

Article 6(2)(b) mentions the particular need for coherence with air quality objectives. To this end the format differentiates between coherence with air quality objectives and coherence with other relevant plans and programmes established on the basis of national or Union legislation. Article 6(2)(b) of the Directive requires that Member States take account of the need to reduce air pollutant emissions for the purposes of reaching compliance with air quality objectives. These are defined in Article 3(4) as the limit values, target values and exposure concentration obligations for air quality set out in the relevant EU Directives. <sup>(19)</sup> Coherence assessment should normally cover at least PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and O<sub>3</sub>, as well as any other air quality objective for which the Member State is in non-compliance. When choosing PaMs under the NAPCP, care should be taken to consider their impact on air quality. For example, reducing NO<sub>x</sub> from remote power stations may do little for urban concentrations of NO<sub>2</sub>, despite exposure being greater in urban areas.

To fulfil the requirement of Article 6(2)(d), Member States must co-ordinate, to the extent feasible, the development of their NAPCP and associated emission inventories and projections with other relevant national plans and programmes, such as those related to the key sectors that emit pollutants regulated under the NECD, including agriculture, industry and transport.

The initial NAPCP should also ensure coherence with the draft Integrated National Energy and Climate Plans due to be submitted by Member States to the Commission under Regulation (EU) 2018/1999 of the European Parliament and of the Council <sup>(20)</sup> on the Governance of the Energy Union.

Member States are encouraged to develop 'With Additional Measures' (WAM) emission projections that would first take account of all PaMs planned for implementation under the draft and final Integrated National Energy and Climate Plans, before proceeding to identification of additional measures in the context of the NECD.

To ensure coherence of the NAPCP with plans and programmes developed in other relevant policy areas Member States should:

1. Identify the related national or sub-national policies, plans, programmes and strategies which can affect the NECD (e.g. air quality, climate change, energy, agriculture and transport policies, plans and strategies), and assess what impacts they could have (both positive and negative) on the Member State's ability to meet emission reduction commitments under the NECD.

For example, fuel taxation policies may encourage greater uptake of diesel passenger cars which may result in increases in emissions of NO<sub>x</sub> and PM<sub>2.5</sub> regulated under the NECD. Similarly, some energy policies may encourage greater uptake of biomass for decentralised provision of heat and/or power in the domestic sector, which may bring emission sources closer to populated areas, impacting on local air quality and thus increasing human exposure to pollution compared to more centralised heat generation.

2. Where negative implications on the NECD are identified, consider whether or not the relevant policy objective can be met without negative consequences for the NECD objectives.

Alternative means to attain the relevant policy objective should be identified, as well as the scope for changing the plan in question (e.g. any upcoming formal reviews) and factors that may affect the acceptability of changes (social, economic and legal).

If the above analysis shows that it is not (yet) possible to address the negative impact at source, assess whether PaMs in the NAPCP can mitigate the negative impacts.

<sup>(19)</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L 152, 11.6.2008, p. 1) and Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (OJ L 23, 26.1.2005, p. 3).

<sup>(20)</sup> OJ L 328, 21.12.2018, p. 1.

3. When considering additional PaMs for inclusion in the NAPCP, identify how those could in turn affect other national or sub-national policies, plans and programmes.

For example, additional measures included in the NAPCP may positively contribute to GHG reduction objectives, such as subsidies to support purchase of low-emission vehicles in urban areas. Improved manure storage and spreading in agricultural sector may also contribute positively to the objectives of, for example, the Nitrates Directive.

Additional measures in the NAPCP which may impact negatively on other plans or programmes should be avoided if possible (e.g. where the adoption of certain combustion practices to reduce SO<sub>2</sub> can lead to increased volumes of alkaline waste going to landfill, such as in the case of fluidised bed combustion).

An indication of the policies/plans with which coherence should be considered is presented in Table 1. Whilst reference is made to EU legislation, it is clearly the national level implementation of this legislation and associated plans and programmes that are relevant (including implementation at regional and/or local level). Table 1 is not an exhaustive list and will be subject to change as plans and programmes become updated over time.

Table 1

**Potentially relevant key plans, programmes and reporting requirements by sector**

NFR sector	Potentially relevant plans, programmes and reporting requirements to consider
Energy production	EU Energy Union Strategy <sup>(21)</sup> — and associated national objectives for renewables, energy efficiency and GHG reductions. Coherence should be assessed against Member State Integrated National Energy and Climate Plans, as outlined in the Energy Union Governance Regulation.
Agriculture	Coherence should be achieved with the priorities established in Member State Rural Development Programmes (RDPs). Coherence should be assessed across all RDPs adopted by a Member State. RDPs and overview information can be accessed via the Commission's European Network for Rural Development <sup>(22)</sup> .
Waste	EU Circular Economy Strategy <sup>(23)</sup> — and associated national implications for recycling and reduced landfill.
Transport (road/non-road)	EU Strategy for Low Emission Mobility <sup>(24)</sup> — and associated national and sub-national implications for reducing transport emissions. National Policy Framework for the development of the market as regards alternative fuels in the transport sector under the Directive on the deployment of alternative fuels infrastructure <sup>(25)</sup> . EU Urban Mobility Package <sup>(26)</sup> for measures implemented at the level of cities
Other	Trans-national, national, regional and local air quality plans under the AAQD. EU Biodiversity Strategy and the Habitats Directive — where habitats are threatened by eutrophication <sup>(27)</sup> . River Basin Management Plans under the Water Framework Directive <sup>(28)</sup> . National nitrate action plans <sup>(29)</sup> . Integrated strategies for sustainable urban development <sup>(30)</sup> .

<sup>(21)</sup> <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union>

<sup>(22)</sup> [https://enrd.ec.europa.eu/home-page\\_en](https://enrd.ec.europa.eu/home-page_en)

<sup>(23)</sup> [http://ec.europa.eu/environment/circular-economy/index\\_en.htm](http://ec.europa.eu/environment/circular-economy/index_en.htm)

<sup>(24)</sup> <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52016DC0501>

<sup>(25)</sup> [https://ec.europa.eu/transport/themes/urban/cpt\\_en](https://ec.europa.eu/transport/themes/urban/cpt_en)

<sup>(26)</sup> [https://ec.europa.eu/transport/themes/urban/urban\\_mobility/ump\\_en](https://ec.europa.eu/transport/themes/urban/urban_mobility/ump_en)

<sup>(27)</sup> [http://ec.europa.eu/environment/nature/knowledge/rep\\_habitats/index\\_en.htm](http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm)

<sup>(28)</sup> [http://ec.europa.eu/environment/water/participation/map\\_mc/map.htm](http://ec.europa.eu/environment/water/participation/map_mc/map.htm)

<sup>(29)</sup> [http://ec.europa.eu/environment/water/water-nitrates/index\\_en.html](http://ec.europa.eu/environment/water/water-nitrates/index_en.html)

<sup>(30)</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R1301>

### 2.7.2. Explanation of the choice of selected measures and an assessment of how selected PaMs ensure coherence with plans and programmes set up in other relevant policy areas

#### **Mandatory content:**

Based on the outcome of the analysis undertaken previously, Member States are required to report on the coherence of the additional PaMs selected for inclusion in the NAPCP with air quality objectives and other national or Union requirements, as follows:

- Coherence with air quality objectives in own territories and, where appropriate, neighbouring Member States
- Coherence with other relevant plans and programmes established by virtue of the requirements set out in national or Union legislation.

#### **Optional content:**

- An explanation of the choice made among the measures considered under 2.6.1 to determine the final set of selected measures.

### 2.8. Projected combined impacts of PaMs ('With Additional Measures', WAM) on emission reductions, air quality and the environment, and the associated uncertainties

#### 2.8.1. *Projected attainment of emission reduction commitments*

The following combined impacts for all selected measures must be assessed quantitatively: Impact of all selected PaMs on emissions of each NECD pollutant for 2020, 2025 and 2030;

#### 2.8.2. *Non-linear trajectory for emission reductions*

Where projected emission reduction under the WAM scenario do not result in a linear trajectory between 2020 and 2030, Member States are required to provide supporting information that confirms that adopted measures will deliver the emission reduction commitments for 2030. This supporting information should highlight the analysis undertaken for emission reduction for the time series and explain why the reduction will not be delivered in a linear way. A non-linear trajectory is only acceptable in circumstances where there is evidence demonstrating that it is economically or technically more efficient, and does not affect the achievement of any reduction commitment for 2030 (Article 4(2)).

The Member State must also demonstrate that, from 2025 onwards, the non-linear trajectory converges with the linear trajectory to meet the same emission reduction commitments for 2030. Information on the projected trajectory of emission reductions, including status in 2025, should be included in the NAPCP proposals presented to the public for consultation in line with requirements of Article 6(5) of the Directive.

The grey line in Figure 2 below presents an example of a linear emission reduction trajectory between 2020 and 2030 emission reduction commitments. In the example presented, under the WAM emission projection scenario (dashed orange line), both the 2020 and 2030 commitments are attained, but emission reductions achieved between 2020 and 2030 do not follow a linear trajectory. The explanation would need to show why further measures to meet the linear trajectory ceiling in 2025 would entail disproportionate costs (Annex III Part 1, point 1(d)).

#### **Characterisation of 'disproportionate costs'**

Under the Water Framework Directive's Common Implementation Strategy, guidance has been prepared on exemptions to the environmental objectives. Specific attention is paid to 'disproportionate costs', see:

[http://ec.europa.eu/environment/water/water-framework/economics/pdf/Guidance\\_document%202020.pdf](http://ec.europa.eu/environment/water/water-framework/economics/pdf/Guidance_document%202020.pdf)

In the Commission's Report on the progress in implementation of the Water Framework Directive Programme of Measures of 2015, the interpretation of disproportionate costs by Member States is further commented on. See:

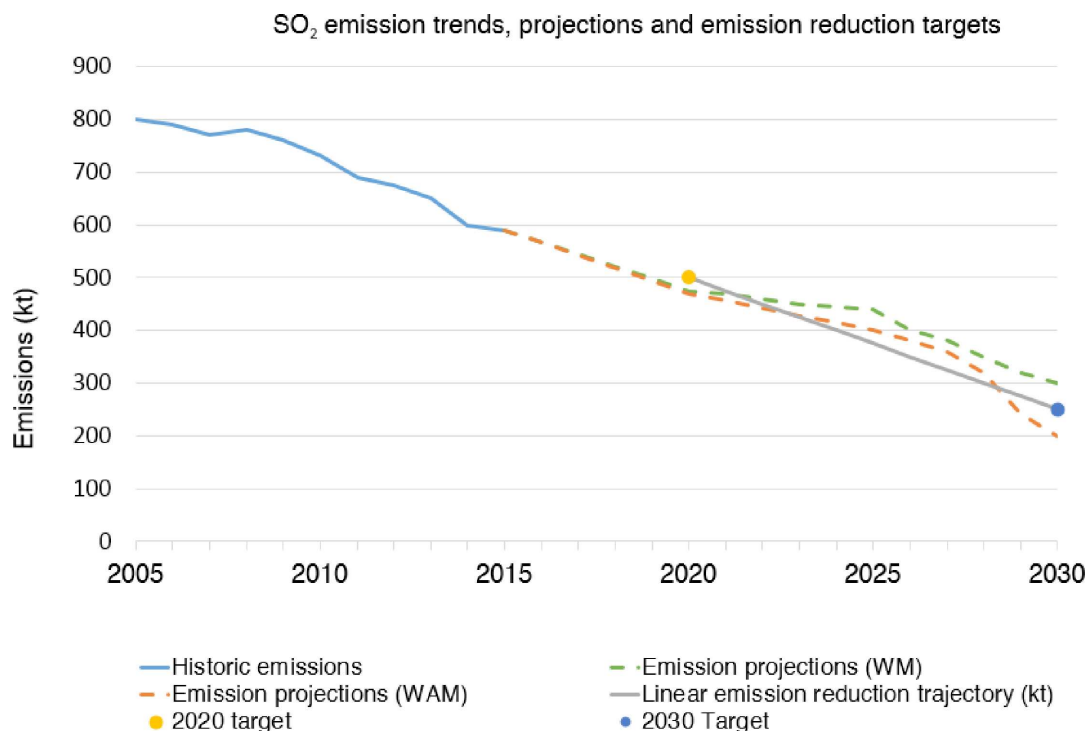
[http://ec.europa.eu/environment/water/water-framework/pdf/4th\\_report/CSWD%20Report%20on%20WFD%20PoMs.pdf](http://ec.europa.eu/environment/water/water-framework/pdf/4th_report/CSWD%20Report%20on%20WFD%20PoMs.pdf)

The recently concluded evaluation study supporting the Commission's Fitness Check of the Birds and Habitats Directives also provides insights on the interpretation of disproportionate costs. See:

[http://ec.europa.eu/environment/nature/legislation/fitness\\_check/docs/study\\_evaluation\\_support\\_fitness\\_check\\_nature\\_directives.pdf](http://ec.europa.eu/environment/nature/legislation/fitness_check/docs/study_evaluation_support_fitness_check_nature_directives.pdf)

Figure 2

Example of emission reduction scenario that does not result in a linear trajectory between 2020 and 2030



### 2.8.3. The use of flexibilities

See Annex III Part 1 (1)(e)

The Directive includes a provision to allow the use of flexibilities with respect to the reporting of national emission inventories in particular circumstances (see Article 5). For those flexibilities which already existed in the (revised) Gothenburg Protocol <sup>(31)</sup>, the conditions in the Directive are aligned with those already established under CLRTAP, although the Directive introduced some additional restrictions. In addition, the use of flexibilities requires annual approval by the European Commission.

The flexibilities set out in Article 5(2) and 5(4) of the Directive mainly apply to cases where exceptional circumstances result in unplanned non-compliance with emission reduction commitments, and so are not relevant when first formulating the NAPCP (but may be for later updates). However, the flexibility mechanism described in Article 5(3) is one that might be taken into account in planning:

*'If in a given year a Member State, for which one or more reduction commitments laid down in Annex II are set at a more stringent level than the cost-effective reduction identified in TSAP 16, cannot comply with the relevant emission reduction commitment after having implemented all cost-effective measures, it shall be deemed to comply with that relevant emission reduction commitment for a maximum of five years, provided that for each of those years it compensates for that non-compliance by an equivalent emission reduction of another pollutant referred to in Annex II.'*

A Member State satisfying the conditions in Article 5(3) which wishes to make use of the flexibility should ensure that the NAPCP includes measures which ensure that:

- the reduction commitment in question is complied with within five years;
- the excess is compensated for in each year for which it persists.

<sup>(31)</sup> <http://www.unece.org/environmental-policy/conventions/envlrtapwelcome/guidance-documents-and-other-methodological-materials/gothenburg-protocol.html>

#### 2.8.4. *Projected improvement in air quality*

To demonstrate projected improvement in air quality under a WAM scenario, Member States could set out the following elements:

- a) Projected number of non-compliant and compliant air quality zones (out of all zones) for the years 2020, 2025, and 2030;
- b) Projected maximum exceedances of air quality limit values and average exposure indicators for the years 2020, 2025, and 2030;
- c) Where quantitative data is not available, qualitative projected improvement in air quality (WAM) and degree of compliance.

Reporting of 'WAM' projections on air quality should preferably include maps showing the projected evolution of concentrations under the WAM scenario at least for the following pollutants: NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and O<sub>3</sub>, and for other AAQD pollutants for which a Member State faces significant problems. The use of histograms showing the projected evolution, under the WAM scenario, of the number of zones in non-compliance, the maximum national exceedance, and (for PM<sub>2.5</sub>) the average exposure indicator should also be considered. The histogram should include the total number of zones as a reference.

#### 2.8.5. *Projected impacts on the environment*

Where Member States include projected impacts of the WAM scenario on the environment for 2020, 2025 and 2030 in the NAPCP, indicators should be aligned with those used under the Convention on Long Range Transboundary Air Pollution on exposure of ecosystems to acidification, eutrophication and ozone<sup>(32)</sup>. Member States may provide a qualitative description of these impacts or quantify the impacts in terms of share (%) of Member State territory exposed to:

- a) acidification in exceedance of the critical level threshold;
- b) eutrophication in exceedance of the critical level threshold;
- c) ozone in exceedance of the critical level threshold.

### **2.8. Projected combined impacts of the PaMs ('With Additional Measures', WAM) on emission reductions, air quality in own territories and neighbouring Member States and the environment and the associated uncertainties**

For PaMs selected for adoption, analyse the combined impacts of the PaMs on emission reductions, and possibly air quality and the environment and the associated uncertainties.

#### **Mandatory content:**

##### Projected attainment of emission reduction commitments (WAM)

To demonstrate projected attainment of emission reduction commitments under a WAM scenario, the content for this section includes the following information at Programme level:

- a) National emission reduction commitments (as reported in the Directive);
- b) Emissions (kt) for the 2005 base year, and projected emissions for 2020, 2025, and 2030;
- c) Projected progress as a percentage of the base year to compare with emission reduction commitments;
- d) Where appropriate, i.e. where a non-linear emission reduction trajectory is evident, a demonstration that it is technically or economically more efficient, will not compromise the achievement of any reduction commitment in 2030, and that the trajectory will converge on the linear trajectory from 2025 onwards;
- e) Where relevant, i.e. where applied, provide an account of the use of flexibilities.

#### **Optional content:**

##### Projected improvement in air quality (WAM)

##### Projected impacts on the environment (WAM)

<sup>(32)</sup> [https://www.rivm.nl/media/documenten/cce/manual/Manual\\_UBA\\_Texte.pdf](https://www.rivm.nl/media/documenten/cce/manual/Manual_UBA_Texte.pdf)

### 3. MONITORING PROGRESS IN THE IMPLEMENTATION OF THE PAMS AND THE NATIONAL AIR POLLUTION CONTROL PROGRAMME

Monitoring progress in implementation should be considered as part of the design and subsequent implementation of additional PaMs and the NAPCP as a whole. This guidance focuses on the elaboration of the initial NAPCP and so monitoring progress is described in this context as part of a continuous cycle. It is recognised that monitoring of the initial NAPCP will provide the basis for the elaboration of the subsequent NAPCP updates where circumstances change and adjustments are necessary. However, this document does not provide guidance on how to do this.

EC Better Regulation Toolbox Tool #35 <sup>(33)</sup>, though not directly addressed to Member States may provide guidance on the monitoring arrangements and indicators for policy implementation with respect to EU policymaking. Aspects of the Toolbox can be used to support Member States with the monitoring arrangements and indicators for their initial NAPCP. The monitoring of the NAPCP implementation should form an integral part of the initial programme. Furthermore, Member States should plan the evaluation arrangements for individual PaMs in order to determine whether, at a PaM level, the objectives have been reached effectively and efficiently, and the reasons for the success or failure of a PaM.

Methods to determine progress made by current PaMs have been described in section 2.4. It is recognised that, for adopted measures (WM), there may still be limited data on the progress in implementation to date. When elaborating the NAPCP, Member States must ensure that progress in implementation of the NAPCP as a whole, as well as for individual additional PaMs, is monitored by continuous and systematic data collection. Intermediate targets should be established where applicable to ensure that any issues with implementation and application of the NAPCP and PaMs are detected early. For the NAPCP as a whole, monitoring of progress must be undertaken relative to the trajectory of emission reductions established in the initial NAPCP.

Monitoring of the NAPCP and individual PaMs should be undertaken throughout their life-cycle and at the relevant levels of implementation (i.e. national/ regional/ local):

- **Implementation:** introduction of PaM into laws, plans and programmes at the local, regional and/or national level as defined in the NAPCP;
- **Application:** monitoring of the progress in PaMs against their initial objectives. This should be supported by monitoring of specific indicators as described below;
- **Compliance and enforcement:** monitoring of specific actions undertaken by operators, authorities and agencies, monitoring of any inspections that took place and enforcement actions taken.

Monitoring of progress in the implementation of NAPCP and additional PaMs should be undertaken against a set of indicators established at the programme and individual PaM level.

When defining indicators for NAPCP and individual PaMs, Member States should ensure that they are **RACER**, i.e. **relevant** (linked to NAPCP and PaMs objectives), **accepted** (by relevant stakeholders), **credible** (easy to interpret), **easy** (to monitor) and **robust** (against manipulation). Indicators may be both quantitative and qualitative. Exact selection of indicators depends on the content and administrative framework in which the NAPCP and individual PaMs are established. For PaMs intended to directly reduce emissions, change in annual emissions and contribution to concentrations from affected sources should be monitored as a minimum. Some examples of possible indicators are presented in Table 2.

Table 2

#### Examples of indicators to monitor progress in implementation and application of NAPCP and additional PaMs

Stage in the policy cycle	Monitoring	NAPCP (all PaMs)	Individual PaMs
Implementation ('outputs')	Indicators relate to results of implementation of an intervention	Update to relevant laws and regulations	Vehicle-kilometres reduced;

<sup>(33)</sup> [http://ec.europa.eu/smart-regulation/guidelines/tool\\_35\\_en.htm](http://ec.europa.eu/smart-regulation/guidelines/tool_35_en.htm)

Stage in the policy cycle	Monitoring	NAPCP (all PaMs)	Individual PaMs
		Number of local authorities which updated local air quality plans	Low-emission vehicles deployed; Share of facilities applying advanced abatement system; Number of domestic boilers replaced; Houses fitted with insulation
Application ('results and impacts')	Indicators related to the main objective of the intervention	Reduction in annual emissions achieved against planned emission reduction trajectory Reduction in concentrations of pollutants in air	Annual emissions from the source Contribution of the source to pollutants concentrations in air

#### 4. CONSULTATION OF THE PUBLIC AND COMPETENT AUTHORITIES, AND TRANSBOUNDARY CONSULTATION

See Articles 6(5) and 6(6)

In accordance with Directive 2003/35/EC of the European Parliament and of the Council <sup>(34)</sup> providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment, Member States shall consult the public and the concerned competent authorities on the draft initial NAPCP prior to its finalisation (Article 6(5) NECD). Directive 2003/35/EC has been amended to include Member State NAPCPs among the relevant plans and programmes referred to in its Annex I. Where appropriate, transboundary consultations shall be conducted (Article 6(6) NECD).

The consultation process should be designed to ensure that the public and the relevant authorities are given early and effective opportunities to participate in all aspects of the elaboration of the NAPCP and of significant updates (Article 6(5) NECD). Recital 26 sets out that consultation should be undertaken '*... at a time when all options regarding PaMs remain open*', and prior to finalisation, in other words at a point in the process when it is still possible to change the content of the plan, based on consultation responses from the public and relevant competent authorities. The public, as referred to in the Directive, includes all interested stakeholders — from members of the general public to environmental NGOs and industry trade associations. The relevant competent authorities include those with '*... specific environmental responsibilities in the field of air pollution, quality and management at all levels*', hence at national, regional and local levels, likely to be concerned by the implementation of the NAPCP.

To the extent possible, all consultations carried out during the development of the national programme should be clearly documented. Member States are expected to follow their national guidelines on conducting stakeholder consultation (if such exist).

Pursuant to Article 2(5) of Directive 2003/35/EC, the public participation procedure established therein **shall not apply** to plans and programmes for which a public participation procedure is carried out under Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment <sup>(35)</sup> ('SEA Directive').

The SEA Directive applies on its own merits and Member States have to assess their NAPCPs accordingly. A strategic environmental assessment (SEA) under the SEA Directive must be carried out for an NAPCP if the programme meets **all four** criteria provided in Article 2(a) and 3(2) of the SEA Directive, namely if the plan or programme:

- (i) is subject to preparation and/or adoption by an authority at national, regional or local level;
- (ii) is required by legislative, regulatory or administrative provisions;

<sup>(34)</sup> OJ L 156, 25.6.2003, p. 17, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003L0035>

<sup>(35)</sup> OJ L 197, 21.7.2001, p. 30, <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1525338019455&uri=CELEX:32001L0042>

- (iii) is prepared for any of the sectors listed in Article 3(2)(a) of the SEA Directive; and
- (iv) sets the framework for future development consent of projects listed in Annex I and II of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment <sup>(36)</sup> ('EIA Directive').

The SEA must be carried out during the preparation of the NAPCPs and before their adoption. Minor modifications to plans and programmes having been subject to a SEA require an environmental assessment only where the Member State determines that it is likely to have a significant environmental impact.

### Transboundary consultation

Transboundary consultation may be needed at the time of drawing up a draft NAPCP (Article 6(6)). This would be the case, for instance, where existing pollution sources have been clearly identified as causing localised transboundary problems for another Member State; for instance, a concentration of energy generation or heavy industry and/or urban areas (and associated traffic) close to a border. Here, there is a need to take account of the relevant transboundary impact when considering additional PaMs under the NECD and joint actions may be required with neighbouring Member States and third countries.

Where the SEA Directive applies, Member States shall engage in transboundary consultations before adoption where the implementation of their NAPCPs is likely to have significant effect on the environment in another Member State, or where a Member State likely to be significantly affected so requests (Article 7 of the SEA Directive).

The purpose is to facilitate transboundary co-operation in the management of air quality as a shared resource by providing a forum for communication <sup>(37)</sup>.

The AAQD draws particular attention to the transboundary nature of PM and O<sub>3</sub>. Under the AAQD Member States are required to cooperate with one another where exceedances are reported '*due to significant transboundary transport of air pollutants or their precursors, and where appropriate, draw up joint activities*' (Article 25 AAQD).

### Reference to consultation in the NAPCP

The information on where the full results of the consultations can be accessed (e.g. web-link) should be provided in the NAPCP.

### Role of stakeholders in the identification and evaluation of additional PaMs

During the identification and evaluation of potential measures, the authorities in charge of preparing the NAPCP should consult with other relevant government departments and agencies (for example those in charge of regulating specific emission sources), as well as other stakeholders which would possess information about current and potential further measures that could be put in place. Examples of the types of inputs to be asked for are provided below.

Stakeholder group	PaM identification	PaM evaluation
Other government departments and agencies	Types of policy instruments that worked well in given policy areas/sectors Priorities in other policy areas (to inform coherence with existing plans and programmes) Information on potential future measures already planned for adoption	Overall feasibility of implementation Level at which measure could be implemented Funding sources Enforcement
Regional and local authorities	Experience with implementation of measures to date Measures currently in place	

<sup>(36)</sup> OJ L 26, 28.1.2012, p. 1.

<sup>(37)</sup> See for example transboundary consultation conducted by Croatia with Italy concerning a river basin management plan: <http://www.va.minambiente.it/en-GB/Oggetti/Documentazione/1607/2691>

Stakeholder group	PaM identification	PaM evaluation
Stakeholders affected by the PaM/ultimate users (e.g. industry, NGOs, residents of inner city areas)	Experience with implementation of measures to date Measures currently in place	Feasibility of measures (i.e. compatibility with current measures, technical restrictions) Expected costs and effectiveness of measure Uptake of measure (linked to acceptability) Date when emission reductions are likely to be attained

## 5. DISSEMINATION OF THE NAPCP

See Article 14(1)

Member States must actively and systematically disseminate their NAPCP to the public by publishing it on a publicly accessible internet site (Article 14(1)). In keeping with the requirements stipulated by the UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matter (the Aarhus Convention), Member States are obliged to ensure public access to environmental information (Directive 2003/4/EC of the European Parliament and of the Council <sup>(38)</sup>).

The Directive also requires Member States to disseminate datasets and information as reported in accordance with Article 10, on a publicly accessible internet site. To facilitate use of all reported information under the Directive, Member States should consider including in the NAPCP links to all datasets and reports alongside their NAPCP, including links to:

- national emission inventories, including the adjusted emission inventory where relevant;
- national emission projections;
- the informative inventory report; and
- additional reports and information communicated to the Commission in accordance with Article 10, including the location of the monitoring sites and associated indicators for monitoring air pollution impacts on ecosystems, and the monitoring data thereafter.

Additional suggestions for best practice:

- A communication plan should be developed to support the dissemination of the NAPCP. For example, this could set out the target audience for the NAPCP (identifying key authorities, agencies, cities or research bodies) as well as a list of media contacts and a timeframe for issuing press releases concerning the NAPCP. It could also include indicators for determining the level of public engagement with the NAPCP (such as setting a target for the number of website hits).
- Publication of non-technical summaries for the public to explain the purpose of the NAPCP and its content.

## 6. APPENDIX: TOOLKIT TO SUPPORT CONSIDERATION AND SELECTION OF ADDITIONAL PAMS

This appendix sets out examples of analytical methods and reporting outputs to facilitate the consideration and selection of additional PaMs. References are made to the relevant sections in the main body of the guidance.

### 6.1. Summary of the assessment of the impacts of past, current and planned measures on air quality

Coverage of the following elements is considered best practice when presenting impacts of the NAPCP on the air quality and environment. To avoid repetition in the initial NAPCP it is recommended that historic data is presented alongside projected data wherever feasible. Examples of evidence to include are presented below.

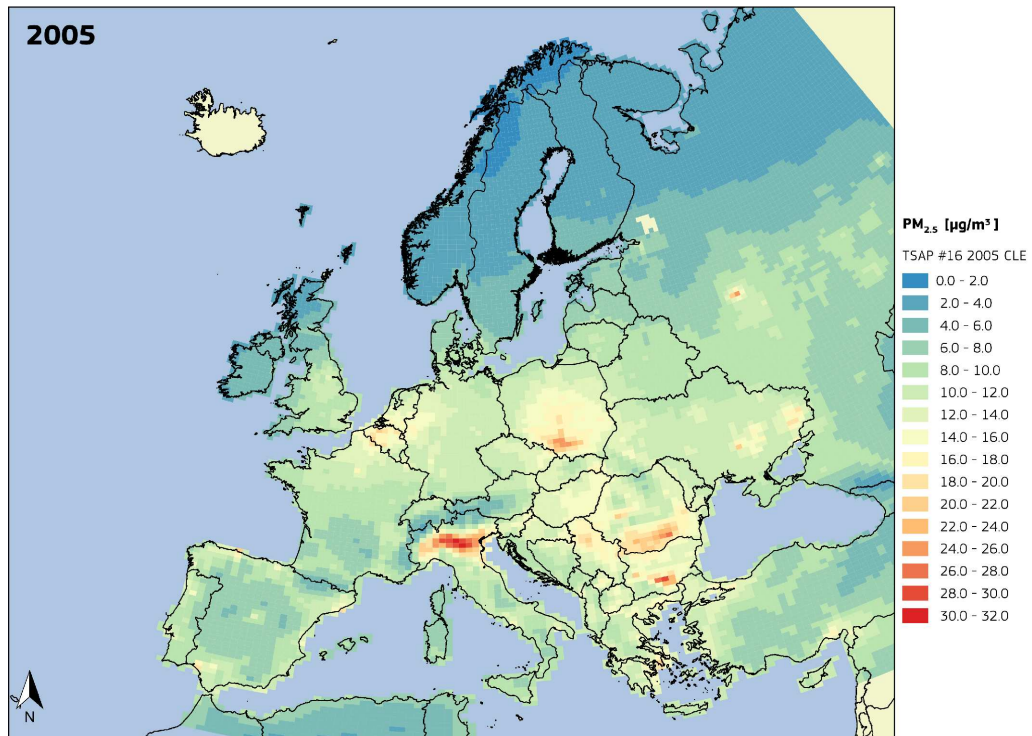
— **The following information for the base year (2005) and the latest reporting year:**

- Maps of current concentrations in air at least for the following pollutants: NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and O<sub>3</sub>, and for other AAQD pollutants for which a Member State faces significant problems. An example is presented below for annual mean concentrations of PM<sub>2.5</sub> in the EU in 2005 and 2015 (see Figures 3 and 4). The examples provided below are for the EU as a whole, but in the NAPCP only Member State level information is required.

<sup>(38)</sup> OJ L 41, 14.2.2003, p. 26, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32003L0004>

Figure 3

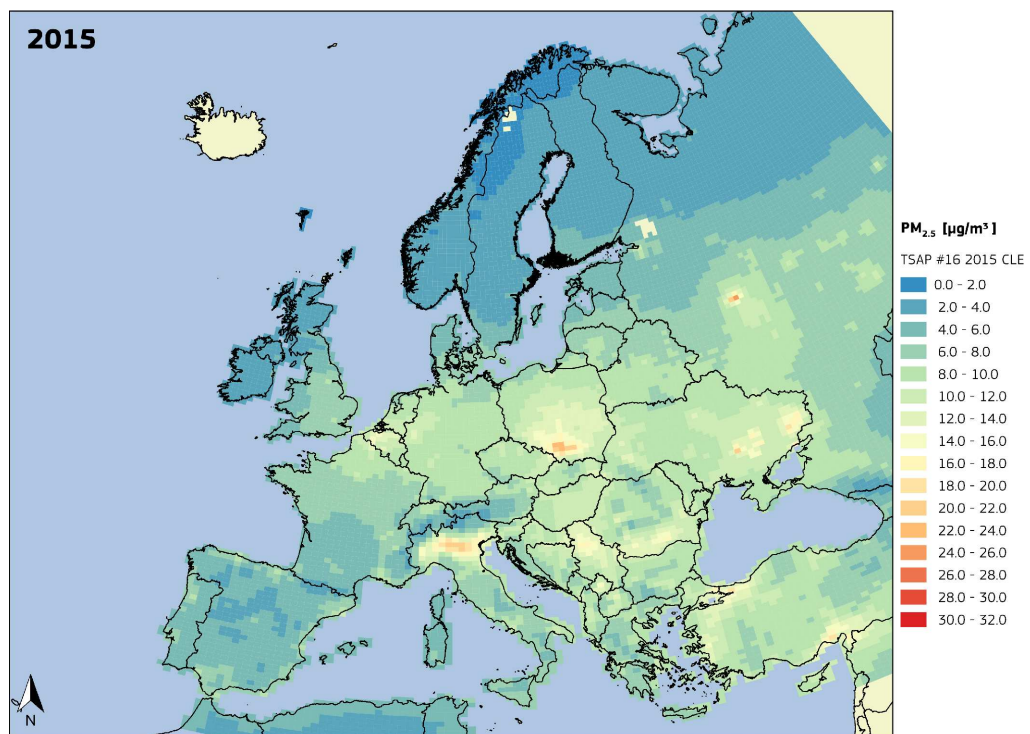
Annual mean concentrations of PM<sub>2.5</sub> in 2005



Source: Own compilation (data from TSAP Report #16).

Figure 4

Annual mean concentrations of PM<sub>2.5</sub> in 2015

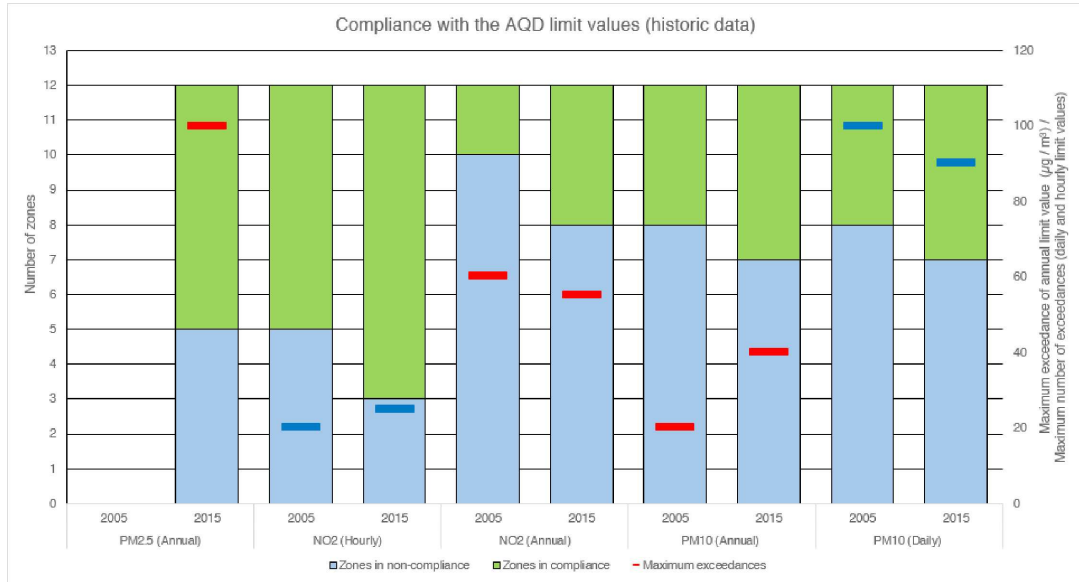


Source: Own compilation (data from TSAP Report #16)

- Histogram showing the number of zones in non-compliance and the maximum national exceedance for NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and O<sub>3</sub>, and for other AAQD pollutants for which a Member State faces significant problems. For zones in non-compliance, the total number of zones should be included as reference. Example is presented below:

Figure 5

**Number of zones in non-compliance and maximum exceedances**

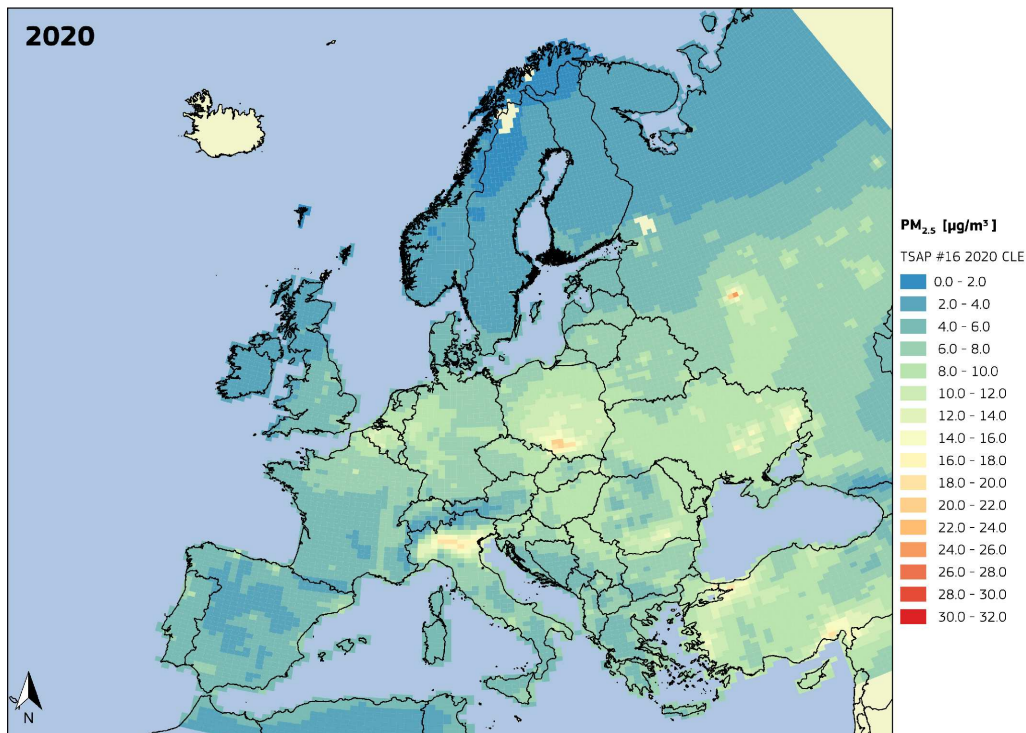


Note: The above graph presents maximum exceedances of annual limit values (in red), and daily and hourly limit values (in blue) on the secondary axis. In order for the figure to be legible, maximum concentrations and number of exceedances need to be in the same order of magnitude.

- **The following information for the WM scenario, for the years 2020, 2025 and 2030 and for each of the above pollutants:**
- Maps of the projected concentrations under the WM scenario. An example is presented below for projected annual mean concentrations of PM<sub>2.5</sub> across EU level in 2020, 2025 and 2030 (see Figures 6, 7 and 8). In the NAPCP, only Member State level information is required.

Figure 6

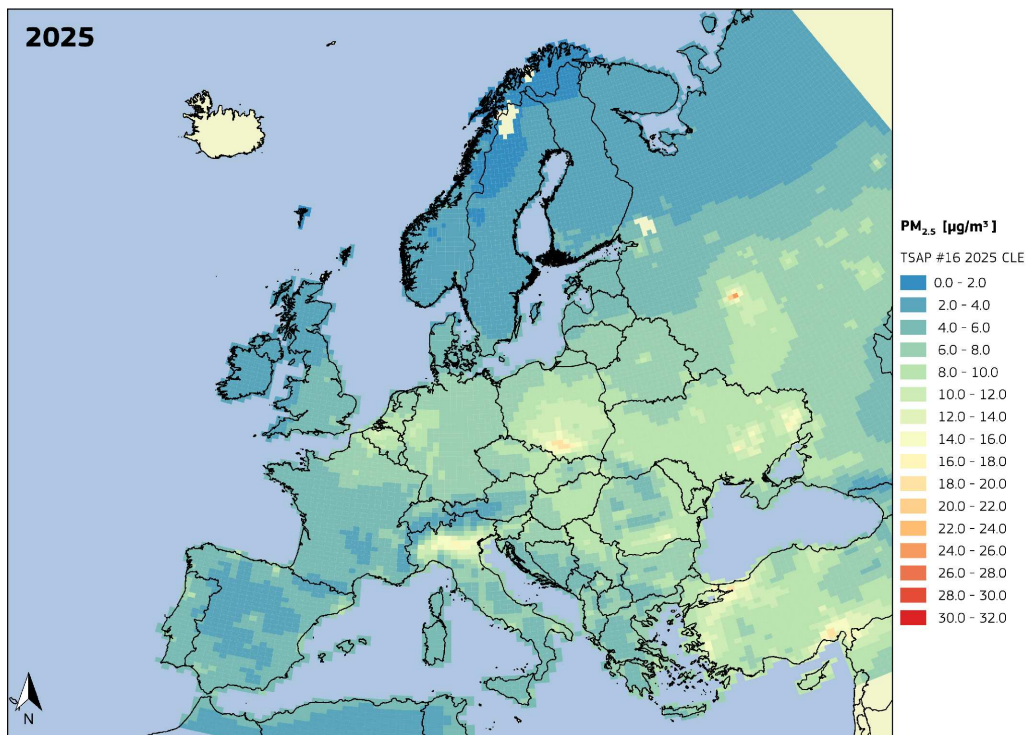
**Projected annual mean concentrations of PM<sub>2.5</sub> in 2020 under the WM scenario**



Source: Own compilation (data from TSAP Report #16)

Figure 7

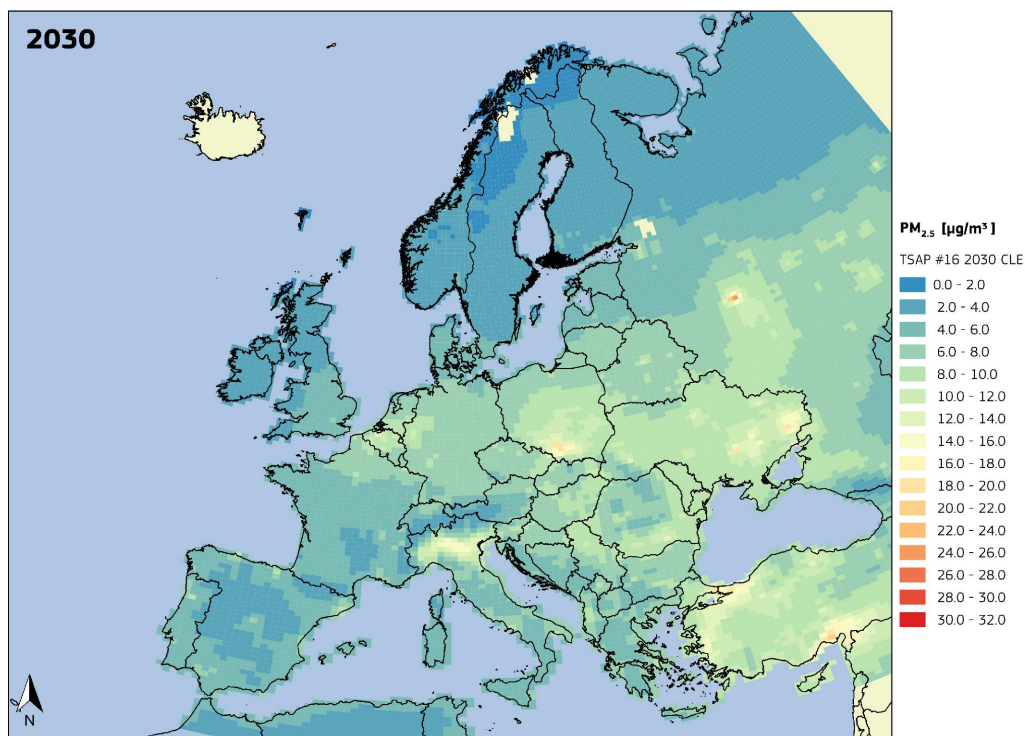
Projected annual mean concentrations of PM<sub>2.5</sub> in 2025 under the WM scenario



Source: Own compilation (data from TSAP Report #16)

Figure 8

Projected annual mean concentrations of PM<sub>2.5</sub> in 2030 under the WM scenario

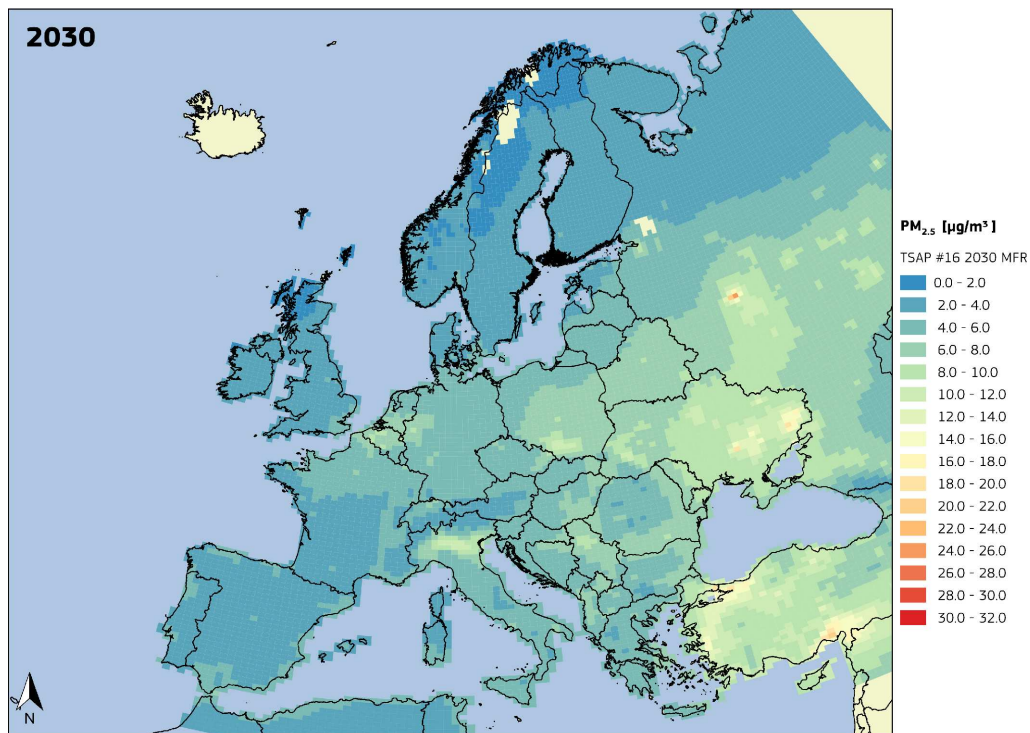


Source: Own compilation (data from TSAP Report #16)

- Histogram of the projected evolution in the number of zones in non-compliance. Information on the maximum national exceedance and the average exposure indicator under the WM scenario (see figure 10 below);
- **The following information for the WAM scenario, for the years 2020, 2025 and 2030 and for each of the above pollutants:**
  - Maps showing the projected difference in concentrations compared with those resulting from implementation of the WM scenario. An example is presented below for projected annual mean concentrations of PM<sub>2.5</sub> across EU level in 2030 (see Figure 9). In the NAPCP, only Member State level information is required.

Figure 9

**Projected annual mean concentrations of PM<sub>2.5</sub> in 2030 under the WAM scenario**

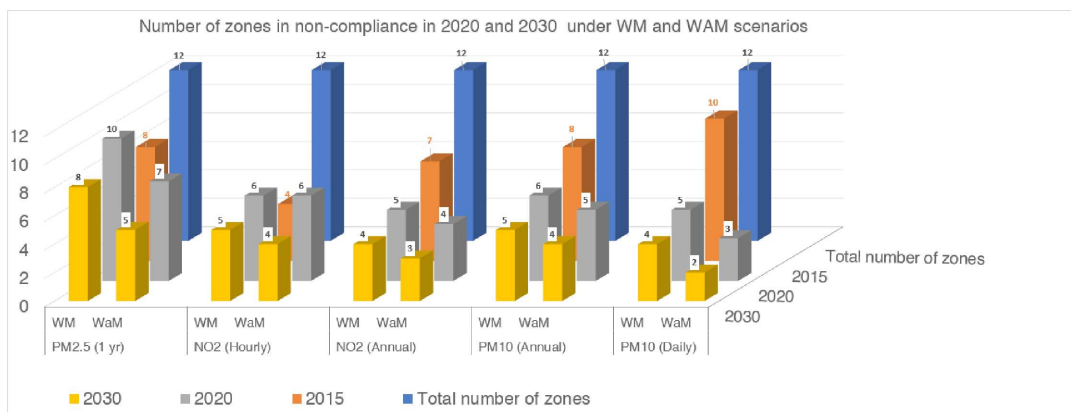


Source: Own compilation (data from TSAP Report #16)

- Histogram showing the projected difference in the number of zones in non-compliance, comparing those projections resulting from implementation of the WM scenario to the WAM scenario. For zones in non-compliance, the total number of zones should be included as a reference. A sample histogram is presented below (Figure 10).
- Table or figure presenting the maximum exceedances (maximum concentrations and/or number of exceedances) of the limit values projected under WAM scenario.

Figure 10

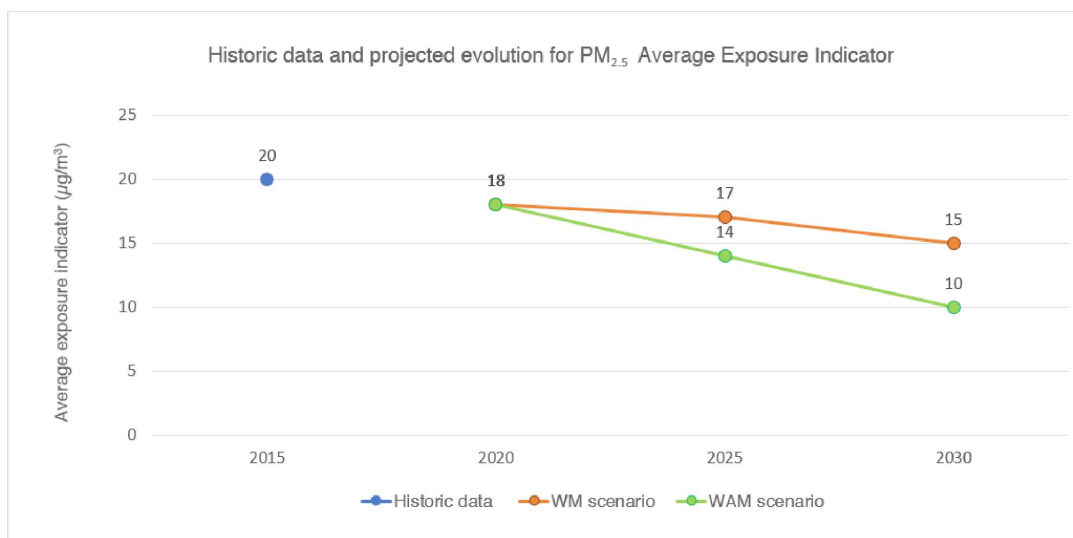
**Number of zones in non-compliance in 2020 and 2030 under the WM and WAM scenarios**



— A sample graph is presented below to show projections for the Average Exposure Indicator (AEI) for PM<sub>2.5</sub> and to compare the expected AEI under WM and WAM scenarios <sup>(39)</sup>.

Figure 11

**Historic data and projected evolution for PM<sub>2.5</sub> Average Exposure Indicator**



**6.2. Examples (non-exhaustive) of emission source/sector-specific PaMs**

Sector	Potential PaMs
Energy production	<ul style="list-style-type: none"> <li>— Abatement technologies (retrofit of existing and installation of new)</li> <li>— Introducing stricter emission limit values than required under existing legislation (e.g. IED)</li> </ul>

<sup>(39)</sup> The Average Exposure Indicator was not reported for the base year 2005. Thus it should be provided only for the latest reporting year, unless the MS wishes to perform an *ex post* calculation of what the average exposure indicator would have been in 2005.

Sector	Potential PaMs
	<ul style="list-style-type: none"> <li>— Fuel switching</li> <li>— Incentivising non-combustible renewable energy generation</li> <li>— Energy efficiency measures</li> <li>— Fuel quality standards</li> </ul>
Industrial processes	<ul style="list-style-type: none"> <li>— Abatement technologies (retrofit of existing and installation of new)</li> <li>— Introducing stricter emission limit values than required under existing legislation (e.g. IED)</li> <li>— Fuel switching</li> <li>— Energy efficiency measures</li> <li>— Fuel quality standards</li> </ul>
Solvent and product use, fugitive emissions	<ul style="list-style-type: none"> <li>— Control of solvent use</li> <li>— Product reformulation</li> <li>— Product substitution</li> <li>— Measures related to public procurement (e.g. water-based road marking)</li> <li>— Measures improving quality of, and consumer's access to, information on solvent and product use and their fugitive emissions</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>— See Annex III Part B of the Directive for the list of obligatory and optional measures to include in the NAPCP</li> <li>— Measures with air quality and climate change co-benefits such as: best practices in precision farming and in biogas installation, extensive pasturing on grassland, organic farming.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>— Optimising waste collection services, abatement equipment in waste treatment facilities</li> <li>— Waste reduction measures, especially for biodegradable waste, such as food waste</li> </ul>
Transport (road/non-road)	<ul style="list-style-type: none"> <li>— Implementation of comprehensive sustainable urban mobility plans (SUMP) by cities and of relevant national (financial, legislative) frameworks</li> <li>— Abatement equipment (filter retrofit)</li> <li>— Targeted taxes on road transport and/or fuel types</li> <li>— Investment in low-emission public transport infrastructure, vehicles and coverage</li> <li>— Promoting car sharing and eco-driving</li> <li>— Promoting zero emission, low-emission and alternative clean fuel vehicles and investment in related infrastructure (charging points)</li> <li>— Congestion charging/low emission zones</li> <li>— Encouraging active mobility (cycling, walking)</li> <li>— Subsidising scrappage schemes — promoting fleet renewal</li> <li>— Better enforcement of existing emission standards (e.g. through improved compliance checking of motor vehicles)</li> <li>— Introducing traffic calming and speed reduction measures (such as 30 km/h zones)</li> </ul>

Sector	Potential PaMs
Domestic combustion	<ul style="list-style-type: none"> <li>— Energy efficiency measures (e.g. insulation)</li> <li>— Minimum fuel quality requirements (for heating oils and/or wood and other biomass)</li> <li>— Promoting fuel switching, targeted taxes on most polluting fuel types</li> <li>— (Subsidising) equipment upgrades, e.g. (coal/wood-fired) stove/boilers replacement programmes</li> <li>— Better enforcement of existing performance standards for domestic boilers (e.g. through improved domestic boilers market surveillance)</li> <li>— Information provisions and capacity building (e.g. raising awareness about air quality, impacts of domestic heating, types of domestic heating equipment and efficient operation)</li> </ul>

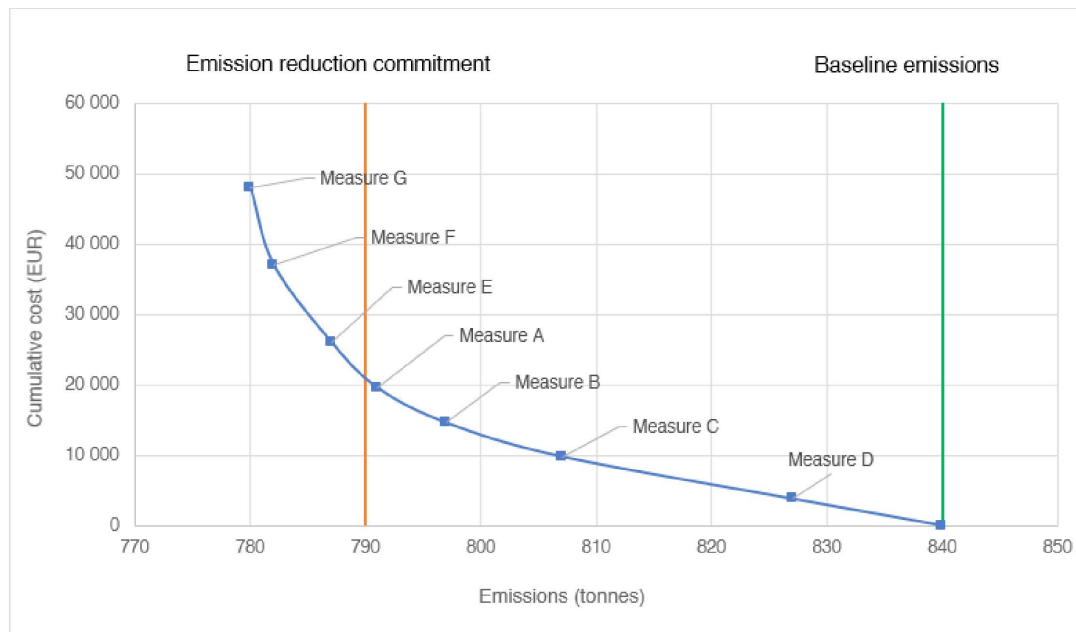
Source: Based on Multi-pollutant Measures Database, Diegmann et al. (2014), RAC Foundation (2014), Evaluation of 2006 National Programmes under NEC Directive, EC Catalogue of Air Quality Measures.

### 6.3. Examples of analytical methods to determine additional PaMs required to meet emission reduction commitments

**Least Cost Analysis (LCA) Cost-Effectiveness Analysis** — these methods consider costs of PaMs in order to select alternative option(s) of achieving the objective that entail the lowest net cost. In the context of NECD, least cost and cost-effectiveness analysis is appropriate as the benefits (expressed as tonnes of pollutants reduced) are fixed at the level of emission reduction commitments for each pollutant. Magnitude of costs of PaMs can be determined either qualitatively (very high, high, medium, low, very low relative to other each other) or quantitatively (monetised). Least cost analysis can be conducted using cumulative abatement cost curves as shown in the example below.

Example: assessment of measures using cost-effectiveness analysis for a sample pollutant. In the example, emissions under the WM scenario in 2030 are projected to be 840t, and emissions associated with the emission reduction commitment in the NECD 790t. Additional PaMs are therefore required to achieve reduction of minimum 50t in order to ensure compliance.

Measure	Emission reductions (tonnes)	Cost (EUR)	Cost effectiveness (EUR per tonne)
Measure A	6	5 000	833
Measure B	10	4 800	480
Measure C	20	6 000	300
Measure D	13	3 800	292
Measure E	4	6 500	1 625
Measure F	5	11 000	2 200
Measure G	2	11 000	5 500



In the above example, Measures D, C, B, A and E would be selected to achieve the ceiling at the total cost of EUR 30 000, while Measure F would no longer be considered as it has a higher cost per tonne of emission reduced. The cumulative cost can be lowered, if measure E is only introduced partially (only up to the level of emission reduction required by the NECD, if possible).

The difficulty in using this approach is that it does not allow accounting for impacts of PaMs on multiple pollutants unless an optimisation approach is taken (similar to that applied within the GAINS model) or pollutant sequencing is used. An optimisation approach finds the least expensive solution to meet the reduction commitments across all pollutants but requires a specific model to implement. Pollutant sequencing is simpler whereby all PaMs that reduce emissions for one of the pollutants are assessed first. Emission reductions for other pollutants achieved by these PaMs are then quantified and subtracted from the WM projections. The assessment of PaMs then proceeds to the second pollutant and so on. It may be that following the implementation of all PaMs for the first pollutant, there is no need to implement any additional PaMs for one or more of the remaining pollutants. There exist different ways in which to select the first pollutant for the assessment, as follows:

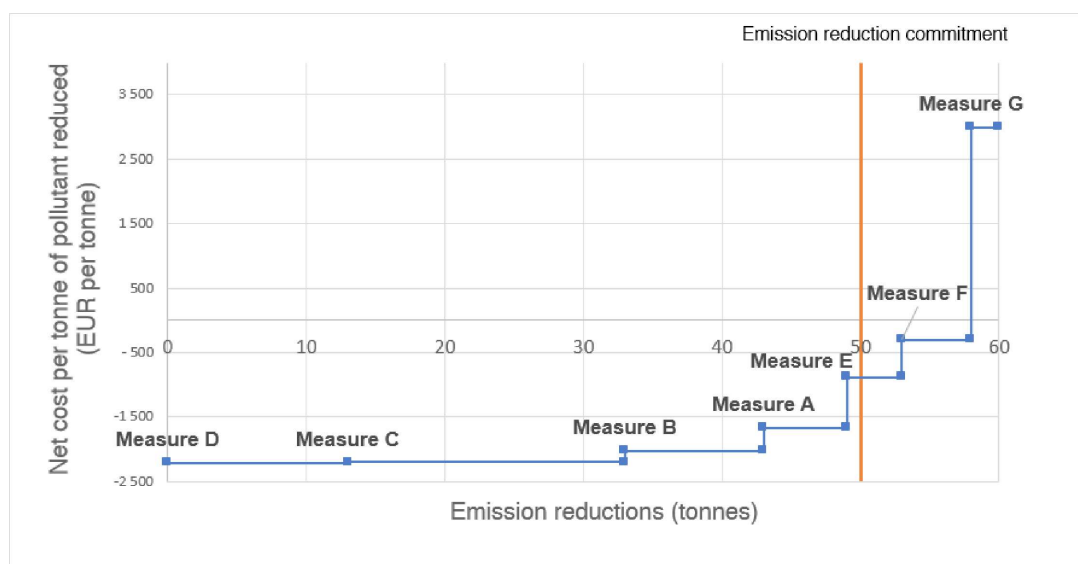
- Prioritising the pollutant for which the distance from meeting the reduction commitment is the largest.
- Selecting the pollutant for which PaMs are most likely to have co-benefits on other pollutants. For example, PaMs to abate SO<sub>2</sub> are most likely to have the largest impact on emissions of PM.
- Starting with PaMs for those pollutants which are also not in compliance with the AAQD limit values, such as NO<sub>x</sub> or PM.

**Cost-benefit analysis (CBA)** — this method is recommended when key direct benefits and direct costs can be monetised. One way to introduce cost-benefit considerations into the evaluation of PaMs is to compare for each identified PaM the cost per tonne of pollutant abated, with the benefit per tonne of pollutant abated, suitably discounted into the future. The latter is commonly monetised using damage cost functions. If damage cost functions only are used to monetise the benefits, the CBA would show similar results to the Least Cost Analysis (LCA) methods described above. However if further benefits are also monetised, selection of measures using CBA and LCA methods would be different. Member States may decide to select PaMs with the highest benefit (or lowest net cost) achieved per tonne of pollutant abated until the emission reduction commitment is reached.

Example: assessment of measures using cost-benefit analysis can also be illustrated using marginal abatement cost curve (i.e. it is an iteration of the cost-effectiveness analysis in which benefits achieved by measures are also accounted for). In the example below, in order to achieve an emission reduction commitment, a Member State must reduce 50t of

a pollutant by introduction of additional PaMs. In order to evaluate the measures, the net cost per tonne of pollutant reduced is calculated by subtracting the benefits of emission reductions (quantified using damage cost function of EUR 2 500 per tonne) from total cost of measure, and dividing by emission reductions achieved by the measure. The cost curve illustrates that Measures A to F have negative net cost (that means that, for these measures, benefits outweigh costs), while measure G have positive net cost (costs of these measures are higher than benefits).

Measure	Emission reductions (tonnes)	Costs (EUR)	Benefit (EUR)	Net cost per tonne of pollutant reduced (EUR)
Measure A	6	5 000	15 000	- 1 667
Measure B	10	4 800	25 000	- 2 020
Measure C	20	6 000	50 000	- 2 200
Measure D	13	3 800	32 500	- 2 208
Measure E	4	6 500	10 000	- 875
Measure F	5	11 000	12 500	- 300
Measure G	2	11 000	5 000	3 000



The benefit of this approach is that it selects the measures with the highest benefits and allows identification of additional measures that are cost-beneficial even if they are not needed to meet the reduction commitments (i.e. Measure F in the above example).

The limitation of this approach is that damage cost functions only capture a share of the overall benefits that could be achieved by a PaM. Furthermore, most damage cost functions are available at national level and are not site or sector specific, therefore not considering actual location of emission reductions and associated exposure of the local population. A more detailed approach to quantify benefits involves the use of the impact pathway approach but this requires detailed Air Quality modelling, health impact analysis and valuation which can be quite resource intensive.

Similarly to the above, this example does not capture impacts of measures on more than one pollutants.

**Optimisation-based modelling** — models with optimisation capability allow identifying combinations of PaMs that would achieve the required emission reductions at the lowest cost, taking into account the multi-pollutant impact of measures. Some optimisation models also simultaneously assess the impact of the selected PaMs on air quality, greenhouse gas emissions and the environment. An example of such a model used for European scale assessments is the GAINS model. Some Member States also use regional versions of GAINS to conduct assessments at national level.

Likely shortcomings of most optimisation models, as well as the LCA and CBA methods, is that they are constructed to assess technical measures and thus tend not to be capable of evaluating impacts of non-technical measures such as structural changes or behavioural type of measures.

#### 6.4. Examples of analytical methods supporting prioritisation of PaMs

**Multicriteria analysis (MCA)** — this method allows selecting PaMs by judging on a set of objectives and associated criteria. In the NECD context, MCA is particularly useful as it allows reconciling analysis of measures with specific NECD objectives and it facilitates simultaneous assessment against effectiveness, efficiency and coherence criteria. Potential MCA criteria could include:

Criteria/Score	1 (Low)	2 (Average)	3 (High)
<b>Does the legal framework exist to implement the measure?</b>	No, existing legislation would need to be modified or new legislation implemented.	Yes, but some additional measures would need to be put in place.	Yes, the legal framework is fully established to support PaM implementation.
<b>When will the emission reductions associated with the PaMs be attained?</b>	No earlier than 2030.	Between 2025 and 2030.	Between 2020 and 2025.
<b>What is the expected impact of PaM on air quality and its contribution to AAQD objectives?</b>	PaM affects emissions from sources located outside of air quality hotspots, with no or very limited impact on concentrations.	Some positive impact on air quality, however little contribution to attainment of AQ objectives.	PaM affects emissions in urban areas and AQ hotspots. It is expected to positively contribute to the attainment of AQ objectives.
<b>What is the impact of measure on BC? [PM measures only]</b>	None	Limited	High
<b>Does the measure incentivise investment in clean and efficient technology?</b>	No, PaM does not involve use of any technology.	To some extent but it mainly relies on conventional and well-established technology.	Yes, it facilitates investment in cutting-edge technology.
<b>Will the measure reduce exposure to sensitive human population groups?</b>	No, it will mostly affect emissions in rural areas.	Yes, it will be implemented in populated areas (e.g. cities).	Yes, it is targeted on locations with sensitive population groups (e.g. schools).

Criteria/Score	1 (Low)	2 (Average)	3 (High)
<b>Will PaM rectify any negative impacts on AQ and emissions from already adopted PaMs?</b>	No, it is independent from any existing PaMs.	Yes, it will reduce the negative impact.	Yes, it will eliminate the negative impact.
<b>Is PaM contributing to attainment of emission reduction commitments for more than one pollutant?</b>	No, it has an impact on only one pollutant.	Yes, it has impact on two pollutants.	Yes, it has impact on more than two pollutants/No, but it enables adoption of other PaMs.

**SWOT analysis** — this method requires the identification of Strengths, Weaknesses, Opportunities and Threats in relation to the PaMs. As comparing numerous PaMs using SWOT analysis may be both difficult and resource intensive, this method may be more applicable to compare between a smaller numbers of shortlisted groupings of PaMs. For example, based on initial analysis, there may be three groupings of potential measures that achieve emission reductions at similar cost. Applying SWOT analysis would allow determining which grouping of PaMs can ensure the largest benefits on air quality and other policy objectives, and ensure greatest coherence with adopted PaMs, plans and programmes, including in other policy areas.

<b>Strengths</b>	<b>Weaknesses</b>
<p>The legal framework is fully established to support PaM implementation.</p> <p>Emission reductions will positively contribute to achievement of the 2030 ceiling.</p>	<p>There is little air quality benefit as the measure will affect emissions in rural areas mainly.</p> <p>There is no expected impact on black carbon.</p> <p>The measure has impact on a single pollutant only (does not contribute to the attainment of other ceilings).</p> <p>The measure is unlikely to facilitate new investment in cutting-edge technology.</p>
<b>Opportunities</b>	<b>Threats</b>
<p>The emission reductions could be achieved in the shorter timescale (between 2025 and 2030) if the measure is accompanied by sufficient promotional activity.</p>	<p>The measure may conflict with the attainment of other policy objectives (risk of incoherence).</p> <p>The measure may not be easily accepted by stakeholders (i.e. lack of social acceptability).</p>