EUROSAI WORKING GROUP ON ENVIRONMENTAL AUDITING

Joint report on air quality

January 2019

Prepared by

the Netherlands Court of Audit
and the Supreme Audit Office of Poland

EUROSAI

Working Group on
Environmental Auditing

Joint report on air quality

January 2019

Prepared by

the Netherlands Court of Audit
and the Supreme Audit Office of Poland

Summary

Air pollution is the biggest environmental risk to health in the world today. Ambient (i.e. outdoor) air pollution is a major cause of death and disease globally. These are just some of the figures presented by the World Health Organisation (WHO) at the first WHO Global Conference on Air Pollution and Health in October-November 2018:

- *Air pollution causes one in every 9 deaths worldwide.*
- *9 out of 10 people worldwide breathe air containing high levels of pollutants.*
- *24% of all stroke deaths are attributable to air pollution. Air pollution causes 1.4 million deaths from stroke every year.*
- *25% of all heart disease deaths are attributable to air pollution. Air pollution causes 2.4 million deaths due to heart disease every year.*
- *43% of all lung diseases and lung cancer deaths are attributable to air pollution. Air pollution causes 1.8 million deaths due to lung disease and lung cancer every year.*

Limit the levels of air pollutants

As air pollution is hazardous to both human health and the environment, we need to limit the prevalence of air pollutants. The EU's 2008 Ambient Air Quality Directive (AAQ Directive) sets air quality standards throughout the EU for concentrations of those air pollutants that have the biggest health impact. The European air quality standards were set almost twenty years ago. The WHO's recommended limits for particulates are based on health impacts and are roughly half the EU limits.

The AAQ Directive requires member states to:

- define air quality zones within their territory;
- carry out preliminary air quality assessments in each zone;
- set networks of fixed measuring stations in polluted areas (the Directive contains criteria both for the location and for the minimum number of sampling points);
- collect data from their networks and report these to the European Commission and the European Environmental Agency (EEA) each year;
- produce Air Quality Plans when concentrations exceed the standards;
- follow/define alert and information thresholds. The government must inform the public if a threshold is exceeded.

The European Commission can take legal action if it considers that a member state has failed to comply with the AAQ Directive.

The scope of the joint audit

Supreme audit institutions (SAIs) play an important role in contributing to efficient and cost-effective policy implementation by conducting independent audits of government activities.

This joint report is a comprehensive summary of 16 audits on air quality performed by the European Court of Auditors and by 15 SAIs in Albania, Bulgaria, Estonia, Georgia, Hungary, Israel, Kosovo*,

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Moldova, Poland, Romania, Slovakia, Spain, Switzerland, the Former Yugoslav Republic of Macedonia and the Netherlands.

In order to collect and assess comparable information on national government actions, the 15 SAIs prepared a common audit framework containing the main audit question, the audit topics and the corresponding secondary questions to be addressed by the national audits. The main audit question was: "*What is known about the effectiveness and efficiency of measures taken by national and local governments to improve air quality, and are these measures compliant with international and national legislation?*"

The SAIs identified six major issues as being relevant to government action on improving air quality: main problem, governance system, statutory rules and regulations, policy, funding and monitoring.

The aim of this joint audit has been to assess how air quality policies and actions are implemented in the participating countries and to generate shared conclusions and recommendations. Additionally, we hope that the joint audit will inspire SAIs by sharing good practices and passing on knowledge.

Findings

Eight SAIs were not able to audit the effectiveness and efficiency of the measures taken by their respective governments. Among the reasons for this were that no policy had been adopted, no performance indicators had been specified, and the monitoring information was inadequate. The seven other SAIs indicated that the measures taken by their governments were at best only partially effective.

The national governments in question have not given sufficient priority to the problem of air pollution, with all the attendant consequences for human health. Despite the differences between the countries, we conclude that (except for Estonia) the governments in the participating countries have not taken sufficient action to improve air quality.

We based this main message on the following overall conclusions:

1) most participating countries do not comply with national and international standards and still exceed limit or target values;
2) not all countries have adopted a national policy; not all have performance indicators;
3) there is a lack of coordination among actors and policies;
4) governments have limited information on budgets;
5) where there is a budget, this is not always sufficient;
6) monitoring systems do not always function properly;
7) there is scope for improving public information.

Based on our main message and conclusions, we make the following overall recommendations:

1) prepare and implement air quality plans;
2) measure the effectiveness of action taken;
3) improve coordination;
4) provide relevant data and perform a full cost-benefit analysis;
5) improve monitoring systems;
6) raise public awareness.

Abbreviations, units and symbols

µg/m³	Microgram(s) per cubic metre
ng/m³	Nanogram(s) per cubic metre
AAQ Directive	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
AQP	Air Quality Plan
BaP	Benzo[ȧ]pyrene
CLRTAP	Convention on Long-Range Transboundary Air Pollution
EC	European Commission
ECA	European Court of Auditors
EEA	European Environment Agency
EU	European Union
EUROSAI	European Organisation of Supreme Audit Institutions
FYROM	Former Yugoslav Republic of Macedonia
FOEN	Federal Office for the Environment (Switzerland)
GDP	Gross domestic product
Low emission	Emission of dust and harmful gases, mostly from local coal-fired boiler houses and domestic heating furnaces, in which coal combustion takes place in an ineffective manner, usually with cheap coal with low heating parameters

NO_2	Nitrogen dioxide
NSAQ	National Strategy on Air Quality (Albania)
NSL	National Air Quality Cooperation Programme (the Netherlands)
O_3	Ozone
OAPC	Ordinance on Air Pollution Control (Switzerland)
PM	Particulate matter
$PM_{2.5}$	Particulate matter with a diameter of 2.5µm or less
PM_{10}	Particulate matter with a diameter of 10µm or less
RIVM	Dutch National Institute for Public Health and the Environment
SO_2	Sulphur dioxide
SWH	Solar water heater
WHO	World Health Organisation
WHO AQG	World Health Organisation Air Quality Guidelines

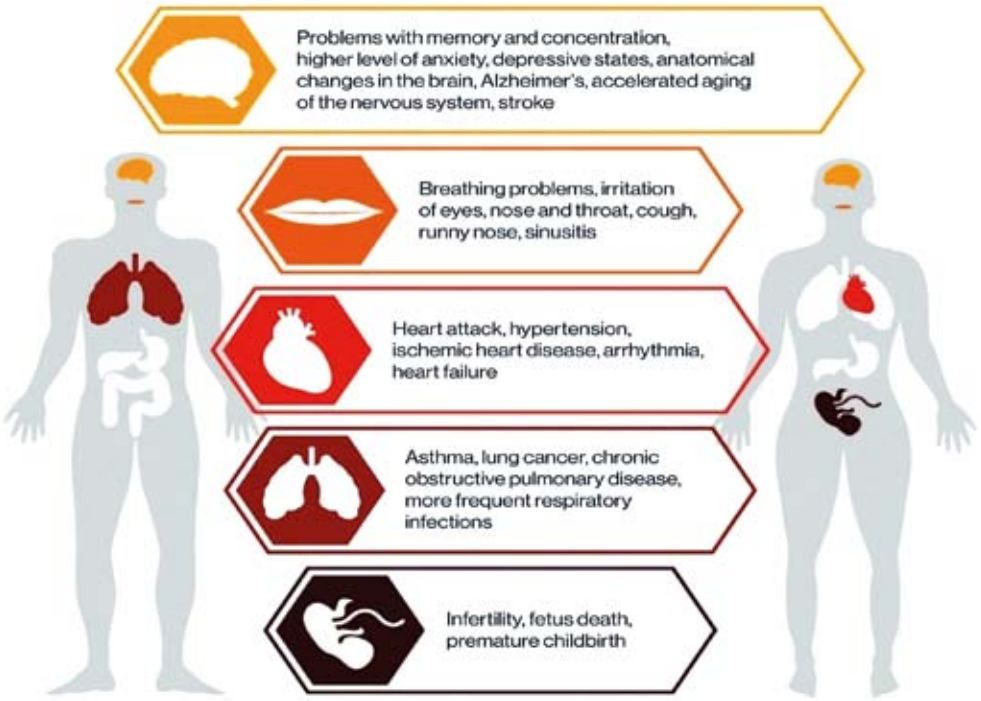
Table of contents

1. Background

1.1 Air pollution and air quality policy

Air pollution is of major environmental and social concern. Many studies show that air pollution is an important factor harming human health. It heightens the risk of disease.

Figure 1. Health effects of air pollution

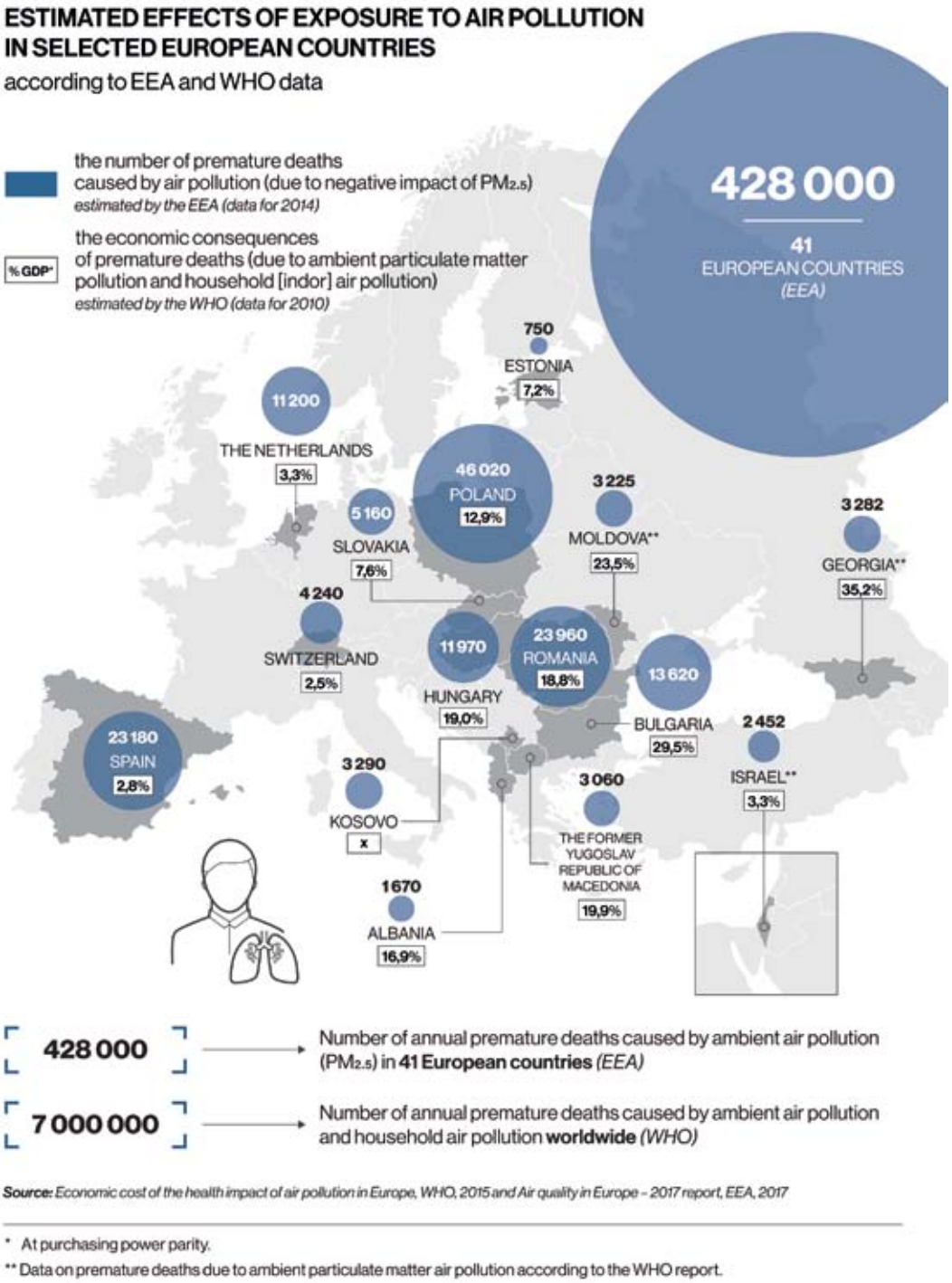


Source: Kraków Smog Alert Association, 2017, *The impact of air pollution on health*, (https://krakowskialarmsmogowy.pl/-text/dopobrania – accessed September 3, 2018)

According to the European Environment Agency (EEA) report on air quality from 2017 (EEA, 2017a), '*air pollution is the single largest environmental health risk in Europe and the disease burden resulting from air pollution is substantial (Lim, Stephen S., et al. (2012). Heart diseases and strokes are the most common reasons for premature death attributable to air pollution and are responsible for 80% of cases; lung diseases and lung cancer follow (WHO, 2014). In addition to causing premature death, air pollution increases the incidence of a wide range of diseases (e.g. respiratory and cardiovascular diseases and cancer), with both long- and short-term health effects, including at levels below the existing World Health Organization (WHO) guideline values (WHO, 2016). The International Agency for Research on Cancer has classified air pollution in general, as well as Particulate Matter (PM) as a separate component of air pollution mixtures, as carcinogenic (IARC, 2013). Various reports (WHO, 2005) show*

that air pollution has also been associated with health impacts on fertility, pregnancy, and new-borns and children. These include negative effects on neural development and cognitive capacities, which in turn can affect performance at school and later in life, leading to lower productivity and quality of life. There is also emerging evidence that exposure to air pollution is associated with new-onset type 2 diabetes in adults, and may be linked to obesity, systemic inflammation, ageing, Alzheimer's disease and dementia (Royal College of Physicians, 2016)'.

Figure 2. Health and economic impacts of exposure to air pollution



Air pollution is also an important factor affecting the economies of individual countries. According to the WHO (2015) and EEA (2017), indoor and outdoor air pollution causes up to seven million premature deaths worldwide each year. This includes about 160,000 people who die prematurely in countries covered by this joint audit of air quality, as a result of the negative impact of $PM_{2.5.}$ The WHO estimated the economic effects of premature deaths caused by air pollution in the participating countries as ranging from 1.4% of GDP in Israel to 35.2% of GDP in Georgia (see Figure 2).

In other words, all governments need to implement an effective air quality policy to tackle this problem, to improve air quality in their countries, and ultimately to improve their citizens' health and quality of life.

1.2 Supreme audit institutions

The supreme audit institutions (SAIs) are important actors overseeing the national implementation of environmental policies. They play an important role in contributing to efficient and cost-effective policy implementation.

The role of SAIs is to conduct independent audits of government activities. These audits provide national parliaments with objective information that can help them examine their government's public spending and performance. The European association of SAIs is called EUROSAI. One of its working groups is the EUROSAI Working Group on Environmental Auditing (EUROSAI WGEA), whose aim is to enhance the capacity of SAIs for auditing government environmental policies, to promote cooperation and to exchange knowledge and experiences on the subject among SAIs.

In order to better address the real risks to the environment and human health caused by air pollution, 15 national SAIs and the European Court of Auditors (ECA) joined forces in performing a joint audit of air quality in the European Union (EU) and a number of countries outside the EU. Both these 15 national SAIs and the ECA are members of the EUROSAI WGEA.

1.3 Scope

The aim of this joint audit is to broaden knowledge of how air quality policies are implemented at national level and to examine how effective and efficient these national policies are. Because air pollution is a transboundary problem, governments need not only to tackle air pollution in their own countries, but also to work together to find a common solution to cross-border air pollution. Our hope in conducting a joint audit is to boost the impact of the resultant report and deliver a powerful message by presenting common findings with joint conclusions and recommendations. We also hope that this joint report will spur national governments to take preventive and corrective action. Finally, we want to raise public awareness of air pollution, by reporting on how citizens are informed and what their governments are doing.

This report is based on a report compiled by the ECA, plus the summaries of the 15 national reports from Albania, Bulgaria, Estonia, Georgia, Hungary, Israel, Kosovo, the Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Slovakia, Spain, Switzerland and the Netherlands (see Figure 3).

Figure 3. Participants in the joint audit on air quality

Source: NCA and NIK

The 15 SAIs taking part in this joint audit assessed the action taken by their governments to improve air quality in their country. The ECA assessed whether EU action to protect human health from air pollution had been effective.[1]

1.4 Audit method

We decided to work with an audit framework (see Appendix 1) consisting of one main audit question and six secondary questions. The main audit question is: "*What is known about the effectiveness and efficiency of measures taken by national and local governments to improve air quality, and are these measures compliant with international and national legislation?*"

[1] To do this, the ECA examined whether (i) the Ambient Air Quality Directive (AAQ Directive) was suited for tackling the health impact of air pollution. The AAQ Directive sets objectives for ambient air quality with the aim of preventing or reducing harmful effects on human health and the environment as a whole. The ECA also examined whether (ii) the EU member states had effectively implemented the Directive; (iii) the European Commission was monitoring and enforcing the implementation of the Directive; (iv) air quality was adequately reflected in other EU policies and adequately supported by EU funds; and (v) the public had been well informed on air quality matters. The ECA examined six urban high-pollution 'hot spots' (i.e. Brussels, Milan, Stuttgart, Ostrava, Krakow and Sofia) and it audited the European Commission and the Environment Agency.

The six secondary audit questions are:

1. What is the main problem in your country in terms of air pollution?
2. What governance system has been put in place; who is responsible for what?
3. What statutory rules and regulations have been enacted?
4. What policy is being pursued to tackle the problem(s)?
5. How is the policy funded; what is known about the cost of the measures taken and the measurable benefits?
6. How are trends in air pollution monitored and reported on?

Because the national audits could not address all the issues covered by all the audit questions, the individual SAIs answered those questions that were relevant to their own national context. This means that each individual SAI decided to audit a selection of questions. In other words, they used what we might call a 'buffet model'. As a consequence, some of the data and findings reported here do not represent all the 15 participating countries.

Organisation of the audit

The audit formally started with a 'kick-off meeting' in The Hague (The Netherlands) in June 2016 and ended with a final meeting in Warsaw (Poland) in June 2018. The scope of the audit and the detailed audit questions were prepared during the kick-off meeting in The Hague.

Kick-off meeting: The Hague, the Netherlands, June 2016

A kick-off meeting was held at the Netherlands Court of Audit on 21 and 22 June, attended by representatives of 18 SAIs. The meeting included a series of presentations, brainstorming sessions and plenary discussions. The goal was to devise a common audit framework for a joint audit of air quality and to discuss project management issues. The end result of these two fruitful days of discussions was an audit framework consisting of the main audit question, six audit topics and six secondary questions (one for each topic, see Appendix 1). We also decided that the SAIs from the Netherlands and Poland would co-coordinate the audit. After the kick-off meeting, 16 SAIs decided to join the audit and the audit framework was finalised.

Final meeting: Warsaw, Poland, June 2018

The main goal of the final meeting was to share the audit findings, conclusions and recommendations of the 15 national audits and the ECA audit. We also discussed the contents of the joint report. Each SAI in attendance gave a presentation on their national audit, focussing on the secondary audit questions. The audits took place in 2016 and 2017 and the results presented by the SAIs were clear evidence of their hard work and dedication. The coordinators also presented the preliminary findings and discussed further steps during the final meeting.

Joint audit

The overall findings, conclusions and recommendations, as well as the 'highlights', are based on an analysis of the SAIs' answers to the audit questions in the summaries of the national audits. These summaries are presented in Appendix 2. The participating SAIs checked the references made in this joint report to their own audits.

National audits

The national audit approaches, including audit criteria, methodology, quality control and publication of findings, were in line with the standard procedures used by the SAIs in the countries in question. The audit criteria applied in the national audits were based on national criteria and on the relevant rules and legislation on air quality. Standard audit techniques such as interviews, document analysis, spot checks and questionnaires were used.

1.5 Reader's guide

This report summarises the findings, conclusions and recommendations of the 16 audits performed by the participating SAIs, i.e. 15 national audits and an ECA audit.

Chapter 2 presents our overall audit messages based on the conclusions and recommendations from the 16 individual audit reports.

Chapter 3 presents the main audit findings, illustrated with highlights from the national audit reports. Section 3.1 describes the problem of air pollution in the participating countries, with graphics showing key information. Our aim is not simply to compare the participating countries with each other - we realise that each country faces different challenges. Nevertheless, we wish to illustrate the problems faced by the participating countries that are related to the main air pollutants.

For reasons of consistency, we made maximum use of data from the EEA and the WHO. In the case of three participating countries, i.e. Georgia, Moldova and Israel, we used data supplied by the SAIs themselves as these countries have no links with the EEA. The data from these three countries is presented in separate boxes.

Sections 3.2 to 3.6 go on to present the audit findings in connection with the secondary audit questions. Section 3.2 describes the relevant governance systems. Section 3.3 sets out the relevant statutory rules and regulations. Section 3.4 discusses the air quality policies pursued by the national governments. Section 3.5 explains how policies (and policy measures) are funded. The final section of chapter 3, section 3.6, examines the monitoring and reporting systems in the participating countries.

The green and grey pages in-between the chapters present a collection of good practices (pages 15, 16, 36, 37, 48 and 49), and accounts of the impact of four national audits (pages 54, 55, 56 and 57).

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practice for improving air quality in Israel

Solar water heaters (SWHs) are a cost-effective way of producing hot water for domestic use. SWHs can be used in any climate, and are powered exclusively by solar energy. SWHs consist of solar collectors and tanks. The solar collectors capture and convert sunlight into heat. Water is then heated and stored in tanks. Israel is a sunny country, with a huge potential for the utilisation of solar energy. SWHs were developed in Israel, and Israel was one of the first countries to approve the use of SWHs. Nowadays, 85% of households in Israel use SWHs. SWH usage in Israel has reduced the country's annual energy consumption by 8%, thus reducing air pollution from electricity generation.

Rooftops of dormitory buildings at the Technion (Israeli Institute of Technology), Haifa.

Source: State of Israel Office of the State Comptroller and Ombudsman, Economic Affairs and National Infrastructure Audit Division.

Best practice in the Slovak Republic

The Ministry of the Environment of the Slovak Republic co-organised an international TAIEX-EIR PEER2PEER workshop on air pollution from household heating. The aim was to exchange best practices on measures for reducing air pollution from domestic heating. A total of 13 countries took part in the workshop, Slovakia included, and presented their best practices. It was the first workshop with such a clear focus on sharing best practices and all the attendees were enthusiastic about it. The workshop was a follow-up activity in the wake of the 'Clean Air Dialogue' previously hosted by the Ministry of the Environment. Both these activities may be viewed as examples of good practice in the field of air quality protection.

Source: Slovakian SAI

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practice in Hungary: support for improving the energy efficiency of buildings

A government scheme has been launched for improving energy efficiency by modernising industrial buildings and housing. Support is available in the form of tax relief or grants, which may be used for thermal insulation, replacing doors, modernising heating systems (replacing boilers, for example) and installing renewable energy recovery systems. Modernising and insulating buildings not only reduces the level of air pollution caused by heating, it also creates tens of thousands of jobs in the construction industry. This fosters economic growth and reduces the country's dependence on imported energy. The scheme has been encouraged by the decline in retail gas prices in recent years, which has prompted a growing number of households to switch from extremely polluting solid-fuel heating systems (many of which include household waste among their fuels) to more eco-friendly heating solutions.

Source: Hungarian SAI

Best practice in Poland

The State Environmental Monitoring (including air quality monitoring) provides real-time data on concentrations of key air pollutants. The data is generated by automatic measurement.

- The Chief-Inspectorate of Environmental Protection shares current data based on the Polish air quality index: http://powietrze.gios.gov.pl/pjp/current,
- Regional Inspectorates of Environmental Protection publish the results of automatic measurements of air quality. For example, data for the Małpolska region is available at:

http://monitoring.krakow.pios.gov.pl/dane-pomiarowe/automatyczne.

Source: Polish SAI

2. Shared conclusions and recommendations

Importance of taking action to improve air quality

Due to the severe impact of poor air quality on public health, air quality is one of the major environmental concerns in Europe today. The main sources of pollutant emissions in the 15 participating countries are transport, industry and households. The national governments in the 15 countries need to take action to improve air quality, so as to minimise the adverse effects and comply with national and international legislation. Knowledge of the risks posed by air pollution to human health and of the concentrations of critical pollutants is essential if governments are to pursue an effective policy for tackling the problem. An air quality strategy, including adequate policy instruments, is also crucial for adequately managing future problems. Due to the cross-sectoral nature of air pollution and the presence of transboundary issues, air quality policies and actions must be coordinated both within and between countries. Moreover, the population must be involved in order to effectively implement air quality policies. For this reason, information on air quality has to be not only reliable and complete, but also publicly available.

Main message

The 15 participating countries face very different challenges in addressing air pollution (for example, in terms of the levels of 'exceedance', governance systems, policy, funding, and monitoring and reporting systems). Our joint audit compares countries where air quality does not exceed any of the limit values set by the European Union with countries that have been brought to the European Court of Justice by the European Commission (Source: http://europa.eu/rapid/press-release_IP-18-3450_en.htm, accessed December 20, 2018). We also sought to compare EU member states bound by EU regulations with non-EU member states that are bound by different rules and regulations.

This chapter seeks to answer the main audit question: "*What is known about the effectiveness and efficiency of measures taken by national and local governments to improve air quality, and are these measures compliant with international and national legislation?*"

Eight SAIs were not able to audit the effectiveness and efficiency of the measures taken by their respective governments. Among the reasons for this were that no policy had been adopted, no performance indicators had been specified, and the monitoring information was inadequate. The seven other SAIs indicated that the measures taken by their governments were at best only partially effective.

The national governments in question have not given sufficient priority to the problem of air pollution, with all the attendant consequences for human health. Despite the differences between the countries, we conclude that (except for Estonia) the governments in the participating countries have not taken sufficient action to improve air quality.

Overall conclusions

The main message is based on the following conclusions:

Most participating countries do not meet national and/or international air quality standards and still exceed limit values

While the situation is improving and air quality has benefited from cuts in emissions, the EU member states included in this audit (except for Estonia) still do not comply with the EU's air quality standards. The same applies to the participating countries outside the EU: they exceed national and/or international standards. All countries except Estonia are in breach of one or more limit values. See sections 3.1 and 3.3.

Not all countries have adopted a national policy; not all have performance indicators

In two of the fifteen participating countries, the government has not produced a dedicated national policy for improving air quality. Six countries have produced a national air quality policy but have yet to fully implement or approve this national policy. The absence of a fully implemented national policy also means that there are no performance indicators for measuring policy effectiveness. The remaining seven countries have produced and implemented a national policy, five countries also specified performance indicators in the national policy. See section 3.4.

There is a lack of coordination among actors and policies

Nine countries reported problems with coordination. Countries that have coordination problems feel that interaction is needed among the various parties at national, local and regional level. A lack of proper coordination, interaction and cooperation may result in the absence of a systematic approach of solving air quality problems. Ultimately, this may result in the implementation of measures or policies (or policies in general) being delayed or implemented only in part. See sections 3.2 and 3.4.

Governments have limited information on budget spending and results

According to five of the twelve SAIs who examined this issue, responsible governments have limited information on budget spending and results obtained. A lack of information ultimately results in governments not knowing whether the measures funded are effective. The other seven SAIs who examined the same issue concluded that, although their governments knew how the budget was being spent, this did not mean that the budget was sufficient or always well-targeted. Six SAIs found that, in those cases in which budget was made available to improve air quality, it was not always sufficient. This affects the implementation of air quality policies and measures, monitoring (meaning that there are not enough monitoring systems) and the maintenance of the monitoring systems (meaning that monitoring systems are outdated). With the exception of Estonia, all countries with budget available for improving air quality incurred exceedances. Regarding EU funding, the ECA concluded that the projects funded were not always adequately targeted. See section 3.5.

Monitoring systems do not always function properly

Ten countries have operational monitoring systems and in five countries the monitoring systems are not in place or do not work properly. In total, nine SAIs reported problems with the monitoring systems in their countries. These varied from not fully functional stations, monitoring stations that were not maintained, and an inadequate number of monitoring stations to monitoring systems that could not generate data on all pollutants. As a result, the governments of at least eight participating countries do not have reliable and/or full data on air pollution. A lack of full and/or reliable data is a risk, in that it may ultimately cause governments not to take adequate and effective action to improve air quality. This may lead to the absence of approved national policies or to policies that are not implemented by the government, whether in full or part. See section 3.6.

There is scope for improving public information

Of twelve SAIs that formed an opinion on the quality and quantity of public information, eight concluded that the information available to the general public was delivered immediately after collection (i.e. the government posted real-time data). This information was made public through websites, electronic portals and mobile phone apps. There was, however, a wide variety in the level of detail provided to the public. In some cases, the information given on websites only showed the level of pollutants in a certain area. More information was provided if the website also stated that the air quality in a certain area was good or bad. While the Estonian government even provides detailed information on the concentration of pollen and on UV radiation, there is scope for improvement in the information provided to the public in other countries. The information that is available is not always reliable and/or complete. In some cases, it is unclear and not real-time information. This means that the general public does not have access to up-to-date, real-time information on a daily basis. Raising public awareness of air pollution and deciding how best to inform the public are both very important aspects of addressing air pollution. See section 3.6.

Overall recommendations

Because of the above differences among the fifteen participating countries, the recommendations made in the national reports vary. The detailed recommendations are grouped by topic below.

Prepare and implement air quality plans

In order to comply with national and international standards, the SAIs of Georgia and the Former Yugoslav Republic of Macedonia (FYROM) recommend that governments should:

1) establish acceptable limits for particulate matter and revise limits for other indicators in accordance with EU standards (Georgia);
2) update all relevant statutory and secondary legislation to achieve full harmonisation of national legislation with the EU's AAQ Directive (FYROM).

Other SAIs urge governments to:

1) take measures to implement a national air quality strategy (Albania);
2) define uniform standards for the preparation of air quality plans (Poland);

3) complete and update key documents needed for safeguarding air quality, i.e. the law on air protection from pollution, the air quality strategy and the air quality action plan (Kosovo);
4) monitor compliance with the targets for reducing emissions of hazardous pollutants, as specified in the national plan, and take action to meet the targets (Israel).

The ECA recommends that the European Commission should assist member states in introducing relevant measures in their air quality plans to better tackle cross-border air pollution and to prioritise and mainstream air quality into EU policies (ECA).

Measure the effectiveness of action taken

In order to measure the effectiveness of government action, SAIs recommend that governments should:

1) prepare, approve and implement a national strategy and a national air quality policy (Georgia, Slovakia, Bulgaria and Moldova);
2) establish and adopt binding indicators for measuring the effectiveness and efficiency of measures taken to combat air pollution (Poland and Slovakia);
3) include information on the impact of action set out in development plans for protecting the public from pollutants and for reducing emissions of pollutants (Estonia);
4) carry out regular interim evaluations to generate information on the efficiency of measures and to be able to adjust policy during the course of implementation (Slovakia, The Netherlands and Israel).

Improve coordination

In order to improve the coordination of air quality policies, SAIs recommend that governments should:

1) improve coordination among responsible entities (Georgia and Moldova);
2) improve coordination between activities planned and implemented under the air protection system (Poland);
3) require relevant ministries to regularly inform the government about the status of air quality (Slovakia);
4) establish an all-round system allowing for the comprehensive, unimpeded exchange of data (FYROM);
5) impose sanctions at central and local level for non-compliance with the goals of air quality policies and with the limit values of specified air pollutants (Bulgaria, Romania and FYROM);
6) designate a body for the national coordination of all activities in this field (Romania);
7) further strengthen federal enforcement. This should ensure that measures proposed are implemented with a high level of effectiveness and come with a healthy cost-benefit ratio (Switzerland).

Provide relevant data and perform a full cost-benefit analysis

In order to improve the evaluation of the costs and benefits of the measures taken, SAIs recommend that governments should:

1) provide budget for the operation and maintenance of all monitoring stations and incorporate financing measures in the planning documents (FYROM and Moldova);
2) ensure that clarity is provided about the financial resources required for implementing measures included in municipal air quality programmes (Bulgaria);
3) lay down rules and procedures for carrying out a cost-benefit analysis for all environmental policy and legislation prior to its adoption (Poland and Albania);
4) link funding to results. This would enable SAIs / Governments to express an opinion on the cost-effectiveness of individual government actions (The Netherlands).

In order to manage both health gains and cost-effectiveness, SAIs recommend that governments should:

1) carry out a full *ex-ante* social cost-benefit analysis, taking account of the non-financial health benefits of each measure. To determine the cost-effectiveness of each measure, the government needs access to information on both health gains and costs (The Netherlands);
2) undertake a progressive review of the current reference indices for pollution concentrations as defined for assessing air quality. Governments should tend towards the gradual approximation of limit levels to the indices recommended by the WHO, as these are geared more closely to health protection (Spain);
3) conduct a pilot study to assess the impact of air quality on the population's health, using the WHO's air quality–health indicators (Albania).

Improve monitoring systems

In order to improve monitoring systems so that they generate reliable, complete and timely data on the air pollution in their countries, SAIs recommend that governments should:

1) improve the air quality monitoring network by means of the adequate relocation of stations and the continuous servicing and maintenance of monitoring stations, set up a centralised system for the automated collection and processing of data, as well as real-time measurement and reporting on air quality (Kosovo, Georgia and FYROM), and establish an air quality dispersion modelling and forecasting system (Georgia);
2) ensure the timely submission and completeness of data from stationary sources of pollution in order to provide comprehensive information on ambient air quality (FYROM);
3) improve air pollution modelling calculations so as to identify tailored measures (Slovakia);
4) set up quality control and assurance procedures specifically for the monitoring system (Albania);
5) improve reports on air quality (Romania).

Raise public awareness

In order to raise public awareness, SAIs recommend that governments should:

1) plan and take appropriate action to raise awareness of the effects of air pollution and their mitigation tools (Georgia);
2) give every citizen access to real-time air quality data (Albania and Romania);
3) organise a national media information campaign, in order to inform the public about the health hazards associated with polluted air. Governments should suggest forms of concrete action that the public could take, depending on the season, atmospheric conditions, sources of pollution and other factors affecting ambient air quality (Bulgaria);
4) continue to raise public awareness of ways and means of improving air quality (Estonia);
5) continue to improve the information on air quality provided to the public. This should become normal practice, and should not be restricted to pollutant episodes described in protocols (Spain).

The ECA recommends that the European Commission should help member states to adopt best practices in terms of communicating with citizens; publish ratings of air quality zones, and seek to harmonise air quality indices in conjunction with the member states (ECA).

3. Main findings

The following sections set out the findings for each set of secondary audit questions and sub-questions. As we already mentioned in chapter 1, this audit was performed with the aid of a buffet model. This means that, although the various national audits may have differed from each other in terms of scope, all the SAIs made a selection from the same audit questions in the Audit Framework. The conclusions and recommendations are summarised in chapter 2 of this report. We use a series of highlights to present a selection of findings from the individual audits. Summaries of all 16 audit reports are attached as annexes to this report.

3.1 The main problem in terms of air pollution

Secondary audit question 1: What is the main problem in your country in terms of air pollution?

- What are the most critical substances posing a threat to air quality in your country and what are their primary sources?
- Has the government, and the central government in particular, made a comprehensive analysis of the problem?
- Is the information used for the problem analysis (publicly) available and reliable?

This chapter presents graphics with key information from the participating countries. Our aim is not simply to compare the participating countries with each other; we realise that each country faces different challenges. Nevertheless, we wish to illustrate the problems associated with the main air pollutants that are faced by the participating countries.

The quality of the air in a given country or region is not determined by just one or two factors. It is the result of a combination of factors, including the extent and source of emissions, meteorological conditions, the terrain and the human factor. This audit focuses on emissions of harmful air pollutants, and on whether government action complies with national and European legislation. The EU's AAQ Directive (Directive 2008/50/EC on ambient air quality and cleaner air for Europe) explicitly states that '*emissions of harmful pollutants should be avoided, prevented or reduced and appropriate objectives set for ambient air quality taking into account relevant World Health Organization standards, guidelines and programmes.*'

To assess the effectiveness of the air quality policies in the participating countries, we first needed to know about the status of the participating countries in terms of concentrations of certain pollutants in the air. Once we had this information, we could then ascertain whether the countries in question met the standards set by the EU and the WHO. Air quality parameters in EU countries are a key indicator of compliance with the standards laid down in EU legislation. In the event of non-compliance, the European Commission is entitled to instigate legal proceedings against the country in question at the European Court of Justice.

The most critical pollutants in participating countries

The main substances polluting the ambient air and those most often specified by the participating countries are particulate matter with a diameter of 10µm or less and particulate matter with a diameter of 2.5µm or less (PM_{10} and $PM_{2.5}$), benzo[ȧ]pyrene (BaP) and nitrogen dioxide (NO_2).

- PM_{10} and $PM_{2.5}$: primary particulate matter (PM) originates from both natural and anthropogenic sources, and is commonly classified as either primary PM_{10} or primary $PM_{2.5}$. Natural sources include sea salt, naturally suspended dust, pollen and volcanic ash, while anthropogenic sources include fuel combustion for power generation, domestic heating and transport, industry and waste incineration, and agriculture, as well as brakes, tyres and road wear and other types of anthropogenic dust. Black carbon is a constituent of $PM_{2.5}$ formed from incomplete fuel combustion, with the main sources including transport and domestic heating.
- BaP: gas emitted as a result of the incomplete combustion of fossil fuels and biofuels. The main sources of BaP are domestic heating (in particular wood and coal burning), waste burning, coke production and steel production. Other sources include outdoor fires, road traffic and rubber tyre wear.
- NO_2: the main sources of nitrogen oxides (NO_x) are combustion processes, which may be either stationary or mobile. Nitric oxide (NO) accounts for the majority of NO_x emissions: NO is subsequently oxidised to form NO_2, although some NO_2 is emitted directly. The proportion of NO_2 (i.e. the NO_2/NO_x ratio) in vehicle exhaust is considerably higher in diesel vehicles than in petrol-fuelled vehicles, because their exhaust after-treatment systems increase the oxidation of NO, thus generating higher direct NO_2 emissions.

Source for description of pollutants: EEA, 2017a

The next four figures show the concentrations of the most critical pollutants in the 15 participating countries, as indicated in the national audit reports produced by the SAIs. To ensure that the data on concentrations of individual substances was consistent, we decided to base these figures on information from a single source, i.e. the EEA database.[2] The EEA database does not contain any data for Israel, Georgia and Moldova, so the data for these three countries is presented separately.

As we have already mentioned, the figures show the concentrations of critical pollutants and illustrate the different challenges faced by the 15 countries. We do not seek to analyse the differences or compare the countries with each other.

Figure 4 shows the concentrations of PM_{10} in selected cities in the participating countries.

Figure 5 shows the concentrations of $PM_{2.5}$.

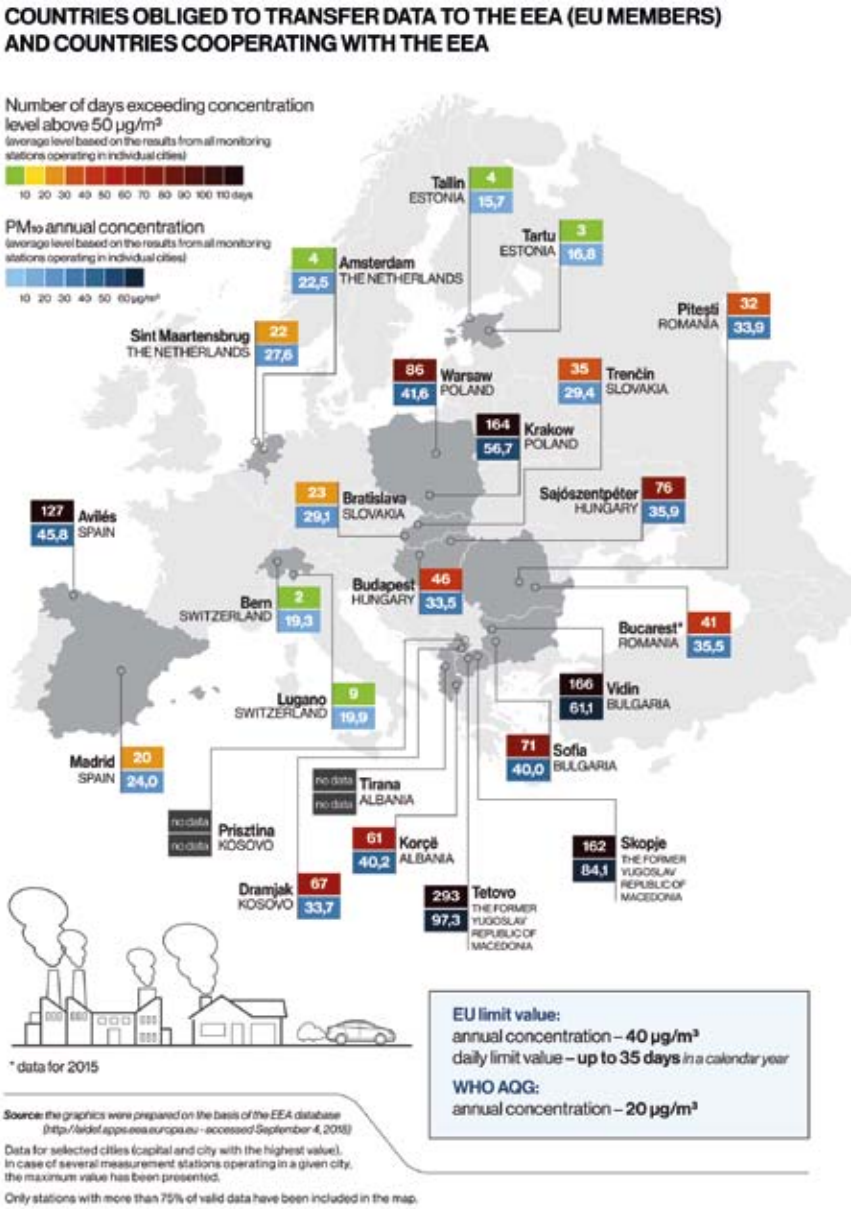
Figure 6 shows the concentrations of BaP.

Figure 7 shows the concentrations of NO_2.

Figure 8 shows the main sources of air pollution in each country.

[2] http://aidef.apps.eea.europa.eu/?source=%7B%22query%22%3A%7B%22match_all%22%3A%7B%7D%7D%2C%22-display_type%22%3A%22tabular%22%7D.

Figure 4. Concentrations of PM_{10} in selected cities in participating countries

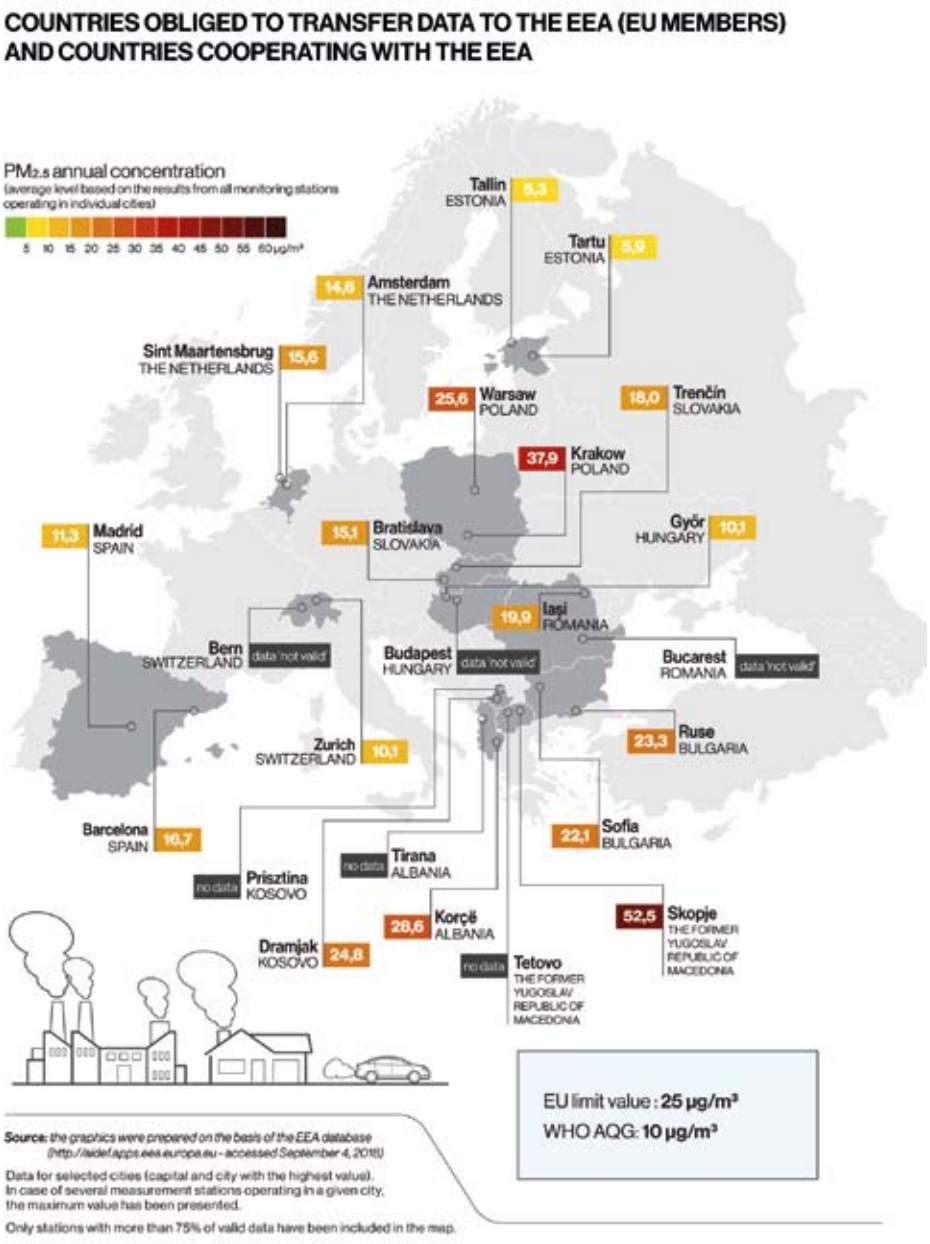


COUNTRIES NOT OBLIGED TO COOPERATE WITH THE EEA

COUNTRY	CITY	REPORTING YEAR	POLLUTANT	DATA REPORTING METRIC	NUMBER OF MONITORING STATIONS	UNIT	AVERAGE LEVEL OF ALL STATIONS
GEORGIA	Tbilisi	2016	PM_{10}	annual mean	4	µg/m³	40,0
				days in exceedance in a calendar year (above 50 µg/m³)		days	no data
MOLDOVA	Chișinău	2016	PM_{10}	annual mean	1 (122 monitoring days)	µg/m³	20,5
				days in exceedance in a calendar year (above 50 µg/m³)		days	8
ISRAEL	Jerusalem (Urban and Rual monitoring station)	2016	PM_{10}	annual mean	2	µg/m³	42,5
				days in exceedance in a calendar year (above 50 µg/m³)		days	103
	Tel Aviv (Traffic monitoring station)	2016	PM_{10}	annual mean	2	µg/m³	45,5
				days in exceedance in a calendar year (above 50 µg/m³)		days	111

Source: Table based on data provided by participants.

Figure 5. Concentrations of $PM_{2.5}$ in selected cities in participating countries

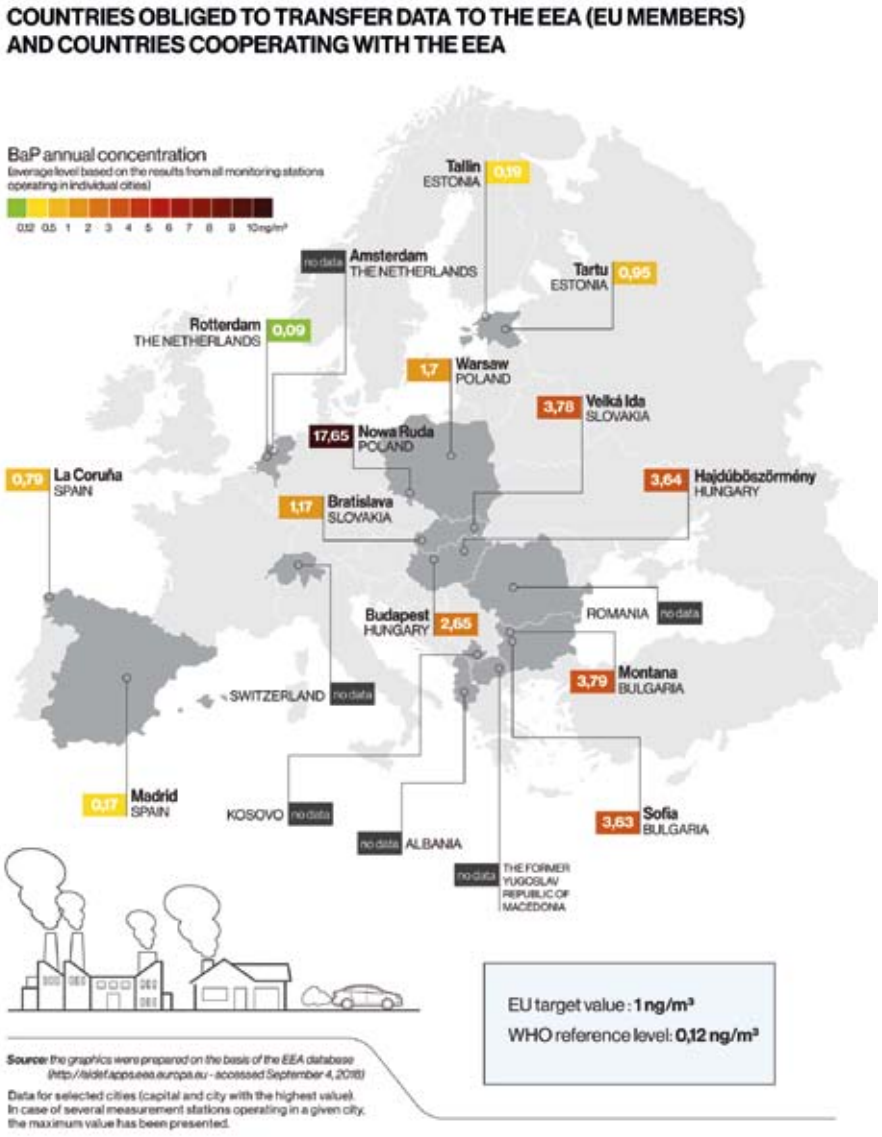


COUNTRIES NOT OBLIGED TO COOPERATE WITH THE EEA

COUNTRY	CITY	REPORTING YEAR	POLLUTANT	DATA REPORTING METRIC	NUMBER OF MONITORING STATIONS	UNIT	AVERAGE LEVEL OF ALL STATIONS
GEORGIA	Tbilisi	2016	$PM_{2.5}$	annual mean	4	µg/m³	21,5
MOLDOVA	Chișinău	2016	$PM_{2.5}$	annual mean	1 (102 monitoring days)	µg/m³	15,3
ISRAEL	Jerusalem (Urban and Rual monitoring station)	2016	$PM_{2.5}$	annual mean	2	µg/m³	16,5
	Tel Aviv (Traffic monitoring station)	2016	$PM_{2.5}$	annual mean	5	µg/m³	20,6

Source: Table based on data provided by participants.

Figure 6. Concentrations of BaP in selected cities in participating countries



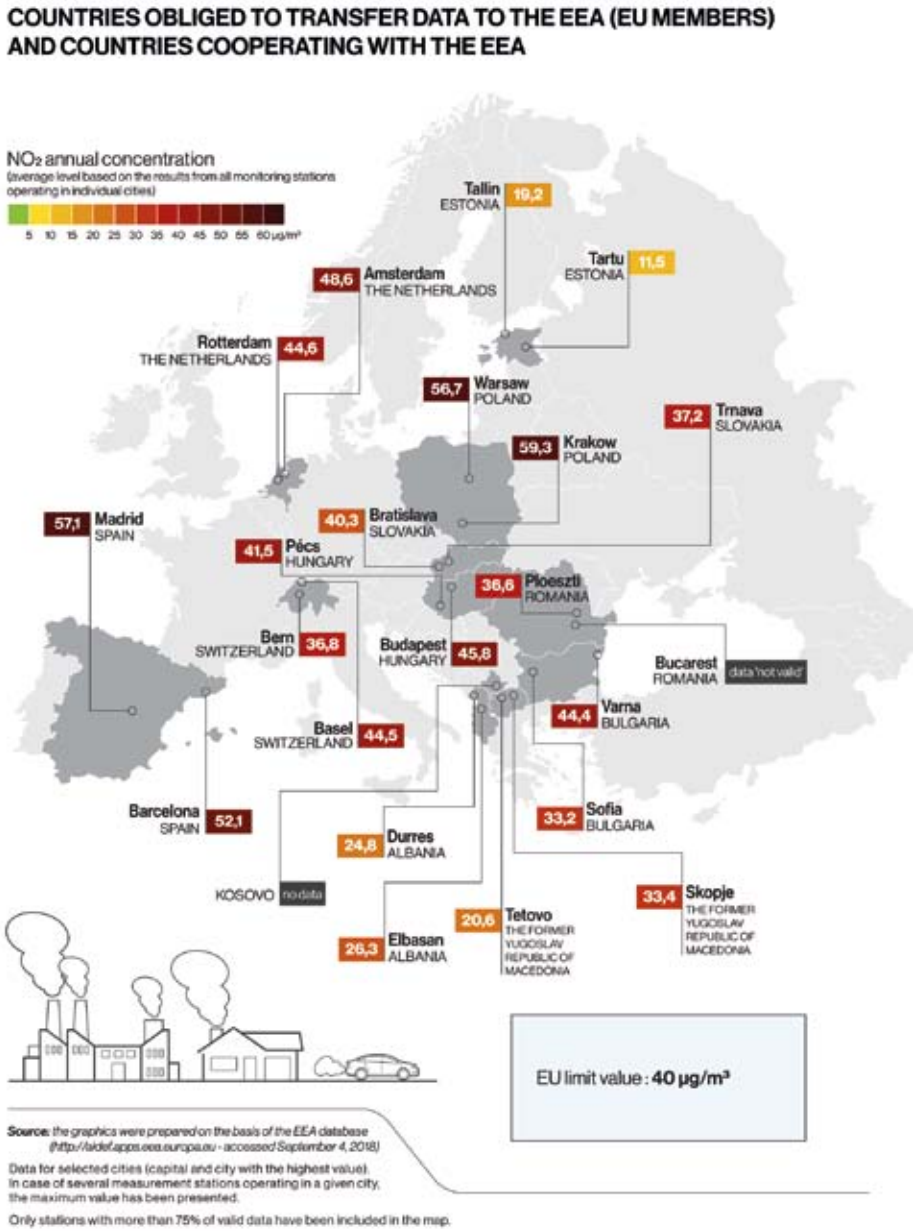
COUNTRIES NOT OBLIGED TO COOPERATE WITH THE EEA

COUNTRY	CITY	REPORTING YEAR	POLLUTANT	DATA REPORTING METRIC	NUMBER OF MONITORING STATIONS	UNIT	AVERAGE LEVEL OF ALL STATIONS
GEORGIA	Tbilisi	2016	BaP	annual mean	0	ng/m³	no data
MOLDOVA	Chișinău	2016	BaP	annual mean	0	ng/m³	no data
ISRAEL	Jerusalem	2016	BaP	annual mean	1	ng/m³	0,11
	Tel Aviv	2016	BaP	annual mean	8	ng/m³	0,09

Source: Table based on data provided by participants.

The completeness and continuity of measurement data were relatively low in some participating countries. This applies particularly to BaP concentrations.

Figure 7. Concentrations of NO_2 in selected cities in participating countries



COUNTRIES NOT OBLIGED TO COOPERATE WITH THE EEA

COUNTRY	CITY	REPORTING YEAR	POLLUTANT	DATA REPORTING METRIC	NUMBER OF MONITORING STATIONS	UNIT	AVERAGE LEVEL OF ALL STATIONS
GEORGIA	Tbilisi	2016	NO_2	annual mean	x	µg/m³	no data
MOLDOVA	Chişinău	2016	NO_2	annual mean	8	µg/m³	50,0
ISRAEL	Jerusalem *(Traffic monitoring station)*	2016	NO_2	annual mean	1	µg/m³	54,0
	Tel Aviv *(Traffic monitoring station)*	2016	NO_2	annual mean	5	µg/m³	45,4

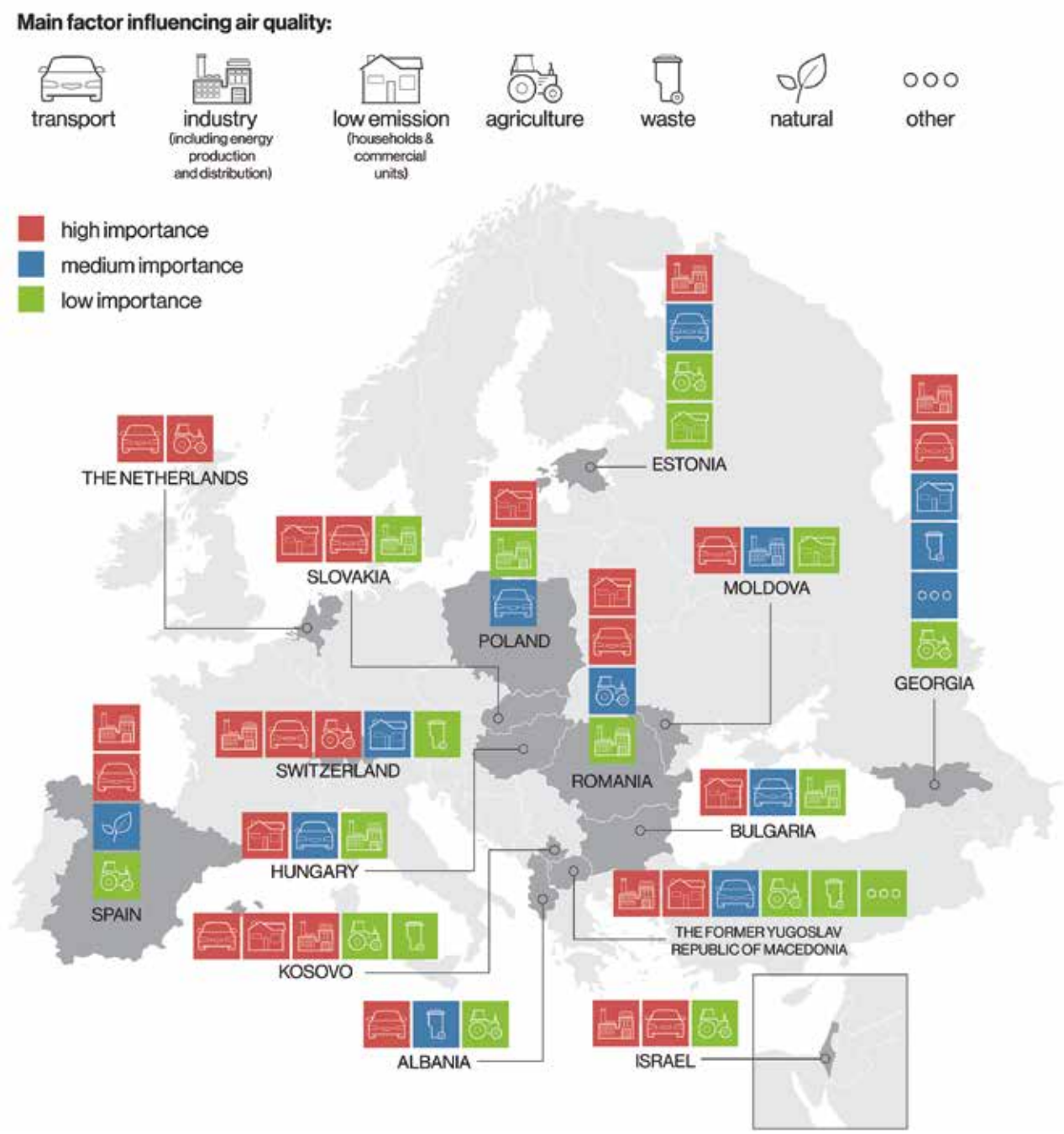
Source: *Table based on data provided by participants.*

High concentrations of NO_2 occur most frequently in cities with a high density of car traffic.

Primary sources of air pollution in participating countries

The results of the national audits presented in Figure 8 show that three main factors influence air pollution: transport, industry and households & commercial units (low emission). 12 participating SAIs identified transport and/or industry as the sources with the biggest impact on air quality in their countries. In Eastern Europe, seven SAIs specified 'low emission' as the main source of air pollution in their country.

Figure 8. Sources of air pollution in participating countries



Source: Table based on data received from participants

Full analysis of the air pollution problem in the participating countries; is the information (publicly) available and reliable?

All SAIs reported that their governments were aware of the problem of air pollution in their country. However, the results from the national audits also show that not all governments had conducted a fully-fledged problem analysis.

The results from the national audits show that data on air pollution is publicly available on websites in most of the countries. Some participating SAIs reported that the data was not always complete, reliable and representative, due to problems with the monitoring system. The problems with the monitoring systems are described in section 3.6.

3.2 Governance systems in participating countries

Secondary audit question 2: What governance system has been put in place; who is responsible for what?

- Which government body in your country is responsible for air quality? What other factors are involved?
- Is there any coordination among the various actors in the government system? If so, how is it organised?
- Are there any sanctions for non-compliance with the goals of air quality policy?
- What is known about the effectiveness of these sanctions?
- Is the governance system adapted to cross-border issues?

Responsibilities at different levels

A summary of the findings of the national audits shows that the main government authority responsible for air quality or environmental policies is usually a central government body (see Highlight 1). Generally speaking, a ministry (such as the Ministry of Agriculture in Hungary or the Ministry of Environment in Estonia) is responsible for preparing strategic documents on how to tackle air pollution. However, local and regional government authorities are also involved in improving air quality. The national audit reports show that there is scope for improving coordination among the various actors (see Highlight 2). The lack of coordination is discussed in more detail in section 3.4. Not all participants answered the questions on sanctions and their effectiveness, thus making it difficult to give a general answer. Highlight 3 highlights four situations.

➢ Highlight 1: Responsibility for air quality at central, regional and local levels

As we have already mentioned, central government is generally responsible for air quality and/or environmental policies. However, action designed to improve air quality is also taken at local and regional level. Switzerland is a good example: *'The Federal Office for the Environment (FOEN) is responsible for enforcing the requirements of the Ordinance on Air Pollution Control (OAPC). The cantons are largely responsible for implementing the OAPC in accordance with the law.'*

In Romania, *'the central authority with regulatory, decision-making and control powers at national level in the field of environmental air quality assessment and management is the Ministry of the*

Environment (ME). In the 41 counties and in Bucharest, the ME's responsibilities have been delegated to Environmental Protection Agencies (EPA). The National Air Quality Assessment and Management System (SNEGICA) provides the organisational, institutional and legal framework for cooperation between government authorities and institutions operating in the field of the evaluation and management of ambient air quality throughout Romania, as well as for informing the population and European and international bodies about ambient air quality.'

In Estonia, *'primary responsibility for the protection and quality of ambient air lies with the Ministry of the Environment. Policies are implemented through different development plans, i.e. the National Development Plan of the Energy Sector, the National Transport Development Plan, the National Health Plan and the Rural Development Plan. Policy coordination is carried out mainly through the compilation and implementation of the development plans, and all related parties are involved in the process.'*

Coordination can be improved in at least five countries

The findings of the national audits show that coordination among the various actors can be improved in at least five countries (see also section 3.4). A lack of coordination can result in poor communication between the parties involved and gaps in assigning responsibilities and tasks. Coordination among actors is organised differently in each country and depends in part on how responsibilities are divided among central, regional and local levels.

➢ Highlight 2: Coordination and cooperation are inadequate

The SAI of the FYROM concluded that the air quality management system was not properly organised and coordinated: *'An inter-sectoral Working Group on Air Quality and a Committee for Health and the Environment have been formed to improve inter-sectoral cooperation, but coordination between institutions is insufficient and there is no system for monitoring the implementation of each measure.'* The SAI also stated that the *'environmental inspections are carried out at central and local level without any coordination.'*

According to the Bulgarian SAI, *'the management and assessment of ambient air quality is a process that falls within the remit of various national and regional institutions and bodies.'* The SAI concluded that *'there are gaps in the allocation of responsibilities at local level for the implementation of clean air policy measures'* and that *'there are deficiencies in communication and the exchange of information on programme measures among municipalities suffering from poor air quality'*. Finally, the Bulgarian SAI concluded that the activities of the bodies were not coordinated and that the Minister of the Environment and Water did not do much in terms of interaction and communication.'

The Slovakian SAI concluded that *'interdepartmental cooperation on the air quality management system was insufficient and dependent on the capacity of human resources. Also, the coordination of health and economic policies with a policy to guarantee good air quality has not yet been sufficiently effective and has not taken place at the required level.'*

Sanctions for non-compliance and their effectiveness

EU member states are obliged to enforce the AAQ Directive. In the event of non-compliance, the European Commission is entitled to instigate legal proceedings against the country in question at the European Court of Justice.

➢ Highlight 3: Sanctions for non-compliance and their effectiveness

The European Court of Auditors concluded that *'the Commission faces limitations in monitoring member states' performance. Subsequent enforcement by the Commission could not ensure that member states complied with the air quality limits set by the AAQ Directive. Despite the Commission taking legal action against many member states and achieving favourable rulings, member states continue to frequently breach air quality limits.'*

The FYROM SAI concluded that *'the Republic of Macedonia is not subject to sanctions for non-compliance with the goals of air quality policies at EU level, nor are there national or local sanctions. Since there are no penalties […] in the plans for ambient air quality protection, the process of implementation is very slow. This poses a risk to the government's ability to achieve the goals it has set, overcome air pollution and prevent new sources of air pollution.'*

As we have previously mentioned, the Bulgarian SAI concluded that different central and local actors were involved in improving air quality and that difficulties had been encountered. However, *'the Minister of the Environment and Water has not imposed any fines on mayors and officials for failing to fulfil their obligations to develop and implement programmes to improve the quality of ambient air.'*

The Romanian SAI stated that *'environmental taxes have been implemented as environmental policy instruments to correct or direct the behaviour of the population and economic agents towards the protection of the environment.'* The effectiveness of these taxes has not been audited, however.

3.3 Rules and regulations

Secondary audit question 3: What statutory rules and regulations have been enacted?

- What international agreements has your country ratified? Has it enacted any additional national legislation?
- Have there been any problems with the implementation of certain legislation? If so, why?
- Is the government obliged to inform the public about air quality problems?

Of the 15 participating countries, eight are EU member states, i.e. Bulgaria, Estonia, Hungary, Poland, Romania, Slovakia, Spain and the Netherlands, and seven are non-members, i.e. Albania, Georgia, Israel, Kosovo, FYROM, Moldova and Switzerland.

In addition to the air quality standards laid down in the EU's AAQ Directive, the World Health Organisation has also recommended certain maximum concentration levels for pollutants. In some cases, the WHO's air quality guidelines are stricter than the AAQ Directive (see Table 1).

Table. 1 EU air quality standards and WHO guidelines (ECA, 2018)

Pollutant	Period	WHO guidelines (µg/m³)	EU AAQ Directive limit values (µg/m³)	No. of times a year that EU standards may be exceeded
NO_2	1 year	40	40	–
	1 hour	200	200	18
O_3	8 hours	100	120	25
PM_{10}	1 year	20	40	–
	24 hours	50[(a)]	50	35
$PM_{2.5}$	1 year	10	25	–
	24 hours	25	–	–
SO_2	24 hours	20	125	3
	1 hour	–	350	24
	10 minutes	500	–	–

(a) The WHO recommends following this guideline as the 99th percentile (3 exceedances)

Because of the many different types of rules and regulations adopted in the non-EU participating countries, we decided not to give an overview of all the rules and regulations, and instead to present a number of findings on the implementation of legislation.

Seven of the eight EU member states have not effectively implemented the AAQ Directive (except Estonia)

The AAQ Directive (EC, 2008, p.1) is the cornerstone of EU's clean air policy. It sets standards for the concentration of the most important airborne pollutants. The AAQ Directive requires member states to define air quality zones within their territory. Member states carry out preliminary air quality assessments in each zone and create networks of fixed measuring stations in polluted areas. The Directive contains criteria both for the location and for the minimum number of sampling points (ECA, 2018, paragraph 8).

Member states collect data from their networks and report this to the European Commission and the EEA each year. The European Commission assesses the data against the standards in the AAQ Directive. Where concentrations exceed the standards, member states must produce air quality plans (AQPs) to tackle the problem as soon as possible. The European Commission assesses these plans and takes legal action if it considers that member states are failing to comply with the Directive. The Directive imposes public information obligations on the member states, including alert and information thresholds (ECA, 2018, paragraph 9).

The ECA found that most EU member states had not effectively implemented the AAQ Directive (as applies for example to Poland in Highlight 4). In 2016, most member states were in breach of one or more limit values. Of the 15 participating countries, only Estonia did not breach any of the limit values.

➢ Highlight 4: Judgment of the European Court of Justice: European Commission vs. Republic of Poland

Due to the continuous exceedance of standards for PM_{10} (from 2007 to 2015), the Court of Justice of the European Union (ECJ) ruled on 22 February 2018 that Poland had infringed EU law on ambient

air quality and had not correctly transposed the provisions of the AAQ Directive concerning air quality plans. The Court noted that the fact of exceeding the limit values for PM_{10} concentrations in the ambient air was in itself sufficient to establish a failure to fulfil obligations. In the present case, data from the annual reports on air quality submitted by Poland showed that, from 2007 to 2015, Poland had regularly exceeded, first, the daily limit values for PM_{10} concentrations in 35 zones and, second, the annual limit values for such concentrations in nine zones. It followed that the exceedance thus established must be regarded as persistent.

Problems with implementation

The Moldovan SAI stated that *'the current legal mechanisms for airspace management in the Republic of Moldova are obsolete and there have been delays in harmonising them with the community framework. In the absence of a new law on air quality and protection that would regulate air quality assessment in relation to atmospheric pollutants, improve pollutant monitoring and public information, set emission ceilings for certain pollutants and reduce emissions of greenhouse gases, it is not possible to reduce the adverse effects of pollution on humans and the environment.'*

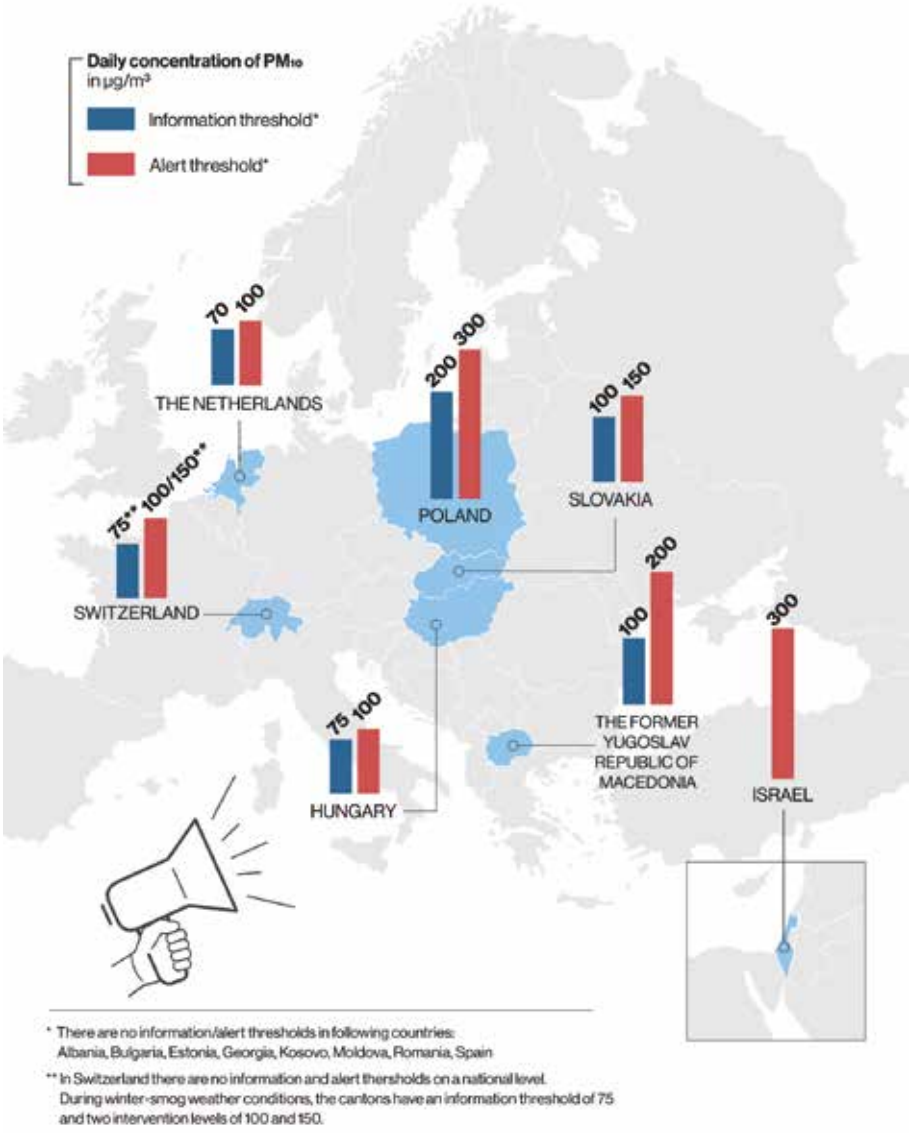
According to the Kosovan SAI, *'the legislative framework is not entirely complete to comply with all the requirements that need to be met in order to improve air quality. Those statutory regulations that have already been enacted have not been fully updated so as to enable easier and more comprehensive implementation.'*

Informing citizens in emergencies

The EEA regards public information as an essential element in addressing air pollution and reducing its harmful impacts (EEA, 2017b). The WHO stresses that 'improving transparency and sharing quality information widely in cities will further empower people to participate productively in decision-making processes' (WHO, 2016, p. 206) (ECA, 2018, paragraph 72).

The AAQ Directive sets information thresholds and alert thresholds for sulphur dioxide, nitrogen dioxide and ozone. The requirements for informing and alerting citizens about high concentrations of PM_{10} are based on national regulations. These requirements are not unified and, as a consequence, there are situations in which – given the same level of air pollution – citizens in different countries may or may not be warned by the authorities (see Figure 9).

Figure 9. Information and alert thresholds for PM_{10} in participating countries



Source: Data received from the joint audit on air quality participants

The AAQ Directive not only sets alert thresholds, but also requires member states to provide detailed information to the public (EC, 2008, Article 26). Citizens can thus play a key role in monitoring their country's implementation of the AAQ Directive, in particular when difficult political choices are involved. Local action is important, but requires public awareness: only if citizens are well informed can they be involved in policy and take action, where appropriate, including changing their own behaviour (ECA, 2018, paragraph 72).

The increasing importance of public action is shown by recent court cases brought by members of the public and NGOs against their own national authorities. In the Czech Republic, Germany, France, Italy and the UK, courts have ruled in favour of citizens' rights to clean air and have ordered the member states concerned to take action to tackle air pollution (ECA, 2018, paragraph 73).

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practices in Bulgaria

There are a number of good air-quality practices in Bulgaria.

- Modernising public transport, i.e. replacing old vehicles with ecologically sustainable vehicles (certified EURO 5 and EURO 6).
- Renovating 496 buses in Sofia and Plovdiv. 10 metro trains have been purchased as well as 20 tramcars, 126 buses and 100 trolley-buses for Sofia, Bourgas, Varna, Stara Zagora and Pleven.
- Extending the metro network in Sofia by building a third line. With its 380,000 passengers daily, the Sofia metro accounts for a 35% share of national transport, thereby reducing gas emissions by 90.5 thousand tonnes per annum, including greenhouse gas emissions.
- Using natural gas to heat public buildings and households. 225 buildings were connected to the central heating network in Sofia and 102 buildings were connected to the gas network in Stara Zagora.
- Installing air filters on chimneys (in Sofia, Plovdiv, Stara Zagora, Blagoevgrad and Veliko Turnovo).
- Extending cycle routes and building new cycle lanes: 49.51 km in Sofia, 48 km in Plovdiv and 7.8 km in Stara Zagora. Expanding parks. Maintaining and creating green areas alongside roads.

Source: Bulgarian SAI

Best practice in Georgia: use of electric vehicles

In order to improve the air quality in Georgia, a national strategy promotes the use of electric vehicles by offering various form of tax relief. Electric vehicles have been exempted from import tax and parking fees since 2017. The local Department of Transport in Tbilisi also plans to exempt electric vehicles from licensing requirements.

E-Space is the name of a start-up dedicated to promoting the use of electric vehicles in Georgia and fostering the adoption of new technologies. The company operates a network of public charging stations (52 in total) throughout the country, where motorists can charge their electric vehicles free of charge. The company is supported by the Ministry of Environmental Protection and Agriculture. The electricity needed for operating the 33 stations in the capital is sponsored by the local authority in Tbilisi.

Source: Georgian SAI

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practice in Estonia: E-Nose project for detecting sources of odour nuisance and tackling the causes

Estonia has taken steps to control odour limit values. If odour limits are exceeded, the odour source owner must take action in accordance with an action plan for odour reduction.

In the most problematic odour area, i.e. the main port of Muuga and the neighbouring Maardu residential area, the main source of the problem is excessive amounts of hydrogen sulphide (H2S) in the ambient air. An innovative project known as 'E-Nose' was launched in 2016 for measuring the degree of odour nuisance. 20 e-noses, i.e. odour sensors and four wind sensors, were installed as part of the project. These will supply information on odour nuisance incidents and odour sources. During the two years since the start of the project, the number of complaints has fallen and the Environmental Inspectorate has been able to detect the causes of odour and take action to end odour nuisance.

Source: Estonian SAI

Best practice in Romania

The best-performing programmes devised by the Environmental Fund Administration for reducing CO_2 emissions from vehicles are the **programme for stimulating the renewal of the national fleet of cars** (known as the 'Rabla Programme') and the **programme for reducing greenhouse gas emissions in transport by promoting non-polluting and energy-efficient road vehicles** (the 'Rabla Plus Programme'). The **Rabla Programme** aims at scrapping old cars (most of which fall in pollution categories Euro 4 and below) effectively producing CO_2 emissions of over 150-160g per km, by introducing new vehicles that meet the latest current pollution standards (Euro 6) and generate up to 130g CO_2 per km. Under the **Rabla Plus Programme**, emission reductions are much higher and are defined as the difference between the average CO_2 emissions of a new vehicle that would have been purchased in the absence of a Rabla Plus grant, which exceeds 110g CO_2 per km, and the CO_2 emission value of an electric vehicle, i.e. 0.

Source: Romanian SAI

3.4 Government policy aimed at tackling the problem

Secondary audit question 4: What policy is being pursued to tackle the problem(s)?

- Does your government have a dedicated policy on air quality? If so, what measures does it contain?
- Are there indicators for measuring the effectiveness of the policy in combating air pollution?
- If there are different approaches, is policy coordinated?

Although most countries have a dedicated air quality policy, some have not fully implemented it

As we mentioned in the previous section, EU member states are obliged to comply with the AAQ Directive. The Directive allows certain exceedances of the limit values for air pollutants annually. Where exceedances are observed, the member states concerned are obliged to produce national air quality plans that must contain concrete measures for attaining the limit or target values as soon as possible. However, this does not apply to the non-EU members covered by this audit, who (as we have already pointed out) are not bound by the AAQ Directive.

The ECA concluded that, while air quality has been improving in the EU, most member states have still failed to comply with the EU's air quality standards and have not taken enough effective action to sufficiently improve air quality. This finding corresponds with the outcomes of the national audits. The ECA also found that, although many EU policies affected air quality, they did not properly reflect the importance of improving air quality. EU policies on areas such as climate, energy, transport, industry and agriculture all have a direct impact on air quality and the choices made in implementing these policies may prove detrimental to clean air.

The findings of the national audits show that six governments have implemented national plans and have policies dedicated to improving air quality. In the case of Estonia, although there is no specific air quality policy, air quality policies are pursued in the form of development plans (see Highlight 5). Five SAIs stated that there were problems with the implementation of their government's strategy or national plan (Highlight 6). Three countries have no national plan or strategy for improving air protection (Highlight 7). Each highlight presents a selection of the main observations.

Table 2 is an overview of all the national audit findings for the secondary audit questions. A distinction is made between EU and non-EU member states. The colours show how much progress each country has made and what still needs to be done.

Table 2: What policy is being pursued to tackle the problem(s)?

	Sub-audit questions	Does your government have a dedicated policy on air quality? If so, what measures does it contain?	Are there indicators for measuring the effectiveness of the policy in combating air pollution?	If there are different approaches, is policy coordinated?
EU member states	Bulgaria	Highlight 5		
	Estonia	Highlight 5	Highlight 8	
	Hungary			
	Poland			Highlight 8
	Romania			
	Slovakia	Highlight 7	Highlight 8	
	Spain	Highlight 6		
	The Netherlands	Highlight 5		
Non-EU member states	Albania	Highlight 6		
	Georgia			Highlight 9
	Israel			
	Kosovo	Highlight 6		
	Moldova	Highlight 7		Highlight 9
	Switzerland			Highlight 10
	The Former Yugoslav Republic of Macedonia		Highlight 8	Highlight 9

Policy implemented/indicators adopted /good coordination

Policy not implemented/indicators not adopted /coordination problems

No policy / no indicators /no coordination

Sub-audit question not in audit scope

➢ Highlight 5: National plans in place and implemented

The Estonian SAI stated that, '*according to the results of the ambient air monitoring programme, Estonia did not experience any problems with the quality of ambient air in 2014-2016, in terms of the most important pollutants, i.e. nitrogen oxides (NOx), sulphur dioxide (S02), volatile organic compounds (VOC) and fine particulate matter (PM2.5). The level of critical pollutants has not exceeded the limit value or been over the limit on more occasions than permitted.*' Under the AAQ Directive, therefore, Estonia is not obliged to have a specific air quality plan. Although the Estonian government does not have a specific, dedicated air quality policy, air quality policies are pursued in the form of development plans, i.e. the National Development Plan of the Energy Sector, the National Transport Development Plan, the National Health Plan and the Rural Development Plan. Their aim is to reduce environmental impacts in general.

The findings of the national audits show that Bulgaria, Hungary, Israel, Poland, Switzerland and the Netherlands have implemented national plans.

The Dutch government launched a National Air Quality Cooperation Programme (NSL) in 2009, in collaboration with the local authorities. The aim of the programme is to improve air quality. This is an example of a policy that exists at both national and local level and in relation to which national and local governments are both responsible for improving air quality.

In Bulgaria, the government protects air quality by means of measures and objectives set out in three national programmes. National measures are aimed at phasing out pollution from large combustion plants, and limiting the sulphur content of liquid fuels. Local air quality management programmes seek to identify hazardous pollutants in the municipality concerned.

➢ Highlight 6: National strategy or national plan not fully implemented

The findings of the national audits show that the governments of Albania, Kosovo, the FYROM, Romania and Spain have not fully implemented a national strategy or national plan.

In the case of Albania, a National Strategy on Air Quality (NSAQ) was adopted in 2014, but has not been implemented. The responsible ministry, i.e. the Ministry of Tourism and Environment, has never reported on the implementation of the NSAQ. A national action plan on air quality has not been approved and, as a result, no municipality in Albania has approved any local air quality action plans.

Kosovo has had an Air Quality Strategy since 2013, but an air quality plan has yet to be approved.

The Spanish government has a National Air Quality and Atmosphere Protection Plan, but only some of the relevant measures have been implemented. The Spanish SAI reported that 38% of the measures have been implemented and the remaining 62% have either been implemented in part or have yet to be implemented.

➢ Highlight 7: No policy or strategic objectives

The findings of the national audits show that Moldova, Georgia and Slovakia do not have a national policy or a strategy for improving air protection.

The Moldovan SAI concluded that '*there is no single national policy for combating air pollution and there are no clearly defined strategic objectives. It is therefore not possible to create an integrated air quality management system. Existing environmental, transport and health policies do not define the environmental factor in the context of the negative impact of pollutants on human health and the balance between economic development and environmental protection.*'

The Slovakian SAI stated that '*a comprehensive strategy for air protection is missing and there is no national emission reduction programme. The Ministry of Environment is, however, preparing a new strategy for air protection which is expected to be adopted in 2019.*'

At least eight countries have no performance indicators for measuring the effectiveness of policy

The findings of the national audits show that six countries, i.e. Bulgaria, Hungary, Israel, Spain, Switzerland and the Netherlands, have adopted performance indicators for measuring policy effectiveness.

The SAIs in the other eight countries stated either that they did not have any performance indicators for measuring policy effectiveness or that such indicators did exist, but had not yet been fully implemented. We found that the absence of a national plan also leads to an absence of performance indicators. This means the SAIs in these eight countries cannot form an opinion on the effectiveness and efficiency of the measures taken by their governments to improve air quality, simply because the government cannot provide information based on performance indicators to show whether their national plan have helped to improve air quality (see Highlight 8).

➢ Highlight 8: Performance indicators not properly implemented

The SAIs in Albania, Estonia, Georgia, the FYROM, Moldova, Poland, Romania and Slovakia reported that their governments either did not have any performance indicators or did have them, but had not properly implemented them. If performance indicators are not available, governments do not have any information on the effectiveness of their policy. As the Estonian SAI commented on its government's development plans, *'the development plans do not contain any information on the impact of the measures on the protection of the ambient air and on reductions in the level of pollutants. For example, although the support given to farmers for storing manure and the measures taken to stimulate the production of bioenergy should also help to reduce NH_3 emissions (ammonia), no information or figures are given about any decrease in NH_3 levels.*'

In the case of the FYROM, where the government's air quality policy has not been properly implemented at either national or local level, the SAI concludes that *'the measures in the National Plan for Ambient Air Protection are complex and cover different areas; they are intended to be implemented by central and local institutions. There is no system for monitoring the implementation of each measure. The National Plan does not contain indicators for measuring the effectiveness of policy implementation, which makes it difficult to monitor measures for achieving the government's goals and policies for combating air pollution. Due to a lack of administrative capacity, despite the fact that most municipalities are located in zones and urban agglomerations where there is a risk of levels of polluting substances exceeding one or more alert thresholds, only the local authorities in Tetovo, Bitola and Skopje have prepared short-term action plans for ambient air protection. The local plans do not set precise deadlines for the implementation of each measure, nor indicate the level of funding required, the sources of funds, the indicators for measuring effectiveness, and the body that is responsible for monitoring and evaluation.*'

The Slovakian SAI recommends that the government of Slovakia should establish and adopt binding indicators for measuring the effectiveness and efficiency of measures for combating air pollution, and that it should regularly evaluate these indicators and subsequently propose action for improving air quality in the Slovak Republic.

Coordination of policy where there are different approaches

The findings of the national audit reports show that most governments have encountered difficulties in coordinating the various sectoral policies on air pollution. In some cases, there is poor cooperation between different public-sector institutions (see Highlight 9) and between national, regional and local initiatives. Countries with a highly complex governmental system (as in the case of Poland) are more at risk of suffering from poor policy coordination (see Highlight 10).

In Hungary, the government body responsible for air quality is the Ministry of Agriculture. The Hungarian SAI concluded that there were no coordination problems. In Israel, the Environmental Protection Ministry is responsible for ensuring air quality. The SAI did not identify any coordination difficulties with other government agencies. In the case of Romania, there is good coordination between the various government objectives: *'the achievement of the objectives for air quality in cooperation between the public-sector institutions with civil-society organisations active in the field is guaranteed by a National System of Integrated Air Quality Assessment and Management.'*

➢ Highlight 9: Neither integration nor coordination

The SAIs in five countries reported that their governments did not have an integrated approach to coordination among the various actors involved.

The FYROM SAI described an example: '*According to the law on waste management, the Ministry of Environment and Physical Planning and the local mayors are obliged to close and re-cultivate illegal landfills. There are 54 municipal landfills that pollute groundwater, soil and air, and these are still functional.*'

The Moldovan SAI wrote: *'The existing air protection system is not integrated. It is characterised by poor cooperation between public-sector authorities and air quality management agencies, and is not capable of guaranteeing that problems affecting air quality are solved in a systematic, uniform manner.'*

The Georgian SAI concluded that coordination among the various air protection was not adequate and effective and urged the Ministry of Environmental Protection to do more in terms of coordination and supervision, so as to ensure that government action to improve air quality is efficient.

➢ Highlight 10: Coordination challenges due to complex governmental systems

In the case of Switzerland, the implementation of the Ordinance on Air Pollution Control (OAPC) is a complex task shared by numerous players. The Federal Office for the Environment (FOEN) is responsible for supervising the implementation of the OAPC, which is largely the responsibility of the cantons. The Swiss SAI (SFAO) reported that '*one benefit is that the cantons can better adapt the implementation of the OAPC to local conditions and specific pollution situations. The considerable coordination effort associated with this is a disadvantage.*' The SFAO concluded that enforcement could be harmonised to an even greater extent and recommended refining existing forms of supra-cantonal cooperation and appropriate forms of efficient and effective enforcement.

The Polish SAI also reported that the air protection system in Poland was very complicated. It requires interaction between multiple participants at various administrative levels, including national, regional and local. For example, '*four independent public-sector entities are responsible for the most important tasks in the air protection system. These entities are responsible for: (1) planning actions to combat air pollution and preparing air quality plans (regional authorities), (2) implementing planned activities (local authorities), (3) finance (one national and 16 regional funds for environmental protection and water management) and (4) auditing the activities performed by local authorities (16 regional inspectorates of environmental protection).*' The Polish SAI concluded that the work of public

sector bodies involved in the air quality system was not adequately coordinated. No adequate action had been taken to guarantee the consistency and continuity of the various sources of funding.

3.5 Funding of the policy and information about costs and benefits

Secondary audit question 5: how is policy funded; what is known about the cost of the measures taken and the measurable benefits?

- How is budget allocated for the government's policy on air quality?
- Does the (central) government have access to information on the costs and benefits of the policy?
- Have the costs and benefits been analysed?
- If so, what were the results of this analysis?
- What is known about the effectiveness of public funding or other incentives for helping to improve air quality?

Table 3 shows whether and how budget is made available for the policy, whether funding is sufficient and whether the government has access to information on the costs. Not all participants answered the last sub-question on the effectiveness of public funding. Most SAIs reported on whether their governments had analysed the costs and benefits and on whether anything was known about the effectiveness of public funding.

Funding is not always adequate and governments do not always know how much action costs.

Table 3: How is policy funded? What is known about the cost of the measures taken and the measurable benefits?

	Sub-audit questions	How is budget allocated for the government's policy on air quality?	Does the (central) government have access to information on the costs and benefits of the policy?	Have the costs and benefits been analysed?	What are the results of this analysis? What is known about the effectiveness of public funding or other incentives for helping to improve air quality?
EU member states	Bulgaria		Highlight 13		
	Estonia				
	Hungary			Highlight 14	
	Poland	Highlight 12	Highlight 13		Highlight 15
	Romania				
	Slovakia				
	Spain				Highlight 15
	The Netherlands		Highlight 13		Highlight 14
Non-EU member states	Albania	Highlight 12			
	Georgia				
	Israel				Highlight 15
	Kosovo				
	Moldova		Highlight 13		Highlight 15
	Switzerland		Highlight 13	Highlight 14	
	The Former Yugoslav Republic of Macedonia	Highlight 12			

Funding allocated/access to information/cost benefit analysis/ measures are effective

Funding allocated but not adequate/no access to full information or no overall picture/incomplete cost-benefit analysis/ measures have only been partially effective

No funding allocated/no access to information/no cost-benefit analysis/ measures are not effective

Sub-audit question not in audit scope

In most participating countries, national policies and measures are funded with domestic funds (i.e. the state budget, taxes, environmental funds and local government budgets). These are sometimes combined with EU funds. The ECA found that EU project funding was not always well-targeted according (see Highlight 11).

The SAIs in five countries stated that, although funding was available for air quality policy, it was not sufficient to improve air quality (see Highlight 12). Even though most governments have set aside budget for air quality policy, not all governments have access to full information on the costs (see Highlight 13).

➢ Highlight 11: EU project funding not always well-targeted:

The ECA found that direct EU funding for air quality can provide useful support, but that project funding was not always well-targeted. The ECA also identified a number of successful projects, particularly those supported by the LIFE programme (see best ECA practice).

The Albanian SAI stated that '*to date, funding from the state budget for air quality has been low, and most funding has come from donors, as in the case of the EU IPA projects. All income generated by environmental taxes goes to the state budget and is used for other purposes. By not providing funding for accreditation and calibration, the Ministry of Tourism and the Environment has been partly responsible for the further deterioration of air quality monitoring stations.*'

➢ Highlight 12: insufficient budget

The FYROM SAI reported that budgets for implementing air quality policy were inadequate. '*According to data from the State Statistical Office for the audited period, air quality investment from the State Budget is minor and represents only 0.1% of GDP. […] Of the planned funding for the annual work programme of the State Automatic Monitoring System, only 31-42% has been approved, which is insufficient to enable it to do its job. As a result, there has not been any regular maintenance, purchases of spare parts for the measuring stations, procurement of laboratory equipment and chemical reagents, laboratory accreditation or staff training. The fact that the work programme is not fully funding undermines the continued operation of the monitoring system.*'

According to the Polish SAI, the sources of funding are varied and fragmented. The main sources are a national fund and 16 regional funds for environmental protection and water management, EU funds and the local authorities' own funds.

➢ Highlight 13: information on budgets can be improved; in certain cases, no complete picture is available

The Dutch SAI reported that '*the Ministry of Infrastructure and the Environment does not keep annual accounts of expenditure on the various forms of action taken under the National Air Quality Cooperation Programme (NSL). In our 2016 audit, we concluded that the Minister did not have much information available on the funds spent in implementing the NSL. Funds were spent both by central government on national measures and by local authorities on local measures. The ministry does not ask for financial progress reports on the cost of local measures. We also concluded that the minister had limited information on the cost-effectiveness of each of the four types of NSL measure. The financial accounts are not linked to the programme's results. There are no clear links between national and local measures; it is not clear whether and how they reinforce each other.*'

The Polish SAI concluded that '*there were no data on the cost of corrective action concerning air protection (including all sources of funding), nor a detailed projection of the future level of expenses*

that needed to be incurred in order to guarantee the requisite air quality. Also, no analysis had been made to establish the level of external cost stemming from poor air quality.'

The Moldovan government does not have access to comprehensive data (for the whole country) on public expenditure on air protection.

The Bulgarian SAI stated that '*there are no financial statements quoting specific figures for the implementation of national and municipal strategies, programmes, plans and there is no link with national and local financial estimates and annual budgets.*'

The Swiss SAI concluded that *'estimates of the cost of implementing the Ordinance on Air Pollution Control in relation to particulate matter are available only for individual measures; there is no overall picture. Consequently, the Swiss Federal Audit Office recommends that the government seek to achieve greater cost transparency in relation to air pollution control.*

Costs and benefits are not analysed or not fully analysed. The cost-efficiency or cost-effectiveness of government action is in some cases negative, and in others unknown or varies considerably.

Only five SAIs, i.e. those in Hungary, Israel, Spain, Switzerland and the Netherlands, said that their government analysed some or all of the costs and benefits of their air quality policy. Although the governments of Israel and Spain analysed the costs and benefits, the SAIs found that the measures taken were not effective. In Hungary and Switzerland, the government analysed some of the costs and benefits. The cost-effectiveness of the measures implemented by the Swiss cantons varies considerably.

Seven SAIs expressed an opinion on the effectiveness of their government's air quality policy or on a selection of government measures. Eight SAIs did not audit the effectiveness of the measures taken by their government. The SAIs in Hungary, Switzerland and the Netherlands claimed that the measures taken by their governments (in the case of Switzerland, as implemented by the cantons) were partially effective (see Highlight 14). The SAIs in Israel, Moldova, Poland and Spain found that the measures taken by their governments had not been effective in improving air quality (see Highlight 15).

➢ Highlight 14: Partly analysed, partly effective

The Hungarian SAI stated that '*the annual reports gave information about the measures planned/taken, on spending on the implementation of the National Environmental Programme for 2009-2014 and on the Cross-sectoral PM10 Programme. The effectiveness and cost of the programmes were analysed in part.*'

The Swiss SAI found that the cost-efficiency of different measures varied considerably. The SAI concluded that *'economic cost considerations should make it possible to better classify and evaluate the benefits of the environmental policy measures.*'

The Dutch SAI found that '*the National Air Quality Cooperation Programme (NSL) had improved air quality in the Netherlands and there were fewer breaches of air quality limits, even though, for example, more infrastructure had been built. But we also found that air quality did not yet comply with the standards throughout the country, as was one of the NSL's objectives. The 2016 audit of central government found that the Minister of Infrastructure and the Environment had failed to learn lessons from the programme and had not made any changes to it during its implementation. The minister had*

not carried out an interim evaluation and the final evaluation of the NSL had been postponed several times. It is now planned for 2019, ten years after the programme's formal launch in 2009.'

[…]

'The 2016 audit of central government found that the Minister of Infrastructure and the Environment had only limited information on the cost-effectiveness of the measures implemented as part of the NSL. The minister did not know whether the mix of national and local measures was the best means of improving air quality in the Netherlands and we were unable to form an opinion on the cost-effectiveness of the measures. In other words, it was not possible to say whether the minister could have achieved more with the same amount of money or achieved the same outcomes with less money.'

[…]

'Our 2017 audit concluded that the minister could certainly have achieved the same reduction in emissions at a lower cost if she had known about the impact of the individual measures.'

➢ Highlight 15: Policy not effective

The Moldovan SAI concluded that '*the national air quality management system is characterised by limited functionality and is unable to assess the impact of emissions on air quality and to manage the health risks posed by the harmful effects of pollution.*'

In Israel, the SAI concluded that Israel had set itself the task of reducing emissions of greenhouse gases and other noxious pollutants into the air. Air pollution is caused by many factors, primarily by the combustion of fossil fuel to generate electricity, power vehicles and conduct industrial operations. More than half of the external costs due to emissions of carbon dioxide and noxious pollutants in Israel originate in the electricity sector. The Office of the State Comptroller estimated the cost of air pollution due to emissions of greenhouse gases and noxious pollutants at €4 billion per annum in 2015. More than half the cost, i.e. €2.2 billion, stems from electricity generation. From 2007 to 2016, Israeli governments took 20 decisions on the reduction of air pollutants, greenhouse gases, energy efficiency, and energy production from renewable sources. The Israeli SAI found that government decisions on cutting emissions of greenhouse gases and using renewable energy in electricity production had not been implemented in practice.

The Polish SAI found that, although the local authorities had taken many measures to improve air quality, they were all still ineffective in the light of the very high scale of normative value exceedances in Poland.

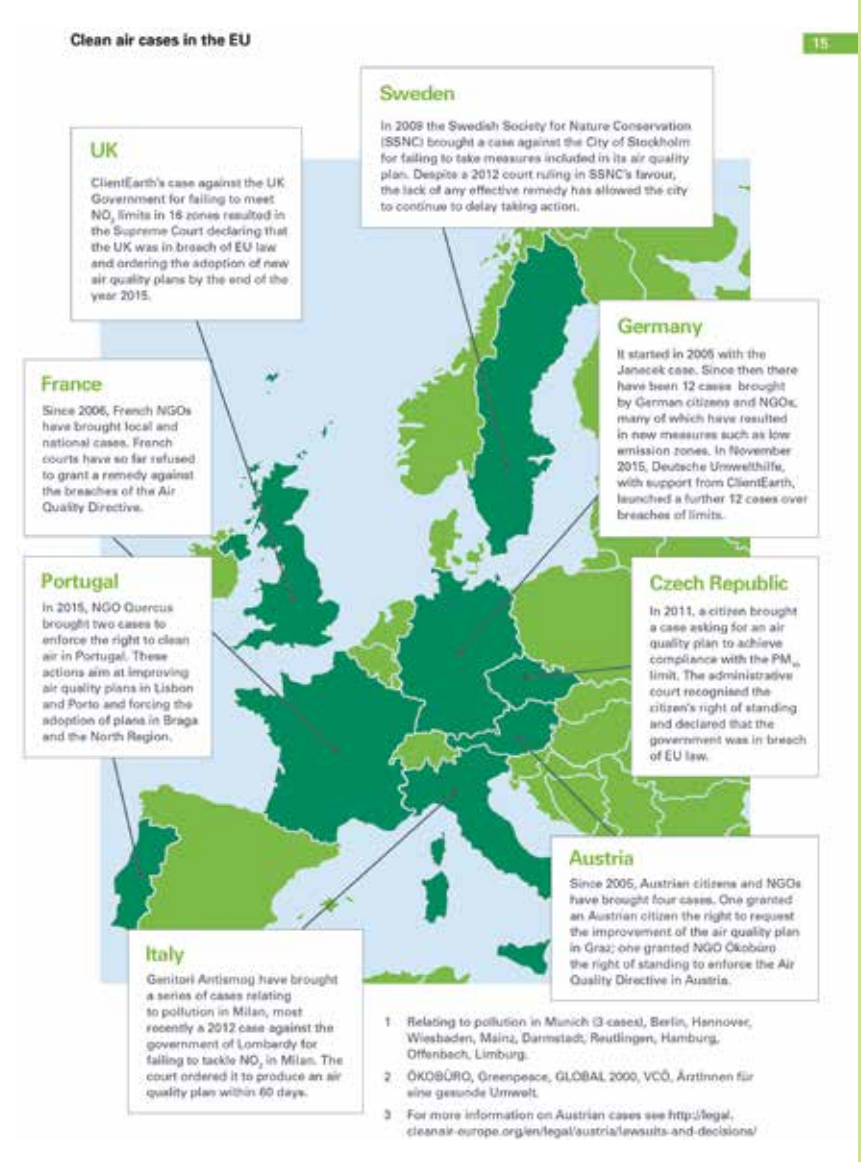
In Spain, the Air Quality National Plan was evaluated in 2016. The aim of the Air Quality National Plan is to reduce the percentage of the population affected by poor air quality. According to the evaluation report, the policy has been ineffective, i.e. it has not achieved its objective.

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practices in the EU identified by ECA: the LIFE project.

One of the ways in which the EU supports air quality is by funding projects through its LIFE programme. One particular project, known as LIFE Legal Actions – Legal Actions on Clean Air, was designed to support civil-society stakeholders. One of the project outputs was a Clean Air Handbook, which stakeholders can use as a guide in launching proceedings in their national courts to seek improvements in air quality. The following image taken from the handbook shows some of the court cases instigated by stakeholders around Europe.



Source: The Clean Air Handbook, Version 2.0, November 2015

Collection of good practices

By sharing good practices in the various countries involved in the joint audit, we hope to inspire governments to learn from each other.

Best practice in the Netherlands

Internal and external reviews of the air quality monitoring system have shown that the methods currently used by the Dutch National Institute for Public Health and the Environment (RIVM) for measuring and calculating air quality are both effective and efficient. The current monitoring system measures and calculates air quality and registers emissions of pollutants. The results provide a detailed picture of air quality in the Netherlands, and are used for various national and international reports.

Information on air quality in the Netherlands is available in real-time at: https://www.luchtmeetnet.nl/. This is open data that is available to all members of the public. The website shows the various stations and pollutants, indicating whether the air quality in a given area is good or bad.

Source: RIVM

Best practice in Spain

The general public in Spain has on-line access to all air quality information, in the form of official and institutional websites, the 'Air Quality Viewer', emission analyses and government-published mobile phone apps. The latter are fed by the Air Quality Database managed by the Ministry of the Environment in conjunction with regional and local authorities. This is an example of successful coordination and cooperation between bodies responsible for managing air quality in Spain.

The use of various air quality monitoring facilities as regular teaching venues for students and the general public can be also highlighted as a good teaching practice.

Source: Spanish SAI

3.6 Monitoring and reporting

Secondary audit question 6: How are trends in air pollution monitored and reported on?

- Has a monitoring system been put in place in your country?
- Are there any problems with the completeness of data and reports?
- Is all air quality data available to the general public?
- What does the responsible body (i.e. a national or local government body or a monitoring agency) do in order to find out about future problems?
- Is air quality reliably monitored and reported on in good time?

In its report covering the EU member states in general, the ECA concluded that *'public awareness and information has a critical role in addressing air pollution, which is a pressing public health issue. Citizens have recently been getting more involved in air quality issues and have gone to national courts, which have ruled in favour of their right to clean air in several member states. Yet we found that the AAQ Directive protects citizens' rights to access to justice less explicitly than certain other environmental directives. The information made available to citizens on air quality was sometimes unclear.'* This statement corresponds with the findings of the national audits.

Monitoring systems functional in ten countries

The national audit findings show that monitoring systems are present, functional and working in ten countries, i.e. Bulgaria, Estonia, Hungary, Israel, Poland, Romania, Slovakia, Spain, Switzerland and the Netherlands.

The national air quality monitoring system in Bulgaria is part of the National System for Environmental Monitoring. According to the Bulgarian SAI, *'uniform, unified sampling and analysis methods are used, in accordance with the procedures for quality assurance of measurements and ambient air quality data.'*

The Polish SAI found that *'the air quality monitoring system in Poland operates very well and provides reliable data. Measurements are made by the Regional Inspectorates of Environmental Protection. Over 230 measurement stations operate within the national network. […] Poland complies with the standard for sampling points laid down in the AAQ Directive. All the data from the monitoring system are available through an electronic portal (operated by the General Inspectorates of Environmental Protection) or a mobile phone app. Air quality measurement is part of the State Environmental Monitoring. The system of air quality monitoring costs approximately €10-12 million per annum. The monitoring system is financed from public funds.'*

The audit findings also show that there are problems with the maintenance of the monitoring systems and that data is not always complete or reliable (see Highlight 16). Air quality data is not always available to the general public. Of the eleven SAIs that answered this question, only four said that all information was available to the general public (see Highlight 17). Regarding knowledge of future problems, only two SAIs found that their governments were aware of future problems and were actively seeking to find out more. With respect to the air quality reporting system, seven SAIs said that the reporting system in their country was both in place and working (see Highlight 18).

Table 4 summarises all the national audit findings for the sub-questions relating to the sixth secondary audit question, i.e. "How are trends in air pollution monitored and reported on?". Again, a distinction is made between EU and non-EU member states. The colours show how much progress each country has made and what still needs to be done.

Table 4: How are trends in air pollution monitored and reported on?

	Sub-audit questions	Has a monitoring system been put in place in your country?	Are there any problems with the completeness of data and reports?	Is all air quality data available to the general public?	Is air quality reliably monitored and reported on in good time?	What does the responsible body do in order to find out about future problems?
EU member states	Bulgaria					✕
	Estonia			Highlight 17		✕
	Hungary					✕
	Poland					✕
	Romania					✕
	Slovakia		Highlight 16	✕	✕	✕
	Spain		✕			✕
	The Netherlands					
Non-EU member states	Albania		Highlight 16		Highlight 18	✕
	Georgia				✕	✕
	Israel		Highlight 16	✕	✕	
	Kosovo		Highlight 16		Highlight 18	
	Moldova				Highlight 18	
	Switzerland			✕	✕	✕
	The Former Yugoslav Republic of Macedonia			Highlight 17		✕

Monitoring systems in place/no problems with completeness of data/data available to the public/trends are reported on

Monitoring systems not working properly/problems with completeness of data/only certain data available to the public/ some trends reported on

Monitoring systems not in place/data is not complete/data is not available to the public/trends are not reported on

✕ Sub-audit question not in audit scope

➢ Highlight 16: Problems with completeness of data in at least nine countries

The findings of the national audits show that the monitoring systems in at least nine countries, i.e. Albania, Bulgaria Georgia, Israel, Kosovo, the FYROM, Moldova, Romania and Slovakia, do not generate complete and/or reliable data.

The Slovakian SAI concluded that the National Air Quality Monitoring System was not representative of the whole of Slovakia: *'The number of monitoring stations and their location corresponded with the pre-set criteria, so that the data obtained were representative of the urban background, industrial areas, transport pollution, rural areas and the regional background. Nonetheless, we feel that the National Air Quality Monitoring System is inadequate due to the complexity of the territory of Slovakia.'*

In Kosovo, monitoring stations are not maintained on a regular basis. They are frequently moved, security is poor and the stations are vandalised. According to the Kosovan SAI, *'the air quality monitoring system is inefficient and the system does not therefore provide the citizens of Kosovo with a real picture of the air quality situation, especially not in real time.'*

The Albanian SAI found that '*the air quality monitoring system in Albania is not functioning very well and it does not provide reliable data. There are discrepancies between the annual environmental monitoring programmes (for air quality) and the Environmental Status Reports (on air quality). Currently, there are only seven static automatic stations in the whole of Albania that monitor air quality 365 days a year. In addition, mobile stations monitor air quality over a period of two to three weeks in different seasons. The monitoring system is not sufficiently inclusive and representative to calculate an average value for a given city. There was no continuous air quality monitoring in Tirana in 2014 and 2015, because the two static stations were out of order. The values published by the mobile station for Tirana are not representative and cannot be taken as average values.'*

The Israeli SAI wrote that the Ministry of Environmental Protection did not have full data on actual emission values for the years 2010-2013. The ministry was required to recalculate emission values for 2010, the base year. Until the ministry completes its update of emission values, it is not possible to ascertain whether the objectives set in government decisions and the national plan for the reduction of emissions of noxious air pollutants have been achieved. It is also not possible to take the steps needed to reduce the level of air pollution.

The Israeli SAI also found that the annual report of the Ministry of Environmental Protection did not include data on total emissions of pollutants for each year by sector, as compared with the targets set in the national plan, nor data on exceedances of limit values. The report also failed to include a comparison between the amount of pollutants emitted that year by each sector and the amount of pollutants emitted in previous years.

➢ Highlight 17: Air quality data is available to the public (but not always in real-time)

The findings of the national audits show that, in six countries, i.e. Estonia, Bulgaria, Hungary, Poland, Romania and the Netherlands, air quality data is published in real time. The other SAIs that answered this question found that, while the information was available to the public, it was not available on a real-time basis.

The FYROM SAI said that, while real-time information was available, the data was not complete. '*The Ministry of the Environment and Physical Planning has established and manages an air quality information system, which is connected to the air quality web portal. The portal provides real-time information to the public on the current status of ambient air, as well as information on pollutants, health effects and legislation. Although the air database contains a lot of data, it is still not complete. There are no emission data from stationary sources, no data on ambient air quality from individual*

stationary sources, no emission data from mobile sources and no data from the Register of Air Pollutants.'

The Estonian SAI stated that *'air monitoring data is made available to public. The state has created a website with information on ambient air monitoring (www.ohuseire.ee) which is easy to use, up to date and informative. It also includes information on pollen and UV radiation levels. Monitoring results are published every year in a special report. The results of a study of environmental awareness among the general public suggest that, although information is available, people either do not look for it or cannot find it. The lack of interest may be due in part to the fact that there are generally no problems with ambient air quality in Estonia.'*

➢ Highlight 18: Reporting systems present in at least nine countries

The findings of the national audits show that a reporting system is present and working in at least eight countries, i.e. Bulgaria, Estonia, Hungary, the FYROM, Moldova, Poland, Romania, Spain and the Netherlands. Reporting systems in Kosovo, Albania and Moldova are in need of improvement.

The Kosovan SAI found that, '*in the absence of a central system for collecting and processing data automatically, as well as for generating reports, data collection in stations is currently performed manually. This method of data processing takes a lot of time and, as a result, causes big delays in the reporting of air quality. It is also error-prone.'*

The Albanian SAI said that *'the reliability of reporting is related directly to the non-accreditation and non-calibration of monitoring laboratories. The non-calibration of the laboratory used for measuring particulate matter at the station for central Tirana directly affects the reliability of air condition reports. The inspection system not only has been ineffective, it has also been totally non-existent.'*

The Moldovan SAI found that *'there is no automatic self-monitoring and recording system for emissions of pollutants into the air, for collecting and processing data in a standard manner and for transmitting the data to environmental institutions.'*

IMPACT OF THE NATIONAL AUDITS

Impact of the national audit report on air quality published by the Albanian SAI

The final report on air quality in Albania was published in January 2018. The Albanian Ministry of Tourism and the Environment responded to the report by sending the Albanian SAI a document entitled *Report on the implementation of the recommendations made by the Albanian SAI in its air quality audit*. **One of the most important recommendations was the drafting and approval of a National Action Plan on Air Quality in 2018.**

Presentation of air quality audit report at Pavarësia University, Vlora.

The Ministry of Tourism and the Environment drafted an action plan and sent it to the Council of Ministers for approval. The approval procedure may take some weeks.

Although the Albanian SAI is very pleased with this, the government either has not yet implemented or is not planning to implement a number of other recommendations. In March and April 2018, the Albanian SAI presented its report to two universities in Albania. Hundreds of students at both universities, as well as lecturers and media representatives, were invited to attend these 'open lessons'. As the general public is becoming better and better informed about air pollution in Albania, the audit report attracted extensive media coverage.

The following links are to news items about the audit report:

http://www.gsh.al/2018/01/30/klsh-cilesia-e-ajrit-e-dobet-problem-shqetesues-per-qytetet-kryesore/

http://www.gazetadita.al/klsh-strategjia-kombetare-e-cilesise-se-ajrit-e-deshtuar/

http://www.kohajone.com/2018/02/07/cilesia-e-ajrit-ne-shqiperi/

http://lajmifundit.al/2018/03/raporti-i-klsh-skandal-me-matjet-e-cilesise-se-ajrit-ne-tirane/

http://www.opozita.com/2018/03/raporti-klsh-skandal-matjet-e-cilesise-se-ajrit/

https://www.youtube.com/watch?v=JE3_Vo3yUkI as well as on investigative edition that journalists of TOPCHANNEL organized relying on air quality audit report https://www.youtube.com/watch?v=QE58g5Rna4c&feature=share.

IMPACT OF THE NATIONAL AUDITS

Impact of the national audit report on air quality published by the Kosovan SAI

Immediately after the audit report was published by Kosovo's National Audit Office, there was a massive response from both popular web portals and the main Kosovan television stations. Some of the articles published by web portals are shown in the figure below.

The audit report on air quality also attracted the government's attention. Responsible government bodies such as the Ministry of the Environment and Spatial Planning decided to implement two of the main recommendations in the report. **The government approved an action plan on air quality for 2018-2020**, and the Ministry of the Environment and Spatial Planning installed software for presenting real-time data on air quality.

IMPACT OF THE NATIONAL AUDITS

Impact of the national audit report on air quality published by the Moldovan SAI

The air quality audit performed by the audit team from the Republic of Moldova was a first, and produced an echo in civil society. Media representatives took over the message and **the audit team was invited to take part in a live radio show to discuss issues raised by the audit**. A number of topics were discussed during the programme, notably air quality, sources of pollution, the most highly polluted areas, the consequences of over-pollution and potential solutions. Together with other guests on the show, i.e. NGO representatives and staff from the State Hydrometeorological Service, members of the audit team discussed the main message of the audit report and answered questions from callers.

At the same time, the audit report was also submitted to parliament for information purposes. The Permanent Parliamentary Environment and Regional Development Committee decided to discuss the audit report, so as to identify recurring problems and potential solutions. All entities with responsibilities for air quality were invited to attend the meetings of the Parliamentary Committee, and discuss the causes of air pollution and the possible government response. The ultimate aim is to solve the problems affecting the management system and implement the audit team's recommendations.

The air quality audit made a particularly keen impact at government level. **Action plans were formulated and responsible officials were instructed to implement the audit team's recommendations.** Steps were taken to harmonise and improve the legislative framework for air quality. Initiatives were also launched in relation to accountability and enhancing coordination among relevant actors. Measures to empower business representatives, streamline environmental checks and adopt the 'polluter pays' principle were also adopted.

IMPACT OF THE NATIONAL AUDITS

Impact of the national audit report on air quality published by the Polish SAI

On the day on which the national audit report on air quality protection was published, **the President of the Polish SAI scheduled a press conference** during which he informed the media about the main audit findings. The contents of the audit report were widely echoed in the electronic media, the press and TV. **The Polish Prime Minister announced on the same day that**, as part of the Clean Air Programme, **the government had decided to spend over €23.2 billion during a 10-year period**. The money will be used for the thermal modernisation of buildings, replacing old stoves and boilers, and buying new ones.

Appendices

1. Air Quality audit framework

Main audit question

What is known about the effectiveness and efficiency of measures taken by national and local governments to improve air quality, and are these measures compliant with international and national legislation?

Audit aspects; secondary audit questions:

1. What is the main problem in your country in terms of air pollution?
2. What governance system has been put in place; who is responsible for what?
3. What statutory rules and regulations have been enacted?
4. What policy is being pursued to tackle the problem(s)?
5. How is the policy funded; what is known about the cost of the measures taken and the measurable benefits?
6. How are trends in air pollution monitored and reported on?

Audit sub-questions (*and suggestions in italics*)

1. What is the main problem in your country in terms of air pollution?

1. What are the most critical substances posing a threat to air quality in your country and what are their primary sources?

Please describe the substances that are critical in your country; state the main areas of pollution (in geographical or sectoral terms).

2. Has the government, and the central government in particular, made a comprehensive analysis of the problem?

We regard the problem analysis as being comprehensive if the following topics have been addressed at the very least: the consequences; the main substances polluting the air; the level of pollution; the sources of pollution; geographical and/or sectoral spread; variation in time; cross-border issues.

3. Is the information used for the problem analysis (publicly) available and reliable?

Was the information obtained from different sources? Are these sources objective? Is the information up to date and/or updated regularly? Is the information shared with stakeholders and/or the general public?

2. What governance system has been put in place; who is responsible for what?

1. Which government body in your country is responsible for air quality and what other factors are involved?

This requires a stakeholder analysis. Possible stakeholders would include the ministry of the environment, monitoring and reporting agencies, local authorities, industry, interest groups, lobby groups, etc.

2. Is there any coordination among the various actors in the government system? If so, how is it organised?

Think about policy conflicts (with other ministries such as those responsible for the economy or public health), centralised and decentralised approaches. Do the various actors hold meetings? Do they inform each other about new policies? Is there a partnership or some form of cooperation? If so, is this both in planning and in practice?

3. Are there any sanctions for non-compliance with the goals of air quality policy?

Are these local, national or EU-wide sanctions? EU-wide sanctions are the same throughout the EU.

4. What is known about the effectiveness of these sanctions?

5. Is the governance system adapted to cross-border issues?

Is there a separate cross-border policy? If so, what does it involve? Is there coordination among countries in terms of responsibilities, measures, monitoring and information-sharing?

3. What statutory rules and regulations have been enacted?

1. What international agreements has your country ratified and has it enacted any additional national legislation?

What EU directives has your country transposed? What national legislation has been adopted?

2. Have there been problems with the implementation of certain legislation? If so, why?

For example, certain laws have not been implemented in time or the legislation in question does not meet the targets set in international agreements or EU directives.

3. Is the government obliged to inform the public about air quality problems?

How is the public informed about air pollution and the associated dangers (to public health, for example)? Are public surveys carried out?

4. What policy is being pursued to tackle the problem(s)?

1. Does your government have a dedicated policy on air quality? If so, what measures does it contain?

Are there any specific geographical or sectoral policies for safeguarding air quality? Is policy implemented at an international, national or local level?

2. Are there indicators for measuring the effectiveness of the policy in combating air pollution?

Please explain what indicators there are and how they measure the effectiveness of policy.

3. If there are different approaches, is policy coordinated?

For example, policies on public health or the economy may affect the policy on air quality. Alternatively, neighbouring countries may have local or national policies of their own.

5. How is the policy funded; what is known about the cost of the measures taken and the measurable benefits?

1. How is budget allocated for the government's policy on air quality?

What sources are used? Are they public or private?

2. Does the (central) government have access to information on the costs and benefits of the policy?

What is known about the costs? Is this information complete, i.e. does it cover all the policy measures described above, and up to date? Is there a funding system?

3. Have the costs and benefits been analysed?

When and how? Are results of the analysis used to improve future policy? Are the results communicated with independent institutes and made public?

4. If so, what were the results of the evaluation?

5. What is known about the effectiveness of public funding or other incentives for helping to improve air quality?

6. How are trends in air pollution monitored and reported on?

1. Has a monitoring system been put in place in your country?

Who monitors the air quality in your country? Is this done in accordance with the relevant legislation? Does the monitoring agency (or agencies) only monitor the data it is required to monitor, or does it go further than this? How is monitoring done?

2. Are there any problems with the completeness of data and reports?

3. Is all air quality data available to the general public?

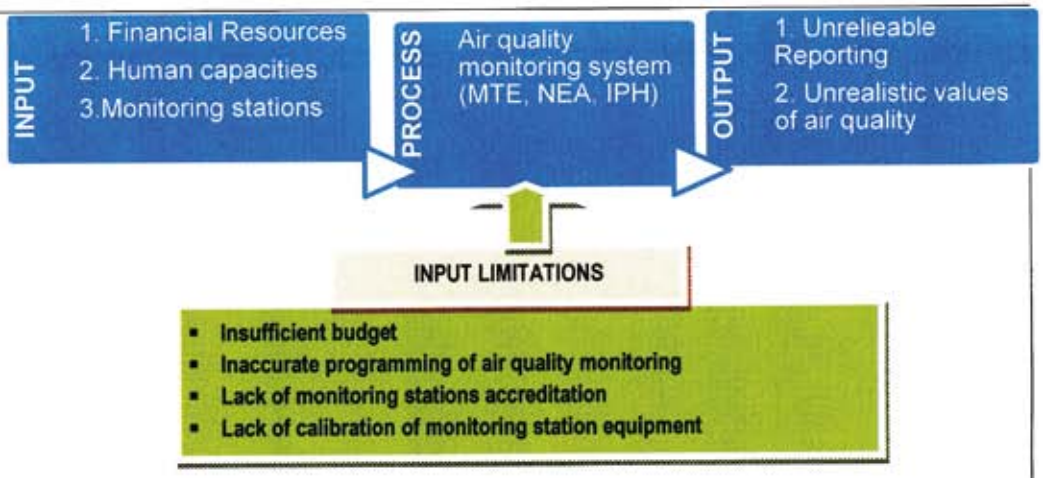
Is the data made available in the form of open data, for example?

4. What does the responsible body (i.e. a national or local government body or a monitoring agency) do in order to find out about future problems?

5. Is air quality reliably monitored and reported on in good time?

2. Summaries of national air quality audits

	KONTROLLI I LARTË I SHTETIT	SAI of	ALBANIA
Main audit question: Answer:	**Have the measures taken by national and local government to improve air quality been effective and efficient and are these measures compliant with national and international legislation?** The measures taken by central and local government to improve air quality in our country have not been effective and efficient. The National Strategy on Air Quality (NSAQ) adopted in 2014, has not yet been implemented. The Ministry of Tourism and Environment has never reported on the implementation of the NSAQ. The Action National Plan on Air Quality has not been approved and as a result no Municipality in Albania has approved the Local Air Quality Action Plans. Air quality monitoring does not fully meet the standards set by the relevant national and EU directives. The published values for Tirana, as well as other cities of Albania from the mobile station of National Environment Agency (NEA), are not representative as average values. The number of fixed air quality monitoring stations in Albania is not sufficient to produce representative and reliable data for the respective cities. The State Inspectorate of Environment and Forests (SIEF) does not carry out inspections in terms of exceeding the pollutant emission rates because it does not have any tools / labs to measure these emissions. The Institute of Public Health (IPH) has not conducted any epidemiological study to assess the link of air quality impact on population health.		
Main findings of national audit on air protection	**The main substances which have a great impact on air quality in Albania are:** particulate matter (PM_{10}, $PM_{2.5}$) Nitrogen oxides (NOx), Ozone (O3), Sulphur dioxide (SO2), Benzene and Carbon mono-oxide (CO). Main sources of these emissions come from transport, industry sector, construction, household burns as well as natural factors (sea storms and Sahara dust). **Policies and legislation adopted for the resolution of air quality problems have not been effective since the responsible institutions in Albania have not evaluated their impacts on the health of population, economy and environment.** The National Quality of Air Quality (SCA) has overall objectives, but it is not "SMART" and does not foresee concrete measures for the implementation of these objectives. The responsibilities of the institutions towards objectives, the activities that they will develop, and the timelines for the fulfilment of these objectives are not clearly defined. The number of fixed air monitoring stations across the Albanian territory continues to be low. Punishment for air pollutants is negligible and disproportionate according to the level of damage to the environment. The IPH does not have any data on the health consequences of air pollution. The NEA does not have sufficient human resources and capacity to carry out studies on estimation of environmental benefits in momentary terms for air quality policies. There is an overlapping and fragmentation of responsibilities between the NEA and IPH. **To date, funding from the state budget for air quality monitoring has been low, and most of the funding has come from donors, such as the EU IPA projects.** All incomes generated by environmental taxes go to the state budget and are used for other purposes. The Ministry of Tourism and the Environment by not providing funding for accreditation and calibration has contributed to the further amortization of air quality monitoring stations. **All the institutions responsible for air quality have no knowledge of the costs and benefits that should accompany air quality policies and have not yet carried out such an analysis.** The process of air quality monitoring carried out in Albania is not efficient. The money spent in this process only goes to the salaries / employees per diem involved in the monitoring, while for the calibration of the monitoring station labs goes nothing. This misplaced allocation or poor budget planning causes a gap between the air quality monitoring objective and the money spent on it. The following figure shows schematically the entire air quality monitoring process and its results according to the "input-output" model.		



The air quality monitoring system in Albania is not functioning very well and it doesn't provide reliable data.
There are discrepancies between the annual environmental monitoring programs (for the Air Quality Chapter) and the Environmental Status Reports (for the Air Quality Chapter).
Currently in all Albania there are only 7 static automatic stations that monitor 365 days / year. Other stations are mobile stations that monitor in 2 to 3 weeks periods in different seasons.
The monitoring system is not inclusive and representative to find the average of a particular city.
In Tirana for 2014 and 2015, there was a lack of continuous air quality monitoring (365 days / year) because the two fixed stations were out of order. The values published by the mobile station for the city of Tirana are not representative as average values. Indicative measurements performed by the mobile station cannot be presented as average values of the cities.
Reliability of reporting is directly related to non-accreditation / non- calibration of monitoring laboratories. Non calibration of the laboratory used to measure particulate matters at the station in Tirana Center is a fact that directly affects the reliability of the Air Condition Reports.
The inspection system not only has been ineffective but it has also been totally inexistent. The SIEF does not have the necessary logistics to enable the certification of overcoming air emission rates.
The NEA does not provide "on line" access to Albania's citizens to have real-time air quality data (e.g., every 1 hour, etc.).
The system of air quality monitoring costs appx. 150.000 € yearly.

Recommendations

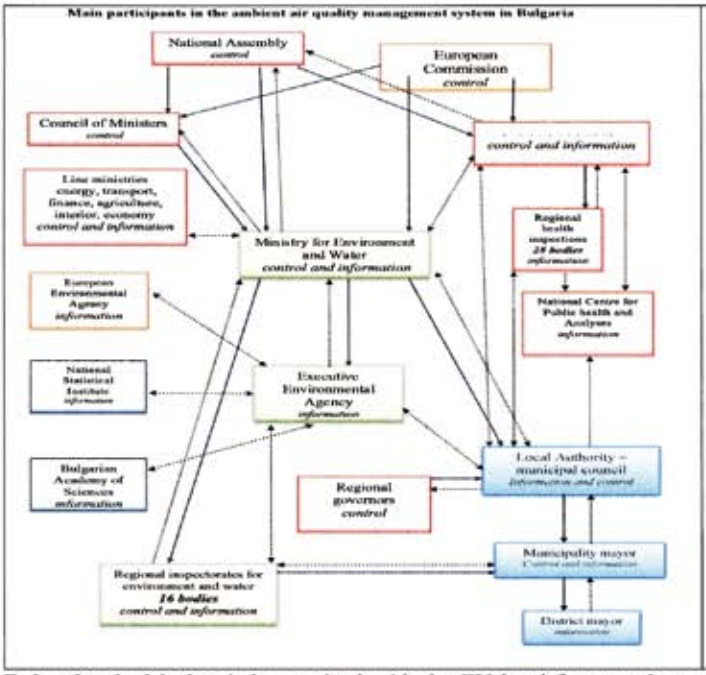
- MTE should take measures to implement the National Air Quality Strategy;
- MTE should take measures to propose changes to the legal framework in order to carry out cost-benefit analysis for all environmental policy and legislation prior to their adoption.
- IPH should take the appropriate measures in order to conduct a pilot study (including MTE, NEA and the Ministry of Health) on assessing the impact of air quality on the population's health, using the air quality-health indicators approved by the WHO such as "Years of Live Lost, " Year lived with disability" etc.
- MTE, in cooperation with NEA, should set up a working group to assess the costs for the accreditation and calibration of air quality monitoring stations
- NEA should draft the Environmental State Reports in full compliance with National Environmental Monitoring Programs
- The air quality monitoring system should undergo specific quality control and assurance procedures.
- SIEF should take measures and seek funding from MTE to fill its gaps in logistical equipment such as air measurement labs etc.
- NEA should enable every citizen to have access to air quality data in Albania in real time.

Best practices

- Review of Conditions and Environmental Permits of quarries activities.
- Preparation by MTE of mechanisms for stopping the import of cars under Euro 5.
- Preparing to increase the number of air monitoring stations.

/signature/

СМЕТНА ПАЛАТА на Република България	Сметна палата на Република България	SAI of	Bulgaria

Main audit question: Answer:	The state policy on the protection of ambient air quality is related to achievement and maintenance of air quality in accordance with the requirements set by the legislation and implementation of the responsibilities of the Republic of Bulgaria on the commitments to implement the European directives and the international agreements. No national strategy for environmental protection has been adopted for the period for 2009-2017 as a means to achieve the objectives and principles of the Environmental Protection Act. The policy of national and local authorities for the protection of ambient air purity is aimed at achieving and maintaining air quality in accordance with the requirements and standards laid down by national law. The reasons for air quality deterioration in the country are of a socio-economic nature and are related to the large number of „fuel poor" households, as the main source of pollution is domestic heating during winter. The social policy implemented envisages heating benefits for people with low income and is not aimed at providing nature-friendly fuels and solving the problems of air quality in large cities. The national and municipality measures are not targeted at the main sources of pollution - domestic solid fuel heating, old car park and infrastructure, which is a challenge for the measures taken to combat the main sources of air pollution in large cities to be effective and efficient.
Main findings of national audit on air pollution	Particulate matter (PM10 and PM2,5) in Bulgaria are the most problematic ambient air pollutants in terms of protecting human health. Other major pollutants influencing the quality of ambient air are the exceedances of the average hourly limit values for nitrogen dioxide and the average annual limit value for benzoapyrene in the big cities (Sofia, Plovdiv and Stara Zagora). Regular exceedances of sulfur dioxide alarm threshold is a problem only in one area in the country (town of Galabovo). **The main sources** of air **pollutants** as the result of human activities are road or other transport, combustion in households, thermoelectric power plants, industrial plants, combustion and non-combustion processes in industry, etc. Combustion in households, transport, industry and construction and repair activities are groups of sources (sectors) that make the greatest contribution to air pollution. **The management and assessment** of ambient air quality is a process, which is within the remit of various institutions and bodies at national and regional level. The authorities involved in the process of air purity in Bulgaria are listed below:  **Main participants in the ambient air quality management system in Bulgaria** National Assembly European Commission Council of Ministers Ministry for Environment and Water Executive Environmental Agency Local Authority – municipal council Regional governors Municipality mayor - No advisory board on the management of air quality has been established by the Minister of Environment and Water; - there are gaps in the assigning of responsibilities at the local level for the implementation of clean air policy measures; - there are deficiencies in the communication and exchange of information between municipalities with poor air quality with regard to the implementation of program measures. - The activities of the bodies involved lack coordination and there is little activity on the part of MOEW for carrying out interaction and communication. **Bulgarian legislation** is harmonized with the EU legal framework on ambient air quality. Transposed are: Directives 1999/30 / EC repealed by Directive 2008/50 / EC; Directive 96/62 / EC; Directive 2008/1 / EC and Directive 2001/80 / EC, the directives being introduced by the EPA, the Clean Air Act, regulations and instructions. **The policy** for the protection of air quality is implemented by the government through measures and objectives set out in three national programs in which the quality of ambient air is among the priorities and in programs of the municipalities with poor air quality. The requirements of the Environmental Protection Act for the existence of a strategic environmental document have not been met. At national

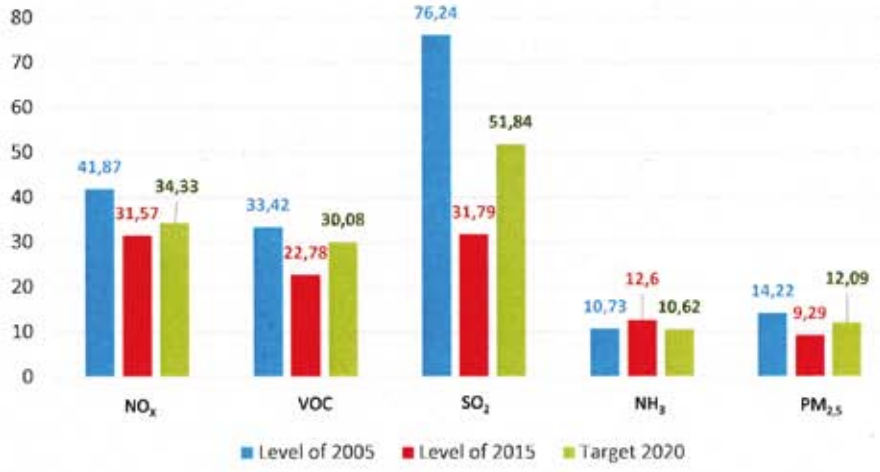
	level, measures aimed at phasing out pollution from large combustion plants, limiting the sulfur content of liquid fuels, as well as legislative changes reinforcing control over the fulfillment of requirements, have been laid down. The air quality management programs of the three municipalities (Sofia, Plovdiv and Stara Zagora) included in the audit provide for measures aimed at identifying problematic pollutants in the respective municipality. The government sector policies also set out objectives and measures the implementation of which contributes to the improvement of air quality. **There are gaps** in the planning and reporting of the implementation of the measures and in the evaluation of the individual contribution of each measure to improving the quality of ambient air, as well as their effectiveness. When reporting on implementation, measures are not taken into account individually in relation to the performance indicators set out; they are taken into account with the summarized results achieved for the year, without considering the individual progress of their implementation. There is no reasonable assurance that accumulated fines and penalty payments received into municipal budgets are spent on activities leading to air quality improvement. **The Minister** of Environment and Water has not imposed any fines to mayors and officials for failing to fulfill their obligations to develop and implement programmes to improve the quality of ambient air. **Performing a cost-benefit analysis** is not introduced as a statutory requirement when planning and reporting measures to improve the quality of ambient air. Considerably less funds have been allocated for the policy on air quality improvement and for the National System for Environmental Monitoring (NSEM) as compared to other budget programs of the MOEW. Minor spending on government investment aimed at upgrading, improving quality and expanding measurement, monitoring and reporting tools has been reported. There are no financial statements with specific amounts for the realization of national and municipal strategies, programs, plans and there is no connection to the adopted financial estimates and annual budgets at national and local level. Specific amounts to provide funding for measures aimed at improving air quality have not been planned in the national and municipal strategy papers. The municipalities do not have sufficient financial resources to implement adequate measures for air quality improvement and do not actively avail themselves of the opportunities to implement projects and activities in the field of air quality protection with funds from sources outside the municipal budget. **The national air quality monitoring system** is part of the National System for Environmental Monitoring. Within the established 6 Regions for Assessment and Management of Ambient Air Quality, 50 stationary stations were created. For the period 2014 - 2016 out of the 50 monitoring stations kept by the National System for Environmental Monitoring, 48 sites are operational due to failure of two systems, which failures have not been remedied. In each region for assessment and management of ambient air quality the minimum number and type of monitoring stations are functioning according to the normative requirements. There is a disruption of the operation mode of part of the monitoring sites due to necessary relocations, technical problems and poor weather conditions. The equipment at most of the monitoring stations is old and at some stations it is unfit to perform the necessary measurements. Prerequisites for the effective functioning of the NSEM have been created by regulating the statutory requirements for its activities. Uniform, unified sampling and analysis methods are applied, observing the procedures for quality assurance of measurements and ambient air quality data. Determined are the procedure and the officials responsible for the functioning of the system and the control and quality of the measurements and the quality control of the data recorded by the automatic measuring stations. PM2,5, this is the pollutant that has the most impact on human health. In spite of the efforts made and the funds invested, the NSEM does not provide the necessary information about this pollutant.
Recommendations	The Ministry of Environment and Water **to take action** to develop / update the national strategy for environmental protection, in compliance with the normative requirements of Art. 75 of the EPA. **Set up** an advisory board to the Minister of Environment and Water for the "air" component, according to the requirements of the EPA. **Improve** the control and sanctioning activity of the MOEW regarding the activities of mayors and officials in municipalities. The Ministry of Environment and Water **to take action** and organize a national media information campaign, together with the local authorities of municipalities with a poor air quality, in order to inform the population about the health hazards due to polluted air, presenting concrete measures to be taken by the population depending on the season, atmospheric conditions, sources of pollution, and other factors affecting ambient air quality. **Ensure** adequate procedure and control in the development of measures in municipal air quality programs in order to ensure clarity as to the required financial resources for their implementation as well as the reference values of the performance indicators.
	Signature President of SAI

EUROPEAN COURT OF AUDITORS	***European Court of Auditors***		***EU***

Main audit question:	*Have EU actions to protect human health from air pollution been effective?*
Answer:	We concluded that EU action to protect human health from air pollution had not delivered the expected impact. The significant human and economic costs have not yet been reflected in adequate action across the EU.
Main findings of EU level audit on air protection	We examined six urban high pollution hotspots (Brussels, Stuttgart, Milan, Sofia, Krakow and Ostrava), and we audited the European Commission and the Environmental Agency. We concluded that EU action to protect human health from air pollution had not delivered the expected impact. The significant human and economic costs have not yet been reflected in adequate action across the EU. The EU's *air quality standards* were set almost twenty years ago and some of them are much weaker than WHO guidelines and the level suggested by the latest scientific evidence on human health impacts. While air quality has been improving, most Member States still do not comply with the EU's air quality standards and were not taking enough *effective action* to sufficiently improve air quality. Air pollution can be underestimated as it might not be monitored in the right places. Air Quality Plans – a key requirement of the Ambient Air Quality Directive – often did not deliver expected results. The Commission faces limitations in *monitoring* Member States' performance. Subsequent *enforcement* by the Commission could not ensure that Member States complied with the air quality limits set by the Ambient Air Quality Directive. Despite the Commission taking legal action against many Member States and achieving favourable rulings, Member States continue to frequently breach air quality limits. Many EU policies have an impact on air quality, but, given the significant human and economic costs, we consider that some EU policies do not yet sufficiently well reflect the importance of improving air quality. Climate and energy, transport, industry, and agriculture are EU polices with a direct impact on air quality, and choices made to implement them can be detrimental to clean air. We noted that direct *EU funding* for air quality can provide useful support, but funded projects were not always sufficiently well targeted. We also saw some good projects – particularly some projects supported by the LIFE programme. Public *awareness and information* has a critical role in addressing air pollution, a pressing public health issue. Recently, citizens have been getting more involved in air quality issues and have gone to national Courts, which have ruled in favour of their right to clean air in several Member States. Yet, we found that the

	Ambient Air Quality Directive protects citizens' rights to access to justice less explicitly than some other environmental Directives. The information made available to citizens on air quality was sometimes unclear. More details can be found in ECA's Special Report No 23/2018.
Recommendations	We make four blocks of recommendations: 1. More effective action by the Commission (including sharing best practices with Member States; active management of infringement procedures against Member States; and assisting the Member States in introducing relevant measures in their Air Quality Plans to better tackle cross border air pollution). 2. Ambitious update of the Ambient Air Quality Directive (including tighter standards for PM, SO_2 and O_3; making Air Quality Plans more result oriented; tightening the requirements for locating measuring stations; and explicit provisions to ensure citizens' rights to access justice) 3. Prioritising and mainstreaming air quality into EU policies (including better aligning EU policies that contain elements that can be detrimental to clean air with the air quality objective; and assessing the actual use of relevant funding available in support of EU air quality objectives to tackle air pollution emissions). 4. Improving public awareness and information (including supporting Member States to adopt best practices to communicate with citizens; publishing rankings of air quality zones; and together with Member states, seek to harmonise air quality indices). The Commission considers that the recommendations of the Court are an important contribution for the ongoing Fitness Check of Ambient Air Quality Directives.
Best practices	The use of the EU's LIFE budget to support civil action at Member State level is a novel, cost effective, rapid route to encourage Member States and cities to support air quality. Most of the cities we visited produced air quality indices, and some had adopted other good practices to inform citizens. For example, Krakow and Ostrava developed smartphone apps, and Stuttgart had an early PM alert system. Paris (Airparif) and London (London Air) are examples of best practices on online information to citizens. For example, Airparif website shows real-time spatial maps, provides next day forecasts, and offers access to automatic alerts and phone applications. We also found examples of well-targeted EU-funded projects that contributed directly to reductions in local emissions such as the replacement of old diesel buses by buses running on compressed natural gas (CNG) in Sofia; and the boiler replacement schemes in Ostrava. There were also projects to modernise inefficient household heating systems in Krakow.
Signature of Chamber I Dean *Signature of Chamber I Reporting Member*	

riigikontroll National Audit Office of Estonia	***Riigikontroll***	***SAI of***	***Estonia***

Main audit question:	*What is the main problem regarding air pollution?*
Answer:	According to the results of ambient air monitoring programme, during 2014-2016 Estonia has not had any problems related to the quality of ambient air regarding most important pollutants (nitrogen oxides (NO_X), sulphur dioxide (SO_2), volatile organic compounds (VOC) and fine particulate matter ($PM_{2,5}$). The level of critical pollutants has not exceeded the limit value or been over the limit on more occasions than permitted. However, there have been regional problems with some less important pollutants exceeding the limit value (i.e. annual mean concentrations of benzo(a)pyrene in Tartu and 1 hour mean concentration of hydrogen sulphide (H_2S) in Kohtla-Järve. The Convention on Long-range Transboundary Air Pollution (LTRAP) and the European Union National Emission Ceilings Directive (NEC) have imposed emission reduction targets up to 2020, for 2020-2029 and beyond 2030. By 2016, Estonia had managed to reduce the amount of 4 pollutants out of 5 down to the level required by 2020. The problem is with ammonia (NH_3), the emission amount of which increased 21% during the 2005-2015 period. The goal is to reduce NH_3 emissions by 1% by 2020. **Main pollutant emissions in 2005-2015 and reduction targets by 2020 (kt)** 
Main findings of national audit on air protection	**Governance system and coordination of different actors.** The primary responsibility for the protection and quality of ambient air lies with the Ministry of the Environment. Policies are implemented through different development plans *(National Development Plan of the Energy Sector, National Transport Development Plan, National Health Plan, Rural Development Plan)*. Policy coordination is mainly carried out through the compilation and implementation of the development plans, and all the related parties are involved in the process. The majority of development plans in the field of ambient air protection do not directly declare the protection of ambient air and reducing the amount of pollutants as the main purpose of these plans. Instead they aim to reduce environmental impact in general. Various measures and actions have been established in the development plans which, if implemented, should also help to reduce ambient air pollution.

	However, the development plans do not have information about the impact of these measures on the protection of ambient air and on the reduction of pollutants. For example, the support given to farmers for manure storages and the production of bioenergy should also help to reduce NH_3 emissions, but there is no information or calculations about the decrease of NH_3. **Air quality monitoring system and informing of the citizens**. Ambient air monitoring is part of the Estonian national environmental monitoring system. Based on the collected information, ambient air monitoring meets the requirements of the Estonian and EU legislation. In Estonia, all primary pollutants are monitored and, in addition, secondary pollutants are also monitored according to financial possibilities. Air monitoring data is made available to public. The state has created a website about ambient air monitoring (www.ohuseire.ee) which is easy to use, up to date and informative. It includes also information on the concentration of pollen and UV radiation. Every year monitoring results have been published in a separate monitoring report. The results of the study on environmental awareness among the public reflect the fact that although information has been made available, people either do not search for or cannot find information. The lack of interest can partly be explained by the fact that there are generally no problems with ambient air quality in Estonia.
Recommendations	The NAO of Estonia did not perform comprehensive auditing procedures. We limited ourselves to collecting relevant information and therefore no formal recommendations were made. However, some areas where improvement could be made were highlighted: o Development plans in the field of air quality should also include information about the impact of measures and actions established in development plans on protection of air quality and on the reduction of pollutants. o Air monitoring data could be made easier to understand (modelling will help to provide information about regions and areas which are currently not covered by monitoring stations, information about air quality (i.e. concentration of pollutants, changes of air quality, correlation of air quality to EU limit values) should be provided as much as possible in the form of figures and graphics). Monitoring reports could also be made more understandable to the public (written entirely in Estonian, simpler text used, information charts added). o It is important to continue raising public awareness on how to improve air quality (i.e. about the harmful impacts of burning waste and low-quality fuel).
Best practices	• Due to requirements of EU Directives 2001/81/EC and 2010/75/EU, Estonia had to reduce emissions of SO_2 and NO_X from large combustion plants. To achieve targets, large oil shale (fossil fuel) burning power plants had to install NO_X and SO_2 capture systems. As a result, SO_2 emissions have decreased 60% and NO_X emissions have decreased 25% in 2016 compared to 2005. • There is a good air monitoring website that provides efficient, diverse information about air monitoring (including information about concentration of pollen and UV radiation). www.ohuseire.ee • Ministry of the Environment has requested additional analyses in order to resolve various ambient air pollution problems (e.g. various studies on the quality of ambient air pollution in different regions – Kohtla-Järve, Muuga, Kiviõli, Vaivara, Sillamäe, Tartu, Viljandi).

Auditor General of Estonia
Mr Janar Holm

	State Audit Office	SAI of	Georgia

Main audit question:	*Whether the Obligatory Auto Inspection (OAI) procedures are sufficient and reliable to improve air quality and how does Georgia meet related requirements defined by EU-Georgia's Association Agreement?*
Answer:	**State control system and mechanisms on OAI are relatively weak and require further strengthening. More coordination and supervision needs to be exercised by the Ministry of Environment Protection to ensure that activities anticipated to improve air quality are efficient. Air quality standards defined by local law need to come to full compliance with EU regulations.**
Main findings of national audit on air protection	Most of the atmospheric pollutants appear to arise from transport and construction sectors. Both sectors generate CO, SO2, NO, NO2, etc. and primary particles. Main source of air pollution in Georgia is automobile emissions. Not all categories of vehicles were obliged to conduct OAI during audit period (Table 1); However, OAI will became mandatory for all types of vehicles from January 1, 2019. The main reason of air pollution from vehicles is the age of transport - 91% are more than 10 years old and combustion engines are outdated.

Table 1 – Vehicle categories and OAI obligations

Obligatory Auto Inspection Issues: During 2016 year, 76% of the automobiles obliged to pass OAI failed to do so. Approximately 40% of municipal microbuses have not gone through the inspection procedures. As for municipal buses, 68% were unable to pass the procedures due to their age and oldness of internal combustion engines.

Low activity of Patrol Police Department: Patrol Police Department fined only 13.6% of the cars not having OAI licenses during the audit period. In addition, the fines were irrelevantly low – 10 GEL for individuals and 50 GEL for Legal Entities per case.

National Environmental Action Plan inefficiencies: National Environmental Action Plan for 2012-2016 (NEAP2) activities were not wholly completed. NEAP3 for 2017-2021 years has not yet been formally approved and NEAP3 actions were not yet fully implemented.

Inconsistencies of Laws and Regulations with EU standards: PM10 and PM2.5 limits are absent from air quality related laws and regulations. CO, SO2, NOx, Cadmium, Nickel, Polycyclic aromatic hydrocarbons limit values are different from the values defined by EU Regulations.

Actual air quality indicators are higher than acceptable: Some indicators' actual levels exceeded acceptable thresholds, e.g. during 2017, three stations located in the Capital of Georgia revealed the exceedance of O3 by 167%, SO2 – 155% and CO – 122%. The Air Quality Dispersion modelling and forecasting system needs to be established.

Insufficient coordination: Coordination between different actors of air protection system is not sufficient and effective. The Government issued decree in 2017, which mandates the activities and responsible parties responsible for reduction of air pollution. As per State Audit Office observation, not all parties were fully aware of their responsibilities and timetables within the mandated framework.

Recommendations	**Transport Department of Tbilisi City Hall** • In order to decrease the pollutant emissions, the Transport Department of Tbilisi City Hall needs to establish and approve the transport strategy, including detailed actions plan. Strategy should also include plans to increase use and share of alternative eco-friendly transportation systems; • The Transport Department of Tbilisi City Hall needs to improve monitoring of the micro-bus conditions and ensure that all such vehicle undergo auto inspections; **Patrol Police Department of Ministry of Internal Affairs** • Patrol Police Department needs to improve monitoring of OAI cases; **Ministry of Environment Protection and Agriculture of Georgia** • Needs to formally approve and implement the National Environment Action Plan. • Needs to establish acceptable limits for particulate matters and revise limits for other indicators in accordance with EU's standards; • Needs to establish Air Quality Dispersion modelling and forecasting system; • Needs to improve coordination between responsible entities. **Environmental Information and Education Center** • Needs to develop and establish appropriate activities oriented to increase awareness on effects of air pollution and their mitigation tools.
Best practices	• Increase of pollution fines for individuals to 50 GEL and increase of pollution fines for legal entities to 200 GEL • Auto inspection should became mandatory for all types of vehicles from January 1, 2019. • Patrol Police Department should improve OAI license checks by road cameras.

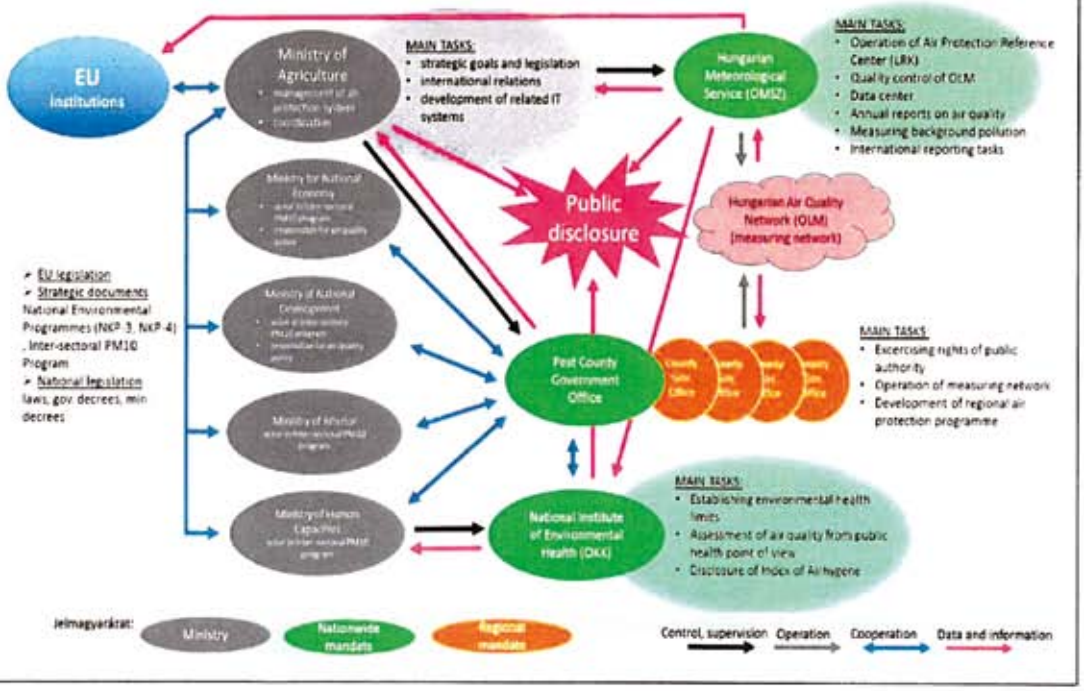
6 June, 2018

Erekle Mekvabishvili

Auditor General

State Audit Office of Georgia

ÁLLAMI SZÁMVEVŐSZÉK	*Állami Számvevőszék*	*SAI of*	*Hungary*

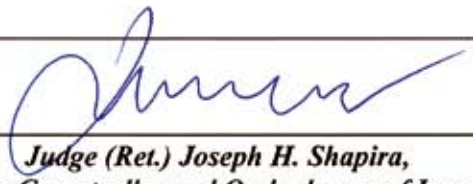
Main audit question: Answer:	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?* **The Parliament and Government have set goals in strategic documents, the Ministry of Agriculture prepared the necessary legislation, the regulations regarding air quality are compliant with the EU legislation.** **The long-term objectives of the National Environmental Programs (NEP) have been fulfilled, the concentrations and total emissions of air pollutants have decreased, except for ammonium. The release of volatile organic compounds exceeded the target limits laid down in NEP.** **Although the concentration of particulate matter and nitrogen dioxide exceeded the limit values, positive tendency is observable. There are several factors contributing to the reduction of the PM10 and PM2,5 concentration in the air, among which we have to mention the reduction of the final retail price of gas for households.** **Transport and households' combustion are decisive factors in air quality. Therefore funding schemes, amendments of legislation and pertaining strategies target primarily energy-efficiency (especially for buildings), and increased use of renewable energy. Besides funding has been provided for environmentally friendly transport solutions (e.g. public transport, cycle routes), and for awareness-raising initiatives, tools regarding combustion.**
Main findings of national audit on air protection	**The Parliament and Government have set goals in strategic documents** in order to protect air quality. Air quality assessments and analysis were taken into account in the development of goals, objectives, measures and indicators. The *National Environmental Program 2015-2020* is approved by the National Assembly. The Program determines generally-defined goals also for air quality and its factors, the goals are set to objectives with performance indicators, and determines measures to be taken by the government, local governments, business organisations and the citizens. The *Cross-sectoral PM10 Program* was approved by the Government. Its main goal is to maintain and improve the air quality and to prevent air pollution that could endanger human health and the natural environment. Accordingly, it includes the measures and tools to achieve the objectives related to grouping transport, industry, agriculture, population, services and transboundary measures; indicators are set to objectives. The ministry developed legal consequences and sanctions in case of infringement of legal requirements regarding air protection. The sanctions are laid down in government decree. The regulations regarding air quality are compliant with the EU legislation. **The organizations of the air protection system have performed their activities in accordance with their responsibilities and scopes.** The cooperation between central, regional, and local governmental actors was adequate (see figure). The organizations' internal regulation is in accordance with mandatory duties. 

	The responsible governmental party for air quality is the Ministry of Agriculture, which has prepared the necessary legislation, performed its supervisory and management duties and fulfilled its reporting obligations, but did not review the designation of air immission agglomerations and zones. The Ministry of Agriculture reports to the government, the reports are publicly available on the government's and the parliament's websites. The annual reports gave information about the measures planned/taken, on the expenditures for implementation of the National Environmental Program 2009-2014 and about the Cross-sectoral PM10 Program. Effectiveness and the costs of the programs were partly evaluated. The county government offices have performed their administrative and supervisory duties properly, monitored the imposed sanctions and obligations in accordance with applicable regulations, issuance of air protection permits and operation of the measuring stations were adequate. **The air quality monitoring system functions properly.** The air quality measurement is performed by the *Hungarian Air Quality Network* (OLM), which is supervised by the Ministry of Agriculture. The monitoring network consists of two parts, the automatic and the manual measuring network. The automatic measurement stations continuously measure the concentrations of wide range of air pollutants, and are operated by the county government offices. The samples collected by the manual measurement network are analysed in labs. The *Hungarian Meteorological Service* (OMSZ) collects, processes and provides meteorological data and information, the data are published daily. It also provides annual analyses of air quality based on OLM-data, but the annual assessments were completed beyond the deadline. The OMSZ's surveys and analyses identified and evaluated the existing air pollution problems and defined their risks, the publications supported the governmental decision-making – especially in the field of strategy revision. OMSZ published the results of a model-analysis on the big-distance spreading of pollution materials. The health impacts of air pollution and the risk factors threatening the health of the population were evaluated regularly. The *National Institute of Environmental Health* (OKK) calculates daily the so-called Index of Airhygene and provides public information on health risks of air pollutants. *The Hungarian Central Statistical Office* publishes time series of annual data in the field of air pollution (emissions, concentrations). The *National Environmental Information System* accumulates ample environmental data on environmental pressure and the status of the environment. Some of them are the regional inspectorates' own measurement data, while others come from the data provided by the environment users under statutory regulation.
Recommendations	{Please point out only recommendations linked to chosen by you audit questions} Recommendation for the Minister of Agriculture: Review the designation of air immission agglomerations and zones. Recommendation for the president of the Hungarian Meteorological Service: Take action to prepare air quality assessments within the deadline set in the relevant regulations.
Best practices	{The most important / successful measures taken to combat air pollution in indicated area – list of 3-5 actions} The most important actions to improve air quality are: • electronic toll for heavy goods vehicles in the entire main road network of Hungary, stricter traffic restrictions on heavy goods vehicles; • particulate filter equipment program for heavy good vehicles; • improving the competitiveness of district heating (tenders for modernization of the district heat sector, use of renewable energy, renewal construction programs); • tenders for thermo modernization for improving energy efficiency; • establishment of low emission zones, construction of bypass roads, cycle routes; • development of public transport, bus replacement programs; • restrictions on the incineration of garden waste, sanctions for illegal firing; • awareness-raising initiatives and tools regarding households' combustion.
	 signature of a Board Member

/SAI logo/	Office of the State Comptroller and Ombudsman /original name of SAI/	SAI of	Israel /country/
Main audit question: Answer:	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?* **The State of Israel set an objective to reduce the emission of greenhouse gases and additional health-damaging pollutants into the air. Air pollution is caused by many factors, primarily by the combustion of fossil fuel, used to produce electricity, power transportation vehicles and for industrial operations. More than half of the external costs caused by emissions of carbon dioxide and health-damaging pollutants in Israel originate in the electricity sector.** **The Office of the State Comptroller estimated the cost of air pollution in 2015, due to emissions of greenhouse gases and health-damaging pollutants, at an amount of €4 billion annually. More than half the cost, an amount of €2.2 billion, stems from the electricity production process.** **From 2007 to 2016, Israeli governments adopted 20 decisions regarding the reduction of air pollutants, greenhouse gases, energy efficiency, and energy production from renewable sources. It was found that government decisions regarding the reduction of emissions of greenhouse gases and the use of renewable energies in electricity production have not been followed.**		
Main findings of national audit on air protection	**Air pollution in Israel is one of the most critical hazards affecting public health, as well as the quality of life and the environment. The Office of the State Comptroller estimated the cost of air pollution in 2015, due to emissions of greenhouse gases and health-damaging pollutants in all sectors (electricity, transportation and industry), and based on the external costs determined by the Ministry of Environmental Protection, at an amount of €4 billion annually. In 2014, the cost was estimated at €3.98 billion. More than half the cost in each of those years, that is, an amount of €2.2 billion, stems from the electricity production process. Despite the fact that over the years there has been a significant reduction in the volume of emissions from coal-powered stations, the external costs remained high and, from the beginning of 2013 to the middle of 2016, amounted to €3.7 billion.** **Even though the discovery and increased use of natural gas led to a certain reduction in emissions, there is still a significant gap between the targets set by**		

	the government, and the actual reduction. **The Ministry of Environmental Protection did not have full data on actual emission values for the years 2010-2013, and the ministry is required to recalculate emission values for 2010, the base year. Until the Ministry completes its update of the emission values, it is not possible to ascertain if the objectives set in the National Plan for the Reduction of Emissions of Health-Damaging Air Pollutants and government decisions were achieved, and it is not possible to take the necessary steps to reduce air pollution.** **The annual report of the Ministry of Environmental Protection to the government did not include data about total actual emissions of pollutants for each year by sector, compared to the objectives stipulated in the National Plan, and about deviations from limit values. Furthermore, the report failed to include a comparison between the amount of pollutants emitted that year by each sector and the amount of pollutants emitted in previous years. Such data and comparisons are required to ensure the efficiency and effectiveness of the measures taken by the ministries to reduce air pollution.** **It was found that the measures stipulated in the government's decisions in respect to the reduction of greenhouse gas emissions, and use of renewable energies, have not been followed. The audit shows that, at the end of 2015, one year after the date stipulated in the government's decision for the achieving of the interim target to produce 5% of electricity using renewable energy, actual production reached only 2%.** **The audit also shows that Israel Electric Company failed to comply with the schedules for execution of the project to reduce emissions from coal power plants. Delays of two to four years were observed in the installation of emission reducing devices (Scrubbers) in coal-powered stations. The continued operation of these stations without Scrubbers led to the emission of health-damaging pollutants. Installation of the Scrubbers by the date determined by the Ministry of Environmental Protection would have reduced the external costs by €1 billion until December 2015.** **For five years, the Ministry of Energy did not make a final decision regarding how to reduce emissions from four coal-powered stations, thus contributing to the ongoing emissions of pollutants. Based on the Ministry of Environmental Protection data, the Office of the State Comptroller estimated the total external costs in the period from 2013 to the middle of 2016 at €1.4 billion.**

Recommendations	**The Ministry of Energy and the Ministry of Environmental Protection must evaluate and update the National Plan for the Reduction of Greenhouse Gas Emissions, and the National Plan for the Reduction of Health-Damaging Pollutants.** **The Ministry of Environmental Protection must monitor compliance with the targets to reduce emissions of health-damaging pollutants as specified in the National Plan for the Prevention and Reduction of Air pollution, and with the targets to reduce gas emissions defined in the National Plan for the Reduction of Greenhouse Gas Emissions, and take the necessary measures to achieve these targets.** **External costs due to emissions from coal-powered power stations costs, amounts to billions of € annually, require IEC and government entities to take measures to reduce emissions of pollutants from coal-powered stations.**
Best practices	



Judge (Ret.) Joseph H. Shapira,
State Comptroller and Ombudsman of Israel

Zyra Kombëtare e Auditimit e Kosovës Nacionalna Kancelarija Revizije Kosova Kosovo National Audit Office	ZYRA KOMBËTARE E AUDITIMIT	SAI of	KOSOVO
Main audit question: **Answer:**	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality?* Air quality management in Kosovo is inefficient because it is not fully supported and empowered by the necessary legal framework, and the monitoring and reporting system is not fully functional. Further on, there are various irregularities at local level in terms of adopting local environmental plans, reporting on the implementation of these plans as well as renewing the plans when they are not valid. The Ministry of Environment and Spatial Planning (MESP) has not established all necessary legal prerequisites to regulate the air quality in Kosovo, and has not updated the entire necessary legal framework according to the current condition of the air quality in the country. Such a framework does not serve as a guidance that facilitates the work of institutions to take specific measures on improvement of air quality.		
Main findings of national audit on air protection	**The main problems for air quality in Kosovo** is particularly the high exceedance of limit value of hazardous parameters to human health such as dust particles PM_{10} and $PM_{2.5}$ and the fact that the value of these parameters have not been reported for months during 2016 and 2017, particularly during the winter months when they have reached maximum values. In those cases when reported, the values of the parameter PM_{10} were exceeded up to 400%. **The legislative framework is not entirely complete in order to respond to all requirements that are needed for improvement of air quality. Legal prerequisites already established are not fully updated to enable easier and more comprehensive implementation.** The law on Air Protection from Pollution, as a key document is very old and does not correspond to the current situation of the air quality in Kosovo, while its reviewed version has not yet been finalized due to the requirement to prepare the financial impact assessment and did not underwent the approval. MESP has prepared the Air Quality Strategy in 2013, in cooperation with other relevant stakeholders and covers the period 2013-2022. After the approval of this Strategy, had been foreseen preparation of the Air Quality Action Plan (AQAP). To date, there is no AQAP approved and this has affected the air quality strategy to be difficult to implement. Due to lack of these preconditions for implementation of the Strategy, MESP has undertaken measures for preparation of emergency plans on improvement of air quality. In December 2016, was drafted and approved the "Plan of measures for improvement of air quality and the condition of the environment in Kosovo". In November 2017, MESP has prepared the document "Plan of activities for improvement of air quality autumn-winter 2017-2018". Emergency plans for addressing the alarming air pollution especially during the winter; despite being compiled do not have reports of the implementation of their measures to reach a conclusion on how effective they were in achieving their goals. **The air quality monitoring system in Kosovo is inefficient.** This system does not provide the citizens of Kosovo a real picture of the situation on air quality, especially not in real time. Air quality monitoring stations are located in the vast majority of the country, and currently the air quality monitoring network managed by Hydro-meteorological Institute of Kosovo (HMIK) counts 12 stations. The stations are generally located at sites where they are influenced by various sources of air pollution. One of the main deficiencies of the monitoring stations is the fact that a considerable part of them, both during 2016 and 2017, have been non-functional and as such have not reported data on air quality for months. The main reasons behind the non-functionality of the monitoring stations include: lack of maintenance and continuous servicing of the stations, frequent displacement, poor security, and damage of the stations by the human factor. The risk imposed by such system of monitoring and reporting consists in the monitoring stations being non-operational and without data particularly in those cases when air pollution in the country is severe and citizens are not aware at the right time to take the necessary measures to avoid exposure to such air pollution.		

Status of monitoring stations	2016		2017
Operational during the entire year	17%	Operational during most of the year	17%
Partially operational	58%	Partially operational	50%
Non-operational	25%	Non-operational for more than 7 months during the year	33%

Air Quality Measurement Techniques are standardized since all monitoring stations are equipped with the same number and type of key parameters that make determination of air pollution with NO_2, CO, SO_2, O_3, PM_{10} and $PM_{2.5}$. Despite this, data collection in stations is done manually, with the exception of three stations located in Obiliq for which data is obtained from the local software that receives the data from them. In the absence of a central system that would collect and process data automatically, as well as generate reports, data is currently processed by one of HMIK officers. This way of data processing takes a lot of time and as such, causes major delays in reporting air quality data and is prone to errors.

Significant deficiency is also the incomplete reporting of air quality data. During 2016, as well as during 2017, there are many stations that have not generated data for various parameters for months. The most problematic air pollution parameters in our country, PM_{10} and $PM_{2.5}$, have not been reported for months. During 2016 these two parameters were not reported on average 6.6 months, while during 2017 the same parameters were not reported on average 4.2 months during the year.

The condition of air quality is also worrying if the recorded exceedances of PM_{10} values are taken into account. Given that the maximum number of permissible exceedances within the PM_{10} value year is 35 days, this audit found that during 2016 there were stations that exceeded this parameter for about 93 days as well as during 2017 up to 68 days. Meanwhile, since the maximum values of PM_{10} of the daily average were analysed, there were days when PM_{10} values reached around 91 (2016) and 326 (2017), compared to the maximum value allowed of 50. The maximum values of $PM_{2.5}$ over an hour have reached extremely high levels and this is still more alarming regarding the human health. While the allowed limited value of $PM_{2.5}$ is 40 µg/m3, during 2016 the highest value recorded was 345.9, while during 2017 $PM_{2.5}$ reached 412.

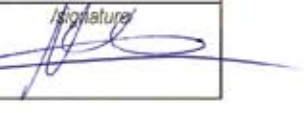
The contract for the maintenance and servicing of monitoring stations that was finalized in June 2017 has reached the value of about €150,000. These funds have been sufficient for servicing of stations compared to those of the contract signed in November 2016 (about €60,000). The funds in 2016 were sufficient for maintaining and servicing only 4 of the monitoring stations that were prioritised by HMIK.

Recommendations

- Entities responsible at the central and local level should make sure that they have established a comprehensive and up-to-date legal framework, as well as efficient and sustainable monitoring and reporting mechanisms on air quality in Kosovo;
- MESP as the key institution in establishing necessary legal framework for improvement of air quality, should complete, update and functionalise as soon as possible key documents that arrange air quality in Kosovo such, as the Law on Air Protection from Pollution, Air Quality Strategy and the Air Quality Action Plan;
- Environmental Protection Agency as a support to the HMIK should as soon as possible fully functionalize air quality monitoring network through adequate relocation of stations, continuous servicing and maintenance of monitoring stations, establishment of a centralized system for automated collection and processing of data, as well as real-time measurement and reporting on air quality condition;
- Municipalities should ensure that as soon as possible they approve or renew their environmental action plans, and to continuously report with complete information on implementation of measures that relate to improvement of air quality foreseen in these plans.

Best practices

- The locations of the majority of the monitoring stations in Kosovo were determined following the criteria given in the Directive 2008/50/EC on ambient air quality and cleaner air for Europe;
- In 2017 there was a signed contract for servicing and maintaining all monitoring stations;
- HMIK from middle of October 2017 reports daily for two stations located in Prishtina, while for three stations located in Obiliq has started daily reporting from 12 January 2018. Daily are reported only particles PM_{10} and $PM_{2.5}$.



	ДРЖАВЕН ЗАВОД ЗА РЕВИЗИЈА	***SAI of***	***Macedonia***

Main audit question:	*What is the effectiveness of measures taken by national and local government to improve air quality?*
Answer:	With the activities taken in relation to harmonization of national legislation with EU Directives on air quality, adoption of national strategic documents, preparation of plans at local level, functioning State Air Quality Monitoring network, Air Quality Information System AIRVIRO, and Air Pollution Cadaster, some progress has been achieved regarding air quality policies, but it is insufficient for improving air quality. Although certain measures from the National Plan for Ambient Air Protection have been implemented in the period 2014-2016, they are not effective in reducing air pollution. Budget funds are insufficient for implementation of Annual work program of the State Automatic Monitoring System (exp. services, procurement of spare parts for the stations, laboratory equipment, accreditation of the Central and Calibration Laboratories). Concerning Environmental Investment Programs, no funds have been allocated for air quality projects for the period under review. According to data from the State Statistical Office for the audited period, the air quality investments from the State Budget is minor and contributes with only 0.1 % of GDP. Additional activities are necessary to strengthen coordination between competent institutions, administrative and technical capacity of the institutions at central, especially at the local level, in terms of human resources, equipment and financial resources, their coordination and mutual cooperation, full harmonization of the national legislation with EU Air Quality Directives, and adoption of planning documents at local level. Integrated approach by all stakeholders and financial resources, especially larger share of Budget funds, is necessary for effective implementation of measures to achieve results for improving air quality. It is necessary to establish a monitoring system for measures implementation and indicators for effectiveness of policy implementation.
Main findings of national audit on air protection	**Assessment of ambient air quality is not complete:** - The State Air Quality Monitoring network has not provided constant monitoring of ambient air quality because some of the analyzers in the measuring stations were not in operation in the period 2014-2016; also they do not measure all necessary parameters - some of the parameters are measured only indicatively and representative measurements are not conducted. - The application of dispersion models for assessing the impact of certain sources of emissions and categories of sources on air quality are limited due to the poor availability of quality input data, longer time series with reliable and detailed emission data, as well as valid data from the meteorological stations of the National Hydro-meteorological Service. **Inappropriate organization and coordination of air quality management system** - Environmental Inspection does not correspond fully with the EU law. Inspection surveillance in the field of environment is carried out at central and local level without coordination. Lack of single system for environmental inspection, inadequate structure to coordinate and supervise inspection at central and local level, lack of single plan and annual programs, do not provide efficient inspection control. Therefore, new Law on Environmental Inspection was prepared in January 2016, but it is still in procedure for adoption. - Inter-sectoral Working Group on Air Quality and Committee for Health and Environment have been established to improve inter-sectoral cooperation, but coordination between institutions is insufficient and there is no system for monitoring implementation of each measure. It is also necessary to improve the existing information and communication system in terms of providing data at various levels of disaggregation. - The administrative capacity of key institutions (MOEPP, SEI, LSGU, IPH) for implementing air quality management policies is insufficient at all levels: central, and especially at local level. Insufficient human resources capacity, large number of competencies and responsibilities, lack of financial resources cause inefficiency in fulfillment of obligations and achievement of goals set by the policies. - Republic of Macedonia is not subject to sanctions for non-compliance with the goals of air quality policies at EU level, nor there are national/local sanctions. Since there are no penalties for not implemented measures in the plans for ambient air quality protection, the process of implementation is very slow. This creates a risk for achievement of established goals, overcoming air pollution and preventing new sources of air pollution.

National legal framework for air quality is generally harmonized with EU Air Quality Directives

- The legal and strategic framework regulating ambient air quality in the Republic of Macedonia is harmonized with EU Directives in the field of ambient air quality: Directive 2008/50/EC, Directive 2004/107/EC, and Directive 2001/81/EC (NEC Directive), but MOEPP has not taken activities regarding transposition of amendments to the directives, that is, updating the secondary legislation. Incomplete transposition of EU Directives on air quality in the national legislation and untimely update of the secondary legislation contributes to delayed implementation.
- In Macedonia, PM_{10} is the most critical pollutant, which often exceeds the daily limit value during the year. This imposes the need of defining thresholds for information and alert in order to take short-term measures by competent authorities. MOEPP prepared an amendment on limit values of levels and types of pollutants in ambient air and alert thresholds, deadline for achieving limit values, margins of tolerance of the limit value, target values and long-term, but the amendment has not been adopted yet. Not adopting legal act on information and alert threshold implies inability to undertake timely and appropriate short-term measures and recommendations in case of high concentrations of polluting substances in the air.

Insufficient implementation of Air quality policy on national and local level

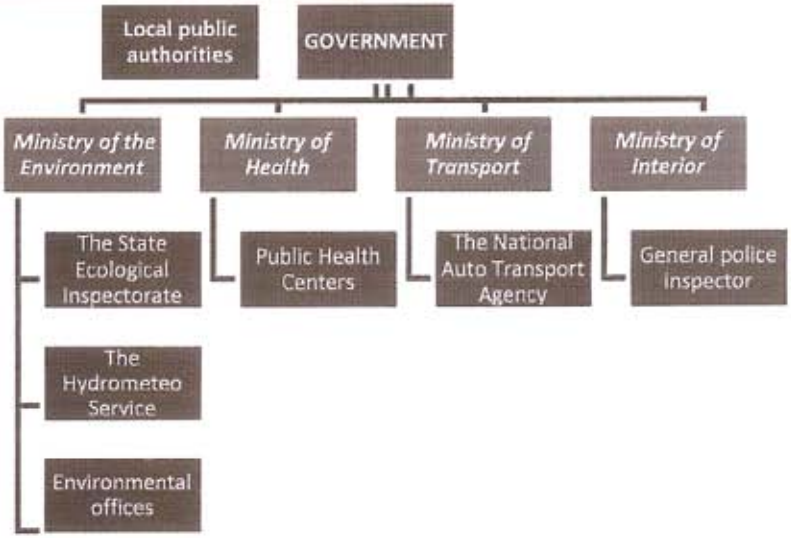
- Measures in the National Plan for Ambient Air Protection are complex and cover different areas that should be implemented by institutions at central and local level, as well as by individual installations. There is no system for monitoring the implementation of each measure. The National Plan does not contain indicators to measure the effectiveness of policy implementation, which makes monitoring and realization of measures difficult for achieving the goals and policies for combating air pollution.
- Due to the insufficient administrative capacity, despite the fact that most municipalities belong to zones and agglomerations where there is a risk that levels of polluting substances exceed one or more alert thresholds, only the municipalities of Tetovo, Bitola and Skopje have prepared short-term action plans for ambient air protection. The local plans do not precisely define deadlines for implementation of each measure, nor required funds, sources of funds, indicators to measure the effectiveness and responsible body for control and evaluation of the implementation.
- There is no integrated approach between policies from different areas such as economy, transport, energy, which are in connection with the basic national policy for air quality improvement. According to the Law on Waste Management, MOEPP and mayors of municipalities have obligation to close and re-cultivate illegal landfills, but these are still operating. There are 54 municipal landfills in the country that pollute groundwater, soil and air, but they are still functional. Policies regarding passenger vehicles and the structure of public transport were not in accordance with the principles of sustainable development and produced long-term environmental problems. According to data from the Customs Administration, by 2015 about 70% of the vehicles belong to high-emission classes (EURO 0, 1 and 2), and relatively large share (around 10-18%) of those belong to the oldest category of vehicles (EURO 0).

Insufficient Budget funds for implementation of air quality policy

- Financing and realization of activities in the field of environment are carried in line with the Annual Program for Environmental Investment. For implementation of the Environmental Investment Program the same unchanged amount of Budget funds was allocated in the years 2014, 2015 and 2016, and no funds were allocated for projects that are in direct connection with improvement of air quality;
- From the planned funds in the Annual work program of the State Automatic Monitoring System, only 31- 42% are approved, which is insufficient for realization of its activities. Therefore, there is no regular maintenance, purchase of spare parts for the measuring stations, dislocation of two existing monitoring stations for air quality, procurement of laboratory equipment and chemical reagents, accreditation of the calibration laboratory and training of the employees. Incomplete financing of this program questions the continuous operation of the monitoring system.
- Although certain measures of the National Plan for Ambient Air Protection have been implemented in the key sectors for air pollution, they are insufficient to achieve satisfactory results in terms of reducing suspended particulate concentrations. Effective implementation requires integrated approach by all stakeholders and provision of additional financial resources. According to the State Statistical Office data for the period under review, investments and costs for air protection participate with 0.1% in the GDP, while in the total investments and environmental costs participate with 13% for 2014 and 2015 and 6% in 2016. Regarding data, most of the investments are in the industry and the specialized producers around 83-96%, while in the other sectors of economic activity the share is small and ranges from 4-17%.

	Incomplete air quality monitoring and information systems - As a result of irregular maintenance of instruments and lack of spare parts for measuring stations, in the period 2014-2016, 3 of 17 monitoring stations did not function, some measuring stations did not measure all parameters, while for some of the parameters minimal data coverage is not provided in accordance with the national legislation. - Benzene concentrations are not continuously measured and concentrations of heavy metals and polycyclic aromatic hydrocarbons are measured only by indicative measurement campaigns. In the period 2014-2016, measurement campaigns were carried out only on two locations - Skopje and Tetovo. - MOEPP has established and manages air quality information system, which is connected to the air quality web portal. The portal provides real-time information to the public for the current situation of ambient air in the country, as well as information on pollutants, health effects and legislation. Although the air database contains a lot of data, it is still not complete. There are no emission data from stationary sources, no data on ambient air quality from individual stationary sources, no emission data from mobile sources and no data from the Cadaster of Air Pollutants.
Recommendations	MOEPP, in cooperation with other involved institutions at central and local level and the Government of the Republic of Macedonia, should undertake activities in order to: - establish integrated system that will provide comprehensive and unimpeded exchange of data/information; - accomplish project documents from the Twinning project "Strengthening the administrative capacities at central and local level for implementation and enforcement of the environmental acquis"; - impose sanctions at central/local level for non-compliance with goals of air quality policies and limit values of certain pollutants in the air; - update all necessary legal and secondary legislation for full harmonization of the national legislation with EU Air Quality Directives; - establish monitoring system for implementation of measures in the National plan for ambient air protection and indicators for measuring effectiveness of policy implementation; - prepare all planning documents at local level, establish appropriate monitoring system for implementation and indicators for measuring effectiveness; - provide Budget funds necessary for operation and maintenance of all monitoring stations and financing measures in the planning documents; and - ensure timely submission and completeness of data from stationary sources of pollution in order to provide comprehensive information system for ambient air quality and data integrity for the Cadaster of air pollutants.
Best practices	

	The Court of Accounts of Republic of Moldova	***SAI of***	***Moldova***
Main audit question: Answer:	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?* The national air quality management system is characterized by limited functionality and is unable to assess the impact of emissions on air quality and to manage the health risks posed by the harmful effects of pollution. The Republic of Moldova is not prepared to respond promptly to environmental challenges, both in financially and technically aspect, in the case of greater industrialization and / or pollution generated outside the state border. Undoubtedly, if the government does not increase its resilience against the vulnerabilities and threats related to the area, the Republic of Moldova endanger the expectations of the results of the European integration, in the field of air quality and doubts the ecological and health safety in case of excessive unpredictable pollution.		
Main findings of national audit on air protection	**The main problems for air quality in** Republic Moldova is related to the increase the number of transport means and to the pollutant-generating companies that influence air quality, which can lead to the exceedance of the alert threshold for pollutant emissions, which is currently maintained at an acceptable level. The Republic of Moldova does not have actual information on the volume of emissions of pollutants in the air, and at the implementation of the state policy, the field of air protection is of no prior interest. The existing air protection system is not an integrated one, characterized by poor cooperation between public authorities and institutions with competence in the field of air quality management, and does not ensure the organized and unitary solving of the problems in the field.		



Current legal mechanisms for airspace management in the Republic of Moldova are obsolete and their harmonization with the Community framework is delaying. In the absence of a new law on air quality and protection that would regulate air quality assessment in relation to atmospheric pollutants, improved pollutant monitoring and public information provision, setting emission ceilings for certain pollutants and reducing pollutant and gaseous emissions greenhouse gases, it is not possible to reduce the adverse effects of pollution on human and the environment.

There is no single national policy to combat air pollution. In the absence of well-defined strategic objectives, supported by an adequate legal and institutional framework, it is not possible to create an integrated air quality management system. Existing environmental, transport and health policies do not define the environmental factor in the context of the negative impact of pollutants on human health and the balance between economic development and environmental protection.

There is no cost – benefit analysis inside air protection system. There are no comprehensive data (for the whole country) on the amount of public expenditure on air protection. Moreover, although the air pollution payments as well as the pollutant emission payments for mobile sources and the import of goods were the income sources of the National Ecological Fund (39.0 thousand EUR), during the audited period for the protection of the air, it were not been made financial efforts by the state budget.

The air quality monitoring system in the Republic of Moldova is not performant and does not provide reliable data, which would allow the evaluation of all pollutants, including PM. At the same time, there is no automatic self-monitoring and recording system for emissions of pollutants into air, which will ensure the collection and processing of data in a unitary manner and their transmission to environmental institutions.

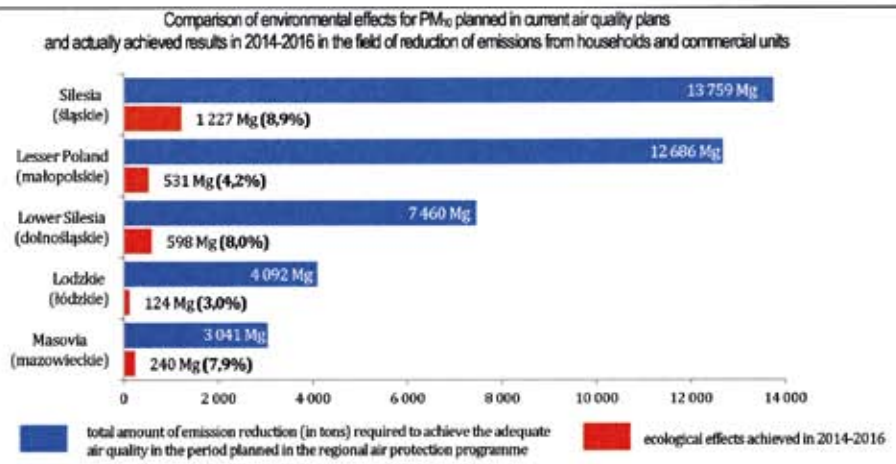
Recommendations	• Approval of a national action plan to ensure the quality of atmospheric air, with the transposition of the results and progress indicators, the responsibilities and timelines, as well as the sources of financing; • The operation of the changes in the national legislation and the internal rules of the authorities involved in the management of the atmospheric air field in order to improve the cooperation between them; • Elaboration of action plans, common methodologies, to solve the identified deficiencies in a unitary manner • Identification of funding sources for the creation of an automated air quality monitoring system.
Best practices	• Introduction to the national law possibility of creating zones with the limited car traffic in the center of the cities (so-called green areas); • Promoting and implementing European standards; • Government programs to stimulate the renewal of the car park, under the name "Rabla", supported by funds allocated by the Ministry of Environment. The mode of operation of the program is to grant a discount on the purchase of a new vehicle.

Veaceslav UNTILA

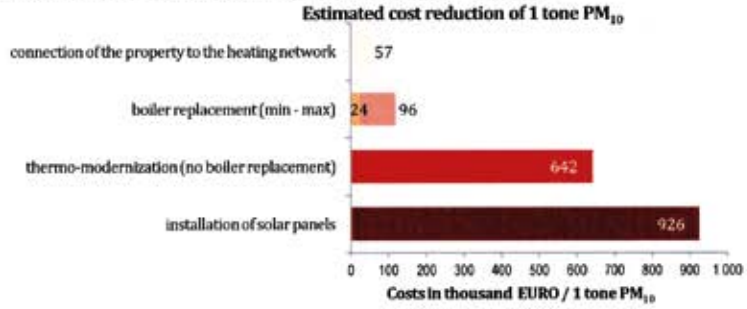
President of the SAI of the Republic of Moldova

/SAI logo/	*Najwyższa Izba Kontroli* /original name of SAI/	***SAI of***	***Poland*** /country/

Main audit question: **Answer:**	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?* The **national government's** activity in the field of air protection was insufficient to create conditions for significant improvement of the situation. The Ministry of Environment did not coordinate all the activities undertaken to combat air pollution in an appropriate way. The standards for solid fuels have not been introduced yet, and as a result poor quality coal is commonly used to heat households. The measures related to emissions from transport are inadequate to provide a significant level of their reduction. There were a lot of measures taken by the **local administration** in Poland to improve air quality. However, all these actions are still ineffective in the light of the very high scale of normative values exceedances (this puts Poland on top of the most polluted countries in the EU). Not all regional air quality plans have implemented solutions to measure the results of the actions taken. Nevertheless, the data collected by NIK on the environmental effects achieved (in some regions also with assistance of external experts) indicate clearly that the current pace of implementation of remedial actions (in 2014-2016) in 5 regions covered by the audit (out of 16 regions in the country) is far from achieving the required air quality in the time perspective assumed in the regional air quality plans. Additionally, some municipalities have introduced activities with low economic efficiency (e.g. thermo-modernization without replacing old, low efficient heating boilers).
Main findings of national audit on air protection	The activities provided by the authorities did not ensure adequate protection for the residents and the natural environment against the negative effects of air pollution. The air quality in Poland in 2014-2017 still significantly deviated from the expected levels. The normative levels of BaP, PM_{10} and $PM_{2.5}$ were frequently exceeded in this period. On the other hand, the concentrations of NO_2 was exceeded on a smaller scale. The maximum annual concentrations of PM_{10}, $PM_{2.5}$ and NO_2 were almost twice as high as the EU respective standards. There were also cases where the daily concentration of PM_{10} above the EU standards occurred for more than half of the year, and the annual concentration of BaP exceeded the EU target level over twenty times. This resulted from both the insufficient activity of public entities at every level (national, regional and local) and insufficient coordination – the consequence of it was lack of ensuring consistency of the actions implemented within the complex structure of the air protection system. **The main problems related to air quality in Poland** are the exceedance of the limit value for particulate matter (PM_{10}, $PM_{2.5}$) and the target value (BaP). On a smaller scale, the problem is also the exceedance of the limit value of NO_2. The main sources of PM and BaP are the non-industrial sector (mainly emissions from households heating) and – in case of NO_2 – transport and industry. **Air protection system in Poland is very complex.** It requires interaction among many participants at various administrative levels, including national, regional and local. For example, four different independent public sector entities are responsible for the most important tasks in the air protection system. These entities are responsible for: **planning** actions against air pollution – preparing air quality plans (regional authorities), **implementing** planned activities (municipalities), **financing** of the actions taken (National and 16 Regional Funds for Environmental Protection and Water Management) and **auditing** the implementation of the activities performed by municipalities (16 Regional Inspectorates of Environmental Protection). The results of the audit showed that the coordination of the activities of the public authorities participating in the air system was insufficient. The actions taken to ensure consistency and continuity of various and scattered sources of financing of tasks related to the reduction of low emissions were inadequate to the needs. **The most important rules and regulations for air quality have their origins in EU directives.** Poland has transposed the EU regulations concerning air quality and protection programmes into the national legal system (directives 2008/50/EC and 2004/107/EC). The basic national regulations referring to air protection are laid down in the Act on Environmental Protection Law. The local administration can also introduce anti-smog resolutions, which define standards of solid fuels and/or standards of boilers at the regional level. The limitations of emissions from industries result from separate EU regulations, implemented into the national legal system. Due to the continuous exceedance of standards for PM_{10} (observed in 2007-2015) on 22 February 2018 the Court of Justice of the European Union stated that Poland had infringed the EU law on ambient air quality and had not correctly transposed the provisions of the AAQ Directive concerning air quality plans. **Policies on air pollution have been developed both at the governmental and regional levels.** The Minister of the Environment has implemented the National Programme for Air Protection, which is a medium-term planning document aimed to improve the air quality throughout Poland. However, the most important documents that form the basis for determining the direction of remedial actions at the regional level are set out in the air protection programmes prepared separately by 16 Marshall Offices representing 16 regions of Poland (air quality plans indicated in AAQ Directive). **The Minister of the Environment did not have the key information to carry out a cost-benefit analysis as part of the existing system of air protection against pollution.** There were no data on the costs of corrective actions concerning air protection (including all sources of financing), nor a detailed forecast of expenses that should be incurred to ensure the required air quality. There was also no analysis to establish external costs in the country due to insufficient air quality. The main sources of financing of tasks against air pollution were: the National Fund and 16 Regional Funds for Environmental Protection and Water Management, the EU Funds and the municipalities' own funds. In addition, other instruments supporting the environment were used, such as: Green Investment Scheme, EEA Grants, Norway Grants, Swiss Contribution, Life Programme. Not all air quality plans include instruments to assess the effectiveness of the actions taken to improve the air quality. The data collected by NIK indicate that the current pace of implementation of the actions taken (in 2014-2016) in the audited regions is not sufficient to achieve the required air quality in the time perspective indicated in the regional air quality plans.



The most efficient action to reduce low emission is to replace old boilers with ecological ones or to connect households to the heating network. Still not all municipalities have implemented actions in this area.



The air quality monitoring system in Poland operates very well and provides reliable data. The measurements are carried out by the Regional Inspectorates of Environmental Protection. Over 230 measurement stations operate within the national network. They measure concentrations of air pollutants such as: SO_2, NO_2, NOx, C_6H_6, O_3, CO, PM_{10}, $PM_{2.5}$, Cd, As, Pb, Ni, BaP (in some stations also Hg and other polycyclic aromatic hydrocarbons – PAH different than BaP). Poland has met the standard indicated in the AAQ Directive referring to the number of sampling points. All the data from the monitoring system are available through an electronic portal (operated by the General Inspectorates of Environmental Protection) or a mobile phone application. Air quality measurement is part of the National Monitoring of the Environment Programme. The system of air quality monitoring costs appx. 10-12 million EUR yearly. The monitoring system was financed from public money.

Recommendations

The full version of the national report contains 17 recommendations addressed to the Prime Minister and four Ministers, and one general conclusion for the Parliament. The most important ones, related to the scope of the joint audit, are:

1. Ensuring comprehensive and reliable coordination of activities planned and implemented under the air protection system **[Prime Minister]**
2. Establishing rules and procedures for obtaining full and comprehensive data systematically (currently these are dispersed, and lie with various ministries and public entities), to allow for conducting a cost-benefit analysis of the necessary repair process in the field of air protection **[Prime Minister]**
3. Establishing the obligation to include, in air quality plans, the elements that allow for assessing the correctness and effectiveness of the actions taken to reduce pollutants emissions (including ecological effects), and defining uniform standards for preparation of air quality plans **[Minister of the Environment]**
4. Verification of the assumptions of the draft regulation on quality requirements for solid fuels in order to protect the citizens and the environment against the negative impact of air pollution **[Minister of Energy]**
5. Ensuring the measurements of indoor air quality (including PM_{10} an BaP concentrations) and performing a cost-benefit analysis of the possible use of protective equipment (e.g. air purifiers) **[Minister of Health]**

Best practices

1. Region of Lesser Poland (Małopolska) – an IT application developed by the regional authorities that allows for direct adding to the database of information on replaced or liquidated solid fuel heating devices and other activities that limit low emissions. This tool enables ongoing monitoring and reporting on the implementation of air quality plans, both in terms of material effects and achieved environmental effects.
2. Region of Lesser Poland (Małopolska) – implementation of a network of eco-advisers (60 persons) at the basic level of the local government (municipalities), responsible for implementation and supervision of the municipal air protection strategy, for obtaining external funds for this purpose, advising, ensuring help and engaging residents in the process of exchanging old heating sources. The project also included information and education campaigns in the field of air protection.

/signature of a Board Member/

	COURT OF ACCOUNTS	SAI OF	ROMANIA

Main audit question:	**Has the organizational and institutional framework been created in line with national and international legislation and have policies and strategies been developed at national level to ensure air quality? Have the measures taken by the national and local government to improve air quality been efficient and effective?**
Answer:	**The central authority with regulatory, decision and control role in the field of environmental air quality assessment and management at national level is the Ministry of Environment (ME). The responsibilities of the ME are carried out in the 41 counties and in Bucharest through the Environmental Protection Agencies (EPA).** In Romania, the legislative framework in the air quality field has been created, the European legislation on air quality as well as The Geneva Convention on Long-range Transboundary Air pollution (CLRTAP)-1979 and three of its eight Protocols, namely the Protocol on Reduction of Acidification, Eutrophication and Tropospheric Ozone, adopted at Gothenburg on 1 December 1999, the Protocol on Persistent Organic Pollutants and the Protocol on Heavy Metals, adopted at Aarhus on 24 June 1998*. The central environment authority issued measures for improving air quality, which are included in the sectorial strategies. The implementation of national and European legislation regarding air quality is carried out through the National Air Quality Integrated Assessment and Monitoring System (SNEGICA). Environmental policy instruments have been implemented at national level, and the Environmental Fund is an important financial instrument for implementing Romania's environmental protection policies, including air quality improvements. No studies have been identified at the Ministry of Health on the basis of which a causal link is established between specific mortality by possible diseases associated with air pollution and air pollutants.
Main findings of national audit on air protection	**1. What is the main problem regarding air pollution in Romania?** The atmospheric pollutants considered in the assessment of ambient air quality in Romania are suspended particles (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), nitrogen oxides (NO_x), lead (Pb), benzene (C_6H_6), carbon monoxide (CO), ozone (O3), arsenic (As), cadmium (Cd), Nickel (Ni). At the time of the audit, in some urban agglomerations, there were constant exceedances of the PM10 air pollution limit values, which have as main sources industrial activities, the transport sector, residential heating as well as natural sources, extreme weather phenomena, leading to increasing the level of dust in the air. **2. What governance system is in place and who bares the responsibility?** The central authority with regulatory, decision-making and control role in the field of environmental quality assessment and management at national level is the Ministry of the Environment (ME), and its attributions at the county level are carried out through Environmental Protection Agencies (APAs). The National Air Quality Assessment and Management System (SNEGICA) provides the organizational, institutional and legal framework for cooperation of public authorities and institutions with competence in the field of evaluation and management of ambient air quality in a unitary manner throughout Romania, as well as for informing the population and European and international bodies on ambient air quality. Environmental taxes have been implemented as environmental policy instruments to correct / direct the behavior of the population and economic agents towards the protection of the environment. **3. What rules and regulations are laid down in legislation?** Law no.104/2011 regulates the measures aiming to maintain the quality of the ambient air, where it meets the objectives of the ambient air quality established by the legislation, as well as the measures for improvement of the ambient air quality in the other cases. Romania transposed and implemented the European legislation on air quality and also the Geneva Convention of Long-range Transboundary Air pollution (CLRTAP)-1979 and three of its Protocols from 1998 and 1999*. The central authority for environment has developed measures to improve air quality. These are included in sectorial strategies, such as: The National Action Plan for Environment Protection and the National Program for Progressive Reduction of SO_2, NO_2, NO_x, VOC and NH_3. Environmental legislation in Romania has been implemented at national and local level, despite the difficulties encountered by the many administrative organizations / reorganizations in recent years suffered by public authorities and institutions with competence in the field of air quality. **4. What policy is undertaken to tackle the air quality issue?** The National Environmental Action Plan provides for several specific air quality objectives, including: pollution control by applying techniques and technologies to contain pollutants and / or introducing less polluting technologies; identifying sources that have generated levels of pollutants above legal limits and reassessing their activity by imposing stricter emission standards, as appropriate; fulfilling the obligations assumed by ratifying / acceding to various international conventions, treaties and protocols.

	Objectives in the field of air quality and reduction of air pollutant emissions are also provided in the National Program for Progressive Reduction of SO2, NO2, NOx, VOC and NH3. Air Quality Plans and Air Quality Maintenance Plans have been initiated but are not finalized. The achievement of the objectives in the field of air quality in cooperation between the public institutions with competences in the field are ensured by the National System of Integrated Air Quality Assessment and Management. **5. How is the policy funded, what is the cost of the measures taken and what are the benefits?** Although the objectives of air quality assurance programs have been defined through financing guidelines, as no performance indicators have been set up to ensure program performance evaluation, the Romanian Court of Accounts' auditors have been unable to express their opinion on their efficiency and effectiveness. The Environmental Fund is an important financial instrument for implementing Romania's environmental protection policies, including air quality improvements, but its proper functioning requires both the strengthening of the administrative system as well as ensuring legal coherence in the setting of environmental taxes. In 2010-2015, according to statistical data, environmental spending fluctuated (with a 3% GDP share in 2010, 3.2% in 2011, 1.9% in 2014 and 2.2% in 2015), and revenues from environmental taxes have had an upward trend (from 2.09% of GDP in 2010 to 2.43% in 2015), but both remained at a very low level in absolute terms and as a share of GDP. There is an increasing trend in environmental taxes, but if we take into account the inflation rate, the growth is relatively low. In the first part of the 2010-2015 period, Romania recorded a decrease in environmental tax revenues as a percentage of GDP. After 2013, when Romania, like other countries, has felt less and less the effects of the financial crisis, the percentage is rising (from 2.04% of GDP in 2013 to 2.43% in 2015) but remains below the EU average. The evolution of the annual average concentrations of air pollutants during the period 2009-2014 was downward, and in 2015-2016 there was a slight increase. **6. How is development in air pollution monitored and reported?** In accordance with the provisions set out in the national legislation, in Romania the responsibility for monitoring the ambient air quality lies with the authorities for environmental protection. The National Air Quality Monitoring Network (RNMCA) is a national public interest objective, and it functions under administration of the Ministry of Environment. Currently, RNMCA includes 148 air quality-monitoring stations, 41 analytical laboratories and 41 data collection and processing centers that operate at the level of each county and municipality of Bucharest. Air quality data from stations is available to the public in real time via www.calitateaer.ro website, on the external panels (in densely populated areas of cities) and indoor panels (located at the main authorities/organization's headquarters). Due to the insufficient funds allocated to the maintenance of the National Air Quality Monitoring Network, monitoring stations with faulty equipment as well as a number of indoor and outdoor panels to inform the public about air quality that did not work were identified. The Annual Report on Ambient Air Quality in Romania is elaborated, sent to the European Commission and published on the website of the National Environmental Protection Agency. Information on the evolution of annual average concentrations of air pollutants can be found as well in the "State of the Environment Report in Romania", also drafted annually and sent to the European Commission.
Recommendations	• To perform an analysis regarding the equipment of the National Air Quality Monitoring Network (RNMCA) with new measurement locations(points) in relation to the classification of areas and agglomerations in air quality assessment regimes as well as the need to relocate existing measurement points for certain pollutants. Depending on the outcome of the analysis, for the measurement points to be redefined or relocated, the steps will be taken to obtain the opinion of the European Commission. • To complete the general overhaul and repair services of the equipment that form the National Air Quality Monitoring Network so that Romania can provide full air quality reports. • To take the necessary measures to ensure the functioning of all indoor and outdoor public information panels. • Periodic request for data and statistics from the public health authority on research and studies on the relationship between pollution and public health and their publication on the official website in order to inform and raise awareness of the effects of pollutant emissions on the health of the population. • To ensure that people are informed about the concentration of pollutants in the atmosphere in all possible environments, they should update the official website, in real time, of the risks affecting air quality. • To complete the legal framework with provisions sanctioning the non-compliance with the Methodology for air quality plans, short-term action plans and air quality maintenance plans. • To coordinate the activities of authorities with responsibilities in the field of air quality management, at governmental level/to designate a body for the coordination at national level of all activities in this field.
Best practices	• Limiting the import of old cars by applying some formulas for tolling of second-hand cars and issuing the Program regarding the stimulation of the national car park renewal.
President of the Romanian Court of Accounts **Mihai BUSUIOC**	Signature

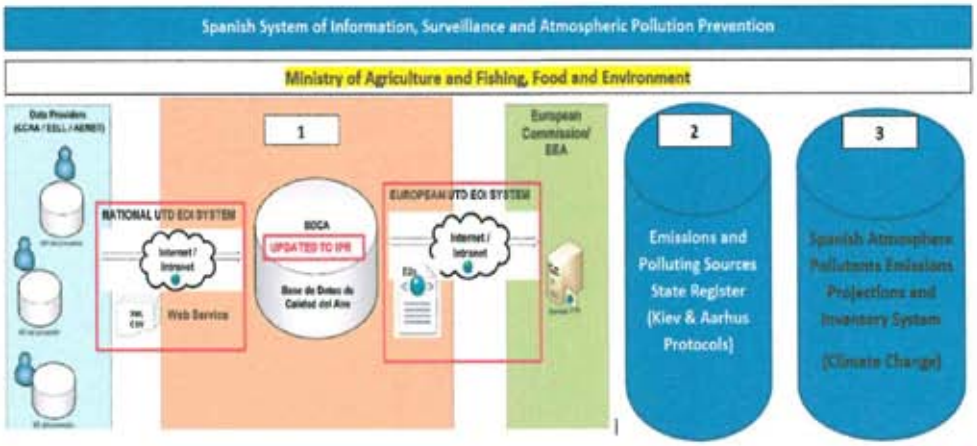
	Supreme Audit Office of the Slovak Republic	***SAI of***	***Slovakia***

Main audit question:	**What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?**
Answer:	**The SAO has verified in the area of air quality**: compliance of the national legislation with the EU legislation, fulfillment of the international obligations of the Slovak Republic, fulfillment of obligations arising from EU and national legislation, air quality management system, financing of measures in the field of air quality, spending of funds for projects funded by and on the effectiveness and efficiency of the measures taken to address the air quality problem in the Slovak Republic. **The Ministry of the Environment is responsible for the transposition and implementation of European environmental legislation** aimed at air protection and permissible pollution. The audit of the SAO SR revealed problems with not full or exact transposition and implementation of European environmental legislation of air quality. **In the Slovak Republic, compliance with the specified limit values for selected areas and concentrations of PM_{10} dust particles was not ensured** for which EU sanctions are threatened. **The implemented measures failed to achieve the air quality objectives set**, so the current measures need to be evaluated and subsequently adopted new, more efficient and more effective measures. **There is no system to measure the effectiveness and efficiency of the measures adopted in the field of air quality**, it will be necessary to establish and adopt binding indicators for their measurement, to periodically evaluate them and subsequently to propose relevant measures to improve air quality.
Main findings of national audit on air protection	**Above average of Slovaks are exposed to harmful dust particles**. More than 12% of the population is exposed to increased levels of $PM_{2.5}$ particulate matter in the atmosphere, which is the highest in the OECD. The concentration of larger particles of PM_{10} is close to the EU average. The concentration of nitrogen dioxide (NO_2) is the worst in the EU, and the concentration of ground-level ozone in the air is third worst in the EU. **The most significant problem identified is air pollution with solid PM particles (PM_{10}, $PM_{2,5}$)**. In 2014, 18 air quality management areas were identified in the Slovak Republic, where limit values for some pollutants were exceeded. The number of air quality management areas is declining slowly, reaching 20 in 2016. In the year 2016, there was more than 1.1 million inhabitants living in that territory, representing about 21% of the total population of Slovakia. The establishment of zones and agglomerations and the assessment of air quality are carried out annually within the meaning of Directive 2008/50 / EC on Ambient Air Quality and Cleaner Air Quality in Europe. **Basic results of the air quality assessment in the Slovak Republic** were the results of constant measurements of concentrations of pollutants in the air carried out by the Slovak Hydrometeorological Institue at 38 stations of the National Air Quality Monitoring System. The number of monitoring stations and their location corresponded to the set criteria so that the data obtained were representative of the urban background, industrial areas, transport pollution, rural areas and the regional background. However, the SAO SR considers the National Air Quality Monitoring System to be inadequate due to the complexity of the territory of Slovakia. **Slovakia lacked a comprehensive strategy for air protection** and no national emission reduction program for basic pollutants was developed until 2020 or 2030. At present, the Ministry of the Environment is preparing a new strategy for air protection, which should include a strategy for improving air quality and a national emission reduction program. Its processing and adoption is expected in 2019. ***The Ministry of the Environment is responsible for the whole air quality management system**, for monitoring, assessment and air quality management. It carries out the main state supervision of air protection.*

	Air quality improvement programs are aimed at solving the air pollution problem. They are designed by their district offices for each area of air quality management. The programs are published on the web sites of individual district offices and on the web portal: www.enviroportal.sk. Implementation of measures to improve air quality is being evaluated on a continuous basis at local and national level. For air quality management, integrated air quality improvement programs for pollutants PM_{10} and NO_2 have been developed. Action plans are issued by District Offices by a binding decree. They contain short-term measures to avert the risk of exceeding the limit value. **Interdepartmental cooperation in the air quality management system was insufficient,** regular and dependent on the capacity of human resources. Also, the coordination of policies for population health and economic policies, with a policy to ensure good air quality, has not yet been sufficiently effective and not at the required level. **Slovakia uses mainly EU funds, the state budget, the Environmental Fund and private sources for air protection programs.** The most important source of funding for air quality measures was EU funding. **Although the financing of measures to improve air quality is directed to the most polluted areas,** but given that the PM_{10}, $PM_{2.5}$ and other pollutant concentrations are still exceeded, funding can not be considered sufficient.
Recommendations	**To Government of the Slovak Republic** **Focus on taking effectiveness and efficiency measures to improve air quality**, focusing in particular on reducing dustiness, especially from local heating and transport, as well as stepping up the funding of such measures, and strengthening inter-ministerial cooperation and cooperation with cities and municipalities; **To impose an obligation on the relevant ministries to regularly inform the Government of the Slovak Republic about the status of air quality** in the framework of the implementation of the Air Protection Strategy, taking into account the impact on the health status of the population in cooperation with the Ministry of Health. **To Ministry of the Environment of the Slovak Republic** **To improve and accelerate the air pollution modeling calculations** to help identify and search for tailor-made measures for a specific territory. **To transfer more competencies and part of the responsibility for solving air quality in the given area to self-government** (higher territorial units and municipalities). **To establish and adopt binding indicators to measure the effectiveness and efficiency of measures** to combat air pollution, regularly evaluate them and subsequently propose relevant measures to improve air quality in the Slovak Republic.
Best practices	• The Slovak Republic was the fourth country in the Europe and the sixth country in the world that had introduced unleaded fuel. • Implementation of progressive technologies and technical measures to measure and reduce emissions of pollutants. • Promoting change in the fuel base of energy sources in relation to use of renewable energy sources to reduce emissions of poluttants. • The greening of public transport in areas requiring special air protection, buses gasification and replacing buses for trolley buses and electric buses.
	/signature of a Board Member/

TRIBUNAL DE CUENTAS /SAI logo/	***Tribunal de Cuentas de España*** /original name of SAI/	***SAI of***	***Spain*** /country/

Main audit question:	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?*
Answer:	Due to the Spanish State decentralization (17 regional governments, 2 autonomous cities and 8,125 municipalities, fully competent all of them on air quality issues), only the Air Quality National Plan (AQNP) and the respective monitoring system could be audited. According to this basic premise: The national government activity on the field of an air protection was insufficient due to: -Merely 38% of the AQNP measures have been totally implemented and 62% have been partially or are pending to be implemented. - According to the 2016 Air Quality National Plan evaluation results, the policy has been ineffective regarding its objective to reduce the percentage of the population affected by poor Air Quality Index. -On the other hand, the on-line air quality data provided by regional governments (Autonomous Communities) networks is considered provisional until its definitive validation. It may produce ulterior data changes during a nine months validation term.
Main findings of national audit on air protection	**The main findings of national audit on air protection** are: 1. The European Air Quality directives transposed into the Spanish legislation are widely and properly implemented, despite some delays regarding terms of compliance. At the same time, constitutional previsions about this issue have been developed through national and autonomous regional acts, thus there is an adequate and up-to date normative framework to carry out the air quality affective assessment. 2. The current infringement procedures against the Spanish Kingdom are being delayed by the ongoing handling, therefore, it has not been fined nor condemned yet for this issue by the European Court of Justice. Moreover, Spain is one of the 19 EU members pursued for non-compliance the EU air quality rules. 3. European Commission and experts stress the low level of tax environmental collection in Spain; the revenue for this concept represents one of the lowest EU GNP rates (1.5% in 2015, EU 2.4%). This is not justified in terms of Environment. In this scope, the initiatives promoted by the Spanish Authorities were considered like "limited and fragmentary measures" that were adopted in economic crisis stage. Therefore, a proper global tax environmental implementation reform, establishing the Principle "The polluter pays" is necessary. It would contribute to modify the environmental behaviour of the producers, consumers and citizenship in terms of aspects and environmental implications. 4. The current lack of the necessary human resources in the scope of the Ministry of Agriculture and Fishing, Food and Environment (MAFFE) General Sub-directorate of Air Quality and Industrial Environment, as the administrative unit in charge of the air quality competences; and their eventual technical disability to face some complex tasks, have driven the Ministry to sign service contracts and management delegation contracts in order to tackle the air quality Spanish information networks data collection successfully. 5. Regarding some specific air pollutants, and according to scientific studies about the relationship between air pollution and citizenship health, the reference indexes established by the Spanish and the European legislation to evaluate the air quality strays from the World Health Organisation (WHO) recommended limits. Thus the Directive 2008/50/CE and the Spanish legislation renounced to lay out more strict limits as it was contemplated in previous norms. Furthermore and in order to avoid that several zones show up as contaminated, laxer limits than the recommended by the international scientist community and the WHO were settled for specific pollutants. 6. Annual assessments on Air Quality in Spain carried out and published by the MAFFE constitute an effective instrument to surveillance the ruled pollutants levels. However, it is not sufficient due to the fact that the reports on the pollutants levels on different zones previously designed by the Autonomous Communities and based on records from the monitoring system stations do not include proper information in terms of consequences and impacts on the citizenship health and ecosystems protection, according to Law 34/2007 of Quality Air and Atmosphere Protection.

	7. The air quality information currently made available to the citizens by the Authorities, and the way to disseminate it, is often incomprehensible and heterogeneous, hampering the comparability of data and making it inefficient. On the other hand, although there are sufficient publications on historical data and its evolution in this field, nevertheless, the on-line available information is not validated and the media involved in the issue do not reach all citizenship. 8. The Air Quality and Atmosphere Protection National Plan 2013-2016 (*Plan Aire*) analysed by the Spanish Court of Audit (SCA) is not based on any previous approved Governmental National Strategy. In this sense, the Plan Lacks of a preceding planning instrument to be properly developed afterwards. 9. The *Plan Aire* effectiveness evaluation carried out by the SCA reveals that only 38% of the measures have been totally implemented and 62% have been partially or pending to be implemented. Furthermore, and regarding the objective to reduce the percentage of population affected by poor Air Quality Index, and according to the 2016 Air Quality National Evaluation performed by the Ministry, the policy has been ineffective. That is because, although all the measures are in compliance with international and national legislation, the main pollutants emissions have been growing during the period 2013-2016. 10. In the end, some dysfunctions due to lack of co-ordination between the Air Quality National Policy and the Energy National Policy arise owing to the last one defending some objectives against the first one. 
Recommendations	1. The Spanish Government, as long as it turns out to be possible and not be in collision with other economy or social policy aims, should advance in the process of a progressive review of the current indexes of reference of the pollutants concentrations, established for the evaluation of the air quality, and tend to a gradual approximation of the limit levels to the recommended indexes by the WHO in this issue, which are more adapted in terms of the health protection. 2. The Public Administrations involved in this issue should continue improving the air quality information provided to citizens, using for that purpose mass media techniques (app, radio, TV, information boards, etc.) as a normal practise, not only in case of pollutant episodes foreseen in protocols.
Best practices	1. The accessibility and quality of the information put at the disposal of the citizens in Spain on air quality, by means of procedures of public information like official or institutional web pages, *Air Quality Visor*, inventories of emissions, mobile official applications, etc. 2. The successful co-ordination and co-operation amongst the competent Administrations, by means of the management and joint utilization of the Air Quality Database. 3. In addition to the annual meetings of the Working Group of representatives of the Ministry and the managers of the regional and local air quality networks, the creation of a relevant body in charge of the co-ordination and administrative and institutional co-operation on air quality is considered positive and necessary, although it was delayed.

THE PRESIDENT

María José De La Fuente y De la Calle

/signature of a Board Member/

	Swiss Federal Audit Office ***Eidgenössische Finanzkontrolle*** ***Contrôle Fédéral des Finances*** ***Controllo Federale delle Finanze***	***SAI of***	***Switzerland***

Main audit question:	*What is known about the effectiveness and efficiency of measures taken by the national and local government to improve air quality and are these measures compliant with international and national legislation?*
Answer:	High levels of air pollution caused by pollutants such as particulate matter cause serious damage to people's health and the environment. The economic consequential costs for the Swiss population alone are estimated at over CHF 11 billion per year. Switzerland has achieved considerable success in the fight against general air pollution in recent decades, but there is still a long way to go to reach the objective of safe air quality. The Federal Office for the Environment (FOEN) is responsible for enforcing the requirements of the Ordinance on Air Pollution Control (OAPC). The cantons are largely responsible for implementing the OAPC in accordance with the law. Estimates of the costs of implementing the OAPC in the area of particulate matter are available only for individual measures, and there is no overall picture. Sound technical information for estimating costs is of great environmental policy interest. Economic cost considerations would make it possible to better classify and evaluate the benefits of environmental policy measures.
Main findings of national audit on air protection	Around ten years ago, Switzerland undertook to work towards extensive air pollution control protection objectives. Measurement data shows that air pollution has been falling continuously for 40 years. Despite this success, efforts will be needed also in the future to achieve the protection objectives. In concrete terms, it is necessary for primary and precursor gases of secondary particulate matter emissions to be reduced by another 40% relative to the reference year of 2005. The implementation of the OAPC is a task shared by all levels of government. One benefit of this system is that the cantons can better adapt the implementation of the OAPC to local conditions and specific pollution situations. The considerable coordination effort associated with that is a disadvantage. In the course of this decentralised implementation, there is also the risk that effective measures may be delayed or implemented inconsistently because of cantonal differences in interests and implementation delays due to the granting of long deadlines, for example. Even though the current implementation has become well established over the years, the SFAO still sees optimisation potential for further strengthening enforcement. This could ensure that defined measures are implemented with a high level of effectiveness and a good cost-benefit ratio.
Recommendations	• striving for greater cost transparency in the area of air pollution control • ensure that defined measures are implemented with a high level of effectiveness and a good cost-benefit ratio.

Swiss Federal Audit Office (SFAO)
Monbijoustrasse 45
3003 Bern

Michel Huissoud
Director

Algemene Rekenkamer

SAI of The Netherlands

Main audit question

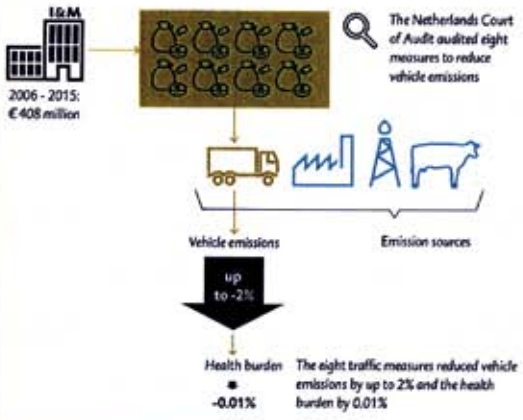
How effective and efficient are the measures taken by central and local government to improve air quality and are they compliant with national and international legislation?

Answer

We conducted two audits of the National Air Quality Cooperation Programme (NSL).
The first audit, in 2016, concluded that air quality in the Netherlands had improved further during the NSL and there were fewer breaches of air quality limits despite the fact that more infrastructure had been built. We also concluded that:

- air quality did not yet comply with EU standards throughout the country, as was one of the NSL's objectives;
- the ministry did not have much information on the funds spent in order to implement the NSL. Funds were spent both by central government on national measures and by provincial and local governments on local measures;
- the ministry did not have much information on the effectiveness of the measures. For this reason, it was not clear whether better improvements could have been made with the same funding.

Eight traffic measures in the National Air Quality Cooperation Programme (NSL) achieved a marginal reduction in vehicle emissions and a limited reduction in the health burden in the Netherlands



A follow-up audit in 2017 concluded that the minister could certainly have achieved the same reduction in emissions at a lower cost if the minister had known about the impact of individual measures. We drew this conclusion from the following findings regarding eight selected NSL traffic measures:

- although the eight traffic measures combined had had a positive impact on emissions, some of them had had a negligible impact;
- five of the eight traffic measures had been cost-effective. The social cost of the other three measures exceeded the social benefits;
- the eight traffic measures had had only a limited impact on public health as a whole.
- The overall disease burden fell by just 0.01%.

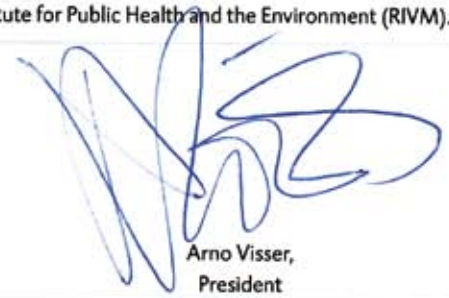
Audit findings, answers to the secondary questions

Air quality not up to standard throughout the country; many locations close to the limits. Air quality throughout the Netherlands should have complied with EU standards by 2015. Although major improvements have been made in recent decades, as disclosed in the Annual Report 2016 published by the Ministry of Infrastructure and the Environment, EU limits were still being exceeded in certain locations in 2015. In 2009, the European Commission gave the Dutch government permission to defer compliance with the limits for two substances. Thus, the limits for particulates (PM10) came into effect as from 2011 instead of 2005 and those for nitrogen dioxide (NO_2) came into effect as from 2015 instead of 2010. Limits for the finer fraction of particulates (PM2.5) have been in force throughout the EU since 2015. In 2015, the nitrogen dioxide limit was breached chiefly along roads in highly populated municipalities and there were near breaches in some 20 municipalities. The particulates limit (PM10) was breached mainly in areas with a high density of intensive livestock farming, particularly poultry farming.

In order to comply with EU standards and improve air quality, the Dutch government launched a National Air Quality Cooperation Programme (NSL) in collaboration with the local governments in 2009. The Ministry of Infrastructure and the Environment is responsible for achieving the national goals set in the programme.

The NSL has two objectives: (a) to ensure overall compliance with the statutory limits on emissions of nitrogen dioxide and particulates, and (b) to facilitate spatial development projects such as road-widening and the construction of new business parks and housing developments. The programme provided a budget for the expected expenditure on each type of measure: national measures, local measures, measures relating to the main road network and measures to promote research and innovation. The Ministry of Infrastructure and the Environment did not keep annual accounts of expenditure on the various NSL measures. In our 2016 audit, we concluded that the minister did not have much information on the funds spent in order to implement the NSL. Funds were spent both by central government on national measures and by provincial and local governments on local measures. The ministry did not ask for financial progress reports on the cost of local measures.

	We also concluded in 2016 that the minister did not have much information on the cost-effectiveness of the measures implemented under the NSL. There was no linkage between the financial accounts and the programme results. In addition, we found that the Ministry of Infrastructure and the Environment had failed to learn lessons from the NSL and had not made any changes during the course of its implementation. The minister had not carried out an interim evaluation as planned, and the final evaluation of the NSL had been postponed several times. It is now scheduled for 2019, ten years after the formal launch of the programme in 2009. As a result, the minister did not know whether the mix of national and local measures formed the best means of improving air quality in the Netherlands and it was impossible to form an opinion on the cost-effectiveness of the measures. In other words, it was not possible to say whether the minister could have achieved more with the same money or the same outcomes with less money. In our follow-up audit in 2017, we calculated the impact of eight national NSL measures and found that, although the eight measures had in their totality reduced emissions to some degree, some of them had had a negligible impact. We also calculated the (social) cost-effectiveness of the eight measures and found that only five of them were cost-effective. The health benefits of the eight measures proved to be limited, in terms of the overall disease burden and the number of years of life gained. Based on these calculations, we concluded that the minister could certainly have achieved the same reduction in emissions at a lower cost if she had known about the impact of individual measures. An internal and external review of the air quality monitoring system has shown that the methods currently used by the Dutch National Institute for Public Health and the Environment (RIVM) for measuring and calculating air quality are both effective and efficient. The current monitoring system measures and calculates air quality, and registers emissions of pollutants. The results provide a detailed picture of air quality in the Netherlands and are used for various national and international reports.
Recommen-dations	Recommendations from the 2016 audit: • During the final evaluation of the NSL, consider the experiences of local governments and the relationship between the measures taken by local governments and those taken by central government. Also take account of tax-related measures and measures taken by industry and agriculture. Past evaluations have focused on incentive schemes for cleaner vehicles. • Link funding to results. Only then is it possible to give an opinion on the cost-effectiveness of the measures. • With a view to the forthcoming final settlement of advance payments under the NSL, make sure that reliable information is available on the money spent by local governments in improving air quality. Recommendations from the 2017 audit: • In order to manage health gains and cost-effectiveness, we recommend that the minister carry out a full ex-ante social cost-benefit analysis that takes account of the non-financial health benefits of each measure. In order to determine the cost-effectiveness of a measure, the minister needs information on both health gains and costs. • In order to select the most efficient measures, we recommend that the minister, if necessary in consultation with the House of Representatives, make a clear choice for one method of calculating health gains. The Ministry of Infrastructure and the Environment currently uses at least two methods, i.e. a method used by the RIVM and WHO, and a method set out in the Environmental Prices Manual used by CE Delft and others. • We also recommend that regular interim evaluations be carried out to generate information on the measures' efficiency and to allow policy to be adjusted during the course of implementation. At the very least, evaluations should be carried out within the term laid down in the Periodic Evaluation Regulations (i.e. between four and seven years after the launch date).
Best practices	The air quality monitoring system used by the National Institute for Public Health and the Environment (RIVM).



Arno Visser,
President

3. References

European Court of Auditors (2018), *Special report no 23/2018: Air pollution: Our health still insufficiently protected*, Luxemburg.

(https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=46723).

European Environment Agency, *Air Quality e-Reporting provided by EEA (The European air quality database)*, Copenhagen. (online database accessed September 3, 2018)

http://aidef.apps.eea.europa.eu/?source=%7B%22query%22%3A%7B%22match_all%22%3A%7B%7D%7D%2C%22-display_type%22%3A%22tabular%22%7D).

European Environment Agency (2017a), *Air quality in Europe – 2017 report – accessed September 3, 2018*, Copenhagen.

(https://www.eea.europa.eu/publications/air-quality-in-europe-2017).

European Environment Agency (2017b), *Cleaner air benefits human health and climate change*, Copenhagen.

(https://www.eea.europa.eu/articles/cleaner-air-benefits-human-health)

European Commission (2008), *Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air and cleaner air for Europe* (OJ: L 152, 11 June 2008, p.1).

International Agency for Research on Cancer (2013), *Outdoor air pollution, a leading environmental cause of cancer deaths*, Press Release no 221, 17 October 2013. Lyon.

(http://www.iarc.fr/en/media-centre/iarcnews/pdf/pr221_E.pdf).

Kraków Smog Alert Association (2017), *The impact of air pollution on health*. Krakow.

(https://krakowskialarmsmogowy.pl/text/dopobrania).

Lim, Stephen S., et al. (2012), A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, The Lancet 380 (9859), pp. 2224-2260

(https://www.ncbi.nlm.nih.gov/pubmed/23245609).

Royal College of Physicians (2016), Working Party Report *Every breath we take: The lifelong impact of air pollution,*. London.

(https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution.

World Health Organization (2005), *Effects of air pollution on children's health and development – A review of evidence*, WHO Regional Office for Europe, Copenhagen.

(http://apps.who.int/iris/handle/10665/107652).

World Health Organization (2013), *Review of evidence on health aspects of air pollution – REVIHAAP project*, Technical Report, WHO Regional Office for Europe, Copenhagen.

(http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report

World Health Organization (2014), *Burden of disease from ambient air pollution for 2012 – Summary of results*, Geneva.

(http://www.who.int/airpollution/data/AAP_BoD_results_March2014.pdf).

World Health Organization. (2015), *Economic cost of the health impact of air pollution in Europe*, WHO Regional Office for Europe, Copenhagen.

(http://www.euro.who.int/__data/assets/pdf_file/0004/276772/Economic-cost-health-impact-air-pollution-en.pdf).

World Health Organization (2016), *WHO expert consultation: Available evidence for the future update of the WHO Global Air Quality Guidelines (AQGs)*, WHO Regional Office for Europe, Copenhagen.

(http://www.euro.who.int/__data/assets/pdf_file/0013/301720/Evidence-future-update-AQGs-mtg-report-Bonn-sept-oct-15.pdf).

World Health Organization (2016), *Global Report on Urban Health*, Geneva.

(http://www.who.int/kobe_centre/measuring/urban-global-report/en/).

EUROSAI
WORKING GROUP
ON ENVIRONMENTAL AUDITING