**Appendix I**

**SAIs Case Studies**

1. **On Air Contamination**

 Topic 1: Public Action to Control and Decrease Air Contamination

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| Image result for france flag .png2016: **SAI of France**Audit objectives: Evaluate the public action to control and decrease air contaminationAudit scope: * + 1. European context
		2. National objectives, policy, regulatory framework, funding and taxation
		3. Public response to contamination events

 Audit methodologies:1. Interviews, data collection, statistics
2. Online survey of regional entities
3. Survey of NGO involved in air quality monitoring
4. European survey (Germany, Italy, Netherlands, UK and Switzerland)
5. Auditions of experts and ministerial directors

Audit criteria:1. Policies consistency
2. Efficiency
3. Utility and effectiveness
4. Adaptability and ability to react quickly

Audit findings:1. Public concern for air contamination has raised and is more precise.
2. Policies consistency is still poor (both governance and contradictions with other environmental policies).
3. Room for improvement to support and share the cost of publics action to prevent air contamination.

 Recommendations:1. 1 for Ministry of Agriculture (consistency with agriculture policy)
2. 1 for Ministry of Health (sharing information)
3. 10 for Ministry of Environment (measure effectiveness, consistency of local and national policies, evaluate the costs of measures, funding by polluters)​

 Available at: <https://www.ccomptes.fr/fr/publications/les-politiques-publiques-de-lutte-contre-la-pollution-de-lair> |

1. **Monitoring Air Quality**

 Topic 2: Air Quality Monitoring and Efficient Management of Greenhouse Gas Emissions Certificates, allocated to Romania under the Kyoto Protocol

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| Flag of Romania.svg2018**: SAI of Romania**Audit objective:To assess the (a) efficiency of the management of greenhouse gas emission allowances allocated to Romania under the Kyoto Protocol; and (b) economy, efficiency and effectiveness of the management of public funds allocated to air quality monitoring (with an emphasis on efficiency issues).Audit scope:Air Quality Monitoring and Management of Greenhouse Gas Emissions CertificatesAudit methodologies:1. Direct observation, examination of documents, summaries, interviews and questionnaires; and
2. Benchmarking, goal-level analysis, cost-benefit analysis, cost-effectiveness analysis.

Audit criteria:1. Specific legislation on air quality; 2. Legislation relating to climate change; 3. Other criteria, such as: * Audit Standards of the Court of Auditors, based on International Standards on Auditing (INTOSAI), the General Framework and the Performance Audit Manual developed by the Court of Accounts of Romania;
* Criteria included in the EU Air Quality Reports, Audit Reports (Financial / Performance) prepared by the SAI and which analyzed the objectives of the Europe 2020 Strategy;
* Indicators reported to the European Commission and / or to the UNFCCC Secretariat; and
* Objectives reflected in plans / strategies.

Audit findings:1. Public authorities and institutions with competence in the field of air quality have undergone, in the last few years, several reorganizations, which have often led to ignoring their obligations (ex: unjustified omissions of air quality tasks or lack of a structure that would fulfill the tasks that they have under the law).
2. Environmental legislation in Romania has been implemented at national and local level, despite the difficulties encountered by the many reorganizations in recent years suffered by public authorities and institutions with competence in the field of air quality.
3. Environmental policy documents do not contain well-defined and measurable objectives and do not indicate the financial resources needed to reach them.
4. The decision to promote a program is largely political and does not rely on studies showing its effectiveness and its qualified contribution (based on scenarios) on improving air quality.
5. Environmental revenues and expenditures increased simultaneously, but both remained at a very low level in absolute terms as well as in GDP.
6. 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 decline in the environmental tax revenues as a percentage of GDP. After 2013, when Romania, like other countries, felt less and less the effects of the financial crisis, the percentage has grown but remained below the EU average.
7. Financial resources are not allocated to finance operational programs to achieve air quality objectives.
8. The funds allocated for the maintenance of air quality monitoring equipment were insufficient.
9. The main sources of pollution are generated mainly by economic and industrial activities, by the transport sector, by residential heating, by agricultural activities, but there are also natural sources such as vegetation fires, extreme meteorological phenomena leading to increased dust levels in the air.
10. Air pollutants, considered in the assessment of ambient air quality in Romania, are suspended particles (PM10 and PM2,5), sulfur dioxide (SO2), nitrogen dioxide (NO2), nitrogen oxides (NOx), lead (Pb), benzene (C6H6), carbon monoxide (CO), ozone (O3), arsenic (As), cadmium (Cd), nickel (Ni). According to the provisions of the Law, in Romania the responsibility for the monitoring of the ambient air quality lies with the authorities for environmental protection. The National Air Quality Monitoring Network (NNMCA) is a national objective of national interest and operates under the Ministry of Environment. At present, the NNMCA includes 148 air quality monitoring stations, 41 analytical laboratories and 41 data collection and processing centers operating at the level of each county and Bucharest Municipality in the field of environmental protection.
11. Air quality data from stations is available to the public in real time via the website www.calitateaer.ro, on external panels (in densely populated areas of cities) and on indoor panels (located at the headquarters of the authorities / organization).
12. Air quality plans and air quality maintenance plans for 2016-2020, although initiated, have not been finalized.
13. Due to the insufficient funds allocated to the maintenance of the National Air Quality Monitoring Network, monitoring stations with faulty physical equipment as well as a number of indoor and outdoor panels to inform the public about air quality that did not work were identified.

Recommendations:1. Perform an analysis regarding the equipment of the National Air Quality Monitoring Network (NAQMN) 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.
2. 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.
3. Take the necessary measures to ensure the functioning of all indoor and outdoor public information panels.
4. 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.
5. Ensure that people are informed about the concentration of pollutants in the atmosphere in all possible environments, the official website should be updated in real time about the risks that affect air quality.
6. It is necessary to complete the legal framework with provisions sanctioning non-compliance with the Air Quality Plans Methodology, Short-Term Action Plans and Air Quality Maintenance Plans.
7. Coordinate the activities of the authorities with the responsibilities in the field of air quality management at governmental level or to design a coordination body at national level for all activities in this field.

Available on line at: http://curteadeconturi:ro/publicatii.aspx?catog=11/24/2015%2010:19:49%20AM |

Topic 3: Performance Audit on Air Quality Control Measures: Bangkok Metropolitan Administration (BMA)

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| Image result for thailand flag .png**SAI of Thailand** (Year Report Published not included in the report)Audit objectives: To determine whether the activities to control air quality of BMA achieved the target.Audit scope: Reviewed three activities to control air quality of BMA. 1. Reviewed the implements activities of BMA to detect, monitor and impose restrictions on motor vehicles emitting black smoke.
2. BMA, the Traffic Police Division and Pollution Control Department have set up 50 emission check points with data-link with the vehicle registration database of Land Transport Department.
3. The smoke detection data link system improves emission detections via real-time emission data records and data link-up with the central database at BMA for decision making to solve air pollution issues.

Audit methodologies:1. Data collection
* Primary data: questionnaire, interview and observation.
* Secondary data: review documents from BMA and analysis.
1. Questionnaire
* 50 directors of 50 district offices. 140
* Traffic Polices who work in the areas that the PM10 higher than a standard
1. Interview
* Director of Air Quality and Noise Management Division, Department of Environment of BMA and 2 staff of the division
1. Observation
* 44 construction sites in 5 district offices.

Audit criteria:The Enhancement and Conservation of National Environmental Quality ActAudit findings:1. Results of black smoke detection had not been reported via the BMA data link system
* District offices have not reported the result of black smoke detection through the BMA data link system. BMA has set up the black smoke detection target in year 2009 to accomplish the task district office and traffic police have to closely work in the field together monthly and report the black smoke detection result through the system from the total of 50 district offices.
* Two district offices from the total of 50 have cancelled the black smoke checkpoint. Among the 48 district offices that implement the black smoke detection, there is only one of them that report the detection result through the BMA data link system.
1. BMA has not determined the criteria for district offices to define the frequency of road cleaning in each areas.
* BMA has not determined the criteria for district offices to define the proper frequency of road cleaning in each areas in order to reduce the dust. As a result the frequency of road cleaning in many district offices are indifferent even though the dust trouble in each areas are much different. In year the PM10 in the inner areas was much wisher those in the middle areas as suburb but the average of road cleaning per month for all areas is only less than 10 time per month.
1. The majority of construction contractors do not implement in compliance with BMA's measures.
* Of the forty four construction sites in inner BKK, areas of 5 district offices in year 2009, it was found that most of contractors are not complying to BMA measures.

Recommendations:1. BMA needs to corporate and consult with traffic police to determine the implementation guideline for smoke detection and to instruct the district offices to focus on the evaluation of smoke detection in order to take the evaluation result to improve their working performance.
2. BMA should set the criteria of the road cleaning standard for district office. So, the district office could use this criteria as a guideline to higher the road cleaning frequency. The district office should also conclude the result of its for each district offices work to the executive monthly.
3. BKK should place an importance on air pollution control by sending staff to closely and continually monitor the construction site and also publicize and inform the contractor to realize the trouble caused by PM10.

Available: https://slideplayer.com/slide/13324923/  |

1. **Improving Air Quality**

Topic 4: Measures to Improve Air Quality

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| File:Flag of Macedonia.svg2018: **SAI of Republic of Macedonia** Audit objectives: What is the effectiveness of measures taken by national and local government to improve air quality?Audit scope:  Period Covered: 2014 – 2016 Audited entities: Ministry of Environment and Physical Planning, State environmental Inspectorate, Institute for Public Health, municipalitiesAudit methodologies: 1. Data collection methods;
	* + Study and analysis of documents
		+ Questionnaires and interviews
		+ Non-statistical sampling
2. Data analysis methods:
	* + Data summarizing
		+ Qualitative, quantitative and comparative analysis

Audit approach**:**Result-oriented; whether activities for improving air quality are carried out as planned and their effects on the reduction of air pollution emissionsAudit criteria: 1. EU Air Quality Directives
2. Relevant national legislative framework
3. Strategic documents at national and local level
4. Effectiveness – the size of investment, plans and programme implementation and achieved results for improving air quality

Audit findings:1. Audit aspect -The main problem in Macedonia regarding air pollution
* Assessment of the ambient air quality is not complete:
* The state monitoring network has not provided constant monitoring of ambient air quality because some of the analyzers within the measuring stations in the period 2014-2016 were not in operation, and they do not measure all necessary parameters, some of the parameters are measured only indicatively and representative measurements are not conducted.
* The application of the 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.
1. Audit aspect- Organization of the air quality management system
* 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 a unique system of environmental inspection, inadequate structure to coordinate and supervise inspection at central and local level, lack of a unique plan and annual programmes, do not provide efficient inspection control. Because of that, in January 2016 a new Law on Environmental Inspection has been prepared, 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 the 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 staffing 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 arenational/local sanctions. Because 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.
1. Audit aspect- Legal framework for air quality
* National legal framework for air quality is mainly 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. The incomplete transposition of EU Directives on air quality in the national legislation and the untimely updating of the secondary legislation contributes to their delayed implementation.
* In Macedonia, the PM10 are the most critical pollutants, which over the course of the year often exceed the daily limit value. This imposes the need to define 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 it has not been adopted yet. Not adopting a legal act on information and alert threshold means inability to undertake timely and appropriate short-term measures and recommendations in case of high concentrations of polluting substances in the air.
1. Audit aspect - Air quality policy on national and local level
* 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 the deadlines for implementation of each measure, nor the required funds, sources of funds, indicators to measure the effectiveness and the responsible body for control and evaluate their implementation.
* There is no integrated approach between policies from different area such as economy, transport, energy, that are in connection with the basic national policy for air quality improvement. According to Law on Waste Management, MOEPP and mayors of municipalities have obligation to close and re-cultivate illegal landfills, but they still function. 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 therefore 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).
1. Audit aspect - Financing measures/activities for improving air quality and measurable benefits
* Insufficient budget funds for implementation of air quality policy
* Financing and realization of activities in the field of environment are carried out on the basis of the Annual Program for Environmental Investment. For the years 2014, 2015 and 2016, the implementation of the Environmental Investment Program allocates budget funds in the same, unchanged amount, 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 the realization of its activities. For these reasons there is no regular maintenance, purchase of spare parts for 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 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 the suspended particulate concentrations. Effective implementation requires integrated approach by all stakeholders and provision of more financial resources. According to State Statistical Office data for the period under review, the investments and the costs for air protection participates with 0.1% in GDP, while in the total investments and environmental costs participate with 13% for 2014 and 2015, and with 6% in 2016. Regarding data, most of the investments are made 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%.
1. Audit aspect - Air quality monitoring and reporting system
* 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, from 17 monitoring stations, 3 of them are not in function, part of the others do not measure all parameters, while for some of the parameters minimal coverage of data 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.
* The MOEPP has established and manages the air quality information system which is connected to the air quality web portal. The portal provides information to the public in real time and contains information for the current situation of the ambient air in the country, as well as information of 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, data on ambient air quality from individual stationary sources, emission data from mobile sources and data from the Cadastre of Air Pollutants.

Recommendations:1. MOEPP, in cooperation with the other involved institutions at central and local level and the Government of the Republic of Macedonia, should undertake activities in order to:
* establish a unified system that will enable comprehensive and smooth 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 the central/local level for non-compliance with the 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 a monitoring system for implementation of measures in the National plan for ambient air protection and indicators to measure the effectiveness of the policy implementation.
* prepare all planning documents at local level, establish an appropriate monitoring system for implementation and indicators to measure the effectiveness.
* provide budget funds necessary for operation and maintenance of all monitoring stations and financing measures in the planning documents.
* ensure timely submission and completeness of data from stationary sources of pollution in order to provide a comprehensive information system for ambient air quality and data integrity for the Cadastre of air pollutants.

Available at: <http://www.dzr.mk/Uploads/56_RU_Kvalitet_na_vozduhot_2017_REDUCE.pdf> |

 Topic 5: Seoul Metropolitan Air Quality Improvement Plan

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| File:Flag of South Korea (1949â1984).png2015: **SAI of South Korea** Audit objective: To enhance the appropriateness of the ‘Seoul Metropolitan Air Quality Improvement Plan’ by analyzing the reason of failure in achieving the 1st plan goal and providing complementary measures to the plan.Audit scope: Management of air pollution source and the measurement and prediction of air pollution dispersion provided by the Ministry of Environment (MoE), National Institute of Environmental Research, and the local governments (Seoul, Gyeonggi, and Incheon)Audit methodologies:1. Established an audit support panel group and a research project conducted by the Korean Academy of Science and Technology from Sep. to Dec. of 2015.
2. Asked the MoE to investigate large factories which can emit air pollutants illegally.
3. Provided scientific evidences and examine the appropriateness of the plan by conducting (a) air quality modeling under various pollution emission sources and emission control scenarios by scientists; (b) air quality monitoring data analysis and field sampling analysis; and (c) documentation screening.

Audit criteria:1. Special act for Seoul Metropolitan City Air Quality Control (Seoul, Incheon, Gyeonggi)
2. Seoul Metropolitan Air Quality Improvement Plan

Audit findings:1. The Seoul Metropolitan Air Quality Improvement Plan must be amended based on the areas affected by the air pollution sources.
2. The efficiency of the air pollution reduction measures (i.e., diesel particulate filter (DPF) attachment support program) in the 2nd stage of the plan has decreased compared to the 1st stage of the plan.
3. The data of the performance report was not reliable and the feedback system was not proper for amending the plan.

Recommendations:The MoE: 1. heed the opinions of those involved in the business of reducing air pollution from diesel cars and to provide a method of amendment to the plan (early disuse of in use diesel car etc.); and
2. set-up adequate performance evaluation and verification on the plan, and proper feedback system to amend with reflecting the performance evaluation result.

Available on line at: intosai-korea-national\_report |

 Topic 6: Investigation into How Authorities Work to Ensure Good Ambient Air Quality in Cities

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| Norway Flag2015: **SAI of Norway** Audit objectives: To assess Norwegian authorities’ work to achieve its targets for ambient air qualityAudit scope: Fourteen municipalities/cities with relatively high levels of air pollution. The period covered was 2005–2014. There were three main audit questions:1. To what degree is the ambient air quality in accordance with limit values and national targets (currently and over time)?
2. To what degree does the implementation of pollution regulations contribute to achieving the targets for local ambient air quality?
3. To what degree do other national measures contribute to achieving the targets for local ambient air quality?

The Norwegian SAI’s audit mandate has limitations at the municipal level. The main auditees are therefore national authorities. Audits may however, look into how national measures and policies affect the situation at the municipal level. That aspect was covered in this audit.Audit methodologies: 1. Statistical analysis of pollution levels (suspended dust/particles and nitrogen dioxide) in 14 Norwegian municipalities
2. Statistical analysis of developments in land use and transportation in the nine largest municipalities
3. Document analysis of reviews, studies, and formal management communication between different levels of government
4. Interviews with key actors, including the Ministry of Environment, the Norwegian Environment Agency, the Ministry of Transportation etc.
5. Survey of representatives of municipality administrations

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4. Interviews with key actors, including the Ministry of Environment, the Norwegian Environment Agency, the Ministry of Transportation etc.
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Audit findings:1. Local ambient air quality does not meet national targets.
* In 11 out of the 14 municipalities the levels of suspended dust/particles was considerably higher than national targets.
* In four of Norway’s largest cities the limit values for nitrogen dioxide were exceeded several times since 2010.
* The various targets for air quality are not coherent and it is challenging for the municipalities to relate to them.
1. The implementation of the pollution regulations by the municipalities and the Environment Agency is not sufficient to ensure that targets for air quality are met.
* The municipalities do not carry out reviews and studies as required.
1. The division of roles and responsibilities between the various levels of government make it challenging to achieve national targets.
* The Ministry of Environment has few measures it can apply to reduce pollution levels. It is dependent on the Ministry of Transportation to facilitate local measures, and on the municipalities to actually implement local measures. There is a risk that the responsibility is shared between too many actors, leading to a lack of implementation of effective measures.

Recommendations:The Ministry of Environment should consider:1. Simplifying the structure of the various targets for air pollution
2. Ensuring the Environment Agency strengthens its guidance towards municipalities
3. Cooperating with the Ministry of Transportation and the Roads Directorate to provide better guidance to municipalities on the measures that are available to reduce air pollution and their likely effects
4. Together with the Ministry of Transportation, consider the division of tasks and responsibilities between various sectors and levels of government in order to increase the goal achievement and implement more effective measures.

Available at: name of website [www.riksrevisjonen.no](http://www.riksrevisjonen.no) (<https://www.riksrevisjonen.no/presserom/Pressemeldinger/Sider/LuftkvalitetBy.aspx> |

1. **Emissions**

 Topic 7: Emissions Resulting from Oil Refineries

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| **Flag of Kuwait.svgSAI of Kuwait** (Year Report Published not included in the report)Audit objectives: 1. Assess the efficiency of the department in charge of monitoring air pollution in the Public Authority for Environment and its role in performing the Authority's mission in monitoring causes of air pollution.
2. Verify the commitment to comply with air quality standards and requirements under the decision no. 210 of 2001 issued by the Public Authority for Environment regarding the executive regulations of the Authority's Law of Establishment.
3. Assess the health and environmental impacts of gas emissions from oil refineries, as well as evaluating the requirements and procedures taken to reduce emissions.

Audit scope: Gas emissions resulting from oil refineriesAudit methodologies:1. Analysis of Air Pollution Monitoring Department of the Public Authority for Environment on 2009 measurements and comparing the results in Annex No. 1 \ 17.2 \ 17 of decision no. 210 of 2001 on air quality
2. Reviewed of the Kuwait National Petroleum Company reports, and the refinery's field inspection for Al.Ahmadi Refinery.
3. Reviewed of Kuwait National Petroleum Company's air pollution measurement of Al-Ahmadi refinery for the year 2009 and compared it with air emissions from fixed sources, Annex No. (20), decision no. 210 of 2001

Audit criteria:1. Analysis of Air Pollution Monitoring Department of the Public Authority for Environment on 2009 measurements and comparing the results in Annex No. 1 \ 17.2 \ 17 of decision no. 210 of 2001 on air quality
2. Reviewed of the Kuwait National Petroleum Company reports, and the refinery's field inspection for Al.Ahmadi Refinery.
3. Reviewed of Kuwait National Petroleum Company's air pollution measurement of Al-Ahmadi refinery for the year 2009 and compared it with air emissions from fixed sources, Annex No. (20), decision no. 210 of 2001

Audit findings: 1. Air Pollution Monitoring Department suffers from deficiency in staff members especially the technical staff, and that the department is in need to train plant operators on the maintenance of equipment and vehicles to better service the departments.
2. The following exceeded the allowable limits/increased:
* 1\2 (n-CH4) gas exceeded the allowed limits (0.24 P.P.M) most of the year.
* 2\2 Sulfur Dioxide (SO2) exceeded the allowed daily limits on September 17 2009 by (70.8 P.P.b)
* 3\2 Nitrogen Dioxide (NO2) exceeded the annual allowed limits

(30 P.P.b) as it achieved an annual average of (43.5 P.P.b), it also exceeded the daily limits reaching (50 P.P.b) in November.* 4\2 Nitrogen Dioxide reported noticeable increase in comparison with previous years averages.
* 5\2 Wind direction indicate that the highest concentration of these pollutants move mostly toward the south, and oil facilities and other establishments in the southern region are responsible for the spread of pollutants in the air around Fahaheel residential area.
1. Kuwait National Petroleum Company reports, and the refinery's field inspection for Al.Ahmadi Refinery showed:
* No presence of the Public Authority for Environment in the oil refineries areas.
* Kuwait National Petroleum Company takes the inspection samples directly from outside the refinery (Alahmadi Refinery), while the Public Authority for Environment takes it from fixed and certain locations (Al-fahaheel Station).
* Entities refer to different standards than the ones used by the Public Authority for Environment which are Annex (1 \ 17 ) (2 \ 17) , decision No. 210 of 2001 on air quality, while Kuwait National Petroleum Company follow Annex No. (20), decision 210 of 2001, environmental standards allowed for air emissions from fixed sources, page 340.
1. By reviewing Kuwait National Petroleum Company's air pollution measurement of Al-Ahmadi refinery for the year 2009, and comparing it with air emissions from fixed sources, Annex No. (20), decision no. 210 of 2001, the following was found:
* The measurement results of sulfur dioxide (SO2) exceeded the standard rates in fluidized catalytic cracker factor (kg 9.8).
* The measurement results of sulfur dioxide (SO2) exceeded the standard rates (ppmv 250).
* The measurement results of sulfur dioxide (SO2) exceeded the standard rates of Claus Sulfur Recovery Unit due to the compulsory stopping of one of the two units and putting extra load on the other unit.
* The measurement results of Hydrogen sulfide in fuel gas (H2S) exceeded the standard rates (mg 230).
1. The different sampling locations, the Public Authority for Environment and Kuwait National Petroleum Company, resulted in varying measurements and thus, lack of accurate pollution monitoring.

Recommendations:Related to high risk: 1. Presence of technical staff of the Public Authority for Environment is required at the oil industry areas and other industrial areas to follow up the environmental situation and conduct daily tests to monitor and measure air pollution, as well as the possibility of environmental monitoring of pollutants resulting from the refineries and gas emissions. 2. Strengthen cooperation between the Public Authority for Environment, the Kuwait Institute for Scientific Research and global environmental institutions to implement studies to measure and assess the pollution rates from oil refineries to ensure compliance with laws and regulations protecting the environment and ensure that the areas adjacent to oil establishments are not affected. 3. Monitor air quality in oil refineries areas and define sources that cause air pollutants emissions, and find solutions to limit the problem in order to ensure a clean and healthy work environment.Related to medium risk: 1. Treat deficiency of staff especially the technical staff expert in air pollution and stations management, to face the expected expansion in fixed stations and mobile labs.
2. Train stations operators on maintenance work to increase equipment efficiency, in addition to the maintenance companies' work.
3. Provide enough vehicles to serve the divisions in order to perform duties timely and efficiently, as well as provide communication means for technical staff for emergencies.

 Available on line at: kuwait\_s\_eng\_emission-resulting-from-oil-refineries |

1. **Health and Cost Impact**

 Topic 8: Consideration of the Health and Cost Impacts of Fine Particles in the Preparation of Strategies

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| **Image result for finland flagSAI of Finland** (Year Report Published not included in the report) Audit objective:Assess whether the emissions of fine particles and the costs arising from their health impacts have been considered in the preparation of the five strategies that are relevant to the emissions.Audit scope: Not included in the reportAudit methodologies:Not mentioned in the Summary ReportAudit criteria:Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (200/2005)Audit findings:1. Most strategies lacked preliminary impact assessments or the assessments were of fairly general nature. There was little examination of the health impacts of fine particles. Moreover, the strategies did not contain any assessments of the costs arising from the health impacts of fine particles. Furthermore, no strategy options were formulated or assessed as part of the preparatory work and no cost-benefit comparisons of the options wereproduced.
2. The fact that no strategy options, as part of the preparatory work and the preliminary impact assessments, were presented for comparison demonstrated how little consideration was given to cost- benefit factors in the preparation of the audited strategies. Moreover, in many cases only the potential benefits of the strategies were highlighted, while no consideration was given to harmful health impacts.

Recommendations:1. The audited ministries should, under the auspices of the Ministry of Employment and the Economy, prepare an overall cost assessment of the health impacts generated by fine particles in Finland.
2. When ministries prepare or update climate, energy, natural resources, transport and health strategies, they should give systematic consideration to the health impacts of fine particles and the costs arising from them the expertise of the ministries in the field of preliminary assessment of environmental and health impacts should be systematically developed under the auspices of the Ministry of the Environment.

Available at: summary\_english\_17\_2015\_consideration\_of\_the\_health\_and\_impacts\_of\_fine\_particles\_in\_the\_preparation\_of\_strategies |

1. **Compliance with law related to air pollution**

 Topic 9: Compliance with Republic Act (RA). No. 9003 otherwise known as the Ecological Solid Waste Management Act of 2000 (with focus on air pollution)

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| Image result for philippines flag2015: **SAI of Philippines**Audit objective:Determine Compliance with R. A. No. 9003 otherwise known as the Ecological Solid Waste Management Act of 2000 (with focus on air pollution)Audit scope: Implementation of R.A. No. 9003 by the Province of BulacanAudit methodologies:1. Review of R. A. No. 9003, Sangguniang Panlalawigan Resolution No. 191-T’11 dated August 9, 2011 and Provincial Ordinance No. 07-2011 dated June 22, 2011.
2. Verification of the Province records on apprehension on burning of hay stalks and similar materials in the Province of Bulacan.
3. Discussions with other Audit Team Leaders of the Province on awareness of the Provincial Ordinance.
4. Observation and taking pictures of the fog-like situation along the stretch from the Candaba Viaduct to the Sta. Rita Exit.
5. Discussion with the Provincial Agriculturist and with the Bulacan Environment and Natural Resources Office (BENRO) personnel on the observations.
6. Interview with the concerned Provincial personnel and Environment Management Bureau (EMB) Region III personnel.

Audit criteria:1. Section 48(3) of R. A. No. 9003 or the Ecological Solid Waste Management Act
2. R.A. No. 7160 or the Local Government Code of 1991
3. Sangguniang Panlalawigan Resolution No. 191-T’11 dated August 9, 2011
4. Provincial Ordinance No. 07-2011 dated June 22, 2011

Audit findings:1. Section 48(3) of R. A. No. 9003 or the Ecological Solid Waste Management Act which prohibits the open burning of solid waste was not strictly and effectively enforced as evidenced by the “fog-like” situation along the North Luzon Expressway (NLEX) from San Simon, Pampanga to Sta. Rita, Bulacan, especially after the palay harvesting season which may result in the exposure of the public to various diseases and impairment and non-protection of the environment.
2. Not a single person was apprehended since the issuance of the local ordinance.
3. Lack of awareness of the ordinance especially in the barangays which should be directly involved in the implementation.
4. A “fog-like” smoke enveloped along the stretch from the Candaba Viaduct to the Sta. Rita Exit caused by the burning of hay stalks, leaves and dried grass as well as the smoke emission from factories in the area of Pulilan, Bulacan.
5. The health of the people living in the area as well as commuters along the stretch of the NLEX may be endangered due to the smoke produced from the burning hay stalks, leaves and other similar waste materials.

Recommendations:1. Provincial Agriculturist and the BENRO Officer-in-Charge coordinate with their counterparts in the cities/municipalities and barangays for the proper implementation of R. A. No. 9003 particularly on the prohibition on the open burning of solid wastes like hay stalks, dried leaves and other farm wastes.
2. Provincial Agriculturist encourage farmers to do composting of farm waste to enrich the soil with natural fertilizers.
3. Provincial Agriculturist, BENRO officials together with the Provincial Health Officer, conduct proper information dissemination like conducting seminars, production of posters/tarpaulins on the harmful effects to the health of the public of smoke from burning of solid wastes.
4. BENRO officials assert their authority in (i) the implementation of the ordinance prohibiting the burning of hay stalks and other farm wastes; and (ii) the monitoring of smoke emitted by factories, in close coordination with other LGU and EMB officials who may share their technical knowledge and skills in safeguarding the environment.

Available on line at: www.coa.gov.ph |

 Topic 10: Compliance with Regulation on Prevention and Control of Pollution

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| Image result for mexico flag .png2015: **SAI of Mexico** Audit objectives: To determine the fulfillment of the objective of inspection actions and monitoring of compliance with applicable regulations in order to prevent and control pollution, as well as to restore the quality of **air**, soil and water. Audit scope: Inspection actions and monitoring of compliance with applicable regulations in order to prevent and control pollution, as well as to restore the quality of **air,** soil and water. Audit methodologies: The audit was conducted in accordance with the regulations applicable to the Public Account Supreme Auditing, and the methodology established in the Performance Auditing Unit’s Technical Guidelines was used to ensure the achievement of the established objective and scope. These guidelines are complementary to the institutional regulations and are consistent with the Fundamental Principles of the INTOSAI Performance Audit. Audit criteria: Federal Government established public policy of environmental protectionAudit findings: 1. The delayed and insufficient attention of the sustainable management of the environment has generated the continuous degradation of its ecosystems and its natural resources such as **air**, soil and water, which increases the health risks and damages the development of the country in the short and long term. The deterioration of the country's natural resources has been caused, mainly, by the increase in industrial activities without sustainability schemes, in addition to domestic activities that use natural resources without good environmental performance, which has raised the concentration levels of pollutants in the atmosphere, higher than the maximum permissible, the increase in water pollution, the concentration of highly hazardous waste and the poor management of urban solid waste.
2. In terms of prevention, in 2014, PROFEPA reviewed 4.5% (4,070) of a list of 91,340 sources of contamination, through 4,787 inspections carried out by 192 inspectors, who carried out an average of 25 inspections; therefore, this activity was marginal with respect to the number of environmental pollution sources of federal competence identified.
3. The Office of the Attorney General did not have objectives or goals to carry out the industrial inspection that would allow increasing compliance with environmental regulations. Through the assistance of environmental emergencies, it identified 809 contaminated sites, in which it carried out 624 inspections, which, from 2007 to 2014, increased 3.0% on an annual average, compared to contaminated sites that increased 43.3% annually, of which, by 2014, 37.8% (404,788.1 m2) of the affected area was remediated 1,071,446.2 m2.
4. Regarding control actions, in 2014 out of 7,394 measures issued, 28.1% (2,079) were not fulfilled; the federal delegations of PROFEPA filled 50 complaints with the federal public prosecutor for alleged criminal offenses derived from **air,** water and soil contamination, but did not inform the head of the General Directorate of Federal Crimes Against the Environment and Litigation, who acts as liaison to the Attorney General's Office (PGR), about the complaints presented.
5. There is no mechanism for its follow-up, besides that neither PROFEPA nor the PGR gave attention to the Collaboration Agreement for the attention and prosecution of crimes against the environment and environmental management, nor to the "Bases of Operation for the Attention, Investigation and Persecution of Crimes against the Environment and Environmental Management ".
6. They did not elaborate the program to develop comprehensive policies for the prevention of damage to the environment and environmental management.
7. For restoration, PROFEPA verified compliance with 1,089 measures issued in 368 contaminated sites, obtaining that 23.9% (260 measures ordered) were not complied with.
8. The Procurator's Office has a correct design of its internal control instruments, but these have not operated properly since they do not allow the identification, evaluation, hierarchy, control and monitoring of the risks that could hinder or prevent compliance with objectives and institutional goals in the field of industrial inspection.
9. The operational capacity of PROFEPA in addressing the problem of **air,** soil and water pollution, through enforcement actions of compliance with environmental regulations by companies of federal competence, was formed by 192 inspectors, which was insufficient to issue administrative sanctions and restoration measures, as well as to promote criminal complaints before the competent authorities, which has had a marginal effect and has not been able to inhibit non-compliance with the regulations. Because of this, the definition and implementation of an inspection strategy to sources with greater polluting potential is fundamental, as well as the strengthening of verification actions of measures dictated to revert the negative effects caused by pollution, and compliance of the collaboration agreement signed in 2004 between PROFEPA and the Attorney General’s Office (PGR), in order to ensure that the enforcement of environmental justice contributes to the preservation of air, soil and water.

Recommendations: Recommendations were generated which are intended to promote the availability of a strategy to reorient inspection actions so that pollution sources comply with environmental standards and ensure adequate follow-up of the measures dictated to ensure compliance, so that they have an impact in the preservation of air, soil and water quality. Available at: https://www.asf.gob.mx/Trans/Informes/IR2014i/Documentos/Fichas/Ficha\_DE\_a.pdf  |

 Topic 11: Implementation of Environmental Rules and Laws by Uttar Pradesh Pollution Control Board (UPPCB)

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| **Flag of India.svg2016: SAI of India** Audit objectives: To assess whether: 1. Proper planning has been done by the UPPCB to ensure compliance of environmental Laws and Acts;
2. Financial management by UPPCB is efficient to secure optimum utilisation and that mechanism for internal control was in place and functioning effectively;
3. Mechanisms have been put in place by the UPPCB for effective implementation of the Water, Air, EP Acts and various Rules framed there- under for prevention, control and abatement of pollution; and
4. There is adequate mechanism for monitoring the various provisions of Air, Water, EP Acts and various Rules framed there under and as per norms of Central Pollution Control Board.

Audit scope: The focus areas of audit were to examine implementation of environmental rules and laws to address environmental pollution, adequacy of measures adopted and the efficiency with which they have been executed and to assess the effectiveness in funds management and internal control in respect of programmes relating to pollution and compliance with relevant statutes. Audit also assessed whether the measures adopted in addressing pollution had the desired impact in abatement or control of pollution in the State. Audit methodologies:1. Examination of reports and records, analysis of documents at UPPCB Headquarter Office, two out of seven circle offices and seven3 out of 28 regional offices.
2. Conducted beneficiary survey in five cities in November 2016 to get the views of public about the pollution and role of UPPCB in prevention, control of pollution and protection of environment.
3. Use questionnaire to obtain the written opinion of a total 256 people in five cities was taken through a questionnaire regarding pollution of air, among others.

Audit criteria:The audit criteria for achievement of audit objectives were derived from the following sources: 1. The Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Air Act)
2. The Environment (Protection) Act, 1986 (EP Act) and various Rules1 under EP Act
3. Directions and notifications issued by the Central/State Government, Central Pollution Control Board (CPCB) and UPPCB
4. General Financial Rules, 2005 (GFR), as amended
5. Environmental Standards evolved by CPCB

Audit findings:1. CPCB notified National Ambient Air Quality Standard (NAAQS) in 2009 under section 16 of the Air Act. As per the notification, 12 parameters were to be monitored. Audit noticed that UPPCB was monitoring only three parameters of the air quality, i.e., nitrogen dioxide (NO2), particulate matter 10 (PM10) and sulphur dioxide (SO2) at 54 points in 20 cities of the State.
2. On scrutiny of test reports of 54 points in 20 cities for the years 2011 to 2015, it was noticed that the annual average level of PM10 was very high ranging from 87 to 347 microgram per cubic metre as compared to the standard of 60 microgram per cubic metre. Major cities with higher level of PM10 against required standard were Allahabad, Ghaziabad, Kanpur, Lucknow, NOIDA, Varanasi. UPPCB failed to take adequate measures to control the level of PM10 and to monitor the remaining nine parameters as it did not have facility to monitor all parameters of air quality under NAAQS.
3. Audit noticed that the process of procurement of CAAQMS was started only in three cities (Ghaziabad, Noida and Moradabad). Audit checked the procurement files and found that process of procurement was started only in July 2014. No reason for this delay for more than three years was however, found on records. Thus, UPPCB could not install CAAQMS in all the eight cities as envisaged in the action plan (March 2016).
4. UPPCB had not installed the necessary software and hardware at its headquarter for centralised data collection and its analysis so far (March 2016). As a result, UPPCB could not link online even with the industries that have installed online monitoring devices. Thus, UPPCB did not take adequate measures for compliance of the order of the CPCB for online continuous emission and effluent monitoring of all highly polluting industrial units in the State.
5. 785.34 Metric Tonne (MT) of fly ash was generated during 2011-12 to 2015-16 against which utilisation of fly ash was 216.28 MT only (28 per cent) which abets air pollution. No monitoring was being done and no directions were issued by UPPCB in this regard, though consents for operation were invariably being issued by UPPCB every year to the TPPs.

Recommendations:UPPCB should take necessary measures to improve the quality of the air, install Continuous Ambient Air Quality Monitoring Stations, continuous emission and effluent monitoring mechanism and monitor full utilisation of fly ash as directed by CPCB/MoEF.Available:<https://www.cag.gov.in/sites/default/files/audit_report_files/Report_No.1_of_2017_%E2%80%93_Economic_Sector_Government_of_Uttar_Pradesh.pdf>  |

1. **Protection of Human Health from Air Pollution**

Topic 12: Air pollution: Our health still insufficiently protected

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| https://europa.eu/european-union/sites/europaeu/files/docs/body/flag_yellow_low.jpg**2018: SAI European Court of Auditors**Audit objective:Assessed whether EU actions to protect human health from air pollution have been effectiveAudit scope: 1. Provisions of the AAQ Directive related to human health and on the air pollutants with the greatest health impact: PM, NO2, SO2 and O3; and
2. Six urban centres in the EU dealt with the problem and used funding from the EU’s Cohesion policy and LIFE programmes.
3. Covered the period from the adoption of the AAQ Directive in 2008 to March 2018.

Audit methodologies:1. Examined the policy design and Commission’s monitoring of implementation of the AAQ Directive through reviewing documents, interviewing staff and checking databases at the Commission and the EEA.
2. To examine Member States’ implementation of the Directive and EU-funded air quality projects, carried out on-the-spot visits, examined project documentation and interviewed local stakeholders (national and local authorities, project beneficiaries, and other civil society stakeholders) in the six selected cities and in the capitals of the respective Member States.
3. For the audit work in Poland, cooperated with the Supreme Audit Office (NIK).
4. Took into account expert advice on the design, implementation and monitoring of the AAQ Directive.

Audit criteria: The 2008 Ambient Air Quality DirectiveAudit findings:1. 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.
2. 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.
3. 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.
4. 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.
5. 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.

Recommendations:1. To take more effective action to improve air quality, the Commission should:
* Share best practice from Member States who have successfully reflected the requirements of the AAQ Directive in their Air Quality Plans, including on issues such as information relevant for monitoring purposes; targeted, budgeted and short-term measures to improve air quality; and planned reductions in concentration levels at specific locations.
* Actively manage each stage of the infringement procedure to shorten the period before cases are resolved or submitted to the European Court of Justice.
* Assist the Member States most affected by intra EU transboundary air pollution in their cooperation and joint activities, including introducing relevant measures in their Air Quality Plans.
1. The Commission should address the following issues when preparing its proposal to the legislator:
* Considering updating the EU limit and target values (for PM, SO2 and O3), in line with the latest WHO guidance; reducing the number of times that concentrations can exceed standards (for PM, NO2, SO2 and O3); and setting a short-term limit value for PM2.5 and alert thresholds for PM.
* Improvements to the Air Quality Plans, notably by making them result oriented; and by requiring yearly reporting of their implementation; and their update whenever necessary. The number of Air Quality Plans by air quality zone should be limited.
* The precision of the requirements for locating industrial and traffic measuring stations, to better measure the highest exposure of the population to air pollution; and to set a minimum number of measurement stations per type (traffic, industrial or background).
* The possibility for the Commission to require additional monitoring points where it considers this is necessary to better measure air pollution.
* Advancing the date (currently 30 September of year n+1) to at least 30 June n+1, to report validated data, and explicitly requiring Member States to provide up-to-date (real time) data.
* Explicit provisions that ensure citizens’ rights to access justice.
1. To further mainstream air quality into EU policies, the Commission should produce assessments of:
* other EU policies that contain elements that can be detrimental to clean air, and take action to better align these policies with the air quality objective.
* the actual use of relevant funding available in support of EU air quality objectives to tackle air pollution emissions, notably PM, NOX and SOX.
1. To improve the quality of information for citizens, the Commission should:
* Identify and compile, with the help of health professionals, the most critical information that the Commission and Member States authorities should make available to citizens (including health impacts and behavioural recommendations).
* Support the Member States to adopt best practices to communicate with and involve citizens in air quality matters.
* Publish rankings of air quality zones with the best and worst progress achieved each year and share the best practices applied by the most successful locations.
* Develop an online tool that allows citizens to report on air quality violations and provide feedback to the Commission on issues related to Member States’ actions on air quality.
* Support the Member States to develop user-friendly tools for the access of general public to air quality information and monitoring (for example, smartphone apps and/or social media dedicated pages).
* Together with the Member States, seek an agreement on harmonising air quality indices.

Available on line at: E:/Project%20Plan%20Final%200Outputs/Audit%20eports/ECA/SR%2023\_2018%20Air%20pollution%200 |