

LOCAL LEVEL IMPLEMENTATION OF THE EU AIR QUALITY POLICY

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Abstract: *Air pollution is one of the domains in which the European Union has been most active by controlling the emissions of harmful substances into the atmosphere. Although it has one of the world's highest environmental standards, European Union is still far from achieving levels of air quality that is acceptable to humans and the environment. The effect of air pollution on health has considerable economic impacts, cutting lives short, increasing medical costs and reducing productivity through working days. This study analyzes the air quality legislation that Member States have to implement in order to maintain the best environmental conditions and presents Iasi County's air quality monitoring system as a part of the national and European monitoring network.*

Keywords: Air quality; European Union; air pollutants; monitoring network; Iasi County

Introduction

Europe's environmental policy is based on the European Union's general objective of achieving a "high level of protection and improvement of the quality of the environment" and on applying the general principles of integrating environmental protection into all policies, precaution, prevention, damage control at source and the polluter pays principle (Scheuer, 2005).

According to EEA's Air Quality Report 2014 (EEA, 2014), despite considerable improvements in the past decades, air pollution is the one of the top environmental risk factor of premature death in EU, it increases the incidence of a wide range of diseases and has several environmental impacts, damaging vegetation and ecosystems. This constitutes a substantial loss for European Union's natural systems, its agriculture, its economy and the health of inhabitants. The effects of poor air quality have been felt most strongly in two main areas: health problems and impaired vegetation growth in ecosystems.

Because of the economic growth and changed standards of living that Europeans had experienced it in the last decades, environmental changes can be

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seen today in the form of water pollution, acid rains, photochemical smog or intense soil erosion as a result of intense deforestation (McMichael *et al.*, 2003).

Emissions of air pollutants are still increasing and EU will find it difficult to meet its commitments under the Kyoto Protocol (2005)¹. Clean air policy-making in the EU has been influenced by international negotiations on air pollution under the 1979 Convention of Long-range Transboundary Air Pollution (UNCE 2015a), and its various protocols, in particular the Gothenburg Protocol (UNCE 2015b). Important EU policy goals relating to air pollution were laid down in the 5th Action Programme (1992), 6th Action Programme (2002) and in the 7th Action Programme (EAP) that is guiding European environment policy until 2020 (EC, 2013).

The European Environment Agency (EEA) regularly publishes environmental indicators, which offers an overview of the state of Europe's environment. EEA indicators are dependent on data availability, which is strongly linked to monitoring and reporting requirements set out in EU environmental legislation (EEA, 2010a).

1. The air quality issue in European Union

Following emission from a particular source, air pollutants are subject to a range of processes including atmospheric transport, mixing and chemical transformation, before exposure to humans or ecosystems may occur (EEA, 2010b). Air pollution's principal effects on European ecosystems are eutrophication, acidification and damage to vegetation resulting from exposure to ozone and ammonia. As sulphur dioxide emissions have fallen, ammonia emitted from agricultural activities, and nitrogen oxides emitted from combustion processes have become the predominant acidifying and eutrophying air pollutants (EEA, 2014).

Heart diseases and strokes are the most common reasons of premature death due to air pollution, followed by lung diseases and lung cancer (WHO, 2014). European Commission estimated for 2010 a direct economic damage of EUR 15 billion from workdays lost and EUR 4 billion in healthcare costs. Besides affecting human health, water and soil quality and agricultural crops, air pollution also damages materials and buildings, including Europe's most culturally significant buildings. At present, particulate matter (PM) and ground level ozone are Europe's most problematic pollutants in terms of harm to human health, followed by benzo(a)pyrene and nitrogen dioxide. Concentration of arsenic, cadmium, lead and nickel in air are generally low in Europe, with few exceedences of limit or target values. These pollutants contribute to the deposition and build-up of toxic metal levels in soils, sediments and organisms (EEA, 2012).

The emissions of acidifying gases – sulphur dioxide, nitrogen oxides and ammonia decreased by 32% between 2000 and 2011. Agriculture, forestry and fishing account for the largest share of all industries, in 2011 they emitted 36% of the total acidifying potential. The second largest contributor to acidifying

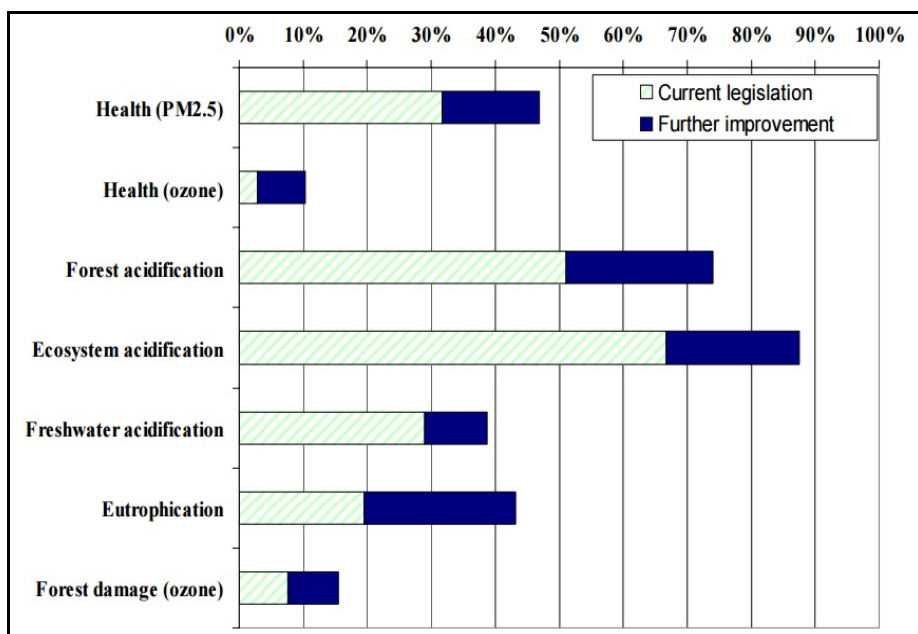
¹ For further details see <http://www.kyotoprotocol.com>



emissions in 2011 was the transport industry with a share of 18% or 3.5 million tons of sulfur dioxide equivalents. The most significant decrease was observed for the electricity, gas, steam and air conditioning supply industries. The more systematic use of end-of-pipe pollution filters and the use of more efficient combustion technologies in the electricity and heat production are the main contributors to this development. EU chemicals production increased continuously during 2002-2007, rising overall by 9.7% to reach a peak of 362 million tons in 2007. During the financial and economic crisis, production fell by 6.6% in 2008 and by further 13.6% in 2009 (Eurostat, 2014).

Within the European Union, the Sixth Environment Action Programme set the long-term objective of achieving levels of air quality that do not give rise to significant negative impacts to human health and the environment. The Thematic Strategy on Air Pollution from the European Commission subsequently set interim objectives for air quality improvement to the year 2020 (EC, 2005).

Figure 1. Improvement of health and environment indicators for 2020, following the Strategy on Air Pollution



Source: Thematic Strategy on Air Pollution, 2005

2. Air quality legislation in European Union

European Union has developed an extensive body of legislation which establishes health based standards and objectives for a number of pollutants in air. These standards apply over differing periods of time because the observed health impacts associated with pollutants occurs over various exposure times (EEA, 2014).

Europe's environmental legislation has grown piece by piece and resulted in a complex body of legislation. It can be observed a trend of delegating further environmental policy decision to lower levels – European Agencies, expert committees, regional expert networks, technical standardization and voluntary agreements. Directives are addressed to Member States and impose upon an obligation to achieve a specific result within a certain period of time. Member States must transpose the Directives into domestic legal orders, but it is up to them to achieve the imposed result as long as the transposition is complete and correct. The European Commission has a special obligation to enforce EU laws and thus must control the quality of transposition and application of provisions (Scheuer, 2005).

The European Union air quality legislation is built on the principle that EU Member States divide their territory into a number of air quality management zones and agglomerations where are undertaken the assessments of air pollution levels using measurements and modelling. In case that air pollutant levels are elevated, each Member State should prepare an air quality plan or program to ensure compliance with the limit value before the date when the limit value formally enters into force. In addition, information on air quality should be disseminated to the public (EEA, 2011).

The European directives currently regulating ambient air concentrations of the main pollutants are design to avoid, prevent or reduce the harmful effects of air pollutants on human health and the environment by implementing limits or target values for ambient concentrations of air pollutants. They comprise:

- Directive 2008/50/EC on ambient air quality and cleaner air for Europe, which regulates ambient air concentrations of sulfur dioxide, nitric dioxide and other nitrogen oxides, PM₁₀ and PM_{2.5}, lead, benzene (C₆H₆), carbon monoxide and ozone (EU, 2008);
- Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (*Fourth Daughter Directive*) (EU, 2004).

Other directives regulate emissions of the main air pollutants from specific sources and sectors by setting emissions standards, requiring the use of best available technology or setting requirements on fuel composition.

Table 1. EU targeted levels of different air pollutant's value

Pollutant	Concentration	Averaging period	Equal nature	Permitted exceedences each year
Fine particles (PM _{2.5})	25 µg/m ³	1 year	Target value entered into force 1.1.2010 Limit value entered into force 1.1.2015	n/a
Sulphur dioxide (SO ₂)	350 µg/m ³	1 hour	Limit value entered into force 1.1.2005	24
	125 µg/m ³	24 hours	Limit value entered into force 1.1.2005	3



Nitrogen dioxide (NO ₂)	200 µg/m ³	1 hour	Limit value entered into force 1.1.2010	18
	40 µg/m ³	24 hours	Limit value entered into force 1.1.2010	n/a
PM10	50 µg/m ³	24 hours	Limit value entered into force 1.1.2005	35
	40 µg/m ³	1 year	Limit value entered into force 1.1.2005	n/a
Lead (Pb)	0.5 µg/m ³	1 year	Limit value entered into force 1.1.2005 (or 1.1.2010 in the immediate vicinity of specific, notified industrial sources; and a 1.0 µg/m ³ applied from 1.1.2005 to 31.12.2009)	n/a
Carbon monoxide	10 mg/m ³	Maximum daily 8 hour mean	Limit value entered into force 1.1.2005	n/a
Benzene	5 µg/m ³	1 year	Limit value entered into force 1.1.2010	n/a
Ozone	120 µg/m ³	Maximum daily 8 hour mean	Target value entered into force 1.1.2010	25 days averaged over 3 years
Arsenic (As)	6 ng/ m ³	1 year	Target value entered into force 31.12.2012	n/a
Cadmium (Cd)	5 ng/ m ³	1 year	Target value entered into force 31.12.2012	n/a
Nickel (Ni)	1 ng/ m ³	1 year	Target value entered into force 31.12.2012	n/a
Polycyclic Aromatic Hydrocarbons	1 ng/ m ³ (expressed as concentration of Benzo(a)pyrene	1 year	Target value entered into force 31.12.2012	n/a

Source: Air Quality Standards, available at ec.europa.eu/environment/air/quality/standards.htm

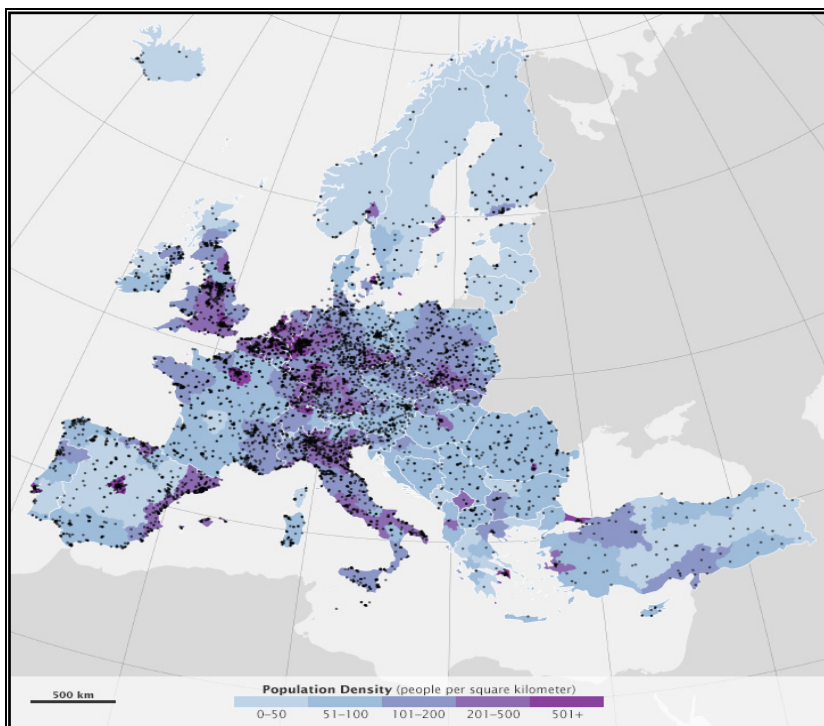
Air quality Directives focus primarily on local pollution hotspots, although the substances addressed are not only those emitted from a local source, but also those that are transported over long distances. Local authorities charged with implementing the Directives often claim that local policies and measures are not sufficient to bring down pollutant concentrations to the required levels. Often, additional measures at national or EU-level are needed to achieve air quality standards. Citizens have the right to go to court if their authorities have not achieved the standards or not implemented appropriate measures to achieve them. This is a strong tool for environmental organizations, which can enforce the air

quality limit values, as it has already been done in the UK and Netherlands (Scheuer, 2005).

The EU Member States have to submit annually their air quality data to Airbase, the European Air Quality Information System. European Environmental Agency (EEA) on behalf of the EU Commission and supported by EEA's European Topic Centre on Air and Climate Change maintains AirBase and produces technical papers for each reporting year with overviews and analyses of the submitted information concerning data quality and zone exceedances in the EU Member States. Data on air pollutants are officially reported under the convention on Long-Range Transboundary Air Pollution (CLRTAP) to the EMEP Program (Cooperative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe). Main elements of EMEP are: collection of emission data (Figure 2), measurements of air and precipitation quality, modelling of atmospheric transport and deposition of air pollutants (Moldanova, 2013, p. 405)

Transport modes are essential tools that address different spatial and temporal scales, linking emissions to calculated air pollutant concentrations or deposition fluxes. In an integrated assessment, air pollutant transport models are used to connect emissions with geographically-specific estimates of health and ecosystem impacts (EEA, 2010b).

Figure 2. The distribution of air quality monitoring stations in Europe



Source: NASA Earth Observatory, available at: <http://earthobservatory.nasa.gov>



3. Air quality legislation implementation at national and local level

In Romania, the Directive 2008/50/EC on ambient air quality and cleaner air for Europe and the Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air are transposed into the national legislation by the Law no. 104/15.06.2011 regarding air quality. Some of the measures stipulated by the law involves defining and establishing air quality objectives in order to prevent and reduce the possible harmful effects on human health and environment. It also refers to air quality evaluation at national level using common methods and criteria in order to make it accessible for the public (Law 104/15.06.2011).

Air quality law implementation is made by the National System of Evaluation and Integrated Management of Air Quality which includes the National System of Air Quality Monitoring and National System of Atmospheric Pollutants Inventory Emissions. The National System of Evaluation and Integrated Management of Air Quality provides the organizational, institutional and legal framework of cooperation of the public authorities and institutions with competence in the field of air quality. It also provides evaluation and management, unitarily, on the entire Romanian territory and it is in charge with the information dissemination regarding air quality to the population and international organisms (www.calitateaer.ro).

National and sub-national authorities are very important actors regarding EU legislation implementation, especially because they can adopt additional measures depending the sources of pollution existing at national level. Usually, in the European cities, most of the targeted measures involve traffic emissions: improvement of public transport, the creation of low-emission zones, and promotion of cycling or changes in speed limits for cars (EEA, 2014).

For air quality assessment on the Romanian territory, 13 agglomerations were established (Bacau, Baia Mare, Brasov, Braila, Bucuresti, Cluj Napoca, Constanta, Craiova, Galati, Iasi, Pitesti, Ploiesti and Timisoara) and 41 zones identified at a county level.² At a national level, air quality data can be accessed on the webpage www.calitateaer.ro. The website is dedicated to real time public information in air quality parameters, updated hourly, monitored at more than 100 stations all over the country.

The National System of Air Quality Monitoring comprise 142 automatic air quality monitoring stations and 17 mobile stations as it follows: 24 traffic stations, 57 industrial stations, 37 urban background stations, 15 suburban background stations, 6 regional background stations and 3 EMEP (EMEP, 2015) stations.

Air quality information data from the 142 monitoring stations and meteorological data obtained from 119 stations are transmitted to the local centers from the Environment Protection Agency of each county. Data regarding air

² For further details check on Romanian Ministry of the Environment, Waters and Forestry website at www.mmediu.ro.

quality are presented to public interest by outer panels, conventionally located in densely populated cities and also in city halls interior panels (APM, 2013).

4. Iasi air quality monitoring system

Iasi County covers an area of 5476 square kilometers and has a population of 849.670 inhabitants. Iasi Municipality is the residence of Iasi County, ranking as first urban settlement of national importance and with potential influence at European level (INSSE, 2013).

The local network of Air Quality Monitoring in Iasi agglomeration was created in 2005, within the PHARE Project RO 2002 “Improving the national network of air quality monitoring” and consists in 6 automatic monitoring stations that are equipped with efficient analyzers that are applying the reference methods mentioned by the Law no. 104/15.06.2011 regarding air quality in Romania (APM, 2013).

The local environmental authority for Iasi County is the Environmental Protection Agency and is subordinated to the National Agency for Environmental Protection, a specialized institution of the central administration, part of the Ministry of Environment, Waters and Forests competent to implement policies and legislation in the field of environmental protection.

The Agency has the following attributions: strategic environmental planning, environmental activities monitoring, authorizes the activities with environmental impact, implements the environmental legislation and policies at national and local level and reports information to the European Environmental Agency for the following domains: air quality, climate change, protected areas, soil contamination and water pollution (ANPM, 2015).

Figure 3. Air quality monitoring points in Iasi agglomeration

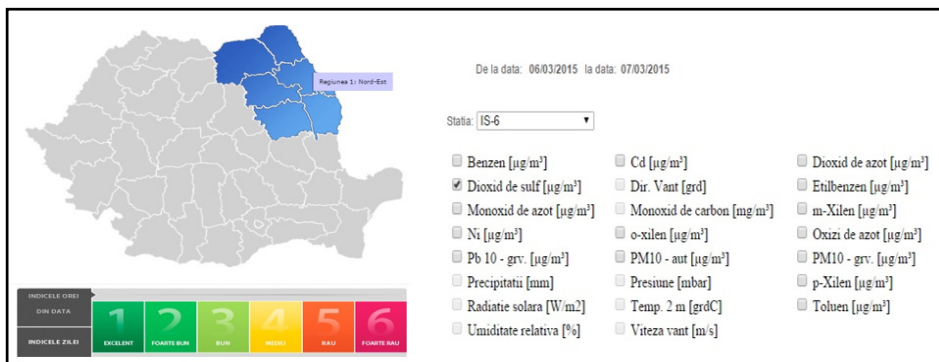


Source: own representation

The local network of Air Quality Monitoring comprises the following six locations (APM, 2013):

- IS-1 Station Podu de Piatra – traffic station located in an area with intense traffic. The monitorized pollutants are specific for the transport activity;
- IS-2 Station Decebal-Cantemir – urban background station located in a residential area, at an appreciable distance from the local sources of pollutants emissions in order to evidetiate the exposure risk of the population;
- IS-3 Station Oancea-Tatarasi – industrial station that highlights the pollutants emissions from the industrial area on Tatarasi district;
- IS-4 Copou-Sadoveanu – rural background station, located in an area sparsely populated, away from the city center and sources of pollutants;
- IS-5 Tomesti – suburban background station that evaluates the exposure of population and vegetation from the periphery to ozone pollution;
- IS-6 Bosia-Ungheni – urban background and traffic station.

Figure 4. Air quality indicators selection



Source: own representation available at www.calitateaer.ro

Local Environment Protection Agency emits each year a complex report regarding the state of the environment in the county that tackles the following subjects: local economy, air quality (types and concentrations of pollutants), water quality, land use, biodiversity, waste management, climate changes and life quality. In this manner, available data is made public and represents an important source of information for the inhabitants regarding the quality of the environmental factors.

Conclusions

Air pollution issue requires international cooperation in order to improve the situation. Poor air quality remains an important public issue in European Union, although there has been clear progress in reducing anthropogenic emissions in past decades. Member States are making efforts to transpose the Directives into the national law and to find specific action plans. The local network of Air Quality Monitoring in Iasi agglomeration is an example of the EU air quality legislation applied at local level. The network is a specific tool of information regarding the pollutants from different points situated inside and outside Iasi. Usually, the most effective measures are taken at a local level where the members of the community

can be informed. Nowadays, the access to environmental information is facilitated by transparent actions of the actors involved in the industrial activities and a better collaboration between institutions at local, national and European level.

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