AIR QUALITY IN ROMANIA. MAIN POLLUTANT EMISSIONS AND FINANCING POSSIBILITIES FOR EMISSION REDUCTION

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Abstract

Air is the environmental factor which is the most important for pollutants transport because it is the support for the fastest transportation throughout the environment. Reducing polluting emissions in air remains a field in which there are needed important investments, considering the commitments assumed by Romania for reducing emissions and the poor quality of the air in certain areas. The paper analyzes the evolution of the main emissions, respectively the ones coming from large burning installations and greenhouse gases and identifies financing possibilities for the reduction of those emissions by using structural and cohesion funds or by using state aid schemes.

Key-words: *air pollution, emissions reduction, large burning installations, financing, Romania*

JEL Classification: Q_{53}, Q_{54}, Q_{58}

Introduction

Air is the environmental factor that contributes greatly to the spreading of pollutants, since in air this process records the highest velocity. In order to evaluate air pollution levels pollutant emissions are calculated by using specific technical devices and methodologies that consider emission factors, activity indicators and dispersion patterns. Fact is, air pollution is difficult to avoid by population or ecosystems. Meanwhile, the emission of greenhouse gases triggers the most challenging environmental issue of the contemporary society – climate change.

The paper intends to build a comprehensive picture on air quality in Romania based on emission data and to reveal the possibilities for securing financial means for emission reduction considering the current framework of European integration. Therefore, in the first section an analysis of pollutants emissions that affect air quality at local and regional scale will be made along with an analyzed of greenhouse gas emissions coming from large burning installations. Further, we will look at the policy framework developed in order to address this issue and how this development created the resources needed for financing new

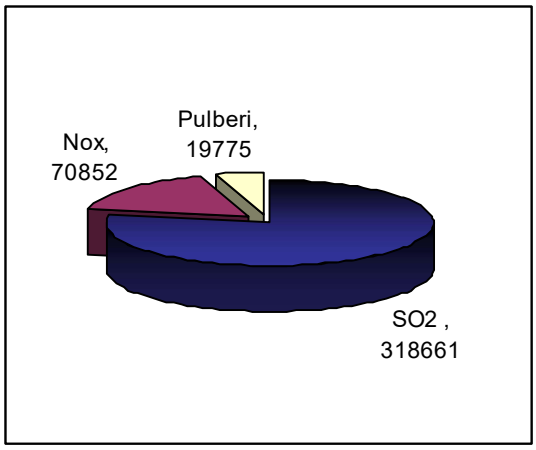
technologies acquired in order to reduce emissions towards, an improved air quality.

Various aspects of environmental degradation and protection are more and more present in the economic literature which provides plenty of theoretical approaches and practical examples on progresses made. Nevertheless, there is little indication on the criteria that could be useful in building a financing architecture that avoids trade-offs among various governmental supports within a relatively new political framework.

Emissions and air quality in Romania

In Romania, air quality data show that we are facing an improvement because of the reduction of economic activities, especially in industrial production that uses large burning installations. The size of emission reduction is estimated to be 50% for most of the pollutants compared with the pre-1990 period.

Air pollution. Romania is still relying mainly on conventional fuels such as crude oil and coal (46%), used for providing urban populations with heating and hot water. Emissions of large burning installations (LBI) represent the most important source of total sulphur dioxide and nitrogen oxides emissions in urban areas, contributing to acidification and troposphere ozone occurrence. According to NEPA (2009), in Romania there are 174 LBI – power and thermal plants with a thermal power equal to or larger than 50 MW that use mainly fossil fuels. The structure of emissions by pollutants is presented in fig.1.

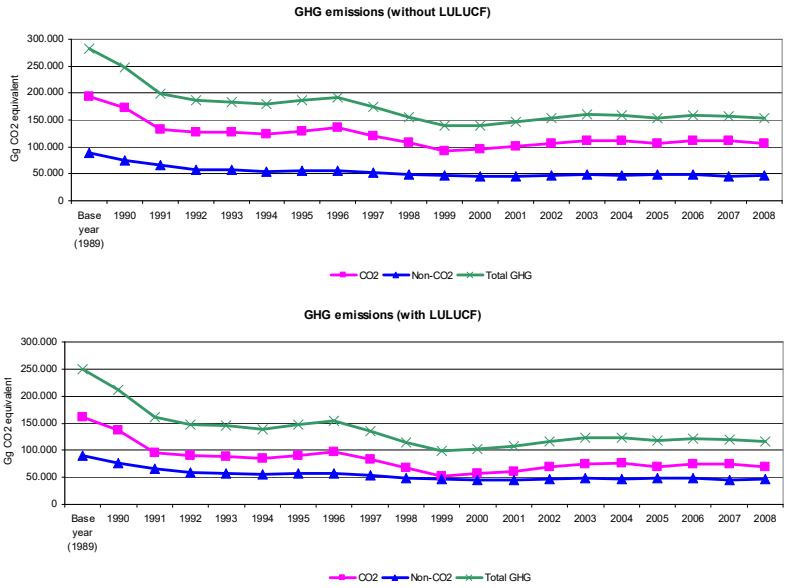


Source: NEPA (2009), *Annual report on the state of the environment in Romania,* http://www.anpm.ro/upload/16097_2%20ATMOSFERA%202009.pdf, accessed in 03.01.2011.

Fig. 1. *The structure of emissions by pollutant*

The main source of sulfur dioxide and nitrogen oxide emissions are burning processes in energy production and transformation industries, followed by

road transportation and processing industries. Particle matter represents another important pollutant for which significant excess of emission standards are recorded. They are coming from a variety of sources: the iron and steel industry; thermal plants that use solid fossil fuels; concrete plants; road transportation, industrial waste deposits, etc. Settlements where the highest pollution levels are recorded are Reşiţa, Bistriţa-Năsăud, Câmpulung, Braşov, Zalău, Vaslui, Miercurea Ciuc, Gheorghieni, Rovinari, Motru, Constanţa, and Iaşi.



Source: UNFCC, GHG emission profiles for Annex I Parties and major groups, http://unfccc.int/ghg_data/ghg_data_unfccc/ghg_profiles/items/4625.php, accessed in 04.01.2011.

Fig. 2. *Total GHG emissions, without and with LULUCF*

Climate change. Information about the amount of greenhouse gas emissions has a strategic importance in designing mitigation plans. Greenhouse gases (GHG) consist of carbon dioxide, methane, nitrous oxide and freons. Looking to the time series, we found that there is a falling trend of emissions, with two periods in which the annual rates are higher: at the beginning (1989-1991) and in the middle (1996-1999) of the 1989-2008 interval (fig. 2).

The structure of emissions by type of greenhouse gas is presented in table 1. Carbon dioxide is, for Romania, the most important GHG in the 1989-2008 period, with almost 72% of the total GHG emissions. Further significant emissions are recorded for methane (17.36%) and nitrous oxide (10.58%). Carbon dioxide and methane recorded a slight increase, while nitrous oxide and some freons are falling. This change in structure could be explained by the reduction of fertilizer

use in agriculture (the main source of nitrous oxide) and the early implementation of Montreal Protocol's provisions.

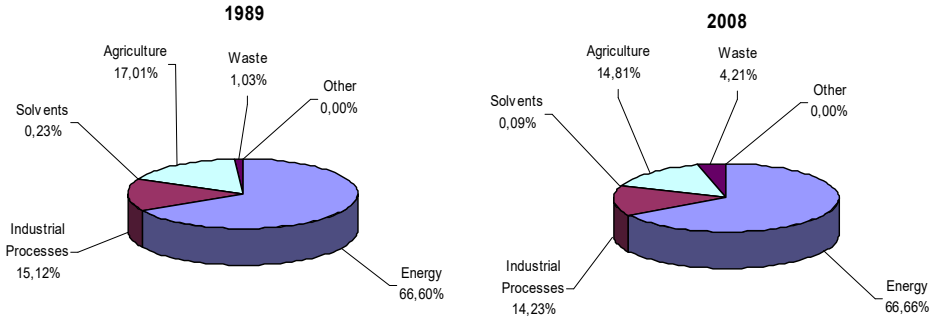
Table 1

GHG emission's structure for the 1989-2008 period

GHGs	1989 %	2008 %	1989-2008 average %
Carbon dioxide	70.36	71.07	71.29
Methane	16.90	17.61	17.36
Nitrous oxide	11.53	10.86	10.58
Hydrofluoro carbons	0.00	0.0141	0.0034
Perfluoro-carbons	1.22	0.43	0.77
Hexafluoro-sulfurs	0.00	0.01119	0.0076

Source: National Emission Inventory, 2010

The structure of emissions by type of sources reveals that the most important contributor is the energy sector, with 66.66%, followed by agriculture (14.81%). This structure is very similar at the beginning and at the end of the period, the slight differences being disputed by industrial processes, agriculture, and waste (fig. 3).



Source: UNFCC, GHG emission profiles for Annex I Parties and major groups, http://unfccc.int/ghg_data/ghg_data_unfccc/ghg_profiles/items/4625.php, accessed in 04.01.2011.

Fig. 2. *Structure of GHG emissions (without and with LULUCF) by sources*

Policy framework for air quality protection and climate change mitigation

In October 2004, the environmental minister elaborated the *National Strategy for Air Protection*, assuming the following goals:

- maintaining air quality within areas where the current legal norms are respected;
- improving air quality in areas where excess of the current legal norms are recorded;

- adopting measures needed for the minimization and, eventually, elimination of the negative environmental impact and of the cross-border impact;
- accomplishing all the commitments assumed by Romania within international agreements and treaties.

By the H.G. no. 586/2004 the National System for the Integrated Assessment and Management of Air Quality was established, which comprises the National network of air quality monitoring and the National system of pollutant emissions inventory. Information provided by the two sub-systems is integrated by the Center for Air Quality Assessment.

Within the National System for the Integrated Assessment and Management of Air Quality there are established eleven crowds that need air quality evaluation and management (Bucharest, Craiova, Piteşti, Ploieşti, Constanţa, Brăila-Galaţi, Iaşi, Baia Mare, Cluj Napoca, Timişoara, and Braşov) and eight areas for air quality management.

As long as international commitments are regarded, Romania made a commitment to reduce GHG emissions with 8% in the first engagement period (2008-2012) compared with the base year (1989) by ratifying the Kyoto Protocol. Meanwhile the Law no. 271/2003 ratified the Convention on cross-border air pollution on long distances and the three successive protocols referring to acidification, eutrophication, and troposphere ozone.

Until 2017, it should be recorded major reductions of sulphur dioxide, nitrogen oxide, and particulate matter emissions coming from LBI. This means a fourfold reduction from the intermediary ceiling from 2007 (540 000 tones) to the 2013 target (148 000 tones). Romania obtained transition periods by pollutant categories (sulphur dioxide, nitrogen oxides, and particulate matter) comprised between 1 and 6 years for 77 LBI (until 2013), while for nitrogen oxides coming from 6 LBI the transition period is an additional 1-2 years (2016-2017).

Financing possibilities for emission reduction

In 2007-2013 financial means provided by the structural and cohesion funds of the European Union could used for emission reduction. These funds are allocated through the so called operational programs. The emission reduction could be financed through the Environmental Operational Program and the Economic Competitiveness Operational Program. Table 2 presents a summary picture of the financing opportunities considering the programs' pillars, financial allocations, and eligible actions.

Table 2

Financing possibilities through structural and cohesion funds

Pillar/OP	Goals	Financial allocation (euro)	Eligible projects
Pillar 3: pollution reduction and minimization of climate change effects through the rehabilitation of urban heating systems, envisaging to reach the energy efficiency targets in identified priority areas / Environmental Operational Program	Reducing climate change effects and pollutant emissions coming from urban heating systems in cities that are most affected by pollution Improving the minimum concentration of pollutants in envisaged settlements Improving public health in affected settlements	458 million, out of which 229.268.644 Cohesion Fund 229.268.644 National co-financing	BAT (best available technologies) introduction for reducing sulphur dioxide, nitrogen oxide, and particulate matter emissions. Rehabilitation of boilers and turbines, including replacement where this is justifiable. Introduction of improved measuring system. Rehabilitation of non-compliant slag and ash deposits. Rehabilitation of hot water and heat distribution networks (including new network designs if this is justified by cost-efficiency ratios). Technical assistance for project preparation, elaboration of option studies, management, supervision of works and advertising, including public awareness campaigns.
Pillar 4: Improving energy efficiency and sustainable development of the sector/ Increasing Competitiveness Operational program	Reducing primary energy intensity for reaching national target (of 40% until 2015, compared with 2001) and reducing pollution degree of energy sector	Public co-financing (European Regional Development and state budget allocations) and private co-financing (own sources of the applicant,	Installations/equipments specific for industry for obtaining a specific energy economy, based on the energy balance (e.g. air compressors, pumps, ventilation equipments, frequency convertors, integrated systems of energy consumption management). Co-generation units with high energy efficiency for

Pillar/OP	Goals	Financial allocation (euro)	Eligible projects
		bank loans etc.)	industrial plants (modernization of co-generation plants or building new ones). Buildings related to the industrial process that is the subject of the project.

Source: Environmental Operational Program, Competitiveness Operational Program

The distinction among interventions within Environmental OP and Economic Competitiveness Increase OP is based on the pattern of provided services, the main type of infrastructure and type of beneficiaries.

For the Environmental OP beneficiaries of Pillar 3 would be local public authorities from the selected municipalities or, in certain cases, the operators of urban heating services. Additional financing sources for municipal heating systems will be attracted through external loans and private-public partnerships (PPP).

Table 3

Current state aid schemes

Crt. no.	Support/Aid scheme	Period
1	Support bonus type for promoting co-generation of high efficiency	2010-2013
2	Regional aid regarding valuation of RES	2008-2013
3	Horizontal aid for regional sustainable development and emission reduction – Pillar 4: Competitiveness OP	2008-2013
4	Project regarding the promotion of clean technologies and energy production from RES	2007-2011
5	Regional aid for promoting clean technologies and energy production from RES	2007-2011
6	Modification of regional aid regarding the promotion of clean technologies and energy production from RES	2007-2011
7	Regional aid for emission reduction of sulphur dioxide, nitrogen oxides, particulate matter, lead, carbon monoxide, benzene, and volatile organic compounds	2007-2011

Source: Competition Council, 2010

For the Economic Competitiveness Increase OP economic actors and public authorities could obtain grants with a maximal value comprised between 10 million euro and 35 million euro, in accordance with the envisaged operation. Thus, projects regarding the procurement by the economic agents of installations and equipments for energy savings in production processes, and also projects of companies and local authorities envisaging the modernization and establishment of

new power producing and thermal energy capacities through the valuation of renewable energy sources (RES) (solar energy, wind energy, geo-thermal energy, bio-fuels or hydro-power of small size) could obtain non-reimbursable financing up to 10 million euro.

Companies that apply projects envisaging investments in sulphur, nitrogen removal installations and filters could receive up to 25 million euro, while projects that target interconnection of the national power and natural gas grid with the European ones could obtain grants up to 35 million euro.

Another financing source for projects with impact on emission reductions is the state aid scheme. A brief review of these opportunities is presented in table 3. These are managed by the Council of Competition which is the national contact point in the relation among European Commission, Romanian authorities, and beneficiaries.

Conclusions

There are a large variety of environmental issues that should be approached with urgency by any government. Meanwhile, the financial means of implementing effective measures are limited, and usually lower than the needs of each solution. Thus, the question of prioritization is of crucial importance. Air quality ranks very well after such processes, since air pollution is the most difficult to avoid by both, humans and ecosystems. Considering this reason, the paper examined the patterns of air pollution in Romania and how the emission reduction could be supported with financial resources.

The social-economic changes occurring in Romania in 1989 had a powerful impact on emission patterns. Thus, current emissions are half of the ones recorded before these changes for sulphur dioxide, nitrogen oxides, particulate matters, and GHGs. Meanwhile, the structure of emissions by source did not change much, as long as GHGs are regarded. Although these patterns could be considered favourable, they are the results of a contracting economy. Further, the European standards are still not met, especially in terms of energy efficiency, sector which is the main emission source.

Browsing among the available governmental funds for emission reductions, we found plenty of opportunities for a wide range of beneficiaries – private companies, public authorities, operators of municipal utilities. European funds – the Cohesion Fund, the Structural Funds – combined with national state aid schemes provide a good support for actions that result in emission reductions, such as acquiring new technologies, rehabilitation of distribution systems, power production based on RES, modernization of boilers and turbines, public awareness campaigns.

Future research should consider a more detailed approach, by company or sector type in order to provide readily available information for decision makers. It should also considered assessment studies that could report on the effectiveness of financial support and comparisons in terms of outcomes.

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