SEFIRA IS A EU FP7 COORDINATION ACTION ON
Socio Economic Implications
For Individual Responses to
Air Pollution policies in EU +27

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POLICY ADDRESS IN VIEW OF THE VOTE OF THE NATIONAL EMISSION CEILING (NEC) DIRECTIVE AT THE EUROPEAN PARLIAMENT

1.ISSUES AROUND (NON-) IMPLEMENTATION OF EU AIR QUALITY DIRECTIVE

What is the problem with air quality?

Pollutants emitted into the air we breathe from various sectors like industry, motor vehicles, agriculture and heating are responsible for bad ambient air quality (AQ), which has been recognised by the Word Health Organisation (WHO)[1] as the single largest environmental health risk in Europe, responsible for 482 000 premature deaths in 2012. 90% of the European population is exposed to annual levels of outdoor atmospheric pollutants that are above WHO's air quality guidelines. Fine particulate matter, ozone, nitrogen dioxide and sulphur dioxide represent the major threats for human health, causing heart and respiratory diseases, blood vessel conditions and strokes, and lung cancer and vulnerable groups such as children, asthmatics and the elderly are the worst affected. The economic cost to society of air pollution health impact (deaths and diseases) in Europe has been estimated to be in 2010 1.6 trillion US$, 20% of which ascribable to indoor air pollution (WHO, 2015). In the light of emerging evidence on the health effects of air pollutants, notably NO_2, these impacts may even be underestimated. The recent revelations about the use of 'defeat devices' in diesel cars highlight a failure in regulation that will have had significant implications for public health. In addition, several non-health impacts of degraded AQ have been identified, among which the direct effect of ozone on crop yields, and the ecosystem and material damage due to ozone, sulphur dioxide and particulate matter.

Which policies are in place in Europe?

The European Directive on Ambient Air currently in force, Directive 2008/50/EC of the European Parliament and of the Council, has been adopted in June 2008, closely mirroring the Commission DG Environment proposal of September 2005. In practice, the Directive is the result of the merging of the Council Directive 96/62/EC on ambient air quality assessment and management with three Daughter Directives on i) Particulate matter, ii) Benzene and carbon monoxide and iii) Ground level ozone and its precursors. One of the 2008 Directive key elements has been the introduction of new AQ objectives for fine particulate matter (PM 2,5) recognised as responsible for significant negative impacts on human health. In the absence of identifiable thresholds below which PM2,5 would not pose a risk, the Directive aimed at a general reduction of

[1] WHO Regional Office for Europe, OECD (2015). Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth. Copenhagen: WHO Regional Office for Europe.

concentrations in the urban background, combining this approach with the introduction of limit values. The Directive also specifies the format and content of Member States' Annual Reports on ambient air quality in their territories.

Emissions of primary pollutants are addressed by the Directive 2001/81/EC of the European Parliament and of the Council on National Emission Ceilings (NECD) for the following atmospheric pollutants: ammonia, nitrogen oxides, non-methane VOCs and sulphur dioxide. The aim of this Directive is to improve the protection of the environment and human health against risks of adverse effects from acidification, soil eutrophication and ground-level ozone. Member States are required to report every year their national emission inventories and their emission projections for 2010. National ceilings in the Directive are similar to those originally set by the Gothenburg Protocol (December 1999) to the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP).

The "Euro standards" regulations for road vehicles include the Regulation 692/2008 for light duty Euro 6 (Sept 2014) and Regulation 595/2009 for Euro VI for heavy duty vehicles (January 2013), and aim at defining the acceptable levels of exhaust emissions for new vehicles sold within the EU. Pollutants to which these standards apply include: Nitrogen oxides, total hydrocarbon, non-methane hydrocarbons/volatile organic compounds, carbon monoxide and particulate matter. It has now become clear that there has been a serious failure in these regulations. Despite very large reductions in the regulatory limits for emissions of nitrogen oxides from diesel cars, over the past twenty years or so emissions in real-world driving have not decreased significantly. The EU response to this finding has been to formulate a more stringent regulation limiting emissions in real-world use but these discussions are still not concluded.

A revision process of the European strategy started in early 2011. Since compliance with existing obligations on PM10 and NO2 in the Air Quality Directive (2008/50/EC) is still a problem in many Member States, the Commission have decided not to revise the Directive but rather to focus on a package of measures to reduce the extent of non-compliance. This package, released in December 2013, includes the proposal for a revised NECD (COM (2013) 920 final). The first stage in revising the NECD is to adopt the revised Gothenburg Protocol agreed in May 2012 in the CLRTAP within the UNECE. The revised Protocol includes an emission ceiling for primary PM2.5 and requires reducing emissions from sources with high proportions of black carbon (BC) in achieving the PM2.5 ceilings. The revised directive also includes emission reduction obligations for methane, precursor of longer-term average ozone concentrations and as such, an important short-lived climate pollutant. The inclusion of climate forcers such as BC, methane and ozone establishes the first legislative link between air quality issues and global warming.

What has been achieved?

Even if a great portion of the European population is currently exposed to pollutant levels higher than the air quality standards established in the WHO guidelines and most of the member states are facing problems in complying with NO_2 and O_3 obligations, it must be pointed out that over the past decades the concentrations of the main pollutants in Europe have declined. One of the most striking example concerns sulphur dioxide whose ambient levels have substantially decreased in Europe with a consequent improvement in surface water acidity and exceedances of critical loads in Europe's sensitive ecosystem areas.

Decreased ambient levels of pollutants are the consequence of a reduction in emissions due to the implementation of control measures. However, a reduction in emissions does not always translate directly into a decrease in atmospheric concentrations because of various factors including the contribution of long-distance transport of air pollutants. This is especially true for a pollutant like ozone for which reductions in peak concentrations in European cities have slowed down and the benefit to European emission controls can be significantly counterbalanced by increasing background ozone due to the global increase of a precursor like methane.

What we can do improve air quality according to the actual state of knowledge?

The most effective immediate action will be to agree and implement the real-world emission test for new Euro 6 vehicles currently being discussed by the Commission, Member States and Stakeholders. The Commission originally stated their desire to see this in place by 2017, however the recent revelations about 'defeat devices' and the poor emission performance of diesel cars and their impacts on public health would now argue for a much earlier date and a 'conformity factor' lower than the 2-3 which is currently being discussed. These improvements should also be reflected in tighter ceilings for national emissions for NO_x in the National Ceilings Directive.

A related action would also be for the European Union to reconsider the priority given to diesel cars in achieving climate targets. With new technologies such as hybrids and electric vehicles becoming more widespread the case for a longer–term decrease in diesel cars is now strong.

Agricultural emissions are another high priority for action and remain one of the great unsolved problems in air quality in Europe. Over the past decades while other industrial sectors have decreased emissions considerably, agricultural emissions, notably of ammonia, have remained high. Ammonia can form a significant fraction of particulate matter leading to its transport across wide areas of Europe and to exceedences of World Health Organisation Guidelines as well as some mandatory EU limit values. It can also lead to significant impacts on biodiversity in the vicinity of large intensive farms and livestock installations.

2. CONFLICTS ARE "IN THE AIR"

Air quality in Europe today is still cause of environmental conflicts over responsibility in emissions, pollution control, and appropriate actions for health and environment protection. This situation may hamper the effectiveness of policy outcomes but, if well managed, may also foster problem solving and policy innovation. We identified four fields representing relevant examples[2].

Coal burning in Eastern Europe

The case of Poland is strongly characterised by the specific energetic infrastructure of the country that is still heavy depending on coal. The long, costly and difficult transition from coal to cleanest fuels is slowed down by the recent geo-political conflicts over the Russian natural gas supply and by the financial crisis that, according to the interviewees, would not give to the government enough resources to subsidise a technological shift to

[2] This section is based on Deliverables D 3.1 and D 3.2 of SEFIRA Fp7 Project that explored four case studies in urban areas, namely Antwerp (Belgium), Milan (Italy) Malmö (Sweden) and Warsaw (Poland).

cleaner fuels. Active lobbies are also supporting the new Poland Energy Policy 2030 that is based on further development of coal burning[3]. Poland is ranked first in the EU in terms of share of coal in electricity production. Conflict over air pollution has emerged in Krakow and subsequently spread all over the country in the form of street protest, web awareness raising campaigns and legal claims soliciting an urgent ban of coal burning and effective air pollution policies[4]. On the 6th of October 2015 President of Poland Andrzej Duda has signed the so-called 'anti-smog' law, marking the culmination of a long-running campaign by the NGO Polish Smog Alert. The law is designed to give local authorities complete sovereignty in deciding whether bans should be implemented regarding such matters as the burning of environmentally unfriendly substances in domestic properties. As long as coal is the primary energy sector in this country there is however small room for substantial reduction of the use of coal for heating in cities.

Biomass and wood burning

Recent research has shown how biomass burning can produce, besides other pollutants, dangerous quantities of the carcinogen benzo(a)pyrene in PM10. The increased use of this kind of fuel also in urban environments has been linked to the fact that biomass and wood burning have been identified in the past decade as a green fuel alternative, having been described as “carbon neutral”. A large share of agricultural and forestry waste have been collected by biomass power plants that concentrate in single spots the incineration of materials that before where scattered in a wide territory. This event has generated new risks and conflicts against this kind of plants, that had a fast and steady diffusion in the last decade by the population living nearby plats, especially in Northern and Central Italy.

Changing agricultural practices

Agriculture contribution to air quality is well known as the first source of ammonia and methane in the EU. However, up to now ammonia does not seem to have received the attention that it deserves. The revised Gotheborg Protocol requires EU member states to cut their ammonia emissions between 2005 and 2020 by only 6%. Such a small reduction is clearly not sufficient to limit the exceedences of World Health Organisation Guidelines for PM, for which ammonia is one of the main precursors. In addition the role in PM formation is not well known by population that tend to under-estimate this pollution source. The positive impact on air quality from organic agriculture should be underlined in order to increase social support to farmers and to foster the transition towards an optimisation of the use of ammonia-based fertilizers and the implementation of low ammonia manure application methods.

Traffic and urban socio-ecological transitions

The analysis of policy translation shows us the complexity of environmental conflicts and institutional frictions at different levels. Scientific evidence supports policy implementation but the different scales from European to local, show specific socio-technical problems that often need to be addressed in a multi-scalar perspective, adopting a mix of different techniques. The study of air quality policies in the four Member States that SEFIRA is carrying out (Belgium, Italy, Sweden, Poland) records a high reliance on technical measures, especially end-of-pipe ones and a strong focus on traffic emissions even if they are not always the first factor of harmful pollution. Measures focused on traffic management and emission control should not leave behind

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[3] http://www.mg.gov.pl/files/upload/8134/Polityka%20energetyczna%20ost.pdf

[4] http://www.krakowskialarmsmogowy.pl

the massive impact of industry and energy sector especially in certain areas of the countries like the Polish case shows. Focus on traffic may be partially explained by the centrality of urban environment in opinion making and civic engagement and activism that has a direct connection with policy making and accountability to stakeholders. The role of civil society actors is crucial in order to improve the policy agenda, having they the capacity to foster social support for behavioural change. Air quality is usually measured and modelled on a spatial scale but time scale also matters. A change toward a sustainable system of production, distribution and mobility in contemporary daily life seems an ambitious objective but it's also the only option to really curb noxious pollution from cities. An ecological transition may take an indefinite time, while the impact of air pollution is already compromising life expectancy with an average loss of three years for each European citizen exposed to harmful air pollutants (WHO 2013). Moreover exposure time span is important for health and also in policies, the timing of implementation is crucial to show effectiveness. Timing can be a further element to interpret the efforts by policy-makers in air quality as hinted above. Mismatch between scientific description of air quality and the public social representation of urban air pollution is a concrete risk today. This outcome of scientific applied research can be avoided with the integration of social sciences at all level of environmental research and policy making. Environmental policies for air quality need to be re-scaled socially and geographically in order to improve the ecological integration of policies, economic activities and individual behaviour.

3. EFFECTIVENESS OF AQ POLICIES: WHAT THE RESULTS OF THE SEFIRA SURVEY SUGGEST?

End of pipe technological measures are not sufficient to effectively tackle Air Pollution problems and the importance of personal choices and changes in personal behaviours has been recognised by the scientific community and policy makers. For environmental policies requiring people's willingness to change their behaviour, the role of policy acceptability is particularly relevant. Within the SEFIRA project, Discrete Choice Models (DCMs) are used to understand the role of selected acceptability drivers of air quality policies. DCMs focus on identifying the underlying influences on an individual´s choice behaviour, estimating the attributes´ trade-offs (e.g. efficiency vs. fairness; budget constraints vs. policy efficacy). The knowledge of public sensitivity of the selected acceptability drivers, across the considered countries, might help in the decision making process and in designing more suitable air quality policies. The SEFIRA discrete choice experiment has been carried out administering 16,100 computer-assisted web interviews in 7 EU countries (Austria, Belgium, Germany, Italy, Poland, Sweden, United Kingdom). The selection of the countries reflects different socio-economic and political patterns of the society. The survey, administered in June 2015, is now being analysed and some preliminary results are now available. Such results, that need further analysis before validation, are referred to an Italian sample of 2,300 respondents. It is important to underline that in the SEFIRA approach, the role of the socio-economic analysis will allow to tailor country-specific policy recommendations contributing to the decision-making process of air quality measures.

As far as the Italian sample is concerned, among the characteristics describing the policy in the choice exercise, the reduction in the use of polluting means of transportation and in the consumption of meat and dairy products seems to have the lowest impact on

the acceptability of a policy. If these results will be confirmed, it means that the Italians are more inclined to change their behaviour on these two topics. As a consequence, for instance information campaigns aimed at raising awareness on the advantages of reducing the meat and diary intake and of dismissing polluting vehicles could be considered as potentially effective actions. Having these two policy drivers a low impact on the acceptability of a potential policy, policy makers can consider designing interventions that are more likely to be accepted in the transportation and food sectors.

According to our research design, the decrease in pollution-related deaths, the cost of the policy and the distribution of the costs implied in the implementation of the policy ('*poor people pay less*' principle) are the drivers with the highest impact. As a consequence, the policy acceptability will be especially affected by measures having an impact on these attributes.

From the preliminary analysis of the socio-economic aspects, we found that:

- In general, women have a higher willingness to pay (WTP) with respect to men regarding a decrease in the number of pollution-related deaths;
- In general, women are also more sensitive to the attribute related to the distribution of costs (poor people should pay less).
- Highly educated people (university and post doctoral) have a higher WTP in order to reduce the pollution related deaths with respect to people with a low degree of education.
- Families with 3 or more children have a higher WTP (to reduce pollution-related death) with respect to families with 2 or fewer children.

The preliminary analysis of the response to selected attitudinal questions included in the survey showed that:

- Those not using the social networks (Facebook, Twitter, Instagram, Tumblr, Myspace, etc.) have a preference for the "*poor people pay less*" principle).
- Those not using the social networks (Facebook, Twitter, Instagram, Tumblr, Myspace etc.) show a lower WTP in order to reduce the pollution related deaths, with respect to people that make an habitual use of social networks.
- Those who think that environmental awareness can help in improving the planet where we are and the future generation will leave, in general have an higher WTP in order to reduce pollution-related deaths with respect to people that have low environmental awareness

Clearly, this last analysis will be more informative when the analysis in the 7 countries will be completed, allowing to compare the results obtained in light of the various country-specific social status characteristics

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