Improving urban air quality with a cost-efficiency and health benefit approach

Note prepared by J. Ferreira and A.I. Miranda

November 2021

European Member States are obliged to develop and implement Air Quality Plans (AQP) to improve air quality and health, when ambient air quality standards established in the EU Directive 2008/50/EC are exceeded. Notwithstanding the achievements in emission reductions and air quality improvement, additional efforts need to be undertaken to improve air quality in a sustainable way – i.e. through a cost-efficiency approach. This work was developed in the scope of the MAPLIA project "Moving from Air Pollution to Local Integrated Assessment" (http://projeto-maplia.web.ua.pt/project/), and focuses on the definition and assessment of emission abatement measures and their associated costs, air quality and health impacts and benefits by means of air quality modelling tools, health impact functions and cost-efficiency analysis. The MAPLIA system was applied to the Grande Porto urban area (Portugal), addressing PM10 and NOx as the most important pollutants in the region. Four different measures to reduce PM10 and NOx emissions were defined and characterized in terms of emissions and implementation costs, and combined into 15 emission scenarios, simulated by the TAPM air quality modelling tool. Air pollutant concentration fields were then used to estimate health benefits in terms of avoided costs (external costs), using dose-response health impact functions. Results revealed that, among the 15 scenarios analysed, the scenario including all 4 measures lead to a total net benefit of 0.3 M €.y^{-1}. The largest net benefit is obtained for the scenario considering the conversion of 50% of open fireplaces into heat recovery wood stoves. Although the implementation costs of this measure are high, the benefits outweigh the costs. Research outcomes confirm that the MAPLIA system is useful for policy decision support on air quality improvement strategies, and could be applied to other urban areas where AQP need to be implemented and monitored.

More details about this project (Miranda et al., 2015, 2016; Silveira et al., 2016; Duque et al., 2016) are included as a pdf file.

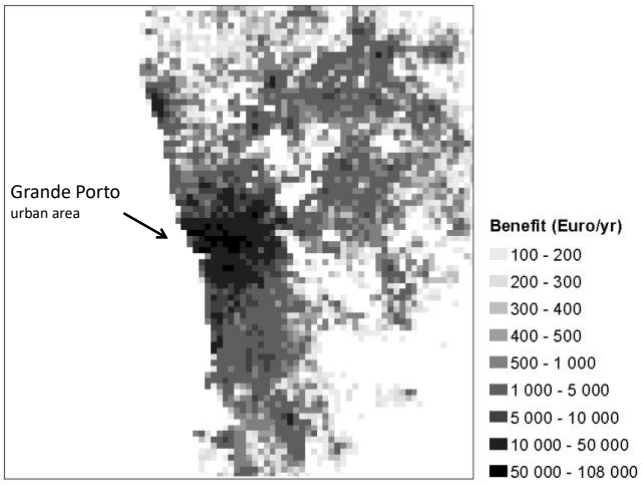

Figure 1. PM10 related human health benefits (€.y^{-1}) for the total reduction scenario including the 4 reduction measures assessed (2 for transport, 1 industrial, and 1 residential combustion). Source: Miranda et al., 2016.