



A decision support system for emission reduction assessment: the OPERA LIFE+ project

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In last decades, air pollution modelling assumed a key role for the definition and evaluation of suitable emission control strategies, supporting Regional Decision Makers in the design of long-term plans for air quality improvement. This is a complex task, due to the non-linear chemical reactions and physical processes that bring to secondary pollution formation and accumulation, involving precursor emissions, namely VOC, NO_x , NH₃, primary PM and SO₂. The problem is even more complex when constraining policy to a fixed budget.

This paper presents the first results of the OPERA (Operational Procedure for Emission Reduction Assessment) LIFE+ project (2010-2013, www.operatool.eu) aiming to design and to implement an enhanced approach to identify efficient regional policies (1) complying with National and EU air quality standards, (2) with local emission and meteorological features, financial, technological and social constraints and (3) considering potential synergies with actions to reduce GHG emissions.

The proposed methodology is based on a multi-objective (air quality, internal and external costs) optimization problem. The decision variables are the technical and non-technical emission abatement measures. Artificial neural networks, identified processing long-term 3D deterministic multi-phase modelling system simulation outputs, describe the nonlinear relations between the control variables (precursor emissions reduction) and the air quality indexes (AQIs), defining the air quality objective. The internal costs are due to emission reduction measures implementation, while the external costs assess the damage due to population pollution exposure.

The methodology has been implemented in a software tool (RIAT+) and tested on two regional applications, Emilia Romagna (IT) and Alsace (FR).