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Decision support and control systems for air quality and climate change policies. IAM to support decision makers in planning multi-dimension systems

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Background

Air pollution and climate change are the two main environmental challenges that humanity has been facing in the past decades. Air quality is the largest environmental cause of premature death worldwide and the observed temperature variation due to climate change is already affecting mortality and morbidity from extreme heat, cold, drought or storms.

Objectives

The main purpose of this research project is the development of an Integrated Assessment Model to help policy makers in the design of win-win policies at urban, national, regional scale and assess the health impacts.

Methodologies

The DPSIR scheme (Figure 1) describes the interactions between society and environment. The core of the system is a decision problem that can be formalized as follows:

$$\min_{\theta} J(\theta) = \min_{\theta} \left[AQI\big(E(\theta)\big); GHG(\theta); ICI(\theta) \right]$$

Subject to $\theta \in \Theta$

Where *AQI* is the Air Quality Index, *GHG* is the Greenhouse gas index a *ICI* is the cost index. θ represents the control variables, namely the penetration level of the emission reduction measures.
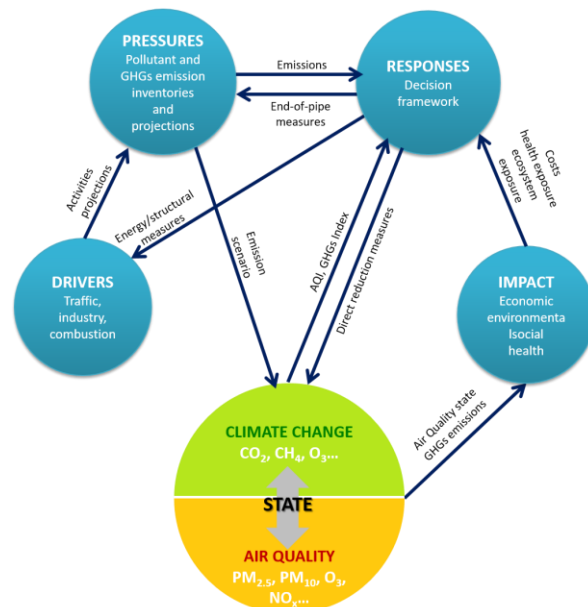

FIGURE 1 – THE DPSIR FRAMEWORK

Expected Results and Impact

➢ Improve air quality in EU cities, reduce GHGs emissions.
➢ Development of communication and education tools to engage the population.
➢ Reduce citizen exposure to air pollutants and to extreme meteorological events.
➢ Integrate different research fields: AQ and climate change modeling, social, economic, policy and life sciences.
➢ Development of a tool aiming at assessing the cost-effectiveness of new technological solutions fostering investments in research and innovation.