

## **Integrated Assessment Modelling (IAM) activities in Spain**

The Technical University of Madrid (UPM) is currently developing and implementing an integrated modelling system for Spain. The main target of this work is to provide the national administration with a tool capable of supporting the development of effective environmental policies in order to meet regulatory standards and international legislation and agreements in the future. The bottom line is the integration of the research on air quality modelling and emission projections done by the UPM with official emission data and statistics provided by National administrations as well as European IAM activities, models and related procedures. IAM activities at the UPM have been funded by the Spanish Ministry of Environment in recent years through a series of research projects and agreements. The system is based on two major components:

- 1) Spain's Emission Projections (SEP) model. Emissions for the main atmospheric pollutants and greenhouse gases are projected up to 2020. These emissions are based on individual, highly-detailed projections for nearly 300 emission categories according to the Selected Nomenclature for Air Pollution (SNAP) classification. National figures are obtained through an integration methodology that guarantee full consistency among individual projections and complete agreement with the National Atmospheric Emission Inventory (SNAEI) estimates for past years. A piece of software called EmiPro has been developed to implement the SEP's methods and support the QA/QC process in emission projections. This tool also assists report generation, including mapping to other nomenclatures relevant in the framework of the Clean Air For Europe (CAFE) program and comparison with other European models (GAINS, PRIMES, etc.). The latest involves the development of appropriate category mappings and provides an effective link to European-level IAM activities.
- 2) An air quality modelling system for the Iberian Peninsula based on WRF, SMOKE and CMAQ models. It includes the adaptation of the SMOKE system to European conditions and the integration of the SNAEI and SEP's databases as inputs to the emission preparation for modelling process. Special attention has been given to emission information in the past, since a) is one of the main sources of uncertainty in air quality modelling, and b) it plays a vital role in the analysis of the possible alternatives to improve air quality in a given region in future years as a result of the implementation of control strategies. Current research efforts are related to the update and refinement of the system as a whole. The SIMCA project (Integrated

Air Quality Modelling System for the Iberian Peninsula), being developed presently, comprises an extensive sensitivity analysis of the WRF meteorological modelling system as well as the CMAQ chemical-transport model. Such experiments include physics options, chemical mechanisms, nesting strategies, computational portability and performance, etc. The models are run in a geographical domain that covers the Iberian Peninsula with 3 km horizontal resolution and 30 layers.

Both components should be regarded as a work in progress, since they are constantly being upgraded and improved. In addition, some important extensions and additions are envisaged for the near future. A closer integration and linkage with the GAINS model is needed to the development of the costs and optimization modules. The methodology to assess health impacts, mainly for secondary pollutants (ozone, fine particles), is being evaluated presently. It was originally intended in the SIMCA project to extend air quality simulations to a Europe-wide domain with lower resolution. Therefore, the constitution of a network of IAM activities across several countries constitutes a good opportunity for joint research activities and harmonization of data and procedures.

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