

THE ROLE OF ENERGY EXTERNAL COSTS FOR A COMPREHENSIVE EVALUATION OF SUSTAINABLE ENERGY STRATEGIES

FILOMENA PIETRAPERTOSA*, SENATRO DI LEO, SIMONA LOPERTE, MONICA SALVIA,
CARMELINA COSMI

*CNR-IMAA National Research Council, Institute of Methodologies for Environmental Analysis,
Tito Scalco (PZ), 85050, Italy
fpietra@imaa.cnr.it*

As well known, pollutants emissions released by energy-related activities are transported in the atmosphere causing health and environmental damages. These external damages are responsible of indirect costs for the society that usually are not taken into account in the commodities' prices. In recent years the scientific community deployed many efforts to assess energy externalities, as well as to give guidance for supporting the design of internalisation measures. The ExternE methodology, developed under a EU-funded ExternE project series, represents the main reference to estimate the external costs of energy technologies, providing generalised values (Euro/ton of emission) per country for the most important pollutants. A subsequent fundamental step is to integrate the external costs into a partial equilibrium model to individuate sustainable development patterns that reduce the overall environmental damages of human activities and take into account these energy-related hidden costs. The IEA-ETSAP makes available a sound modelling framework to combine into an unique platform the economic, environmental and energy-technology data in order to better understand the behaviour of energy systems, to plan their optimal development over a medium-long term horizon, and thus to provide direct, usable inputs to the formulation and evaluation of energy policies in the overall framework of sustainability. In particular, the TIMES models' generator allows developing flexible and detailed energy-technology- models on different spatial scales to perform an in-depth characterisation of the analysed energy system, from demand to supply side, and to explore contrasting scenarios representing the potential development of the energy panorama over the time horizon according to the take up of different policy measures (resources and technology availability, pollutant emissions reduction, renewable share, etc.). The integration of externalities into this modelling framework set up thus an innovative tool to support policy-oriented multidisciplinary investigations, aimed at achieving a sustainable resource management notably taking account of the economic, environmental and social dimensions of energy policies. Selected scenario results concerning the NEEDS-Italy model will be presented to illustrate the expected role of different energy sources and energy related-externalities in the definition of air quality policies.

Keywords: energy system model, external costs