Model could help policy makers remould energy systems

Researchers have applied a new methodology for modelling energy systems to the Italian energy sector. Their study is a first step towards a mathematical model that can be used to analyse national energy strategies. The Italian example acts as a case study for a pan-European project aimed at modelling energy scenarios across the EU.

Policy makers face real challenges in putting together energy strategies designed to reduce the toll on the environment and avoid consumer dissatisfaction with increasing costs. There is no doubt that the energy sector must reduce its reliance on fossil fuels: in the EU, it is responsible for 80 per cent of greenhouse gas emissions. However, this means changing the entire energy production, supply, distribution and pricing structure, at international as well as local and national levels. Mathematical models may be able to help policy makers undertake this difficult task.

As part of the EU-funded NEEDS project, the researchers are developing a model called “TIMES” in order to produce models for 29 European nations. In their latest study, they apply the TIMES model to the Italian energy system to demonstrate its potential use in decision making. They model the so-called “business as usual” scenario for the period 2005 to 2050 – projecting what would happen if no changes were made to the energy sector. In future research, they will use the TIMES model to assess various policy scenarios and extend it to enable the effects of a range of different air pollution emissions to be analysed at local as well as national levels.

The research shows the model is capable of handling a range of different types of data, which is essential for creating a realistic model of a country’s energy sector. In the Italian case study, the researchers created a reference energy system to teach TIMES about energy flows through the system and how different sectors, such as agriculture, transport and electricity and heating production, impact on each other. They then incorporated real data on energy production and use in Italy to produce a model that would be able to extrapolate current trends over coming decades in the business as usual scenario. Without policy action, the model predicts steady increases in energy consumption and carbon emissions.

Italy has a large economy, with a complex and highly variable energy system, making it a testing case study, say the researchers. But the study demonstrates a flexible and powerful approach that could be used in future policy making to address important issues such as climate change and imports of raw materials. Another important feature, according to the researchers, is the program’s ability to simultaneously analyse several separate energy systems, providing a tool that could be useful at a European level as well as a national level.

1. NEEDS (New Energy Externalities Development for Sustainability) is supported by the European Commission under the Sixth Framework Programme. See: [http://www.needs-project.org/](http://www.needs-project.org/)


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