

Planning for future energy needs

MESSAGE is a IIASA modeling framework for medium- to long-term energy system planning, energy policy analysis, and scenario development. It provides a flexible framework for the comprehensive assessment of major energy challenges. It has been applied extensively to developing scenarios for large global research programs, such as the latest three assessment reports of the Intergovernmental Panel on Climate Change (IPCC) and the 2012 Global Energy Assessment.

MESSAGE was developed in the late 1970s when modeling was in its infancy. The MESSAGE concept was ground-breaking. The model is a large-scale optimization model for global and regional energy supply analysis. It aims to find an optimum solution for the energy system as a whole, rather than for specific parts of it. Typical MESSAGE outputs provide information on the use of domestic resources, energy imports and export- and trade-related monetary flows, investment requirements, technology substitution, air pollution and greenhouse gases, and increasingly for detailed analysis of energy demand.

Integrated assessment modeling

MESSAGE is a core component of the IIASA integrated assessment modeling framework. It has been integrated with the IIASA GLOBIOM land-use model to allow assessment of the implications of energy systems for land, forest, and water. An explicit linkage to the IIASA GAINS air pollution framework also allows assessment of the health impacts of energy systems. In energy supply and demand terms, MESSAGE-MAGICC estimates the effects of energy use on net carbon flows and atmospheric CO₂ concentrations plus changes in radiative forcing, temperature, and sea level. MESSAGE-MACRO reflects the influence of energy supply costs on the wider economy and vice versa. MESSAGE-Access is used to assess future transitions in household energy use and the costs of alternative policies, and thereby accelerate universal transition to modern energy sources and technologies.

Impacts

- MESSAGE was the core modeling tool for the IIASA-coordinated Global Energy Assessment, published in 2012. Using multi-criteria analysis methods, it provided insights into achieving holistic transformations toward a more sustainable energy future, simultaneously addressing diverse challenges such as energy security, local air pollution and associated health impacts, and climate change.
- The MESSAGE modeling framework and modeling results provide core inputs for recent major international assessments and scenarios studies. MESSAGE was to generate one of the four Representative Concentration Pathways (RCPs) being used before to estimate future climate change in the context of IPCC Fifth Assessment Report. MESSAGE was also used in the development of the Shared Socioeconomic Pathways (SSPs), which replace the scenarios from the 2000 Special Report on Emissions Scenarios. The RCPs and SSPs together form the backbone of climate change research for the coming decade.
- MESSAGE was used to generate scenarios for innovative IIASA studies such as the book, *Energy in a Finite World*. Published in 1981, this IIASA analysis is the first truly global and long-term study of future energy, and the first in which scientists from East and West collaborated. MESSAGE was the foundation for the 1995 study, "Energy Perspectives to 2050 and Beyond," by IIASA and the World Energy Council. The study considered the policies needed immediately to initiate long-term structural changes in the energy system.
- MESSAGE is the subject of a special agreement between IIASA and the International Atomic Energy Agency (IAEA). IAEA distributes a modified version of MESSAGE with a graphical front-end as well as training on how to use it.



Further information:
www.iiasa.ac.at/impacts/message