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Advanced Model Development and Validation for the Improved Analysis of Costs and Impacts of Mitigation Policies

Objectives

- Building trust and confidence of politicians in the results of energy-economy and integrated assessment models (IAM) by increasing transparency of models, underlying structures, and model-specific input data assumptions
- Developing a new generation of advanced energy-economy and integrated assessment modeling tools for the analysis of the costs and impacts of climate change mitigation policies
- Validation and diagnostics of models with the aim of evaluating their strengths and limitations
- Considerably improving the representation of energy demand in IAMs through better modeling of energy services, technologies, and consumer behavior
- Enhanced understanding and representation of technological innovation, uncertainty, system integration and resource constraints
- Evaluation of impacts of mitigation policies on economic sectors in the EU and beyond
- Creation of a platform for the coordinated development and sharing of methodologies and input data sets for the general modeling community

Typical questions asked by ADVANCE

- What's the role of energy efficiency improvements for climate change mitigation?
- What are the bottlenecks for the development of a sustainable/carbon-minimizing energy supply system?
- What are broader sustainability implications of alternative mitigation pathways?
- How does uncertainty about technological innovation affect optimal **innovation policies**?
- How can climate mitigation targets and energy access objectives be reconciled?

Project Summary

Integrated assessment and energy-economy models have become central tools for informing long-term global and regional climate mitigation strategies. Sound policy advice requires improved representations of complex system interactions and thorough validation of model behavior in order to increase confidence in climate policy assessments.

ADVANCE aims to respond to this demand by triggering the development of a new generation of integrated assessment models. This will be achieved by substantial research and development work in key areas where model improvements are greatly needed:

- end use and energy service demand;
- representation of consumer heterogeneity, preferences and behavior;
- technical change and uncertainty;
- system integration of variable renewable energy sources, path dependencies and resource constraints;
- economic impacts of mitigation policies.

In the past, methodological innovations and improvements were hindered by the unavailability of suitable input data. The **ADVANCE** project will make a large and coordinated effort to generate relevant datasets. These datasets, along with newly developed methodologies, will be made available to the broader scientific community as open-access resources.

ADVANCE will also put a focus on improved model transparency, model validation, and data handling. A central objective of **ADVANCE** is to evaluate and to improve the suitability of models for climate policy impact assessments. The improved models will be applied to an assessment of long-term EU climate policy in a global context, and the results disseminated to the wider community.

WORK FLOW FOR METHODOLOGICAL INNOVATIONS

