GRACE

A model for climate and environmental economic analysis by CICERO.

CICERO has developed GRACE, a multi-sector and multi-regional dynamic model of the global economy, which is used for analysis of interactions between climate change and economic activities. The model estimates the economic impacts of specific changes in resource constraints, economic policies, environmental and climate mitigation and adaptation, preferences and production technologies.

GRACE provides information about the activity of various sectors of the economy, flows of income and investments, demand for goods and services by households and companies, and trade between regions – including bilateral trade.

There are different versions of GRACE with different sets of industries and regions. One version divides the world into 11 regions with 15 industries each. The regions are Western Europe, Central and Eastern Europe, Former Soviet Union, Middle East & North Africa, Sub-Saharan Africa, South Asia, East Asia, other Pacific Asia, Pacific OECD, North America, and Latin America. Regions are defined partly to limit the economic diversity within a region, partly to capture similar climatic zones.

With the relatively small number of regions applied to the global model version, the heterogeneity of both economies and climate may still be substantial. GRACE is flexible and can define sub-regions for specific purposes. The division into regions thus depends on the purpose of a study. In a previous study the EU was divided into 84 sub-regions, while the rest of the world were treated as one region.

Manufacturing and energy sectors can be adapted to the study purpose, both with respect to activities and technologies. This includes the option to introduce new or hypothetical technologies to study their implications for the economies and the environment.

Input data:

- Economic data: GTAP data base, A comprehensive and consistent set of national accounts for the world countries/regions, based on accounts from individual countries.
- Emissions data: GTAP database and/or EDGAR database

The model has been used to analyze, among others,

- Extreme weather impact on crop yields in China
- Economic evaluation of solar radiation management
- Macroeconomic adaptation to climate change impacts on forests in India
- Impacts and adaptation to climate change in European economies