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Subject: The IMAGE 2.2 Implementation of the SRES scenarios.  
MNP CD-ROM Publ: 500110001; Reprint of RIVM CD-ROM publ.:481508018  
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Dear Sir or Madam,

Please find enclosed the CD-ROM "The IMAGE 2.2 Implementation of the SRES scenarios. A comprehensive analysis of emissions, climate change and impacts in the 21st century." This CD-ROM presents information on the updated IMAGE 2.2 (Integrated Model to Assess the Global Environment) and demonstrates its implementation of the IPCC SRES scenarios, including the results for impacts on temperature change, sea-level rise, shift of vegetation and change in agricultural yields.

#### **Contents of this CD-ROM (main disc)**

- Narratives and quantification for the new IPCC scenarios (SRES: A1B, A1F, A1T, A2, B1 and B2) by the IMAGE 2.2 model on basis of the HADCM2 climatic-change patterns.<sup>1</sup>
- The IMAGE 2.2 User Support System (USS), a comprehensive and interactive graphical interface to view and analyse scenarios of global change.
- Extensive documentation on the models, indicators and scenario assumptions in HTML
- A guided tour and manual to provide an overview of the possibilities and special features of the USS, and a step by step guide how to use them,
- A tool for importing data from the USS in Excel.

#### **Aim of IMAGE**

The Integrated Model to Assess the Global Environment (IMAGE) is a dynamic integrated assessment modelling framework for exploring global change. The main objectives of IMAGE are to contribute to scientific understanding and support decision-making by quantifying the relative importance of major processes and interactions in the society-biosphere-climate system. To accomplish this, IMAGE provides:

1. dynamic and long-term perspectives on the systemic consequences of global change;
2. insights into the impacts of global change;
3. a quantitative basis for analysing the relative effectiveness of various policy options to address global change.

#### **Components**

In the IMAGE 2.2 framework the general equilibrium economy model, WorldScan, and the population model, PHOENIX, feed the basic information on economic and demographic developments for 17 world regions into three linked sub-systems:

- The Energy-Industry System (EIS), which calculates regional energy consumption, energy efficiency improvements, fuel substitution, supply and trade of fossil fuels and renewable energy technologies. On the basis of energy use and industrial production, EIS computes emissions of greenhouse gases (GHG), ozone precursors and acidifying compounds.

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<sup>1</sup> The Supplementary Disk "Climate change scenarios resulting from runs with several GCMs" (RIVM publ. 481508019) presents the IMAGE 2.2 implementation of the IPCC scenarios (A1F,A2,B1) for five different General Circulation Model (GCM) runs, i.e. ECHAM4, CGCM1, GFDL-LR15-a, HADCM2, CSIRO-MK2.

- The Terrestrial Environment System (TES), which computes land-use changes on the basis of regional consumption, production and trade of food, animal feed, grass, timber and modern biofuels, considering local climatic and terrain properties. TES computes emissions from land-use changes, natural ecosystems and agricultural production systems, and the exchange of CO<sub>2</sub> between terrestrial ecosystems and the atmosphere.
- The Atmospheric-Ocean System (AOS), which calculates changes in atmospheric composition by using the emissions and other aspects of EIS and TES, and by taking oceanic CO<sub>2</sub> uptake and atmospheric chemistry into consideration. Subsequently, AOS computes changes in climatic properties by resolving the changes in radiative forcing caused by greenhouse gases and aerosols and oceanic heat transport.

### **Modelling approach**

Historical data for the 1760 to 1995 period are used to initialise the carbon cycle and climate system. IMAGE 2.2 simulations cover the 1970-2100 period. Data for 1970-1995 are used for the calibration of EIS and TES. Simulations up to the year 2100 are made on the basis of scenario assumptions on, for example, demography, food and energy consumption, technology and trade. Although IMAGE 2.2 is global in application, it performs many of its calculations either on a high resolution terrestrial 0.5 by 0.5 degree grid (land use and land cover) or for 17 world regions (energy, trade and emissions).

### **New elements**

The main new elements of IMAGE 2.2 include the following:

- The base year has been updated to 1995 (was 1990 in IMAGE 2.1) and the number of regions has been extended to 17 regions (plus Greenland and Antarctica);
- The WorldScan model for simulation of economic input and the PHOENIX model to simulate population have been added;
- The simple IMAGE 2.1 energy demand model has been replaced by the TIMER energy demand and supply model;
- The IMAGE 2.1 AOS model has been replaced by a global-mean AOS, consisting of the MAGICC climate model and the Bern Carbon Cycle model for the oceanic carbon uptake;
- The geographical Pattern Scaling of IMAGE 2.1 has been extended to take into account non-linear regional effects of sulphate aerosols on climatic change;
- The Agricultural Economic Model (AEM) of IMAGE 2.1 has been replaced;
- The Land Degradation Model (LDM) has been added to identify areas prone to loss of soil productivity from erosion due to rainfall.

We hope that this CD-ROM is a supportive tool to many policy makers, stakeholders and scientists in the world of integrated assessment and global change. We welcome comments and suggestions for improvement.

Sincerely yours,

On behalf of the IMAGE Team,  
Elke Stehfest