

# ISEEM

## Development of an integrated spatio-economic-ecological modeling framework for the analysis of overall impacts of sustainability policy measures.

DURATION OF THE PROJECT  
15/12/2006 – 31/01/2009

BUDGET  
389.156 €

### KEYWORDS

Sustainable development, new economic geography, spatio-temporal analysis, use of natural resources, land use and transportation models, environmental effects

### CONTEXT

The ISEEM project aims at becoming an interdisciplinary network of researchers. It covers such subjects as economic development and endogenous growth, land and resource use, commuting and transportation, location of economic activities and housing market as well as technological development and energy use, environmental economics, emissions and waste. All of the mentioned subjects are unified by an integrated modeling approach.

The ISEEM modeling approach will provide the Belgian community with the sound scientific support for formulating sustainability policies, which are characterized by a balanced integration between social, economic, transportation and environmental policy objectives. The approach will assist in the implementation of the EU strategy for sustainable development in Belgium, as well as efficient incorporation of the sustainability goals into the existing Belgian policy tools on regional and federal levels.

### PROJECT DESCRIPTION

#### Objectives

The main objective of the ISEEM project is to develop and implement an integrated spatio-economic-ecological modeling approach for Belgium. This represents the state-of-the-art in different areas of economic, transport, land-use and environmental modeling, and can be used to assist policy makers in their choice of long-term sustainability policies. It implies the following interrelated aims:

- develop a modeling approach, which represents the state-of-the-art in economic modeling and corresponds to the complexity of the sustainability issues,
- build a consistent data set necessary for the implementation of the developed approach for Belgium,
- analyze the data set in order to understand the major changes in spatial consumption and production patterns,
- revise the modeling approach according to the results of

the data analysis,

- construct the spatio-economic-ecological model for Belgium,
- develop a welfare measure associated with the model, which allows for quantification of social, economic, transportation and environmental effects of sustainability policies,
- use of the model to assess the effects of already implemented sustainability policy measures in order to verify reliability of the developed approach,
- evaluate sustainability policies identified by the consortium experts and approved by the follow-up committee using the developed model.

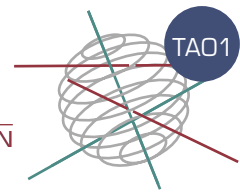
#### Methodology

As a starting point for the development of the ISEEM methodology, we will take an approach already implemented in the RAEM regional new economic geography model for the Netherlands. The RAEM approach will be complemented by the methodology used in the E3ME regional model for the European Union. The ISEEM approach integrates a range of important elements of general equilibrium and macro-sectoral econometric modeling approaches. This integrated approach combines theoretic structure and micro-foundations of general equilibrium models with the use of econometric methods for the estimation of model coefficients. The central modeling framework will be further extended by introducing major elements of integrated transportation and land-use models, and environmental resource-use models. We will preserve the energy and emissions related parts of the E3ME methodological approach.

We will further use the combination of econometric methods and calibration for the estimation of the model coefficients. The concrete combination of these methods will be determined by the availability of time series data for the Belgian economy. Estimation of major model coefficients will make our modeling approach more reliable and suitable for long-term analysis.

The uncertain nature of future economic development, and the long-run nature of sustainability policies, requires incorporation of stochastic elements into the modeling approach.





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In order to do this, one can either use a stochastic modeling approach instead of deterministic one, or simply allow some of the model elements to have a stochastic nature. These stochastic elements may include probability distributions for the technological progress components, or stochastic changes in the long-run preferences of the consumers. Given the complexity and the level of detail of the ISEEM spatio-economic-ecological modeling framework, we have decided to include a number of important stochastic elements to the model, instead of using the stochastic modeling approach.

### INTERACTION BETWEEN THE DIFFERENT PARTNERS

The work on the ISEEM project starts from a detailed literature study and the development of the methodological framework. This part of the project is going to involve all project partners and will be lead by TML and FPB. After the main methodological framework is set up, the project team will work on the collection and analysis of the Belgian data. At this stage the lead is taken over by UG together with FPB. Based on the collected data and the related analysis thereof, the project team will start building the modeling framework. The major modeling work in this part of the project

will be done by TML and FPB. The final stage of the project involves the construction of the welfare measure for the assessment of the overall effects of the sustainability policies, and a set of the policy runs with the model. At this point the lead will be taken over by the FUSL.

### EXPECTED RESULTS AND/OR PRODUCTS

The products developed during the ISEEM project will be publicly available. This includes the developed methodology for modeling and policy assessment, a full mathematical formulation of the integrated spatio-economic-ecological model for Belgium, the structure of the model database and the results of a number of test policy studies performed with the model.

One of the core products of the ISEEM project is the overall model design of the spatio-economic-ecological system coupled with an efficient policy assessment method. The model design will include detailed information on the inputs and outputs of the various components of the integrated model, and on the calculation methods and algorithms. It will also include information on the data necessary for the implementation of the model and a description of the model estimation method.

### PARTNERS - ACTIVITIES

Transport & Mobility Leuven specializes in policy analyses and model building in the fields of transportation and economics. Its researchers are familiar with different types of modeling techniques and software. Federal Planning Bureau has an extensive experience in data analysis, econometric techniques and macro-econometric modeling. University of Gent is an excellent research center with a broad knowl-

edge and experience in the areas of spatial modeling, discrete choice and transportation modeling, as well as real-estate economics. Facultés Universitaires Saint-Louis is a small but active research group with a broad experience and state-of-the-art knowledge in the areas of environmental economics and policy, ecological modeling and analysis.

### CONTACT INFORMATION

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#### Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting <http://www.belspo.be/fedra> or <http://www.belspo.be/ssd>

