Modelling the macroeconomic and fiscal impact of climate and energy policies in Slovenia

2-pager

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Project: Modelling the macroeconomic and fiscal impact of climate and energy policies in Slovenia

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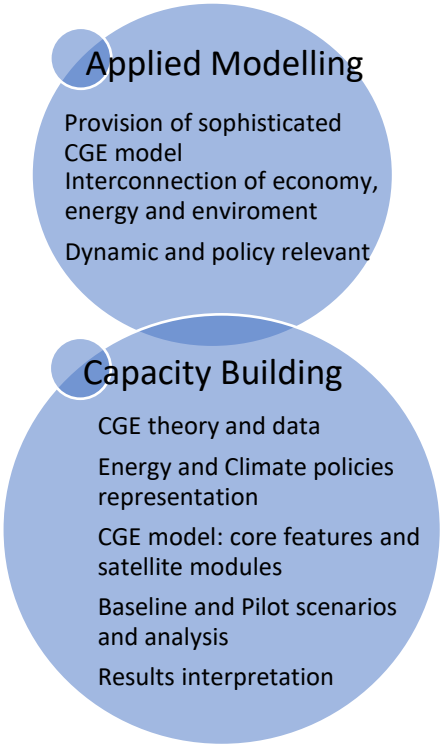
Project context

Climate, environmental and energy policies affect social and economic systems through a multitude of channels including competitiveness, income generation and distribution, employment and skill requirements, financing costs of investments, fiscal revenues, and energy prices. Assessing the impact of these policies on economic and social systems needs to consider the interlinkages between all economic agents and how these evolve over time. In this context, Ministries of Finance increasingly seek to integrate climate, environmental and energy-related aspects in economic modelling to be able to assess the impact of these policies on the economy, public finances and distributional aspects. Slovenia's national energy and climate plan (NECP) 2021-2030 sets the strategy to meet the EU's climate and energy targets for 2030. In addition, Slovenia's national recovery and resilience plan (RRP) 2021-2026 aims to direct 42% if available funding for Slovenia to investments and policy measures supporting the green transition. The Slovenian Ministry of Finance needs to be able to assess the macroeconomic, fiscal and social implications of climate and energy measures related to green transition, and to contribute towards ensuring quality and cost-effectiveness of measures. Computable General Equilibrium (CGE) models have been widely used to assess the macroeconomic and fiscal impact of energy and climate policies either at global or at national, regional or subnational level.

Results

A CGE model named GEM-E3-SI has been developed and transferred to the Ministry of Finance to be used in applied policy analysis and in particular to assess the socio-economic implications of alternative fiscal, climate and energy policies in Slovenia.

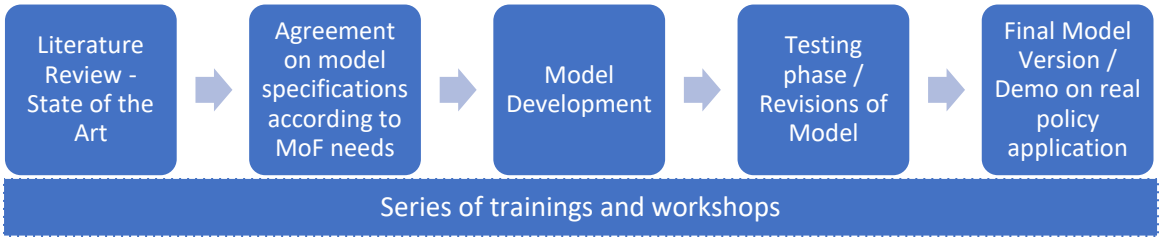
- It is a large-scale recursive dynamic CGE model with sophisticated mechanisms and sufficient sectoral granularity to be used in real policy analysis.
- Capacity building and trainings to ensure the beneficiary becomes fully autonomous in using and maintaining the model.



Main activities during the project

The project developed in a step-wise manner (Figure 1) in which the model built from scratch taking into account the most recent advancements in CGE modelling but also the needs and specifications set by the Ministry of Finance. The model calibrated to the most recent statistics available whereas its core modules developed using the template of the large-scale applied CGE model GEM-E3[1].

Figure 1: Key stages



A core team from members of the Ministry of Finance and the Institute of Macroeconomic Analysis and Development established and a series of six 3-days trainings sessions (five virtual and one physical) was made.

Both theoretical and technical topics covered (mathematical optimization, general equilibrium theory, energy system modelling, climate change and mitigation policies etc.).

Deliverables

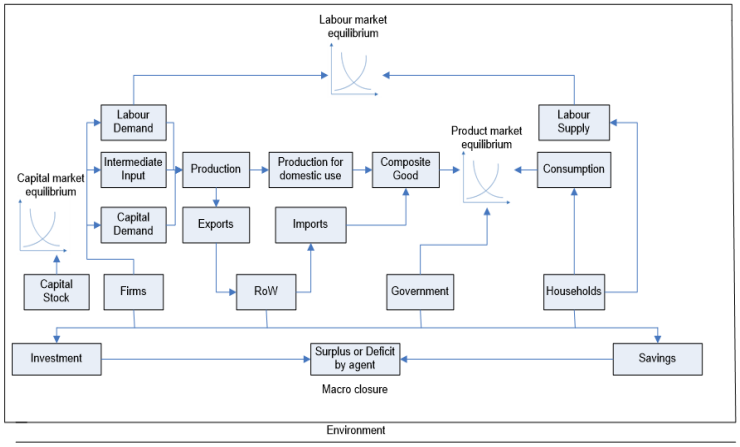
Deliverables	
D.1	Kick-off meeting minutes and Draft inception report and summary
D.2	Technical report defining the preliminary characteristics of the new modelling framework
D.3	Draft modelling framework and technical specification
D.4	User guide and training sessions
D.5	Final modelling framework and final technical note with recommendations to improve and further develop the modelling framework

[1] https://e3modelling.com/modelling-tools/

The GEM-E3-SI model

The modelling suite include a set of satellite modules within a comprehensive representation of the modelling system. The model has high sectoral detail and explicitly represent the interactions of the energy, environment, and economic system.

Figure 2: GEM-E3-SI model schematic representation



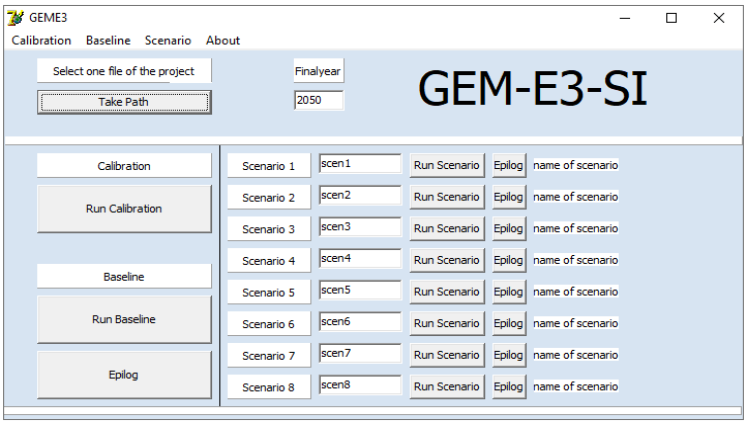
The model features a bottom-up representation of the power generation system, transactions among the sectors of the economy and covers all GHG emissions. Imperfections in the labour markets are considered while the trade transactions with key trade partners explicitly modelled.

The suite can simulate the Slovenian economic system up to 2050 in a five-year time step.

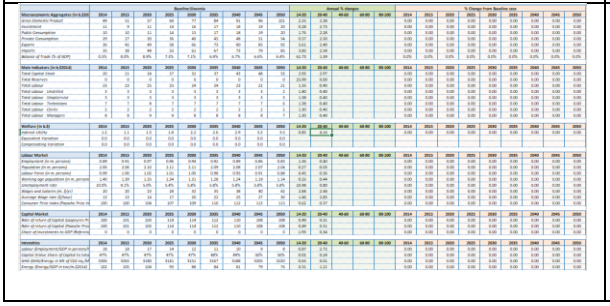
The model developed in the GAMS software and formulated as a mixed complementarity problem using the PATH solver.

The model operates through a simple graphical user interface that allows the beneficiary to perform basic operations such as model calibration, simulating a reference scenario and perform basic simulations.

Figure 3: Graphical user interface of the GEM-E3-SI model



The model provide detailed results for the full economic system both for the reference and counterfactual scenarios in a format that allows the beneficiary to easily compare them and derive the key differences.

Results in excel files	Visualization of the results
	

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