

Exercise 2: Identification of indicators for an IGE assessment

Course: Inclusive Green Economy (IGE) modelling

1 Overview and objective

This exercise will allow you to assess whether all required IGE indicators are included in the modelling exercises you have studied or worked with.

First, building on Exercise 1, having identified an issue and related investment opportunity, and the indicators required to analyse the problem and the outcomes of the investment, you will explore if existing models used to analyse the problem include all the indicators you have identified as being relevant for an IGE assessment. For the indicators that are missing, you will review how other models, in different fields,)estimate them, and then you will proceed to review data availability and data gaps for the possible integration of relevant indicators or existing models. This last step will allow you to learn about where to find data when model customization starts later in the course.

2 What needs to be done and how

2.1 Tasks

This exercise comprises three main tasks, building from Exercise 1 that focused on the identification of indicators and intervention options to analyse a given problem and investment opportunity:

1. Assess whether key IGE indicators are included in existing/ongoing modelling exercises that you have studied or worked with in previous courses.
2. Study and document how the missing indicators are estimated in their respective fields, and hence in other models.
3. Review data availability and data gaps for the missing indicators, from global and national databases.

The specific goal of the first task of the exercise is to create a list of key output indicators required to carry out an IGE assessment and compare it with the list of indicators included in existing models that analyse the issue or investment chosen.

For instance, the analysis of decarbonization paths requires you to analyse performance for both emission reduction and economic growth. On the other hand, are the bottom-up energy models used to estimate emission reduction also capturing and forecasting economic growth?

The second task looks at both available and required indicators. The goal is to identify how these indicators are estimated.

For instance, if economic growth is missing from energy models, how is economic growth estimated by macroeconomic models? Some models use an econometric approach, others use optimization; some models use a supply-side approach, while others use a demand-side approach.

The third task concerns data collection. This task is designed to allow you to familiarize yourself with national and international databases before the final assignment, which is when you will need data to improve the calibration of existing models.

2.2 Common challenges

It is often the case that only a subset of indicators are identified, such as only economic indicators if you have studied economics, or only environmental indicators if you have studied biology. It is important to know that several social, economic and environmental indicators should be identified for any given problem

that is analysed. If needed, develop a new and more detailed CLD or tree diagram to better identify all relevant indicators.

You should be aware that you and your classmates may have followed different courses and have knowledge in various fields. Share your experience with models and encourage your classmates to do the same as they may be able to give insights into how certain variables are calculated in a variety of diverse sectoral models.

3 Example of results

Example for task 1:

An energy optimization model generates, as main outputs, the power generation capacity, investment required for such capacity and emissions from power generation. On the other hand, if the issue to analyse is the occurrence of power shortages, the list of indicators required may include power generation capacity, as indicated above, but would also require the location of such capacity and transmission losses, rainfall and water availability in dams, in the case of hydropower, or water temperature, in the case of thermal generation (for the cooling of power plants, which can't happen if water temperature reaches above 26°C) and the impact that power shortages have on society, such as through access to electricity.

Example for task 2:

Annual electricity supply is estimated in energy models by multiplying power generation capacity, measured in MW, by the number of hours per year and by the load factor of each technology. Not available in energy models, but necessary to understand the issue of power shortages, water balance for hydropower generation is estimated in hydrological models based on rainfall, evapotranspiration, percolation and water use. Similarly, social indicators can be added regarding employment and income creation from the various power generation options available.

Examples for task 3:

The following databases, amongst others, provide valuable information to assist students:

- Population: <https://population.un.org/wpp/>;
- Energy: <https://www.iea.org/classicstats/relateddatabases/worldenergystatistics/>;
- Water: <http://www.fao.org/aquastat/en/>;
- Agriculture: <http://www.fao.org/faostat/en/#home>;
- Economy: <https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases#sort=%40imfdate%20descending>;

- Cross-sectoral databases:
 - WDI: <https://databank.worldbank.org/source/world-development-indicators>;
 - UN: <http://data.un.org/>.

4 Evaluation criteria

The exercises will be evaluated taking into account the following:

- Have you identified the key social, economic and environmental indicators required for the IGE assessment?
- Have you correctly identified the gaps in indicators between your list and existing sectoral models?
- Have you carried out research and have you identified the correct methods for the estimation of the variables that would need to be added to existing models?
- Have you identified reliable national and international data sources for the missing variables?
- Have you worked in isolation or have you exchanged information with classmates for the exercise? Exchanges are encouraged!

The Partnership for Action on Green Economy (PAGE) is a joint programme between the UN Environment Programme (UNEP), the International Labour Organization (ILO), the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO) and the United Nations Institute for Training and Research (UNITAR).

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