

Multidimensional feasibility – “the big picture”

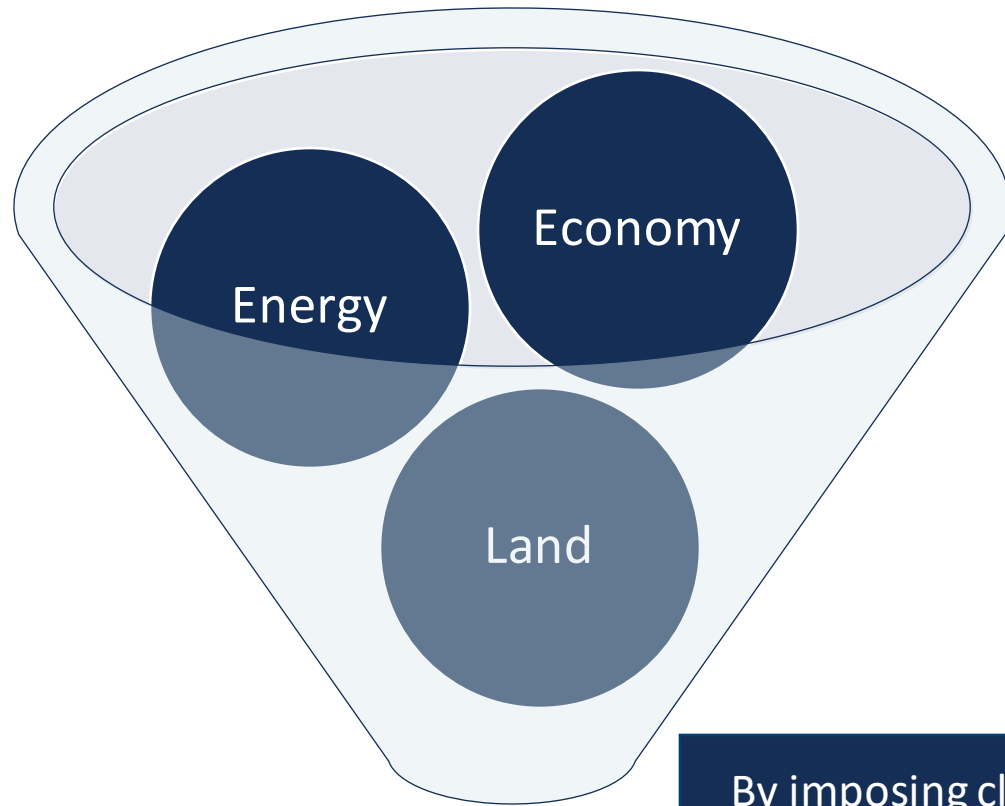
Insights from the feasibility evaluation of ENGAGE scenarios with
the focus on **Regions**

Presentation based on the following publication and additional support and comments from IIASA colleagues:

Brutschin, E., Pianta, S., Tavoni, M., Riahi, K., Bosetti, V., Marangoni, G., & Ruijven, B. J. van. (2021). A multidimensional feasibility evaluation of low-carbon scenarios. *Environmental Research Letters*, 16(6), 064069. <https://doi.org/10.1088/1748-9326/abf0ce>

What are scenarios or pathways?

Integrated Assessment Models (IAMs) cover the main “systems” that could be sources (or sinks) of emissions

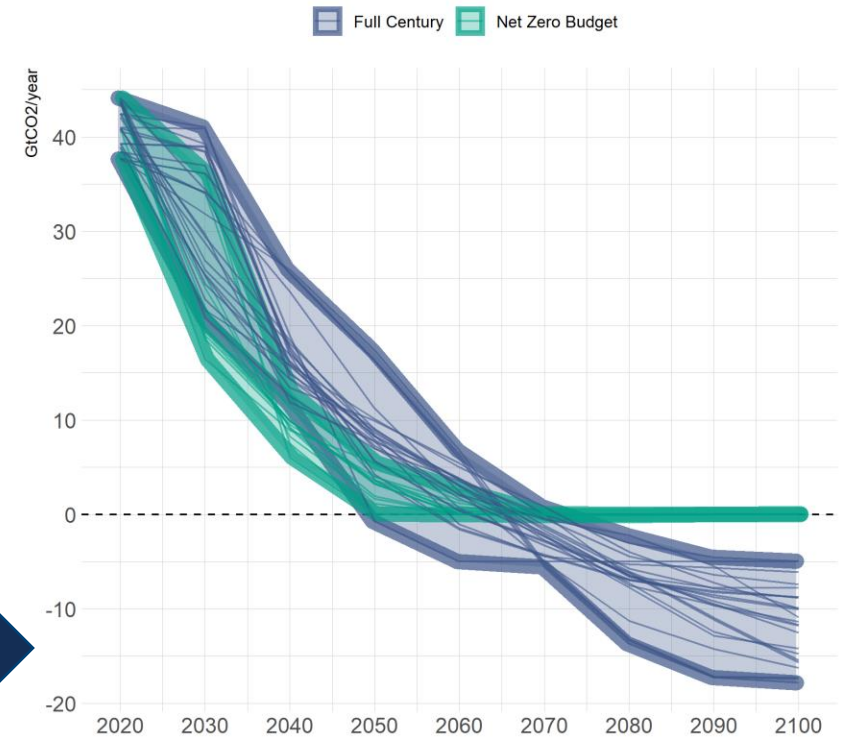


CO2 emissions

By imposing climate goals, we can learn how emission pathways could look like

Through mitigation efforts global emissions need to decrease at least by half or more in 2030

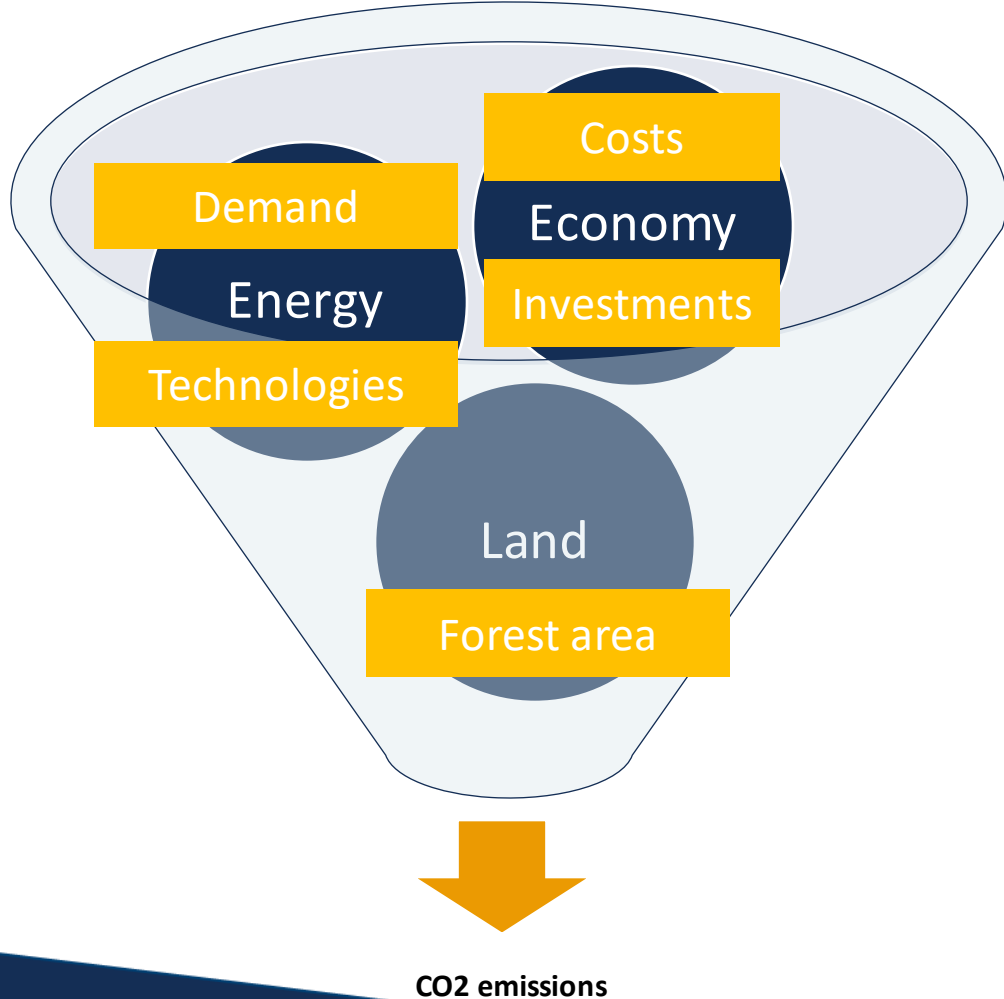
CO2 emissions ranges 600Gt Budget scenarios



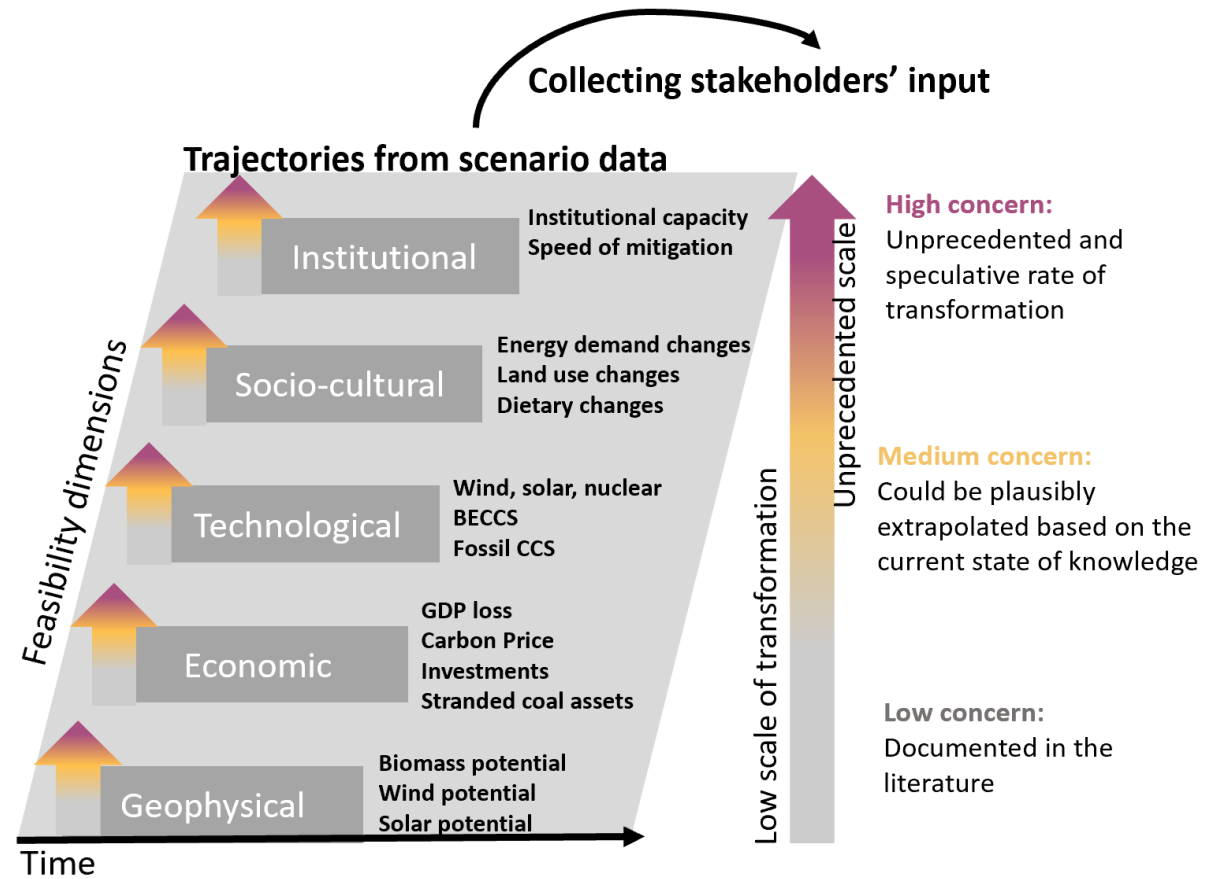
Global scenario runs from the ENGAGE project

Multi-dimensional feasibility assessment

IAMs report **many variables** that could be benchmarked to real world data



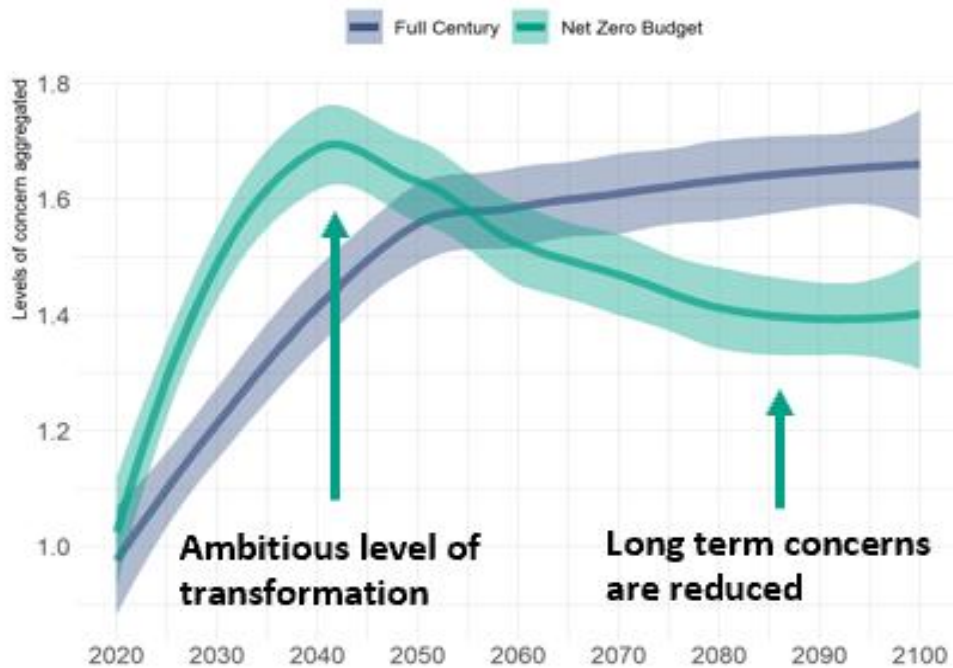
Based on **Brutschin et al. (2021)** we propose an over-reaching systematic evaluation along the following **dimensions**:



What did we learn based the thresholds that we derived?

Global Net Zero Budget scenarios require **faster transition by 2030** but **avoid persistent feasibility concerns later in the century** when compared to Full Century scenarios

Illustration of aggregated levels of concern



What are we missing?

Accounting for regional heterogeneity

Input from stakeholders and regional experts

Visual tool to evaluate scenarios

Scenario Selection

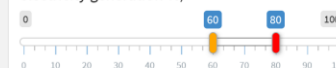
Select Model:

- COFFEE 1.1
- GEM-E3_V2021
- IMAGE 3.0
- MESSAGEix-GLOBIOM_1.1
- POLES ENGAGE
- REMIND-MagPIE 2.1-4.2
- WITCH 5.0

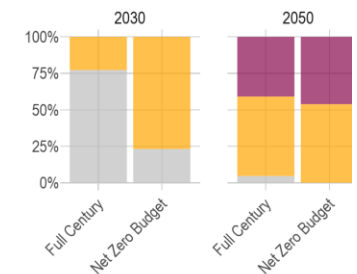
Renewables upscaling

- **Share of renewables:** share of non-biomass renewables in total electricity generation (in a given decade)
- Includes shares of hydro power, wind and solar in electricity generation
- Currently the share of non-biomass renewables is around 30 % (IEA)
- Here we focus on the decades 2030 and 2050 because in most ambitious scenarios decarbonization of the electricity sector is achieved by then

Share of renewables (non-biomass) in electricity generation (%)



Evaluation of scenarios



Our plan for today

- **Main goal:** feedback from stakeholders regarding the current scenario ensemble and the levels of transformation that are implied for the Asian region
 - ⇒ Step 1: brief survey on 4 key indicators (to gain a better understanding of the indicators and the methods)
 - ⇒ Step 2: Exploring ambitious climate scenarios with the visual tool based on the group's Input
 - ⇒ Step 3: Q&A