Framework Convention on
Climate Change

Detecting synergies and trade-offs of policy measures: impact analyses with country-specific e3 (economy-energy-emission) models

1. *Name of proposing Party or organization.*
   GWS (Institute of Economic Structures Research)

2. *Brief description of the proposed study:*
   Climate change poses enormous challenges for many countries amongst them South Africa, Brazil and Pakistan. On the one hand, those countries committed themselves to reduce GHG emissions thus contributing to limiting global warming. On the other hand, they are confronted with climate change affecting the economy and society. All three countries have established their Nationally Determined Contributions and their National Adaptation Plans. Climate change adaptation and mitigation must be integrated into long-term economic planning considering sustainable development and a just transition. Such policies and strategies require comprehensive analysis before implementation to be informed about (obvious) direct impacts but also (possibly unwanted) feedback effects. As climate change generates considerable economic costs and affects key sectors, policymakers require robust analytical tools that map the socioeconomic effects of climate change together with adaptation and mitigation measures over the long term. These tools are essential to identify socio-economic risks and opportunities (awareness), evaluate alternative strategies (preparedness), and steer the transition towards a climate-resilient, sustainable and just economy. Understanding the economy-wide impacts of climate change and corresponding policy measures is crucial for designing such development pathways. Environmentally extended economic models so-called e3 (economy-energy-emission) models, combined with scenario ("what-if") analysis, provide valuable support for evidence-based policymaking. Country-specific e3 models will be developed for the three countries. These models include the structure of the economy, labor market and the main connections to the environment, i.e. the use of energy resources and the release of combustion-related GHG emissions into the environment. This integrated modelling approach of the 3Es in one model framework assures a consistent view of policy measures and supports in designing "better" policies. These new models become part of the suite of e3 models developed by the Institute of Economic

Structures Research (GWS) for countries in Asia (e.g., Mongolia, Nepal), Africa (e.g., Egypt, Morocco) and South America (Chile) to simulate the economy-wide impacts of adaptation and mitigation strategies. The e3 models are used to simulate the impact of selected policy options mentioned in NDCs and NAPs. They are examined in terms of their economy-wide effects, environmental and social implications. "What-if" analysis helps to detect synergies and trade-offs with other transition pathways. With clearly defined indicators, these options can be systematically compared to identify the most effective solutions or suitable combinations of measures. Applying the same methodology allows for easier comparisons of simulation results and the exchange between country experts. An advantage of the Excel-based model building framework, which is the basis of the models, is the well-known Excel-Interface. It reduces the typical technical hurdles of model building and scenario analyses tremendously. The "white box" approach ensures that all components of the model – including data, model equations, scenario settings and results – are fully transparent, accessible, and adaptable. That enhances user control and flexibility and strengthens confidence in the models and improves understanding of their potential applications and inherent limitations. Transferring full ownership of the model to the country partner allows for evaluation and continuous monitoring of future policy options. A necessary prerequisite for independent future use and ownership of the model is intensive and continuous capacity building.

3. *United Nations region to be covered by the case study:*

   Africa;Asia-Pacific;Latin America and the Caribbean;

4. *Country or countries to be covered by the case study*

   South Africa, Brazil, Pakistan (possibly other countries could be covered and / or number of countries to be considered could be less; the latter would reduce the budget)

5. *Area of the case study:*

   The experience of countries on the use of impact assessment tools ;

6. *Expected duration for completion of the case study (in months):*

   24

7. *Contribution of the submitting organization*
   Technical inputs;Data;Authorship;

8. *Can the study be developed without financial support from the UNFCCC?*
   No

9. *If no, please provide the estimated range of required financial support in USD (Please note that the UNFCCC is not a donor organization and has limited funding):*
   450000

10. *Please provide the status of any preliminary work undertaken that could serve as a basis for the study, including a link to any available reports, if available.*
    The following country studies are completed evaluating the economy-wide impacts of climate change, adaptation and / or mitigation policies. Results of policy simulations were analyzed to detect synergies and trade-offs of policy measures. For example, socio-economic indicators shed light on which policies boost domestic production, jobs (by gender, economic activity, low / high paid jobs). Environmental indicators provide information on how economic activity may trigger energy demand and emissions. a. Mongolia: i. 2026: https://www.adaptationcommunity.net/wp-content/uploads/2026/08/2026-Economy-wide-impacts-of-green-loan-financed-climate-adaptation-and-mitigation-in-Mongolia.pdf ii. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/20250915_Policy_handbook_on_Strategies_for_a_climate_resilient_economy_in_Mongolia.pdf iii. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/20250911_Economy-wide_impacts_Mongolia_en.pdf iv. 2024: https://gws-os.com/fileadmin/downloads/giz2024-en-policybrief-cp-in-mn.pdf b. Kazakhstan: i. 2022 https://downloads.gws-os.com/giz2022-en-supporting-climate-resilient-economic-development-in-kazakhstan.pdf ii. 2023: https://www.giz.de/de/downloads/giz2023-en-kazakhstan-economic-impact-climate-change-adaptation.pdf iii. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/202509

15_Policy_handbook_on_Strategies_for_a_climate_resilient_economy_in_Kazakhstan.pdf iv. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/20250911_Economy-wide_impacts_Kazakhstan_en.pdf c. Georgia i. 2022: https://downloads.gws-os.com/giz2022-en-supporting-climate-resilient-economic-development-in-georgia.pdf ii. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/20250915_Policy_handbook_on_Strategies_for_a_climate_resilient_economy_in_Georgia.pdf iii. 2025: https://www.international-climate-initiative.com/fileadmin/iki/Dokumente/Publikationen/Projekte/18_II_141/20250911_Economy-wide_impacts_Georgia_en.pdf d. Tunesia: i. ILO 2018: Green Jobs ii. GIZ 2012: EN_Renewable_energy_and_energy_efficiency_in_Tunisia_GIZ_2012.pdf and Employment from Renewable Energy and Energy Efficiency in Tunisia – New Insights, New Results - ScienceDirect (2016) e. IDB 2026: Modeling the Economic Effects of Climate Policy Instruments at the Macroeconomic level – a case study in Chile (study not published yet) f. IRENA 2025: Socio-economic impact assessment of adaptation measures in Nepal (study not yet published) g. Egypt i. GIZ 2017: https://downloads.gws-os.com/report-final_rcreee_website-_13-02.pdf ii. ILO 2025: Measuring Social and Employment Impacts of NDC policies using Just Transition Assessment Model (JTAM-e3.eg) in Egypt (study not yet published https://www.ilo.org/resource/news/evidence-based-assessment-models-simulate-greener-future-egypt) h. Uganda (mitigation policies) i. GIZ 2023: https://gws-os.com/fileadmin/downloads/giz2023-en-macro-economic-impact-analysis-of-energy-transition-scenarios-in-uganda.pdf ii. https://gws-os.com/fileadmin/downloads/giz2024-en-policy-brief-3-energy-efficiency.pdf iii. https://gws-os.com/fileadmin/downloads/giz2024-en-policy-brief-4-renewable-energy.pdf

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