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DENMARK'S GREENREFORM MODEL TO ASSESS THE ECONOMIC AND FISCAL IMPACTS OF CLIMATE POLICIES

Key messages

Denmark has been a frontrunner in implementing green budgeting practices. Drawing on this experience, it is going one step further by developing GreenREFORM, an analytical tool that allows for an integrated and consistent assessment of the environmental and climate effects of economic policies from 2015 to 2100. GreenREFORM is a computable general equilibrium model, which simulates the environmental effects of Danish economic activity and the economic effects of policy interventions. This allows for more rigorous *ex ante* evaluations of different climate policy options with a view to informing the policy target of reducing greenhouse gas emissions by 70% in 2030.

Country: Denmark
Sectors: Energy | Transport | Buildings | Infrastructure
Scale: National

Challenge

Denmark has set ambitious, legally binding climate targets. The country committed to reducing greenhouse gas emissions by 70% by 2030 compared to 1990 levels. The Ministry of Finance intends to make the green transition a core policy priority. "We must be a green main engine in society, so that the green transition is not just something that lives in the traditional green ministries", declared Nicolai Halby Wammen, Minister of Finance (FOES, 2022).

Green budgeting is a policy-making tool that supports policy makers' objectives by aligning the budgetary process with environmental and climate goals. It involves tagging climate change expenditures and allowing for focused policy analysis through *ex ante* environmental assessments, environmental cost-benefit analysis and environmental expenditure reviews (OECD, 2021). However, so far it has been difficult to integrate long-term economic development and environmental objectives.

Denmark intends to simulate the long-term economic impacts of climate and environmental policies. This will also provide key insights into how fiscal policies impact the delivery of national and international climate and environmental commitments in the short, medium and long term.

Approach

Denmark is developing a macroeconomic model, GreenREFORM, to enable the fiscal and economic planning to support the green transition. The model is designed by the Danish Research Institute for

Economic Analysis and Modelling, with the support of the Danish Ministry of Finance and other partners. The analytical tool draws from Danish experience with green budgeting, and aims to provide an integrated assessment of the environmental and climate effects of economic policies, as well as the socio-economic effects of energy and climate policies. Beyond climate budgeting, it can also simulate the possible effect on emissions of environmental taxes, subsidies and other regulations. In this way, it aims to strengthen the consistency of public finances with climate and environmental targets.

GreenREFORM is based on a main dynamic computable general equilibrium model and several sub-models that describe key sectors with important climate and environmental impacts (e.g. agriculture, electricity and heat, transport, waste management). It is designed as a fully integrated model system in which sub-models and the main model are linked and solved simultaneously. The data describes 142 different sectors in the economy and includes 27 different energy products (e.g. oil, gas and biomass). Denmark aims to illustrate the interactions between different sectors by bringing them together in a "one-stop-shop" offering an integrated perspective of the potential climate and environmental impact of a given policy measure. This would enable ex-ante assessments of new measures to weigh possible effects, and enable more rigorous evaluations of different climate policy options.

The model can produce yearly forecasts for each year 2015-2100, thereby enabling medium-to-long-term fiscal and economic analysis. This will allow Denmark to position climate and environmental policy centrally in the preparation of its medium-term fiscal framework (OECD, 2022).

Results

The GreenReform model is currently being tested and implemented for the first time in 2022. It is thus too early to assess results. However, early findings illustrate the importance of getting access to the necessary input data and expert knowledge (OECD, 2021). Denmark's extensive climate budgeting is a key source for implementing the model. Openness, transparency and co-operation are key principles of the project; the completed model, including the model's input data, methodology and code, will be made publicly accessible with a level of detail that makes it useful for policy evaluation. The project also places a strong emphasis on inclusiveness. Research work involved experts at Statistics Denmark, the Danish Energy Agency, and a large number of other ministries, agencies and institutions. This helps ensure data reliability and accuracy. Experts' consultations and feedback from practitioners will continue to inform the future development of the analytical tool.

Further information

OECD (2021), Introductory note on integrating climate into macroeconomic modelling. Drawing on the Danish experience, https://www.oecd.org/gov/budgeting/integrating-climate-into-macroeconomic-modelling.pdf.

OECD (2021), Green Budgeting in OECD Countries, OECD Publishing, Paris, https://doi.org/10.1787/acf5d047-en.

Blazey, A. and M. Lelong (2022), "Green budgeting: A way forward", OECD Journal on Budgeting, vol. 22/2, https://doi.org/10.1787/dc7ac5a7-en.

GreenReform, project description, https://dreamgroup.dk/greenreform/project-description.

Featured publication

OECD (2021), Green Budgeting in OECD Countries, OECD Publishing, Paris, https://doi.org/10.1787/acf5d047-en.

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