How ambitious can the Israeli Green Deal be?
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Introduction
Policy makers around the world are in the process of establishing national development plans to get countries on track to 2050 to meet their climate change. In the present study, we simulate the adoption of energy-related carbon emissions reduction targets and their impact on the economic growth in Israel by means of an original dynamic integrated energy system framework. MESSAGEix_IL - MACRO.

The energy sector in Israel is at a crossroad. Traditional energy sources are in the process of replacement by natural gas (NG) and renewable energy (RE) in power generation. Industry and transport sectors are being gasified and electrified. Long a resource-poor country, Israel now has more NG than it needs for the next thirty years. As Israel’s energy bill before the NG discoveries was about $10 billion—more than 5% of the gross domestic product (GDP)—the supply of domestic NG and export have been contributing to the country’s trade balance (Palatnik, Tavor & Nathan 2018).

The Israeli policy makers are skeptical as to how far greenhouse gas (GHG) emissions reduction in Israel can go without hampering economic growth. The aim of this study is to investigate the economic impacts of alternative paths for GHG emissions reduction in Israel.

Co-production process and research design

Research Structure

Models

We utilize a novel long-term, bottom-up, linear, least-cost, integrated-assessment model of the Israeli energy system, MESSAGEix_IL - MESSAGEix, in a country-level application of the integrated assessment model MESSAGEx, developed at the International Institute of Applied Systems Analysis (IIASA). MESSAGEix is a comprehensive energy technology-based optimization model designed for medium- to long-term energy planning and policy analysis that provides a framework to represent energy systems with all their interdependencies and correlations.

Overview of MESSAGEix_IL Energy System

Objective: The long-term option for meeting emissions reduction not-for-modelling period

To obtain macroeconomic feedback for changes in an energy system, MESSAGEix_IL is linked directly to the MACRO module that minimizes the intertemporal utility function of a single representative producer-consumer. Policies that promote reaching 85% of RE in the energy mix for power generation and full electrification of transport by 2050, combined with modest carbon tax rates reduce emissions by about two-thirds (Policy Scenario). Another carbon tax rate might achieve an even sharper decline of 73% to 92% (Ambitious Policy Scenario). The estimated direct economic cost in 2050 is between 0.02% and 0.04% of GDP. To recover any investment in energy efficiency, based on MESSAGEix_IL. The savings amount to 30% of GDP until 2050, while in the energy intensive declines by 53%. The share of RE in power generation sharply increases to reach the goal of 85% by 2050.

Discussion

• Only energy related GHG emissions are analyzed
• Only direct costs of the transition are evaluated
• Related benefits for health, productivity, are not in the model
• BUT
• Khan et al. (2019) analyzed climate impact on countries’ productivity
• Israel will impose 1.5% GDP per capita in 2050 in case of “no global climate mitigation policy”
• Israel will gain 0.24% GDP per capita in 2050 in case of “global climate policy”

Conclusions

• Relatively low carbon tax values reduce energy-related GHG to 33% in 2050 compared to 13% in the BASE and with only a minor impact on GDP growth
• Carbon tax speeds up phase out of oil in transport and decarbonization of industry
• A significant step for decarbonization is diversifying energy production from the use of polluting fuels in RE while electricity generating
• The improved efficiency and transition to RE are partly due to the competition for RE in power generation and full electrification of transport and are partly due to the imposition of a carbon tax

Policy recommendations

• There is a synergy between adopting emission reduction targets and the need for considerable investment in infrastructure to achieve the Israeli economy’s green targets, given the expected demographic growth
• To meet the goals of RE in power generation, demand management and storage of electricity, as well as wind and waste to energy, should be promoted
• For solving road congestion and the continuous increase of new vehicles, which are driven by demographic and economic growth, we recommend rapid electrification of light-duty vehicles and public transport. Accordingly, we call for investment in electric and efficient public transportation
• Carbon tax internalizes the negative externalities created by GHG emissions and found to be the least-cost option to mitigate GHG emissions. In the post-Catalan World, we recommend accompanying the policy targets with the adoption of a carbon tax

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Results

GDP and carbon dioxide equivalent (GHG) emissions in Baseline Scenario I and II

The main drivers for carbon mitigation are electrification of the economy from about 30% today to 70% in 2040, while the energy intensity declines by 53%. The share of RE in power generation sharply increases to reach the goal of 85% by 2050.