Macroeconomic and Employment Impacts of Achieving Net-Zero Emissions in the US by 2050

Topic: Dynamic Modelling of Economic Impacts of GHG Reductions
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Policymakers and researchers have proposed a variety of decarbonization strategies to reduce GHG emissions in the US. A important question is: â€œWhat will be the economic impacts of these strategies, and how will they affect US households and business?â€• In particular:

â€¢ Will decarbonization lead to a net increase in employment?
â€¢ What sectors face the greatest opportunities for job growth?
â€¢ How will job opportunities change over the coming decades?

In this study, the Inforum macroeconomic interindustry model LIFT was coupled to the ENERGYpathways model produced by Evolved Energy Research to analyze the macroeconomic and employment impacts of a set of decarbonization strategies that may enable the US to achieve net-zero emissions by 2050.

The paper describes the detailed features of the decarbonization strategies, and how they were implemented in the LIFT model. We report on salient features of the resulting structural change in the US economy, and the net changes in production in jobs at the industry level. Of special interest is the impact on fossil fuel and supporting industries. Under any conceivable decarbonization scenario, economic activity in these sectors is expected to decline. An open question is whether investments in carbon-reducing technologies will create sufficient production and jobs to counteract these losses in the aggregate.

The net-zero technology and policy pathways examined in this analysis is based on Decarb Americaâ€™s Sectoral Policies Scenario, with the addition of supplemental measures to reach net-zero. The modeling approach combines a zero-emission vehicle standard, zero-carbon fuel standard (for diesel, gasoline, jet fuel, and hydrogen), electrification and efficiency standards for buildings, a clean energy standard for the power sector (100 percent clean electricity by 2050), and policies to reduce emissions of methane and ozone-depleting substances. Together, these policies are estimated to reduce overall U.S. emissions by 70 percent relative to current emissions, while reducing energy and industrial CO2 emissions by 80 percent. Reaching the net-zero goal in this scenario thus requires further reductions in non-CO2 greenhouse gases as well as additional CO2 reductions from carbon removal (including land-based sequestration, direct air capture, and carbon capture and storage) and further emissions mitigation in the areas of bioenergy, industrial heat, and off-road transportation.

Two scenarios are explored. The first is the High Electrification/High Renewables pathway, which we also refer to as the core scenario. For the second net-zero pathway, under renewables deployment is more constrained, but the US economy still achieves net-zero by 2050. The reference to â€œnet-zeroâ€• under both scenarios means that GHG emissions are reduced significantly and that all remaining GHG emissions released from human populations are counterbalanced by removing GHGs from the atmosphere, for example through forest restoration or direct air capture.

This study presents two complementary assessments of the economic impacts of achieving net-zero emissions by 2050. The first focuses on the direct employment impacts associated with the up-front investments in energy facilities and equipment to help achieve the net-zero target, as well as employment impacts associated with the operation and maintenance of these facilities. This first

analysis does not capture spillover impacts associated with complex supply chain interactions or workers spending their wages.

The second analysis uses the Inforum LIFT model, and takes a broader perspective than the first by estimating the economy-wide economic impacts associated with reaching the net-zero by 2050 goal. As such, it was designed specifically to capture the spillover effects not accounted for in the direct employment impacts assessment. These spillover effects reflect a number of economic dynamics that affect industries and households across the broader economy. These include impacts up the supply chain from directly impacted industries as well as impacts for industries that produce goods purchased by workers in affected industries. The economy-wide assessment also reflects how changes in prices affect consumer spending patterns and how changes in investment affect productivity over time and the associated implications for output, employment, and income.

The paper synthesizes these two assessments, the findings of which highlight the importance of planning for the energy transition, particularly in helping affected workers and communities navigate the clean energy transition. Federal and state governments can draw upon the results of this study as they consider strategies for attracting new investments and industries and scaling up job training.