Energy scenarios provide useful decision-support tools for policymakers and investors

January 20 2017, by Mark Dwortzan

Credit: David Pilbrow/Flickr

Fulfilling the promise of the 2015 Paris Agreement on climate change—most notably the goal of limiting the rise in mean global surface temperature since preindustrial times to 2 degrees Celsius—will

require a dramatic transition away from fossil fuels and toward low-carbon energy sources. To map out that transition, decision-makers routinely turn to energy scenarios, which use computational models to project changes to the energy mix that will be needed to meet climate and environmental targets. These models account for not only technological, economic, demographic, political, and institutional developments, but also the scope, timing, and stringency of policies to reduce greenhouse gas emissions and air pollution.

Model-driven energy scenarios provide policymakers and investors with a powerful decision-support tool but should not be used as a decision-making tool due to several limitations. So argues a new study in the journal Energy and Environment by Sergey Paltsev, deputy director of the MIT Joint Program on the Science and Policy of Global Change and a senior research scientist for both the Joint Program and the MIT Energy Initiative. The study shows that overall, energy scenarios are useful for assessing policymaking and investment risks associated with different emissions reduction pathways, but tend to overestimate the degree to which future energy demand will resemble the past.

"Energy scenarios may not provide exact projections, but they are the best available tool to assess the magnitude of challenges that lie ahead," Paltsev observes in the study, a unique review of the value and limits of widely used energy scenarios that range from the International Energy Agency (IEA) World Energy Outlook, to the Joint Program's own annual Food, Water, Energy and Climate Outlook (which uses the MIT Economic Projection and Policy Analysis model), to a recent Intergovernmental Panel on Climate Change (IPCC) assessment report (AR5) presenting 392 energy scenarios aligned with the 2 C climate stabilization goal.

The study points out that because energy scenarios tend to vary widely in terms of the projections they produce for a given policy and the degree

of uncertainty associated with those projections, it's not advisable to base an energy policy or investment decision on a single energy scenario. Taken collectively, however, energy scenarios can help bring into sharp focus a range of plausible futures—information decision-makers can use to assess the scale and cost of the technological changes needed to effect significant transformations in energy production and consumption. A careful review of multiple energy scenarios associated with a particular emissions pathway can provide a qualitative analysis of what's driving the results and the potential risks and benefits of a proposed policy or investment.

That said, projections in energy scenarios can sometimes be highly inaccurate due to factors that are difficult to anticipate.

For example, according to the study, which compared several energy scenario projections to historical observations, most energy scenarios do not account for sudden changes to the status quo. One of the greatest contributors to uncertainty in energy scenarios is the demand for low-emitting energy technologies, whose timing and scale of deployment—dependent on several economic and political factors—is highly unpredictable. Paltsev notes that the IEA constantly underestimates renewable energy production; in its 2006 World Energy Outlook, the agency projected for 2020 a level of wind power generation that the world exceeded as early as 2013.

In addition, while energy scenarios have been largely successful in projecting the quantity of global energy demand (e.g., the 1994 IEA World Energy Outlook's projection for 2010 was off by only 10 percent, despite highly disruptive developments such as the breakup of the Soviet Union, the world recession in 2008, and the emergence of the shale gas industry), most have been considerably off the mark when it comes to projecting energy prices (e.g., in 1993 dollars, the 1994 IEA WEO projected $28/barrel in 2010, but the actual price was $53/barrel).

Recognizing the steep challenge in projecting demand and prices for different energy sources in the midst of a dramatic energy transition, Paltsev emphasizes that governments should not try to pick a "winner"—a single energy technology that seems poised to reduce emissions singlehandedly—but rather adopt a strategy that targets emissions reductions from any energy source.

"Governments shouldn't pick the winners, because most likely that choice will be wrong," he says. "They should instead design policies such as carbon-pricing and emissions trading systems that are designed to achieve emissions reduction targets at the least cost."

More information: Energy scenarios: the value and limits of scenario analysis. DOI: 10.1002/wene.242 , onlinelibrary.wiley.com/doi/10.1002/wene.242/full

This story is republished courtesy of MIT News (web.mit.edu/newsoffice/), a popular site that covers news about MIT research, innovation and teaching.

Provided by Massachusetts Institute of Technology

Citation: Energy scenarios provide useful decision-support tools for policymakers and investors (2017, January 20) retrieved 3 May 2024 from https://techxplore.com/news/2017-01-energy-scenarios-decision-support-tools-policymakers.html