Sightline INSTITUTE

Sightline Research Backgrounder

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Modeling Cap-And Trade:

Potential pitfalls in the Western Climate Initiative's economic modeling effort

The Western Climate Initiative—an effort by seven US states and three Canadian provinces to develop a "cap-and-trade" system for reducing greenhouse gas emissions—has engaged a private consulting firm to analyze the potential economic impacts of different cap-and-trade program designs. The consultants use an economic model known as ENERGY 2020, which contains detailed data and assumptions about North American energy use and consumption.

As with any exercise in economic modeling, ENERGY 2020's outputs depend on the assumptions and methods embodied in the model itself. But ENERGY 2020 is a *proprietary model,* meaning that the WCI's consultants will not disclose details about how the model works. As a result, it's virtually impossible to discern what sorts of biases may be built into the model.

If the public is to evaluate and understand the WCI's modeling results, there are at least five areas where greater transparency about ENERGY 2020 is important:

1) How does ENERGY 2020 estimate cost savings from energy efficiency? Consumers and businesses often skimp on energy efficiency. (For example, many consumers fail to purchase Energy Star appliances, even when they could reap big savings on their utility bills.) So there are plenty of opportunities to *profit* by using less energy. Nonetheless, many economic models ignore these cost-saving opportunities, and assume that efficiency upgrades always increase net economic costs. If ENERGY 2020 uses such a cost model, it could *radically overstate* the total cost of reducing emissions.

2) Does ENERGY 2020 allow for "early retirement" of energy-intensive capital? ENERGY 2020 bases its estimates of energy demand, in large part, on details about the energy use of "capital stock," such as power plants and factories. Most of today's capital stock was built in an era of cheap energy and zero-cost carbon emissions. But if energy costs rise—either because of market trends, or because of legal limits on greenhouse emissions—some of these facilities may be rebuilt or retired long before the original owners expected. Understanding ENERGY 2020's assumptions about how quickly the current capital stock will be retired is vital to understanding how the model estimates future energy demand.

3) What assumptions does ENERGY 2020 make about technological innovation?
A dynamic economy will respond to greenhouse gas limits through *innovation*. Photovoltaic cells, for example, may come down in price as manufacturing techniques improve; while entirely new, low-carbon technologies or services may arise to replace carbon-intensive fuels. More innovation will mean lower costs. But ENERGY 2020's assumptions about future technological innovations are secret—which makes it impossible to understand how the model puts a price tag on emissions reductions.

4) What does ENERGY 2020 assume about consumer behavior?
Over the past few decades, most consumers have assumed that energy price increases would be temporary. As a result, they didn't make the long-term choices (such as buying more efficient homes, cars, and appliances) that could have substantially reduced their energy consumption. However, future price impacts—whether from market forces or greenhouse gas limits—are likely to be longer-lasting than previous price spikes. Consumers may respond to permanent price increases more quickly than they have in the past. If ENERGY 2020 fails to incorporate the potential for greater consumer response, it could underestimate how readily demand will change—and, as a consequence, overestimate the economic costs of emissions limits.

5) How can we compare ENERGY 2020 to other models?
If ENERGY 2020's cost predictions differ from the estimates of other modeling efforts underway around the globe, does that mean that the WCI region itself is different from other regions? Or does it simply mean that ENERGY 2020's built-in assumptions dictated the results? This question will be impossible to answer, since the inner workings of ENERGY 2020 are trade secrets. This problem is exacerbated by the need to link ENERGY 2020 with a separate macroeconomic model, which will likely be yet another closed, proprietary system. At the end of the day, the WCI may be simply unable (and its consultants unwilling) to explain why its modeling results differ from those appearing in other venues.

These are just five of the most crucial uncertainties in the public understanding of the ENERGY 2020 model. But there are other significant uncertainties in other areas too. Without a fuller explanation of the modeling methods, WCI policymakers and the general public will likely find that the ENERGY 2020 modeling exercise raises more questions than it answers.

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