Regulations only a first step in cutting emissions

July 29 2014, by Audrey Resutek And Hannah Flesch

Coal power plant in Datteln, Germany. Credit: Arnold Paul

Intensifying calls for action on climate change have led to a variety of proposed regulations to cut greenhouse gas emissions from specific sources of the economy, including, most recently, the environmental

protection agency's (EPA) rule on coal power plants. Examining the costs and effects of such regulatory approaches, MIT researchers found that source-specific regulations will reduce emissions, but not enough to substantially slow future climate change—and at a steep cost compared to price-based policies. However, if regulations are combined with a price-based policy further down the road, such a two-step approach would have significant benefits for climate, at a lower cost in the future than regulations alone.

"Increasingly, source-specific regulations are becoming the policy norm in addressing climate change, and they are an important first step," says Sergey Paltsev, the assistant director for economic research at the MIT Joint Program on the Science and Policy of Global Change, and lead author of the study released Monday in Climate Policy. "But because regulations have only partial coverage, they are only the first step. On their own they won't prevent the worst impacts of climate change."

While the researchers did not specifically study the proposed EPA rule, the rule's limit on emissions from coal plants is expected to put momentum toward a switch from coal powered generation to natural gas powered generation, because gas has a much lower carbon footprint. The regulatory scenario examined by the MIT researchers reduces emissions from the power sector through a globally mandated switch from coal powered electricity to natural gas. The power sector regulations were then combined with fuel efficiency standards for passenger vehicles, another popular policy approach to lowering emissions.

The researchers used ambitious regulatory targets in the electricity and transportation sectors, and found that this scenario would lower emissions, but only by about a third of the amount that a price-based policy—such as cap and trade or a carbon tax—would reduce. The reduction in emissions from regulations was not large enough to reduce carbon dioxide (CO_2) in the atmosphere to a level that would prevent

warming by 2 degrees Celcius, the level usually argued as necessary to prevent the worst impacts of climate change.

"There is a lot of inertia in the climate system," Paltsev says. "To meet global temperature targets we have to counteract past emissions with a substantial reduction in emissions going forward."

Controlling greenhouse gas emissions through sector-specific regulations alone is also expensive. It costs more per ton of CO2 to reduce emissions through regulations than through a price on carbon. This is because regulations force action in particular areas, while ignoring cheaper options, such as reducing overall energy use or cutting emissions from industry or commercial shipping.

"Electric power generation and transportation are large sources of greenhouse gas emissions, making them obvious targets for regulatory action," Paltsev says. "But you also miss a lot of other sources of emissions by targeting only those sectors."

The researchers also found that regulating coal use in the power sector actually increased coal use in other areas. In the United States, coal is mostly used in power generation, but in countries such as China, it is used extensively in industry and for heating purposes. When there is a drop in global demand for coal for power generation, the price of coal plummets. The lower price encourages consumers in these areas to use more coal than they would have otherwise, increasing global emissions.

Fuel economy standards cause a similar effect. As more efficient cars use less gas, the global price of gasoline falls, encouraging consumers to drive more miles.

"Using targeted emissions policies can actually encourage emissions increases in other areas," Paltsev says. "It's important to consider smart

policy designs that take this into account."

Although price-based mechanisms are ultimately cheaper and more environmentally effective, regulations often offer a more politically feasible way to address climate change. With an eye toward this, the researchers studied another policy approach combining regulations in the present with a broader, price-based policy in the future. In this combined scenario, the pricing system eventually offsets the high cost of regulations while still achieving substantial emissions reductions.

Paltsev says this shows that it's important to consider how policies might interact. For example, regulations requiring expensive fuel efficiency technology might not make economic sense in a situation where they are combined with a carbon price. Understanding how regulatory measures interact with other policies, and how that affects the economy will help to pave the way for more effective and broader-based economic tools.

"Political infeasibility of an efficient global climate agreement should not deter from action on climate," Paltsev says. "Regulations might be an easier way to get started, and it's important to understand how current regulations might interact with future pricing policy."

More information: Sergey Paltsev, et al. "Regulatory control of vehicle and power plant emissions: how effective and at what cost?" DOI: 10.1080/14693062.2014.937386

Provided by Massachusetts Institute of Technology