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Technology Can Nudge Climate Change Politics: Charles Perrow

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Reducing carbon-dioxide emissions is primarily a political problem, rather than a technological one. This fact was well illustrated by the fate of the 2009 climate bill that barely passed the U.S. House of Representatives and never came up for a vote in the Senate.

The House bill was already quite weak, containing many exceptions for agriculture and other industries, subsidies for nuclear power and increasingly long deadlines for action. In the Senate, both Republicans and Democrats from coal-dependent states sealed its fate. Getting past these senators is the key to achieving a major reduction in our emissions.

Technological challenges to reducing emissions exist, too. Most pressing is the need to develop the know-how to capture carbon dioxide on a large scale and store it underground. Such technology could reduce by 90 percent the emissions from coal- fired power stations. Some 500 of these facilities in the U.S. produce 36 percent of our CO_2 emissions.

But these plants aren't evenly spaced around the country. And therein may lie the key to addressing the political and technological challenges at the same time. If the federal government would invest in carbon capture and storage, it could go a long way toward persuading politicians in every state to sign on to emission reductions.

I'll get to the specifics of the technology shortly. But first, consider how the costs of emission reduction fall hardest on certain parts of the country: A carbon tax levied on all major sources of released CO_2, the approach favored by most of the environmental community, would make energy from coal-fired power plants cost more. To make a significant difference, such a tax would have to amount to $60 a ton.

Midwest Carbon Footprint

As a result, gasoline prices would rise 26 percent, and natural gas for household usage by 25 percent, nationwide. Rich and urbanized states could probably tolerate this. The West Coast, with its hydroelectric power, and the Northeast, which relies to a large extent on natural gas, could most easily absorb the associated increase in energy costs.

But the price of energy in the rural, Midwestern states would more than quadruple because of their large carbon footprint. Midwesterners get most of their electricity from coal; they drive relatively long distances to get to work, shopping and entertainment; and rural homes and buildings use more energy for heating and cooling.

One carbon-tax proposal now being considered is a “cap and dividend” plan that would send the tax revenue back to all U.S. citizens equally. But that would also favor the rich states that are less dependent on driving and coal.

It would be more helpful for the coal-dependent states if the federal government would use revenue from a carbon tax to help develop the technology for carbon capture and storage.

And that brings us to the technological challenges: No plant of any size with the capacity for CCS yet exists, but it has been demonstrated to work at small scales. Three different processes for capturing the CO_2 are being tested, and scaling them up for 500-megawatt or 1,000-megawatt facilities should be possible.

For two years, the Mountaineer plant in New Haven, West Virginia, has been capturing and storing a tiny amount of its CO_2 -- 2 percent of it -- but plans to build a full-scale carbon-capture plant here have been abandoned. Because Congress has dropped any idea of imposing a tax on carbon emissions, the investment doesn’t make sense.

A large plant in Edwardsport, Indiana, was being constructed with the expensive gasification process that makes it easy to add carbon-capture facilities, but it, too, has been shelved.

China may finish its large demonstration carbon-capture plant before the U.S. gets any model up to scale. Others are planned in Europe, and a small one is operating in Germany. This plant has been unable to get permission for underground storage, so it is selling some of its CO_2 to soft-drink companies and venting the rest.

Subterranean Storage

Storing captured CO_2 is eminently possible, too. For 15 years, the Sleipner facility in Norway has been storing 3 percent of that country’s CO_2 underneath the ocean floor, with no appreciable leakage. Algeria has a similar facility, the In Salah plant, operating in the desert.

One storage strategy under consideration in the U.S. is to inject captured CO_2 into huge basalt formations off both the east and west coasts. Inside the basalt, the carbon gas would gradually turn into bicarbonate of soda.

There are other ways to dispose of carbon dioxide. It has been used for enhanced oil recovery for many

decades without any danger, and has been effectively stored in depleted oil reservoirs. (The gas is dangerous only in high concentration.)

It remains uncertain how much of the captured CO2 might leak during storage. Even if this were as much as 10 percent, however, it would mean that 90 percent of it would stay underground.

As CCS technology develops, it will have to be made more efficient so that it uses less energy. As it is, the capture phase is expected to require that a power plant burn 20 percent to 25 percent more coal than it otherwise would.

The technological challenges may explain why energy companies haven't lobbied for subsidies to develop CCS. The electric-energy sector isn't known for innovation and risk- taking. Just look at the U.S.'s outdated power grid.

But the federal government could pay for the subsidies through a tax on carbon. Such a levy would have other advantages, too: It would raise the cost of energy to reflect the damage that burning coal and oil now do to the environment, and spur the development of renewable sources.

If states with large carbon footprints can't accept such a tax, the CCS subsidies could be paid from the general fund. The cost to build coal-fired power plants with CCS technology is estimated to be about $5 billion to $6 billion -- about the price of a single nuclear power plant. The total price for the U.S.'s 500 large plants would be $250 billion. That's as much as the planned modernization and expansion of our missile defense system over 10 years.

But it would slash our carbon emissions by at least 20 percent. There is no other politically possible way to cut CO2 as much, and as quickly -- in a decade or two. And devastating climate change is far more likely than a missile attack.

U.S. investment in CCS technology could also induce China and Europe to follow suit. And this would allow the world time for renewable-energy technologies to mature -- to the point where we could do away with coal burning altogether.

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