

Yale Environment 360

Innovation is Not Enough

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Why Polluters Must Pay

Steven Chu, the Secretary of Energy and a Nobel laureate, has argued that what the world needs is a handful of Nobel-level breakthroughs in energy technology. They sure would come in handy in the fight to avoid the worst consequences of global warming. But counting on breakthroughs is a crapshoot. We cannot rely on a miracle to navigate away from our current head-on collision with the planet.

That hasn't stopped Breakthrough Institute co-founders Ted Nordhaus and Michael Shellenberger from arguing — [as they did in a recent article for *Yale Environment 360*](#) — that technology research will stop the runaway train of climate change. You don't have to bother limiting emissions through a carbon price or cap, they say, because energy innovation will come to the rescue.

Frankly, this is bunk. Reasonable people may disagree about what policies will best fight climate change. But climate science makes one thing clear: The planet must limit carbon emissions, or face a bleak future. And we will never get there unless we make policy changes that align market incentives with this goal. It's economics 101. There's no way to avoid making polluters pay for the damage they cause, or they'll keep causing it. That either starts with a price on carbon or, ideally, a cap on carbon emissions.

Nordhaus and Shellenberger argue that taxing or capping carbon pollution is tough, so better to invest in new pollution control technologies instead (though they don't say where those investments would come from —the deficit-obsessed U.S. Congress doesn't seem poised to provide major new funding for clean-energy R & D). Certainly, it's true that it will be tough to keep polluters from passing on the costs of their pollution to the rest of us, as they always have. It's also true that

innovation in governance has never been easy. Ask Niccolò Machiavelli, who wrote in *The Prince*, back in 1505: “The innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.”

And, yes, greater investment in clean energy R&D will likely produce important advances, especially if government takes a more active role, as urged by the [American Energy Innovation Council](#), whose leaders include hardheaded business types like John Doerr, Bill Gates, Chad Holliday, and Jeff Immelt.

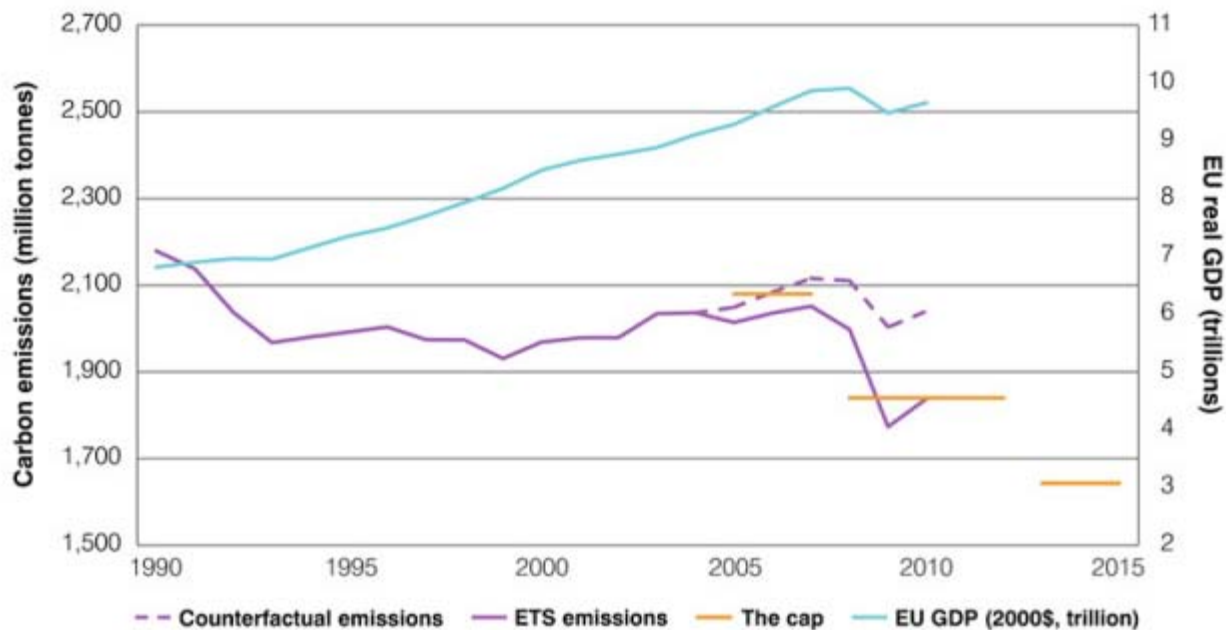
But no one, including the American Energy Innovation Council, would seriously suggest — as Nordhaus and Shellenberger do — that we just focus on innovation and dismiss the hard but all-important task of capping or pricing pollution.

R & D alone just isn't enough. There's an all-important second “D”: deployment. And clean energy deployment won't happen by itself. The world already has a \$5 trillion-a-year energy industry that makes lots of money for lots of people, and does so while forcing the rest of us to pay enormous socialized costs of its pollution.

That's O.K., say Nordhaus and Shellenberger. All we need to do is subsidize new technologies to bring down their price. They aren't the first to make this claim. Ted Nordhaus's uncle, the Yale University economist William D. Nordhaus, has written eloquently on the topic. Companies don't care that their inventions may set the stage for others to create profitable new products, he says, and as a result, they don't invest enough in research. The logical prescription: spend public money on research.

But the elder Nordhaus, like any good economist, also understands that the only way to make these subsidies effective is “[directed technical change](#)” — that is, subsidize in order to generate needed innovation, but also put a cap or a price on pollution to make sure the innovation does what we want it to do.

This is what the European Union does. It subsidizes R&D (&D) through a variety of direct and indirect means, while employing a cap-and-trade system that covers almost half of EU emissions. It's difficult to determine the portion of emissions reductions achieved by each of these policies, especially given the economic downturn and other external factors. What is clear is that total emissions in the sectors covered by the EU's [Emissions Trading System](#) have declined by 4 percent from 2007 to 2010, the last year for which comprehensive data is available. The decline is expected to continue in the years ahead.



Even assuming an emissions growth rate that is 1 percent less than the growth in GDP (represented by the dotted “counterfactual” line, which estimates what emissions would have been from 2005 to 2010 without the introduction of the EU’s Emissions Trading System), the data suggests that the system has succeeded in reducing emissions beyond what would be expected from the recession alone. (EU Emissions Data: A. Denny Ellerman/EU GDP data: World Bank)

Nordhaus and Shellenberger try to argue that Europe’s cap has been counterproductive. To support their claim, they focus on emissions intensity — emissions per unit of economic output. That is fundamentally the wrong metric. The planet doesn’t care about emissions per dollar. It’s absolute emissions that count. Moreover, Nordhaus and Shellenberger are forced to cherry pick data to make their case.

They pick 2008-2009 and argue that energy intensity in the power sector increased despite cap and trade. It’s true, EU energy intensity **did increase slightly** by around 0.3 percent that year. More to the point, however, Europe’s overall energy intensity — much like the United States and most everywhere else on the planet — has declined consistently over time. Even in 2008-2009, absolute power sector emissions decreased, and that wasn’t a fluke. The latest (partial) data show fossil generation in large EU states **fell 3 percent in 2011**.

Switching from coal to natural gas was responsible for some of the EU’s emissions reductions. A natural gas boom in the United States may have a similar effect. This boom, Nordhaus and Shellenberger argue, was the result of basic research on shale gas extraction technologies. They may

be right about the role of government funding here, but that has little to do with the need for controlling pollution through caps or prices.

It's true that natural gas may prove to be a lower-carbon fuel than coal for generating electricity, but only if leaks in the natural gas system, from production to use, are strictly limited. It's also true that even if the U.S. shifted entirely to gas from coal, we would still not meet the long-term emissions reduction goals science tells us are necessary.

In short, we need to ramp up and be able to sustain R&D (&D) — and that is nearly impossible when all market forces are pointing in the opposite direction. We need to guide private research efforts, and we need to pay for public ones. The American Energy Innovation Council lists five ways for government to come up with the necessary funds, four of which point to increasing the price of fossil energy.

The best policy instruments toward that end are pricing or, ideally, capping greenhouse gas emissions. Already, Europe's Emissions Trading System has helped give the EU the global lead in green technology deployment, and similar policies are being put in place from [California](#) to [Australia](#) and New Zealand. India has a coal tax. Brazil has placed an absolute limit on emissions and has significantly decreased emissions due to deforestation. China is starting seven regional cap-and-trade pilot programs.

Policies like these can change market incentives, which, despite the contentions of Nordhaus and Shellenberger, are key to fighting climate change. Only by getting the incentives right can we create the conditions for development and — most crucially — deployment of new technologies.

Ultimately, the world needs *both* new technologies and proper market incentives. Neither can go it alone.

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