Carbon Fees and Regulations: Striking the Right Balance

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Summary

Faced with an urgent global climate crisis, the United States must quickly adopt the most effective policies to curb greenhouse gas emissions without imposing undue burdens on the public or jeopardizing public support for action. Economists overwhelmingly endorse taxing fossil-fuel emissions as the most cost-effective means of encouraging a rapid transition toward a low-carbon economy. Most economists also believe that certain well-crafted regulatory and subsidy programs can and should play an important complementary role. However, *unless they genuinely address real market failures that remain even after carbon emissions are properly priced, regulations and subsidies may prove less effective, more costly, and more regressive than carbon fees* coupled with distribution of revenues back to individuals.

Introduction

How the United States responds to the climate crisis will make an enormous difference to humanity's future. Many environmental activists advocate traditional government regulations and subsidies. But these familiar remedies typically cover only specific industries, such as power generation or vehicles, thus offering piecemeal solutions to the problem of reducing GHG emissions from millions of disparate sources across the entire economy. Most performance standards also impose relatively inflexible, one-size-fits-all requirements on diverse producers and consumers in rapidly changing markets. That inflexibility raises the cost of curbing emissions, especially harming lower-income households who struggle to pay their energy bills.

The case for carbon fees

A more comprehensive and effective "carbon fee" policy would levy an additional cost on fossil fuels to motivate every consumer, producer, and inventor to conserve energy and find lower- carbon alternatives in every sphere of work and daily life.[1] Regardless of the sector—retail stores, steel foundries, or hospitals—a carbon fee creates common incentives for all to reduce fossil fuel use and shift to more efficient heating, cooling, lighting, fabrication, and transportation throughout their operations. Carbon fees are much simpler to draft, administer, and update than technology or performance standards covering thousands of industries. Carbon fees encourage individuals and businesses in *every* industry to pursue optimal solutions tailored to their particular circumstances, which regulators cannot hope to fully know or anticipate.

By steadily raising the cost of fossil energy embedded in all goods and services bought and sold in the economy, moreover, carbon fees provide a financial incentive for individuals and organizations to go *beyond* minimum regulatory requirements, in order to reduce costs as much as possible by lowering their carbon footprint. At the same time, price incentives respect individual freedom of choice more than regulatory commands.

Carbon fees are also highly flexible. Their rates can be adjusted, or ramped, as environmental conditions warrant, as our understanding of climate science grows, and political will permits. To help households transition to a low-carbon future and serve the goal of economic justice, the revenues raised by carbon fees can be returned to individuals as lump-sum dividends.

Perhaps most important, carbon fees are a powerful way to encourage the *discovery and implementation of innovations*, from efficiency tweaks to leap-frog breakthroughs. Nobel laureate economist Paul Romer argues that even a relatively small but rising carbon fee will generate rapid technological advances and slash fossil fuel consumption much faster than most current models assume.[2]

The consensus among economists for pricing carbon is as overwhelming as that among climate scientists about the human contribution to climate change. More than 3,500 economists, an unprecedented number, have joined 27 Nobel laureates and other leaders in their field to endorse a statement declaring that a carbon tax-and-dividend policy "offers the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary. By correcting a well-known market failure, a carbon tax will send a powerful price signal that harnesses the invisible hand of the marketplace to steer economic actors towards a lower-carbon future."[3] Denial is not a credible response to these experts any more than it is to climate scientists. As Christopher Udry, King Professor of Economics at Northwestern University, put it, "This is as clear as economics gets; [a fee] provides incentives to find minimally costly ways to reduce emissions."

Cost, equity, & effectiveness: the problems with (many) regulations and subsidies

Corporate Average Fuel Economy (CAFE) standards are a classic example of a well-intentioned regulation that achieves some worthy environmental goals, but less effectively and at a higher cost than carbon taxes could. Such standards do nothing to lower emissions from existing vehicles. By raising the average cost of new cars relative to old cars, they discourage people from upgrading to cleaner vehicles. Carbon taxes, on the other hand, encourage car owners to operate their existing vehicles more efficiently (e.g., driving fewer discretionary miles and at lower highway speeds), to use lower-carbon fuels where available, and to purchase cleaner vehicles that will lower their fuel costs. As consumers pay more attention to those costs, manufacturers will in turn be motivated to develop and incorporate more fuel-efficient, low- carbon designs as quickly and cost-effectively as possible.[4]

A 2013 study by four economists at M.I.T. concluded that fuel economy standards cost the U.S. economy six to 14 times more than a higher federal gas tax would have for the same reduction in fuel use over a period of four decades.[5] As the lead author explained, "That is because a gas tax provides immediate, direct incentives for drivers to reduce gasoline use, while the efficiency standards must squeeze the reduction out of new vehicles only. The new standards also encourage more driving, not less." UC Davis economist Mark Jacobsen similarly determined that owing to high compliance costs and modest effectiveness, national fuel economy standards lower greenhouse emissions at a cost of $307 per ton of CO2—a price far higher than most carbon tax proposals. He also determined that the overall cost of the program falls more heavily on lower- income individuals.[6] The rationale for such standards largely disappears if fuel prices are raised through a carbon fee to reflect the impacts of tailpipe emissions on climate.

A wide range of credible studies estimate that many other green programs in the United States and Europe, including incentives for home weatherization, rooftop solar panels, electric vehicle purchases, and "low carbon" fuels, range in cost from $100 to $2,200 per ton of CO2.[7] As we will see, some of these programs may be justified by other social benefits, such as improved health from cleaner air. In general, however, they tend to target narrow sectors of the economy at relatively high cost. As one program is piled on top of another, the costs add up, putting an undue burden on consumers and businesses without necessarily achieving the dramatic emissions reductions demanded by the climate emergency.

Excessive social costs cannot be ignored, even if they are disguised. Individuals may eventually chafe at paying higher costs and at facing undue restrictions on their choices, undercutting political support for action. Companies will try to lower their higher costs by paying lawyers to exploit loopholes in regulatory language, and by lobbying regulators to ease their burden. They will also mobilize political campaigns to undermine public support for expensive climate solutions. If they fail to evade the burdens of regulation, companies will pass many of their costs onto consumers, with impacts akin to regressive sales taxes.

Many clean-energy subsidies also have regressive impacts. As two University of California scholars demonstrated in a study of subsidies for hybrid and electric vehicles, residential solar electric power systems and water heaters, and other categories, "Overall, the bottom three income quintiles have received about 10% of all credits, while the top quintile has received about 60%. The most extreme is the program aimed at electric vehicles, where we find that the top income quintile has received about 90% of all credits."[8]

They also pointed out that "Whereas tax credits are received disproportionately by high-income households, a carbon tax would be paid disproportionately by high-income households." In addition, the revenues raised by carbon fees can readily be returned as lump sum payments to individuals, fully mitigating the economic impacts of the climate transition on most low- and middle-income households and making carbon fees even more progressive.

At their worst, some subsidies, like the Renewable Fuel Standard, are sustained by pork barrel politics more than any demonstrated environmental benefits. Every four years, presidential candidates reassure corn farmers in Iowa of their absolute commitment to supporting ethanol as a fuel additive. Yet a Congressional Budget Office report concluded in 2014, "using corn ethanol in place of gasoline has only limited potential to reduce greenhouse gas emissions (and some researchers estimate that it could actually increase emissions)."[9] A 2013 report by the Organization for Economic Cooperation and Development pegged the cost of U.S. biofuels policy at more than $400 per ton of CO2 abated.[10] Citing the agribusiness industry's role in keeping the program alive, economist Ed Dolan observed that a carbon tax would "help defuse the danger of opening the choice of winners to influence by special interests" and "reduce the risk that that dead ends would never be abandoned, even when they are shown to have failed."

The case for limited regulations and subsidies as complements to a carbon fee

Although carbon taxes do the best job of correcting the broad failure of markets to properly price pollution, they are not a complete solution to the climate crisis. Some specific market failures or opportunities may respond better to regulations or subsidies.[11] Such instances may arise when:

- *Carbon fees don't impact the specific problem*. For example, mandates are better for dealing with emissions sources that are hard to measure or price, such as methane-burping cows or industrial leaks of methane. Land-use regulations and subsidies are more appropriate than carbon fees for promoting carbon sequestration in soils and forests, and to promote denser, transit-friendly development that lowers the energy needs of the transportation sector.
- *Market barriers muffle the impact of carbon taxes*. Energy efficiency standards for buildings address a well-known disconnect between the incentives of landlords and tenants to invest in energy-saving retrofits.[12] Low-cost government information programs like Energy Star help overcome widespread consumer ignorance about potential energy savings from more efficient appliances.

• *Regulations and subsidies provide ancillary benefits*. Targeted subsidies to accelerate the transition to electric vehicles may be warranted by the large public health benefits from cleaner air. Most economists also endorse some government subsidies and standards to spur basic research and development for early-stage clean technologies such as solar power and batteries, taking into account the broad social benefits from knowledge spillovers and efficiencies achieved from greater production scale.[13]

Lessons from California

Even where a theoretical case exists for particular regulations, however, policymakers need to carefully evaluate their real-world impact. California, for example, now has a host of ad hoc and sometimes overlapping programs to subsidize renewable energy, cleaner vehicles, alternative fuels, energy efficiency, zero-emission homes, and more—all piled on top of its cap-and-trade program to price carbon.[14] The state's nonpartisan Legislative Analyst's Office (LAO) cautioned, "Although some . . . market failures almost certainly exist, we found limited evidence to suggest that the current mix of policies are effectively addressing these failures."[15] A 2016 report by the LAO observed that optimistic estimates of the cost per ton of CO2 abated exceeded $100 for about half the programs—at a time when the state's cap-and-trade market imposed a price on CO2 of less than $13 per ton (see Figure 1).[16]

In view of these issues, the LAO encouraged the Legislature in 2018 to "consider modifying or eliminating some of the more costly programs and, instead, relying more heavily on cap-and-trade (or a carbon tax) to encourage the lowest-cost emission reductions. . . The Legislature might want to direct agencies to ensure that any GHG reduction policy beyond carbon pricing is based on strong evidence that a market failure exists and the policy is effectively targeted at addressing that identified market failure."

Conclusion

The LAO's advice also applies to national policymakers, as they craft long-overdue measures to address the impending threat of climate disruption. Given the high stakes, they have a profound responsibility to ensure that programs addressing the climate crisis are as effective, cost-efficient, and equitable as possible. Carbon fee-and-dividend policies pass all three tests. They cover the vast majority of carbon emissions, unlike regulations that target only specific industries or technologies. They encourage cost-effective reduction of carbon emissions by putting the same price on carbon in all sectors, unlike regulations whose compliance costs vary widely from sector to sector. Perhaps most important, market solutions harness the vastly superior knowledge that individual consumers and producers have of their unique and changing circumstances, which government regulators can never equal. Market incentives also accelerate progress by rewarding innovations that achieve greenhouse gas reductions above and beyond regulatory targets. Well- crafted regulatory and subsidy programs can and should play an important complementary role, but only if they genuinely address real market failures that remain even after carbon emissions are properly priced.

This paper reflects the author's views and not necessarily those of the Citizens' Climate Lobby.

Estimated Average Cost Per Ton of Reduction Varies Greatly

Program	Cost Per Ton[a]
Organics and recycling loans	$4
Forest health	4
Dairy digester research and development program	8
Organics composting/digestion grants	9
Forest legacy	10
Recycling manufacturing	15
Delta and coastal wetlands restoration	30
State water and efficiency and enhancement program	33
Clean vehicle rebates	46
Sustainable agricultural lands conservation	59
Mountain meadow ecosystems restoration	113
Urban and community forestry	116
Water-energy grant program	141
Affordable housing and sustainable communities	191
Single-family solar photovoltaics[b]	209
Transit and intercity rail capital	259
Single-family energy efficiency and solar water heating[b]	282
Large multifamily energy efficiency and renewables[b]	343
Enhanced fleet modernization program "plus-up"	414
Truck and bus voucher incentives	452
Incentives for public fleets pilot project for DACs	725
Overall Average	**$57**

[a] Calculated as the amount of cap-and-trade funds awarded to a program divided by the total estimated greenhouse gas (GHG) emission reductions from the projects that receive cap-and-trade funds.
[b] Assumes GHG reductions at the midpoint of the administration's estimated range.
DACs = disadvantaged communities.

Figure 1 – Estimated cost-per-ton of CO2 reduction from California environmental programs.

Source: Legislative Analysts' Office, 2016

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[1] For international evidence that carbon taxes work, see Jonathan Marshall, "Carbon Taxes Can Do the Job," April 2019.

[2] Paul Romer, "Conditional Optimism," October 8, 2018. See also Rong Wang et al, "Induced Energy-Saving Efficiency Improvements Amplify Effectiveness of Climate Change Mitigation," *Joule* (2019).

[3] The market failure here is the failure of polluters to pay the social cost of the damage they cause—referred to by economists as a "negative externality."

[4] Jonathan Marshall, "Are Carbon Fees Effective For Reducing Emissions in Transportation?" March 2019.

[5] Valerie Karplus, et al., "Should a vehicle fuel economy standard be combined with an economy-wide greenhouse gas emissions constraint? Implications for energy and climate policy in the United States," *Energy Economics*, 36 (March 2013), 322-333.

[6] Mark R. Jacobsen, "Evaluating U.S. Fuel Economy Standards In a Model with Producer and Household Heterogeneity," *American Economic Journal: Economic Policy*, 5 (May 2013), 148-187. On the regressive impact of fuel standards, see also Davis, L. W. and C. R. Knittel, "Are Fuel Economy Standards Regressive?" Working Paper 22925, National Bureau of Economic Research, 2016. A broader analysis of the transportation sector finds that "a carbon tax is a much more cost-effective approach to reducing emissions compared to other policies, including a fuel economy regulation, clean fuel standard, or zero emission vehicle mandate. Whereas the average cost of emissions reductions achieved under a carbon tax is about $175 per tonne to reduce emissions by about 10%, the average cost for a fuel economy regulation, clean fuel standard, or zero emission vehicle mandate are all between $200 and $1,000 per tonne." Nicholas Rivers [University of Ottawa] and Randall Wigle [Wilfrid Laurier University], "An evaluation of policy options for reducing greenhouse gas emissions in the transport sector: The cost-effectiveness of regulations versus emissions pricing," Laurier Centre for Economic Research & Policy Analysis, Working Paper 2018-1, January 2018. For broader comparisons of carbon taxes to regulations, see Christoper Knittel, "Diary of a Wimpy Carbon Tax: Carbon Taxes as Federal Climate Policy," MIT working paper, August 15, 2019; and Lawrence Goulder and Ian Parry, "Instrument Choice in Environmental Policy," *Review of Environmental Economics and Policy* 2 (Summer 2008), 152-174.

[7] Kenneth Gillingham and James H. Stock, "The Cost of Reducing Greenhouse Gas Emissions," *Journal of Economic Perspectives*, 32 (Fall 2018), 53-73.

[8] Severin Bornstein and Lucas Davis, "The Distributional Effects of U.S. Clean Energy Tax Credits," Haas Working Paper 262, July 2015; see also Andrew Campbell, "Bringing Fairness to Energy Programs," Haas Energy Institute Blog, July 5, 2017.

[9] Congressional Budget Office, "The Renewable Fuel Standard: Issues for 2014 and Beyond," June 2014. [10] OECD, *Effective Carbon Prices (2013),* Table 3.2, 57.

[11] Justin Gundlach, Ron Minsk, and Noah Kaufman, "Interactions between a Federal Carbon Tax and Other Climate Policies," Columbia Center on Global Energy Policy, March 6, 2019. See also Canada's Ecofiscal Commission, *Supporting Carbon Pricing: How to Identify Policies that Genuinely Complement an Economy- Wide Carbon Price*, June 2017.

[12] For a survey of theory and evidence about such market failures, see Todd D. Gerarden, et al. "Assessing the Energy-Efficiency Gap," *Journal of Economic Literature*, 55 (December 2017), 1486-1525.

[13] Adam Jaffe, et al., "A Tale of Two Market Failures: Technology and Environmental Policy," *Ecological Economics,* 54 (2005), 164-174. Industry subsidies should generally sunset when their target achieves lift-off. For example, costly subsidies for renewable energy may perversely discourage more beneficial investments in energy efficiency. David M. Schizer, "Energy Subsidies: Worthy Goals, Competing Priorities, and Flawed Institutional Design," 70 *Tax L. Rev*. 243, 2017.

[14] Independent Emissions Market Advisory Committee, *2018 Annual Report*, October 22, 2018, 11-12.

[15] California Office of the Legislative Analyst, "Assessing California's Climate Policies—Transportation," Report 3912, December 21, 2018. In another report, the LAO emphasized, "There are benefits associated with reducing GHGs, but there are also costs that have real impacts on households. These costs are likely to become more significant as the state's GHG reduction goals become more ambitious. As a result, it is important for the state to prioritize strategies that reduce GHGs at the lowest cost. A large body of academic literature indicates carbon pricing policies . . . are a more cost-effective strategy to reduce emissions than other regulatory strategies. . . [W]hen considering . . . other policies, the Legislature should ensure that there is strong evidence of other 'market failures' that a carbon price does not adequately address prior to adopting them." California Office of the Legislative Analyst, "Assessing California's Climate Policies—An Overview," Report 3911, December 21, 2018.

[16] California Office of the Legislative Analyst, "Administration's Cap-and-Trade Report Provides New Information, Raises Issues for Consideration," Report 3445, April 15, 2016.