Decarbonizing the Power Sector

Are Feebates Better Than a Clean Energy Standard?

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Following the failure in 2010 to pass a comprehensive cap-and-trade bill to reduce carbon dioxide (CO_2) and other greenhouse gas emissions, the Obama administration and some in Congress are now focused, in particular, on a *clean energy standard* (CES). Under this approach, electricity producers would be required to meet a rising fraction of their generation using zero-carbon sources or sources with lower carbon intensity (defined as CO_2 emissions per kilowatt-hour [kWh]) than that of coal generation.

Although a CES would lower the carbon intensity of the power sector, it is typically viewed as a second-best approach relative to a well-designed, economywide cap-and-trade policy, as the latter promotes a broader range of behavioral responses to reduce CO_2 emissions across all sectors of the economy.

In some important economic and practical regards, however, a CES may be a better first step than the cap-and-trade proposals floated in Congress. In particular, it can

FEEBATES AT A GLANCE

What are feebates? This energy policy option has the potential to come out on top in terms of effectiveness and cost-effectiveness when compared to a clean energy standard for significantly reducing carbon emissions from the power sector. Feebates can be understood on a basic level by breaking down the term to its two components: fees and rebates. First, an average emissions level of carbon dioxide per kWh (or a ***pivot point***; see full story) is determined. Then, put simply, firms that generate power at above-average emissions intensity are charged a fee. Firms that do the job at below-average levels of emissions intensity are given a rebate or subsidy. The feebate option has a number of potential advantages, including its ability to be made (approximately) revenue neutral and facilitate comparison of policy stringency across countries.

be significantly more cost-effective and it avoids, at least initially, large increases in energy prices, which are a major political hurdle for emissions pricing policies. Nonetheless, policymakers should seriously consider a pricing alternative to a CES, known as a *feebate*, which involves fees for generators with above-average emissions intensity and subsidies or rebates for those with below-average emissions intensity. Feebates are a potentially more effective, and cost-effective, policy than a CES for decarbonizing the power sector.

Cap-and-Trade versus CES

As long recognized in the literature on climate policies, a potentially important problem with cap-and-trade systems is that they create a large amount of allowance revenue. It is important that this be used productively, in particular by auctioning allowances and using the revenue to alleviate distortions from the broader fiscal system.

To understand this, consider how broader fiscal instruments affect the economy. Personal income and payroll taxes cause distortions by reducing the overall level of work effort below levels that would maximize economic efficiency, by lowering the returns to labor force participation, effort on the job, accumulation of skills, and so on. Similarly, personal taxes paid on dividend and capital gains income, and taxes at the corporate level on investment returns, cause distortionary effects by reducing capital accumulation. And generous tax preferences in the fiscal system, such as tax exemptions and deductions for employer-provided medical insurance and home ownership, further warp the economy by creating a bias toward tax-favored spending and away from ordinary spending.

Emissions pricing policies potentially interact with these sources of preexisting distortion in two important, but offsetting, ways. First, revenues resulting from an emissions permit auction, or from a carbon tax, could be used to reduce taxes on labor and capital income—offering a relatively large source of economic efficiency gain by alleviating distortions from the broader fiscal system. Second, however, the overall level of economic activity will contract in response to higher energy prices, leading to a (slight) reduction in work effort and capital accumulation, exacerbating the costs of preexisting taxes on labor and capital income.

These linkages with the broader fiscal system have two key implications for ranking different policies on cost grounds.

There is a large cost savings from emis-

sions pricing policies that exploit revenues to reduce tax distortions (what we term "revenue recycling") versus pricing policies that do not take advantage of this effect, for example, by returning the revenues in lump sum transfers to households.

Without the benefits of revenue recycling, emissions pricing policies may not be superior to a CES on cost-effectiveness grounds. This is because emissions pricing policies have a bigger impact on energy prices, and hence can further amplify preexisting tax distortions.

These implications are borne out in a recent RFF study by Parry and Williams (2011). They looked at several policies to reduce domestic, energy-related CO_2 emissions by 8.5 percent (about 0.5 billion tons) in 2020 below levels otherwise projected to occur for that year (this is about the level of domestic reductions projected under federal cap-and-trade proposals). Under cap-and-trade policies with free allowance allocation (or a carbon tax with revenues returned in lump-sum transfers) the estimated average cost per ton reduced is $91 (in current dollars). In contrast, under a carbon tax or cap-and-trade scheme with full allowance auctions, where revenues are used to cut distortionary income taxes, average costs are actually slightly negative (as a result of large gains from cutting other taxes when they distort both factor markets and create distortionary tax preferences). Parry and Williams also examined a CO_2 intensity standard for the power sector, which is similar to a CES in that it promotes fuel switching without a large increase in electricity prices. This policy represents an intermediate case, with average costs of $29 per ton reduced.

In short, the revenues created by carbon taxes or under cap-and-trade are potentially problematic. They need to be used to cut distortionary taxes (or used in other

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ways that yield comparable economic efficiency benefits) for these instruments to be unambiguously better on cost-effectiveness grounds than a CES and similar policies. If not, then well-designed policies to lower the emissions intensity of the power sector could be the better way forward, at least for the scale of energy-related CO_2 reductions envisioned for the medium term.

There are caveats here. One is that a CES may not be well designed in practice (for instance, it could be designed with limitations on credit-trading provisions—see below), with a resulting loss of cost-effectiveness. Another is that the relative differences in the average costs per ton of different instruments, caused by their interactions with the tax system, become less pronounced as the goal for CO_2 reductions becomes more ambitious. A third, related point is that there are limits to the reductions in CO_2 that a CES can deliver compared to a cap-and-trade or carbon tax policy because a CES offers less of an incentive for energy conservation and would only apply to the electricity sector. So, pushing the CES hard could, beyond some point, result in a rapid escalation of costs compared to a cap-and-trade policy.

Nevertheless, important practical obsta-

cles associated with higher energy prices are holding up emissions pricing policies and the current political environment seems to favor a CES-type approach for the time being. One such obstacle is competitiveness and the related issue of emissions leakage. As energy prices rise in response to climate policy, firms trading in global markets with energy-intensive production processes (steel, aluminum, and cement, for example) suffer a loss of competitiveness and may relocate some of their activities to countries without emissions pricing policies. Measures to address capital flight, however, such as taxes or permit requirements imposed on embodied carbon in imported products (with symmetrical rebates for exported products), are contentious because of problems measuring carbon content and possible conflicts with international trade obligations.

Similar issues arise in the context of distributional impacts. CO_2 emissions-pricing policies are regressive (that is, the burden of higher energy prices, relative to income, is greater for poor households than for wealthy households) because lower-income households tend to spend a relatively larger portion of their income on energy. Under emissions pricing policies, complicated compensation schemes could be designed to address some of these regressive effects (for example, using revenues to fund tax cuts that disproportionately benefit the poor), though these schemes typically lower the economic efficiency benefits from revenue recycling.

In short, to the extent that competitiveness and emissions leakage are concerns for the near term (and until emissions pricing becomes more prevalent in other countries), a CES may be favored over a cap-and-trade or carbon tax policy because the former results in less of an energy price increase. And until carbon taxes can be implemented as part of a broader fiscal package that has some progressive elements (like scaling back tax preferences favoring the wealthy), distributional concerns might be better addressed through a CES or other policy that avoids large increases in energy prices.

A clean energy standard may be favored over a cap-and-trade or carbon tax policy because it results in less of an energy price increase.

CES versus Feebate

Although we have discussed some potential merits of a CES, some potential pitfalls exist in the details of design (rather than the general concept). In fact, a feebate could be a more promising approach.

A feebate—a term taken from the literature on applying rebates to vehicles that more than meet a fuel economy standard and a fee applied to vehicles with fuel economy worse than the standard—would have two elements in the context of the electricity sector. First, a price on CO_2 emissions. Second, a *pivot point* level of CO_2 per kWh. Firms with emissions intensity (averaged across their portfolio of generation plants) in excess of the pivot point would pay a fee calculated based on CO_2 price, emissions per kWh beyond the pivot point, and their electricity generation (in kWh). Conversely, firms with CO_2 per kWh below the pivot point would receive a rebate or subsidy based on a similar calculation. The policy can be made revenue-neutral (approximately) by setting the pivot point in one year equal to the average observed CO_2

per kWh in the previous year. The feebate approach has several potential advantages over a CES.

For starters, the incremental costs of reducing CO_2 are automatically equated across different generators, promoting a cost-effective allocation of emissions reductions within the power sector at a given point in time. Another attraction of the feebate is that it automatically handles changes in the future costs of different generation technologies or fuel prices. If, for example, the future expansion of nuclear power is temporarily held up, firms would be permitted a higher emissions intensity (at the expense of paying more fees or receiving fewer rebates); under a strict CES they would be required to meet a given emissions intensity standard, regardless of costs. Conversely, if the competitiveness of wind power improves, firms are rewarded for exploiting this opportunity and further cutting their emissions under a feebate system; with a CES, they have no incentive to do better than the emissions intensity standard.

By establishing a fixed price on CO_2 emissions, moreover, a feebate facilitates comparison of policy stringency across countries. This price could be set in line with estimates of the (global) environmental damages from CO_2 (currently about $21 per ton, according to a recent review across U.S. agencies and subsequent use in U.S. regulatory impact analyses [U.S. Interagency Working Group on Social Cost of Carbon 2010]) or prices prevailing in the European Union's Emissions Trading. Finally, designing a transitory compensation scheme to improve feasibility by helping coal-intensive generators should be straightforward under a feebate system, where the future emissions price is known, rather than under a CES where the emissions price is revealed later on during credit trading.

Today, without either an auctioned cap-and-trade system or a revenue-neutral carbon tax in place, a serious and reasonably comprehensive effort on behalf of the United States to begin scaling back CO_2 emissions is urgent, not only for its own sake, but also to undermine excuses for delaying emissions-reduction programs in other countries. A CES could, under certain conditions, be more cost-effective and less contentious than a tax or cap-and-trade program. Policymakers would be wise to also consider a feebate applied to power sector emissions, which could strike a better balance between cost-effectiveness and political realities than a CES.

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FURTHER READING

Parry, Ian W.H., and Roberton C. Williams III. 2011. Moving U.S Climate Policy Forward: Are Carbon Taxes the Only Good Alternative? Discussion paper 11-02. Washington, DC: Resources for the Future.

U.S. Interagency Working Group on Social Cost of Carbon. 2010. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Washington, DC: United States Government.

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