

## **Are Tradable Emissions Permits a Good Idea?**

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## **Contents**

<b>Green Tax Swaps and the “Double Dividend” .....</b>	<b>2</b>
<b>Revenue-Raising vs. Non-Revenue-Raising Policies .....</b>	<b>3</b>
<b>Distributional Implications .....</b>	<b>6</b>
<b>Further Considerations in the Choice Among Market-Based Instruments .....</b>	<b>7</b>
<b>Conclusion .....</b>	<b>8</b>
<b>Recommended Reading .....</b>	<b>10</b>

## Are Tradable Emissions Permits a Good Idea?

Ian W.H. Parry\*

Economists have long advocated the use of market-based policies to achieve environmental objectives. These policies include taxes on the waste emissions of firms, and programs in which the government limits pollution by issuing emission permits that can be traded among firms. Market-based approaches allow firms to reduce pollution at lowest cost, unlike command-and-control regulations that specify which technology firms must use.

But recent research suggests there can be a strong case on both economic and distributional grounds for using emissions taxes or auctioned emissions permits rather than programs in which permits are given out free or grandfathered to firms. One issue has to do with how environmental policies can exacerbate distortions in labor markets created by the broader tax system. A recent study by Parry et al. (1999) suggests that the economic costs to the United States of meeting its carbon emissions target under the original Kyoto Protocol would more than double when the costs of reduced employment are taken into account. In contrast, much of this extra social cost could be offset by emissions taxes and auctioned permits if revenues from these policies were used to reduce income taxes

Furthermore, a study by the Congressional Budget Office (2000) suggests that if grandfathered permits were used to reduce carbon emissions, low-income households might be worse-off by several hundred dollars per year while wealthy households could be better-off by around \$1,500 per year. Grandfathered permits create windfall gains for shareholders, who are concentrated in high-income groups, because such policies hand out a valuable asset (sellable permits) to firms for free. There is no windfall gain to wealthy households under auctioned permits or emissions taxes; instead, the government obtains revenues that can be recycled in tax reductions that benefit everyone or disproportionately favor the poor.

Policymakers are currently debating proposals to implement nationwide tradable permit programs for nitrogen oxide and mercury, and to strengthen the existing allowance trading program for sulfur dioxide. Indeed, because of its prominence in proposals that deal with climate

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change, the tradable permits approach pioneered by the United States is now receiving a great deal of attention throughout the world as a possible tool for managing greenhouse gas emissions. The rest of this article discusses in more detail why policymakers should think twice before agreeing to give away allowances for free rather than selling them.

### **Green Tax Swaps and the “Double Dividend”**

To understand how environmental policies interact with the broader fiscal system, it is helpful to start with the so-called “double dividend” hypothesis. The idea behind this hypothesis is that revenues from environmental taxes or auctioned emissions permits could pay for cuts in labor taxes such as income and payroll taxes, thereby increasing employment (as employment benefits improve via reduced taxes, more people will opt to work) and reducing pollution at the same time. The double dividend issue is particularly salient in the context of climate change policies, where the revenue potential is so large.

Suppose the United States was to recommit to its pledge under the initial Kyoto agreement to reduce annual carbon emissions to 7% below 1990 levels—1.16 billion tons—by 2010. This might be achieved by a tax on the carbon content of fossil fuels anywhere from \$50 to \$150 per ton of carbon, depending on whether the United States could buy credits for carbon reductions overseas. If, for example, the carbon tax were \$75 per ton, then the revenues raised would be approximately \$90 billion per year—about one-sixth of all federal receipts from personal income taxes.

But on closer inspection, the links between environmental taxes and the broader tax system are more complex. Environmental taxes raise the cost of business for firms that produce products and, in this way, they act like a tax on economic activity. This means that, prior to revenue recycling, the levels of production and employment are lower than they would be in the absence of the emissions tax. For the economy as a whole, these employment effects might be barely noticeable, but they are still large enough to offset—and more than offset, according to most studies—the employment gains from recycling emissions tax revenues in labor tax reductions. In short, environmental taxes need to be justified on environmental grounds, not on the dubious claim that they increase employment.

## Revenue-Raising vs. Non-Revenue-Raising Policies

Tradable permits also raise firms' production costs and reduce economic activity. If a polluting firm increases production, it must either buy permits to cover the extra emissions or forgo sales of its own permits to other firms; either way, there is a financial penalty for producing polluting output. Consequently, grandfathered permits have adverse effects on employment in the same way that emissions taxes do, but permits forgo the potential benefit from revenue recycling. This has two important policy implications.

First, in terms of economic efficiency, society is better-off under emissions taxes or auctioned permits than under freely allocated permits, so long as revenues are recycled in other tax reductions. Tax economists have estimated that for each dollar of revenue used to reduce income taxes, there will be a gain in economic efficiency of approximately \$.20 to \$.50. Lower income taxes increase employment and also reduce distortions in the pattern of expenditure between ordinary spending and tax-favored spending, such as owner-occupied housing and employer-provided medical insurance. In the carbon example above, the United States might be better-off to the tune of \$20 billion to \$45 billion per year if a carbon tax or auctioned permits were used rather than grandfathered permits.

Second, the economic costs of grandfathered permits can be substantially higher than previously thought. According to Parry et al. (1999), the cost to the United States of meeting the initial Kyoto target by a system of grandfathered permits imposed on fossil fuel producers rises from roughly \$25 billion per year to approximately \$55 billion (in current dollars) when the permits' effect on compounding tax distortions is included.

In fact, taking account of fiscal interactions might compromise the ability of grandfathered permits to generate overall net benefits for society (see Table 1). Suppose, for the sake of argument, that the global environmental damages from carbon emissions, such as the economic damage to world agriculture from climate change and the costs of protecting valuable land against a rising sea level, were \$70 per ton. (This is actually on the high side compared with most damage studies, though the estimates are subject to much dispute.) The initial Kyoto target for the United States would have reduced carbon emissions by approximately 630 million tons in 2010, yielding annual environmental benefits of approximately \$45 billion in current dollars.

Using the above cost figures, if we ignored fiscal interactions, the grandfathered permit scheme would produce estimated environmental benefits of \$20 billion in excess of costs;

however, with fiscal interactions, the policy fails the cost-benefit test—at least for 630 tons of abatement—as the costs exceed environmental benefits by \$10 billion. Only the emissions tax or auctioned permit policies pass the cost-benefit test when allowance is made for fiscal interactions, producing net benefits of \$10 to \$35 billion.

**Table 1. Illustrative Calculations of the Implications of Fiscal Interactions**

Policy goal	Instrument	Annual costs (\$ billions.)		Annual environmental benefits (\$ bl.)	Benefits minus costs (\$ bl.)
		Without fiscal interactions	With fiscal interactions		
Original target for U.S. carbon emissions under Kyoto Protocol	Grandfathered permits	25 <sup>a</sup>	55	45 <sup>b</sup>	-10
	Emissions tax/auctioned permits	25 <sup>a</sup>	10-35	45 <sup>b</sup>	10-35
Meet 50% sulfur reduction target	Grandfathered permits	1.0 <sup>c</sup>	1.7	10 <sup>d</sup>	8.3
	Emissions tax/auctioned permits	1.0 <sup>c</sup>	1.2	10 <sup>d</sup>	8.8

<sup>a</sup> Assumes carbon tax or permit price of \$75 per ton.

<sup>b</sup> Assumes benefits of \$70 per ton.

<sup>c</sup> Assumes sulfur tax or permit price of \$200 per ton.

<sup>d</sup> Assumes benefits of \$1,000 per ton.

Sources: Burtraw et al. (1998), Goulder et al. (1997), Parry et al. (1999), and author's own calculations.

Fiscal interactions do not always have such striking implications for the economic performance of environmental policies, however. Consider grandfathered sulfur dioxide permits,

which reduced power plant emissions by about 50%, or 10 million tons. The annual benefits from the program, mainly from reduced mortality, have been measured at more than \$10 billion per year. Estimates of the annual costs of the program, including fiscal interactions, are much lower: around \$1.7 billion under the existing grandfathered scheme or \$1.2 billion if the permits were auctioned rather than grandfathered. Regardless of whether permits are auctioned or not, estimated benefits swamp the costs for the sulfur dioxide program (see Table 1).

If environmental taxes or auctioned permits were to be implemented, is it plausible that the revenues would, in fact, be used to cut other taxes? Apparently yes, at least in European countries. For example, Denmark recently introduced a package of taxes on sulfur dioxide, carbon dioxide, fossil fuels, and electricity. The revenues raised amount to approximately 3% of gross domestic product and have been used to lower personal and payroll taxes and to provide tax incentives for energy efficiency. One potential obstacle to green tax shifts, however, is the conflicting objectives of different government agencies. An environmental agency would typically be concerned about setting rates to meet a particular environmental goal, without regard to revenues. In contrast, the Treasury might be more concerned about revenues, regardless of whether environmental taxes lead to under- or over-shooting of environmental objectives. Box 1 discusses the implications of not using environmental tax revenues to cut other taxes.

### **Box 1. Alternative Uses of New Revenue Sources**

Suppose that revenues from environmental taxes or auctioned permits were used to reduce the federal budget deficit. This would lead to a smaller carryover of the national debt, implying that taxes in the future need not be as high to cover debt interest and repayment of principal. There is still an economic gain from lower taxes, although it occurs in the future rather than the present.

What if the revenues were used to finance additional public spending? The bulk of federal spending consists of transfer payments such as Social Security, or expenditures that effectively substitute for private spending, such as medical care and education. Loosely speaking, the private benefit to people from \$1 billion of this type of spending is \$1 billion dollars. But the benefits to society may be higher if, for example, the spending is achieving some distributional objective, such as a safety net for the poor. If revenue-financed cuts in distortionary taxes are enacted, households get the \$1 billion back and, on top of this, there is a gain in economic efficiency as the distortionary effect of taxes on employment are reduced. Thus, the social benefits from extra transfer spending could be larger or smaller than the benefits from cutting taxes, depending on the particular spending program.

Governments also provide public goods such as defense, crime prevention, and transportation infrastructure that, for various reasons, private firms may not provide. People may or may not value \$1 billion of this type of spending at more than \$1 billion. If they do, the benefits from this form of revenue recycling may also be as large or larger than the benefits from reducing taxes.

### **Distributional Implications**

Policymakers also may be concerned about the effects of environmental policies on different household income groups. Unfortunately, environmental and distributional objectives often appear to be conflicting. Several studies suggest that the burden on households from environmental regulations imposed on producers such as power plants, refineries, and vehicle manufacturers are moderately regressive. That is, the increase in product prices as producers pass on the costs of regulations tends to hurt lower-income groups disproportionately, because these groups spend more of their income on polluting products than better-off households.

But distributional concerns should not be used as an excuse for avoiding action on serious environmental problems. Pollution control measures should mainly be evaluated by weighing

their environmental benefits against the economic costs for society as a whole. Distributional objectives are much better addressed through altering the progressive nature of the income tax system or providing a safety net via the benefit system. However, to achieve a given environmental objective, it still makes sense to use an instrument that is more benign with respect to income distribution rather than one that might redistribute income from the poor to the better off.

In this regard, grandfathered emissions permits suffer an important drawback when compared to other instruments. When the government gives away rights to pollute, firms acquire an asset with market value that enhances their net worth. In turn, the increase in firms' equity values leads to more income for shareholders, either directly through higher dividends and capital gains or indirectly through their holdings in retirement accounts. Stock ownership is highly skewed towards the rich: the top income quintile owns approximately 60% of stocks, holding them in individual holdings and retirement instruments such as 401(k)s and IRAs, while the bottom income quintile owns less than 2%. Using annually allocated grandfathered permits to meet the United States' original carbon pledge under Kyoto could transfer more than \$50 billion each year in pre-tax income (as higher retirement assets) to the top income quintile. This means that higher-income groups can benefit greatly from grandfathered permits (their windfall gains easily outweigh their real income losses from higher product prices) while poor households become worse-off. According to a study by the Congressional Budget Office (2000), using grandfathered permits to reduce U.S. carbon emissions by 15% would reduce the annual real spending power of the lowest income quintile by \$530 per household while simultaneously boosting that for the top income quintile by \$1,810 per household.

In contrast, auctioned emissions permits or emissions taxes do not create windfall gains for shareholders. Instead, the government obtains revenues that can be returned to households either in a distributionally neutral manner, such as providing proportional reductions in all marginal income tax rates, or in ways that disproportionately benefit the poor, such as increasing personal allowances.

### **Further Considerations in the Choice Among Market-Based Instruments**

One reason why emissions permits—whether auctioned or not—might be preferable to an emissions tax is that the emissions reduction a given tax rate might induce may be unknown in

advance. Suppose, for example, that an environmental agency wishes to prevent pollution in a lake from exceeding a certain threshold, one beyond which the lake will be very harmful to aquatic life or unsuitable for recreational purposes. If firms must obtain permits for each unit of emissions put into the lake, the agency can keep pollution below the threshold by placing appropriate limitations on the total availability of permits. Under an emissions tax, where the amount of pollution abatement that will be induced is initially uncertain, the agency will be in the uncomfortable position of having to adjust and readjust the emissions tax to ensure that the pollution target is eventually attained.

On the other hand, an emissions tax puts a ceiling on economic costs: if abatement is very costly to firms, they will avoid it and instead pay a larger tax bill. But under a permit scheme, firms as a group are forced to reduce pollution because of the limited number of permits, no matter how costly the required abatement turns out to be. These considerations have led some economists to recommend a hybrid policy, or “safety valve.” With this scheme, a limited number of permits would be issued with the aim of hitting a desired environmental goal, but the government would sell additional permits if the permit price and the cost to the firm of abatement reached an unacceptably high level. That way, the stringency of the environmental goal is relaxed somewhat if abatement costs turn out to be particularly large.

Finally, there is the obvious political appeal of grandfathered permits. Firms are worse-off if they have to buy all their emissions permits from the government or pay a tax on all their emissions than if they receive a free allocation of emissions permits. Consequently, politicians are more likely to lose votes or contributions from stakeholders in these firms if they support taxes or auctioned permits. Even so, at least in the context of carbon policies, work by Goulder (2000) suggests that only a small portion of permits need to be grandfathered to prevent the profits or equity values of energy firms from falling: the government could still auction most of the permits without making these firms worse-off.

## **Conclusion**

There is a potentially strong case on both economic and distributional grounds for using auctioned permits or emissions taxes instead of grandfathered permits. The argument depends on the revenues raised being used efficiently—for example, paying for cuts in other distortionary taxes rather than pork-barrel spending projects—and in a way that provides benefits to all

households rather than just the better off, such as providing broad income tax reductions rather than cuts in the estate tax. The case for auctioning permits is particularly striking in the context of carbon policies, under which potential annual government revenues might approach \$100 billion. In Washington, D.C., however, new taxes, even if introduced in a revenue-neutral fashion, are not on the agenda. If the choice is between grandfathered emissions permits or nothing, what should be done?

In other policy contexts, such as the sulfur-trading program, grandfathered permits appear to be a good idea, in spite of the drawbacks emphasized here. Even in the context of climate policies, in my view, a system of grandfathered carbon permits, appropriately scaled, would be preferable to doing nothing. For one thing, tradable permits provide incentives for the development of cleaner production methods, offering the hope that the next generation of Americans will be substantially less dependent on fossil fuels than the current one. Moreover, as people become more receptive to the idea of tradable permits over time, it is conceivable that the government may hold back an increasing portion of the annual carbon allowances for auctioning.

**Recommended Reading**

Burtraw, Dallas, Alan Krupnick, Erin Mansur, David Austin, and Deidre Farrell. 1998. Costs and Benefits of Reducing Air Pollutants Related to Acid Rain. *Contemporary Economic Policy* 16: 379–400.

Cropper, Maureen L. and Wallace E. Oates. 1990. Environmental Economics: A Survey. *Journal of Economic Literature* 30:675–740.

Congressional Budget Office. 2000. *Who Gains and Who Pays Under Carbon-Allowance Trading? The Distributional Effects of Alternative Policy Designs*. Washington, DC: Congressional Budget Office (June).

Goulder, Lawrence H. 2000. Confronting the Adverse Industry Impacts of Carbon Dioxide Abatement Policies: What Does it Cost? Issues brief No. 23, Washington, DC: Resources for the Future.

Goulder, Lawrence H., Ian W.H. Parry, and Dallas Burtraw. 1997. Revenue-Raising vs. Other Approaches to Environmental Protection: The Critical Significance of Pre-Existing Tax Distortions. *RAND Journal of Economics* 28:708–31.

Harrison, David, Jr. 2001. *Tradable Permit Programs for Air Quality*. Cambridge, MA: National Economic Research Associates.

Kopp, Raymond, Richard Morgenstern, William Pizer and Michael Toman. 2000. A Proposal for Credible Early Action in US Climate Policy. Available at [www.weathervane.rff.org/features/feature060.html](http://www.weathervane.rff.org/features/feature060.html).

Parry, Ian W.H. and Wallace E. Oates. 2000. Policy Analysis in the Presence of Distorting Taxes. *Journal of Policy Analysis and Management* 19:603–614.

Parry, Ian W.H., Roberton C. Williams, and Lawrence H. Goulder. 1999. When Can Carbon Abatement Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets. *Journal of Environmental Economics and Management* 37:52–84.

Portney, Paul R. and Robert N. Stavins. 2000. *Public Policies for Environmental Protection*. 2nd ed. Washington, DC: Resources for the Future.

*A comprehensive bibliography on tradable emissions permits is available at Professor Tom Tietenberg's website: [www.colby.edu/personal/t/ttieten/](http://www.colby.edu/personal/t/ttieten/)*