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Voluntary versus Mandatory Approaches to Climate Change Mitigation

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Executive Summary

U.S. policy on climate change throughout the Clinton and Bush administrations has promised mandatory controls on greenhouse gases (GHGs) but delivered voluntary programs instead. Clinton proposed a carbon tax upon taking office, but domestic political resistance to it, as well as to the Kyoto Protocol, proved overwhelming. As a result, Clinton's Climate Change Action Program put forward a wide range of voluntary programs designed to provide technical assistance and favorable publicity to companies that improved their energy efficiency. During his presidential campaign, Bush promised to regulate carbon dioxide emissions, but this pledge was abandoned when he took office in favor of a mix of research funding, tax credits, and the creation of early reduction credits for firms that can credibly demonstrate reductions in GHG emissions. Recently, Senators McCain and Lieberman have renewed the call for mandatory GHG controls.

This Issue Brief presents a general framework for understanding the relative performance of voluntary and mandatory approaches to mitigating climate change, and applies the framework to the climate change policies of the last two U.S. administrations. Because voluntary programs provide modest government subsidies in the form of technical assistance and publicity, companies find them much more palatable than pollution taxes or the auctioning of tradable pollution permits. However, economic analysis shows that voluntary programs cannot achieve the same level of environmental protection as mandatory programs. Hence, government-sponsored voluntary programs are best understood as weak instruments adopted when political resistance blocks the implementation of more powerful mandatory controls. Furthermore, if a voluntary program appears likely to follow the defeat of proposals for mandatory programs, then industry has increased incentive to expend resources fighting mandatory controls. Over the longer horizon, though, voluntary programs may lessen the costs to industry of complying with

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mandatory controls and hence may ultimately pave the way for political acceptance of more stringent mandatory policies.

Early reduction credits (ERCs) are a special case of a voluntary program for mitigating climate change. These credits would be awarded to firms that implement projects to reduce GHG emissions and would be exchangeable for tradable permits if and when a mandatory cap-and-trade program is created in the United States. Compared with a cap-and-trade system, early reduction credits require the creation of a complicated system that invites "gaming" by participants. Because ERCs do not make use of the price system, incentives for reducing GHG emissions will not be transmitted fully throughout the economy.

Furthermore, the failure to price out the environmental costs of GHG emissions makes it necessary to create separate tiers for the two kinds of reductions—improvements in energy efficiency by energy producers, and reductions in absolute energy use by energy consumers. Each type of reduction must then be measured against a baseline "business as usual" level of emissions whose true value is known only to the firm claiming the credit; hence incentives for misrepresentation of the baseline level are a concern. When they improve the energy efficiency of their products, manufacturers of intermediate goods, such as tires, will have incentives to expend political resources jockeying for claims to ERCs rather than allowing them to flow to buyers. Issuance of ERCs will crowd out government revenues that could be collected by auctioning emissions permits.

For all of these reasons, an ERC system promises to be weaker and more costly than an immediate move to a cap-and-trade system with a generous initial cap. Consistent with the general framework presented earlier, voluntary programs appear to be weak instruments adopted when political resistance blocks the implementation of more powerful mandatory plans.

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Introduction

Despite the U.S. government's consistent rejection of the Kyoto Protocol on Climate Change, pressures for stronger action continue to mount. Ratification of the Kyoto Protocol is one (Russian) vote away from creating a worldwide, legally enforceable system of controls on carbon dioxide, methane, and other greenhouse gases (GHGs). Meanwhile, multinational companies press forward with programs to reduce their GHG emissions, and a market in greenhouse gas reductions has emerged: Ford, Dupont, BP America, and 25 other large companies have created the Chicago Climate Exchange to provide an institution for the trading of greenhouse gas reductions. According to Richard Rosenzweig of NatSource, an environmental trading company, between 1996 and 2001, roughly 55 million tons of carbon emissions were traded, and more than 100 million additional tons have been traded since 2001. The World Bank's Prototype Carbon Fund expects to acquire more than $150 million in carbon assets by the end of 2003. The United Kingdom has already launched the first economy-wide control plan for greenhouse gases. Worldwide, it is hard to avoid the impression that the demand for action on global climate change is growing.

U.S. policy on climate change throughout the Clinton and Bush administrations has promised mandatory controls on greenhouse gases (GHGs) but delivered voluntary programs instead. President Clinton proposed a carbon tax upon taking office, but domestic political resistance to it, as well as to the Kyoto Protocol, proved overwhelming. As a result, Clinton's Climate Change Action Program put forward a wide range of voluntary programs designed to provide technical assistance and favorable publicity to companies that improved their energy efficiency. During his presidential campaign, Bush promised to regulate carbon dioxide emissions, but this pledge was abandoned when he took office in favor of a mix of research funding, tax credits, and early reduction credits for firms that can credibly demonstrate reductions in greenhouse gas emissions. Recently, however, Senators McCain and Lieberman have renewed the call for mandatory GHG controls.

In light of the ongoing importance of climate change and the very different policy responses being discussed around the world, this Issue Brief presents a clear and simple framework for thinking about mandatory and voluntary approaches to dealing with the issue.

2. A Framework for Understanding Voluntary Environmental Programs

Since the Earth Summit in Rio de Janeiro in 1992, voluntary approaches to environmental improvement have become increasingly popular around the world. Timber companies participating in the Sustainable Forestry Initiative have made voluntary commitments to environmentally friendly forest management programs. Large industrial firms joined the U.S. Environmental Protection Agency's 33/50 Program, which called for voluntary reduction in emissions of certain toxic chemicals by first 33% and then 50%, relative to a 1988 baseline. The French government has worked with major automobile manufacturers to create a voluntary program for recycling end-of-life vehicles. German industry has entered into a voluntary agreement with the German government to reduce carbon dioxide emissions. British Petroleum has committed itself to cutting greenhouse gas emissions by 10%, relative to its 1990 emissions levels.

A growing body of research has emerged that is beginning to provide a comprehensive framework for understanding these new voluntary efforts and, somewhat more slowly, to develop empirical assessments of how well these programs perform. The Organisation for Economic Co-operation and Development classifies voluntary programs into three broad categories:

- *Unilateral initiatives* by industry, sometimes referred to as self-regulation, are typically seen as attempts to ward off regulatory threats. They may also produce a range of ancillary benefits, however, including improving the morale of employees, wooing environmentally sensitive consumers and investors, and influencing future regulatory programs. Self-regulation can avoid the costly process of passing legislation and implementing regulations and give industry flexibility to meet environmental goals in a cost-efficient manner. Unilateral initiatives can be found in countries around the world.
- *Negotiated agreements* are also a means of averting a regulatory threat, but the government, by participating in the negotiation process, can make a clear policy statement and can push industry to go beyond what it would have done on its own

initiative. Some European negotiated agreements, for example, make it clear that an environmental tax will be imposed if industry fails to achieve certain goals on its own. Negotiated agreements are much more common in Europe and Japan than in the United States.

- *Public voluntary agreements* (PVAs) are primarily a U.S. phenomenon. These programs typically involve government provision of technical assistance in meeting environmental goals, government-sponsored publicity for firms with outstanding environmental records, and information sharing between participating firms. The Energy Star program is among the most visible of these programs. It began as the Green Lights program, which helped companies make the shift to more energy-efficient lighting systems, and has evolved into a wide-ranging set of programs that encompass homes, commercial buildings, and industrial operations.

Since PVAs are the approach of choice in the United States, it is worth providing more detail about their performance and how it compares with that of a mandatory policy like a tradable permit program. This analysis is based on a forthcoming model by Lyon and Maxwell (see For Further Reading).

2.1 The Simple Economics of Mandatory versus Public Voluntary Programs

Greenhouse gases come from many sources. The single largest source is the production of electricity. Electricity-generating units vary greatly in their environmental performance. Hydropower and nuclear power emit essentially no greenhouse gases. At the other end of the spectrum, coal-burning power plants—especially older, less efficient units—emit large volumes of GHGs. In between are plants burning natural gas. Utilities can reduce their emissions of carbon dioxide by adopting various types of abatement technologies. These are costly to implement, but some plants can achieve abatement at substantially lower cost than others.

Decisions on how to deal with emissions at any particular industrial plant must balance the economic benefits the plant provides—in terms of jobs, earnings for stockholders and consumer benefits—against the environmental impact of the plant. At a simple level, we can think of all plants as falling into one of three categories:

1. *Dinosaurs*: These are plants whose economic benefits are worth less than the cost of the environmental damage they cause. Society as a whole would be better off if these plants

were shut down altogether. The environmental improvement thus obtained would more than offset the lost profits to owners of the firm.

2. *Survivors:* These plants produce economic benefits that outweigh the environmental damage they cause, but they do not have the potential for great environmental improvements. On balance, society benefits from allowing them to continue to operate.
3. *Leaders:* These plants are efficient industry leaders that can cost-effectively implement abatement technology that will significantly reduce their impact on the environment. Society obtains both economic and environmental benefits from these units and should encourage them to adopt new technologies for cutting emissions.

With these three categories in mind, it is possible to compare the performance of a mandatory system of tradable permits against the performance of a public voluntary program, focusing on how each group is affected.

The Economics of Tradable Permits

A cap-and-trade program involves defining a maximum level of emissions from the sectors to be covered, and issuing permits (according to some allocation rule) to firms, thereby granting these firms "property rights" in a certain level of emissions. Firms can freely trade the permits among themselves. Firms that do not have enough permits to cover their current emissions levels can either take internal measures to reduce emissions or purchase permits from firms that have more than enough. If one firm can abate more cheaply than another, there is an opportunity for mutually beneficial trade, in which the low-cost firm sells permits to the firm with higher abatement costs. A market for permits then develops, with the price determined by supply and demand. The presence of a permit market ensures that abatement is undertaken by the firms that can abate at lowest cost.

A permit system forces firms to incorporate the environmental consequences of their emissions into their cost structure and uses the price system to transmit information about this environmental cost throughout the economy. To ensure that the price system is put to its full use, permits should be issued as far "upstream" as possible—that is, based on the carbon content of fossil fuels at their point of extraction. Businesses and consumers in all sectors of the economy that rely on fossil fuels will then face prices that reflect how their purchases affect the earth's climate and will begin to adjust their behavior accordingly. This is obviously much simpler than a "downstream" system requiring motorists to obtain permits for their

automobile emissions. If emissions permits are auctioned by the government, then the permit system will have the added benefit of generating government revenue that can be used to reduce taxes on income or sales.

Consider the broad range of actions that are coordinated through the creation of a uniform price for GHG emissions. Electric utilities have incentives to improve the efficiency of their generation units and to switch from old, inefficient, coal-fired units to newer gas-fired units with lower levels of GHG emissions per kilowatt-hour of electricity produced. Electricity consumers have incentives to reduce their consumption by installing more energy-efficient lighting and appliances. Drivers have incentives to reduce their consumption of gasoline by walking, bicycling, car-pooling, taking public transportation, or switching from gas-guzzling sport utility vehicles to gas-sipping hybrid-powered sedans. Tire manufacturers have incentives to introduce new tires with reduced rolling resistance, knowing that they will appeal to drivers wishing to reduce their driving costs. Landfill operators have incentives to tap the methane generated by decaying garbage and convert it to electricity, simultaneously reducing the need to purchase electricity from their local electric utility and freeing up methane permits that can be sold on the GHG market. This kaleidoscope of activity is, of course, just the familiar beauty of the marketplace celebrated some 200 years ago by Adam Smith.

Return now to the three groups of firms discussed above. Each is affected differently when pollution carries a price tag. If the price of pollution is set equal to the level of environmental damage, then the Dinosaurs will be induced to shut down. Although society loses the economic benefits these plants earn, this loss is more than outweighed by the social gain from reduced pollution. Survivors will continue to operate without installing abatement technology but will purchase emissions permits, potentially generating government revenue that can offset the need for other taxes. Finally, Leaders adopt new abatement technology and sell permits to others. This benefits society by creating a cleaner environment.

The Economics of Public Voluntary Agreements

Consider now the economic effect of a public voluntary agreement. PVAs typically involve government provision of technical assistance, access to specialized software, publicity for firms that adopt abatement technology, and sponsorship of technical conferences at which participating firms can exchange information about cost-effective means of pollution control. These benefits can be thought of as a small positive inducement to encourage firms to adopt

the abatement technology—an in-kind subsidy, if you will, or an economic carrot to reward good behavior.

How does a PVA affect the three groups of firms we are considering? Dinosaurs are unaffected by the subsidy; even with government assistance, these plants cannot afford to adopt leading-edge abatement technology, but neither are they forced to exit the industry. Similarly, Survivors are not affected by the PVA; they, too, cannot afford to adopt new abatement technology, nor are they required to purchase permits. Only the Leaders change their behavior. At least some of these firms will find the government assistance enough to induce them to adopt new abatement technologies. The need to raise (costly) government funds to finance the PVA program, however, means that the assistance will not be enough to achieve all desirable environmental improvements. Fewer firms will adopt new abatement technologies under the PVA than under a tradable permit system, which does not rely on public funds to create carrots rewarding good behavior.

The Economic Effects of Cap-and-Trade versus Voluntary Programs

From the foregoing discussion, it is easy to see that a cap-and-trade system (CAT) is an inherently more powerful regulatory instrument. Because it the price system serves as both stick and "carrot", a CAT approach affects all three groups of firms. It induces the closure of inefficient Dinosaurs, can collect auction revenues from moderately efficient Survivors that must buy permits, and induces new abatement efforts by efficient Leaders. The PVA, in contrast, has no impact on Dinosaurs and Survivors, induces abatement only by Leader firms, and diverts tax revenues from other government programs. Furthermore, even among the efficient Leaders, the PVA induces less adoption than do tradable permits. Because the PVA is a carrot, the funding for which must come from other programs or higher taxes, its cost in public funds increases the cost of achieving abatement and reduces the number of firms that can be induced to abate. In short, the combined stick and "carrot" of a CAT system has a more powerful effect on corporate behavior than does the carrot of a PVA program. Table 1 summarizes the effects of these two types of programs.

Table 1: Economic Effects of Alternative Approaches to Climate Change Mitigation

	Cap-and-Trade System	Voluntary Program
Does it induce firms to switch from old, dirty plants to new, clean ones?	Yes	No
What effect does it have on the government budget?	Positive if permits are auctioned; neutral otherwise	Negative
Does it induce efficient firms to adopt new abatement technology?	Yes	Yes, but less than CAT

2.2 The Politics of Cap-and-Trade versus Voluntary Programs

Although tradable permits are inherently more powerful instruments than PVAs, they have a serious drawback: they are less politically popular, especially if permits are auctioned rather than given away. A permit system that significantly reduces overall emissions imposes costs upon all groups of plants: those that exit, those that pay for permits, and those that purchase new abatement technology. The tighter the cap, the more political resistance can be expected from the industry. Thus, from a policymaker's perspective, there is no guarantee that a CAT system can be passed by the legislature. Indeed, the more stringent the proposal, the less chance it will pass. Since even the attempt to pass new legislation is costly, policymakers may decide that it is simply not worthwhile to spend the political resources necessary to push a CAT proposal against industry resistance.

In some situations, then, it may make more sense for policymakers to pursue a voluntary approach, especially if the costs to industry of a mandatory program like the proposed carbon tax are expected to be high. Thus, voluntary programs have a role in the regulator's toolkit, even though they are less effective than mandatory programs. Unlike unilateral industry initiatives, which tend to emerge in the shadow of a strong regulatory threat, PVAs tend to emerge in the *absence* of a strong regulatory threat. They are weak tools useful when political resistance makes stronger tools unworkable.

In addition to their general weakness, public voluntary programs have a further drawback: they strengthen incentives for industry to lobby against mandatory programs. If industry believes that a government assistance program will be forthcoming should a CAT proposal be defeated, the benefits of fighting the CAT proposal grow and its chance of passage falls. Not only does the prospect of a voluntary program encourage firms to divert resources from making things to lobbying for government benefits, it reduces the chance of passing effective legislation.

All of the above concerns notwithstanding, there may be interesting dynamic relationships between voluntary and mandatory programs. For example, a president may propose a pollution tax, and if the proposal fails, pursue a set of voluntary programs. This is exactly what happened to the carbon tax proposal of the Clinton administration: it was eventually scuttled and replaced with a set of voluntary programs. From another perspective, voluntary programs may serve to reduce the political resistance to future pollution taxes or CAT systems. Since public voluntary programs are essentially a modest subsidy, firms that participate in a PVA are effectively being subsidized to adopt new abatement technology. Once they have done so, they have less incentive to oppose new legislation. Thus, over the longer horizon, voluntary programs may pave the way for more stringent mandatory programs.

3. Applying the Framework to Climate Change

This section uses the framework of section 2 to understand the progress of climate change policy in the United States. It begins by discussing President Clinton's failed efforts to pass a carbon tax, and the voluntary programs he proposed instead. It then turns to President Bush's approach to dealing with climate change, with a special focus on early reduction credits.

3.1 Clinton, the Carbon Tax, and the Climate Change Action Plan

After President Clinton was elected in November 1992, he announced support for stronger measures to mitigate climate change. In the early months of 1993, his administration floated a variety of proposals to tax energy, including a carbon tax and a broader-based Btu tax based on the energy content of fuels as measured in British thermal units. The political response, summarized by Michael Winer in the *International Herald Tribune* (June 15, 1993), was fast and powerful:

> A cadre of lobbyists began to plot the death of President Clinton's energy tax in December 1992—a month before Clinton took office and two months before he submitted the tax plan to Congress…Jerry Jasinowski, president of NAM [National Association of Manufacturers]…helped organize a group of 1400 lobbies, dubbed the American Energy Alliance. The NAM, the U.S. Chamber of Commerce, and the American Petroleum Institute footed most of the bill…Behind the scenes, groups lobbied successfully for exemptions…By June, what had been a fair, across-the-board tax was riddled with loopholes…Lacking any clear popular support for the BTU tax, and facing defeat in the Senate, the White House threw in the towel and withdrew its proposal.

When the administration presented its Climate Change Action Plan later in the year, the focus had shifted from mandatory regulations to financial subsidies (including $200 million per year to stimulate the adoption of more energy-efficient technologies) and voluntary programs. Among the voluntary programs were Green Lights, Climate Wise, Motor Challenge, and Energy Star Buildings. Firms participating in these programs received several benefits. They were given case studies detailing the cost savings of program participants. Program administrators commissioned outside consulting firms to provide technical information and organized seminars at which firms could exchange information about cost savings. Other benefits included access to question hotlines, free software, and access to databases of equipment suppliers and financing programs.

The environmental community was not impressed. Quoted in the *New York Times* (October 12, 1993), Alden Meyer, director of the program on climate change and energy at the Union of Concerned Scientists, argued that the plan placed too much emphasis on voluntary measures, "with no prospect of hammers or sticks to bring us into compliance if those don't work."

3.2 Bush and Early Reduction Credits for GHG Emissions Reductions

When President Bush was campaigning for office, he promised to regulate emissions of carbon dioxide. This was one of the first campaign pledges he abandoned upon taking office. Even some large U.S. companies were taken aback by the speed of Bush's reversal. The Bush administration, like the Clinton administration before it, quickly replaced its talk of a mandatory program with proposals for voluntary programs.

The administration's approach to climate change is organized around a stated goal of an 18% improvement in emissions intensity (emissions per unit of output) by 2012. This goal would be pursued through voluntary commitments by firms, tax credits for investments in renewable energy, research, and development into fuel-efficient transportation systems, and incentives for carbon sequestration. It would also build upon a program of voluntary reporting of GHG emissions that was created under section 1605(b) of the Energy Policy Act of 1992, clarifying the reporting requirements and creating a system of trading in emissions reductions.

Early reduction credits (ERCs) would be awarded to firms that implement projects to reduce GHG emissions and would be exchangeable for tradable permits if and when a mandatory cap-and-trade program is created in the United States. In a political setting where a CAT program seems distant, ERCs are appealing because they offer Leader companies an additional incentive for undertaking projects that reduce GHG emissions. They can be viewed as a subsidy designed to encourage voluntary reductions of GHG emissions. Thus, the ERC program can be seen as a special case of the more general framework presented earlier. It also possesses unique features that are worth discussing in detail.

Early reduction credits are defined against a "business as usual" baseline. Firms that can credibly demonstrate that they have reduced their GHG emissions below the baseline level are awarded ERCs that can be traded. Primary energy producers are considered sources of direct emissions. Consumers of electricity, however, do not emit any GHGs directly, so they are considered sources of "indirect" emissions. To create incentives for both kinds of sources to improve their efficiency, separate systems must be created. Direct sources obtain credits for *improvements in energy efficiency*—that is, for reductions in GHG emissions per unit of energy produced. To be tradable, these reductions must be translated into reduction in levels of absolute emissions. Indirect sources obtain credits for *reductions in energy consumption.* This sets up a bit of a dilemma. The simplest system would measure energy consumption directly, but then declining industries would find it easier to obtain ERCs than would growing industries. An alternative is to normalize energy consumption by units of output, which requires the construction of counterfactual business-as-usual forecasts as baselines.

For both direct and indirect emissions sources, the creation of business-as-usual baselines involves forecasting. Clearly the sources themselves have better information about their situations than do outsiders, and thus there emerges the possibility that they will "game" the forecasts to obtain greater ERCs. This could be done, for example, by projecting greater

energy use than would really have been expected, and by claiming ERCs for "anyway" reductions—reductions that would have occurred without any additional action on the part of the source. Gaming would inflate the volume of credits issued.

The distinction between direct and indirect sources of emissions leaves out firms that do not quite fit into either category, namely those that manufacture products that affect the energy consumption of end-users. Consider, for example, automobile tires. A firm in this sector might reduce the rolling resistance of its tires, thereby increasing the overall fuel efficiency of cars using these tires. Buyers of the tires would then claim "indirect" reduction credits. However, the firm might prefer to claim the credits itself, rather than allowing them to flow to buyers. It is not hard to imagine many similar situations in which firms would jockey for claims to indirect reduction credits.

The benefit of ERCs is that they encourage GHG reductions earlier rather than later, but the costs of ERCs depend on the structure of any future cap-and-trade system. The largest impact would occur if the future CAT system involved the auctioning of emissions permits. In this case, issuance of ERCs that could be redeemed for future permits would crowd out government revenues from future permit auctions. This could make the implicit costs to the government of an ERC program much higher than they look at first glance.

For all of the above reasons, an ERC system promises to be weaker and more costly to operate than an immediate move to a cap-and-trade system with a generous initial cap. This finding is consistent with the general framework presented earlier, in which voluntary programs are seen as weak instruments adopted when political resistance blocks more powerful mandatory plans.

3.3 The McCain-Lieberman Bill

On January 9, 2003, Senators John McCain and Joseph Lieberman introduced Senate Bill 139, which outlines a mandatory program for climate change mitigation. The bill would establish a cap-and-trade system for greenhouse gas emissions starting January 1, 2010. During the first six years of the program, the cap would be set at the level of GHG emissions in 2000, but in 2016 the cap would be lowered to the 1990 emissions level. Emissions allowances would be fully tradable and would be allocated at no cost to major industrial sectors based on their share of emissions in 2009. The bill would incorporate a provision for ERCs that could be converted into allowances after 2010.

According to a recent analysis by Pizer and Kopp (2003), the bill would lead to emissions reductions of approximately 860 million metric tons of carbon dioxide equivalent in 2010. The bill is thus less stringent than the Kyoto Protocol (which would require reductions of 2 billion metric tons in 2010) but more rigorous than the Bush administration's stated goal of an 18% reduction in GHG intensity (which would amount to about a 350 million metric ton reduction in 2012).

Since the bill includes both a period of ERCs and then a transition to mandatory controls, it will incur the transaction costs of creating two separate measurement and trading systems, as described in section 3.2 above. The ERC component of the bill may also induce industry to focus on investments that can produce short-term reductions at the expense of investments that might produce greater long-term efficiencies in reductions. Nevertheless, as discussed in section 2.2, the ERC system may play an important political role by providing a mechanism that eases the transition to a mandatory permit system.

4. Conclusions

This Issue Brief has argued that voluntary programs for climate change cannot be expected to perform as well as mandatory programs and has explained why, using a simple framework for understanding the basic economics of the two approaches.

Researchers have recognized the problems with ERC programs for some time. For example, Parry and Toman (in press) use arguments similar to those laid out above to argue for a generous early cap rather than an ERC system. Kennedy (in press) shows how ERC systems may distort the investment incentives of companies, inducing too much focus on investments that can produce quick emissions reductions at the possible expense of investments with longer-term but potentially greater payoffs. The primary rationale for an ERC system appears to be its political value as a means for softening political resistance to a mandatory cap-and-trade system.

In the United States, political resistance to climate change legislation may still be overwhelming. Yet the increasing number of self-regulatory actions by major multinational companies throw this conventional wisdom into question. Furthermore, they raise the ironic possibility that it will be corporate America that drags the U.S. government into the international system of greenhouse gas controls.

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