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# The Institutional Blind Spot in Environmental Economics

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## Abstract

Economic approaches are expected to achieve environmental goals at less cost than traditional regulations, but they have yet to find widespread application. One reason is the way these tools interact with existing institutions. The federalist nature of governmental authority assigns to subnational governments much of the implementation of environmental policy and primary authority for planning the infrastructure that affects environmental outcomes. The federalist structure also interacts with the choice of economic instruments; a national emissions cap erodes the additionality of actions by subnational governments. Even the flagship application of sulfur dioxide emissions trading has been outperformed by the venerable Clean Air Act, and greenhouse gas emissions in the United States are on course to be less than they would have been if Congress had frozen emissions with a cap in 2009. The widespread application of economic tools requires a stronger political theory of how they interact with governing institutions.

**Key Words:** environmental federalism, additionality, emissions cap, Clean Air Act, sulfur dioxide, carbon dioxide

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# The Institutional Blind Spot in Environmental Economics

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## Introduction

At least among economists, one often-heard lament is that those who develop and implement environmental policy rarely follow economic advice. Economics also has something to say about the efficient stringency of environmental policy, but most economists readily appreciate that efficiency, such as it is measured, is just one among many criteria to be considered. However, after a policy goal is established, economists typically feel confident that economic approaches to environmental policy can help achieve the goal at less cost, which should be good for everyone.

Why then are economic methods not the central tools for implementation of environmental policy? One reason may be that these tools have been developed in an intellectual laboratory that, for the most part, is free from consideration of institutions that influence how they will be used. These institutions include the agencies that implement regulations, the broader legal structure of business and government, and existing regulations. Economic authors sometimes argue that sweeping away existing prescriptive standards in favor of economic tools would yield more cost-effective results, which is possible. Many other interested parties believe that confidence in this outcome requires full consideration of the broader institutional setting. Economic methods may not work exactly as anticipated, in part perhaps because institutional influences are not addressed in most economic writing. To resolve this issue, economic discourse must incorporate a more sophisticated understanding of institutions (broadly defined) than is usually achieved.

In this discussion paper, I consider three institutional relationships that strongly influence how economic tools can be used in environmental policy. One such institution is the federalist nature of governmental authority, especially with respect to issues central to the management of the environment and natural resources. Arguably, economic instruments may not provide

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adequate incentives for behavioral responses by subnational authorities that are responsible for infrastructure planning. A second issue is how this federalist structure interacts with the economic alternatives of cap and trade versus emissions fees; an emissions cap eliminates the additionality of subnational efforts, which could have an important effect on local initiatives. Third, another core institution is the venerable Clean Air Act. I conclude by comparing the effectiveness of economic instruments versus regulation under the Act in the context of mitigating emissions of sulfur dioxide and greenhouse gases. Even compared to the flagship example of sulfur dioxide trading, regulation under the Act has done more to achieve emissions reductions since 1990, and greenhouse gas emissions in the United States are on course to be less than they would have been if Congress had enacted cap and trade in 2009. Economic tools offer the promise of substantial cost savings, but the advantages are not likely to be embraced until there exists a stronger political theory of how they interact with institutions on national and subnational levels.

### **The Role for Incentives**

The straightforward axiom that incentives affect behavior leads economists to emphasize how various policy designs might provide incentives with intended as well as unintended consequences. Consider, for example, the introduction of a standard that mandates efficient technology for new capital purchases. Such standards are prevalent, ranging from fuel efficiency standards for new vehicles to performance standards for new power plants, and their motivation is clear: it is typically less expensive to adopt efficient (nonpolluting) technology at the time something is first built than to try to improve its performance in the future. If capital has a long lifetime, the consequence of a technology choice may have long-term environmental consequences. Unfortunately, such a policy is likely to raise the initial cost of new investment, providing an incentive to delay investment and extend the life of existing capital. This result is perverse because new investment, even if it lacks state-of-the-art technology, is likely to be more efficient than existing capital. Consequently, the emissions standard might actually cause emissions to increase, at least in the short run.

The dilemma for regulators in this case is how to promote the adoption of state-of-the-art technology without providing incentives for deviant or unintended responses. Economists have an answer: use prices to provide incentives for investors to align their actions with social interests. In principle, a set of prices that accurately reflects the damage from various investment choices, including the continued operation of an existing facility, will accomplish just that. But

honestly, after providing a recommendation like that, economists like me often feel our work is done. We offer guidance that is logical and compelling. Why does it not just happen?

One obvious answer is that the status quo has its own constituency. In any context, a change in the rules will create losers who will act to obstruct such a change. More deeply, though, existing rules and institutions strongly affect our ability to implement new ideas. Although sometimes institutions can be painfully recalcitrant, it might be useful to think of them as the watchtowers that protect the precedents and values of previous social decisions.

A relevant core institution is the federal structure of governance in the United States. Most economic analysis focuses on national policy within a uniform model of governance and implicitly assumes the harmonization of climate policies at the subnational level. However, harmonization is not guaranteed; the design and implementation of policy in a federal union will diverge in important ways from policy in a unitary government. Economic advice built on the assumption of a unitary model of governance may not achieve the expected outcome in a federal system because of interactions with policy choices made at the subnational level and because choices at the subnational level are so important to the success of the policy. Most economic analysis suffers from a lack of understanding of how price incentives are transmitted to markets through levels of government. For instance, the way in which environmental prices would propagate through and provide incentives for the consumers and producers of electricity varies importantly among states that have regulated cost-of-service versus competitive electricity markets.

We have even less understanding of how price signals under a national policy directly affect other layers of government. There is evidence that mobile resources such as labor and new capital investment move to jurisdictions that are less expensive and/or provide better services, which provides an economic incentive for efficient government. Similarly, when facing a national emissions price, a locality has the incentive to choose a cost-effective response. But the myriad layers of institutional authority mean that the response of individual bureaus may not be efficient or timely. Local officials will face a trade-off between price signals and the local preferences of incumbent consumers and businesses. Generally, local regulatory institutions are organized to modify the influence of price signals, not to transmit or amplify them. For instance, in land-use planning, private parties are expected to respond assertively to the profit motive, and local regulators are expected to moderate and channel that motive to the benefit of the entire community, including incumbent residents in particular.

To understand this issue, especially in the context of climate policy, requires consideration of what state and local governments do. Local governments conduct a variety of functions with substantial environmental consequences that federal authorities could not possibly provide based on the information available to them.<sup>1</sup> For example, local authorities decide the alignment of streets and building footprints and implement building standards that affect heating and cooling needs, and they determine land use and transportation systems that influence where people live in relation to their work. The sum of these subnational activities pervasively shapes the long-lived infrastructure that will constrain our options to address issues such as climate change for decades into the future. The influence on the global climate, in the aggregate, is profound.

### **Federal Relationships Affect Outcomes**

Some of the models of economic approaches to climate policy consider the role for subnational economic policies, such as cap and trade or emissions fees at the state level, but virtually all ignore the planning function at the subnational level.<sup>2</sup> The implicit assumption is that in the face of mobile capital and households, the price signal will efficiently influence economic behavior throughout the economy. However, local planners and policymakers may respond slowly or only partially to the direct incentives of price signals stemming from the national emissions-quantity constraint. The primary concern of their constituents is likely the preservation of the status quo and protection of values associated with existing land use. Perhaps surprisingly, in the local planning process it is typically developers and builders who take the role of innovator, and they often encounter substantial friction at the local planning department. Indeed, an individual homeowner who wants to introduce innovative architecture or align a house differently to maximize solar gain is likely to encounter stiff resistance if that design detracts from the neighborhood norm.

Compound layers of agency exist between national-level policy, fuel markets, and local decisionmakers. Information asymmetries between multiple layers of government imply that a cost-effective outcome is dependent on decentralized policies and behavior such as could occur

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<sup>1</sup> Dallas Burtraw and William Shobe, "Rethinking Environmental Federalism in a Warming World," *Climate Change Economics* (forthcoming 2012).

<sup>2</sup> Robertson C. Williams III, "Growing State-Federal Conflicts in Environmental Policy: The Role of Market-Based Regulation," *Journal of Public Economics* (forthcoming 2012).

on a subnational level. Hence, state and local governments are uniquely positioned to implement many aspects of an overall climate strategy. The institutional question is whether a price signal would provide incentive for these governmental actors to do so.

Unfortunately, we do not know much about how responsive local authorities will be to a modest market signal associated with the introduction of pollution prices; modest changes in fuel prices have not prompted much response in most jurisdictions. Is it surprising, then, that many people discount the likely effectiveness of economic prescriptions such as prices? Instead, polling shows that the public holds a general preference for regulatory approaches in constructing climate policy.<sup>3</sup>

One can anticipate that economic forces will ultimately influence local tastes in planning functions. The difficulty is that one may have to wait for prices to rise high enough and persist long enough to evoke changes in infrastructure investment, and then wait decades longer for new infrastructure to take shape broadly. If one's concern is climate change, the process may feel like too long of a wait because, in the meantime, local decisions using conventional planning tools continue to lay the foundation that constrains society's options for decades to come. Legal scholar Holly Doremus and economist Michael Hanemann have argued that a price signal created by a national cap-and-trade policy is not salient enough to induce all the behavioral changes necessary to achieve the desired emissions reductions in an efficient and timely manner.<sup>4</sup> They explicitly invoke a federalist model calling for price-based policies at the national level to be joined to regulatory policy that would be developed by subnational authorities.

### **Subnational Policy Is Effectively Preempted under an Emissions Cap**

Leaving aside whether subnational levels of government are responsive to price signals in the market in a timely way, there are other aspects of the economic prescription for national environmental policy that typically do not anticipate how those signals are transmitted and received or what incentives they provide. A persistent parlor question in economic thinking is the relative advantage of cap and trade versus an emissions tax. For the most part, economic advice

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<sup>3</sup> Brent Bannon, Matthew DeBell, Jon A. Krosnick, Ray Kopp, and Peter Aldhous, "Americans' Evaluations of Policies to Reduce Greenhouse Gas Emissions," June 2007, [http://woods.stanford.edu/docs/surveys/GW\\_New\\_Scientist\\_Poll\\_Technical\\_Report.pdf](http://woods.stanford.edu/docs/surveys/GW_New_Scientist_Poll_Technical_Report.pdf); accessed June 18, 2012.

<sup>4</sup> Holly Doremus and W. Michael Hanemann, "Of Babies and Bathwater: Why the Clean Air Act's Cooperative Federalism Framework Is Useful for Addressing Global Warming," *Arizona Law Review* 50 (2008): 799–834.



considers the two approaches fairly equivalent, with nuanced issues favoring one or the other policy in the face of uncertainty about benefits or costs.<sup>5</sup> The answer to this question almost never addresses the influence of each instrument within a federalist system of governance. However, the two approaches are dramatically opposed when it comes to transmitting incentives to affect behavior by subnational levels of government.

Under an emissions cap, because maximum emissions are fixed at the national level, the actions of subnational government cannot affect the overall level of emissions. Although described as an emissions cap, such a policy is also effectively an *emissions floor* because any effort to reduce emissions by one entity, including state and local governments or private parties, does not affect the overall level of emissions.<sup>6</sup> With an emissions cap, efforts to reduce emissions by one party make possible additional emissions by another party. The emissions floor undermines the incentive for state and local governments to adopt measures unilaterally that may contribute to local emissions reductions because leakage of emissions to other jurisdictions would be 100 percent. In effect, a cap-and-trade program at the national level preempts efforts to achieve additional emissions reductions at the local level.

In contrast, the same issues do not arise under a national emissions fee. A jurisdiction with a greater willingness to pay for emissions reductions could adopt ancillary measures that would result in additional reductions. Unlike under a quantity constraint, net reductions in emissions can be achieved.

Economic advice typically has not considered the interaction of policy design at the national level with the incentive or need for subnational action. If one believes prices to be perfectly salient and that the national government can set the optimal policy, there is no role for subnational action; one effectively embraces a unitary model of government. After a goal is established at the national level, the actions of subnational units of government are determined by the change in prices. However, if prices are not perfectly salient, then the ability of policy to provide incentives to subnational levels of government is important. A tax instrument at the national level would have strong advantages over cap and trade in this regard.

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<sup>5</sup> Martin L. Weitzman, "Prices vs. Quantities," *The Review of Economic Studies* 41 (1974): 477–491.

<sup>6</sup> Dallas Burtraw and William M. Shobe, "State and Local Climate Policy under a National Emissions Floor," Discussion Paper 09-54 (Washington, D.C.: Resources for the Future, 2009); Lawrence H. Goulder and Robert N. Stavins, "Challenges from State-Federal Interactions in U.S. Climate Change Policy," *American Economic Review* 101 (2011): 253–257.

This example illustrates that new ideas are usually not born fully formed and can have their own unanticipated outcomes. Few advocates of a cap-and-trade program have anticipated that this approach is likely to diminish greatly the incentives for local innovation in climate policy. Whether this characteristic is a disadvantage or not depends on one's point of view, but the fact that it is generally unappreciated in economic discourse could legitimately cause many advocates to favor more traditional approaches over new and untested ones.

### **Regulation Has Contributed Fully Half of SO<sub>2</sub> Emissions Reductions Since 1990**

Traditional approaches to regulation under the Clean Air Act are disparaged by many economists for their inefficiencies. But for environmental advocates, a remarkable attribute of the Act is that it provides a safety ratchet promoting incremental environmental progress without backsliding. Perhaps surprisingly, this is evident even where economic approaches have ostensibly had their greatest influence—the innovation of emissions allowance trading for sulfur dioxide. Indeed, the sulfur dioxide trading program is trumpeted for providing a cost-effective implementation of substantial reductions in emissions and is the leading example of the use of economic instruments in environmental policy.<sup>7</sup>

The trading program was statutorily created in the Clean Air Act Amendments of 1990 and led to cost reductions of roughly 40 percent compared to traditional approaches under the Clean Air Act.<sup>8</sup> However, the program had what literally became a fatal flaw: namely, an inability to adjust to new scientific or economic information. Though information current in 1990 suggested that benefits of the program would be nearly equal to costs,<sup>9</sup> by 1995 there was strong evidence that benefits were an order of magnitude greater than costs.<sup>10</sup> Today the Environmental

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<sup>7</sup> Gabriel Chan, Robert Stavins, Robert Stowe, and Richard Sweeney, “The SO<sub>2</sub> Allowance-Trading System and the Clean Air Act Amendments of 1990: Reflections on 20 Years of Policy Innovation,” *National Tax Journal* 65 (2) (2012): 419–452.

<sup>8</sup> Curtis Carlson, Dallas Burtraw, Maureen Cropper, and Karen Palmer, “SO<sub>2</sub> Control by Electric Utilities: What are the Gains from Trade?” *Journal of Political Economy* 108 (6) (2000): 1292–1326. A. Denny Ellerman, Paul L. Joskow, Juan-Pablo Montero, Richard Schmalensee, and Elizabeth M. Bailey, *Markets for Clean Air: The U.S. Acid Rain Program* (New York: Cambridge University Press, 2000).

<sup>9</sup> Paul R. Portney, “Economics of the Clean Air Act.” *Journal of Economic Perspectives*, 4(4) (1990): 173-181.

<sup>10</sup> Dallas Burtraw, Alan J. Krupnick, Erin Mansur, David Austin and Deirdre Farrell, “The Costs and Benefits of Reducing Air Pollutants Related to Acid Rain,” *Contemporary Economic Policy*, Vol. 16 (1998): 379-400.

Protection Agency would argue that benefits are more than thirty times the costs.<sup>11</sup> Unfortunately, to change the stringency of the program requires an act of Congress, at least according to the D.C. Circuit Court.<sup>12</sup> The Act locked in the emissions cap, and despite several legislative initiatives to change the stringency of the trading program, none have been successful.<sup>13</sup>

The failure to amend the statute is emblematic of the limitation of legislative actors to finely manage scientific information, a role that is usually left to expert agencies. If the nation's fate with respect to sulfur dioxide emissions were left to Congress, tens of billions of dollars in additional environmental and public health costs would have been incurred in the last few years and into the future. Fortunately, the inability of Congress to act was backstopped by the regulatory ratchet of the Clean Air Act that triggers a procession of regulatory initiatives based on scientific findings that have been effective in shaping investment and environmental behavior in the electricity sector.

The sulfur dioxide cap-and-trade program was intended to reduce sulfur dioxide emissions from power plants from anticipated levels of 16 million tons per year to 8.95 million tons per year by 2010. However, evidence based on integrated assessment suggests an efficient level would be just over 1 million tons per year.<sup>14</sup> In the absence of legislative action, regulatory initiatives have taken effect and driven emissions from power plants to 5.157 million tons, as measured in 2010. By 2015, the Clean Air Interstate Rule and the Mercury and Air Toxics Standard will further reduce emissions to 2.3 million tons per year. In doing so, the emissions constraint under the 1990 Clean Air Act amendment has become irrelevant, and the price of those tradable emissions allowances has fallen from several hundred dollars a ton to near zero.

The sulfur dioxide cap-and-trade program is the flagship example of the use of economic instruments in environmental policy. However, since its adoption in 1990, although the sulfur dioxide trading program gets most of the credit in textbooks, more than half of the emissions

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<sup>11</sup> Lauraine G. Chestnut and David M. Mills, "A Fresh Look at the Benefits and Costs of the U.S. Acid Rain Program." *Journal of Environmental Management*, 77(3) (2005): 252–266.

<sup>12</sup> *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008).

<sup>13</sup> Dallas Burtraw and Sarah Jo Szambelan, "U.S. Emissions Trading Markets for SO<sub>2</sub> and NO<sub>x</sub>," in *Permit Trading in Different Applications*, ed. Bernd Hansjürgens, Ralf Antes, and Marianne Strunz (New York: Routledge, 2010).

<sup>14</sup> Spencer Banzhaf, Dallas Burtraw, and Karen Palmer, "Efficient Emission Fees in the U.S. Electricity Sector," *Resource and Energy Economics* 26 (3) (2004): 317–341; Nicholas Z. Muller and Robert Mendelsohn, "Efficient Pollution Regulation: Getting the Prices Right," *American Economic Review* 99 (5) (2009): 1714–1739.

reductions that have and will occur are due to regulation. Without the Clean Air Act in place, the flagship program in emissions trading would have left unrealized substantial benefits to public health and the environment.

### **CO<sub>2</sub> Emissions Are on Course to Meet Copenhagen Targets and May Be Lower Than If Waxman-Markey Had Passed**

The sulfur dioxide experience highlights a central controversy in contemporary proposals to use price-based approaches (cap and trade or an emissions fee) to mitigate greenhouse gas emissions in the United States: that is, the possible preemption of the Clean Air Act. In general, there are redundant mechanisms and overlapping regulations under the Act, a structure sometimes referred to as “belts and suspenders.” If one mechanism fails, another mechanism can fill in. With adoption of the sulfur dioxide trading program, many economists (including me) clamored initially that other regulations under the Act were unnecessary, inefficient, and raised costs; but ultimately they delivered substantial public health and economic benefits. What would be the fate of the Act under national climate policy?

The most prominent proposal, H.R. 2454 (also known as the Waxman-Markey Bill), was introduced in the 111th Congress, passing in the House but not in the Senate in 2009. It not only would have instigated a system with 100 percent leakage for subnational efforts to reduce emissions, effectively preempting those efforts (as discussed above); it would have preempted specific aspects of the Clean Air Act as well. Representatives Waxman and Markey have recently proposed an alternative price-based policy in the form of an emissions fee to address climate concerns; other commentators have suggested that such a proposal might be more likely if it included preemption of greenhouse gas regulation under the Clean Air Act.<sup>15</sup>

The possibility raises several questions. Would a national price on greenhouse gas emissions make the Clean Air Act’s authority to regulate greenhouse gases irrelevant? How do the two approaches compare with respect to climate goals? Could the slow ratchet of the Clean Air Act regime achieve emissions reductions as great as could be achieved under a price-based policy? In fact, it appears it might.

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<sup>15</sup> Ted Gayer, “Linking Climate Policy to Fiscal and Environmental Reform,” in *Campaign 2012* (Washington DC: Brookings, 2012).

The Energy Information Administration's (EIA) modeling of H.R. 2454 projects U.S. emissions in 2020 to be about 10.2 percent below 2005 emissions levels. (The year 2005 was the benchmark year for emissions covered under H.R. 2454.) About 40 percent of these reductions would contribute to the emissions bank under cap and trade and would reappear in later years as actual emissions, leaving permanent emissions reductions within the United States of about 6 percent below the benchmark. The contribution of offsets, from both within and outside the United States, would have made up the difference between emissions reductions in the United States and President Obama's Copenhagen commitment to make reductions in the neighborhood of 17 percent.

Reductions in the electricity sector arising from greater use of natural gas would have occurred with H.R. 2454 also, but because *the emissions cap is an emissions floor*, they would not directly result in equivalent emissions reductions. Instead, the price of emissions allowances would fall. Indirectly, there may have been a smaller purchase of international offsets and the realization of more emissions reductions onshore, but to a large extent the emissions reductions would be crowded out by lower allowance prices, making it less costly to emit elsewhere in the economy. Additional policies to reduce greenhouse gas emissions that may have still occurred under H.R. 2454, such as increased fuel economy standards and California's emissions reduction goal, would similarly be crowded out by lower allowance prices under a greenhouse gas cap-and-trade program.

What will happen given the legislative defeat of H.R. 2454? The Clean Air Act regime remains in place, and three factors contribute to emissions reductions under this regime. First, substantial impacts have come from subnational policies that would have effectively been preempted by 100 percent leakage under a national emissions cap. California's goal embedded in state law requires emissions reductions of 80 million metric tons annually in 2020, equivalent to 1.3 percent of benchmark emissions at the national level. Reductions in other states, including the emissions cap for the nine-state Regional Greenhouse Gas Initiative, would be additional. Second, in its technical documents, the Environmental Protection Agency has identified opportunities at existing stationary sources to be pursued under the Clean Air Act totaling approximately 7.2 percent of benchmark emissions.<sup>16</sup> It is uncertain whether these reductions will be fully realized, but the legal and institutional dominoes are in place for this to occur.

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<sup>16</sup> Dallas Burtraw, Art Fraas, and Nathan Richardson, "Greenhouse Gas Regulation under the Clean Air Act: A Guide for Economists," *Review of Environmental Economics and Policy* 5 (2) (2011): 293–313.

Further, in the transportation sector, the 2007 vehicle standards were included in the EIA's baseline projections for H.R. 2454, but the 2011 standards, which take effect in 2017, will achieve additional reductions of approximately 200 million metric tons by 2020, or 3 percent of benchmark emissions. H.R. 2454 did not preempt the portion of the Clean Air Act addressing mobile source standards or the ability of California to set its own emissions reduction goal, so these policies might have emerged even if H.R. 2454 had become law. However, their emissions reductions would have largely been crowded out by emissions increases elsewhere, resulting in little change in domestic emissions given the overall national cap.

Finally, there is the influence of secular trends in the economy, including not only the recession but, more important, the reduction in natural gas prices that has resulted in a shift away from coal for electricity generation and the increasing influence of energy efficiency investments in reduce demand. These developments have led to additional reductions of 4.9 percent, compared to 2005 levels. Total reductions by 2020—accounting for changes due to subnational policy, regulatory actions under the Clean Air Act, and advantageous secular trends—are on track to yield emissions reductions of 16.7 percent relative to 2005 levels.

The anticipated emissions reductions under the Clean Air Act regime exceed those reductions within the United States that would have occurred under cap and trade. It is noteworthy, to be sure, that the comparison ignores the contribution of emissions reductions abroad through the purchase of international offsets. Global emissions may have been lower with passage of H.R. 2454, but surprisingly in the domestic economy they likely would have been more than will occur under the Clean Air Act regime.

### **Economic Prescriptions Need a New Round of Thinking about Institutions**

Perhaps with the exception of economists, the enthusiasm of advocates for H.R. 2454 was not an endorsement of emissions pricing per se; rather, it was support for an overall limit on emissions and the legislative certainty of emissions reductions. The pathway under the Clean Air Act remains uncertain, and is not likely to be as efficient as would a national price on carbon, but it remains effective. The comparison invites a more circumspect consideration of the trade-offs in the potential creation of a new price-based institution for regulating greenhouse gases and addressing other environmental challenges.

Economic advice for the design of environmental policy emphasizes cost effectiveness, a criterion that is centrally important in facing the most challenging environmental issue of our time, climate change. A virtue of economic approaches is that they are typically simple and in

principle cost effective. However, for economic advice to reach its full influence requires consideration of the role of institutions and their complexity that determines how economic policies ultimately will function. The success of economic prescriptions for environmental policy depends on a new round of sophisticated thinking about institutions and how they interact with the policy tools at our disposal.