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Setting Climate Regulatory Targets in Emissions Trading Regimes

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This paper examines the design of climate regulatory targets in the context of a two-phase international institutional regime that relies on emissions trading as the primary regulatory tool for achieving GHG emissions reductions.[2] The L20 country leaders would play a key role in launching this regime and breaking the current global impasse over climate policy.

Even if Russia ratifies Kyoto and it enters into force, neither the United States nor major developing countries will join the Kyoto treaty-based structure of emission limitations commitments in the near future. In order to enlist these countries more fully in the climate protection effort, we need a new non-regulatory leadership focus and institutional structure that will reach beyond but not displace Kyoto and the UNFCCC. This paper proposes an inclusive, non-binding global framework for climate cooperation established and lead by the L20. It would be used to promote and monitor an array of international arrangements, including not only the Kyoto regulatory system but also bilateral and plurilateral agreements and programs among developed and developing countries for joint development and implementation of climate policies, technologies, and measures, including various emissions trading systems operating outside the Kyoto Protocol. It would also be used to promote greater focus on climate objectives in development assistance, consistent with developing country needs. The framework would include a mechanism for establishing non-binding long-term climate targets in the form of

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[2] This paper draws substantially on the arguments, analysis and evidence presented in Richard Stewart and Jonathan Wiener, Reconstructing Climate Policy: Beyond Kyoto (AEI Press, 2003).

emissions reduction pathways that would serve as a benchmark for motivating and gauging progress made by the various emissions reduction arrangements within this first-phase structure. The L20 leaders of major developed and developing countries would be the ideal group to launch and lead this new framework of cooperation.

This loose-knit polylateral regime would likely represent only a first phase. Eventually, as a result of international emissions trading markets, competitiveness concerns, and environmental imperatives, the different emissions trading programs and other regulatory elements in this plural regime would likely be merged or assimilated into an inclusive and truly global post-Kyoto cap and trade system. In this phase, a global GHG regulatory authority would establish long-term targets in the form of emissions reduction pathways and legally binding near-term targets in the form of emissions caps for a given commitment period set consistent with the long-term pathways. Both types of targets would be set with the objective of maximizing net global social benefits, based on a balancing of the costs and benefits of GHG emissions reductions. This approach is superior to negotiating successive near time targets ad hoc, without reference to longer term objectives, or basing the entire GHG regulatory program on achieving a single atmospheric stabilization target. But even after an inclusive global GHG regulatory system emerges, there would still be a need for an overarching institutional framework for promoting and coordinating non-regulatory aspects of international cooperation on climate. The L20 could continue to play the role of leading this regime.

Environmental Regulatory Targets: Basic Design Choices

In the domestic context, there has been substantial experience with three basic types of regulatory standards or targets: ambient quality standards, technology-based standards for limiting residuals discharge, and reductions of aggregate discharges.

Under the first approach, a target level of environmental quality is established, typically expressed in terms of the maximum level of permissible ambient concentrations of residuals (emissions, effluents, wastes, etc.) in a given environmental medium. Controls of discharges by sources, typically using a command and control approach, are then adopted and implemented to

achieve the target. The target level may be set solely by reference to health or environmental quality objectives without consideration of costs, as exemplified by the national ambient air quality standards under the U.S. Clean Air Act. Or, the target could be set by balancing the environmental benefits associated with alternative target levels and the social costs of achieving those targets.

Under the second, technology-based approach to targets, limitations on residuals discharges are adopted for categories of sources or activities, based on technological cost and feasibility (often using a "knee of the curve" approach), without any explicit linkage to overall environmental quality objectives. Under the third approach, aggregate reductions in residuals discharges are required for all covered sources or activities. While the level of reductions may be broadly based on environmental quality goals or considerations of cost and technology, regulatory implementation is not linked to these factors but to allocating the aggregate emissions limitation burden among individual sources through command prescriptions (perhaps supplemented with a credit trading system to provide flexibility) or through a cap and trade system.[3]

Each of these approaches to setting and implementing targets has advantages and disadvantages in terms of information-gathering and decision-making burdens, implementation and enforcement considerations, and economic efficiency. Many domestic environmental regulatory programs use a mix of approaches. It is not easy to extrapolate from domestic experience to the design of global climate regulation, both because of the very different international institutional context and the special features of climate problems, especially the very long time frames involved as well as the circumstance that GHG are emitted by such a wide variety of sectors and activities.

There has been little experience with international regulatory control of residuals on a global scale. The Montreal Protocol uses the third type of target: it schedules the phase-out or phase-down of aggregate total discharges of specific types of aggregate discharges of ODS

[3] A fourth approach is the use of environmental taxes. There has been no significant environmental regulatory program that has relied solely on such taxes, although they have been used as an add-on supplement to command systems.

residuals on various timetables; these targets have been negotiated based on considerations of technological feasibility and cost (including the availability of substitutes), and are implemented domestically by Parties primarily through command techniques. The Protocol states an overall aspirational goal of eventually eliminating all ODS discharges. The POPS Convention for the control of persistent organic pollutants uses a similar approach. Although both of these programs set targets based on limiting aggregate residuals, which is the basic approach of the UNFCCC/Kyoto and other GHG cap and trade systems, experience with these programs is otherwise not very helpful in setting climate regulatory targets because they deal with quite limited industry or activity sectors and generally aim for complete elimination of discharges over a short-to-medium time frame. By contrast, anthropogenic GHGs are emitted by many activities and sectors, can not be eliminated, and involve very long regulatory horizons. The relevance of experience under other important international pollution control agreements at the sectoral level, including technology-based standards to address dumping and oil pollution from ships and aircraft emissions, and at the regional level, including the Convention on Long Range Transport of Air Pollution and the OSPAR Convention on pollution of the North Sea, is similarly limited.

International GHG Regulation through Cap and Trade Systems

Regulatory targets can be designed only within the context of the basic regulatory institutional structure within which they operate. There are two compelling reasons for selecting emissions trading as the primary regulatory instrument for regulating GHG emissions. First, by taking advantage of the wide differences in marginal GHG reduction costs in different sectors and countries, emissions trading can achieve dramatic cost-savings relative to command and control approaches, including approaches using technology-based standards. Given the scale of the costs involved in serious GHG regulation, such cost effectiveness (which also requires use of a comprehensive approach, involving trading among different GHGs, and flexibility in the precise timing of emissions reductions) is essential to achieve wide international participation and ambitious reduction targets. While emissions taxes could, in theory, also achieve GHG reductions in a highly cost-effective manner, in the international context they suffer from severe practical limitations, including enforceability (countries will offset the burden of taxes on their industries through fiscal cushioning games) and difficulties in securing developing country

agreement to harmonized taxes at appropriate incentive levels. Second, emissions trading is extremely well-suited to attract participation by developing countries in emissions reduction programs by providing them with favorable allowance allocations (including "headroom" allowances) and mobilizing private sector capital and technology with the promise of additional capital inflows. Tax systems lack this key advantage.

The most desirable type of emissions trading to use for GHG regulation is a cap and trade system, which (particularly in the context of the medium to long term) enjoys much lower transaction costs than credit trading systems, including especially project-based trading systems such as the CDM. The circumstances that GHG mix globally and that the atmosphere is a common pool resource imply adoption of a single, globally inclusive cap and trade system. This was precisely the basic logic of the UNFCC and of the Kyoto Protocol, as a first step to a fully inclusive global regulatory system. The need for such a system is reinforced by free riding problems and competitiveness concerns. While this logic is impeccable, there are several overriding practical considerations that dictate use, as first phase, of a plurilateral approach involving a variety of trading and other regulatory and non-regulatory components. There is no near-term prospect that the United States and major developing country emitters will accede to Kyoto limitations or any similar arrangement. Also, given that we are at a very early stage in climate regulation, there is much to be said for regulatory diversity and experimentation. Regulatory decision-making in the Kyoto framework has been clogged by the UN approach and the inevitable caution of countries in committing to broadly applicable, legally binding arrangements that will likely be difficult to modify once adopted. The problems of the CDM are illustrative. Given the practical barriers to achieving an inclusive, well-functioning international GHG regulatory program on a top-down basis using a single blueprint, the use of a plurilateral approach as first phase makes a virtue of necessity.[4]

[4] Legal regulation of emissions through a cap and trade system is, to be sure, only one tool among several in a sound climate policy. At least five other strategies are also warranted and would be complementary to emissions limitations. First, investment in low-GHG technology research needs to be accelerated, in both the public and private sectors, including through cooperative international arrangements. Second, international development assistance should be directed to opportunities for producing climate benefits in conjunction with delivering local economic, environmental, and social economic benefits to developing countries. Third, government should identify and correct existing policies and institutional failures that blunt the economic incentives that producers and consumers would otherwise have to conserve energy and economize on net GHG emissions. These include perverse government subsidies that exacerbate fossil fuel extraction and clearing of forests. Fourth, information-based strategies, including public GHG reporting by governments, firms, and development assistance agencies, may also be useful as a means of generating incentives, especially in the early years before a full-fledged regulatory system is

Setting Targets in the Context of International Cap and Trade GHG Regulation

An international GHG cap and trade regulatory system must be based, at the operational level, on aggregate emissions limitations targets. The determination of individual countries' limitations burdens is achieved through an initial negotiated allocation, adjusted through subsequent trading. Such a system is incompatible with the use of technology-based targets or command requirements based on achievement of environmental quality standards. Environmental quality objectives, cost, and technology may, of course, enter into the selection of trading cap levels. As one option, cap levels may be explicitly linked to achievement of environmental quality objectives such as those set forth in Article 2 of the UNFCCC, discussed below.

A sound climate regulatory strategy must include both near-term and long-term targets. The demands of regulatory practicality, accountability, and credibility require that GHG emissions reduction targets be established and their achievement monitored for successive discrete time periods, such as five to ten years. These demands also require that countries and sources flexibility in the precise timing of reductions in order to promote cost-effectiveness. But, given the long-term character of climate problems and the GHG regulatory programs needed to address those problems, these periodic targets must be established in the context of longer term targets or goals that provide an analytical, normative and public reference point for setting successive near time targets. Basing near-term targets on long-term targets or goals is necessary to build and maintain long-term political support for regulatory programs, limit the extent of gaming in the redetermination of near-term targets, and provide a degree of longer-term regulatory guidance, assurance, and incentive for governments and firms that must make long-

implemented. Fifth, governments should invest in assisting societies to adapt to a changing climate. This assistance is especially needed for poorer and more vulnerable regions of the world, which lack affordable insurance or access to adaptive technologies. These elements would be included in the first-phase plural regime sketched above. The L20 framework could continue to provide a promotional and coordinating umbrella for these non-regulatory activities in the second phase of international GHG regulation after a comprehensive legally binding global regulatory regime has emerged.

term investments in GHG-reduction technologies and measures. In the first, plurilateral phase of the climate strategy proposed herein, non-binding long-term targets would be set by the L20 or a mechanism established by the L20. Short-term targets would be set by the component regimes and be evaluated and monitored by the L20 mechanism in light of the long-term target. In the second phase, a global GHG regulatory body would set long-term and legally binding near-term targets based on the long-term target.

Thus, in the first phase, some cap and trade agreements, such as Kyoto, will involve legally binding near-term targets involving firm limitations on total emissions by all sectors and activities in participating countries. But other regulatory arrangements could be included under the broad first phase umbrella. They could include, for example, cap and trade systems that might call for reductions in emissions intensity rather than emissions, and/or might be limited to specific sectors or activities. Such agreements could include safety valve features. They could also include credit trading arrangements. The commitments to develop and adopt specified policies and measures, including technology-based standards, technology development targets, removal of subsidies, and so on. This diverse suite of approaches would maximize the chances for broad participation, including developing country participation, and promote regulatory learning. Further, the first phase approach could include agreements or programs that do not take the form of legally binding regulatory commitments. These could include programs based on non-binding goals, including sectoral goals, for emissions limitations, energy efficiency, and renewable energy, and so on. They could also include development assistance programs undertaken by UN agencies and national or multilateral development agencies that include GHG emissions limitations among their objectives. Countries participating or contributing to such arrangements might receive some form or recognition or regulatory "credit" for the reductions achieved. The L20 would encourage all components to use compatible emissions accounting periods and methods. It would monitor and publicize the emissions reductions achieved in relation to the long-term targets that it had adopted, as well as other aspects of components' performance (including cost). This information would provide an essential basis for setting future near-term targets (including in the second phase) and reconsidering the long-term target.

Within the two-phase structure envisaged, how should near-term and long-term targets be set and precisely how should they be related to one another? The provisions of the UNFCCC/Kyoto Protocol provide a starting point for discussion. Article 2 of the UNFCCC provides as an "ultimate objective" the "stabilization" of atmospheric GHG concentrations at a level that "would prevent dangerous anthropogenic interference with the climate system." This single environmental quality objective, however, is an incomplete recipe for regulation. Such a stabilization objective (which would most plausibly be defined as maintaining the GHG concentration no higher than a certain level after a given year, such as 550 or 650 ppm by 2100) could be achieved through many different time paths of abatement, some of which are much less costly than others. Also, different pathways would produce different rates of warming and different levels of interim damages. The only guidance that Article 2 provides on these pathway issues is that stabilization "should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner." The reference to "economic development" may imply that costs are to be considered in the definition of "dangerous" or in the selection of regulatory pathways.

By contrast, the Kyoto Protocol adopts binding near-term emissions reduction targets that are not linked to this or any other longer-term objective or principle and consist of ad hoc and essentially arbitrary one-period reductions from countries' historical emissions baselines, not based on any reasoned consideration of benefits or of costs. Analyses by different economists consistently show that these targets are excessively costly and unduly stringent in relation to the climate benefits likely to be achieved.

This paper proposes a different approach: long-term targets expressed in terms of one or a suite of emissions reduction pathways, and (in the second phase) a nested series of near-term targets consistent with these pathways. Both types of targets would be reconsidered and modified in light of experience and new information and knowledge. Both would be based on the principle of maximizing net global social benefits and would be established through institutional processes which take into account the full range of social costs (including the costs associated with uncertainty and risk aversion and the value of new information) and benefits

(including ancillary environmental and other benefits) associated with alternative limitations levels. Such targets would reflect timing of investments in GHG emissions limitations designed to maximize net benefits, taking into account the relation between the stringency and timing of emissions limitations and the atmospheric GHG stock, the damages associated with changing atmospheric temperatures including interim as well as long-term damage, and the differences in the costs of achieving different levels of emissions reductions at different time periods.[5] Analytically, the near-term targets could be understood as segments of the long-term pathways, which in turn could be understood as envelope of successive near-term targets. The international distributional and equity issues involved should be addressed through the allocation of allowances within the context of emission trading arrangements as well as related development and climate change adaptation assistance arrangements.

Setting such targets would confront significant uncertainties and other difficulties in estimating the relevant costs and benefits, and social and political elements would play a substantial role in the ultimate judgments made. Nonetheless, the net-benefits maximizing principle, supplemented by sensitivity analysis and other established decision analytical methods, is conceptually and normatively sound and would provide salutary direction and discipline to the decision process. By maximizing overall net benefits, this approach has the overriding practical advantage of being able to generate and then distribute substantial regulatory gains widely enough to attract broad participation and also absorb the transaction costs involved in such arrangement. Of course, near-term emissions limitations obligations in particular will inevitably be the product of difficult, contingent political negotiations. But these negotiations should take place in the context of a clearly acknowledged, foundational term principle – emissions pathways based on net benefits maximization. Such an arrangement would make political officials responsible and accountable for judgments based on the expected benefits and costs of abatement, informed and disciplined by information and analysis developed by global communities of experts.

[5] Using this approach (which, unlike a simple stabilization objective, explicitly takes into account the adverse effects of different levels of near-term warming under different pathways), assuming "average" climate sensitivity and damages, and assuming cost-effective strategies for global abatement, Hammitt found that net societal benefits would be maximized by reducing global emissions 3% below business-as-usual (BAU) emissions by 2010, 5% below BAU by 2025, and 20% below BAU by 2100. See James K. Hammitt, "Evaluation Endpoints and Climate Policy: Atmospheric Stabilization, Benefit-Cost Analysis, and Near-Term Greenhouse-Gas Emissions," 41 Climatic Change 447-468 (1999). This pathway calls for greater near-term abatement than implied by the least-cost path to stabilization, but substantially less near-term abatement than required by Kyoto.

By contrast, a strategy based on a fixed long-term stabilization target, such as implied in the UNFCCC Article 2, involves an essentially arbitrary regulatory objective and presents a number of fundamental conceptual and practical difficulties. Adopting a stabilization objective, or any other single environmental quality objective, immediately raises the problem of determining what level of concentration, temperature etc. is "dangerous" or otherwise unacceptable. Since 1992 the UNFCC parties have made no progress in determining what the Article 2 objective means. This record undoubtedly reflects fear by countries who wish to avoid emissions limitation obligations of the possible consequences of setting a specific limitations objective in the context of a legally binding treaty.[6] But it also reflects the inherently intractable character of the task. Climate change involves a variety of existing and threatened impacts of varying magnitude, some near-term and certain or highly likely, others long-term and with lower probability or highly uncertain. What type and magnitude of adverse impacts at what level of probability (or uncertainty) should define the choice of the target level and the date by which it should be achieved and thereafter maintained? Even if a target level and date is set, there remains the question of the timing of the limitations needed to achieve the target; one must also choose among pathways compatible with the objective. The objective itself provides no guidance on this task. Finally, should costs be considered and balanced against benefits in setting the stabilization target or the pathways? If cost-benefit analysis is used to set targets and pathways, the system dissolves into the approach advocated in this paper. If costs are ignored, the selection of the target and timetable becomes arbitrary. Unless anchored in a consideration of costs, the targets and timetables chosen are likely to be unduly ambitious, and will have to be relaxed as the burdens of compliance become manifest. This has been the experience, for example, with national ambient air quality standards under the Clean Air Act, which are set without any explicit consideration of costs. The deadlines for achieving the standards have been repeatedly postponed, undermining the system's credibility and "technology forcing" incentives. A similar fate appears to await the ad hoc and arbitrary targets and timetables adopted under Kyoto. The relevant considerations in developing appropriate GHG regulatory policies to deal with long-term climate risks are simply too complex to be resolved simply by picking a single

[6] The first phase strategy proposed would minimize such fears by making long-term targets non-binding goals that would not be linked to any near-term targets that might be adopted by component arrangements.

stabilization target and a date for its achievement. A system of near-term and long-term emissions pathways is a far superior regulatory tool.

Nevertheless, a stabilization objective for regulation may be irresistible because it provides a psychologically and politically powerful reference point for mobilizing commitments and energies to change accepted ways of producing and consuming and to invest in development of the technologies that will enable us to do so comfortably. But any such objectives should be based on and reflect long-term emissions pathways selected on the principle of net benefits maximization, rather than being set independently. Alternatively, or in addition, the selection of such pathways as proposed herein could be made in the context of explicit benchmarks based on salient adverse effects, such as the death of coral reefs, at given concentrations. These benchmarks may capture public imagination and commitment that can appropriately help influence a target-setting process that is also based on an explicit and healthy consideration of the likely benefits and costs of alternative pathways.

Conclusion

This paper proposes a strategy for global GHG regulation, including target-setting, that relies primarily on emissions trading and involves two institutional stages. The first stage would involve a plural regime, led and supervised by a non-regulatory body – the L20. It would include the Kyoto trading systems but also other types of cooperative regulatory arrangements (some of which would involve emissions trading outside Kyoto) as well as non-regulatory programs, all aimed at limiting GHGs. This regime would likely evolve, in a second stage, into a unified, inclusive international GHG regulatory regime using a truly global cap and trade system. This system would be based on near-term targets and long-term pathways developed on the principle of maximizing net global social benefits. Such arrangements are likely to be superior to the available alternatives in enlisting broad country participation and actually achieving significant emissions limitations.