Washington State Department of Ecology

Economic Analysis of a Cap and trade Program

Task 3: Combining Cap and trade with Other Policy Instruments

September 17, 2008

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TABLE OF CONTENTS

EXECUTIVE SUMMARY I

Combining Cap and trade with Other Instruments i

Looking to the Future: A Potential National System iii

1 INTRODUCTION 1

2 OVERVIEW OF POLICY INSTRUMENTS 1

2.1 Introduction to Mechanisms 2

2.1.1 Traditional Regulatory Instruments 2

2.1.2 Economic Incentives 2

2.2 Criteria for Evaluating Mechanisms 5

2.3 An Overall Approach to Controlling Greenhouse Gases: Emissions Trading vs. Carbon Tax vs. Standards 6

3 CAP AND TRADE AND OTHER INSTRUMENTS: TO COMBINE OR NOT TO COMBINE? 9

3.1 Potential Conflicts in Combining Cap and trade with Other Policy Instruments 9

3.2 Combining Cap and trade and a Carbon Tax: Efficiency Considerations 11

3.3 Instruments to Complement a Cap and trade System 13

3.3.1 Instruments to Address Market Failures of a Trading System 13

3.3.2 Instruments to Achieve Environmental, Economic, or Social Goals 14

3.3.3 Instruments to Encourage Early Action 14

3.4 Combining Cap and trade with Other Instruments in Practice 15

4 LOOKING TO THE FUTURE: NATIONAL CAP AND TRADE 16

4.1 Introduction 16

4.2 Allocation of Allowances in a National Cap and trade Program 16

4.2.1 National Program with State Caps 17

4.2.2 Allocations in National Program 18

4.2.3 Summary 19

4.3 Choice of Policies and Measures at the State Level 20

4.3.1 Offsets under a Federal Cap and trade Program 20

4.3.2 Choice of State Climate Policies and Measures: Standards 21

4.4 Federal Preemption 22

5 CONCLUSION 23

6 REFERENCES CITED 24

DRAFT

EXECUTIVE SUMMARY

A number of states, including Washington, are moving to join regional cap and trade systems, and the possibility of a national cap and trade system also seems more likely. Many states, however, already have in place, or are contemplating using, other types of policies and measures (including other economic incentives, such as taxes or subsidies, more traditional regulatory approaches, information provision and education, and other policy instruments) to reach overall targets and goals for greenhouse gas (GHG) reductions. This situation raises two types of questions:

- Under what types of circumstances can cap and trade be combined, or not combined, with other policy instruments
- How will decisions that Washington state makes today about its overall GHG control policy position it for a potential future national cap and trade system?

Combining Cap and trade with Other Instruments

Three approaches are most commonly discussed as the foundation for a broad program to reduce greenhouse gas (GHG) emissions: an emissions cap and trade system, a tax on the carbon content of fuels, and traditional regulatory approaches. Each of these three approaches has its staunch supporters and detractors. Because of the potential cost-savings it provides, many economists and policy analysts recognize the strength of using a market-based policy, such as cap and trade or a carbon tax, as the central element of a domestic climate policy. The argument, in this case, is over what type of economic incentive is preferred. However, those analysts who are wary of the flexibility provided by economic incentives prefer a more prescriptive approach, which can provide the greatest certainty over emissions and/or technologies in particular industries.

These instruments have strengths and weaknesses (see Table ES-1), which make it better or worse suited to using for a particular environmental problem or to control a specific GHG source category. A cap and trade system, for example, will work best when (1) there is a known overall goal (an emissions target) and (2) there exist significant cost differences among the regulated community, so that it is important to provide an incentive for reducing emissions while at the same time providing flexibility to the regulated community in how much—and by what means—emissions are reduced. A tax or charge will be most applicable when it is not as important to reach a particular environmental goal, but it is important to provide the regulated community with flexibility; a tax also raises revenue which makes it desirable as well. In contrast, more traditional regulatory approaches—such as those identifying specific technologies to be used—make sense when it is difficult to develop, monitor, and enforce a price incentive (e.g., emissions at the source level are difficult to estimate), and when enough is known about available technologies to regulate cost-effectively.

In practice, policy makers will not rely on a single instrument, but on combinations of policies. The decision of how to combine cap and trade with other policy instruments rests on both economic efficiency—whether the overall policy strategy results in abatement at lowest overall cost—and other policy goals and evaluation criteria.

Economic incentives—cap and trade or a carbon tax--provide covered industry with flexibility over how much, and by what means, to reduce emissions. Both instruments operate by placing a price on carbon-emitting activities, and by using the market to transmit that price up-and-down the production-sales chain. Each instrument places a uniform price per ton of CO_2 (or other GHG, if included). By placing the same price per ton throughout the economy, these market-based systems (theoretically) result in efficient, low-cost emissions reductions. This low-cost property results from the flexibility emitters have over how much they reduce emissions and what technologies they choose to use; because the aggregate number of allowances is fixed, however, overall environmental goals are met. Each emitter chooses to

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reduce emissions to the point where the cost of emitting another unit—the price of an allowance that must be purchased—equals the cost of adopting a lower-emitting technology or reducing output in order to reduce emissions further.

Table ES-1. Evaluation of Policy Instruments

Criteria	Carbon Tax	Cap and trade	Regulations / Standards
Certainty of environmental results	Low. May need to set tax iteratively to hit targets	High. Provides limit on aggregate emissions, although some cost-containment mechanisms can reduce this certainty	High, since specifies results, subject to enforcement considerations and design decisions (technology vs. emissions)
Cost-effectiveness of emissions control	High. Allows flexibility in choice of control technology and emissions reductions by firm	High. Allows flexibility in choice of control technology and emissions reductions by firm	Low
Certainty of price per ton and control costs	High. The tax establishes a well-defined price	Low. Allowance prices/control costs will vary. Volatility can be limited by design features.	Medium. In some industries, may have good information on costs of given technologies or control levels.
New Institutional requirements	Minimal	Experience suggests that markets for trading arise quickly and relatively inexpensively.	Minimal
Potential to raise revenue through the mechanism	Provides revenue, although excessive charges can lead to illegal behavior to avoid tax	Depends on whether allowances are auctioned or grandfathered.	Does not raise revenue
Impacts on competitiveness of industries	Tax will negatively affect industries in the system relative to untaxed industries.	As with a tax, auctioned allowances will affect financial position of covered industry, but allocated allowances do not	Some. Regulations increase the cost of production, but do not also place a price on emissions (i.e., energy)
Provides incentives for technological innovation over time	Encourages development and adoption of new control technology over time. Price certainty provides a stronger incentive.	Encourages development and adoption of new control technology over time. However, price volatility weakens the incentive.	Performance standards provide some incentive to develop and adopt new control technologies (but technical standards do not) in specific industries
Distributional impacts and burden on vulnerable populations or businesses	Effects will depend on the extent of price changes and how they filter through the economy.	Effects will depend on the extent of price changes and how they filter through the economy.	Effects will depend on the extent of price changes and how they filter through the economy.
Ease of adjustment in mechanism to reflect changing circumstances over time as technology/costs develop	Difficult to adjust tax upwards if needed.	Difficult to adjust target and allocation over time	Difficult to adjust standards over time
Practical or political obstacles to implementation	May be perceived as politically unacceptable by the public or a "double tax" on industry	May depend on whether allowances on auctioned or grandfathered; identifying a reasonable allocation and target can be difficult	Familiar and therefore potentially acceptable, although setting the level of the standard can be difficult
Source: adapted and expanded from Parry and Pizer (2007) and expanded.			

In practice, the cost-effectiveness properties of market-based systems are not always realized, and so others policy instruments can work to complement the cap and trade system in producing overall cost-effective environmental protection. In addition, because widespread action by a diverse set of sectors and emitters is needed, no single approach is likely to be able to provide the coverage, as well as the incentives, needed to meet overall targets cost effectively. Moreover, cost-effectiveness is not the only programmatic goal; other policy instruments can assist in spreading the burden of emissions control,

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redistributing income, or meeting other, non-GHG environmental goals. Policies and instruments will be needed to complement a cap and trade system in the following circumstances:

- ***Using instruments to address the "market failures" of a trading system.*** The cap and trade system does not always create price signals that are sufficiently strong to alter the behavior of all the economic agents that have control over emissions in the sector. This is the case particularly where energy efficiency is concerned, because multiple economic agents have control over emissions; for example, manufacturers of vehicles or appliances, buyers of these products, users of the products (who determine how much the vehicle is driven or where the thermostat is set) who are not always the same as the buyers of the product.
- ***Non-economic motivations for behavior.*** Not all behavior is economically motivated, and so price signals may not be the most cost-effective means of altering behavior in all cases. Car purchases, for example, are motivated by a host of considerations, of which fuel efficiency is not often the most significant factor. Similarly, consumers and producers do not always have the information needed to make rational decisions, and so information provision can both assist in decision making, as well as change the culture surrounding decisions.
- ***Policies to product the adoption or diffusion of technologies.*** Various cost, institutional, market, and cultural barriers limit the extent to which energy efficiency and renewable energy technologies are adopted. Policies that help transform markets by conducting demonstration project, subsidizing cost differences, or using procurement to expand the market (and so bring down costs by reaching economies of scale) can complement the cap and trade system and work towards cost-effective GHG control.
- ***Achieving other environmental, social, or economic goals.*** Some GHG control technologies may conflict with other environmental or social goals, and so regulations or other approaches may be needed to supplement the system. In addition, economic efficiency is not the only goal; taxes that raise revenue to be used for environmental or other purposes, subsidies that reduce adverse distributional effects of higher energy prices, and other policies can all complement the cap and trade system and help meet other goals.

A number of systems are currently keeping in place, or adopting new, policy instruments to complement cap and trade for the reasons described above. California, for example, has a number of GHG reduction measures for renewable energy and energy and fuel efficiency that have been recommended to complement its participation in the Western Climate Initiative (WCI) trading system. Many states of the Regional Greenhouse Gas Initiative (RGGI) have renewable portfolio standards that will continue to operate in tandem with the regional cap and trade program. Recent economic modeling results for design options for the WCI have found that complementary policies can improve the cost-effectiveness of emissions control under the WCI.

Looking to the Future: A Potential National System

It appears likely that, at some point in the future, federal legislation will be passed that creates a national GHG cap and trade system. Layering federal GHG legislation on top of existing regional trading programs, such as the WCI, and other state-level policies and measures may have a variety of implications for Washington State as an early mover. Decisions that Washington State makes today—for example, in terms of the types of emissions reductions policies the State adopts and the sectors that those policies cover—will affect the position of its industries under a federal cap-and trade-program. Key points to consider, include:

- Decisions that Washington State makes today—for example, in terms of the types of climate policies and measures the State adopts and the sectors that those policies cover—will affect the position of its industries under a federal cap-and trade-program. While these potential conflicts are

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generally not strong enough to warrant changing decisions that Washington State may make about taking early action on climate change, awareness of these issues may help the State participate in future discussions regarding the design of a federal program.

- Under a federal program, how allowances are allocated will have implications for Washington State as an early mover. In general, auctioning or allocation approaches based on benchmarks or a historical emissions base period that precedes implementation of significant GHG reductions in the State can represent an advantage for early actors. A historical emissions approach where the base period follows GHG reduction efforts can disadvantage early actors, as can a projected emissions basis for allocation. Setting state caps could afford Washington State the flexibility to reward its early acting industries.
- The types of emission reduction policies Washington State adopts might also have implications for how its industries fare under a federal cap and trade program. For example, state policies requiring emission reductions in sectors that are ultimately eligible for offsets might limit the extent of offset credits that can be earned in-state. In addition, certain types of policies—such as technology standards—may also disadvantage industries in Washington State if a federal cap and trade program is established.
- Aspects of the WCI cap and trade program—along with other climate policies and measures that Washington State implements—could be preempted by a federal emissions trading program. This preemption could be more or less restrictive depending on the design of the federal legislation.

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1 INTRODUCTION

States are taking action to reduce greenhouse gases (GHGs) via regional programs (such as the Western Climate Initiative (WCI) and the Regional Greenhouse Gas Initiative (RGGI)) that use cap and trade. However, many states also already have in place (or contemplate using) a variety of policy instruments to reduce GHGs, as part of larger mitigation plans. These instruments may affect some of the same sectors potentially covered by cap and trade, such as electric power and transportation. In addition, there is the likelihood of a national cap and trade program down the road that may replace—or operate in conjunction with—regional or state policies and programs.

Decisions are being made now—and will continue to be made in coming years—about how states should design their GHG mitigation efforts in the context of both existing and planned policies and measures (PAMs), including regional (and potential national) cap and trade programs. This paper begins to explore some of the issues in choosing among alternative approaches--cap and trade, carbon tax, and traditional regulatory controls—as well as those in combing approaches. The paper also explores the types of conflicts or difficulties that might arise for states that have already made significant reductions in GHGs, if a national cap and trade program is implemented. The intent of the paper is to develop insights that can provide the foundation for further analysis and ultimately for decisions about how Washington State should participate in the WCI or use other PAMs to control GHGs. The intent is not to be comprehensive, but illustrative.

The remainder of this paper is divided into 5 sections:

- *Section 2* provides an overview of cap and trade, carbon tax, and traditional regulatory instruments
- *Section 3* discusses how and when to combine policy instruments
- *Section 4* discusses how decisions made today to reduce GHGs may influence how Washington State and industry located in the state fare under a potential future national cap and trade system
- *Section 5* concludes
- *Section 6* provides the references cited in this paper

2 OVERVIEW OF POLICY INSTRUMENTS

Several broad families of policy instruments can be used to reduce GHG emissions. These families, or groups, include economic incentives (which encompass both fiscal measures and cap and trade systems), traditional regulatory mechanisms, information provision and outreach, and research and development. These mechanisms tend to work in different ways. Some, for example, provide financial incentives, while others mandate behavior, and still others focus on transforming and creating markets. Because of differences in how they influence the behavior of various market players and emitters, the alternative approaches and mechanisms will be more or less useful (and cost-effective) in reducing emissions from different source categories and meeting environmental and other goals.

This section provides an introduction to different types of policy instruments that can be used to reduce GHG emissions. The focus in this paper is on three approaches: cap and trade, emissions or output tax or charge, and traditional regulatory approaches. While other approaches can and should be used as part of an overall policy strategy, these are the three approaches most commonly discussed as the foundation for a broad program to control GHGs.

The discussion is divided into three sections: Section 2.1 presents a description of each mechanism and provides examples of where it is currently being used to reduces GHG emissions; Section 2.2 describes the criteria by which the mechanisms can be evaluated, and describes the ideal circumstances

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for using each type of mechanism; and Section 2.3 compares the three mechanisms as foundation approaches for GHG mitigation.

2.1 Introduction to Mechanisms

This section introduces the broad policy mechanisms available to mitigate GHG emissions, describing what they are and how they work, including some of their strengths and weaknesses.[1] Table 1, presented at the end of Section 2.1, summarizes the types of instruments and how they function, and also provides some examples of how they have been used to reduce emissions of GHGs and other pollutants—in both the United States and worldwide.

2.1.1 Traditional Regulatory Instruments

Traditional regulatory approaches to environmental protection focus on specific goals, such as achieving given concentrations of pollutants in air or water or limiting facility emissions to a particular level. In the context of reducing GHG emissions, standards are often considered as a means of achieving environmental targets in a traditional regulatory manner, and there are two general types:

- Technology or technical standards or mandates, which require the use of specified technologies or best practices; and
- Performance standards, which can take many forms, including emissions limits, fuel economy standards for automobiles, alternative fuel requirements for vehicle fleets, and renewable energy portfolio standards for electric utilities.

These traditional regulatory instruments reduce GHG emissions by modifying a legal framework to dictate specific technological or performance outcomes, rather than by changing market prices (like economic incentives). Because they mandate the use of specific technologies—and thereby restrict the number of options for compliance—technology standards are often considered less flexible regulatory instruments than performance standards, which dictate the required level of performance, but do not specify how that level must be achieved.

2.1.2 Economic Incentives

Economic incentives, sometimes called market mechanisms, include both fiscal policy incentives (such as those that operate through the tax system or provide grants or loans) and tradable permit systems, also referred to as cap and trade. Offset credit systems, which are generally included in the design of cap and trade systems, also use price incentives to affect behavior. Two types of economic incentives are discussed here:[2]

- Cap and trade systems, sometimes referred to as tradable (or marketable) permit (or allowance) systems, and which are often accompanied by offset/credit systems.
- Charges and taxes (e.g., emissions fees, or energy or product taxes).

The rationale behind using economic incentives in environmental policy is that they raise the price of polluting products or activities. Taxes or a cap and trade system, in particular, will increase price of

[1] Because the focus of this paper is primarily on carbon taxes, emissions trading, and traditional regulatory approaches, a number of other approaches are mentioned occasionally, but not discussed in detail. These include information provision, research, demonstrations, and development, procurement policies, and tax credits. All these policies have a role in reducing GHG emissions and could, potentially be combined with a trading system and used to complement the system.

[2] Economic incentives also include preferential tax treatment (such as tax credits, accelerated depreciation, exemption from taxes), subsidies of various types (e.g., grants, subsidized loans, or loan guarantees), and programs that combine subsidies with taxes, such as deposit-refund or feebate programs, which typically assess a surcharge on polluting behavior and give rebates for environmentally preferred behavior.

products that are correlated with emissions or the price of emissions themselves—and so discourage the activities that produce emissions. In contrast, tax credits and other subsidy-type programs work by directly encouraging (subsidizing) desirable activities, i.e., by reducing their price or cost.

Because economic incentives work through prices rather than mandating specific behaviors that consumer or producers must adopt, these policy instruments provide flexibility to the regulated community—often cited as one of the key advantages of their use. Consumers and producers can choose the extent to which they reduce emissions, as well as the specific technologies they adopt. By providing incentives for those polluters who can reduce emissions most cheaply to do so, appropriate economic signals promote a least-cost pattern of abatement.

A cap and trade system has some unique characteristics among economic incentives. Under a cap and trade system, sources included in the system (covered sources) must hold allowances that represent the amount of their emissions. Aggregate emissions from covered sources are "capped" by limiting the total number of allowances that are available in the system. Individual sources that are included in the system have the choice of reducing emissions or purchasing allowances equal to their emissions. Cap and trade systems also generally allow covered sources to offset their emissions using credits, or *offsets*, generated by emission reductions from a project implemented outside the umbrella of the cap and trade, i.e., by a source that is not covered by the cap.

Thus, while a cap and trade system allows individuals within the covered community to choose the extent to which emissions are reduced and the technologies they employ, overall emissions are capped (unlike other economic incentives). Further, the flexibility of a cap and trade system also promotes economic efficiency (see Exhibit 1), i.e., helps to ensure that the aggregate emissions limitation is achieved at the lowest possible cost. In contrast, a regulatory permit system that specifies the emissions level or technology of each polluter does not provide flexibility, and so may not achieve aggregate emissions reductions at lowest cost. Analogously, a tax at the same level as the equilibrium price per unit of emissions at which permits are bought and sold provides the same efficiency properties as a cap and trade system.

Exhibit 1: Frequently Used Economic Terms

Economically efficient pollution control—Achieves a given aggregate level of emissions or level of environmental quality at least-cost.

Cost-effectiveness of pollution control—Cost per unit of emission reduction, may be used to describe a particular technology, policy, or set of policies used to achieve a given environmental goal.

Optimal level of pollution—Pollution control (in aggregate) to the point where the dollar value of the environmental and health damage of the last unit of pollution equals the cost of eliminating that unit.

Benefit-cost analysis—Compares the total avoided damages associated with a control policy to the total costs of control.

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Table 1: Policies and Measures for Environmental Protection

Category of Tool	Definition and/or Illustrative Types	Incentive or Function of Tool	Examples of GHG / Energy Application
Traditional Regulatory Mechanism			
Technology standards or mandates	Standards that dictate the use of specific technologies or best practices, such as best available control technology standards	Requires the adoption and use of certain technologies or practices in order to comply with standard.	✓ *Minimum energy efficiency mandates for government agencies purchases*. For example, the EU has adopted a regulation that requires its member governments to purchase computers that at a minimum comply with the standards established by the ENERGY STAR product labeling scheme. As another example, the U.S. will require all federal buildings to use ENERGY STAR light products by the end of 2013.
Performance standards	Standards that dictate a minimum level of performance (e.g., energy efficiency standards, renewable energy portfolio standards, emissions limit). These standards may be implemented at many different levels, e.g., facility-based, entity-based, unit-based, etc.	Ensure certain level of performance (e.g., maximum emissions level per unit, minimum level of energy efficiency per unit, etc.).	✓ *Fuel economy standard*s. For example, the U.S. has set a national fuel economy standard of 35 miles per gallon to be achieved by 2020. ✓ *Mandatory standards for efficient lighting*. For example, the U.S. plans to phase out incandescent bulbs by 2014 and improve lighting efficiency by 70% by 2020. ✓ *Provisions to improve energy efficiency in appliances and buildings*. For example, new federal buildings in the U.S. are required to achieve at least 30% greater energy efficiency than the prevailing building codes would permit. ✓ *Renewable portfolio standards*. For example, 26 U.S. states and the District of Columbia as of November 2007 have adopted standards mandating the share of renewable energy in the power generation mix. ✓ *Minimum standards for biofuels*. For example, in the U.S., fuel producers are required to use certain levels of biofuel in the fuel supply.
Economic Incentive			
Tradable/ marketable emission allowances or permits	Quotas, allowances, permits (i.e., a ceiling) on emissions levels that can be bought and sold or traded in markets	Raises the price of polluting activities (whether emissions or production), and limits the extent of this activity in aggregate.	✓ *Emissions trading systems*. Examples include the European Union Emissions Trading System, and the Regional Greenhouse Gas Initiative in the U.S. ✓ *Carbon credit trading systems*. Examples include the Chicago Climate Exchange.
Taxes, charges, and fees	A charge or tax paid on: ✓ emissions or discharges into the environment ✓ output/product that is correlated with emissions ✓ use of natural resource ✓ user charge (to recover costs, e.g., of public treatment of effluent)	Raises the cost of undesirable activities, such as emitting pollutants, and so may discourage the targeted activity. Taxes, charges and fees work through the market, by placing a price on certain activities or products. Taxes also raise revenue.	✓ *Carbon tax applied to the purchase of fossil fuels*. For example, in British Columbia, Canada, the provincial government has instituted a carbon tax that applies to almost all fossil fuels, including gasoline, diesel, natural gas, coal, propane, and home heating fuel. ✓ *Fuel taxes*. Gasoline and other transportation fuels are widely taxed in both the US and internationally. Revenues in the US are earmarked tor the Highway Trust Fund and maintenance/improvements to the transportation infrastructure. Some non-fossil fuels are exempt from fuel taxes.

Sources: IEA (2008); Pew Center on Global Climate Change (2007); and ICF.

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2.2 Criteria for Evaluating Mechanisms

The choice of incentive system or other regulation to address pollution issues will depend on economic implications, distributional and equity considerations, and practical considerations. In general, an environmental instrument will be evaluated on the basis of how it satisfies the following criteria:

- Certainty of achieving an environmental target (providing an adequate level of protection for the environment)
- Cost-effective emission reductions, i.e., low overall costs of meeting an environmental target
- Certainty of costs (i.e., burden on polluted community of complying with the requirements of the mechanism will not be unexpectedly high)
- Ease of administration and enforceability (achieves goals through a minimum of administrative and enforcement efforts) and does not require new institutions
- Potential to raise revenue through the mechanism
- Impacts on competitiveness of industries
- Incentives provided for technological innovation over time
- Distributional impacts and burden on vulnerable populations or businesses
- Ease of adjustment in mechanism to reflect changing circumstances over time as technology/costs develop
- Practical or political obstacles to implementation

Different mechanisms have different strengths and weakness. As discussed above, for example, economic incentives have the general advantage of achieving environmental targets at low costs, while more prescriptive regulatory approaches provide more certainty over the level of environmental protection.

When looked at in isolation, each of these instruments has characteristics that make it better or worse suited to using for a particular environmental problem or a specific GHG source category. A cap and trade system, for example, works best when (1) there is a known overall goal (an emissions target) and (2) there exist significant cost differences among the regulated community, so that it is important to provide an incentive for reducing emissions while at the same time providing flexibility to the regulated community in how much—and by what means—emissions are reduced. In contrast, more traditional regulatory approaches make sense when it is difficult to develop, monitor, and enforce a price incentive (e.g., emissions at the source level are difficult to estimate), and when enough is known about available technologies to regulate cost-effectively.

Table 2 summarizes a few of the key considerations in choosing between the most widely advocated methods of emissions control: an emissions trading (cap and trade) system, a tax or charge, and a more traditional regulatory approach. The table also indicates the types of circumstances in which a particular approach might be considered “ideal” for addressing a particular economic problem. The next subsection focuses in on the advantages and disadvantages of these three most debated overall approaches in the specific context of GHG emissions control.

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Table 2: General Advantages and Disadvantages of Alternative Policies and Measures

Policy Instrument	General Advantages	General Disadvantages	Situation Ideally Suited
Traditional regulatory tools that employ direct controls	May be more effective if quick action (e.g., in response to a crisis) is required Provides considerable certainty over environmental outcome Does not restrict new firm entry	Can be overly prescriptive in terms of technology, and so fail to provide flexibility and incentives for innovation	✓ Applicable when have good information on available technologies, their costs and effectiveness, and on desired environmental goals. ✓ More prescriptive regulatory approaches can be used when it is difficult to monitor emissions at the level of the emitter, but technology can be identified.
Marketable / tradable emission allowances or permits	Provides a ceiling / cap on aggregate emissions Meets overall targets at low cost because of flexibility in compliance Flexibility encourages the development and adoption of new control technologies over time	Can restrict new entry or expansion of industry if improperly designed Cost of control is unknown and could be high if system is too restrictive	✓ Can identify emitters and number is large enough to create a viable market and small enough to monitor and enforce ✓ Preferred when it is important to achieve a certain level of emissions reduction and costs of achieving that goal are not expected to be too high ✓ Control costs vary across covered entities, providing opportunities for trading and cost savings
Taxes / charges / fees	Provides regulated community with flexibility in response (level & technology) and so achieves cost-effective control Can be designed to provide an incentive, raise revenues that can be used for environmental purposes, or both No barrier to economic growth of individual firms or entry into industry Provides more certainty over costs	Does not ensure a particular level of environmental quality In practice, environmental taxes are often too low to provide a large incentive effect Inflation can erode the effect of a tax over time, unless it is raised May not be easy to adjust over time to reflect changing environmental and/or technological conditions	✓ Works best when price incentive is likely to change behavior in desired direction ✓ When costs of control are unknown or uncertain, a tax instrument limits the total control cost faced by polluters ✓ Ideally, also want to be able to monitor taxed commodity and enforce payment

2.3 An Overall Approach to Controlling Greenhouse Gases: Emissions Trading vs. Carbon Tax vs. Standards

Each of the three main approaches to GHG mitigation—emissions trading, a carbon or CO_2 tax, and a standards approach—has its staunch supporters and detractors. Because of the potential cost-savings it provides, many economists and policy analysts recognize the strength of using a market-based policy, such as cap and trade or a carbon tax, as the central element of a domestic climate policy (Stavins 2007). The argument, in this case, is over what type of economic incentive is preferred. However, those analysts who are wary of the flexibility provided by economic incentives prefer a more prescriptive approach, which can provide the greatest certainty over emissions and/or technologies in particular industries.

GHG emissions are unlike many other environmental problems, in that climate change uniquely combines two key attributes; the policy instrument used to limit GHG emissions should reflect these attributes. First, once emitted, GHGs mix virtually uniformly in the atmosphere, so that the impact of climate change is independent of where geographically the gases are emitted. Consequently, there is no environmental reason to limit emissions on one geographic region or sector over another. Second, GHGs include a variety of gases, with emissions arising from a range of industry and household activities; with varying costs of control and technologies that can be used. This diversity suggests that, to be successful in reducing emissions cost-effectively, a system of controls must achieve broad and deep coverage of industry and gases and should reflect differences in control costs and technologies across diverse emitters. In addition, policies should—as described in Section 2.2 above—meet other criteria, such as encouraging innovation, distributing the burden equitably, and allowing for incorporating new information.

Carbon taxes and emissions trading systems have some important similarities. Both operate by placing a price on carbon-emitting activities, and by using the market to transmit that price up-and-down the production-sales chain. Each places a uniform price per ton of CO_2 (or other GHG, if included). By placing the same price per ton throughout the economy, these market-based systems (theoretically) result in efficient, low-cost emissions reductions.[3] In principle, both types of systems can be administered to target upstream producers (e.g., refineries), or downstream end-users (at least for large sources) (Parry and Pizer 2007). And both types of systems can incorporate incentives for carbon sequestration and other offset activities (Parry and Pizer 2007).

The key difference is how the two systems operate. Taxes generally fix the price of emissions and leave the annual level of emissions uncertain; although taxes can be ratcheted up or down over time, in response to perceived effects of the taxes on emissions, it is an unwieldy way to achieve a specific goal. In contrast, trading systems fix the quantity of emissions on an annual basis. If the short or long-term goal for emissions reductions is clear, a trading system can help to meet that goal more cost-effectively than a tax. Emissions trading does require more institutions than a tax, to administer, but experience suggests that the institutions are likely to arise quickly and for the most part inexpensively (Parry and Pizer 2007). As displayed in Exhibit 2, administrative costs for a trading system have not generally been found to be as high as had been feared.

The differences between taxes and trading systems can be blurred in systems that have different design features. For example, trading systems can be designed with "safety valves" to ensure that costs to covered industry do not rise above a certain level, or a trading system that has an auction rather than allocation allowances will have the revenue raising properties of a tax system.

Traditional forms of regulation—technology and performance standards—are an alternative to either taxes or trading. The key disadvantage of these approaches relative to market-based approaches is that they tend to fix the commitments of industry and so limit the flexibility that industry has to respond. For example, standards that limit emissions per unit of output so not allow industry to reduce emissions most where reductions are cheapest to attain; consequently, the overall costs of achieving a given target tend to be higher than under market-based approaches. If standards dictate technologies as well, then the flexibility for industry to choose how to meet

Exhibit 2: Comparing Administrative Costs

The costs of administering cap and trade programs can be similar to the costs of administering carbon tax policies and require even fewer resources than traditional regulatory approaches (EPA 2003). The U.S. SO_2 Allowance Trading Program, for example, uses fewer administrative and operational resources than traditional regulatory programs in the United States (EPA 2003).

One reason why cap and trade and carbon tax programs can have similar administrative costs is that both instruments require covered entities to track and report GHG emissions or energy/fuel consumption. In addition, the regulating authority must process, review, record, and potentially audit this information for both approaches (EPA 2003).

In the case of a cap and trade program, some additional resources may be required to develop new administrative infrastructure to track allowances transfers and ownership and to reconcile emissions and allowances at the end of each compliance period (Stavins 2007; EPA 2003; CBO 2008). However, experience with previous cap and trade programs has suggested that these administrative costs are not great (Stavins 2007; CBO 2008). For example, the total federal costs for developing and implementing the U.S. SO_2 Allowance Trading Program have equaled less than $1 per ton of SO_2 reduced (EPA 2003).

By contrast, while a carbon tax program will also require resources to collect and manage tax receipts, new administrative structures may not be required, to the extent that the existing infrastructure for tax administration can be used (EPA 2003; CBO 2008).

[3] As discussed in Section 3, this "ideal" properties of economic incentives often not realized in practice. The discussion in section 3 focuses on cap and trade, but could equally apply to the price incentives created by a carbon tax.

emissions targets is also removed.

As discussed in Section 3 below, the theoretical cost-effectiveness properties of market-based systems are not always realized in practice, and so more regulatory approaches have a place in complementing the workings of economic incentive approaches. Moreover, because widespread action by a diverse set of sectors and emitters is needed, no single approach is likely to be able to provide the coverage, as well as the incentives, needed to meet overall targets cost effectively.

Table 3 below evaluates these three policies according to the criteria laid out in Section 2.2 above.

Table 3: Evaluation of Policy Instruments Against Criteria

Criteria	Carbon Tax	Cap and trade	Regulations / Standards
Certainty of environmental results	Low. May need to set tax iteratively to hit targets	High. Provides limit on aggregate emissions, although some cost-containment mechanisms can reduce this certainty	High, since specifies results, subject to enforcement considerations and design decisions (technology vs. emissions)
Cost-effectiveness of emissions control	High. Allows flexibility in choice of control technology and emissions reductions by firm	High. Allows flexibility in choice of control technology and emissions reductions by firm	Low
Certainty of price per ton and control costs	High. The tax establishes a well-defined price	Low. Allowance prices/control costs will vary. Volatility can be limited by design features.	Medium. In some industries, may have good information on costs of given technologies or control levels.
New Institutional requirements	Minimal	Experience suggests that markets for trading arise quickly and relatively inexpensively.	Minimal
Potential to raise revenue through the mechanism	Provides revenue, although excessive charges can lead to illegal behavior to avoid tax	Depends on whether allowances are auctioned or grandfathered.	Does not raise revenue
Impacts on competitiveness of industries	Tax will negatively affect industries in the system relative to untaxed industries.	As with a tax, auctioned allowances will affect financial position of covered industry, but allocated allowances do not	Some. Regulations increase the cost of production, but do not also place a price on emissions (i.e., energy)
Provides incentives for technological innovation over time	Encourages development and adoption of new control technology over time. Price certainty provides a stronger incentive.	Encourages development and adoption of new control technology over time. However, price volatility weakens the incentive.	Performance standards provide some incentive to develop and adopt new control technologies (but technical standards do not) in specific industries
Distributional impacts and burden on vulnerable populations or businesses	Effects will depend on the extent of price changes and how they filter through the economy.	Effects will depend on the extent of price changes and how they filter through the economy.	Effects will depend on the extent of price changes and how they filter through the economy.
Ease of adjustment in mechanism to reflect changing circumstances over time as technology/costs develop	Difficult to adjust tax upwards if needed.	Difficult to adjust target and allocation over time	Difficult to adjust standards over time
Practical or political obstacles to implementation	May be perceived as politically unacceptable by the public or a "double tax" on industry	May depend on whether allowances on auctioned or grandfathered; identifying a reasonable allocation and target can be difficult	Familiar and therefore potentially acceptable, although setting the level of the standard can be difficult
Source: adapted from Parry and Pizer (2007) and expanded.			

One issue that is not discussed in the table is "coverage"—the extent to which the system covers all sources of GHGs. A review of the potential for measuring, monitoring, and including each of the GHG

DRAFT

emissions source categories in each of the three broad types of systems is beyond the scope of this paper, but a few observations may indicate the importance of including the issue of scope/coverage in any evaluation and choice of policy instruments. Most discussions of the choice between instruments focus on CO_2 and fossil fuels; in this context, the issue of coverage is simply whether the system captures all sources or, as is the case in cap and trade and many regulatory approaches, only large sources. A carbon tax has the advantage of providing price incentives throughout the system, and so affects the behavior of small, as well as large sources. Since large sources are usually responsible for a significant portion of emissions (often 80 percent or more), and also may be more financially able to deal with the requirements of the system, this aspect of coverage is not that critical in choosing among instruments.

An aspect of coverage that may be more critical concerns which sources and gases are covered. A broad-based economy-wide carbon charge that covers not only fossil fuels, but also emissions of methane, industrial emissions of GHGs such as N_2O, and the so-called high-GWP gases is likely to be unpopular and impractical. It is possible, however, to capture many of these gases in a cap and trade system, either via allowance requirements or through offsets attached to the system. Thus, consideration of what types of policy approach to use should also take into account the potential for using other instruments, or combining instruments, to achieve broad coverage and a broad set of incentives. The next section discusses how cap and trade can be combined with other policy instruments.

3 CAP AND TRADE AND OTHER INSTRUMENTS: TO COMBINE OR NOT TO COMBINE?

The primary motive for implementing a cap and trade system is that it limits the total quantity of emissions to a target level, while at the same time minimizing the overall cost of the cost of attaining a particular environmental goal. Despite its strengths, emissions trading is not a panacea for all environmental ills. In theory, economic incentives, such as cap and trade, are cost-effective means of reducing greenhouse gas emissions; in practice however, these ideal properties are not always realized, due to various market failures that can occur. In addition, competing environmental and social goals may be at odds with the workings of the trading system. Consequently, other policies and measures are not only complementary, but often necessary to address these market imperfections and so meet overall GHG goals cost-effectively, as well as to meet other goals.

Retaining existing legislation and regulations, and/or supplementing the trading system with other policies and measures, can provide a more effective set of environmental policies. If inappropriately designed, however, multiple policies can conflict with each other. To be effective, regulations, programs that use market/economic incentives (such as emissions trading) and other policies and measures musts be designed compatibly, and should together contribute to meeting environmental, social, and economic goals. This section presents the circumstances governing the combination of a cap and trade system can with other environmental instruments, given economic goals or criteria (e.g., efficiency) and non-economic goals (e.g., burden sharing). The discussion consists of three parts: (1) why conflicts can arise between a trading system and other policies; (2) an examination of the efficiency aspects of combining cap and trade with a carbon tax; and (3) circumstances under which combining cap and trade with other instruments can enhances the operation of the overall system.

3.1 Potential Conflicts in Combining Cap and trade with Other Policy Instruments

Multiple policies can create conflicts in different ways. For example, policies—whether focused on greenhouse gases or other issues—that have multiple requirements for the regulated community (sometimes referred to as “double regulation”) can be seen as imposing unfair burdens on particular target groups that are being regulated (Sorrell 2003). As another example, when two trading schemes co-exist, there is the potential for double-counting; emissions reductions may be counted under different scheme, and so erode total environmental benefits and/or change the distributional qualities of the policies. This paper is focused, however, on one, very specific type of conflict: the issues associated with combining a cap and trade system with other policies and measures focused on greenhouse gas reductions, and how this combination has the potential to erode the least-cost properties of the cap and trade system.[4]

A cap and trade system achieves its low-cost properties because of the flexibility it provides covered industry, and because control costs of the last ton of emissions are equalized across industry. Companies are required to hold allowances equal to their emissions, and individual companies have the choice of reducing emissions (by using different technologies or reducing output) or purchasing allowances to cover their emissions. Those companies who can reduce emissions most cheaply do so, and may sell off their excess allowances (or not choose to buy them); other companies for whom reducing emissions is expensive, will choose to buy additional allowances.

As companies buy and sell allowances, the resulting market yields an equilibrium price for allowances. In general, a company will choose to reduce emissions to the point where the cost of further reducing emissions equals the price of the allowance that permits the continuance of that emission. If the trading system is working as intended, all participants in the trading system equalize the cost of reducing emission with the price of allowances. Consequently, the emissions target of the trading system could not be reached more cheaply (in aggregate) by changing the distribution of emissions reductions. Imposing additional policies—outside the trading system--may erode the low-cost properties of the cap and trade system.

Given how the trading system operates, the most obvious role for policies and measures is to address greenhouse gas reductions from industry and sources not covered by the cap and trade system. In this case, a policy and measure can be applied to a source category where the emissions can be reduced relatively cheaply, but which cannot (for enforcement, monitoring, or other reasons) easily be included in the cap and trade system. In this situation, the policy and measure helps to ensure that total emission reductions are achieved cost-effectively, and also spreads the costs of compliance across a wider range of emitting industries than the cap and trade can achieve by itself. Thus, there is little question that cap and trade can be combined with other policy instruments when the instruments focus on sectors that are outside the cap and trade system. The difficulty can arise when multiple policies target the same sector or industry , for example, a tax, or a technology or performance standard, is applied to a sector covered by the cap and trade system.

Conflicts between the cap and trade system and other policies can occur particularly when the two policies try to alter the behavior of the same economic agents in the sector (i.e., the same consumers or producers). In this case, multiple policies may produce conflicting results.[5]

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[4] Very little literature addresses the issue of what happens when multiple policies are combined. Sorrell (2003) presents a framework for analyzing conflicts in policies with the EU ETS, and has case studies from several countries, with general recommendations for how to combine policies effectively to create a broad and comprehensive set of national policies for addressing GHG emissions, in the context of the EU ETS. An early paper by the Center for Clean Air Policy (CCAP 1999) discusses some issues in combining policies and measures with a trading system, in the context of specific policies in place in Europe at that time.

[5] In some cases, the conflicts associated with multiple policies can be resolved within the context of the trading system. For example, a sector with strict regulatory requirements might have lower emissions than it would have had in the case of an emissions trading system. If the intended goal of the regulations was to further reduce GHG emissions (beyond the reductions associated with the trading system), then the regulation will be ineffective: the excess allowances that would have been held by entities in the sector will be sold and held elsewhere in the economy, bring emissions up to the level of the cap. One way in which this effect could be counteracted is to limit the number of allowances that can be sold from the sector with regulations.

For example, a performance or technology standards that mandates a particular level of emissions or a technology to be used by industry entities covered by the trading system would alter the outcome of the cap and trade system, and so increase the overall cost of achieving its environmental targets. A prescriptive regulatory approach would specify either the technology to be used or the level of emissions per unit of output. The technology adopted under this approach would not necessarily be the same technology that companies would choose to adopt in a cap and trade system, in which they had the option of both choice of technology and purchasing allowances. If a standard requires a more costly technology than manufacturers would otherwise adopt, then the costs of compliance with the standard will be higher than with the cap and trade system in the absence of the standard. Moreover, because covered manufacturers can resell their unused allowances back into the system, setting a standard on industry already covered by the cap and trade system does not further reduce aggregate emissions in the system.

The trick, then, is to identify circumstances where other policy instruments can be complementary to—rather than impede—the cap and trade system, by covering sectors that are not already included in the cap and trade system (but where low-cost emission reductions are possible). Section 3.2 continues with the efficiency discussion, focusing on issues in combining a carbon tax and cap and trade system. As discussed in Section 3.3 below, there are circumstances in which the cap and trade system does not operate to reduce emissions as cost-effectively as possible, suggesting a significant role for other policies and measures. Moreover, there may be compelling, non-cost reasons to use other policies and measures in combination with a cap and trade system.

3.2 Combining Cap and trade and a Carbon Tax: Efficiency Considerations

Depending on whether and how a carbon tax interacts with a cap and trade system, the combination of these policies can either efficiently contribute additional emissions reductions, or can be inefficient and duplicative (Sorrell 2003; CCAP 1999). Efficiency, in this case, is represented by price equalization; that is, the price of an allowance or of the tax is the same throughout covered industry, so that the cost of the last ton of GHG reduced is the same in all industries. The remainder of this discussion focuses exclusively on this aspect of efficiency. *Subsection 3.3 discusses circumstances in which market failures occur, and so price efficiency does not guarantee that all cost-effective mitigation measures are adopted, as well as other goals that may conflict with the efficient solution.*

A tax and a cap and trade system can interact in either of two general ways: if the tax is directly applied to emissions already covered under the trading system, then there is **direct interaction**; or if the tax indirectly affects the emissions of participants in the trading system, then **indirect interaction** occurs (Sorrell 2003). Alternatively, if a tax is independent of the cap and trade system (e.g., by applying it to sector that is not covered by the trading system), then there may be **no interaction**, although in practice this independence may be difficult to achieve. The implications of these different types of interaction for the efficiency and additionality of emissions reductions are explored below. As discussed in the next section, however, efficiency is not the only

***Direct Interaction*.** Direct tax-trading system interaction typically results in an increase in the cost to meet the emissions cap, without achieving additional reductions in the overall level of emissions (Sorrell 2003). If, for example, a carbon tax is applied at $20 per metric ton of CO_2 equivalent ($MTCO_2eq$), and a cap and trade system exists with an allowance market price of $10 per $MTCO_2eq$, then the sectors covered by both of these policies will be subject to $30 per $MTCO_2eq$ (CCAP 1999).[6] In addition, because the higher costs faced by these sectors provide a greater incentive to adopt emissions reduction technologies, direct interaction results in some efficiency losses associated with the substitution of higher

[6] Rather than the market price of $10 per $MTCO_2eq$, which also represents the price of next least-cost emission reduction (CCAP 1999).

DRAFT

cost reductions in the doubly-covered sectors for other, lower-cost reductions achievable in the trading system.[7]

As an example, consider a cap and trade system that covers transportation fuel combustion from gasoline (upstream, when the fuels enter commerce), as currently recommended for WCI. The system-wide cap tends to raise the price of gasoline, acting similarly to a tax. If a gasoline tax is also applied, the price of gasoline rises further, increasing the price incentive faced by consumers. If the amplified price signal causes reductions in gasoline demand, then the associated emission reductions will take the place of other, lower cost abatement options by other trading system participants.

The result is that it is easier for other trading system participants to meet their compliance obligations, since some allowances have been freed up by the reduction in demand. The overall level of emissions does not change, but the cost of abating increases since the tax has distorted the market and substituted reductions in emissions from gasoline combustion for other, lower cost options (Sorrell 2003; CCAP 1999).

Indirect Interaction—Like direct tax-trading system interaction, indirect interaction also generally results in increased costs, a loss of efficiency, and no additional reductions in emissions levels (Sorrell 2003). As an example, consider the combination of a tax on electricity consumption with a cap and trade program that covers electricity generators. The tax on electricity consumption increases the price of electricity, tending to reduce electricity demand. As a result, electricity generators substitute the reduction in electricity demand for other, potentially lower cost abatement options, such as fuel switching (Sorrell 2003). The tax on electricity consumption does not reduce the overall level of GHG emissions;[8] rather it works to change the mix of abatement technologies that are used to meet the emissions cap, and this new mix may not be the most efficient. In this example, the electricity generators are directly affected by the cap and trade program, and indirectly affected by a tax on electricity consumption.

Opportunities for No Interaction—The combination of a carbon tax and a cap and trade system can efficiently achieve emission reductions that are additional to the reductions achieved under the trading system, if the policies do not interact (Sorrell 2003). Interaction can be effectively negated by either (1) levying a tax on a sector that is both not covered under an emissions trading system and does not influence the trading system—a feat that may difficult in practice, particularly if the trading system is broad-based and multi-sectoral—or (2) by equalizing the price of the tax and an allowance in the trading system.

To understand how this second mechanism works, consider the example of a trading system that does not cover process-related emissions from cement manufacturing. Levying a tax on the carbon content of those emissions would send a price signal that may result in cement manufacturers reducing their process-related emissions more or less than they otherwise would have if those emissions were covered under the trading system (CCAP 1999). According to economic theory, if the tax is levied at the same rate as the trading system allowance price (e.g., both the tax and allowance price are $10 per $MTCO_2eq$), additional emission reductions will be achieved without any loss of efficiency.

In practice, however, it could be difficult to set the tax so precisely. If the tax ends up being less than the allowance price in the trading system, then cement manufacturers might substitute some reductions in process-related emissions for combustion-related emissions (if technologically possible), and vice versa. The result is that overall economy-wide emissions are reduced, but not in the most cost-efficient way since the tax has changed the incentives for adopting emission reduction technologies in the cement sector versus other sectors covered under the cap and trade system.

[7] In this context, efficiency can be thought of in technological terms, i.e., whether the policy approach(es) provide incentives for the most cost-effective combination of emission reduction technologies to be adopted across sectors.

[8] It is possible that overall emissions could decrease under certain circumstances, e.g., if a cap and trade system were to only cover electricity generators, and if the electricity tax were extremely stringent.

As a general rule, if there is potential for interaction between mechanisms (i.e., both mechanisms either directly or indirectly affect the price of carbon), the use of only one instrument for carbon pricing will improve efficiency (Sorrell 2003; CCAP 1999). That said, there are other persuasive reasons to levy a tax, including revenue raising potential, and other reasons (discussed below) to combine approaches.

3.3 Instruments to Complement a Cap and trade System

There are circumstances in which it will be appropriate to combine the trading system with other policy instruments even for the same sectors. The circumstances include addressing market failures within the cap and trade system, spreading the cost of emission reductions more evenly across emitters, encouraging early action, transforming markets, or achieving other environmental and social goals. This section discusses those circumstances.[9]

3.3.1 Instruments to Address Market Failures of a Trading System

Reducing emissions cost-effectively in a sector will involve actions by a wide range of actors. The cap and trade system does not always create price signals that are sufficiently strong to alter the behavior of all the economic agents that have control over emissions in the sector. This is the case particularly where energy efficiency is concerned. For example, emissions from road vehicles are determined by vehicle owner behavior (choice of vehicle, miles traveled, decisions to use public transit), by manufacturers' decisions (what types of vehicles to design and produce, the number, and price), and by fuel producers' supply decisions (which affect prices and availability of gasoline and alternative fuels). Changing gasoline consumption requires changing the behavior of individuals, manufacturers, and fuel suppliers. A cap and trade system that restricts upstream petroleum emissions increases gasoline prices and so provides price signals to consumers, but it does not provide any direct incentives to vehicle manufacturers, suggesting that CAFE or similar standards are also warranted to correct this "market failure."

When there is a failure of the trading system—such as occurs in the energy efficiency example above—the price signal provided by the cap and trade system fails to provide sufficient incentive for all cost-effective actions to occur. Consequently, the system may work better when complemented by other policy instruments (both economic incentives and non-economic measures). Circumstances in which market failure occurs includes:

The trading system can fail to provide adequate signals in several circumstances:

- ***The carbon prices generated by the trading system may not reach some or all of the economic agents that control emissions***, as in the transportation example above. Rental buildings provide a similar example. Consider a trading system that raises prices of home heating oil and gas and electricity. If renters pay utilities but do not choose the heating/cooling/lighting equipment in their rental units, the building owner has no incentive to install energy-efficient technologies for heating and cooling, or insulation. Alternatively, if renters do not pay utilities, they have no incentive to moderate temperatures and their use of energy.
- ***Economic considerations are not the only factors governing decisions.*** Not all decisions are made for economic reasons, or in response to price signals. For example, decisions about what car or appliance to purchase, or the lighting to use in a building, are made for both financial and non-financial reasons. Some studies have suggested that—historically—fuel economy has been a small factor in vehicle choice, with luxury features, space, and other factors generally ranking much

[9] This paper addresses the circumstances where a trading system exists, and the question is whether other instruments should be layered on top of the trading system (or left in place, if they already exist). A slightly different—but related perspective—might be to ask whether, in circumstances where strong policies already exist, the trading system should be designed to cover sources already facing these alternative policies.

higher.[10] Status, what my neighbors are doing, what the norm is in society—all these contribute to how consumers and producers respond to prices of energy and technologies, as well as other environmental issues, such as recycling or water conservation. These non-economic motivations suggest that a range of policies and programs may be needed—not only command and control, but also information and education—in order to move society along an efficient trajectory.

- ***Market failures that inhibit the adoption or diffusion of technologies.*** Various cost, institutional, market, and cultural barriers may limit the extent to which energy efficiency and renewable energy technologies are adopted, or technology innovation and diffusion for these technologies occurs in the economy (Sorrell 2003). Consequently, subsidies, information provision, or procurement policies may be needed to overcome these failures, or to help to transform markets for these products and technologies. For example, if markets are too small for potential economies of scale in the production of a renewable energy technology to be realized, the price incentives provided by a trading system will be inadequate to generate more widespread use of the technology, even though the technology is potentially cost-effective.

3.3.2 Instruments to Achieve Environmental, Economic, or Social Goals

Policies and technologies to reduce GHGs may conflict with other environmental and non-environmental goals. For example, some technologies that reduce GHGs may not also meet environmental goals, or may even conflict with them. This the case in aviation, where some technologies to reduce GHGs increase emissions of criteria air pollutants. Some policy tools serve very specific purposes. For example, taxes can be used to raise revenue, penalize non-compliance, capture windfall profits from high prices, and various purposes other than direct emissions reduction.

Similarly, there are distributional concerns and other non-environmental goals that may conflict with a policy designed purely to promote economically efficient reductions in GHGs. For example, if a trading system is limited in coverage, adding policies can spread the cost of emissions control more equitably among emitters. As another example, taxes raise revenue that can be used for both environmental and non-environmental purposes.

3.3.3 Instruments to Encourage Early Action

There are a number of reasons to encourage innovation and early action using instruments to complement the trading system. First, as described in section 3.2.1 above, if economic agents do not respond quickly and strongly to the price signals created by the trading system, the economy may be slow to adapt to the new regime, suggesting that the adoption of cost-effective technologies may be slower than the restrictions on quantities under the trading system, potentially resulting in shortages or dislocations during a transition period to a lower-carbon economy. Policies that hasten the transition can assist the trading system in operating more smoothly.

Second, there may be value to early actions that reduce emissions because, by encouraging innovation and the transformation of the economy, they will make future emission reductions needed less drastic. This has been the argument for the early action programs implemented by a number of governments. Canada, for example, in its report from the Credit for Early Action Table (CEA 1999) argued that adopting early actions could facilitate Canada's transition to a low carbon economy by encouraging investment in low cost options (such as energy efficient technologies) and thereby "bend the curve" and allow for a "smoother and less costly adjustment" to meeting Canada's Kyoto targets.

Third, various policy instruments can assist in achieving long term goals and developing new GHG reducing technologies. While price signals provide incentives for adopting proven, cost-effective

[10] The recent high energy prices may be sufficiently high to shift the demand more towards energy-efficient vehicles.

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alternatives to existing technologies reductions, they may not provide as much incentive for the development and demonstration of technologies that are not yet economically viable. Research and demonstration programs, subsidies, and similar programs can provide an impetus for these developing technologies and for additional innovation.

3.4 Combining Cap and trade with Other Instruments in Practice

As this section has discussed, cap and trade can be combined with other policy instruments to produce an overall GHG strategy that both reduces emissions cost-effectively and meets other social and environmental goals. Policies can be used to cover sectors not already included in the cap and trade system, to correct "market failures" of the cap and trade system (particularly likely in the case of energy efficiency and renewable energy), and to address other environmental and social consequences of GHG control.

The notion that cap and trade can be complemented by other policy instruments has also been supported by economic modeling of cap and trade programs, such as WCI. Recent modeling of the economic impacts of WCI program design options has found that the implementation of certain policies and measures—aggressive energy efficiency programs, clean car standards, and programs that reduce total vehicle miles traveled (VMT)—can be supportive of a cap and trade program. With the inclusion of these complementary policies, the allowance price was calculated to be substantially lower and a substantial number of allowances were expected to be banked by 2020. These complementary policies also contributed to projected small net savings to the economy (less than 0.5% of GDP in 2020) associated with the achievement of the WCI Partners' regional emission reduction goal of 15% below 2005 levels by 2020.

Exhibit 3: Reductions in California's Greenhouse Gas Emissions from Recommended Policies

Preliminary Recommendation

Recommended Measures

Table 2: Recommended Greenhouse Gas Reduction Measures

Recommended Reduction Strategies	Sector	2020 Reductions (MMT CO_2E)
The Role of State Government	Various	1-2[17]
California Cap-and-Trade Program Linked to WCI: Emissions cap of 365 MMTCO_2E covering electricity, transportation, residential/commercial and industrial sources by 2020. Shaded reductions contribute to achieving the cap.		
California Light-Duty Vehicle GHG Standards	Transportation	31.7
Energy Efficiency	Electricity & Commercial and Residential	26.4
Renewables Portfolio Standard (33% by 2020)	Electricity	21.2
Low Carbon Fuel Standard	Transportation	16.5
High Global Warming Potential Gas Measures	High GWP	16.2
Sustainable Forests	Forests	5
Water Sector Measures	Water	4.8[18]
Vehicle Efficiency Measures	Transportation	4.8
Goods Movement	Transportation	3.7
Heavy/Medium Duty Vehicles	Transportation	2.5
Million Solar Roofs (Existing Program Target)	Electricity	2.1
Local Government Actions and Regional GHG Targets	Land Use and Local Government	2
High Speed Rail	Transportation	1
Landfill Methane Control	Recycling & Waste	1
Methane Capture at Large Dairies	Agriculture	1[19]
Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	Industrial	TBD
Additional Emissions Reduction from Capped Sectors		35.2
	Total Reductions	169

Source: CARB (2008).

Moreover, in practice, many of these types of complementary policies are being applied or considered for application. For example, many RGGI states have renewable portfolio standards that will continue to be implemented in tandem with the regional cap and trade program. In California, similar types of GHG reduction measures—including renewable energy and energy and fuel efficiency—are being recommended for coupling with the WCI trading system, as shown in Exhibit 3.

4 LOOKING TO THE FUTURE: NATIONAL CAP AND TRADE

It appears likely that, at some point in the future, federal legislation may be passed that creates a national GHG cap and trade system. Layering federal GHG legislation on top of existing regional trading programs, such as the WCI, and other state-level policies and measures may have a variety of implications for Washington State as an early mover. This section will highlight some of the issues that may arise when national GHG legislation is layered on top of existing state and regional trading programs and other policies and measures.

4.1 Introduction

Decisions that Washington State makes today—for example, in terms of the types of emissions reductions policies the State adopts and the sectors that those policies cover—will affect the position of its industries under a federal cap-and trade-program. The issues that may arise will depend on how programs are structured today at the state and regional level, and on how the national program is ultimately designed.

In particular, the method chosen for allocating allowances under a federal system will impact the position of Washington State's industries, as discussed in Section 4.2. The types of emissions reductions policies that Washington State adopts, as well as their sectoral coverage, might also impact how the State's industries fare in the context of a federal program; these implications are addressed in Section 4.3. Finally, the possibility of federal preemption poses a potential challenge to state-level policies depending on how a national program is designed, as described in Section 4.4.

While these potential conflicts are generally not strong enough to warrant changing decisions that Washington State may make about taking early action on climate change, awareness of these issues may help the State participate more effectively in future discussions regarding the design and implementation of a federal program.

4.2 Allocation of Allowances in a National Cap and trade Program

How allowances are allocated under a national cap and trade program will have implications for Washington State as an early mover in the climate arena. Depending on the allocation method chosen by a federal program, industries in Washington State could receive relatively more or fewer allowances than industries in other states as a result of the State's early reductions in GHG emissions.

Under a national emissions trading program, allowances could either be (1) allocated to the states—which would then have the flexibility to determine how to distribute allowances among their covered entities—or (2) allocated at no cost or auctioned off directly to industry by the national program. A combination of these two allocation methods could also be implemented; for example, the Boxer-Lieberman-Warner Climate Security Act (S.3036) [11] proposes to allocate some allowances directly the states and to allocate and auction off remaining allowances to covered and other entities. The implications of these two basic allocation methods for Washington State are described in the next two sections, followed by a summary discussion in Section 4.2.3.

[11] Substitute amendment released by the Senate Environment and Public Works Committee on May 21, 2008.

4.2.1 National Program with State Caps

If a federal cap and trade system decides to allocate allowances directly to the individual states, depending on the formula that is used to determine the states' allocations, states that have made more or less stringent GHG emissions reductions may be at a disadvantage. This framework for an emissions trading system—i.e., a broader program with caps at the individual jurisdiction level—has been adopted for regional trading programs, such as RGGI and WCI.[12] For example, RGGI apportioned individual "emissions budgets" for each signatory state through a process that was based on historical emissions and negotiation among the states. Similarly, the WCI program (according to current design plans) will likely apportion allowance budgets to individual jurisdictions based on Partner and regional emissions reduction targets, taking into account factors such as electricity production and consumption, and projected changes in population and economic activity.

As noted, the impact of state-level caps for Washington State will depend heavily on the formula and process used to establish the caps. Any number of different formulas for distribution can be employed, including formulas based on historical emissions, projected future emissions, output measures, emission intensity rates (benchmarks), or other metrics (as described in Exhibit 4). It is important to note, however, that these formulas may only serve as the starting point for negotiations on the final distribution among the states. Moreover, use of one methodology or another for allocating allowances to the states does not preclude the use of special provisions to reward early action; for example, the Boxer-Lieberman-Warner Climate Security Act (S.3036)—while it does not set state caps—proposes to allocate 4 percent of emission allowances among states that have "led the nation in efforts to reduce greenhouse-gas emissions and improve energy efficiency.". In the context of setting state caps, this might mean, for example, that a certain percentage of allowances are distributed among the states based on a set allocation formula, with the remainder distributed based on the extent of early action taken.

Exhibit 4: Approaches for Allocating Allowances

- Historical Emissions Levels: Allowances are allocated pro rata based on emissions levels in a historical year (often referred to as the base year) or set of years (base period).
- Benchmarking: Allowances are allocated based on the setting of some specific "benchmark" or common standard, such as an emissions intensity rate, such as emissions per unit of input or output, and then the comparison of an entity's performance against that standard.
- Projected Emissions Levels: Allowances are allocated pro rata based on projections of future emissions levels; these projections may assume certain actions, such as adoption of best available technologies. This allocation method is not commonly used, but has been employed, for example, to accommodate new entrants to the market under Ireland's National Allocation Plan for 2005-2007 (Ireland EPA 2004).
- Other Measures: Allowances can be allocated based on any number of other measures, such as output, input, or capacity metrics. These metrics are not commonly used in multi-sector trading systems due to difficulties with heterogeneity of output, inputs, and capacity measures.

The implications of these different formulas for determining state caps are discussed below for Washington State as an early mover.

- How well an early mover like Washington State fares if the state caps are set based on **historical emissions** depends on the choice of the base year or base period. If the base year follows Washington's enactment of emissions reductions programs, the State could receive relatively fewer allowances than other states. In this case, early action by the State would not be rewarded, and the State's relative position in the trading system may be weaker than that of states that have not pursued early GHG control programs.

[12] The EU ETS is slightly different – Member States are assigned a *national* target based on the burden sharing agreement, but they choose how to split that target between trading and other initiatives in non-covered sectors.

Alternatively, if the base year is instead one that precedes significant climate action in the State, the State would be allocated relatively more allowances (compared to the number of allowances needed for compliance) than other states that have not made early reductions. The same logic follows if the chosen base year is one in which Washington's economy was in an upswing (and so GHG emissions were higher); in this case the State may receive more allowances relative to other states in a downturn.

- A **benchmarking approach** can reward early action if State policies results in entities achieving a lower emissions intensity of production than the standard. Under this approach, the State could receive relatively more allowances (compared to the number needed for compliance) than other states that have not taken early action. As an example, benchmarking was used by the Ozone Transport Commission to set state-level caps for the NO_x Budget Program. The size of each state's cap was determined based on the heat input of the covered power plants in a base period multiplied by a set emissions rate. This calculation formed the total state cap, which could then be allocated to the individual installations at the discretion of the state (Aulisi 2005). This system rewards those early-acting installations that achieve an emissions rate lower than the set rate.
- Using **projected emissions** to set state caps could disadvantage Washington State if projections are based recent emissions levels. Under this scenario, Washington State as an early mover would receive relatively fewer allowances than States with higher current emissions levels and emissions trajectories.

For an early mover like Washington State, one advantage of state caps is that even if the approach used to set the state caps disadvantages the State relative to other states, Washington State would still have the flexibility to design its own state-level allocation scheme to reward its early movers. For example, under RGGI, each state must allocate a minimum of 25 percent of its emissions budget to "consumer benefit or strategic energy purpose," but beyond this requirement, states have the flexibility to determine the allocation method for the remaining allowances, including whether early reduction allowances are awarded.

4.2.2 Allocations in National Program

If allowances are distributed directly among covered entities by the federal trading program, early action by Washington State's industries can be rewarded or disadvantaged depending on the methodology employed. Allowances can either be auctioned or allocated at no cost, or a combination of those methods can be used, and the choice of these methods will have implications for the relative position of the State's industries in the federal trading program, as discussed below.

In addition, special provisions may also be incorporated into the allocation method to reward early action. For instance, the Boxer Lieberman-Warner Climate Security Act proposes to allocate 5 percent of allowances to early actors in 2012 (declining to 1% in 2018 and to zero in 2026). As another example, under RGGI, signatory states have the option of adopting special provisions for early reduction credits. Provisions like these in the allocation scheme of a federal cap and trade program could reward Washington State's efforts to reduce GHG emissions today.

Auction

An auction system tends to favor entities that have made early reductions since they need to purchase fewer allowances under a federal system than if those reductions had not been made. And because the purchase of allowances can be considered a cost of production, the need to purchase fewer allowances under this scenario has the potential to improve the relative position of early actors in Washington State. Several RGGI signatory states have decided to auction the entirety of their annual CO_2 allowance budgets, which should favor early movers in those states.

Allocation at No Cost

If allowances are allocated to covered entities at no cost under a federal trading program, the implications for Washington State's early acting industries will depend heavily on the method of allocation (as described in Exhibit 4 above).

- **Historical emissions levels**. As with the state caps, the base year or period selected determines the impacts for Washington State's industries. A historical emissions approach was employed, for example, in the EU ETS National Allocation Plans (NAPs), which used the recent years 2001-2005 as part of their Phase II base period for allocating allowances at the installation level (Neuhoff et al. 2006; Netherlands MEZ/VROM 2006). The result is that the allocation approach does not recognize action that precedes the base period. In general, an allocation formula based on recent historical emissions levels may result in industries that have already reduced emissions in response to Washington's policies being allocated fewer allowances than industries in other states.

  Alternatively, if the base year or period chosen precedes Washington State's implementation of significant controls on GHGs, the State's industries would be allocated relatively more allowances (compared to the number of allowances needed for compliance) than industries in states that have not made early reductions. In this case, the relative position of the State's industries in the trading system could be stronger than that of industries in states that have not taken early action.
- **Benchmarking**. Under a benchmarking approach, entities that maintain the same level of output with a lower level of emissions would receive the same number of allowances as entities reaching the same production levels but with higher emissions intensity. Thus, the lower-emitting entities would be better positioned in a cap and trade system, since they would need fewer allowances to achieve compliance, and would thus have more allowances to sell relative to higher-emitting competitors in other states (Blachowicz 2003). In this way, benchmarking can reward early action. Partly for this reason, an environmental performance benchmarking approach has been recommended by the Market Advisory Committee to the California Air Resources Board for the design of a cap and trade program in the State of California (CARB 2007). Some NAPs for Phase I of the EU ETS also included some benchmarking elements in their allocation methodologies, including the Netherlands, Austria, Denmark, and Lithuania (Indecon 2006).
- **Projected emissions**. Allocating allowances to covered entities on the basis of projected emissions could disadvantage early moving industries in Washington State if projections are based recent emissions levels. Under this scenario, the State's industries would receive relatively fewer allowances than states with higher current emissions levels and emissions trajectories.

4.2.3 Summary

As shown in this section, the implications of allowance allocation for Washington State as an early mover depend on the basis of allocation. In general, a historical emissions approach where the base period follows the implementation of significant GHG reductions in the State can disadvantage early actors, as can a projected emissions basis; on the other hand, auctioning, benchmarking, and a historical emissions base period that precedes GHG reduction efforts can reward and provide an incentive for early actors. These impacts are summarized in Table 4.

DRAFT

Table 4: Summary of Implications for Washington State as an Early Actor

Basis of Allocation		State Caps	Direct Federal Allocation to Covered Entities
Historical Emissions	If base year/period is prior to implementation of early action initiatives:	Early action is an **advantage**; more allowances allocated to Washington State relative to other states	Early action is an **advantage**; more allowances allocated to early acting industries in Washington State relative to industries in other states
	If base year/period is after implementation of early action initiatives:	Early action is a **disadvantage**; fewer allowances allocated to Washington State relative to other states	Early action is a **disadvantage**; fewer allowances allocated to early acting industries in Washington State relative to industries in other states
Benchmarking		Early action is an **advantage**; more allowances allocated to Washington State (compared to the number needed for compliance) than other states that have not taken early action	Early action is an **advantage**; more allowances allocated to early acting industries in Washington State (compared to the number needed for compliance) relative to industries in other states
Projected Emissions		Early action is a **disadvantage**; fewer allowances allocated to Washington State relative to other states if projections are based recent emissions levels	Early action is a **disadvantage**; fewer allowances allocated to early acting industries in Washington State relative to industries in other states if projections are based recent emissions levels
Auction		--	Early action is an **advantage**; early acting industries in Washington State must purchase fewer allowances relative to industries in other states

4.3 Choice of Policies and Measures at the State Level

The choices that Washington State makes today about (1) what types of climate policies and measures to adopt and (2) what sectors to cover will have implications for the position of its industries under a future federal cap and trade program. Early adoption of policies and measures in sectors that are not ultimately covered by a federal program might limit the extent of low-cost credits that can be earned in-state through a federal offsets program, as addressed in Section 4.3.1 below. In addition, different types of policies and measures (e.g., performance versus technology standards) are likely to have different implications for the future position of Washington State's industries; these issues are briefly discussed in Section 4.3.2.

4.3.1 Offsets under a Federal Cap and trade Program

Most cap and trade programs include some type of offsets, which allow emissions reductions that are generated outside of the program's covered sectors to be used to "offset" the compliance obligations of covered entities. For example, a system of offsets is included in the proposal for the Boxer-Lieberman-Warner Climate Security Act; offsets are also part of the RGGI system and envisioned for the WCI trading market. How Washington State's industries fare under such a future offsets program in a federal emissions trading system will depend on decisions that the State makes today about adopting climate policies and measures.

The key issue for Washington State's industries is that of the "additionality" of offsets projects, i.e., the determination that offsets are additional to what would have otherwise happened. Several measures of additionality (as shown in Exhibit 5) can be used to establish eligibility of offset projects. As early movers, the State's industries are particularly vulnerable to an offsets requirement for regulatory additionality—and this requirement is common among offsets programs (e.g., regulatory additionality is effectively required by CDM, the Carbon Trust, and the RGGI model rule).[13] If Washington State develops

[13] See the UNFCCC's CDM "Tool for the demonstration and assessment of additionality (Version 05)" available online at http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html; the Climate Trust Web site at: http://www.climatetrust.org/; and the RGGI model rule available online at: http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf.

regulatory policies and measures in sectors that are (1) not ultimately covered by a federal cap and trade program and (2) eligible for offsets under the federal program, early action could limit the extent of offsets that could be earned in those sectors.

As an example, if Washington State pursues policies to reduce direct methane emissions from manure by diverting openly stored animal waste to an anaerobic digestion process—as recommended by the Washington Climate Advisory Team Agriculture Technical Work Group—and a federal cap and trade program ends up listing manure management projects as eligible for offsets—as proposed by the Boxer-Lieberman-Warner Climate Security Act[14]—then any offset projects would likely have to be above and beyond the manure management practices that Washington State has already required from in-state entities. Under this scenario, the bar is set higher for earning manure management offsets in Washington State. Covered entities in Washington State may seek offsets in other geographical locations, but to the extent to which covered entities in Washington State can earn in-state offsets at a lower cost (e.g., lower administrative costs in-state), this could represent a disadvantage for the State's industries under future federal legislation. Offsets for manure management are also included as eligible projects in the RGGI model rule.

Exhibit 5: Possible Criteria for Additionality

- Regulatory or legal additionality: Offset projects must reduce GHG emissions below the level required by existing laws, policies, or other regulatory frameworks. If reductions are mandated by law, then they cannot be considered additional.
- Environmental additionality: Offset projects must result in a net environmental benefit.
- Financial or investment additionality: Revenue associated with GHG reductions must be a key decision factor for implementation of the offset project. For example, to be considered additional, projects may have to demonstrate a low rate of return without revenue from GHG reductions.
- Technology or common practice additionality: Offset projects must utilize innovative technologies rather than "common practice" ones, and reduce GHG emissions levels below levels produced by these commonly used technologies.
- Timing additionality: Offset projects must be initiated after a certain date to meet this criterion.

Sources: WRI and WBCSD 2005.

The counterpart to additionality is the baseline scenario. Emission reductions are often measured against projections of the GHG emissions that would have occurred in the absence of the offset project, otherwise known as the "business-as-usual" or "counter-factual" baseline. Because the project activity must be additional to the baseline, the same considerations as discussed above in relation to additionality also apply to the determination of the baseline scenario.

In short, while offset markets can often provide low-cost emissions reduction options and increase the flexibility with which covered entities can meet their compliance obligations, early movers such as Washington State may find that prior reductions made in non-covered sectors effectively limits the extent of offset credits that can be earned in-state by changing the baseline.

4.3.2 Choice of State Climate Policies and Measures: Standards

The types of policies that Washington State chooses to reduce GHG emissions in its industries may affect how those industries fare under a federal cap and trade program. Standards are often proposed as a policy approach to reduce GHG emissions, and several types are available for climate policy, including technology standards, which mandate a specific technology, and performance standards, which set a maximum level or rate of emissions for a certain technology or sector. Depending on the type and stringency of standards that Washington State imposes on a sector that ultimately is covered by a federal program, the sector may or may not be better positioned to comply with federal legislation.

[14] Manure management offsets are also included as eligible in the RGGI model rule, and proposed as part of the design of the WCI cap and trade system.

DRAFT

Technology standards can have a “lock-in” effect on technologies adopted, which could potentially disadvantage the State’s industries under a federal cap and trade program (Yang and Oppenheimer 2007; Aldy *et al.* 2003). For example, consider that an industrial facility has invested in a certain emissions reduction technology in response to state technology standards, but that investment in an alternative reduction technology will be needed to meet a more stringent federal policy. If re-tooling the facility to accommodate the alternative technology will be more expensive because the original reduction technology was implemented, then industrial facilities could be at a disadvantage as a result of early state action.

On the other hand, performance standards—such as limits on allowable stack emissions per ton of cement clinker produced—are less likely to have negative implications for Washington State’s industries under a federal cap and trade program. As an example, stringent limits on allowable stack emissions per tons of cement clinker produced could be advantageous for cement kilns under a federal cap and trade program if the allowance allocation scheme favored early action, as discussed in Section 4.2 above.

4.4 Federal Preemption

Depending on how a federal emissions trading program is designed, aspects of the WCI cap and trade program—along with other policies and measures that Washington State implements—could be preempted by a national program. There is precedent in environmental regulation for a variety of levels of preemption. For example, the U.S. Clean Air Act (CAA) expressly preempts all states besides California from regulating mobile source GHG emissions.[15] On the other end of the spectrum, the CAA also generally allows states the flexibility to decide how to regulate sources in order to meet the National Ambient Air Quality Standards (NAAQS). The CAA also expressly allows states to set more stringent emissions limits for stationary sources than the national standards. Exhibit 6 provides an overview of the legal aspects and different types of federal preemption.

In the context of a national GHG emissions trading program, federal preemption could range from express superseding of state policies that reduce emissions from sectors covered by the federal cap and trade program, to cooperative policymaking that allows states climate policies to exist in parallel with the federal program (Litz 2008). The latter scenario is more in line with the roles of the states that were envisioned in earlier versions of the Lieberman-Warner Climate Security Act of 2008, which proposed to reserve the right of the states to enforce any caps, limits, standards, or other requirements controlling the emissions of GHGs.

[15] 42 U.S.C. §§ 7543(b)(1), 7543(e)(2)(A) (2000).

For Washington State, the implications of possible federal preemption will depend on how restrictive it is.

- Under a less restrictive preemption scenario, Washington State would be able to legally maintain its existing climate policies. In this situation, the State's challenge will be to navigate any difficulties that arise from the combination of a federal cap and trade program with State-level policies and measures (as discussed in Section 2). This could include determining the future of the WCI trading program given the operation of a federal emissions trading program. In the EU, for example, installations that had been covered under the United Kingdom's Emissions Trading System (UK ETS) prior to the implementation of the EU ETS were allowed to apply for temporary exclusion from the EU ETS through the end of 2006, at which point the UK ETS ended (UK DEFRA 2007).
- Under a more restrictive preemption scenario, laws enacted by Washington State to control GHG emissions could be superseded by federal legislation. Full preemption—and subsequent disbanding—of the WCI cap and trade program could have economic consequences for participants. For example, if no integration was provided for between a federal cap and trade program and the WCI, federal preemption could render any regionally banked allowances valueless, thus representing a loss for those entities holding banked allowances.[16] The Boxer Amendment of the Climate Security Act calls for entities holding allowances issued by RGGI or by California under AB32 to receive an amount of allowances "necessary to compensate the entity for the cost that the entity incurred in obtaining and holding […those…] allowances."

Exhibit 6: Legal Aspects of Federal Preemption

"Preemption" is said to occur when federal law is rendered supreme over state law, and can either be express or implied. Three types of preemption are generally recognized:

- Express Preemption: Federal statute contains language that expressly says that federal law will supersede state law, or that states are prohibited from regulating in certain areas.
- Conflict Preemption (Implied): Preemption occurs when the courts determine that there is an actual conflict between state and federal law (i.e., it is impossible to comply with both federal and state laws or state law is an obstacle to accomplishing the objectives of Congress). In this case of direct conflict, federal law is rendered supreme under the Supremacy Clause of the U.S. Constitution.
- Field Preemption (Implied): Preemption occurs when it is determined by the courts that federal law was intended to "occupy the field" so thoroughly that no room is left for state law to supplement it.

Another aspect of preemption is whether state law is preempted by either a "floor" or a "ceiling." Under floor preemption, federal law establishes a minimum standard, but allows states to enact more stringent legislation. Ceiling preemption establishes a standard above which states may not regulate.

Sources: Litz 2008; Harvard-Duke Offsets Conference

5 CONCLUSION

Cap and trade can, in theory, be a cost-effective means of controlling GHG emissions. However, because of the diversity of emission sources and the variety of economic agents with some control over emissions, cap and trade cannot be a panacea. Other types of policies and instruments will be needed to reduce emissions from sources not easily included in the system, to provide incentives for a wide range of economic agents to take actions that reduce emissions, and to address other environmental or social goals that may conflict with GHG reductions. Moreover, as a national cap and system appears closer on the horizon, it will be important for Washington State to participate in the debate about system design, so that industry affected by current state-level programs (including both the WCI and other policy instruments) are not put in an adverse position in the future.

DRAFT

[16] To avoid these losses, allowances banked under regional cap and trade programs like WCI could be allowed to be traded in the federal market, either as full or discounted allowances.

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