Concepts in Greenhouse Gas Regulation
A Primer on Meeting ACT 234

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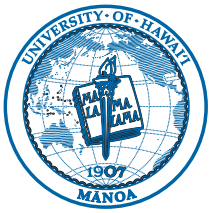

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I. Introduction

In 2007, Hawaii became the second State after California to adopt binding greenhouse gas reductions targets in ACT 234. The legislation follows the example set by California in attaining 1990 levels of greenhouse gas emissions by the year 2020. The State of Hawaii Department of Health Clean Air Branch is tasked to regulated emissions through the use of market-based mechanisms - essentially building a market for greenhouse gas pollution.

While ACT 234 was in many ways modeled after California's AB32, it is also recognized that Hawaii has unique economic and environmental characteristics. Hawaii will require policies tailored to its island features. This briefing provides a primer on greenhouse gas regulation options and how they might be applied to the case of Hawaii.

II. Policy Options for Greenhouse Gas Regulation

There are two market-based approaches to GHG regulation: Carbon tax and Cap-and-trade. A third approach entails direct environmental regulation and is called 'Command-and-control.' Carbon tax and cap-and-trade mechanisms create markets for environmental pollution and implicitly give a price to pollution that emitters must pay. This cost provides a financial incentive to reduce emissions and improve environmental outcomes. Both the carbon tax and cap-and-trade mechanisms are characterized as "market-based mechanisms." Market-based mechanisms are designed to establish a cost for polluting and provide emitters with greater flexibility in how they respond to meet environmental targets. As the name implies, a "carbon tax" imposes a tax on the carbon content of fossil fuels and other related greenhouse gases. This means that the regulating body sets the price of pollution. Although it is referred to as a "carbon" tax, it often includes other greenhouse gas emissions measured in carbon dioxide equivalent. A cap-and-trade system, on the other hand, allows the market to set the price of greenhouse gas emissions.

Traditionally, environmental regulation has occurred through mandated command-and-control systems. These systems set a regulatory standard that emitters must meet irrespective of compliance costs. A commonly cited example of a command-and-control system is the CAFE standards that set gasoline mileage standards for new automobiles. Command-and-control approaches may be used to reduce greenhouse gas emissions in Hawai'i, and are currently being used to mandate renewable energy standards. Consistent with national and international approaches, however, ACT 234 emphasizes the use of market-based approaches to achieve greenhouse gas emissions reductions.

Policy Choices for a Carbon Tax

Within a carbon tax system, the regulator sets the tax rate on greenhouse gas emissions such that desired levels of emissions are met for a designated group of polluters who will reduce emissions to minimize their carbon tax. More specifically, the regulator identifies both the types of greenhouse gas emissions and the industries to be regulated. Achieving the emissions cap, however, is difficult due to the issue of setting an appropriate tax rate. Even with sophisticated modeling techniques built on detailed market data, the appropriate tax rate to reach the emissions cap will be an estimate at best. Thus there must be built-in flexibility of the tax rate over time to reach the emissions cap as well as an understanding that, in any given compliance period, the regulatory standard may not be attained.

While there is uncertainty in the environmental outcomes of a carbon tax system, there is greater certainty in the price burden of the regulation. In addition, because tax systems are well established, carbon taxes are often administratively simpler from an implementation standpoint.

Policy Choices for Cap-and-Trade

In a Cap-and-trade system for greenhouse gas reduction, a regulatory body establishes a greenhouse gas

emissions cap for a designated group of polluters. The emissions allowed under the cap are divided up into individual 'permits'-each permit usually equals one ton of carbon dioxide equivalent - where each permit represents the right to emit that amount of greenhouse gas emissions. The permits are either auctioned or freely allocated to the regulated industries.

Because the emission cap restricts the amount of pollution allowed, permits take on financial value. Companies are able to buy and sell permits in order to continue operating in the most profitable manner available to them. Those that reduce emissions below their cap can sell their extra permits to companies facing high costs of emission reduction. A key advantage of a cap-and-trade system compared with command-and-control regulation is that it gives companies flexibility in the manner in which they achieve their emission targets.

In a cap-and-trade system, a series of policy choices need to be made:

1. Allocation of Emission Permit: The distribution of emission permits (allowances) can either be 1) freely allocated (also called grandfathering) or 2) auctioned to the highest bidder in a given compliance period.

It is important that allocations are made based on accurate historical information. For example, the Chicago Climate Exchange allocates emissions permits based on an average of 1998-2001 emission levels for an individual firm. It is important that the baseline is based on accurate historical information such that it does not cause perverse incentives to shirk while the regulatory scheme is being developed and before implementation (i.e. companies pollute more to build a higher baseline). In addition, the allocation must be made such that it is equal or less than current industry emissions to avoid creating industry windfalls from receiving free and valuable permits above emissions targets.

The alternative is to auction emissions permits to the highest bidder. By doing this, the outcome of industry windfalls is avoided and polluters are faced with the true cost of their emissions (i.e. internalizing environmental damage).

Current thinking on the allocation of emission permits tends to favor a mixture of grandfathering and auction, with increasing the portion of auctioned permits over time. This allows companies to gradually phase into paying for emissions permits, facing true environmental burden and also giving companies and consumers time to adjust to new regulatory standards.

2. Safety Valve Price: A safety valve effectively puts a price ceiling on the sale of emissions permits. Unlike a carbon tax, the price is uncertain in a cap-and-trade system and thus the price ceiling is implemented to avoid "undue" economic effects. Under a safety valve system, when open-market emission credits reach the ceiling price, the regulator will intervene and issue additional permits- at the ceiling price - to meet the demand for emissions. The issuance of these ceiling permits compromises the ability to meet the emissions target.

3. Banking: Allows for the carry-over of unused allowances or offset credits from one compliance period to the next. The rationale for implementing a banking mechanism is that it hedges uncertainty of future periods. Allowing banking means that the emissions cap may not be met in any given compliance period.

4. Borrowing: A mechanism that allows regulated industries to use allowances designated for a future compliance period to meet the requirements of the current compliance period. Borrowing may entail penalties to reflect the programmatic preference for near-term emission reductions. Allowing borrowing means that the emissions cap may not be met in any given compliance period.

Policy Considerations Pertaining to Both Carbon Tax and Cap-and-Trade Systems

In addition to the specific design of either a carbon tax or cap-and-trade system, there are several overarching considerations in any greenhouse gas reduction policy. The question of which industries to regulate, how to use government revenue generated from a car-

bon tax or the sale of emission permits, and how to provide appropriate incentives for all greenhouse gas reducing actions, are of crucial importance. In addition, any regional greenhouse gas reduction target should be met in the context of greenhouse gas emissions being a global pollutant and thus consider the impact of local reduction strategies on global emissions.

1. Upstream Regulation: An upstream approach to greenhouse gas emissions regulation matches the point of regulation with the point of entry of fossil fuels into commerce within the covered region. In the case of Hawaii, this would mean regulation, for example, of oil, coal, and natural gas at the level of the petroleum refineries, coal plant, and natural gas companies. By pursuing upstream regulation, subsequent price increases are passed-on by the upstream industry to downstream consumers. For example, additional costs accrued to the petroleum refineries would be passed (at least partially) to the electric sector through the purchase of refined product.

2. Downstream Regulation: A downstream approach to greenhouse gas emissions regulation, also characterized by being source-based, means regulation occurs at the point of fossil fuel combustion. In this case, regulation in Hawaii would occur at the industry that most closely interacts with final consumers. For example, a downstream system would include regulation of electric companies and gasoline stations.

3. Revenue Recycling: The use of revenue generated from a carbon tax or pollution permit sales are a matter of considerable concern. There are several thoughts on how increased government revenue as a result of a greenhouse gas reduction strategy should be utilized: 1) to offset the regressive effects of the policy on low income families, 2) to ease the transition to renewable energy through research and development and capital investments, and 3) to address the physical effects of global warming through investments in infrastructure needed to cope with sea level rise and extreme weather events.

4. Offsets: Most greenhouse gas reduction policies include provisions to account for various offset projects. These projects are designed to reduce greenhouse gas emissions through sequestration or avoidance of carbon that would not have otherwise occurred. Offset credits are often considered a substitute for emissions reductions and can also be traded directly between emitters or through commodity exchanges. There are, however, often caps on the amount of allowable offsets as well as strict guidelines for offset criteria. Offset criteria generally include evidence that the offset is 1) both real and measurable, 2) additional - meaning that it would not have occurred otherwise, 3) permanent, and 4) enforceable.

5. Early Reduction Credit: Well-designed greenhouse gas emissions reduction programs include provisions for emitters who chose to reduce greenhouse gas emissions prior to the implementation of the program. In the absence of an early adopters provision, companies might hold-off on capital investments and other reduction measures because it may constrict potential baseline accounting of emissions or because it preemptively uses a cost-effective reduction strategy prior to the compliance period.

6. Leakage: Given the global character of greenhouse gas emissions, well-crafted policies ensure that reduction strategies in one location do not lead to increased greenhouse gas emissions in another. For example, due to national and international accounting standards, the embedded carbon content of imports does not technically accrue a larger carbon footprint to the import location. As such, it is possible to effectively export a region's carbon emissions by reducing the production of goods locally and increasing imports. Although the region's carbon footprint goes down by regional accounting standards, it shifts the burden of greenhouse gas emissions from one location to another and may increase global emissions. As an island highly dependent on imports, this consideration is of crucial importance.

7. State and National Policy Integration: In the absence of federal legislation, States are paving the way for binding U.S. greenhouse gas emissions reduction commitments. In the realization of national legislation, however, the role of State systems is put into question. Given federal preemption, it is likely that State

programs will fold into national programs or possibly receive exemption. It is important for State policies to be flexible in the case that State programs are superceded. For example, any revenue from the sale of emissions permits or taxes will cease at the State level. For more information on potential national legislation, see An Overview of U.S. Regional and National Climate Change Mitigation Strategies (UHERO).

III. Discussion

As an island, Hawaii faces different energy and environmental problems than the U.S. mainland as well as different opportunities for environmental improvement. Many of these differences have implications for how climate change legislation will affect Hawaii's economy and its ability to address global climate change. Some fundamental differences that are potentially relevant to implementing climate change policies include:

1. Hawai'i is highly oil-dependent and thus there are mutually supportive goals of environmental improvement and energy security.

2. As a series of islands, it is difficult to import and export power between islands. Unlike contiguous States, there is little opportunity for power-sharing.

3. Hawaii's largest economic sectors are tourism and the military. Tourism, as the largest private sector industry, is highly dependent on international, national, and local air travel.

Hawaii is among many other jurisdictions in the U.S. and around the world working to develop appropriate greenhouse gas emissions reductions policies (see An Overview of U.S. Regional and National Climate Change Mitigation Strategies). Although Hawaii faces unique challenges in creating an emissions reduction scheme, it also benefits from a wide array of potential renewable energy sources like the sun, wind, and ocean. As such, there are many considerations in crafting an appropriate greenhouse gas emissions reduction policy - as this briefing highlights. Ultimately, it is the goal to create a policy that effectively reaches the legislative cap of 1990 levels of greenhouse gas emissions by the year 2020 in an efficient and equitable manner.

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