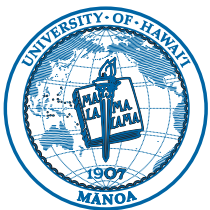


**An Overview of U.S. Regional and National Climate Change Mitigation
Strategies**
Lessons for Hawai'i

August 25, 2008

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I. Introduction

Global warming due to unprecedented levels of anthropogenic greenhouse gas emissions is among the most pressing public policy issues of our time. Intricately linked with comforts of modern society - primarily electricity and transportation - addressing greenhouse gas emissions in an ecologically responsible, efficient, and equitable manner is at the forefront of international, national, and regional policy-making.

Although the United States has been part of the global dialogue on greenhouse gas emissions reduction, also called mitigation, it has not committed itself to any reduction schedule. In the absence of federal guidance, individual states and regional cooperatives have formed to address this pressing issue. In 2007, Hawaii became the second state after California to adopt legally binding greenhouse gas emissions reduction legislation in ACT 234, capping statewide emissions at 1990 levels by the year 2020. Over half of all U.S. states have committed to meeting greenhouse gas reduction targets and many more are participating as observers.

The challenge of reducing greenhouse gas emissions will differ from place to place, although it is particularly unique in the case of islands. Islands tend to be highly oil and tourism-dependent. Questions as to what type of market-based mechanism, such as cap-and-trade or a carbon tax, and what type of regional partnerships will be appropriate for an island economy are questions that Hawaii policy-makers face. A 10-member Task Force was created as a result of ACT 234 to develop the work plan for reaching the target reduction. This briefing is designed to help the Task Force and others to better understand what climate mitigation policies have been developed elsewhere, the choices made in developing the policy architecture, what types of economic and environmental analyses support these policy decisions, and how examples of other states, regional cooperatives, and international initiatives may be applicable to the case of Hawaii.

The remainder of this paper presents a review of other U.S. regional and state greenhouse gas emissions

reduction initiatives in terms of reduction commitment, timeline, policy mechanisms and economic analysis. It provides an overview of what insights Hawaii policy-makers may gain from the experience of other jurisdictions and a variety of climate change mitigation strategies. Section II examines various regional strategies including regional cooperation and state initiatives. Section III presents a leading national proposal, Lieberman-Warner. Section IV provides concluding remarks. Discussion sections on what Hawaii can learn from various examples are provided in the presentation of each jurisdiction's mitigation strategy.

II. Regional Strategies

In response to the threats posed by global climate change, several regional greenhouse gas emissions reduction cooperatives have formed at various levels of government and private industry in the US: The Regional Greenhouse Gas Initiative, the Western Climate Initiative, the Midwestern Greenhouse Gas Reduction Accord, and the Chicago Climate Exchange. As a leader in greenhouse gas emissions reduction policy at the State level, California's progress in meeting AB32 is also presented.

The Regional Greenhouse Gas Initiative (RGGI)

The Regional Greenhouse Gas Initiative (RGGI or "ReGGIe") is a greenhouse gas emissions mitigation effort established between Northeast and Mid-Atlantic states. Beginning in December 2005, a Memorandum of Understanding (MOU) was signed by Governors of participating States - Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Maryland, Massachusetts, and Rhode Island.

The MOU specifies that RGGI members will regulate carbon dioxide emissions from fossil fuel-fired electricity generation units with capacity greater than 25 megawatts, amounting to roughly 95% of regional electric sector generated carbon dioxide emissions (RGGI, 2007). Because RGGI targets carbon dioxide

emissions from electricity generation only, it is a form of downstream regulation. The program is scheduled to launch on January 1, 2009. While the initial MOU set the process and guidelines, as well as initial policy architecture, the framework is discussed, altered, and decided upon through amendments to the MOU as well as within the RGGI “model rule.”

After a period of public comment, participating states issued the RGGI model rule in August 2006. The model rule establishes regulatory details of a regional cap-and-trade program.

Policy Architecture

RGGI is the most developed regional greenhouse gas mitigation effort in terms of formalizing its policy structure. For example, RGGI has decided upon a reduction timeline, much of how allowances will be allocated, as well as regarding issues of banking, borrowing, and safety valve price caps.

Baseline

The greenhouse gas emissions baselines were established within the initial MOU for the seven founding signatory states (and subsequently updated with additional state participation). The regional baseline annual carbon dioxide emissions budget was estimated and set equal to 121,253,550 short tons, and the state emissions caps were allocated accordingly. For example, the state of New York has the highest emissions baseline, estimated at 64,310,805 short tons of carbon dioxide, while the state of Vermont has the lowest emissions baseline, estimated at 1,225,830 short tons (RGGI, 2005).

Cap and Timeline

From 2009 to 2014, each state’s baseline emissions are capped at 2009 levels. Beginning in 2015, each state’s emissions budget will decline by 2.5% per year, relative to 2009 levels, such that it will be 10% below the baseline in the year 2018. This is a state-based cap structure and thus it is individual state emissions, and not total regional emissions, that are monitored.

Emissions Allowances

Emissions allowances are determined by the baseline emissions estimates and every allowance is equal to one ton of carbon dioxide emitted (RGGI, 2007).

While cap-and-trade systems in the US (regulating air pollution monitored by the Clean Air Act) have historically tended to grandfather the majority of allowances, RGGI is moving towards a regional auction of allowances. The RGGI program emphasizes the use of allowance revenue to provide incentives for end-use energy efficiency and other measures, intended to lower the financial burden on electricity consumers. In the RGGI MOU, participating states have agreed that a minimum of 25% of the allowances be auctioned to generate revenue, which will be allocated for a “consumer benefit or strategic energy purpose.” This includes the use of allowances revenue to “promote energy efficiency, to directly mitigate electricity ratepayer impacts, to promote renewable or non-carbon emitting energy technologies, to stimulate or reward investment in the development of innovative carbon emissions abatement technologies with significant carbon reduction potential, and/or to fund administration of this Program” (Brenner, 2006, p. 8).

Within the MOU, the other 75% of emissions allowances are left up to participating states determination. Several states have announced their intention to auction nearly all of their allowances and recycle the revenue stream towards various consumer benefit programs. For example, New York, Maryland, Vermont, Rhode Island, Connecticut and Massachusetts have publicly announced their commitment to a nearly 100% auction of allowances (RGGI, 2007).

To promote electricity generation from renewable energy sources, allowances may be retired in the amount of avoided carbon dioxide emissions (from not burning fossil fuels). Retiring allowances in this way helps to avoid the perverse result that increasing renewable energy capacity also increases the relative availability of emissions allowances.

Banking and Borrowing

The banking of allowances is allowed without restriction. This means that facilities may rollover their

unused allowances to future compliance periods. Borrowing is not permitted.

Safety Valve

A safety valve threshold is set at \$10 (in 2005 dollars), with an upward adjustment of 2% per year beginning in January 2006.

If the safety valve threshold is consistently reached for a period of twelve months on a rolling average, then the compliance period (which is initially set at 3 years) may be extended by one-year for up to a period of four years (extended from three to four years between the MOU and subsequent amendment made in August 2006).

Emissions Offsets

The RGGI gives reduction credit to offset investments made in approved projects. There is a cap on the use of offsets, however, of 3.3% in each compliance period. Offsets are allowable anywhere within the United States provided that offsets outside of participating RGGI states are also participants in a greenhouse gas reduction cap-and-trade system and have entered into an MOU with implementing environmental agencies. This is to ensure credibility of offset programs such that they have real and measurable impacts.

Early Reductions Credit

Participating states may grant “early reductions credit” for early, voluntary adopters of carbon dioxide emissions reductions measures that were undertaken between the time of signing the MOU and its implementation.

Environmental-Economic Modelling Effort

The RGGI initiative used two modeling techniques to assess economic impacts. They used the Integrated Planning Model (IPM) model, often used by the EPA and states for air quality policy modeling, as well as Regional Economic Modeling, Inc. (REMI), a regional input-output model using multiplier effects to determine key indicators such as gross regional product, personal income, and employment (Prindle, 2006). The outputs of the IPM model, such as electricity prices,

were used as inputs into the REMI model. The REMI model found that that the RGGI program would “increase economic output, income and jobs by very small amounts-1 to 2 100ths of a percent-over the next 20 years,” and that “doubling energy efficiency increases economic benefits several-fold, up to 8-100ths of one percent” (Prindle, 2006). The modeling results were presented in May 2006 at a stakeholder meeting and interpreted as meaning that “RGGI has positive economic impacts, and that greater efficiency investment increases those benefits.”

The modeling effort was criticized by some, however, including the Edison Electric Institute, because key price mechanisms such as the safety valve price and banking were not included within the model. While REMI models are commonly used for macroeconomic impact assessments, they are also often criticized for not having a full representation of price feedbacks and thus Edison Electric Institute suggested using a modeling mechanism such as Computable General Equilibrium (Edison Electric Institute, 2006).

Discussion

The RGGI initiative is one of the more developed U.S. regional greenhouse gas emissions reductions strategies in terms of targeting specific sectors and gases for regulation, developing the baseline, reduction timeline, and the cap-and-trade market mechanism. Because RGGI targets solely the electric sector and carbon dioxide emissions, transportation-related and other emissions will need to be regulated under a different initiative in order to see reductions in those areas.

The emphasis of RGGI on the auction of emissions permits stands-out in comparison to previous examples of cap-and-trade policies. In fact, the term “cap-and-auction” is becoming more prevalently used in the greenhouse gas arena. Because there is considerable regional participation within RGGI, including eleven states, there should be enough competition for emissions permits within the auction system.

Lessons from RGGI are applicable to Hawaii in the sense that auctioning permits rather than grandfather-

ing them will generate a source of government revenue and preclude industry windfalls that often occur under free allocation systems. As a small State, however, Hawaii has only two electric companies, Hawaiian Electric Industries, Inc. and the Kauai Island utility Cooperative. Thus it would likely mean joining with a continental agreement in order to participate in targeted downstream regulation. With few electric utilities, the question of whether upstream or downstream regulation is most appropriate is of great importance.

In addition, the RGGI structure of focusing solely on the electric sector may not cross-over to the case of Hawaii because of the technological differences in electricity generation in Hawaii versus continental U.S. states. Hawaii primarily uses residual fuel oil for electricity generation whereas most other U.S. utilities rely on coal, which tends to be a considerably dirtier fuel type. As such, greenhouse gas emissions in Hawaii tend to be more evenly spread through electric and transportation sectors than other places.

The Western Climate Initiative (WCI)

The Western Climate Initiative is a greenhouse gas mitigation partnership launched in February 2007 by the Governors of Arizona, California, New Mexico, Oregon, and Washington. Since its founding, Utah, British Columbia, Manitoba, Montana, and Quebec have become active members. Observers include Alaska, Colorado, Idaho, Kansas, Nevada, Wyoming, Ontario, Saskatchewan, Baja California, Chihuahua, Coahuila, Nuevo Leon, Sonora, and Tamaulipas.

Ultimately, the WCI may involve a trading scheme that links across the country with the Midwestern Regional Greenhouse Gas Reduction Accord (MGA) and the Regional Greenhouse Gas Initiative (RGGI) (ICF, 2008,8). The goal of WCI is to reduce participating provinces and states greenhouse gas emissions footprint, meaning all greenhouse gases and covering all sectors, to 15% below 2005 levels by 2020. The draft recommendations, released May 15, 2008, recommend a regional cap-and-trade program to reach this goal (WCI, 2008).

Although WCI is working to institute a regional cap-and-trade system, the framework is still being developed. To design recommendations for WCI, five subcommittees were created: Reporting (recommend the reporting system needed to support WCI); Electricity (define the point of regulation for the electricity industry); Scope (identify other sectors and sources to include in the cap-and-trade program); Allocations (specify how to distribute emissions allowances); and Offsets (examine whether and how emission offset projects should be included) (WCI, 2008).

In October 2007, a preliminary work plan was released for review and comment. The types of questions asked of stakeholders and participants are: what point of regulation is most important (i.e. electric sector at generator level or retail level)? How should the allocations be distributed (i.e. % auction or % grandfather)? What role, if any, should offsets play in meeting the cap? From this, a series of stakeholder workshops were conducted and in May 2008 the comments for draft recommendations on the key elements of a regional cap-and-trade were released (WCI, 2008).

Policy Architecture

After a period of public comment, the subcommittees recommend that WCI join The Climate Registry (TCR) to support reporting protocols and ensure accuracy and consistency. In terms of scope, subcommittees recommend that electricity, transportation, as well as residential and commercial fuel combustion be regulated under the cap. There is, however, a recommendation for a minimum threshold such that emissions sources under a range of 10,000 to 25,000 metric tons of carbon dioxide equivalent per year are excluded. This leads to covering about 90% of non-power plant station source fuel combustion emissions (WCI, 2008).

Cap and Timeline

The emissions cap is set at 15% below 2005 levels by 2020 - although the timeline is yet to be determined. The subcommittee recommendations suggest that the cap will be a regional cap (meaning that individual states or provinces do not necessarily have to

stay within their emissions budget depending on trading) and will decline over time (WCI, 2008).

Emissions Allowances

In terms of administrative authority, the subcommittee recommends that emission allowances be allocated by each partnering state or province rather than through a regional entity. In addition, the subcommittee recommends that between 25-75% of allowances be auctioned - this is a rather wide range and thus is clearly up for much deliberation. It was also suggested that proportion of auctioned allowances be increased over time (WCI, 2008).

Banking and Borrowing

The WCI recommends that banking be allowed without restriction while borrowing should not be permitted (WCI, 2008).

Early Reductions Credit

WCI recommends that each partner be able to give credit for early adopters of emissions reductions. Credit should be deducted from the individual state or provinces allowance budget and not added to the allowable emissions (WCI, 2008).

Safety Valve

Mechanisms to avoid the speculative hoarding of allowances, through mechanisms like a safety valve, are yet to be determined. Further development of the policy architecture will be released in August 2008.

Environmental-Economic Modeling Effort

The WCI retained ICF International and Symantec Solutions, Inc., to develop a model of a western U.S. and Canada cap-and-trade system. While the modeling effort is still a work in progress, several developments have been made, including the use of an energy-sector specific model called ENERGY 2020. In order to get macroeconomic impact results, the outputs of ENERGY 2020 are suggested to be run through a more broad-based model such as REMI (ICF, 2008, 28). ENERGY 2020 is calibrated for utility energy use only and does not assess transportation impacts. A draft report

on the ENERGY 2020 Inputs and Assumptions was released by ICF in July 2008.

Discussion

The Western Climate Initiative is the most comprehensive regional effort to address greenhouse gas emissions reductions, covering all sectors and all emissions-types. As a regional system, potentially including RGGI and MGA, as well as individual State initiatives such as California, collaboration between Hawaii and WCI is a potential partnership that should be further examined. Questions to address are 1) whether Hawaii could benefit economically or administratively from this type of strategic partnership, allowing for more trading partners and 2) the effects of a regional, rather than state-specific emissions quota.

ICF International was also retained, in July 2008, as the consultant for the State of Hawaii Greenhouse Gas Emissions Reduction Task Force. The ENERGY 2020 model has been used to model energy efficiency and the potential for bio-energy in Hawaii. Both REMI and CGE models have also been utilized by the State of Hawaii to guide policy-making decisions.

[The Midwestern Greenhouse Gas Reduction Accord \(MGA\)](#)

The Midwestern Greenhouse Gas Reduction Accord, also known as the Midwestern Accord or MGA, is a regional agreement signed in November 2007 between several Midwest states and the Canadian Province of Manitoba. Participating states include Illinois, Iowa, Kansas, Michigan, Minnesota, and Wisconsin. Observers include Indiana, Ohio, South Dakota, and Ontario (MGA, 2008).

The goal of the MGA is to establish greenhouse gas reduction targets and reduction timeline consistent with those of MGA members in order to develop a market-based cap-and-trade mechanism to help achieve the targets within multiple sectors. In addition, MGA will work with The Climate Registry to manage and verify greenhouse gas reduction over time (MGA, 2007).

Policy Architecture

The MGA is structured into five subgroups encompassing a range of policy decisions that need to be made to design a market-based greenhouse gas reduction mechanism: 1) Scope, 2) Target-Setting, Data and Reporting, 3) Modeling, 4) Allowances, and 5) Offsets. MGA is in the early stages of the process to define the policy structure.

Cap and Timeline

No specific greenhouse gas emissions target or timeline has been set. The MGA is in the process of reviewing sample targets from other jurisdictions. In terms of targeting specific sectors in the economy, the MGA has identified several criteria for “scope decisions,” as outlined by the “Scope” subgroup:

- Whether the sector or category of sources will be adequately addressed outside the cap-and-trade program through complementary measures.
- If the sector is not presently practical to include in the cap-and-trade program, whether the sector could be added in a subsequent phase of the program.
- Whether the sector offers the cheapest, quickest reductions.
- Whether it is administratively practical to include the sector or category of sources.
- Whether inclusion of the sector or category of sources is possible with a clear compliance path.
- Equity across and within sectors and states and provinces.
- Whether inclusion of the sector poses unacceptable leakage impacts that cannot be addressed.
- Whether it is political “doable” to include the sector or category of sources.
- Whether inclusion of the sector or category of sources enhances or detracts from “linkability” of the program.
- Whether inclusion of the sector will have unacceptable fuel price and other impacts.

Although these criteria provide considerable policy guidance, they also leave much room for interpretation. For example, what constitutes “unacceptable” fuel price impacts. These are the types of normative ranges that will have to be determined through an inclusive process between members.

Emissions Allowances and General Structure

While there has been no final decision on how emissions allowances will be allocated, the MGA has identified “key decisions” to be made. They include timing (long-term versus transition), purpose (relating to specific Midwest concerns such as agriculture), apportionment to members, state versus regional allocation, auction versus free allocation, credit for early action, treatment of new entrants, identifying receiving parties, and addressing known undesirable outcomes such as wind-fall profits due to perverse incentives (MGA, 2008).

Currently both banking and borrowing are under consideration. There is no specific discussion of including a safety valve, although it would address the concern of precluding “unacceptable” price impacts.

Offsets

As a region characterized by considerable industrial processes and a strong agricultural sector, offsets are expected to play a large role in the MGA structure. For example, in the June 2008 Full Advisory Group meeting, the presentation highlighted offsets saying, “Challenge: Midwest has unique offset potential in comparison to some regions. At the same time, our approach needs to be credible in broader marketplace that uses the RSVP&E formulation (real, surplus, verifiable, permanent and enforceable).” The Offsets subgroup developed a set of criteria to guide offset consideration. The criteria include: 1) ability to meet RSVPE standards, 2) stakeholder and political considerations, 3) avoiding perverse incentives and other unintended consequences, and 4) administrative feasibility. Offsets under priority consideration include afforestation/reforestation, annual to perennial cropping,

methane capture, soil sequestration techniques, and no-till agriculture (MGA, 2008).

Environmental-Economic Modeling Effort

The Draft Work Plan of the modeling subgroup outlines several driving analytical questions to be addressed in the future work of an outside consultant (yet to be determined). The questions pertain to: 1) the scope of the modeling effort in terms of geography, included sectors, and interaction with complementary policy modeling, 2) projected “business as usual” trends in energy and emissions in the absence of regulation and under the proposed regulatory framework, 3) more detailed GHG market outlooks such as the expected price of allowances, and 4) macroeconomic impacts of proposed regulation. A consulting vendor was chosen in July 2008 and policy analysis is scheduled from July to September 2008.

Discussion

The MGA is a fast-developing greenhouse gas reduction initiative - although it is still in early stages and thus few final decisions have been in terms of the structure of the regulation. Due to the agricultural base of the Midwest economy, in-region offsets are playing a larger role in the MGA discussion relative to other efforts. Given Hawaii’s historically agricultural economy and unique native forests, application of the MGA offset criteria to the case of Hawaii might help leverage greater protection for forested areas and support local agriculture.

California

California has paved the way for State leadership in climate change mitigation, starting with Governor Schwarzenegger’s 2005 Executive Order setting a target of 1990 levels by 2020 and 80 percent below 1990 levels by 2050. In 2006, California became the first State to pass binding Kyoto-like legislation in AB 32, the California Global Warming Solutions Act of 2006, which commits California to reach the reduction schedule outlined in the Executive Order (ARB, 2008). The California Environmental Protection Agency Air Resources Board has been tasked with developing the

GHG inventory and work plan for meeting the reduction targets.

Policy Architecture

The Air Resources Board is required by AB 32 to prepare a Scoping Plan such that the GHG reduction schedule will become operational by 2012. The draft Scoping Plan was released in June 2008 and the proposed plan is scheduled for release in October 2008. The draft plan outlined the implementation of a regional cap-and-trade program in cooperation with the Western Climate Initiative. Other key elements of the draft plan include expanding energy-efficiency programs and strengthening standards; expanding the renewable portfolio standard for electricity generation to 33%; implementing and enforcing existing laws in relation to clean car standards, goods movement measures, and the low carbon fuel standard; and targeting fees to fund the long-term implementation of AB32. California’s approach focuses not only on market-based mechanisms such as cap-and-trade, but also on voluntary measures and specific command-and-control regulations (ARB, 2008).

Cap and Timeline

To develop a baseline, the California Climate Action Registry, a private non-profit created by the State, was created. The California Registry is a voluntary GHG registry for California entities to protect and promote early actions to reduce GHG emissions. December 31, 2006 marked the last day for California organizations to register and report to the California Registry in order to receive recognition of voluntary GHG reporting and be grandfathered into the ARB’s reporting and verification program.

Although the cap was set into law by AB32, capping greenhouse gas emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050, the reduction schedule has yet to be determined.

Environmental-Economic Modeling Effort

Three primary models are being used to guide California’s effect: Energy 2020, E3, and E-DRAM.

Energy 2020 is “being adapted to provide ARB with the ability to model policy options for reducing greenhouse gas emissions across all sectors of the California economy.” Energy 2020 is a model run by ICF International and Systematic Solutions, inc. The model includes all U.S. States and Canadian Provinces, showing energy demand by end-use sector and energy supply for electricity, oil, gas, and coal, as well as subsequent greenhouse gas emissions. The model projects into the year 2050. Model outputs include fuel usage in quantities, device and process efficiencies, fuel shares, electricity generation, capacity, and prices, oil and gas imports and exports, greenhouse gas emissions, and outputs for all end uses, sectors, and regions (Wood & Amlin, 2008).

The California Energy Commission and California Public Utility Commission are using E3 (Energy and Environmental Economics, Inc.) to inform their recommendations on policy options for reducing greenhouse gas emissions within the electricity and natural gas sectors. The model specifically estimates the cost and rate impacts of regulation to the electricity and natural gas sectors (Price, 2008).

E-DRAM (Environmental Revenue Dynamic Assessment Model) is “being used by the ARB to inform their recommendations on policy options for reducing greenhouse gas emissions within all sectors by modeling the entire California economy.” E-DRAM is a computable general equilibrium (CGE) model of the California economy, developed by Dr. Peter Berck of the University of California, Berkeley. The model is calibrated to represent 188 sectors of California’s economy, including 10 household and 45 government sectors. From this, changes in output, prices, employment, personal income and consumer spending are estimated as a result of regulation (Wood & Amlin, 2008).

Discussion

The Hawaii GHG reduction legislation, ACT 234, is modeled after California in terms of meeting the 1990 target by 2020 and housing the administrative authority within the State of Hawaii Department of Health - Clean Air Branch. As such, California has been and will be a role model in guiding Hawaii both administra-

tively and in crafting policy to meet the reduction target over time.

Both California and Hawaii are working with ICF International and Systematic Solutions Inc. and employing the Energy 2020 model. California and Hawaii are characterized, however, by very different economies and energy realities. Although similar models are being used to assess the environmental and economic implications of to both Hawaii and California, it is important to note the unique characteristics of each economy in the driving modeling assumptions.

The Chicago Climate Exchange (CCX)

The Chicago Climate Exchange (CCX) is a voluntary, yet legally binding, greenhouse gas emissions trading scheme. CCX launched in 2003 with thirteen founding members: American Electric Power, Baxter International Inc., City of Chicago, DuPont, Ford Motor Co., International Paper, Manitoba Hydro Corp., MeadWestvaco Corp., Motorola Inc., STMicroelectronics, Stora Enso North America, Temple-Inland Inc., and Waste Management Inc. CCX now has over one hundred members with direct greenhouse gas emissions. Unlike other regional emissions mitigation strategies, CCX members range from private businesses to city governments. In joining CCX, members who successfully reduce their emissions footprint to the established targets are able to sell or bank their surplus allowances. Those who go over their target emissions must purchase CCX Carbon Financial Instrument (CFI) contracts (CCX, 2007).

Institutional Structure

Baseline

The baseline emissions are estimated taking an average of 1998-2001 emissions. The Financial Industry Regulatory Authority (FINRA) acts as a third party verifier of member’s baseline emissions and annual emissions reports (CCX, 2007).

Cap & Timeline

In Phase I of CCX, which was between 2003 and 2006, members were required to reduce emissions a

minimum of 1% per year, meaning at least a 4% reduction in that time period. Phase II of CCX launched in 2007 and will continue through 2010. In Phase II members are required to reduce their emissions footprint to 6% below the baseline by the end of the time period in 2010. This is an additional 2% reduction from Phase I (CCX, 2007).

Emissions Allowances

Emissions allowances are allocated freely to members according to baseline emissions estimates. This means that an entirely grandfather system of permit allocation is used - a much more traditional cap-and-trade system where innovative entities are rewarded by selling permits and others must purchase permits.

Banking, Borrowing & Selling at Auction

If members go beyond their required reduction target, members can bank the surplus to be used in the next period or auction the surplus credits as a revenue source. The CCX Trading Platform is an anonymous electronic auction system where bids are posted and accepted to buy and sell CFI allowances in the case of excess and shortage (CCX, 2007). Borrowing is not permitted.

Offsets

Although CCX is based in the US, verified offsets are allowed worldwide. CFI contracts are issued to approved offset project owners, verified by FINRA. CCX has developed standards for offset projects involving: agricultural methane, coal mine methane, land-fill methane, agricultural soil carbon, rangeland soil carbon management, forestry, renewable energy, and ozone depleting substance destruction. Other projects may include energy efficiency, fuel switching, and working under the Clean Development Mechanism as outlined in the Kyoto Protocol (CCX, 2007).

Discussion

The CCX is a privately run entity and the sister organization of the European Climate Exchange, which is the largest emissions trading scheme operating under the European Union's Emissions Trading Scheme. CCX allows both upstream and downstream entities

to participate in carbon reduction markets, not distinguishing between public and private entities. The question of whether Hawaii should join the CCX has been raised several times in Hawaii policy circles, particularly commissioned in a study by the Hawaii Energy Policy Form (HEPF). The HEPF did not find it beneficial for Hawai'i to join CCX at that time.

III. National Legislation

America's Climate Security Act of 2007 - SB 2191

SB 2191, also known as Lieberman-Warner, was Congress' leading proposal to address climate change in 2007 - although it failed to pass to legislation. It sought to reduce GHG emissions by 65 percent below 2005 levels by 2050. It also discussed the establishment of carbon markets through a cap-and-trade system.

The timeline for emissions reduction described in SB 2191 began in 2012, capping emissions at 2005 levels, estimated at 5200 million metric tons of CO₂ equivalent. Further reductions of 2 percent per year are scheduled between 2012 and 2020.

In terms of emissions allowances, 5 percent of allowances were proposed to be freely allocated in the first year, with a one percent decline in free allocation each year until 2016 when only one percent of allowances would be freely allocated. It does not specify allocations after 2016.

The bill allows for banking, borrowing, and a safety valve on the price of carbon. The bill states that no limit will be placed on banking. Borrowing can occur in each period of up to 15 percent of the compliance obligation.

Discussion

The form of future national legislation will greatly affect the status of State mitigation commitments - and vice versa. While preemption may be an issue, meaning that States' will need to conform their mitigation strategies to the national policy, States have shown sub-

stantial leadership that will also guide national policy. As an island and non-contiguous State, the question of whether Hawaii can and should obtain exemption from a national system is pertinent. In addition, much like participating in a regional-cap system, there is a question of how Hawaii will be affected under any kind of national cap system. Presumably, because Hawaii is significantly dependent on tourism and imported goods, the increased transportation costs will be sizeable.

IV. Conclusions

Hawaii is facing a number of choices in crafting an appropriate climate change mitigation strategy. These include:

- Whether to adopt a cap-and-trade system or carbon tax;
- Whether to join a regional partnership;
- What type of modeling will help determine answers and guide recommendations;
- How potential national legislation might affect the status of any state or regional partnership.

There is much to be learned from the experience of other jurisdictions in crafting appropriate climate change mitigation policy: from setting the cap to identifying sectors and emissions sources, to selecting a cap-and-trade or taxation mechanism, to making strategic partnerships.

In ACT 234, Hawaii has set the emissions cap modeled after California's AB32 at 1990 levels by the year 2020. Also similar to California, the regulation is administratively housed within the Clean Air Branch of the Department of Health. This makes the link between traditional and greenhouse gas pollutants clear in the regulation process.

Unlike California, however, no long-range greenhouse gas reduction goal has been determined. Looking to the leadership of California, the trajectory of

other regional agreements, and the possibilities of national legislation will help guide Hawaii in making a longer commitment to reduction measures.

Through examining the efforts of other jurisdictions in greenhouse gas mitigation strategies, several trends and findings emerge:

- Cap-and-trade mechanisms are used more often than carbon tax.
- Cap-and-trade mechanisms are moving towards auctioning of emissions allowances in lieu of traditional grandfathering systems.
- Baselines are being set around the years 1990 (Kyoto precedent) and/or 2005 (more recent year to obtain data).
- The targeting of specific sectors varies - although there seems to be a move towards more encompassing systems that target both electricity and transportation. For example, although RGGI targets solely electricity, more recent agreements such as WCI and MGA are aimed to target both.
- There is an emphasis on upstream regulation using market-based mechanisms - particularly targeting electricity generation and refinery operations.
- Although the primary emphasis is in the creation of greenhouse gas emissions markets, a mix of command-and-control mechanisms are also being considered. Command-and-control mechanisms generally target technology standards.

These findings have potentially important implications for the case of Hawaii. For example, to the extent to which Hawaii can and/or should participate in a regional greenhouse gas market is of question. Given its unique island characteristics and small economy, is it more beneficial for Hawaii to regulate within the State or to join a partnership like the Western Climate Initiative? The answers to this will depend on whether there is a regional or state-specific emissions quota, the

timeline and form of future national legislation, and the environmental and economic implications of each. As States are providing leadership and paving the way for creating greenhouse gas emissions markets in the U.S., national legislation seems closer and closer. How state legislation and regional agreements influence the structure of national legislation - as well as how national legislation will affect State participation - is of crucial importance to create systematic, binding greenhouse gas emissions reductions to meet the challenges of global climate change.

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