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A STUDY OF ISSUES SURROUNDING EMISSIONS LEAKAGE POLICIES IN THE ELECTRICITY SECTOR WITHIN SUB-NATIONAL CAP AND TRADE SYSTEMS IN THE UNITED STATES

by

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Thesis directed by Professor William Boyd

Climate change policy at the national and international level has met with significant resistance, and sub-national cap and trade programs in the United States are being implemented in their stead. However, these sub-national policies face significant inefficiencies because they must “imperfectly” map cap and trade programs onto a small subsector of a nationally connected economy. Policymakers cannot avoid the expense of extensive administrative resources upfront to battle such inefficiencies without sacrificing the program’s structural and environmental integrity once in operation. This is demonstrated in this paper through an analysis of policies to battle emissions leakage in the electricity sector, where increased electricity prices under the sub-national cap and trade program could cause increased use of dirtier, cheaper electricity generation outside of the cap. Emissions leakage is an unfortunate but important consequence of overlaying a cap and trade program on top of an extremely interconnected national electricity grid. The amount of resources expended to create policy that anticipates emissions leakage issues must be determined through a difficult and value-laden balancing of administrative efficiency and environmental integrity, and should be guided by precaution. This is especially true because the sub-national policymakers are creating climate change programs in the face of significant jurisdictional, efficiency, and technical hurdles. Two case studies are specifically highlighted in examining emissions leakage policies for sub-national programs: The Regional Greenhouse Gas Initiative (“RGGI”) and California’s Proposed Regulation to Implement a California Cap and Trade Program. RGGI's usage of a passive approach to emissions leakage policy is contrasted against California’s proactive, resource-intensive approach. The paper uses these case studies to help guide a sub-national policymaker’s decisionmaking process by highlighting the difficulties inherent for a sub-national program, the precaution requisite in balancing administrative resources against environmental integrity, and the possible consequences of a passive versus proactive approach to emission leakage.
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I. INTRODUCTION

Sub-national climate change programs are becoming more prevalent in the United States, in part as a reaction to global and national standstill on climate change policy\(^1\), and in some cases simply as an effort to lead efforts in implementation of climate change programs. These sub-national programs are acting as the nation’s laboratory by enacting policies that are “imperfect” in scale or coverage. The imperfectness in coverage forces these programs to address the effects of imposing sub-national programs onto an interconnected nation. These programs face inefficiencies - it is relatively well-settled among economists that a broader, more integrated program would capture greater efficiencies in emissions and cost reductions. Thus, policymakers at the sub-national level cannot simply create a cap and trade program and expect it to be successful at achieving emissions reductions and at operating an efficient marketplace. Instead, sub-national policymakers must brace for a significant investment in administrative time and resources upfront in order to better ensure the environmental and structural integrity of the program. This is made especially clear through an examination of emissions leakage in the electricity sector, where increases

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\(^1\) Witness the inability of the recent Cancun Agreements to gain binding commitments or agreement on a second commitment period for the Kyoto Protocol, following on the heels of the Kyoto Protocol’s incapacity to achieve its goal in reductions of global emissions. United Nations Framework Convention on Climate Change [UNFCCC], Rep. on its 15th Sess., Nov. 29-Dec. 10, 2010, Decision - /CP.16, U.N. Doc. FCCC/AWGCL/2010/CRP.1 (Advanced unedited version); FULVIO CONTI, HARVARD PROJECT ON INTERNATIONAL CLIMATE AGREEMENTS, TOWARD A POST-2012 INTERNATIONAL CLIMATE AGREEMENT (2010). Further, efforts to create a comprehensive cap and trade market on the national level in the United States have failed. See, e.g., Climate Security Act, S. 2191, 110th Cong. (2007), which was ultimately stopped after six months in the Senate; American Clean Energy and Security Act, H.R. 2454, 111th Congress (2009), which passed the House but did not pass the Senate; Clean Energy Jobs and American Power Act, S. 1733, 111th Congress (2009), which passed Committee but was not passed by the Senate; and the American Power Act, S. ____ , 111th Cong. § 756(c) (as circulated in draft form May 12, 2010), which was introduced in May and has not been passed in the Senate. (Note that international efforts to battle greenhouse gas emissions began largely with the United Nations Framework Convention on Climate Change and its resultant greenhouse gas emissions reduction treaty, the Kyoto Protocol. Kyoto Protocol to the United Nations Framework Convention on Climate Change, UNFCCC Conference of the Parties, 3d Sess., art. 2(1), Dec. 10, 1997, UN Doc. FCCC/CP/1997/L.7/Add.1.)
in carbon prices under sub-national cap and trade programs can cause dirtier, cheaper
generation resources outside of the cap to capture more market power in the region and
affect true emissions reductions of the program. This problem specially affects the
electricity sector because application of a cap and trade program to a subset of the nation’s
highly interconnected electricity grid creates significant obstacles in relation to policy
structure and jurisdiction.

Two case studies on this subject are specifically enlightening to demonstrate the
difficulties in enacting sub-national cap and trade programs that can prevent or keep
emissions leakage to a minimum. First, the Regional Greenhouse Gas Initiative (“RGGI”) is helpful in examining a program that enacted a very passive approach to emissions
leakage with a focus more on monitoring the problem. Second, California’s Proposed
Regulation to Implement the California Cap and Trade Program assists a discussion of a
program that utilizes heavy administrative resources upfront to proactively address
emissions leakage issues.

This paper attempts to outline the import of sub-national policymakers’ decisions
regarding emissions leakage before cap and trade programs are put in place through
examining the structure, background, and possible effects of RGGI and California’s
approaches to emissions leakage in the electricity sector. The paper begins with background
information on electricity markets, carbon markets, and emissions leakage. It then
proceeds to an overview of the general dilemma of a sub-national policymaker in
implementing a cap and trade program that can effectively deal with emissions leakage
problems. RGGI is introduced as the first of two case studies on emissions leakage policies.
It is the nation’s only non-voluntary cap and trade market in place, and acts as a study in a
passive approach to emissions leakage. The paper contrasts this case study with a detailed
analysis of California’s Proposed Regulation to Implement the California Cap and Trade Program, which instead utilizes a very proactive approach to emissions leakage.

The paper ends with the conclusion that policymakers constructing an “incomplete” or sub-national cap and trade program cannot avoid the expense of extensive resources upfront without possibly sacrificing the program’s structural and environmental integrity once in operation. This is an unfortunate but important consequence of overlaying a cap and trade program on top of an extremely interconnected national electricity grid. The amount of resources expended must be determined through a difficult and value-laden balancing of administrative efficiency and environmental integrity, but should be guided by precaution. This is especially true because the sub-national policymakers are creating climate change programs in the face of significant jurisdictional and technical hurdles (as California is experiencing currently). Further, because the sub-national cap and trade program is already battling inefficiencies by its incomplete regulatory nature, it is imperative that policymakers utilize resources upfront to ensure that the program does not produce more inefficiency through emissions leakage once the program is in operation. This paper contributes to the sub-national policymaker’s decisionmaking by highlighting the difficulties inherent for a sub-national program, the precaution requisite in balancing administrative resources against environmental integrity, and the possible consequences of a passive versus proactive approach to emission leakage.

II. ELECTRICITY MARKETS OVERVIEW

In order to better understand the intricate issues associated with the creation of sub-national cap and trade markets, a broad background of electricity markets must be first explained. The electricity markets in the United States can be divided into three categories of services provided: generation, transmission, and distribution.
Generation plants can be divided into three basic categories: 1. Base load plants that have low fuel costs and cannot be turned off and on rapidly (usually coal, nuclear, or occasionally hydro); 2. Intermediate load plants, which are more costly to operate but can be used as “spinning reserves”, ramping up and down quickly to balance load and generation, or helping out with unscheduled outages (usually natural gas, or hydro); and 3. Peaking plants, which may have high operating costs but can be turned on and off quickly (usually natural gas or hydro).  

Emissions leakage often occurs when dirtier generation sources (like coal) outside of the cap capture more market power of generation and cleaner sources (like natural gas or renewables) within the cap capture less market power. As discussed infra, California’s calculation of a default emissions factor based on intermediate and peaking power on California’s spot market but used for dirtier coal power might be problematic.

Because electricity cannot be easily stored, the generation load on the grid must constantly be carefully balanced to meet the demand. This is done as best as possible through a transmission network of lines, distribution centers, and control systems. However, “control” of electricity is minimal - when power is injected into a transmission line, it flows through the entire network, not just to a point where the control operator wishes it to go. This means that it is close to impossible to “control” emissions leakage from a transmission network point of view. Thus, policies are used instead that track the generation through contracts or through spot market transactions.

Transmission networks help connect generation sources to distribution networks. Together, these three sectors create an electricity “grid”. The United States has a highly

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interconnected electricity grid – some have coined it as the “largest interconnected machine on Earth” with 200,000 miles of high-voltage transmission lines and 5.5 million miles of local distribution lines linking thousands of generation plants to end users.\(^4\) The transmission systems of the United States are divided into three large networks: 1. The Western Interconnection, governed by the Western Systems Coordinating Council; 2. The Texas Interconnection, operated by the Electric Reliability Council of Texas; and 3. The Eastern Interconnection, managed by seven regional reliability councils.\(^5\) RGGI is located within the Eastern Connection, while California is located in the Western Interconnection.

Transmission networks must be operated in a way that keeps voltage and frequency with very narrow limits, which requires the oversight of network operators. Further, as aforementioned, the physics of the grid is such that there is very little that grid operators can do to exercise control over the flow of electricity once it’s been put onto the grid.\(^6\) The necessity of electricity and the delicate requirements for management of transmission networks lead to the need for standards in operation of the networks. The standards for operation of transmission networks are set by the North American Electric Reliability Council.\(^7\) See Figure 2 in the Appendix for a map of these networks.

Distribution is the final stage of electricity transportation from generation to the consumer. It occurs where electricity is “stepped down” through transformers from high voltage lines to lower voltage lines and carried to end consumers.

Historically, generation, transmission, and distribution have been provided by the same entity – a “vertically-integrated” utility. However, increasingly, these services are


\(^5\) *Id.* at 4.11-4.12.

\(^6\) This is because electricity simply flows along the path of least resistance, so the electricity flows where it is most needed and is not so easily directed towards a certain geographic area. *Id.*

\(^7\) *Id.* 4.11.
provided by different entities in order to provide a relatively competitive marketplace for the services. This involves both the wholesale (generation and transmission of bulk power) and retail (customer distribution and distributed sales of electricity) levels. Wholesale competition involves introducing competition amongst generators (e.g. through the introduction of independent power producers) and open access to transmission lines. Retail competition involves the ability for the customer to choose their generation provider. Emissions leakage issues are primarily concerned about how the wholesale power market maps onto the sub-national cap and trade markets.

FERC has jurisdiction over wholesale rates and sales under the Federal Power Act, while retail sales are generally under the jurisdiction of states and their associated public utility commissions. As discussed infra, this creates some concerns with California’s cap and trade market, where California could possibly be seen to be adding value to wholesale power brought into the state. Public utility commissions approve rates charged by utilities for electricity in a rate case, and the rate allowed is the “cost of service,” determined by the utility’s operating expenses, fixed costs, and a set rate of return.

Restructuring of the electricity industry and the associated encouragement of wholesale competition in the electricity industry began with the 1978 Public Utilities Regulatory Policy Act (“PURPA”), in its requirement that utilities purchase or sell electricity from small power producers (“qualifying facilities”) at “avoided cost,” which incentivized the growth of an independent energy sector. Wholesale competition in transmission and generation was further incentivized in 1996, when the Federal Energy Regulatory Commission (“FERC”) issued Orders 888 & 889, which effectively restructured

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the electricity industry by requiring open access to transmission services and requiring the functional unbundling of transmission services for wholesale competition.\(^{10}\)

Although Order 888 did not mandate the formation of independent system operators (“ISO”) to operate the transmission system and facilitate open access, it did pave the way for them by suggesting the creation of an ISO as a way to provide non-discriminatory access to transmission. Soon after Orders 888 and 889, FERC issued Order 2000, codifying minimum characteristics, functions, and ratemaking policies regarding regional transmission organizations (“RTOs”), which also operates a transmission system, but has met the minimum characteristics in Order 2000 and petitioned FERC for RTO status.\(^{11}\)


Retail competition is state-specific, as it is under state jurisdiction. Many states have attempted to restructure their retail electricity markets by encouraging competition, but these attempts have not been extremely successful.\(^{14}\) Most of the Northeast states have active restructured retail markets, while California’s retail market has stalled after the

\(^{10}\) Order No. 888, 75 FERC ¶ 61,080 (1996); Order No. 889, 75 FERC ¶ 61,078 (1996).
\(^{13}\) See id.
\(^{14}\) See, e.g. California’s experience in its retail competition plan, where its electricity industry collapsed under the attempt at restructuring.
collapse of its electricity industry in 2000-2001. California maintains an ISO and Power Exchange for day-ahead and hour-ahead electricity markets, and consumers can still “choose” retail suppliers, but the retail supplier choice is not meaningful and the market restructuring is currently delayed.\(^{15}\)

For the purposes of emissions leakage within the electricity sector under sub-national cap and trade markets, issues arise primarily with how sub-national carbon markets overlay their cap and trade markets onto wholesale power markets, and how those policies affect choices and rates within the wholesale power markets.

III. CARBON MARKETS OVERVIEW

Climate change is primarily caused by the release and subsequent accumulation of greenhouse gases into the Earth’s atmosphere. Carbon dioxide is a greenhouse gas, and it accounts for approximately 77% of the total anthropogenic greenhouse gases present in the atmosphere.\(^{16}\) Due to carbon dioxide’s significant contribution to atmospheric greenhouse gases, efforts have increased worldwide to reduce carbon emissions. Climate change is becoming more studied\(^{17}\), the United States Supreme Court ruled in 2007 that the Environmental Protection Agency has the authority to regulate carbon dioxide emissions\(^{18}\), and the “vast majority of Americans (some 84%) now believe that global warming has been occurring” and would like the government to be “devoting substantial attention to addressing climate change.”\(^{19}\) In part due to this increased awareness of the damage from


\(^{19}\) BRENT BANNON ET AL., AMERICANS’ EVALUATION OF POLICIES TO REDUCE GREENHOUSE GAS EMISSIONS 1 (2007).
greenhouse gas emissions, the movement to implement a market-based program to reduce carbon dioxide and other greenhouse gas emissions is gaining tremendous momentum. Cap and trade markets are an important component of efforts to mitigate such concerns about greenhouse gas emissions, but can be difficult to implement at the national or international level because of pushback from industry and from political gridlocks.

Cap and trade markets help achieve reductions in global carbon emissions by putting a price on carbon and/or other greenhouse gas emissions, which helps stimulate abatement and drive investment in low carbon technologies and services.\(^\text{20}\) Cap and trade markets can be either voluntary or compliance markets. Voluntary markets typically involve entities which voluntarily decide to reduce their carbon footprint by using offsets. In contrast, compliance markets are mandatory and generally limit emissions by a regional or nationwide “cap,” allowing carbon units to be bought and sold on a carbon market.\(^\text{21}\)

Compliance carbon markets establish a price of carbon through traditional concepts of supply and demand by constraining the amount of carbon “permits” available and thus increasing the price of carbon through scarcity. The most common emissions trading scheme is a cap and trade program, where a central authority caps the amount of carbon emissions an industry or entity can emit and instigates rules and regulations to create a market for carbon emission units to be bought and sold.\(^\text{22}\) The scheme’s cap dictates scarcity of the carbon, which in turn helps dictate the price of carbon.\(^\text{23}\) However, most emissions trading schemes also allow entities to meet their obligations under the cap

\(^{22}\) Id.
\(^{23}\) Id.
through the use of “offset” credits created by projects outside of the cap. The system allocates or auctions tradable allowances to emission sources or fuel distributors, and the total number of allowances adds up to the amount of emissions allowed under the cap. Free allocation of allowances is one policy tool to help mitigate the economic impact of the cap and trade program. California’s program would use free allocations to help the electricity industry transition to a cap and trade program, whereas RGGI chose to use primarily an auctioning approach to allowances. The point of regulation varies - an “upstream” approach regulates fuel suppliers, while a “downstream” approach regulates the entities that emit the greenhouse gas emissions.

The most effective, cost efficient way to implement a cap and trade system is by maximizing the efficient factors that make up a cap and trade system, which means: “targeting all fossil-fuel-related CO2 emissions through an upstream, economy-wide cap; setting a trajectory of caps over time that begins modestly and gradually becomes more stringent; establishing a long-run price signal to encourage investment; adopting mechanisms to protect against cost uncertainty; and including linkages with the climate-policy actions of other countries.” A regulation becomes “incomplete” by targeting anything less than all fossil fuel emissions within an economy, and is ridden with possible policy obstacles and failures because it is vulnerable to emissions leakage outside of the cap. Incomplete regulation is also less cost effective than a program with broader, more expansive coverage, such as inclusion of as many sources as possible. Thus, incomplete

24 Id.
26 Id.
regulatory systems can undermine emissions reductions produced under the regulation and cost more than programs that have broader coverage. Emissions leakage occurs under incomplete regulation where unregulated entities capture market power from regulated entities due to increases in prices under the incomplete regulation.

IV. THE PROBLEM OF EMISSIONS LEAKAGE IN THE ELECTRICITY SECTOR

Emissions leakage can be defined as “the ratio of emissions increase from a specific sector outside the [cap] (as a result of a policy affecting that sector in the [cap]) over the emission reductions in the sector (again, as a result of the environmental policy).”\(^{29}\) Specifically in relation to cap and trade programs implemented as sub-national regimes, coverage of emissions-intensive, trade-exposed sectors (such as electricity generation) can create a disadvantage to those sectors relative to out-of-state competitors.\(^{30}\) For the electricity sector, this can lead to a shift in electricity production to generators outside of the cap and total emissions of the area could remain unchanged or even increase.\(^{31}\) This is important because “[l]eakage from the regulated regions can undermine the cap and trade market by distorting actual emissions levels and providing incentives to shift, rather than reduce, GHG emissions.”\(^{32}\)

Emissions leakage in a cap and trade program occurs where three important factors are present: 1. The grid is connected enough to make the electricity sector “trade-exposed” such that out-of-state competitors could in fact take on a certain amount of generation from inside of the cap; 2. The cap is stringent enough to create a price

\(^{29}\) **INTERNATIONAL ENERGY AGENCY, ISSUES BEHIND COMPETITIVENESS AND CARBON LEAKAGE 3** (2008). The Western Climate Initiative defines leakage as “a shift in power plant operations or investment from WCI to non-WCI jurisdictions, which reduces WCI CO2 emissions while increasing non-WCI CO2 emissions.” WCI, ELECTRICITY LEAKAGE ANALYSIS SUMMARY REPORT 9 (2009).


\(^{31}\) *Id.*

\(^{32}\) WCI, SUMMARY REPORT, *supra* note 29, at 5.
on carbon that is high enough to affect generation under the cap to the point where generation is shifted to sources outside of the cap; and 3. The sources outside of the cap are “dirtier” than those sources which, absent the price on carbon, would have provided the electricity. For cap and trade programs implemented as sub-national regimes within the United States, all three assumptions are quite probable. As discussed in Section III, the Electricity Markets Overview section, the United States has a highly interconnected electricity grid, making the electricity sector exposed to out of state competitors should prices increase.

The interconnectedness of the grid also contributes to the second factor – creation of a carbon price high enough to cause a shift in generation. The ease with which generation from outside of a sub-national cap and trade market can take on some of the market power of generation within the cap and trade market makes the requisite increase in electricity price to cause emissions leakage relatively low.

The third factor, that there are “dirtier” sources nearby, is also easily satisfied in the United States. Coal, the dirtiest source of electricity, provides the nation with 45% of its electricity - more than any other resource, and more than the second and third place resources combined (natural gas and nuclear power, respectively).\(^{33}\)

Thus, emissions leakage for sub-national cap and trade programs in the United States presents a unique disadvantage to policymakers. Policymakers do not have a perfect model to follow for creation of measures to battle the problem. Instead, they must proceed blindly and choose to either implement intricate, administratively complicated measures or follow a wait-and-see approach and hope that the data gained from the program shows only minimal leakage.

A. Leakage Causation

Emissions leakage can be described through a few simple formulae. Robert Ritz, in his paper on carbon leakage under incomplete environmental regulation describes the phenomena of leakage, emphasizing the consequences of environmental regulations that cover only a subset of firms within a sector.\textsuperscript{34} He demonstrates the causation of leakage through the following equation\textsuperscript{35}:

Equation 1: Emissions leakage

\begin{equation}
L = \frac{\Delta E_0}{-\Delta E_i}
\end{equation}

Where:
- \(L\) = Leakage
- \(\Delta E_0\) = change in emissions by entities outside of the cap
- \(\Delta E_i\) = change in emissions by entities from inside the cap

In other words, leakage is defined by the proportion of emissions reductions by “inside” entities \((-\Delta E_i)\) that leaks out in the form of emission increases by “outside” entities.\textsuperscript{36} This leakage occurs where the “inside” generators’ marginal costs increase due to the price on carbon under the cap.\textsuperscript{37} This in turn leads to a decrease in emissions under the cap or a decrease in output, or both, leading towards \(-\Delta E_i > 0\).\textsuperscript{38} Yet, “outside” generators do not similarly have this marginal cost increase, so they can gain market share, which in turn increases their emissions, \(\Delta E_0 > 0\).\textsuperscript{39} Thus, \(L > 0\) and emissions leakage occurs.\textsuperscript{40} If \(L \geq 1\), then the emissions leakage actually increases the emissions as opposed to emissions had the cap and trade system not been implemented.

\textsuperscript{34} ROBERT RITZ, CARBON LEAKAGE UNDER INCOMPLETE ENVIRONMENTAL REGULATION: AN INDUSTRY-LEVEL APPROACH 3 (2009).

\textsuperscript{35} Id.

\textsuperscript{36} Id.

\textsuperscript{37} Id.

\textsuperscript{38} Id.

\textsuperscript{39} Id.

\textsuperscript{40} Id.
Emissions leakage thus occurs under “incomplete” climate change policies – policies that apply to a sub-sector of an economy. The causes for emissions leakage are relatively straightforward, but the conditions which worsen emissions leakage are not as simple. However, the International Energy Agency notes that the short-term competitiveness channel (the ability of unconstrained competitors outside of the cap to take the market share of entities inside of the cap) and the investment channel (increases in marginal costs from mitigation under the cap cause firms to relocate capital outside of the cap) are extremely important factors determining the rate and amount of leakage of a climate change policy.41 In a way, the competitiveness and investment opportunities define the “trade-exposed” industries, or the industries that are carbon intensive and face competition with unconstrained competitors without similar compliance requirements.

Thus, the electricity sector’s vulnerability to emissions leakage is highly dependent on both its ability to respond to carbon constraints as well as its unconstrained competitors outside of the cap to accommodate excess generation. This can be further expressed in the form of three factors determining a sector’s vulnerability to leakage under a sub-national program: 1. The outside generators’ emissions intensity relative to inside firms before the policy is implemented; 2. Energy efficiency improvements of inside generators after the policy is implemented; and 3. The amount of profitable opportunities for inside generators to switch to cleaner production technologies.42 Hence, if generators located outside of the cap are “dirtier” than inside the cap and cheaper, the margin for energy efficiency improvements is small for generators under the cap, and the generators under the cap are relatively constrained from switching to cleaner technologies, then leakage will occur at a

41 INTERNATIONAL ENERGY AGENCY, COMPETITIVENESS AND CARBON LEAKAGE, supra note 29, at 3.
42 RITZ, supra note 34, at 3-4.
higher rate than if the opposite were true. Of course, the rate of leakage remains unknown unless regulators are able to monitor it in some way, which proves to be quite difficult.

B. Inability to Track the Flow of Electricity

The inability to track and verify the environmental attributes of electricity from the generator to the consumer greatly affects the ability to discern the extent of emissions leakage in a sub-national cap and trade system. Although the inability to track the flow of electricity itself is not necessarily a cause of emissions leakage, it certainly accentuates the inability of policymakers to even attempt to manage the problem.

In order to monitor and quantify emissions leakage (as in RGGI) or to utilize policies to prevent emissions leakage (as in California’s proposed cap and trade program), the electricity must be tracked back to the generator. However, tracking the physical charge of electricity is essentially impossible. As explained by the National Council on Competition and the Electric Industry:

[E]lectricity follows the laws of physics, not the computations of accountants. With an interconnected grid, the power flow over the transmission system is ambiguous. A relevant generalization is that power is put into the grid at certain points and taken out at other points. Which generator produced the power that went through a particular customer’s meter is, in a physical sense, indeterminate, except in a very few cases.43

The electricity created from the charge carried through electrons simply cannot be traced back from a customer to the generation source. Two ways to attempt to track the environmental attributes (or the emissions associated with the electricity) are to either have a system to track contracts or to tag electricity.44 Tracking contracts focuses on the chain of financial transactions between generators and electricity suppliers.45 In a tagging

45 See id.
system, generators create tags for each MWh they produce and then pass those tags along the supply chain. Utilities are required to hold certificates for all power sold to consumers. Both systems can be hugely burdensome administratively. To some extent, tagging could be slightly less burdensome, as it on the face only requires knowledge of the generation and end-utility transaction, whereas tracking financial transactions throughout the entire system could be information-heavy.

Tracking electricity is made more complicated through spot markets – markets where electricity is bought and sold on an hour-ahead or day-ahead market. In this situation, there is no clear path of ownership between a generator and utility, because buyers buy power out of a pool without being able to specify the type of electricity they buy. Similarly, difficulties arise for sub-national cap and trade programs attempting to track electricity from outside of the program’s jurisdiction – much of the power is “unspecified,” like the spot market pool of power. Issues associated with tracking electricity from outside a cap and trade program include: issues of data validity, legal issues associated with the inability to impose any tracking burden on entities outside the jurisdiction, and issues from the inability to enforce any tracking requirement.

A specific tension between tracking electricity and creating climate change policy is that of sub-national cap and trade programs incorporating emissions associated with imported electricity into the program. One way to construct a cap and trade system to assist with accounting for imported electricity is to use a load-based point of regulation. Yet, this approach offers many problems with tracking electricity beyond state borders to generators

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46 See id.
47 Id.
48 NATIONAL WIND, DESIGN GUIDE FOR RENEWABLE ENERGY CERTIFICATE TRACKING SYSTEMS 10 (2004).
49 Id. at 15.
50 WCI, SUMMARY REPORT, supra note 29, at 12.
not subject to the cap and trade program. Thus, there must be a system to accounting for the imported electricity consumed, which often is done by monitoring contracts and spot market transactions. A load-based point of regulation indirectly includes all generators that contribute electricity to the cap and is in direct contrast to a source-based point of regulation, which only covers emissions created from generators physically located under the cap. California and the Western Climate Initiative both propose to use a consumption-based point of regulation by regulating “first jurisdictional deliverers,” or the first entity that delivers electricity onto the grid over which the regulators have jurisdiction. In contrast, the Regional Greenhouse Gas Initiative uses a source-based point of regulation in that it only regulates power plants under its cap. This approach is easier to track, as all generation is subject to regulation and can better harmonize a comprehensive tracking system. Tracking electricity is important in a load-based program, as the first entity that delivers electricity to the grid needs to be able to account for the emissions of that electricity. In a way, attempting to incorporate emissions from imported power into an emissions leakage prevention policy (as exemplified in California’s proposed cap and trade program) requires some load-based mechanisms in order to track the electricity to the source. This is because imported power is tagged with emissions at the point of the “first seller” into the relevant market, which is not source-based. First jurisdictional sellers must be able to somehow track as much electricity as possible back to the source.

Despite the difficulties, there are a few successful tracking systems already in place. NE-ISO has a Generation Information System (“GIS”) in place that tracks all generation in or delivered to the dispatch and control area. Certificates are issued based on settlement (rebundling of attributes at the pool transmission facility) data and deposited into

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51 Id.
52 NATIONAL WIND, supra note 48, at 7.
generator accounts so that certificate transfers can occur. Data is derived from financial
data from ISO’s Market Settlement System. PJM also has a Generation Attribute Tracking
System (“GATS”), which creates and tracks a generator-specific electronic certificate for
every MWh of electricity produced by a generator.\textsuperscript{53} Each certificate has a unique serial
number, and in that way is tracked through every financial transaction.\textsuperscript{54} The GIS and
GATS are compatible with each other. Texas and Wisconsin also have programs to track
Renewable Energy Credits associated with their Renewable Portfolio Standards.\textsuperscript{55}

C. Law and Regulation

The legal and regulatory schemes that this nation has built around federalism and
electricity regulation can often be both causes and obstacles to the solution to emissions
leakage in sub-national cap and trade programs. Though the Commerce Clause in the
Constitution is a positive grant of power to Congress, it also serves as a negative removal of
power to states by denying states the power to “unjustifiably to discriminate against or
burden the interstate flow of articles of commerce.”\textsuperscript{56} This Constitutional clause provides
significant problems with creating a sub-national cap and trade program that aims to
account for emissions from imported power. States must treat the power the same as in-
state power – they must refrain from discriminating against the power. Yet, it is often
difficult to specify the source of electricity, so assigning emissions to imported power can
often lead to differential treatment between imported and “domestic” power in a sub-
national cap and trade program. This issue is explored further \textit{infra} in Section VIII(C)(2) in
the context of California’s proposed cap and trade program.

\textsuperscript{54} Id.
\textsuperscript{55} Id.
Further, sub-national programs must step carefully around the authority of the Federal Energy and Regulatory Commission (“FERC”) in its regulation of wholesale power. Section 206 of the Federal Power Act gives FERC the power to set and review wholesale power rates.\textsuperscript{57} When sub-national cap and trade programs are attempting to regulate imported power, these programs must utilize policies that will not regulate the wholesale power in such a way to infringe on FERC’s authority to regulate wholesale power. This difficulty is also discussed \textit{infra} in Section VIII(B) regarding California’s proposed cap and trade program.

Thus, regional or state cap and trade programs that choose to regulate emissions associated with imported power under the cap are left with extremely difficult policy obstacles before the program even gets off the ground. The imported emissions carry with them constitutional and regulatory land mines that must be carefully considered. This leads to a heavily front-loaded administrative approach to treatment of imported power, creating high administrative costs at the outset that may or may not pay off once the program is implemented. Yet, many policymakers choose to do this approach in fear of the effects if emissions leakage is not addressed.

D. Emissions Leakage Effects

Emissions leakage is not just an abstract economic concept – it produces unwanted consequences. First and foremost, it sacrifices efficiency in emissions reductions at a high cost. One study on emissions leakage found that an “incomplete” cap and trade program, or a program that applies to only a subset of facilities contributing to the pollution problem, achieves only 35% of the emissions reductions of a complete cap and trade program at more

\textsuperscript{57} 16 U.S.C. §§ 824d, e; see, e.g., \textit{Federal Power Commission v. Conway Corp.}, 426 U.S. 271, 281-82 (1976) (holding that the FPC could consider allegations of the wholesale customers of certain municipally owned and cooperative electrical systems that wholesale rates were discriminatory and noncompetitive in comparison to retail rates).
than twice the implied cost per ton of emissions reduced.58 Thus, the prominent reason why emissions leakage is a “problem” is because it can defeat the very purpose for which a sub-national cap and trade program is put in place by decreasing or even making a positive impact on the amount of emissions reductions incurred. Economically, it creates concerns in relation to distributional welfare – money is transferred from the capped region or state to areas outside of the cap. Emissions leakage, or the threat of emissions leakage, puts a heavy administrative burden on any cap and trade program in preventing potential leakage and rectifying any ongoing leakage. This in itself is an efficiency loss to the system. The most efficient way to mitigate such emissions leakage is to have a broader, more inclusive system. In the absence of such a system, sub-national cap and trade systems in the international arena and in the United States are beginning to experiment with which could help approach the “messy” problem of implementing an “incomplete” environmental program at a regional or state level. However, a quick discussion about emissions leakage policies worldwide is first examined.

V. INTRODUCTION TO THE CASE STUDIES OF SUB-NATIONAL CARBON MARKET REGIMES

A. The Sub-National Climate Change Policymaker’s Problem

One of the largest dilemmas in sub-national climate change policymaking is mapping a complex, sub-national climate change policy onto a highly-connected national economy. This causes an extremely messy policy problem in administrative efficiency of policy implementation.59 Essentially, a policymaker implementing climate change policy must deal with wicked, ill-defined problems that are not necessarily solved through some

59 STEVEN NEY, RESOLVING MESSY POLICY PROBLEMS 8 (2009).
universal decisionmaking process. Like much progressive social policy, climate change policymakers at the regional and state level are left to grapple with this problem without much “prior art” to learn from, thus becoming the nation’s laboratories in themselves. The consequences of such sub-national approaches within a broader economy can be quite costly – both in monetary terms and in emissions reductions.

Thus, a policymaker’s dilemma in creating climate change policy in a sub-national regime is the messy, wicked problem of converting a sub-national policy into one that will withstand the tests of time. The policy must inevitably operate within an anthropogenic-constructed boundary, while minding the reality of interstate commerce and the physics of a highly interconnected national electricity grid. This creates a tension between administrative effectiveness and environmental integrity of the climate change policy. Once a region or other subset of a national political entity resolves to put into place a climate policy, it is only logical that this would be the result. Policymakers of sub-national climate change regimes are faced with such extremely complex problems associated with implementation that they are faced with two options: 1. Implement a climate change regime that is administratively complicated to manage but more environmentally sound; or 2. Create a climate change regime that is simple to implement but sacrifices a certain amount of environmental integrity.

The tension between efficiency or effectiveness and environmental integrity is especially true in relation to policies created to address emissions leakage in the electricity sector under a sub-national cap and trade system. The electricity grid in the United States

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60 Horst Rittel and Melvin Webber described the nature of the policymaker’s dilemma in their 1973 paper, *Dilemmas in a General Theory of Planning*. Horst W.J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 POLY SCI. 155 (1973). Rittel and Webber’s argument is that utilization of science as a basis for solutions in social policy is bound to fail because science is developed to deal with “tame” problems and social problems are “wicked” in nature *Id*. Social problems are inherently different than scientific problems – they are “wicked” in their nature because they are ill-defined and “rely upon elusive political judgment for resolution.” *Id.* at 160.
is highly interconnected\textsuperscript{61}, so it is difficult for a sub-national cap and trade market to ensure that its cap is not compromised due to emissions leakage. If prices of electricity increase under the cap, then it is difficult for a sub-national cap and trade market to stop electricity from outside of the cap to be used instead. Policies put into place to mitigate this consequence are faced with multiple obstacles, most of which deal with the inability to extend jurisdiction over electricity generation in other states.

Thus, policymakers approaching messy problems are left to wield a certain amount of judgment guided by selected ideas, values, and beliefs in order to impose a policy onto an area that is only a subsector of the affected population. This inevitably leads to weighted decisions where there may not be a “right” solution. Where policymakers are faced with such a delicate balancing act between administrative efficiency and environmental integrity, it is perhaps best for policymakers to follow the precautionary principle and delineate policies to deal with the failings of the “incomplete” environmental regulations from the outset to avoid possibly degrading the policy scheme and environment in the future.

California chose to do so in its Proposed Regulation to Implement a Cap and Trade Program by approaching emissions leakage problems before implementing the program. Although California in turn has faced not a small amount of obstacles in anticipating emissions leakage within a small, statewide carbon market that maps onto a nationwide electricity grid, it is using precaution ex ante. Expense of such resources is a type of gamble in that it could be that emissions leakage does not create costs equal to those resources spent to prevent it. Yet, the prevention in itself could prove extremely valuable once the cap and trade program is in place, as it is much more difficult to create such policy once the program is operating. In contrast, the Regional Greenhouse Gas Initiative implemented a

\textsuperscript{61} See Figure 1, Appendix.
more passive, wait-and-see approach to emissions leakage, possibly sacrificing integrity of
its program and of the environment once the cap starts tightening. RGGI’s choice to
passively monitor emissions leakage was a choice that could still prove to be troublesome
once the cap begins to ratchet down in 2015. Given the precarious placement of sub-
national programs onto the national electricity grid, it seems more logical to deal with
emissions leakage policies outright than to wait and monitor the costs that it might cause.
Precaution seems to be a better guide for policymakers wishing to successfully decrease
emissions and maintain a robust sub-national carbon market.

B. International Leakage Approaches: Overview

Interestingly, emissions leakage concerns in the electricity sector have not been as
large of an issue in other international cap and trade markets. The European Union’s
Emissions Trading Scheme has very limited concerns about emissions leakage from the
electricity sector due to the large coverage of the capped area. It does have extensive
concerns of carbon leakage through other sectors, and in December 2008, the European
Commission and European Parliament agreed on a revision of the ETS Directive that
deems certain sectors and/or subsectors exposed to a significant risk of carbon leakage in
order to receive more free allowances. Similarly, New South Wales has a Greenhouse Gas
Reduction Scheme (GGAS) that has largely ignored emissions leakage issues, although it
is a sub-national program. This may have been a mistake - over 33% of the abatement

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62 The EU has a substantial Emissions Trading Scheme that covers approximately 11,000 power
stations and industrial plants in 30 countries. European Commission Climate Action, Emissions
63 Indeed, it has been estimated that the EU actually has no notable emissions leakage from its
electricity sector as a result of its broad cap and trade program. Michael Grubb, Climate Strategies,
64 European Commission Climate Action, ETS: Carbon Leakage Background,
65 The GGAS plans to reduce per-capita greenhouse gas emissions due to electricity consumption
from 8.65 tons CO\textsubscript{2}e in 2003 to 7.27 tons CO\textsubscript{2}e by 2007, and continue this level until 2020. GGAS, INTRODUCTION TO THE GREENHOUSE GAS REDUCTION SCHEME 7 (2008).
credits issued from 2003-2005 were from projects outside the borders of New South Wales, and it is estimated that only about 30% of the certificates issued were for reductions within New South Wales for electricity generation in New South Wales from 2003-2005.66

Thus, most concerns about emissions leakage under the electricity sector center around sub-national regimes in the United States due in part to the vulnerability of these regimes to emissions leakage because of both the highly interconnected nature of the United States electric grid and also the “incompleteness” of the cap and trade regimes in spatial coverage. As mentioned, the two case studies that follow have approached emissions leakage in different ways. RGGI implemented a passive, wait-and-see program, while California’s program is proposing a highly proactive policy towards emissions leakage. The first program to implement a mandatory cap and trade program in the United States was the Regional Greenhouse Gas Initiative.

VI. CASE STUDY #1: THE REGIONAL GREENHOUSE GAS INITIATIVE

A. Overview

In 2003, the Governor of New York began discussions with eleven states in the area to gauge cooperation for a regional cap and trade regime.67 By the summer of 2003, a working group had created an action plan for a regional cap and trade program.68 On December 20, 2005, seven states entered into a Memorandum of Understanding to implement the Regional Greenhouse Gas Initiative (“RGGI”).69 RGGI is the first

68 Id.
mandatory, market-based effort in the United States to reduce greenhouse gas emissions. It is a regional cap and trade program covering ten states in the Northeast and Mid-Atlantic and targets reductions in carbon dioxide emissions from power plants. Its goal is for each state to achieve a 10% reduction in carbon dioxide emissions by electric power plants from their base level emissions by 2018. The program officially started on January 1, 2009, stabilizing carbon dioxide emissions from 2009-2014 and decreasing the cap by 2.5% per year from 2015-2018, for a total of 10% reduction by 2018. All of the RGGI states, except for Vermont, are deregulated in the generation and sale of electricity, and the RGGI region also falls under the jurisdiction of four ISOs/RTOs which manage the transmission and wholesale electricity markets of the area while also ensuring reliability of the grid. The coverage of the program is “source-based” in that it only covers fossil-fuel fired power plants under the cap that are 25 megawatts or greater in size.

RGGI was concerned with the probability of emissions leakage because it was implemented as a subset within an extremely interconnected and competitive generation market. A price on carbon could thus easily lead to a shift in generation from sources

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72 Id.
74 CENTER FOR INTEGRATIVE ENVIRONMENTAL RESEARCH, ECONOMIC AND ENERGY IMPACTS FROM MARYLAND’S POTENTIAL PARTICIPATION IN THE REGIONAL GREENHOUSE GAS INITIATIVE 20 (2007) (the ISOs are: the New York Independent System Operator (NYISO) and the Northern Maine Independent System Administrator (NMISA), and the RTOs are: the ISO-New England (ISO-NE) and the PJM Interconnection).
under the RGGI program to higher-emitting sources outside of the cap. Specifically, Pennsylvania acted as a threat for emissions leakage because it was connected to the grid associated with the states under the RGGI system, it had excess capacity that could be absorbed – capacity that in 2002 exceeded the annual CO2 emissions cap for the seven RGGI states – and it did not sign onto RGGI.

However, at the outset it should be noted that the RGGI program has been criticized that its own weak cap and the nation’s economic conditions make it so that the program has done little to change power plant behavior. Both the nation’s economic recession and dropping natural gas prices caused the region’s carbon dioxide emissions to drop nine percent between 2008 and 2009, placing carbon dioxide emissions in the RGGI region at thirty-four percent below the cap level in 2009. Utilities in the region candidly admit that the cap has done nothing to change their day-day business decisions. Although the cap set is indeed weak, the states involved under RGGI were still concerned about the possibility of emissions leakage.

Starting in 2005, the RGGI Agency Heads recognized the possibility of emissions leakage and directed staff to study, analyze, and propose policy solutions on emissions leakage. An Initial Report was delivered in 2007, and the Final Report was completed in 2008, making the emission leakage policymaking process last at least four years. It is still unclear how much the emissions leakage problem would have affected the cap and trade system if measures were not taken to preempt any problems associated with it – one report

77 Id.
78 CENTER FOR INTEGRATIVE ENVIRONMENTAL RESEARCH, supra note 74, at 19.
80 Id.
81 Id.
82 RGGI, POTENTIAL EMISSIONS LEAKAGE, supra note 76.
83 Id.
noted that the “order of magnitude of the potential problem is relatively small.” The RGGI report on emission leakage itself acknowledged that “[t]here is significant uncertainty related to the magnitude of the potential threat of emissions leakage and the manner in which emissions leakage may occur.” Furthermore, the impact of emissions leakage depends on the value of CO₂ allowances, and critics point out that a significant shortfall of RGGI is its weak pricing for emissions allowances. The price of allowances is critical for a cap and trade market, as it acts as the “price signal” for the price of carbon. This is important from an environmental standpoint because it is that price signal that, assuming it is passed onto consumers, will change consumer behavior (and, in the long term, industry behavior).

RGGI suffers from an over-supply of allowances with not enough demand, such that its allowance price remains extremely low – indeed, at RGGI’s ninth auction in September, 2010, not all of the available allowances for sale were sold at the auction. Just fewer than 25% were left as excess, and the price of the 75% that were bought was $1.86 – the “basement” reserve price for the auction. A low price on allowances means that electricity under the cap will not carry a large, marked price difference as compared to electricity sold outside of the cap. RGGI performed an analysis of the system in 2009 and reported that “[n]et imports of electricity into the RGGI region were estimated to be virtually the same in

85 Potential Emissions Leakage, supra note 76, at 4.
89 Id.
2009 as in 2005.” Of course, the system is still in its stabilization period and, given that
the allowance prices and electricity demand are low, emissions leakage does not yet seem to
pose any problem to the RGGI cap and trade system.

On the other hand, several economic studies determined that leakage occurring
under RGGI could be significant. Perhaps most notably, Marek Kolodziej and Ian Sue Wing
performed a numerical analysis on theoretical emissions leakage under RGGI and found
the possibility for an astonishing rate of emissions leakage of approximately thirty-three
percent by the year 2015. Although they emphasized the relatively small economic impact
of RGGI, they pointed out that the small impact created large increases in power exports
from unconstrained states. Yihsu Chen determined leakage under RGGI could be much
higher – his economic model was run before RGGI was put into place and estimated leakage
between eighty to ninety percent for the year 2006. These numbers are skewed by the fact
that Chen’s model used allowance prices of pollutants other than CO₂ - mainly prices from
the Clean Air Act’s acid rain trading program - which were selling allowances at a price of
between $769-$1,840 for Chen’s model, while RGGI’s actual CO₂ allowance prices have
turned out to be somewhere around $1.89. Even so, RGGI itself estimated that a “middle-
of-the-road” scenario would produce emissions leakage of about twenty-seven percent of the
net carbon dioxide emissions reductions through 2015.

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90 RGGI INC., RELATIVE EFFECTS OF VARIOUS FACTORS ON RGGI ELECTRICITY SECTOR CO₂
91 MAREK KOLODZIEJ & IAN SUE WING, THE REGIONAL GREENHOUSE GAS INITIATIVE: EMISSION
92 Id.
93 Yihsu Chen, Does a regional greenhouse gas policy make sense? A case study of carbon
94 See RGGI Inc., RGGI Auction Yields $83.4 Million for Investment in Energy Efficiency, Job
95 POTENTIAL EMISSIONS LEAKAGE, supra note 76, at 9.
Regardless, RGGI formed a working group to suggest certain policies for alleviating any possible emissions leakage issues ex ante. Yet, these policy recommendations were passive approaches that would enhance the ability of RGGI to determine the extent of emissions leakage after the cap and trade system was already in place. The working group hung its hopes on the implementation of a national cap and trade program that would moot any emissions leakage concerns under RGGI. Indeed, the working group stated in its final report on emissions leakage, “[g]iven current political momentum toward a national program, Staff views the potential for emissions leakage primarily as a near- to mid-term concern.”96 The report later states, “[m]any business executives expect a national carbon policy to be implemented between 2012 and 2015.”97 As the nation’s first binding cap and trade system put into place, RGGI policymakers had to balance the aspirations of their own cap and trade system with the current tide of political thought. Further, it was easier for the policymakers to implement a more passive approach to emissions leakage than to act as the nation’s laboratory and make policy on a subject that was not yet well-researched or studied. It was not even clear whether the system would even be affected by high emissions leakage, so the policymakers put less emphasis on precaution and more emphasis on information gathering under the system so that any emissions leakage could be detected once the regime was put into place.

RGGI policymakers also knew that the cap of the system was extremely mild – the system was only “stabilizing” carbon emissions through 2014. Given the uncertainty of the actual impact of leakage on the RGGI region, the weak cap in the beginning years, and the confidence in the passage of a national system in the near future, the policymakers logically weighed administrative efficiency heavily over concerns of environmental integrity lost

96 Id. at ES-2.
97 Id. at 8 (citations omitted).
from not implementing leakage prevention measures ex ante. Indeed, the Final Report on emissions leakage suggested that RGGI participating states “prioritize the implementation of emissions leakage mitigation measures that have demonstrated effectiveness and that can be implemented relatively quickly, instead of more complex measures that would require greater implementation lead times and for which effectiveness has yet to be demonstrated.”\(^9\) This is in stark contrast from California’s own cap and trade regime, where policymakers are creating quite complicated leakage measures ex ante, at a high cost of administrative time and efficiency. It is possible that the current national standstill on carbon policy contributes to California’s concern, whereas the political pulse on carbon policy during the creation of RGGI seemed to be more hopeful. It is also possible that the inclusion of multiple states under RGGI made it more difficult in general to get emissions leakage policies in place than in California’s case, which deals with only one state.

Among the policy choices recommended by RGGI’s working group were: 1. Modification of tracking systems in the three ISO regions included under the cap to monitor potential emissions leakage\(^9\); 2. Policies that indirectly address carbon emissions by reducing electricity demand\(^10\); 3. Carbon adder and emissions rate mechanisms\(^11\); and 4. Capping emissions associated with serving load\(^12\). The only recommendations truly adopted into practice under RGGI were the modification of tracking systems.

**B. Modification of Tracking Systems**

As noted *supra*, the ability to track the environmental attributes of electricity is paramount to monitoring and measuring the extent of emissions leakage. RGGI proposed to attack this issue by utilizing current tracking systems of the covered ISOs and updating

\(^{98}\) *Id.* at 15.  
\(^{99}\) *Id.* at ES-2.  
\(^{100}\) *Id.* at 4-5.  
\(^{101}\) *Id.* at 6-7.  
\(^{102}\) *Id.* at 7-8.
them further to accommodate the cap and trade regime. Of the four ISO/RTO systems involved under RGGI, two (PJM’s GAT and ISO-NE’s GIS) already had systems in place to account for MWHs of electricity generated and MWHs of electricity used as well as the environmental attributes of those MWHs. NY-ISO is currently in the process of modifying its current system to incorporate the ability to track the environmental attributes and MWHs of the electricity used throughout its system through possibly adopting ISO-NE’s GIS system.

Between these three systems, virtually all of the electricity under the RGGI system could be tracked. These systems are further described supra in section V(B). RGGI proposed adding new categories of generation units to the tracking systems already in place, labeling generation as generation from one of three categories: 1. RGGI-affected unit (> 25 MW fossil fuel-fired unit subject to RGGI cap and trade program); 2. Unaffected fossil fuel-fired RGGI-region unit (e.g. <25 MW not subject to RGGI but under jurisdiction of RGGI area); and 3. RGGI-region unit (includes RGGI-affected units and all other units located in the RGGI region, e.g., a unit located within a control area fully subject to RGGI or located within the RGGI portion of a control area partially subject to RGGI). The net power flows under the ISO/RTO areas would then be tracked either directly (for NY-ISO and ISO-NE) or indirectly (for PJM).

C. Policies that Reduce Electricity Demand

The RGGI Working Group suggested several policies to indirectly approach emissions leakage by reducing electricity demand. The policies were generally energy

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103 Id. at 12.
105 Note that this is with the exception of the Northern Maine ISA, which only serves 130 MW and is minor in relation to the rest of the RGGI system. NMISA, Home, http://nmisa.com/.
106 POTENTIAL EMISSIONS LEAKAGE, supra note 76, at 19-21.
107 Id. at 21.
efficiency recommendations, and included energy efficiency portfolio standards, building energy codes, appliance efficiency standards, and combined heat and power systems.\textsuperscript{108}

D. Carbon Adder and Emissions Rate Mechanisms

The carbon adder is a direct approach to emissions leakage and would require the load-serving entities to include consideration of carbon emissions in their energy resource planning and procurement strategies through a carbon procurement adder and an emission portfolio standard.\textsuperscript{109} The adder would require LSEs to incorporate a “shadow price” for carbon emissions into its evaluation of investment options. Incorporation of this “shadow price” might alter the “least-cost” option of the LSE.\textsuperscript{110} An emissions rate mechanism would limit the emissions rate of power supplied to an LSE through a long-term power purchase agreement, requiring all long-term contracts to meet a specific CO\textsubscript{2}/MWh emission rate.\textsuperscript{111} An emissions portfolio standard would require the LSE to meet an output-based emissions standard for the portfolio of electricity supply resources the LSE uses to provide retail electricity.\textsuperscript{112}

E. Capping Emissions

A load-based emissions cap would cap CO\textsubscript{2} emissions related to all electricity use in the region, moving the cap requirement from generators to electricity providers.\textsuperscript{113} This approach eliminates most concerns of emissions leakage - the generation leakage concerns are mooted because the LSEs would be subject to regulation and they would need to account for their electricity’s environmental attributes, no matter if it came from under the cap or outside of it.

\textsuperscript{108} Id. at 27-30.
\textsuperscript{109} Id. at 31-32.
\textsuperscript{110} Id. at 32.
\textsuperscript{111} Id. at 34.
\textsuperscript{112} Id. at 36.
\textsuperscript{113} Id. at 39.
F. RGGI: Conclusion and Going Forward

The Memorandum of Understanding that was signed by RGGI states in 2005 required a comprehensive 2012 review of all components of the cap-and-trade program, including the effectiveness of any measures put in place to control emissions leakage.\footnote{RGGI MOU, supra note 69, at §6(D).} Clearly, the reliance of RGGI’s Final Report on emissions leakage on a nationwide cap-and-trade program was misplaced, so it is now important for RGGI states to review the impacts of emissions leakage on the integrity of their cap and determine whether more proactive measures are necessary. Further, the recommendation of the Working Group on emissions leakage that states “prioritize the implementation of emissions leakage mitigation measures that can be implemented relatively quickly” does not seem to have caused any action, at least on the part of regulated entities.\footnote{Edison Electric Institute, Edison Electric Institute Comments on the Regional Greenhouse Gas Initiative’s Comprehensive 2012 Review of All Program Components 8 (Nov. 30, 2010).} Regardless of what RGGI’s 2012 comprehensive review finds on the actual impacts of emissions leakage to date, the RGGI policymakers will find it much more difficult to impose policies on emissions leakage now that the system has been in operation for a number of years. It is possible that the choice of the RGGI policymakers to take a more passive approach to emission leakage from the outset, coupled with high hopes of a nationwide cap-and-trade program, sealed the fate of the RGGI program in relation to emissions leakage should it begin to battle higher prices on carbon as the cap ratchets down. As the Western Climate Initiative put it, RGGI has “generally failed to address the leakage potential at all.”\footnote{WCI, DESIGN RECOMMENDATIONS, supra note 75, at 23.}

RGGI’s program operates as a prime example of a sub-national cap and trade program that chose to prioritize administrative efficiency over implementation of proactive environmental integrity provisions. Perhaps this is in part due to the political tide of the
time in which it was implemented, but it seems equally possible that this is due to the lack of experience in sub-national regimes. RGGI policymakers were forced to create a system that dealt with many diverse and complicated concerns, many of which were not even proven to be implicated once the program was put in place. Faced with the unique opportunity to pioneer sub-national cap and trade markets in the nation with its program, RGGI's policymakers made a choice to hedge their bets, create a weak cap, hope that a nationwide system would be put in place before long, and let concerns about emissions leakage go by the wayside. The consequences of such actions will come to light in 2012, but it is clear that the cap will not achieve high emissions reductions even as it ratchets slowly down starting in 2015. Thus, although it seems that RGGI's program is dealing with minimal emissions leakage, the passive approach cannot be said to be a reason behind this success. If RGGI eventually sees higher carbon prices, it will certainly face at least a small amount of leakage that it will not be prepared to handle. It is a strong argument for getting measures in place from the outset in order to prevent an overhaul of the program should leakage become a problem.

VII. ARB Proposed Regulation to Implement A California Cap and Trade Program

A. Overview

California’s Air Resources Board (ARB) in its Proposed Regulation to Implement the California Cap-and-Trade Program is attempting to create the first statewide cap and trade regime in the United States. The ARB is going to great lengths to create a regime ex-ante that keeps emissions leakage to a minimum. The regulation is a result of California’s Global Warming Solutions Act (“AB 32”), passed in 2006, that set a statewide greenhouse

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117 STAFF REPORT, supra note 30, at IV-8.
gas emissions goal of 1990 levels by 2020 into law.\textsuperscript{118} The Act required ARB to develop a scoping plan before January 1, 2009 for achieving the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from sources or categories of sources of greenhouse gases by 2020.\textsuperscript{119} ARB approved its Scoping Plan on December 12, 2008, and included a recommendation that a cap and trade mechanism be developed as part of California’s greenhouse gas reduction efforts.\textsuperscript{120} Two years, forty public workshops, and hundreds of stakeholder meetings later, ARB endorsed the proposed cap and trade program with modifications on December 16, 2010.\textsuperscript{121} Final approval has not yet been reached\textsuperscript{122}, but the program is currently set to start on January 1, 2012.\textsuperscript{123} ARB’s Proposed Regulation casts a wide net in coverage, as it extends to most large industrial entities and electricity generating facilities or importers.\textsuperscript{124} It also covers more greenhouse gases than just carbon dioxide.\textsuperscript{125} The cap and trade system would start in 2012 with coverage of large industry, electricity generation, and importers of electricity\textsuperscript{126} and expand in 2015 to cover emissions from combustion of fuels by residential, commercial, and small industrial, liquefied petroleum gas combustion, and transportation fuels.\textsuperscript{127}

\textsuperscript{119} Id. at § 38561.
\textsuperscript{121} California Air Resources Board gives green light to California’s emissions trading program, ARB (Dec. 16, 2006), http://www.arb.ca.gov/newsrel/newsrelease.php?id=170.
\textsuperscript{123} Proposed Regulation Order § 95840(a).
\textsuperscript{124} California Act of 2006, supra note 118, at § 95811.
\textsuperscript{125} Id. at § 95810 (the Proposed Regulation would cover carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and other fluorinated greenhouse gases).
\textsuperscript{126} Id. at § 95851(a).
\textsuperscript{127} Id. at § 95851 (b).
California’s effort to enact its own cap and trade program is an even stronger example than RGGI of a market created to regulate a “good” within borders that are drawn inside of a much larger grid. The inherent nature of the nation’s interconnected electricity grid means that the cap within California’s borders imperfectly maps onto the electricity grid\textsuperscript{128} because the electricity grid does not follow the carbon market boundaries.\textsuperscript{129} Furthermore, imported electricity accounts for a large part of emissions in California. In fact, in 2008, California imported 31 percent of its electricity supply, which accounted for 56 percent of its electricity sector emissions.\textsuperscript{130} This makes the probability of emissions leakage even higher for California’s carbon market. Yet, in the absence of a national market, California must approach such imperfect border matches in order to enact its own “interim” or “messy” solution to greenhouse gas emissions. Given constraints in California’s ability to regulate entities outside of its borders due to Commerce Clause and federalism concerns, the imperfectness of the borders of its carbon market requires policymakers to formulate a market that is either simple to administrate or complicated and possibly still imperfect in its ability to include concerns of emissions leakage.

California effectively chose a precautionary approach to emissions leakage by way of its time-intensive efforts upfront to establish policy measures for emissions leakage ex ante. Although at least some of the time and resources lost from these efforts could have been avoided by a more comprehensive carbon market, if California wishes to make its market as structurally and environmentally sound as possible, then these efforts are necessary. In the face of the complex, messy problem of overlaying its small carbon market on top of a national electricity grid, California policymakers decided to proceed cautiously in order to

\textsuperscript{128} See Figure 4, Appendix. (http://www.npr.org/templates/story/story.php?storyId=110997398).

\textsuperscript{129} See Figure 1, Appendix.

\textsuperscript{130} California Energy Commission, Total Electricity System Power, http://energyalmanac.ca.gov/electricity/system_power/2008_total_system_power.html.
get it right before the program is in operation. This is probably a wise decision, as once the program is in place, overhaul of the program in order to implement such measures would be much more time consuming and burdensome. The time and efficiency lost in the implementation of preemptive measures must be balanced against the probability of compromised environmental and structural integrity of the program from emissions leakage.

The proposed cap-and-trade regime attacks emissions leakage through essentially a four-pronged approach: 1. Free allocations of allowances in the early years of the program to electrical distribution utilities using emissions efficiency benchmarks\textsuperscript{131}; 2. Utilization of a first jurisdictional deliverer approach as the point of regulation\textsuperscript{132}; 3. Accounting for both in-state and out-of-state electricity generation; and 4. Linkage to partner jurisdictions in the future Western Climate Initiative\textsuperscript{133}.

B. Free Allocations of Allowances in the Early Years of the Program to the Electricity Sector

Free allocations of allowances to the electricity sector directly mitigate cost impacts on ratepayers and indirectly assist with emissions leakage by making the transition by an industry to a cap and trade program easier. This is not a measure to actually prevent price increases, but instead to help generators capture more producer profit in the cap and trade market than others under the market. The allowances given do not affect the total emissions allowed under the cap – rather, they just affect the distribution of costs within the market. Whereas RGGI did primarily an auctioning approach to allowances in the electricity sector\textsuperscript{134}, California’s Proposed Regulation contains a placeholder for allocation of

\textsuperscript{131} Staff Report at II-26.
\textsuperscript{132} Staff Report at II-10.
\textsuperscript{133} Staff Report at II-43.
\textsuperscript{134} RGGI, \textit{Fact Sheet: RGGI CO\textsubscript{2} Allowance Auctions}, \url{http://www.rggi.org/docs/RGCI_Auctions_in_Brief.pdf} (last visited Apr. 14, 2011).
allowances to electrical distribution utilities\textsuperscript{135}, but does not include specifications for distribution of allowances among utilities. The Proposed Regulation does allocate 89 million allowances multiplied by an adjustment factor each year to electrical distribution utilities.\textsuperscript{136} Essentially, the adjustment factor begins as “1.0” and gradually decreases until it reaches “.851” in 2020 in order to gradually decrease the amount of allowances that are granted to utilities through 2020.\textsuperscript{137} The allowances given to IOUs must be auctioned at general quarterly auctions, and the proceeds must be used to mitigate the impacts of the cap and trade system on distribution customers.\textsuperscript{138} The stated reason for this maneuver is to maintain the “current competitiveness of the deregulated California electricity market.”\textsuperscript{139}

Although the free allocation of allowances to utilities may ease the transition to a cap and trade regime, it is not a solution for emissions leakage but merely a way to ease into the transition. The cap and the amount allocated are ratcheted down through the years, and the free allowances might not fully account for price increases during that time. Thus, it is possible that prices in the electricity sector would still be such that emissions are leaked outside of the cap. Further, AB 32 required ARB to limit statewide emissions to 1990 levels by 2020, including all emissions delivered to and consumed in California.\textsuperscript{140} Ultimately, ARB had to address imported electricity in order to more fully manage any possibility of emissions leakage. Incorporation of imported electricity consumed under the cap helps mitigate incentives for emissions leakage by indirectly applying the regulations to out of state generators. This helps to encompass generation from outside of the cap, and

\textsuperscript{135} Proposed Regulation Order § 95892.
\textsuperscript{136} Proposed Regulation Order, Appendix A, § 95870 (c).
\textsuperscript{137} Id. at Table 9-2.
\textsuperscript{138} Proposed Regulation Order, Appendix A, § 95892(b)-(d).
\textsuperscript{139} Staff Report at II-32.
\textsuperscript{140} CAL. HEALTH & SAFETY CODE §38505(m), §38550.
helps eliminate any advantage such out of state generators would have over generators under the cap.

C. Accounting for both in-state and out-of-state generation

AB 32 requires ARB to include out-of-state electricity that is consumed in California within its regulation of greenhouse gas emissions.141 Although ARB is attacking the directive through many other measures, ARB chose a cap and trade system as its primary approach to achieve those emissions reductions.142 In-state electricity generation only accounts for about 11 percent of CO₂ emissions in California, while the emissions from electricity in California more than doubles when out-of-state electricity generation to serve California consumers is included.143 As aforementioned, California imports more electricity than any other state.144 Thus, even aside from AB 32’s directive to account for all emissions consumed whether originating in-state or out-of-state, if California wishes to achieve a high level of environmental integrity with its cap and trade system, it is imperative for California to include electricity from out-of-state generation that is consumed within the state’s borders. This approach must be able to measure the emissions from the associated generation. This essential component of California’s cap and trade is a creature of sub-regional cap and trade markets that rears its nasty head during policymaking discussions due to the difficulty of tracking electricity on a grid. It is physically impossible to track electrons on the grid, so ARB must come up with an approach that is able to either track the electricity through electricity tagging or contract methods or to instead just assign a default emissions factor to unspecified electricity.

141 Id. at §38505(m), §38550.
142 See ARB, CLIMATE CHANGE SCOPING PLAN 1, 15-17 (2008) (Detailing measures aside from a cap and trade program to reduce greenhouse gas emissions, such as energy efficiency, low carbon fuel standards, and renewable portfolio standards).
144 California Quick Facts, supra note Error! Bookmark not defined.
ARB proposes to solve this problem by dividing its imported power into two categories: specified source of electricity or unspecified source of electricity. The unspecified electricity is then given a “default emissions factor” based on the spot market price in California. This creates perverse economic incentives for dirty power to somehow be “unspecified” and for clean power to be “specified,” which ultimately could compromise the environmental integrity of the system. ARB’s efforts to include imported electricity under the cap and trade program for the sake of environmental integrity of the cap thus could in actuality undermine it more than if the imported electricity was treated differently or left outside of the cap and trade program.

Specified electricity is that which can be traced somehow, either through ownership or contracts. That electricity can subsequently be assigned its emissions based on knowledge of the generation source. Thus, ARB defines a “specified source of electricity” as “a facility or unit which is permitted to be claimed as the source of imported electricity delivered by an electricity importer. The electricity importer must have either full or partial ownership in the facility/unit or a written contract to procure electricity generated by that facility/unit.” An “unspecified source of electricity” is defined as “electricity generation that cannot be matched to a specific electricity generating facility or electricity generating unit or matched to an asset-controlling supplier recognized by ARB. Unspecified sources contribute to the bulk system power pool and typically are dispatchable, marginal resources that do not serve baseload.” ARB proposes to “assign a default emissions factor to unspecified sources of electricity that would be based on the average emissions associated with the available electricity generation that could be sold on the spot market and brought

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146 Id. at § 95802(a)(201).
into California. The GHG emissions will be calculated by multiplying this emissions factor by the MWh delivered.”\textsuperscript{147}

1. FERC Jurisdictional Issues

ARB must be extremely careful in setting its default emissions factor for unspecified sources of imported electricity in order to avoid collision with FERC jurisdiction. FERC has jurisdiction over wholesale sales of power, and this jurisdiction has been interpreted broadly due to the interconnectedness of the electricity grid.\textsuperscript{148} Further, Section 206 of the Federal Power Act gives FERC the power to review wholesale power rates and conditions and determine whether these rates are “unjust, unreasonable, unduly discriminatory or preferential.”\textsuperscript{149} This power is currently exercised in California’s spot market, where FERC approves the prices put forth by California’s Independent System Operator.\textsuperscript{150} FERC has sweeping “jurisdiction over all rates, terms, and conditions of electric transmission service provided by public utilities in interstate commerce, as well as over the sale of electric energy at wholesale.”\textsuperscript{151}

\textsuperscript{147} Staff Report at II-20.
\textsuperscript{148} See The Federal Power Act of 1935, 16 U.S.C. § 824(a), (b) (“It is hereby declared that the business of transmitting and selling electric energy for ultimate distribution to the public is affected with a public interest, and that Federal regulation of matters relating to generation to the extent provided in this Part and the Part next following and of that part of such business which consists of the transmission of electric energy in interstate commerce and the sale of such energy at wholesale in interstate commerce is necessary in the public interest. . .”); Federal Power Commission v. Florida Power & Light Co., 404 U.S. 453 (1972) (holding that the predecessor of FERC, the Federal Power Commission, had jurisdiction over an electric company in Florida which put electricity onto a grid that transmitted energy into interstate commerce); FPC v. Southern California Edison, 376 U.S. 206 (1964) (holding that “s 201(b) grants the FPC jurisdiction of all sales of electric energy at wholesale in interstate commerce not expressly exempted by the Act itself”).
\textsuperscript{149} 16 U.S.C. §§ 824e (a); see, e.g., Federal Power Commission v. Conway Corp., 426 U.S. 271, 281-82 (1976) (holding that the FPC could consider allegations of the wholesale customers of certain municipally owned and cooperative electrical systems that wholesale rates were discriminatory and noncompetitive in comparison to retail rates).
\textsuperscript{150} See generally FERC, Electric Power Markets: California (ISO), http://www.ferc.gov/market-oversight/mkt-electric/california.asp.
\textsuperscript{151} 16 U.S.C. § 824(b); Atlantic City Elec. Co. v. FERC, 295 F.3d 1 (C.A.D.C. 2002).
ARB’s approach to imported wholesale electricity might involve or infringe on FERC’s authority over wholesale electricity rates. ARB’s imposition of a default emissions factor onto imported electricity at the wholesale level in California is effectively imposing a value onto that imported electricity. This is because the default emissions factor can be seen as carrying a value with it – the price on carbon – which is subsequently imposed onto imported electricity through the default emissions factor (or other set emissions factors as well). FERC’s jurisdiction over power at the wholesale level stretches across all rates, terms, and conditions of transmission service in interstate commerce, such that ARB’s imposition of a de facto value onto imported power through emissions factors could very well infringe on FERC’s authority. In a similar way, California’s feed-in tariff program that would require utilities to purchase at a price set by the California Public Utilities Commission (“CPUC”) electricity from combined heat and power generators and other types of renewable generators has experienced difficulties in doing so without infringing on FERC’s wholesale power rate-setting authority. A feed-in tariff usually allows generators to receive a premium price for renewable electricity produced, but this forced price impinges on FERC’s rate-setting authority at the wholesale level. Indeed, in two separate orders, FERC clearly stated that the Federal Power Act preempts the CPUC from establishing rates for the utilities’ purchase of electricity unless such rates do not exceed the utility’s avoided cost.\textsuperscript{152} Thus, FERC’s broad authority over wholesale power is easily infringed by imposing any kind of value requirement onto the power at that level. Thus, ARB’s usage of emissions factors for imported wholesale power could easily run into jurisdictional issues unless ARB is able to somehow prove that the value of the emissions factors are legitimate values on the wholesale market.

\textsuperscript{152} See Order on Petitions for Declaratory Order, 132 FERC ¶ 61,047 (July 15, 2010); Order Granting Clarification and Dismissing Rehearing, 133 FERC ¶ 61,059 (Oct. 21, 2010) (avoided cost provisions are approved under PURPA).
Perhaps one way for ARB to do so is to use a default emissions factor that is derived from the spot market, which operates under approval by FERC. ARB may be able to argue that deriving a default emissions factor from a market which has a value approved by FERC is thus also an approved value for imported electricity. However, the default emissions factor is still imposed onto imported electricity that may or may not be sold through California’s spot market.\(^{153}\) FERC will likely at least flag the approach as adding value to imported electricity. ARB’s ability to defend its imposition of the default emissions factor on wholesale sales of electricity will depend on the correlation between spot market prices and the emissions factor that is defaulted onto the imported power.

2. Economic Incentives of the Default Emissions Factor Based on the Spot Market Price

The emissions from in-state generation are already measured and reported under ARB’s Regulation for Mandatory Reporting of Greenhouse Gas Emissions.\(^{154}\) Approximately 56 percent of imported electricity is given an emissions intensity from precise identification of generation due to the California Climate Action Registry’s Power/Utility Reporting Protocol.\(^{155}\) This leaves approximately 44 percent of imported electricity as “unspecified.”\(^ {156}\) Of that unspecified electricity, approximately 50% originates from the Southwest and approximately 50% originates from the Northwest.\(^{157}\) The total resource mix of electricity imported from the Southwest into California is estimated to be 57.4% coal, 27.9% natural gas, 11.4% nuclear, and 3.4% hydropower.\(^{158}\) The total resource mix of electricity imported

\(^{153}\) Imported electricity is also sold through long or short-term contracts (especially for base load resources such as coal).

\(^{154}\) CAL. HEALTH & SAFETY CODE §38530 (West 2011).

\(^{155}\) ARB: MARKET ADVISORY COMMITTEE, supra note 143, at H-53.

\(^{156}\) AL ALVARADO & KAREN GRIFFIN, CALIFORNIA ENERGY COMMISSION, REVISED METHODOLOGY TO ESTIMATE THE GENERATION RESOURCE MIX OF CALIFORNIA ELECTRICITY IMPORTS 6 (2007).

\(^{157}\) Id.

\(^{158}\) Id. at 14.
from the Northwest is estimated to be 65.3% hydropower, 19.4% natural gas, 10.5% coal, 2.4% renewables, and 2.3% nuclear.\textsuperscript{159}

The spot market sells primarily intermediate to peak load power that is much cleaner than coal power— in 2009, the resources sold on the spot market were primarily marginal, and natural gas accounted for 39% of generation, hydropower accounted for 9%.\textsuperscript{160} Natural gas emits approximately one-half the carbon dioxide per unit of energy that coal combustion does\textsuperscript{161}, and hydropower operates without emitting carbon dioxide\textsuperscript{162}. This means that out-of-state coal generators will have the incentive to sell its power as “unspecified” such that it will get a lower emissions factor than if it was specified. In contrast, renewable energy generation will have the incentive to put efforts into selling its power as “specified” such that its power is not rated as natural gas, which emits more carbon dioxide than renewable energy does. This can be shown by a few simple equations.

Equation 2: The profit function for an electricity marketer in California’s cap and trade market

$$\pi = P_S Q_S + P_U Q_U - C(Q_S) - C(Q_U) - P_p Q_p$$

s.t. $\beta_S Q_S + \beta_U Q_U \leq \text{cap}$

The Lagrangian can be written as:

$$P_S Q_S + P_U Q_U - C(Q_S) - C(Q_U) - P_p Q_p - \lambda (\beta_S Q_S + \beta_U Q_U - Q_p)$$

With first-order conditions:

$$Q_S: \frac{d\pi}{dQ_S} = P_S - MC_S - \lambda \beta_S = 0$$

$$P_S = MC_S + \lambda \beta_S$$

$$Q_U: \frac{d\pi}{dQ_U} = P_U - MC_U - \lambda \beta_U = 0$$

\textsuperscript{159} Id. at 29.

\textsuperscript{160} CALIFORNIA ISO, ANNUAL REPORT ON MARKET ISSUES AND PERFORMANCE 2.10 (2010). See Figure 5 in Appendix.

\textsuperscript{161} B.D. HONG & E.R. SLATICK, ENERGY INFORMATION ADMINISTRATION, CARBON DIOXIDE EMISSIONS FACTORS FOR COAL (1994).

\textsuperscript{162} Bureau of Reclamation, supra note Error! Bookmark not defined..
\[ P_U = MC_U + \lambda \beta_U \]

\[ Q_P: \frac{dL}{dQ_P} - P_P + \lambda = 0 \]

\[ \lambda = P_P \]

Where:

- \( P_S \) = Price of specified electricity
- \( P_U \) = Price of unspecified electricity
- \( P_P \) = Price of permits
- \( Q_S \) = Quantity of specified electricity
- \( Q_U \) = Quantity of unspecified electricity
- \( Q_p \) = Quantity of permits purchased
- \( C(Q_S) \) = Cost function of specified electricity
- \( C(Q_U) \) = Cost function of unspecified electricity
- \( \beta_S \) = Emissions intensity of specified electricity
- \( \beta_U \) = Emissions intensity of unspecified electricity, which will = \( \beta_{mkt} \) or the average of emissions on the spot market
- \( \lambda \) stands for the shadow price of greenhouse gas emissions, determined by the cap and trade market.

Assuming \( P_P \geq 0 \), then \( \lambda \beta_U > 0 \), and \( \lambda \beta_U \) acts as a tax on the unspecified power. This tax is higher on unspecified power if \( \beta_U > \beta_S \). Similarly, the tax is lower on specified power if \( \beta_U < \beta_S \).

Thus, if coal’s emissions intensity is actually larger than the default emissions intensity assigned to unspecified electricity, \( \beta_{Coal} \neq \beta_{mkt} \) and \( \beta_{Coal} > \beta_{mkt} \), then coal has an incentive to ensure its power remains unspecified. This is because the cost of selling its electricity as unspecified power, \( P_U \), will be less than selling its electricity as specified electricity where \( \beta_{Coal} > \beta_{mkt} \). However, renewable energy will have an incentive to ensure its power is specified if \( \beta_{Renewable} \neq \beta_{mkt} \) and \( \beta_{Renewable} < \beta_{mkt} \). This is because the cost of selling renewable electricity as unspecified power, \( P_U \), will be higher than selling the electricity as specified where \( \beta_{Renewable} < \beta_{mkt} \). Coal will capture a lesser emissions intensity, while renewable power will move from the unspecified category to specified, causing the default emission intensity assigned to unspecified electricity to be overall incorrect. Renewable energy will not have an incentive to be unspecified, so the default emissions factor will be applied primarily to
dirtier generation than it actually measures, given that the spot market average used for the default emissions factor includes renewable energy and natural gas.

Hence, the policy decision to utilize a default emissions factor, derived from the average emissions on the spot market, creates an incentive to degrade the cap. The incentives that the default emissions factor creates are especially impactful given that California imports more electricity than any other state in the nation. Further, given that the majority of electricity imported from the Southwest is coal and the majority of electricity imported from the Northwest is hydropower, the incentive for coal to label its power as “unspecified” and the incentive for hydropower to label its power as “specified” is heightened. While ARB grapples with its limited jurisdiction over the out-of-state electricity and attempts to sidestep conflict over FERC jurisdiction, it also must create a system that can cope with the inherent shortcomings of the electricity grid. Although ideally each electricity sale and purchase would be tracked to individual generators, this is simply not the case. Further, the grid expands past California’s borders, so ARB must impose a policy on a subset of emissions within a much larger system without any ability to “mark” or track the electricity back to its source.

Ultimately, the policy it put forth is one of comparative administrative efficiency in that the average emissions factor is relatively easy to determine and use for unspecified electricity. Other options would entail information and transaction costs of the system, and possibly more constitutional challenges. The ARB is left to determine whether it should choose an administratively efficient option for unspecified imported electricity that will likely sacrifice the environmental integrity of the cap or force a more difficult option on the system that could bring better accuracy in accounting for the unspecified electricity emissions. This is perhaps the most poignant example of the rough-edged solution that

163 See California Quick Facts, supra note 144.
results from the mismatched overlay of policy and the electricity grid under a national regime that is at a gridlock in climate change policy.

3. Other Options to Deal with Emissions from Unspecified Sources of Imported Electricity

ARB could instead choose from a few other options to deal with the emissions from unspecified imported electricity. These options include: 1. A high default emissions factor that is not tied to the spot market; 2. Regional emission factors that are tied to regional sources of electricity; or 3. A regional emissions factor that is tied to the highest polluting sources in the area.

First, ARB could choose to a set emissions default factor for all power imported instead of basing it on spot market prices.\(^\text{164}\) This number would still have to be high enough in order to avoid incentivizing dirty energy to be classified as “unspecified.” The California Energy Commission and California Public Utilities Commission supported this approach, and suggested a set regional default emission rate of 1,100 lbs CO2e/MWh, which would be eventually replaced by a value developed by the Western Climate Initiative.\(^\text{165}\)

Alternatively, ARB could choose a default emissions factor that was related to regional variations based on the resource mix or some other defined region, as reported on the North American Electricity Reliability Council E-tag.\(^\text{166}\) This approach seems ideal in that it would likely be more accurate in its ability to estimate the actual emissions from the generator. However, it is unclear how detailed the regional factor could be, given that the

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\(^\text{165}\) ARB, Presentation: Including Imported Electricity, *supra* note 164, at 20.

\(^\text{166}\) *Id.* at 22.
emissions are “unspecified.” If the electricity could at least be determined as originating from the Southwest or Northwest, then the emissions factor might be more accurate than a factor based on the spot market. This is especially true given the wide variation in generation sources between the Southwest and Northwest, and given that the large majority of the Northwest generation is primarily hydropower with no emissions, while the Southwest is largely coal, which is the dirtiest source of electricity.\textsuperscript{167}

Lastly, and possibly most importantly, ARB could utilize an approach which assigned a default emissions factor based on the emissions of the most polluting sources within a region.\textsuperscript{168} This is essentially assigning a high default emissions intensity that would incentivize specification of electricity imported into California for all sources that are cleaner than the dirtiest source in the region. It would act in the opposite manner of the chosen policy approach for unspecified electricity. Yet, this approach may invoke constitutional concerns because it would burden the unspecified out-of-state electricity that was not coal with the emissions factor of coal. Courts would likely see this as a direct discrimination against interstate commerce. Running through the Dormant Commerce Clause case law discussed \textit{infra}, the approach would possibly serve a legitimate local purpose of climate change and the integrity of the cap, but it could be adequately served by reasonable nondiscriminatory alternatives, such as those discussed previously.

D. The First Jurisdictional Deliverer Approach

Covered entities in the electricity sector for ARB’s proposed cap and trade regime are “first deliverers of electricity,” which chooses the point of regulation to be the first party responsible for putting electricity onto California’s grid.”\textsuperscript{169} This approach is applied to both importers of electricity and in-state entities, thus including all emissions consumed within

\textsuperscript{167} Hong & Slatick, \textit{supra} note 161.
\textsuperscript{168} ARB, Market Advisory Committee, \textit{supra} note 143, at H-54.
\textsuperscript{169} Proposed Regulation Order, Appendix A, § 95811(b).
California’s borders. Using a first deliverer approach ensures a higher level of environmental integrity, but may be implemented at the cost of administrative burden in defending against possible constitutional concerns. The first deliverer of imported electricity is subject to different thresholds for both specified and unspecified electricity under the proposed regulation vis-à-vis in-state generators. Application of the threshold is further differentiated between specified and unspecified electricity. As explained below, this may violate the Dormant Commerce Clause.

ARB is faced with a policymaking obstacle – AB 32 directs ARB to regulate all emissions from both imported and in-state sources. However, establishment of a threshold amount of emissions for imported electricity is extremely difficult. In-state sources are easily regulated under the threshold policy – after the generator emits the amount of the set threshold, it is covered under the cap and trade regime. For importers of electricity, the threshold becomes more difficult because importers of electricity often deal with many different sources of electricity. The threshold approach is simply not a good fit for the montage of electricity sources that California faces from its imported electricity. The boundaries of California and its cap and trade regime do not match the boundaries of the electricity grid, and yet the threshold approach ignores California’s boundaries and extends its jurisdiction to out-of-state generators. ARB chose an approach which focuses on the out-of-state generators’ total emissions, and which also may implicate the Dormant Commerce Clause. Ironically, California’s frustration with the national standstill on cap and trade policy might involve an area that the Supreme Court has interpreted to be left to national jurisdiction (Congress). Although the national level is failing, an attempt at the

170 CAL. HEALTH & SAFETY CODE §38505(m), §38550.
171 California’s Senate Bill 1368 also makes this threshold requirement easier, as it already established greenhouse gas emission performance standards for utilities. CAL. PUB. UTIL. D. 4.1 Ch. 3.
state level to proceed in the absence of national action is confronted with federalism concerns.

1. Covered Entities: First Deliverers of Electricity

The proposed regulation chooses its point of regulation to be the first deliverers of electricity. For electricity generated within California’s borders, the regulation would be applied to generators. For electricity generated outside of California’s borders but consumed within them, the regulation would apply to “electricity importers.” These entities include electrical distribution utilities that sell electricity to retail customers and marketers that buy and sell in the wholesale electricity market. First deliverers of electricity are responsible for deliveries of both specified and unspecified electricity delivered to the California grid.

The threshold for a generating facility in-state is 25,000 metric tons of CO₂ equivalent ("CO₂ e") per data year. For electricity importers of specified sources of electricity, the threshold is “based on the annual emissions of the electricity generating facility from which the imported electricity originated. The threshold for an electricity importer from a specified source which emits 25,000 metric tons of CO₂ e per year is zero.” ARB’s regulation sets the threshold for out-of-state unspecified sources of electricity at zero. ARB’s threshold for entities covered in-state and out-of-state is likely

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172 Proposed Regulation Order, Appendix A, § 95811(b).
173 Id.
174 Staff Report at II-12.
175 Id.
177 Id. at (b)(2)(B). The threshold for electricity importers of both unspecified and specified sources of electricity becomes zero starting January 1, 2015. This is because all natural gas fuel sources in-state are also covered under the regulation starting in 2015 such that all emissions from in-state electricity will also be directly or indirectly covered. Id. at (d)(2). This makes in-state and out-of-state electricity coverage in effect the same (though maybe not worded to look like they are applied the same).
178 Id. at (b)(2)(C).
not discriminatory *per se* but might be in its effects on interstate commerce. The basic framework for any infringements on the Commerce Clause follows.

1. Dormant Commerce Clause Analysis

The Commerce Clause in the Constitution states that: “[The Congress shall have power] To regulate Commerce with foreign Nations, and among the several States, and with the Indian tribes.” The Supreme Court has interpreted this to also mean that the Commerce Clause prevents states from taking actions which improperly burdens or discriminates against interstate commerce, even if Congress has not actually exercised its power in the area. This is to keep states from acting out of interests related to “economic protectionism.” The Court has created a two-tiered approach to state economic regulation. *Per se* invalid state statutes directly regulate or discriminate against interstate commerce. Where a state statute directly regulates or discriminates against interstate commerce, or when its effect is to favor in-state economic interests over out-of-state interests, [the Court] has generally struck down the statute without further inquiry. The statute will be invalidated unless the law “advances a legitimate local purpose that cannot adequately be served by reasonable nondiscriminatory alternatives.”

The Court employs a more flexible balancing approach if the statute only indirectly affects interstate commerce. Where the statute “has only indirect effects on interstate commerce and regulates evenhandedly, [the Court] has examined whether the State's interest is legitimate and whether the burden on interstate commerce clearly exceeds the

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179 U.S. Const. art. 1, § 8, cl. 3.
180 Oregon Waste Sys., 511 U.S. at 106.
182 Id. at 579.
183 Oregon Waste Sys., 511 U.S. at 100-01 (internal quotations and citations omitted).
local benefits.”\textsuperscript{184} In that case, the statute will be upheld “unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits.”\textsuperscript{185} Ultimately, the “critical consideration is the overall effect of the statute on both local and interstate activity.”\textsuperscript{186}

Here, the Proposed Regulation clearly regulates interstate commerce because it is admittedly regulating out-of-state emissions that are consumed in-state.\textsuperscript{187} Yet, it probably does not discriminate against out-of-state commerce \textit{per se}. The threshold for a generating facility in-state and a generating facility out-of-state are both 25,000 metric tons of CO$_2$e per year.\textsuperscript{188} Although the wording of the Proposed Regulation states that the threshold for specified sources of electricity which emits 25,000 metric tons of CO$_2$e per year is zero, the threshold is essentially the same for both in-state and out-of-state generators.\textsuperscript{189} There is no doubt that the threshold requirement imposes a burden on the regulated entity, as it puts that entity under the cap and trade system by which emissions are valued. Yet, California’s rule does cover imported, specified sources equally on the face in that both in-state and out-of-state specified sources are covered if they generate 25,000 metric tons CO$_2$e per year or more. Thus, although the regulation could be written in a less-discriminatory manner, it does not seem to discriminate \textit{per se} against interstate commerce.

Yet, if California’s regulation is seen as \textit{per se} discriminatory towards interstate commerce, then the state would have to put forward a legitimate local purpose that cannot

\textsuperscript{184} \textit{Id.} (citing \textit{Pike v. Bruce Church, Inc.}, 397 U.S. 137, 142 (1970)).
\textsuperscript{185} \textit{Pike}, 397 U.S. at 142.
\textsuperscript{186} \textit{Id.}
\textsuperscript{187} \textit{Staff Report, IV-8.}
\textsuperscript{188} Proposed Regulation Order, Appendix A, § 95812(b)(2)(A).
\textsuperscript{189} \textit{Id.} at (b)(2)(B). The threshold for electricity importers of both unspecified and specified sources of electricity becomes zero starting January 1, 2015. This is because all natural gas fuel sources in-state are also covered under the regulation starting in 2015 such that all emissions from in-state electricity will also be directly or indirectly covered. \textit{Id.} at (d)(2). This makes in-state and out-of-state electricity coverage in effect the same (though maybe not worded to look like they are applied the same).
adequately be served by reasonable nondiscriminatory alternatives.”\textsuperscript{190} Whether ARB has nondiscriminatory alternatives is questionable – it is difficult to construct a threshold regime for out-of-state generators that does not run afoul of the Commerce Clause. However, ARB could possibly instead establish a threshold focused on the amount of electricity that the out-of-state generator puts onto the California grid. The court’s analysis would turn on the availability of such nondiscriminatory alternatives.

Although unspecified imported electricity does seem to be treated differently than in-state sources in that there is a 0 metric ton CO\textsubscript{2}e threshold for them, it seems that the court would likely find that the threshold is advancing a legitimate local purpose that cannot adequately be served by reasonable nondiscriminatory alternatives. Because the electricity is unspecified, it is inherently impossible to impose any requirement on the specific generator creating that electricity.

Yet, although the threshold regulation will likely be seen as treating generation in-state and out-of-state evenhandedly, there could be indirect effects on interstate commerce from the way the threshold is applied. Electricity coming from specified, imported electricity could be given a higher burden in practice than in-state sources, assuming that not all electricity from out-of-state specified generators is consumed in California (thus the 25,000 metric tons CO\textsubscript{2}e threshold is counting emissions from that generator which are not covered under the cap). Hence, the total effect of that generator within the California market would be less than 25,000 metric tons of CO\textsubscript{2}e per year, but the electricity originating from that generator that is consumed in California would be covered.

This is perhaps made clearer by the following table on the threshold requirements.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Threshold: metric tons CO\textsubscript{2}e emitted</th>
<th>Threshold effect: metric tons CO\textsubscript{2}e/year emitted in California’s market</th>
</tr>
</thead>
</table>

\textsuperscript{190} Oregon Waste Sys., 511 U.S. at 100-01 (internal quotations and citations omitted).
In-state generator  | 25,000 metric tons CO₂e  | 25,000 metric tons CO₂e  
Electricity Importer: Specified Source Electricity from an out-of-state generator emitting 25,000 metric tons CO₂e outside of the cap  | 25,000 metric tons CO₂e  (becomes 0 metric tons CO₂e per year in 2015)  | >0 metric tons CO₂e  
Electricity Importer: Unspecified Source of Electricity  | 0 metric tons CO₂e  | >0 metric tons CO₂e  

Table 1: Thresholds for California’s proposed cap and trade program for in-state versus out-of-state generators.

For example, a generator located inside of California’s border that emits 24,000 metric tons CO₂e would not be subject to regulation under the cap and trade system. Yet, a generator located outside of California which exports electricity to California that results in 24,000 metric tons CO₂e but also contributes electricity within its own state that results in another 1,000 metric tons CO₂e would be covered. Although both generators contribute 24,000 metric tons CO₂e to California’s cap and trade system, the out-of-state generator would be regulated and the in-state generator would not. This effect is boosted by the fact that California’s regulation reads that the threshold for out of state, specified sources of power that emit more than 25,000 metric tons CO₂e is zero, while the threshold for in-state sources is stated as 25,000 metric tons CO₂e.\(^\text{191}\)

If the threshold requirements are seen as evenhanded and not \emph{per se} discriminatory, then the threshold requirements on out-of-state generation are likely to be upheld. The balancing approach for a regulation that has only an indirect effect on interstate commerce would be much more deferential to California. California’s interest in regulating emissions in order to mitigate climate change would likely be legitimate and the burden on interstate commerce probably does not clearly exceed the local benefits. There is still an issue with differential treatment of specified electricity from out-of-state generators because California

\(^{191}\) Proposed Regulation Order, Appendix A, § 95812(b)(2)(A).
could instead impose a 25,000 metric ton CO$_2$e threshold on the amount of electricity from that generator imported into California, but the more flexible balancing approach that the court uses for this effect on interstate commerce allows California considerable leeway in proving the burden on interstate commerce doesn’t clearly exceed the local benefits.

This is especially true in examining any protectionist concerns that are prevalent throughout Dormant Commerce Clause analysis. California’s regulation should be protecting some in-state entity from out-of-state competition in order to actually implicate the concerns of the Dormant Commerce Clause, and it is unclear whether in-state generation will actually benefit from the different thresholds and effects set forth in California’s Proposed Regulation. If generators of specified, imported electricity are able to show that the threshold’s effect makes them more readily included into the cap and trade program than California’s in-state generators, it is possible that they would have a case (though the flexible balancing approach of the Dormant Commerce Clause analysis would probably weigh against them). This would require data on how many generators in California are left out from the threshold versus those out of state generators left out. The entire analysis seems moot once all generation is encompassed starting in 2015 (though again, that threshold is worded and applied differently$^{192}$, its impacts seem to be applied equally to both in and out-of-state generators).

Regardless of the probability of success, ARB is clearly left to grapple with a messy solution at the outset while creating its cap and trade system. California has made it clear that it wants a cap and trade system of environmental integrity where all emissions that it consumes count under the cap, yet many of those emissions originate outside of the state’s

$^{192}$ The threshold for electricity importers of both unspecified and specified sources of electricity becomes zero starting January 1, 2015 in order to accommodate the full coverage of natural gas fuel sources in-state starting in 2015. This applies equally in that all emissions from in-state electricity will also be indirectly covered. Id. at (d)(2).
jurisdictional reach. Yet, the worth of any cap and trade program is not in the program itself, but its effects on emissions and the efficiency of its market. ARB must be able to ensure these effects are assured before implementing the program, which requires a great deal of caution and resources at the outset, but this is necessary in order to ensure the program has a chance at success in operating under a much larger electricity grid and national economy. The ultimate decision on policy requires a delicate dance to include out-of-state electricity within the purview of its proposed cap and trade system. Before ARB can even begin to determine the intricate details of its cap and trade system, it must first defend against constitutional concerns for its choice of threshold for coverage under the cap and trade system. This is valuable time lost—a sort of opportunity cost for administrators. The sub-regional system is inherently imperfectly overlain onto the nation’s regulatory, legal, and electrical system, and the policymakers are left to pay for this in time and resources.

E. Linkage with the Western Climate Initiative

Linkage to external greenhouse gas emissions trading systems is allowed under the proposed ARB regulation193 and the Initial Statement of Reasons states that the program’s design is meant to link to the Western Climate Initiative (“WCI”) in order to “create a regional market system.”194 ARB is especially interested in linkage to a regional cap and trade system because of its ability to reduce the risk of emissions leakage.195 The Western Climate Initiative is the strongest possibility for such linkage as it is the closest in proximity to California’s program, but it is not on track to be implemented by its current start date in 2015 in large part due to the Governor turn-over in many of the participating

193 Proposed Regulation Order, Appendix A, §§ 95940-43.
194 Staff Report, ES-1.
195 Id. at II-43.
states after the November 2010 elections. It currently involves seven “partner” states in the west, six “observer” states, four “partner” Canadian territories, one “observer” Canadian territory, and six Mexican states. 

This expansive regime would greatly enhance California’s administrative efficiency – the program would cover ninety percent of the region’s emissions.

1. WCI Overview

The Western Climate Initiative is a joint strategy of seven U.S. states and four Canadian provinces to reduce greenhouse gas emissions through 15 percent below 2005 levels by 2020. This greenhouse gas emissions reduction goal is derived from the sum of emissions goals of the partner jurisdictions. The WCI began with a Memorandum of Understanding in 2007 signed by the Governors of Arizona, California, New Mexico, Oregon and Washington establishing the Western Climate Initiative. The undertaking, if successful, would cover 19% of the total U.S. population and 90% of the total emissions located under the cap. It would operate as a broader program composed of individual cap-and-trade programs through state and provincial regulations. Each jurisdiction would issue emission allowances sufficient to meet its jurisdictional-specific goal, with the total

196 Western Climate Initiative, Program Design, [link].
197 Western Climate Initiative, WCI Partners and Observers, [link]. More information on the Western Climate Initiative is discussed infra.
198 Staff Report at I-5.
199 WCI, Program Design, supra note 196. (U.S. states are Washington, Oregon, California, Arizona, Utah, New Mexico, and Montana).
202 WCI, DESIGN SUMMARY supra note 200, at 3.
203 Id. at 5.
204 Id. at 6.
number of allowances adding up to the “cap” of the whole program.\textsuperscript{205} The program is set to begin on January 1, 2012 for the jurisdictions’ largest sources of emissions, including electricity and industrial sources, and to expand in 2015 to cover providers of transportation fuels and residential and commercial fuels, although it is not currently on track to hit either deadline.\textsuperscript{206}

2. Policies to Address Emissions Leakage

California and the WCI have largely the same approach to emissions leakage. WCI also intends to include electricity generated outside the cap but consumed within it to be included in the program through a First Jurisdictional Deliverer approach.\textsuperscript{207} WCI states that this choice was made because, “[d]ue to the interconnected nature of the electric grid, leakage of electricity emissions to jurisdictions or entities that are not part of the WCI is a significant concern that the First Jurisdictional Deliverer point of regulation is intended to address.”\textsuperscript{208} Also similar to California, the emissions from imported electricity would be divided into specified and unspecified imports. Unlike California, emissions from unknown sources would be determined through a default emissions calculator, where all generators in an area “are identified along with their recent historical emissions.”\textsuperscript{209} WCI’s proposed default emissions calculator would be calculated by using detailed information on many factors including generator types, capacities, quantities of fuel consumed, and net generation produced.\textsuperscript{210}

\begin{itemize}
  \item \textsuperscript{205} Id.
  \item \textsuperscript{206} Id. at 8.
  \item \textsuperscript{207} Id. at 15 (this is the same approach California is using for its cap and trade program).
  \item \textsuperscript{208} WCI, DESIGN RECOMMENDATIONS, supra note 75, at 22.
  \item \textsuperscript{209} WCI, DESIGN SUMMARY, supra note 202, at 16.
  \item \textsuperscript{210} WCI, DEFAULT EMISSIONS CALCULATOR – ANNOUNCEMENT AND DESCRIPTION 2 (2009). The default emissions factor is derived by assigning facilities to either a marginal or non-marginal category. It then divides total emissions by the total net generation of all marginal sources. Id. Plants are considered non-marginal if they are Combined Heat Power units or used renewable energy sources.
\end{itemize}
3. Emissions Leakage Effects in the WCI

Currently nearly all coal-fired power within the WCI region is specified, but similar concerns of California’s cap-and-trade system are expressed in the WCI that coal-fired power could find incentives to become “unspecified” if the deemed emissions factor for unspecified imported power is closer to natural gas emissions. Indeed, WCI admits that “even under the best regulatory strategy, it may not be possible to guarantee that currently specified coal generation will remain specified power in the future.” Undoubtedly, the larger spatial coverage of the system would certainly reduce emissions leakage concerns—to the extent that the states can incorporate a cap and trade system into their own legislative system. However, despite the efforts of WCI, its prospects for a full-scale program start in 2012 seem to be dwindling.

Id. Fossil fuel-based plants (non-CHP) are considered marginal only if their capacity factor was below 60%. Id.

211 WCI, ELECTRICITY LEAKAGE ANALYSIS, supra note 32, at 15.

212 Id. Although implementation of WCI would greatly reduce emissions leakage concerns of California in relation to its own cap and trade program, some economists have found that leakage of emissions in the electricity sector under WCI is still a “significant concern.” JAMES BUSHNELL & YIHSHU CHEN, REGULATION, ALLOCATION, AND LEAKAGE IN CAP-AND-TRADE MARKETS FOR CO2, 3 (2009). An analysis performed for the WCI found that 16% of the energy produced by generators within WCI jurisdictions use coal, but over 50% of non-WCI generation is expected to come from coal. WCI, ELECTRICITY LEAKAGE ANALYSIS, supra note 32, at 10. See Figure 6, Appendix. Further, imported electricity is expected to account for 26% of the electricity sector’s emissions under the WCI cap. Id. at 14. This is a significant portion or the electricity, and could indicate the ability for outside sources to increase the amount of generation imported under the cap if prices of electricity under the cap are high enough. However, a report performed for the WCI found very limited ability of increased operation of coal generation, as those units are already operating at full capacity. Id. at 34. Some leakage could occur through natural gas generation, but that could be mitigated by providing a deemed emission rate at or just above the emissions intensity of an average natural gas plant. Id.

4. WCI: Conclusion

WCI has the potential to implement a large, regional cap and trade system with a much broader coverage than RGGI. Yet, the program could be undermined by its goal of creating a larger, more inclusive cap because the several states involved may not be able to instigate cap and trade legislation in time for the WCI program to be put into place by 2012. The sheer effort that has already been put into the WCI exemplifies the difficulty of getting a program that expands over state boundaries into place – it began in February, 2007 and seems to be well off its timeline to be implemented by 2012. The excessively long planning period exemplifies the difficulty and disconnect between executive aspirations and administrative implementation. Yet, the time and effort spent to manage emissions leakage under the WCI seems to be lessened because of the broader coverage, and the WCI’s emissions calculator used to determine the default emissions factor for unspecified, imported electricity seems to be a more accurate and efficient tool than California’s approach. Regardless, if WCI is eventually put into place, it would clearly be a success for climate change legislation in the United States and could be as close to a solution for emissions leakage that California can get. Aside from Nevada, which remains an observer state in the WCI, every other state directly adjacent to California would theoretically be involved in the WCI. Yet, California cannot rely solely on linkage to the WCI as an emissions leakage solution because progress on implementation of the WCI seems to be stalled. It is also not clear whether Nevada will continue to hold out on joining the WCI as a partner, so California will have to construct its cap and trade policy with concerns for emissions leakage regardless of current WCI standings.

F. ARB Cap and Trade Proposal: Conclusion

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214 WCI Partners and Observers, supra note 197.
A discussion of the advantages and disadvantages of ARB’s policy choices to attack emissions leakage in the electricity sector cannot escape a broader, more basic question: Should these measures even be considered at the beginning of ARB’s policymaking process for its cap and trade program? It is unclear how much emissions leakage will actually occur in California under a cap and trade policy, but California’s use of precaution in proceeding will likely be rewarded in the future under the program. Especially because there is considerable uncertainty surrounding the amount of possible emissions leakage in the future and surrounding the possibility that the Western Climate Initiative will become a reality in the future, California’s policymakers should use precaution to guide them in balancing between the administrative resources used upfront against the integrity of the program and emissions reduced in the future. This is made even more complex in that the “costs” associated with emissions leakage include environmental integrity of the cap, on which it is difficult to place a monetary value. Ultimately, ARB must determine how important it is to its sub-national cap and trade market to devote time and administrative costs now for a problem that might never be a true cost to the policy. In this case, a messy climate change problem is approached with a wicked solution. Yet, California has a unique opportunity that RGGI and the WCI were not able to take advantage of – it is composed of only one state’s legislature that has already given it authority to create a climate change program, coupled with an order to include imported electricity. RGGI and WCI are plagued with the problem of coordinating multiple state legislatures into agreement for the program, which is likely a big reason why RGGI ended up using a wait-and-see emissions leakage policy, and why the WCI is nowhere near meeting its timeline.

Thus, ARB is smart to utilize the power it has in implementing a program within only one state’s borders and cautiously create a program that, as best as ARB can, works to correct emissions leakage from the beginning.
VIII. CONCLUSION

International negotiations have failed to deliver any meaningful reduction in greenhouse gas emissions, but the world agrees that climate change is absolutely a pressing issue that must be addressed. Sub-national programs that are implemented in the face of these stalemates are faced with significant cost-effective hurdles to the imperfectness of the programs’ coverage. In the face of such efficiency hurdles, sub-national policymakers have to brace for significant administrative resources invested in the beginning of creating such programs in order to ensure the program’s environmental and structural integrity is not compromised. The quantity of administrative resources used at the outset is tempered by the judgment of policymakers, and the delicate balancing of administrative efficiency and environmental integrity must be acknowledged and discussed by policymakers.

Although RGGI chose not to use precaution and invest significant resources in relation to emissions leakage issues, it has survived due to an extremely low price on carbon (and also gambled on a better, more efficient national scheme). Perhaps the better method is to instead adopt something similar to California’s approach, which utilizes precaution and extensive administrative resources to proactively plan for emissions leakage at the outset of the program in order to prevent the need for an overhaul of the program once in operation. The significant obstacles involved – tracking electricity, carefully stepping around FERC’s wholesale power authority, and incorporating imported electricity into the program – are all unfortunate consequences of overlaying a cap and trade program on top of an extremely interconnected national electricity grid, and California exemplifies the intricate difficulties in enacting a policy that can navigate around each obstacle without a legal challenge. By highlighting the need for significant administrative resources upfront, the precaution requisite in balancing administrative resources against environmental
integrity, and the possible consequences of a passive versus proactive approach to emission leakage for being ineffective, this paper attempts to help guide policymakers as they struggle through the process of creating sub-national cap and trade programs.

The ability of policymakers to translate a sub-national cap and trade program into an enforceable, effective policy that can operate within a national economy will largely depend on the way that they are able to assess and incorporate such guidance into the cap and trade program.

Lastly, it is important to note that these policies, whether flawed or not, are leading the way for other entities to learn from and create their own cap and trade programs, and this in itself is valuable. Perhaps it is this benefit that makes the administrative resources lost and inefficiencies created from creating an “imperfect” regulatory scheme valuable to society. It is indeed the pioneers that must cover the rockiest ground and break the most axles before the population can follow their path. Here, sub-national policymakers mapping their cap and trade programs onto a subset of the United States’ economy seem to be just as bravely forging such a path, no matter the efficiencies lost or emissions reduced.
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APPENDIX

Figure 5. Monthly generation in California by fuel type in 2009 on the spot market. CALIFORNIA ISO, ANNUAL REPORT ON MARKET ISSUES AND PERFORMANCE 2.11 (2010).

Figure 6. Differences in fuel type by 2020 in WCI and non-WCI jurisdictions, demonstrating the opportunity for emissions leakage under the WCI cap. WCI, ELECTRICITY LEAKAGE ANALYSIS SUMMARY REPORT 11 (2009).