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State and Regional Comprehensive Carbon Pricing and Greenhouse Gas Regulation in the Power Sector under EPA's Clean Power Plan

Summary of a Workshop Hosted by the UC Davis Policy Institute, Resources for the Future, and Next 10
November 21, 2014 | Davis, California

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RESOURCES FOR THE FUTURE

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Abstract

The Clean Power Plan (CPP) is the centerpiece of the US efforts to reduce carbon emissions, introducing regulation of greenhouse gas emissions from existing power plants for the first time on a national basis. These regulations may interact with existing initiatives, for example, in California, where the state has a comprehensive economy-wide cap with emissions allowance trading in place. In addition, three Pacific coast states and British Columbia have supported the idea of comprehensive pricing. This paper provides a summary of a workshop that examined the interaction of these policy approaches. A main observation in the workshop was that the forthcoming CPP will likely facilitate and complicate the prospect of comprehensive carbon pricing. Multistate coordination in complying with the CPP could be key to making simultaneous progress on both the national and regional policy efforts and could provide a pathway from regulation to carbon pricing.

Key Words: Clean Air Act, Clean Power Plan, carbon pricing, cap and trade, regulation, emissions rates

JEL Classification Numbers: Q28, Q48, Q58

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1. Motivation

1.1. Description of the Workshop

On November 21, 2014, the University of California–Davis (UC Davis) Policy Institute, Resources for the Future (RFF), and Next 10 hosted a workshop in Davis, California, to identify interactions between the US Environmental Protection Agency's (EPA's) proposed rule to reduce carbon emissions in the electricity sector and comprehensive (economy-wide) carbon pricing among the three Pacific coast states and British Columbia, as envisioned by the Pacific Coast Climate Alliance (PCCA).

The 38 participants in this workshop included regulators from Washington, Oregon, California, and Nevada, regional EPA officials, nongovernmental organizations, and academics. The workshop was held under the Chatham House Rule, meaning that participants are invited to share insights that were learned during the workshop, not to attribute statements or information to individuals. This paper offers a summary of the highlights and range of discussion in the workshop. No attempt was made to achieve a consensus view.

1.2. Motivation for the Workshop

The motivation for the workshop was twofold. First, it was to explore whether the Clean Power Plan (CPP), EPA's proposed rule developed under Section 111 of the Clean Air Act, might facilitate or complicate the further introduction of a carbon price in the Pacific states. This

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motivation arises because a comprehensive carbon price would likely be the most economically efficient and environmentally effective approach for reducing carbon emissions. Various steps taken among the four jurisdictions have begun to pave the way for comprehensive carbon pricing. This effort could provide a model for the nation and internationally. Consequently, workshop participants were motivated to explore whether the CPP would advance or erode this effort.

The second motivation, closely related to the first, was to identify steps that could be taken toward multistate coordination in complying with the CPP and look at how this coordination might advance comprehensive carbon pricing. Comprehensive carbon pricing could imply a uniform economy-wide carbon price among the Pacific Coast jurisdictions, but PCCA describes an incremental process of maintaining existing pricing policies and expanding those policies over time. The workshop was meant to initiate a dialogue to inform state efforts to comply with the CPP while enabling progress on carbon pricing. The purpose of the workshop summary is to provide feedback to states in the development of their compliance plans and EPA in the development of its final rule. State regulators and EPA officials are the primary intended audience for this paper.

1.3. Summary of Main Observations

This paper highlights three main observations that were evident in the workshop:

- First, the forthcoming CPP will likely facilitate *and* complicate the prospect of comprehensive carbon pricing, with the net effect depending on future decisions by EPA and the states. Facilitation may result by introducing requirements on electricity generators throughout the entire western region of the United States to reduce carbon emissions. Because the Pacific Coast jurisdictions are closely linked to other western states in the power grid and are net importers of power from other western states, the Pacific Coast jurisdictions cannot pursue environmental policies without considering the interaction of those policies with their neighbors. The CPP introduces obligations and invites coordination on a multistate basis, which could help the Pacific jurisdictions achieve greater emissions reductions. However, the policy choices that might be made to comply with the CPP may introduce regulatory frameworks that would detract from the use of pricing mechanisms.
- Second, the degree and type of collaboration that jurisdictions pursue in response to the CPP may determine the likelihood of a future comprehensive carbon price in the West.

The ideal form of collaboration for compliance with the CPP that facilitates a comprehensive carbon price is not initially obvious. In this setting, a potential path forward may be for states to align their policies incrementally over time.

- Third, additional analytical and legal questions were identified that could usefully inform the decisions of the states and the intent of the workshop participants that collaborative strategies would be available for ensuring that the CPP facilitates the prospect of a comprehensive carbon price. We identify many of those questions in this workshop summary.

2. Background

2.1. Prior Collaboration

2.1.1. Conventional Pollution

States across the United States have a history of cooperation on management of conventional pollutants such as emissions of nitrogen oxides and sulfur dioxide. Due to its north-south geography, the Pacific Coast states and British Columbia share little cross-border exposure to air pollution, but the region does share economic markets and an important transportation corridor, so coordination of air quality management is important to achieving air quality goals. Second, because these jurisdictions share a similar geography and resource base, the experiences in one jurisdiction can help guide policy in neighboring jurisdictions. At a regional level, concerns about regional haze and visibility in national parks precipitated a multistate approach to deal with air quality issues. Workshop participants pointed to that experience as a basis for a relationship among technical experts in state agencies throughout the West, who also will be charged with developing compliance plans for the CPP.

2.1.2. Western Power Markets

The workshop placed an emphasis on the interconnected nature of power markets throughout the western states as an overarching issue for compliance with the CPP. The Pacific Coast states import a substantial fraction of their power from other western states. Power generated along the Pacific Coast tends to have relatively lower carbon intensity than power generated in the rest of the West. Prior policies to limit emissions associated with electricity consumption in the Pacific Coast have had to anticipate the emissions associated with power imports. This has been most explicit in California, which enacted regulation that was subsequently enshrined in legislation to prohibit new long-term contracts from power plants that

had carbon dioxide emissions rates that were greater than natural gas combined cycle units. To some degree, this policy is likely to have led to a reshuffling of resources so that financial arrangements would direct lower-emitting units to the California market while coal-fired generation would be directed to other states. However, the legislation also affected the investment climate throughout the region, working to the disadvantage of new coal plants.

The introduction of a price on carbon emissions associated with the electricity sector in California under the state's cap-and-trade program includes explicit consideration of emissions associated with power generated outside the state. The state places an obligation for complying with the program on the entity that first delivers power onto the grid in the jurisdiction. Power from out of state is brought into the state by parties that are licensed to put power onto the grid, and these parties are subject to the regulation. The state has developed a protocol for assigning an emissions rate to these power imports and an associated compliance obligation. This *first jurisdictional deliverer* requirement is another way that the states are explicitly linked by environmental policy in other states.

Workshop participants pointed to the development of renewable generation throughout the Pacific Coast states and other western states as presenting another coordination challenge in the region. Although renewable sources are prominent throughout the West, they are most prominent along the Pacific Coast. To varying degrees, the several states that impose renewable performance goals on their retail local distribution companies also impose limitations on the geographic source of renewable generation. The strongest requirement, in percentage terms, is in California, where qualifying renewables are sorted into bins describing their geographic location and a substantial portion must be located in the state. This requirement has earned some disaffection from investors in other states who feel they are unfairly excluded from the California market. Clearly the requirements of the CPP to accelerate the introduction of renewables on a regional basis will interact with these regional limitations. Moreover, efforts among states to coordinate in complying with the CPP may have to address this issue also.

2.1.3. Carbon Pricing

Efforts to introduce carbon pricing have a beginning in the Western Climate Initiative (WCI), which at one point had the involvement of seven states and four Canadian provinces in a regional effort intended to design a functioning cap-and-trade program. Changes in political leadership and other events took the WCI into a mostly dormant phase currently, although it still is the platform for active cooperation between California and Quebec in their linked cap-and-trade programs. British Columbia, meanwhile, turned to a carbon tax as a way to introduce a

price on carbon emissions. The programs in these three jurisdictions are among the most stringent and comprehensive in the world.

The PCCA portends a broadening carbon pricing beyond California and British Columbia to include Oregon and Washington, and suggests coordination between efforts to price carbon along the Pacific Coast. Moreover, the PCCA calls for linkage among carbon prices along the Pacific Coast, where possible, for consistency and predictability (Pacific Coast Climate Action Plan 2013). Oregon and Washington have a spectrum of carbon pricing models to choose from, with cap and trade on one end of the spectrum and a carbon tax on the other. These states might link with similar existing programs (cap-and-trade programs in different states may accept each other's allowances, and tax programs in different states may equalize rates), or they may find a way to integrate efforts between trading and taxing approaches. For example, one participant at the workshop suggested that one of the states might adopt a carbon tax that was explicitly calibrated to the auction outcome in the cap-and-trade programs. However, these states may also pursue only a limited form of coordination. The outcome of the PCCA remains quite unclear.

New compliance obligations under the CPP influence the efforts of the Pacific Coast Climate Alliance. The structure of policies to achieve compliance with the CPP could move the jurisdictions toward or away from carbon pricing. However, the jurisdictions also are aware that the obligations on their neighboring states under the CPP will close the distance between themselves and their neighbors with respect to carbon mitigation policies. This may make their leadership efforts somewhat less daunting.

2.2. The Clean Power Plan

The CPP poses several design questions to the states. The decisions that states make will affect the degree of regional coordination and the ability to move forward with comprehensive carbon pricing.

2.2.1. Decisions Facing States

2.2.1.1. Targets in Rate or Mass Terms

Under the CPP, EPA has assigned each state an emissions rate target (carbon intensity target) expressed in tons per megawatt-hour (MWh). The target is calculated based on four "building blocks" that EPA uses to characterize the opportunity for emissions reductions in a state's electricity sector: (1) the opportunity for increased efficiency at existing coal-fired units, (2) more effective use of existing natural gas combined-cycle units, (3) expanded renewable

generation, and (4) ramping up of energy efficiency programs. However, the building blocks are not central to states in deciding how to comply with the CPP. State obligations are directed only at the emissions rate target that results from this calculation, and a state may decide to emphasize efforts in one or another domain or to pursue options that are not included explicitly, such as cofiring of biomass at coal-fired power plants or improvements in the transmissions and distribution system.

States have a choice about how to demonstrate compliance with the CPP—that is, they can choose what should be the metric on which they are evaluated. States can decide to comply by achieving their assigned emissions rate target, or they can translate their emissions rate target into a mass target (an emissions budget) expressed in total tons. Translating intensity into mass targets is conceptually straightforward; one could project future MWh and multiply by intensity targets in order to arrive at mass values. However, future MWh of generation could be estimated in a variety of ways, and there is uncertainty regarding which methods for translation EPA would accept from a state. EPA has provided additional guidance, but much uncertainty remains. Several participants at the workshop encouraged EPA to clarify this issue further in its final rule.

2.2.1.2. Choice of Policy

A state's choice of policy or policies to achieve compliance in principle is independent from its choice of method to demonstrate compliance. For example, a state might choose to use a tradable emissions rate performance standard to achieve its emissions rate target. Or it might choose to use other policies to achieve its emissions rate target. Similarly, the state might decide to comply with a mass-based target, and it could choose to use one policy or a variety of policies, including cap and trade, to achieve this emissions outcome. EPA grants states wide discretion in choosing policies, meaning states have a rich palette of policy options at their disposal that includes, inter alia, cap and trade, emissions taxes, emissions rate averaging or trading, integrated resource planning, and portfolios of technology support policies. EPA requires that each state's plan identify which policies it intends to use to achieve its target, as well as corrective measures it will employ as a backstop if policies fail to keep the state on track toward its target.

Importantly, state's policies will interact with one another in two ways. First, state policies may interact in their compliance obligations. For example, a state can claim credit only for energy efficiency measures that lead to emissions reductions from generators located in that state. However, if states enter into multistate agreements, there would be methods for the group of states to claim credit for more of the aggregate emissions reductions achieved through energy

efficiency. Some participants observed that a region-wide cap-and-trade program would capture all of the reductions achieved within the regional coalition.

Second, state policies will interact through the regional power market. Differences in state emissions rate standards, and the choice of whether to use an emissions rate policy or mass-based policy to achieve compliance, will affect the relative economics of operation and investment of the electricity systems in neighboring states. Moreover, individual states or companies might see a strategic advantage in the choice of one or another of these policies.

2.2.1.3 Joint or Separate Plans

States also choose whether to submit a multistate plan, written in conjunction with other states, or an individual state plan in order to comply with the CPP. If a multistate plan selects a rate target, it appears EPA would require that a weighted average intensity target would apply for that region, although this may be changed in the final version of the rule. Participants at the workshop observed that this appears to introduce a significant disincentive to multistate cooperation around an emissions rate policy, because the regional average rate target would inevitably be more stringent than the standard facing some individual states if they acted alone. Consequently, those states would have a disincentive to enter into a regional effort absent some other concessions.

Further, the emissions credit value is self-contained within the power sector under a rate-based system. Facilities that are dirtier than the standard pay for credits produced by facilities that are cleaner than the standard. This could lead to a flow of credit value among states.

It was also observed that if an individual state were to abandon the regional effort late in the planning process, it would force a recalculation of the regional standard and affect the adequacy of state and company planning efforts up to that point. In general, while rate-based standards appeal to some jurisdictions as a stand-alone option, they appear to create more challenges and uncertainty as a regional compliance approach.

In contrast, a mass-based approach may be more easily implemented on a regional basis. Each state would effectively bring its emissions budget with it to the regional process if it was joining a multistate compliance plan. And if a state decided to leave the multistate effort late in the planning process, it would take its budget with it and the budget for the remaining states would be automatically adjusted. This was the process observed when New Jersey left the Regional Greenhouse Gas Initiative.

2.2.1.4. Formal Linkage or Linkage by Degrees

Formal linkage refers to exchange of compliance units (allowances from a cap-and-trade or rate-based trading program, or credits from renewable portfolio or energy efficiency standards), while linkage by degrees refers to the process of incrementally aligning climate policy and other air pollution and energy policies that may or may not result in formal linkage. Both modes of linkage have unique benefits and costs, but linkage by degrees can achieve many of the benefits typically associated with formal linkage with arguably fewer costs (Burtraw et al. 2013; Mansell and Munnings 2013). States face a choice in the degree to which they wish to coordinate, from initial forms of collaboration (such as harmonizing monitoring of emissions, for example) to advanced forms of collaboration that include actual trade of allowances or credit.

2.2.1.5.State or Utility Approach

Participants at the workshop envisaged two approaches to compliance with the Clean Power Plan, one driven by states and another driven by utilities. More accurately, it may be that one approach places the compliance obligation entirely on the states, while the other approach places it on the emitting facilities. While most of the discussion focused on a state-based approach, there was also consideration of a utility-based approach.

One form that a utility regulation approach might take is for the emissions rate target assigned to a state to be devolved to the generation companies operating within the state. Another approach might introduce an emissions price or cap-and-trade system on generators within a state or power pool. A proposal along these lines was suggested by a midwestern generation company in 2014 that would have levied a charge per unit of emissions on generators, and that revenue would have been distributed to local distribution companies to offset the price impact for consumers. The logic of this approach appeared to be driven by the idea that one way or another, the revenue would stay within the electricity sector. Discussants considered that a state could direct the revenue to specific purposes, such as strategic energy investments or energy efficiency. Proposals that place compliance at the level of utilities hold promise but also bring novelty that may require additional analysis.

2.2.2. Decisions Facing EPA

EPA. Additional uncertainty comes from the difficult coordination problem among states when a wide spectrum of design options is available. The resulting uncertainty stymies current conversations about multistate collaboration and complicates states' individual approaches to comply with the Clean Power Plan.

One key and potentially pivotal design decision that EPA faces is how to treat new fossil sources. This is especially relevant to the role played by new natural gas. A somewhat dominant view was that the relevant portion of the Clean Air Act is intended to address existing sources only, so new facilities would be excluded. This would give new facilities an advantage, especially if a state used a mass-based approach, because the new facility would not have to acquire an emissions allowance. Some participants expressed the opinion that states could choose to include new sources under a mass-based system but may not be compelled to by EPA.

However, there was also substantial sentiment that EPA could regulate new sources along with existing sources, as was apparently attempted in the proposed Clean Air Mercury Rule. Inclusion of new sources would give them an advantage in states that use an emissions rate approach, because in most states the emissions rate of a new source is below the state's target.

2.2.3. Multistates Collaboration Is Essential to Achieving EPA's Goals

A widespread opinion at the workshop is that whatever form state policies take, it is essential to the goals of the CPP that states enter into multistate collaboration. This would be expected to reduce the costs of compliance for companies and consumers and ease the administrative challenges faced by states.

Advocates of comprehensive carbon pricing also felt that multistate collaboration under the CPP provides a substantial opportunity for realizing their goal. If states join into multistate efforts, it will reconcile differences in policy approaches and make it easier to envision how comprehensive carbon pricing could expand throughout the Pacific Coast states and potentially to a broader region.

The CPP provides several incentives for multistate collaboration. This can be a mechanism to make sure that states realize full credit for energy efficiency investments and renewable energy policies. Most importantly to states, they would be granted up to two extra years to develop compliance plans if they enter into multistate efforts.

However, participants emphasized that states may require additional motivation and assistance from EPA in order to pursue multistate collaboration in reaction to the CPP. Without modification, the proposed CPP contains complexities for states trying to collaborate, which must be sorted out by staff that may already be strapped for administrative resources.

2.3. Threading the Western Needle: Clean Power Plan Meets Carbon Pricing

2.3.1. Motivation for Importance of Pacific Coast States

The long-term establishment of a comprehensive West Coast carbon price would represent a major accomplishment in policy collaboration, with national and international relevance. However, each state must comply with the CPP in the short term.

States are in the situation of pursuing two objectives over different time horizons and with different industrial scope. In the short term, Pacific Coast states must comply with the CPP, while in the long term, they are striving to facilitate a long-range comprehensive carbon price that would likely extend beyond the power sector. In the context of the CPP, as with the introduction of carbon policies generally and carbon pricing in particular, jurisdictions that take actions engage the risk that they are introducing costs that put their industries at a competitive disadvantage relative to jurisdictions that do not take similar action. Multistate coordination can help solve this problem. Careful collaboration under the CPP might facilitate greater coordination and increase the odds of a West Coast carbon price emerging.

From the workshop discussion and the authors' perspectives, there are several possible outcomes among the states:

1. States may decide not to collaborate. Then, whether states choose to introduce a price on carbon would be a decision at the state level, but it would have to evolve in what may be a Balkanized setting in the power sector.
2. States may align their CPP plans in a way that facilitates short-term compliance, without using these plans to pursue intentions to form a comprehensive carbon price in the long term.

The risk of both these first two approaches is that policies could be adopted that make the ultimate coordination and introduction of comprehensive pricing more difficult. For example, if a state or region adopted an emissions rate compliance plan, this may be difficult to unwind if the state wants to adopt carbon pricing later.

3. States may wait to form a carbon price but align their plans in the short term in a way that facilitates the introduction of carbon pricing emerging in the future.

For example, states might decide to adopt mass-based approaches that could enable cap-and-trade covering electricity generation in the short term, leaving open the possibility for more comprehensive policies affecting all sectors in the long term.

4. Carbon may be priced regionally at sources not covered by the CPP (transportation, industrial, and/or agricultural sectors). This could be independent of whatever mechanism is used for compliance with the CPP.

Coordination of this approach would be more difficult, given that California has already implemented comprehensive pricing in an integrated way across all sectors of the economy. States outside of California would have to reconcile the fact that their carbon price would be at least indirectly linked to electricity emissions in California through California's existing cap-and-trade program.

5. Carbon may be priced regionally in the electricity sector through state plans submitted to comply with the CPP.

A variety of policy approaches that introduce formal or informal prices on carbon are available to states. One of these would be cap and trade, which is viewed as "self-correcting" in that it would automatically achieve the mass-based goal. An emissions tax could also be used, but the state's plan would need to describe the contingency measures the state would enact if the tax proved insufficient.

2.3.2. The Prospect of Collaboration across the West

One question posed by a workshop participant was whether coastal states could present a meaningful coalition in terms of influencing broad regional outcomes. Given that they import a substantial amount of power, coastal states may earn an opportunity to influence multistate collaboration with other states throughout the West. A regional western collaboration brings the potential to limit emissions leakage and improve the cost-effectiveness of mitigation in comparison with scenarios without western collaboration. Whether the CPP facilitates or complicates the prospects of carbon pricing on the coast and perhaps in the West depends on the actions of all the western states and EPA in the coming months and years.

3. Advantages of Collaboration under the Clean Power Plan

Workshop participants described several advantages to collaboration under the CPP:

- Environmental effectiveness. Coordination across states would be expected to help mitigate the potential for emissions leakage by shuffling electricity generation to states with higher emissions standards. It could also help avoid leakage associated with accounting for the contribution of renewable energy investments.

- Cost-effectiveness. Differences in the opportunities and costs of achieving emissions or emissions rate reductions will vary across states, presenting an opportunity to reduce joint costs and perhaps share the cost savings.
- Politically durable policies and processes. The process of multistate collaboration will build relationships and technical expertise, which should help states achieve broader environmental goals, such as compliance with other provisions of the Clean Air Act. And, in turn, these relationships fold back into helping identify broad regional approaches to reducing emissions.
- Reliability of the electricity grid. Regional collaboration is expected to improve planning in electricity power markets, which in every case except Texas involve many states.
- Simplicity. Multistate collaboration is likely to simplify the compliance process. This is especially true under a mass-based approach, which may offer substantial administrative advantages to state agencies and regulated parties.

4. Does the Clean Power Plan Facilitate or Hinder a Coastal Carbon Price?

4.1. A Constraint Limiting States' Design Choices

The CPP narrows states' options for policy design in the short run, as it imposes specific compliance obligations. Workshop participants counted three specific ways that the CPP complicates the prospects of a West Coast carbon price:

First, the CPP may temper states' appetite to expand their carbon trading markets to other sectors and to other allowance and credit markets because it targets only the electricity sector. For example, if jurisdictions were to introduce economy-wide cap and trade, then emissions allowances could flow freely among sectors and sources not covered by the CPP. Demonstration of compliance with the CPP in the electricity sector would not be guaranteed by its coverage under the emissions cap because allowances could flow into the sector, which may consequently raise its emissions and leave the state noncompliant with the CPP.

Second, the CPP could present obstacles to the development of comprehensive policies if it led to policies in the electricity sector that could not be integrated with other sectors. For example, an emissions rate standard is denominated in tons per MWh, but this metric would not automatically apply to other sectors.

Third, the CPP may lead states to adopt inconsistent approaches to compliance. For example, one state might adopt a rate-based policy and a neighboring state might adopt a mass-based policy that could not be linked. This different architecture would make comprehensive carbon pricing that reached across both states difficult to achieve.

4.2. A Rising Tide: Forcing States to Make an Effort

At the same time, the CPP may also expedite progress of a West Coast carbon price (or other forms of collaboration) by forcing all states to make some minimum level of effort. There are at least three reasons why this might be true:

First, the CPP offers large administrative incentives and economic efficiency gains from multistate coordination. This provides an opportunity for states to build relationships that could lead to more expansive policies.

Second, the CPP offers a political moment during which state regulators can craft agreements on how to treat other sources of pollution beyond electricity generators.

Third, the CPP offers a strategic moment where state regulators can synergize climate with other air policies, including the regulation of SO_2, NO_X, and ozone.

5. Strategies to Increase Collaboration

Workshop participants felt that collaboration among the states was important to both policy frameworks—the CPP and comprehensive carbon pricing. It appeared clear that a failure of states to collaborate under the CPP would undermine efforts to do so with comprehensive carbon pricing. However, it was not obvious to workshop participants that state collaboration would be viewed as desirable by many states. Hence, attention focused on ways that multistate collaboration and regional planning could emerge under the CPP.

5.1. Navigating Design Choices

5.1.1. Rate versus Mass Compliance Target

Rate- and mass-based targets offer different advantages and disadvantages. For example, a rate-based approach does not have an absolute cap on emissions. This would automatically accommodate economic growth or further electrification of the economy. Moreover, a rate-based approach avoids the need to translate targets into a mass value. On the other hand, an absolute cap on emissions sends a clearer signal for investors and guarantees a certain level of emissions. Rate targets have also been criticized as being more vulnerable to imperfect measurement of

energy efficiency impacts and of inadequately reflecting the cost of carbon in wholesale electricity prices (Fowlie et al. 2014).

5.1.2. Choice of Compliance Policy

The choice of the type of target is suggestive of the choice of policy that is used to achieve the target. For example, a rate-based target is suggestive of a tradable performance standard approach for compliance, and a mass-based target is suggestive of cap and trade.

Under EPA's proposed rule, states that choose a tradable performance standard could complicate efforts toward multistate collaboration in at least two potential ways. First, insofar as a tradable performance standard (TPS) allows for states to trade renewable and energy efficiency credits, it requires complicated and likely inaccurate accounting for emissions reductions. Workshop participants expressed considerable concern that measuring the contribution from energy efficiency is difficult and practices vary across states. Second, inefficiencies arise if an integrated electricity market includes both states using a TPS and states using a cap-and-trade program, because the two approaches may impact wholesale electricity costs in different ways, depending on how the emissions allowances under cap and trade are distributed. Such a mix could both increase costs and reduce emissions abatement relative to a situation where a coordinated regulatory approach is adopted by all states sharing a power market (Bushnell et al. 2014). States can adopt particular strategies, such as the allocation of emissions allowances through output-based updating that mimics the production incentive of the TPS, or they could use allocation to achieve other outcomes, such as promotion of specific technologies (Fischer 2003; Burtraw et al. 2015).

Choosing a cap-and-trade program would simplify many of the complexities states would face under a TPS approach (Fowlie et al. 2014). A carbon tax would behave similarly to a cap-and-trade program, but both approaches come with the drawback of having to project emissions and MWh, respectively, to ensure compliance with a rate-based target. Matching a cap-and-trade program with a translated mass-based target may minimize this trade-off. In that case, a cap-and-trade approach behaves like a self-correcting policy in achieving the mass-based target. An emissions tax, however, would require contingency plans in case the level of the tax was not sufficient to achieve the policy target.

5.1.3. Multistate or Individual State Plans

The CPP appears to require that states using emissions rate targets that want to engage in multistate compliance average participating states' rates together, sometimes called calculating a

"blended rate," and use this regional rate when submitting a joint state plan. If a state wants to use a rate-based approach and EPA requires that states take a regional emissions rate target when submitting a multistate plan, workshop participants felt that states would likely perceive this as an incentive to forgo regional compliance and instead write an individual state plan, for at least two reasons.

First, states with a relatively less stringent rate would be disadvantaged and would not want to join a regional effort. EPA assigns states different emissions rates, which may be a large source of perceived unfairness. States with less stringent rates may therefore see bad incentives in writing a state plan with a state with a more stringent rate. Second, if a state decided at a late point that it wanted to leave the group and submit an individual compliance plan, then remaining members of the group would be required to recalculate the group's relevant emissions rate target. This would jeopardize the compliance planning activities of states and companies late in the planning process. Participants also discussed recent economic modeling that suggests that a coordinated approach for the Clean Power Plan could achieve overall compliance by some states overcomplying and other states undercomplying, which prompts the question of legal liability under plans written jointly by states.

5.1.4. Aligning State Plans to Properly Account for Energy Efficiency

Participants expressed strong concern that a main disadvantage of a rate-based approach, for the purpose of regional collaboration, is that this approach contains a denominator that includes generation from renewables and avoided generation from energy efficiency improvements, and many state efforts in these areas have effects that cross state lines. States would likely have to harmonize their treatment of renewables and energy efficiency, and this still may be insufficient to provide a full incentive for energy efficiency investments to be able to fully account for the contribution of these technologies in a rate-based system.

The varied accounting for energy efficiency in different states may mean that interstate coordination under a rate-based system is untenable. States may wish to retain authority for measurement and verification of energy efficiency implementation, because in some cases state shareholders have dedicated thousands of hours to developing protocols that are perceived to meet the needs of the state. It seems unlikely that states will harmonize treatment of energy efficiency improvements and perhaps renewables, because each state—and sometimes each company within a state—has a strong preference for following its own accounting rules for these activities. This provides a strong barrier to formal linkage using a rate-based approach to compliance.

In addition, the accounting for energy efficiency varies among protocols. In fact, the same energy efficiency measure may lead to different reductions in energy use in different states as a result of different geography or demography. This may invite policy objections and potential legal interventions to prevent crediting for energy efficiency in one state that is different from the protocol in another state when both are involved in regional compliance activities.

Moreover, as discussed previously, energy efficiency is discounted by that portion of a state's electricity consumption that comes from imported power. This serves to substantially reduce the incentive for energy efficiency measures. However, regional approaches could enable the full value of the contribution from energy efficiency to be realized.

5.2. Linking by Degrees

Another useful strategy may be to work up to formal linkage through linking by degrees and employing the near-term opportunity of the Clean Power Plan to align climate policy features. This may be a good way to build political durability step by step.

Participants expect that formal linkage will not be allowed between heterogeneous policy instruments and that states may be required to declare their intent to formally link in their state plans. If states are not ready to agree on a policy instrument and declare their effort to link formally, they may be more prone to pursue an incremental alignment of their compliance activities.

One advanced form of collaboration, which may or may not constitute formal linkage, might be implemented within regional power markets. This approach would require a permit for emissions as part of the tariff within regional power markets, with emissions allowances initially given to local distribution companies. This would keep the asset value of emissions allowances within the sector and mitigate the increase in electricity prices. The disadvantage of this approach is that it would not provide incentives for retail customers to pursue energy efficiency; therefore, states would need to implement other programs if this approach is encouraged.

A second approach that might not constitute formal linkage would be to take a multistate approach where utilities are the point of compliance instead of states.

A third option may be informal linking for compliance through coordinated accounting for renewable and energy efficiency measures, but otherwise maintaining separate accounting of emissions and calculation of emissions rate outcomes. This could be especially useful if states use rate-based targets or implement a tradable performance standard policy, or possibly even if

they use different types of compliance approaches, mixing a tradable performance standard and cap and trade or other policies.

Another possibility is allowing companies to collect their responsibilities across state lines without states actually authoring joint compliance plans.

6. Recommendations for EPA to Incentivize Multistate Collaboration

Workshop participants identified several places where EPA could facilitate efforts at multistate collaboration.

6.1. Provide Regulatory Clarity

Participants felt EPA should and will likely modify its proposed rule, perhaps significantly. A prominent sentiment was that EPA should provide greater clarity regarding a preferred approach when it has offered several approaches to various provisions in the rule.

6.2. Acknowledge Gaps in Regulatory Capacity of States

Some state agencies have relatively limited resources, and it will be a challenge for them to develop a state plan, given requirements to address other EPA regulations such as ozone standards. EPA might encourage collaboration by rewarding states actively working on coordinating their plans with those of other states. For example, EPA might choose to reward states with various technical resources and additional extensions on deadlines for submitting their state plans.

6.3. Incorporate Wider Definitions of Coordination

States have a wide range of options for coordinating their plans for the Clean Power Plan. EPA, however, proposes a somewhat narrow definition of what type of collaboration counts as a joint plan. For example, while formal linkage is clearly acceptable, it is not clear whether less ambitious forms of collaboration would constitute a joint plan. Some participants at the workshop explored the possibility of coordination between states with respect to accounting for energy efficiency or renewable energy investments that affected electricity generation in other states. States may want to pursue this limited alignment of their programs without formally linking, but they may hope to capitalize on incentives that EPA is offering for a complete integration of state plans—including extra time for compliance.

Another possibility that was discussed was that companies might engage in limited linkage through contracts while not involving their states in formal multistate compliance planning. For example, if companies in different states were regulated under cap and trade, then one company might purchase allowances from another while the states might not formally link their trading programs.

The workshop participants generally recommended that EPA consider incorporating a broader definition of multistate collaboration so that various forms of coordination count.

6.4. Allow States to Update Certain Aspects of Their Plans

Many participants observed that states may desire to maintain discretion over their domestic climate policies even if they collaborate with other states. For example, states may wish to revise their plans because of changes in demographics, economic activity, or technology (such as electrification of the vehicle fleet, a technology that appears favored by the transportation policies of the coastal states).

The proposed rule, however, seems to be unclear as to whether certain changes to state plans would be encouraged or even allowable. Some participants feel that state plans should be revisited on an ongoing basis. In fact, this may be necessary for states that do not adopt self-correcting mechanisms—that is, emissions rate averaging or emissions budgets. Thus states pondering complying through a tax may require revisions on an ongoing basis.

A broad sentiment emerged among participants recommending that EPA encourage or require regular amendments to state plans. Participants also recommended that EPA enable states to join or exit multistate plans without penalization at future points in time. This might be an automatic provision of mass-based approaches, which is a point EPA could clarify. How this could be accomplished under a rate-based approach is more difficult to imagine. Moreover, guidance on how EPA will treat formal linkages that are approved under a state plan but then dissipate would help states determine the level of collaboration they want to pursue.

6.5. Consider Requiring Additional Analysis from States

One salient concern of some participants was what impact the policies in one state will have on emissions in other states. There are two important dimensions to this question.

The first is how a state's policy choice may affect CO_2 emissions in other states. Because emissions rate targets differ among the states, this could provide an incentive to move electricity generation to states with higher emissions rate standards, potentially leading to greater emissions

overall. Currently, EPA provides limited modeling of the impact of formal linkage between certain states on overall emissions. Some workshop participants felt that EPA should provide more detailed modeling in this context and also should require that state plans include a similar analysis.

A second dimension is how a state's policy choice may affect emissions of other pollutants in the state or in neighboring states. For example, if a state continued to rely primarily on coal-fired generation, it would delay decreases in emissions of sulfur dioxide and nitrogen oxides as well as carbon dioxide. A state might be able to continue large-scale operation of coal-fired generation if it also invested in renewables. While this might be neutral with respect to carbon emissions, it could lead to an increase in conventional air pollutants compared with other approaches to compliance, such as a plan that expanded use of natural gas.

A more subtle interaction between state plans could more directly undermine the goals of the CPP. States that adopt mass-based standards could reduce their capped emissions simply by importing more power from neighboring states. If those exporting states adopted rate-based standards, increasing exports may actually ease the compliance burden on those exporting states. Such differences in emissions accounting could produce more modest emissions reductions in aggregate than implied by the compliance of each state with the letter of its specific regulatory approach.

Further, if state policy choices interact to lead to a relocation of electricity generation for any reason, this is likely to result in a geographic relocation of emissions of conventional pollutants. This may invoke a consideration of the good neighbor provision of the Clean Air Act. The workshop participants supported the idea that EPA consider conducting additional analysis or requiring states to include an analysis of the impact of their policy choices on other states' emissions when they submit their state plans.

7. Conclusions

The CPP introduces new requirements on greenhouse gas emissions from existing power plants for the first time for most of the country. This development provides new impetus for coordinated national efforts to reduce emissions. And it could contribute to efforts by the Pacific Coast states to develop comprehensive policies that introduce carbon pricing. But that outcome in the Pacific states is not an automatic result from the CPP.

The workshop at UC Davis identified many complementarities between these policies and some ways in which the CPP could encourage a compliance structure that would actually

obstruct the introduction of carbon pricing. One factor that would contribute to the success of both policies is multistate collaboration.

Hence, to meet the short-term requirements of the CPP and remain on a path toward the introduction of comprehensive carbon pricing in the long term, the workshop participants placed considerable emphasis on multistate collaboration, in particular, for compliance with the CPP. This seemed likely to be more successful under a mass-based approach than under a rate-based approach, but that opinion was not universally held. The workshop identified several features of the CPP that could be improved by EPA in issuing the final rule.

The structure of the CPP places planning responsibility with the states. Future analyses by academics, think tanks, and EPA could support state efforts in this regard. These involve economic and legal analyses of the several questions identified in this workshop summary, as well as evaluation of organizational strategies for multiparty coordination by states and compliance entities.

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