

Climate Policy Economics Insights

Overlapping State and Federal Climate Programs: Economic and Policy Considerations

By Meghan McGuinness

From the Editor

The US government is moving toward a federal cap-and-trade program for greenhouse gas emissions. At the same time, one regional program already is in place and other state and regional programs are being developed. In this issue of *Climate Policy Economic Insights*, NERA's Meghan McGuinness looks at the implications of overlapping federal and regional programs for both governments and industry. Will companies have to "pay twice" for each ton of emissions? Will the overall costs of meeting CO₂ targets increase? What will the impacts be on potential federal and state auction revenues? This issue shows how economic analysis can help answer these and other policy questions.

Meghan, a Consultant in NERA's Boston office, has substantial experience in the design and analysis of emissions trading programs and is an author of several papers on the subject. Before coming to NERA, Meghan was in the Clean Air Markets Division at the US Environmental Protection Agency, where she was extensively involved in the development of market-based regulatory programs addressing power sector emissions. She holds a Masters degree in Technology and Policy from MIT.

Best regards,

David Harrison, Editor

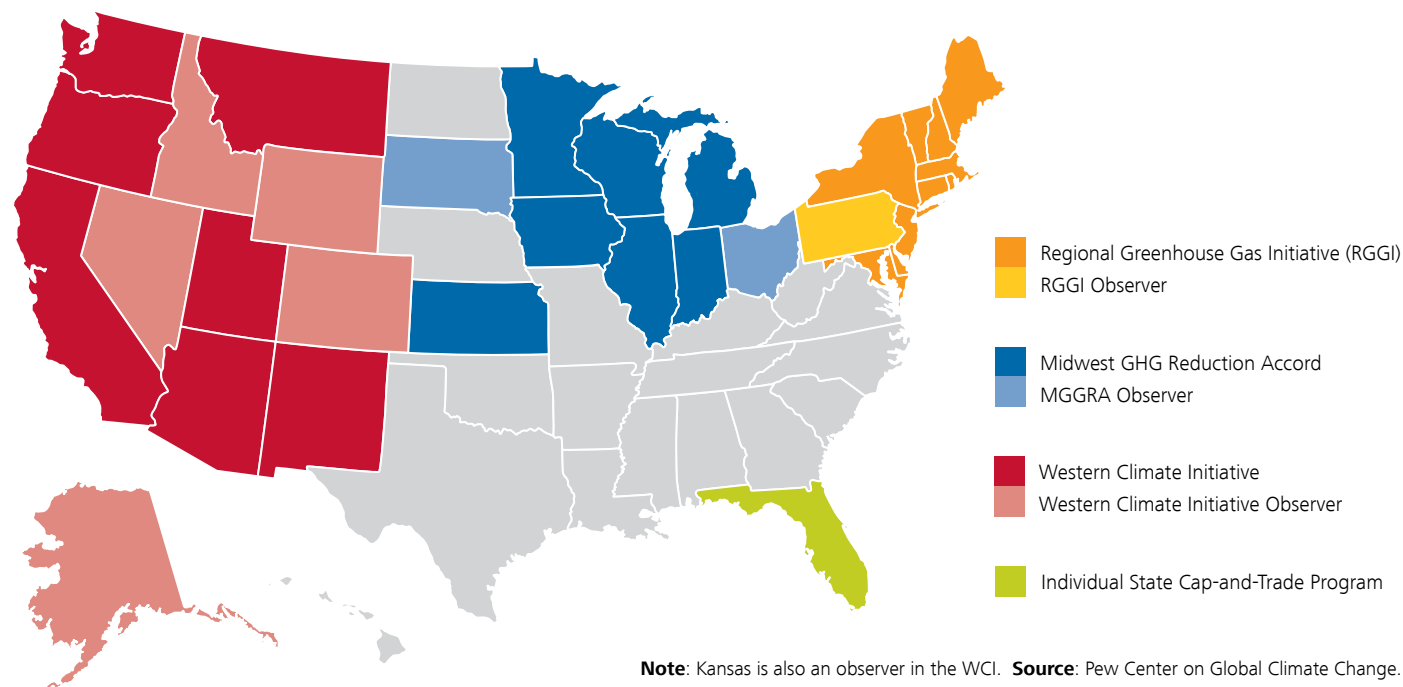
Introduction and Overview¹

As the United States develops federal climate change legislation, regulators, policymakers, and corporations need to consider the implications of overlapping state, regional, and federal programs, in terms of costs, allowance revenues, and environmental outcomes.

In the absence of a federal program, 24 states have developed or are developing regional or individual state programs to cap CO₂ emissions. The first compliance period for the Regional Greenhouse Gas Initiative (RGGI), a cap-and-trade program for CO₂ emissions from the power sector in 10 Northeastern states, began on 1 January 2009. Similar cap-and-trade programs are being developed in groups of Western and Midwestern states, as well as individually in California and Florida.

The likelihood of a federal cap on CO₂ emissions raises the question of whether state and regional² programs should be continued under a federal program, how the relationship between federal and state programs would be defined, and the implications of this relationship for the overall cost of achieving the national cap, as well as the distribution of costs, emissions, and revenues generated by emission allowances. Some states have advocated for the continuance of state cap-and-trade programs under a federal cap, and there appears to be support for this position in principles developed recently

Figure 1: Map of US states and regional cap-and-trade programs/proposals



by the Senate majority leadership.³ However, the most recent discussion draft bill from the House of Representatives, the American Clean Energy and Security Act of 2009, explicitly prohibits states from implementing or enforcing a cap on emissions that are covered by the federal cap.⁴

If a state cap is stringent enough to have an effect on emissions in the presence of the federal cap, overlapping state and federal cap-and-trade programs would have several major implications:

- Costs and emissions reductions would be redistributed relative to the pattern that would occur under a federal cap alone; sources subject to overlapping programs (and ultimately their customers) would bear a larger share of the cost and emissions reduction burden than under a single federal program. Companies and customers in states without state caps would pay less than otherwise.
- The overall cost of meeting the federal target would increase. (Economic efficiency of the cap-and-trade program is sacrificed because of disparities in marginal abatement costs between sources subject to both programs and those subject to the federal program only).⁵

- Although a state program could yield auction revenues, the revenues would be substantially less than if there were no federal program.

The compliance cost increase from overlapping programs could be avoided under two policy approaches: (1) discontinuation of state cap-and-trade programs, either through explicit preemption or state withdrawal of their programs; and (2) a “carve out” of existing regional/state cap-and-trade programs from the federal program, with linkage allowed to the federal allowance market. Both approaches raise important policy and implementation challenges.

The size of the potential compliance cost increases—as well as the shifts in costs, emissions, and revenues—that result from overlapping state and federal programs are empirical questions that can be informed by economic modeling.

Impacts of Overlapping State and Federal Programs

State and Federal Marginal Abatement Cost Curves

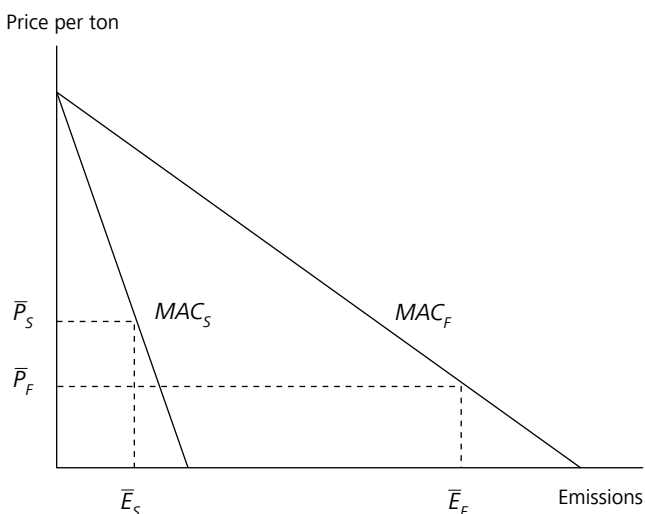
When sources are subject to both a state and federal cap-and-trade program, they must obtain and surrender both a state and a federal allowance for each ton of emissions. As a result

the costs of reducing emissions at the state and national levels are affected by the other program. This can be illustrated with stylized representations of the costs of reducing emissions, in the form of “marginal abatement cost,” or MAC curves. MAC curves show how the cost of reducing emissions changes with each incremental ton reduced, and in the context of an emissions cap-and-trade program, are representative of the demand for emissions allowances.

The impacts on marginal costs from overlapping state and federal programs depend on two factors. The first is the relative stringency of the state and federal cap from the perspective of emissions sources in the state. We define the more stringent program as the one that, when considered independently, would result in the higher marginal cost for sources in the state. The second factor is the relative scope of the two programs, in particular, whether the federal program covers the full set of sources that is covered by the state program. Generally, common design features of cap-and-trade programs, such as banking, borrowing or cost-containment mechanisms, affect the analysis indirectly through their impact on relative stringency.⁶

Figure 2 depicts an example of state and federal MAC curves, denoted MAC_S and MAC_F , respectively. \bar{E}_S and \bar{E}_F represent the respective state and federal emissions cap levels. The state cap would lead to an equilibrium allowance price of \bar{P}_S , and the federal cap would lead to an equilibrium allowance price of \bar{P}_F . In this example, then, the state program is more stringent than the federal one because \bar{P}_S is greater than \bar{P}_F .

Figure 2: **State and federal marginal abatement cost curves and emissions caps, where the state program is more stringent**



The Effect of Overlapping Policies

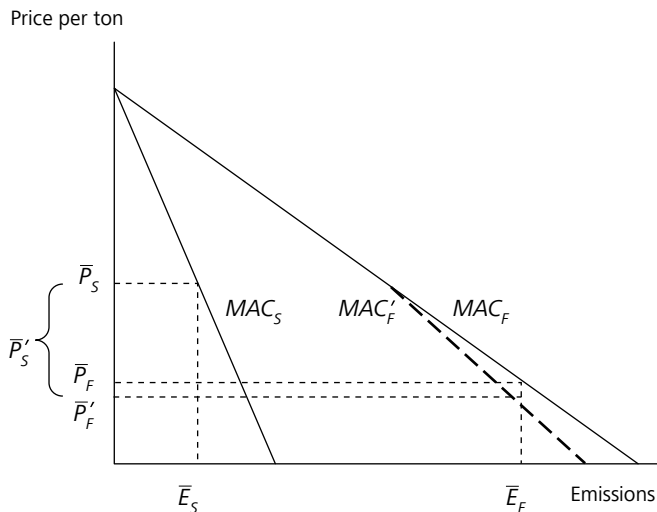
Where state and federal cap-and-trade programs coexist (and where the federal program includes all of the sources that are included in the state program), sources in the state will reduce emissions in response to both the federal and state allowance prices. The demand for state allowances, and consequently the state allowance price, will be reduced relative to under a state program alone. If the federal program is more stringent than the state program, the state allowance price will be driven to zero and there will be a surplus of state allowances. This result is important for state program administrators. Once a federal cap-and-trade program is implemented, the value of state program allowances, and thus potential auction revenues, will be reduced, and could even disappear.

The existence of a state cap-and-trade program also has implications for the demand for federal allowances. If the state program is less stringent than the federal program, the demand for federal allowances is unaffected and the federal MAC curve remains the demand curve for federal allowances.⁷ However, if the state program is more stringent than the federal program, a positive (though reduced) state allowance price will persist in the presence of the federal program, leading state sources to reduce emissions more than they would with only the federal program. This reduces the demand for federal program allowances and results in a somewhat lower federal allowance price. The magnitude of the state program’s impact on the federal allowance price depends primarily on the relative stringency of the two programs and the state’s proportion of national emissions, but it will always be smaller than the impact of the federal program on the state allowance price.⁸

Figure 3 provides a graphical demonstration of the impact of overlapping programs on federal and state allowance prices where the state program is more stringent. The federal MAC curve adjusts to the demand curve denoted by MAC'_F . Note that the adjusted curve is actually kinked; at federal allowance prices at or above the original state allowance price, \bar{P}_S , the state program is no longer more stringent, and thus has no effect on the demand for federal allowances. Sources subject only to the federal program will pay a marginal abatement cost equal to the adjusted federal price, \bar{P}'_F . Sources subject to both programs will pay \bar{P}'_F , as well as the adjusted state allowance price, \bar{P}'_S , which is equal to \bar{P}_S minus \bar{P}'_F .⁹ The costs to state sources are therefore higher than they would be under a federal cap alone, while the costs to sources outside of the state are lower than they would be absent the state cap.

The state program does not affect aggregate national emissions, which are dictated by the federal cap, \bar{E}_F . However, assuming allowances are auctioned, state allowance revenue is reduced from the area of rectangle demarcated by \bar{P}_S and \bar{E}_S to the area of the rectangle demarcated by \bar{P}'_S and \bar{E}_S . The total allowance costs faced by state sources are equal to what they would have been under the state program alone. However, the existence of overlapping state and federal programs implies that this allowance payment is divided between the state and federal government as demonstrated in Figure 3, rather than paid entirely to the state government.

Figure 3: Implications for allowance prices under overlapping federal and state cap-and-trade programs



A number of important conclusions emerge from this analysis. First, if state and federal cap-and-trade programs are allowed to overlap, a more stringent state program will lead to disparities in marginal abatement costs between sources subject to both programs and sources subject only to a federal program, with a resulting efficiency loss.¹⁰ Total compliance costs for achieving the national cap will be greater than they would be under the national program alone. Second, unless the state program covers sources that are excluded from the federal program, it will not generate additional emissions reductions.¹¹ Finally, as noted above, where federal programs and state programs coexist, the federal program will reduce potential state allowance auction revenues, even if the state program is more stringent than the federal program.

Policy Options to Avoid Efficiency Loss

There are two major policy options for eliminating the efficiency loss that results from overlapping state and federal cap-and-trade programs. These are a federal program that supersedes (either through preemption or withdrawal of) state programs, or one that allows state programs to be “carved out” from the federal program but permitted to link to the federal allowance market.

Preemption/Withdrawal of State Cap-and-Trade Programs

Replacement of state cap-and-trade programs with one national program will avoid the duplicative compliance requirements that occur under overlapping programs, and the potential disparities in marginal costs that result. Of course, direct federal preemption is likely to be politically controversial, particularly if states perceive federal policy goals as inconsistent with their own. However, the federal government might also offer states an incentive to withdraw their cap-and-trade programs, such as through the conditional provision of allowances (or federal allowance auction revenues). Under the Boxer Substitute Amendment to the Lieberman-Warner bill, for example, in order for states to receive allocations from a pool of allowances for state leaders in addressing climate change, they would have had to transition any state cap-and-trade programs into the federal program.¹²

The primary implementation challenge under the discontinuation of state programs is the treatment of any banked allowances and offsets under the state program that remain unused when the federal program takes effect. If a bank of allowances or streams of future year offset credits have been generated under the state program and the state program is terminated, their value will fall to zero if they are not recognized in some manner in the federal program. In addition, in anticipation of banked allowances losing all value, sources under the state program would be expected to relax emission-reduction efforts (to the extent there are marginal savings) and exhaust the bank prior to expiration of the state program. A similar effect occurred in the European Union’s Emissions Trading Scheme (EU ETS) when the end of Phase I neared and the price of Phase I allowances plummeted because they could not be banked for use in Phase II.

Transitioning banked allowances and offset credits into the federal program would mitigate losses to companies that have invested in abatement. Two key implementation

considerations must be addressed. First, policymakers would need to determine the appropriate rate of exchange, and, for offsets, clearly specify which types of projects would be honored. Second, policymakers would have to determine whether the federal allowances provided in the exchange would be provided from within the cap or on top of the cap as early reduction credits.¹³ Any empirical analysis of policy costs should take into account how offsets and banked allowances are treated.

“Carve-out” of State Programs with Linkage to the Federal Allowance Market

Under the “carve-out” scenario with linkage, the state cap-and-trade program would be allowed to exist separately from the federal program, but link to the federal allowance market, thereby resulting in a single allowance price and one compliance obligation for all sources. From the perspective of a state with its own cap-and-trade program, one benefit of this approach, relative to preemption, is the ability to continue raising revenue through allowance auctions, though of course it implies a sacrifice in potential revenue by the federal government. Of course, this same result can be achieved under preemption or withdrawal should the federal government choose to provide compensation to states for lost allowance revenue.

This approach presents a number of implementation challenges to policymakers. First, a federal program would have to define criteria by which to determine whether a given state program is sufficiently comprehensive and stringent to be granted this option.¹⁴ Further challenges exist for the creation of a unified allowance market for two programs that may have irreconcilable design differences. Differences in point of regulation between the two programs could lead to duplicative coverage on some sources (for example, if the federal program covered a source category upstream and the state program covered it downstream).¹⁵ In addition, design features such as safety valves or offset provisions in one program can become automatically imposed on the second program when emissions markets are linked.

Assuming the federal government intends to preserve the emissions reductions and associated policy goals of the federal program, this approach would most likely require that states intent on continuing to administer existing programs modify these programs by adopting specified provisions and design elements. In this sense, the end result might resemble the first two phases of the EU ETS or the NO_x Budget Trading Program, programs implemented at the EU member

state and US state levels, respectively, but with very limited flexibility to deviate from key design principles other than allowance allocation.

Conclusions

In the presence of a federal cap on CO₂ emissions, state emissions caps would not provide additional emissions reductions (unless they cover emissions outside of the federal cap), and could increase the cost of meeting the national emissions target. While preemption may be the most straightforward approach for avoiding efficiency losses, it carries a political cost and successful negotiation may require some degree of compensation to states for lost allowance revenues. Implementation challenges under the “carve-out” with linkage approach may render it impracticable, unless states are required to modify their rules to satisfy key policy and design principles, a result which would closely resemble a uniform national program where allowances are allocated to the states.

While our analysis provides a theoretical framework for evaluating potential interactions between federal and state cap-and-trade programs, the magnitudes of impacts of interactions between specific existing or proposed state and federal programs are empirical questions that can be informed by economic modeling. Economic modeling can provide information on the size of the potential efficiency loss under overlapping programs; the impacts on potential state and federal allowance auction revenues; the impacts on the distribution of emissions of CO₂ and co-pollutants such as nitrogen oxides, sulfur dioxides, and mercury; and the impact on compliance costs to individual companies and industries. This empirical information is likely to be of substantial value as climate policy discussions move forward at the federal level and the issue of overlapping programs is confronted.

End Notes

- 1 Various NERA colleagues have provided helpful comments on this article, including Adam Findeisen, David Harrison, Nick Nichols, and Daniel Radov. Any remaining errors or omissions are the author's own.
- 2 To avoid repetition of 'state or regional' we use the term 'state' to refer to both state and multi-state regional programs.
- 3 These principles, released by the office of Senate Environment and Public Works Committee Chair Senator Barbara Boxer, state that federal legislation should "Ensure that state and local entities continue pioneering efforts to address global warming." See "Principles for Global Warming Legislation." February 3, 2009. Online: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=14dc734d-74c9-4fb3-8bf2-6d5d539226d1.
- 4 This discussion draft is available online at: http://energycommerce.house.gov/index.php?option=com_content&task=view&id=1560&Itemid=1.
- 5 Note, we ignore the potential dynamic effects of higher CO₂ prices on innovation, as well as the possibility that states also could get "first-mover" advantages (or disadvantages) in restructuring economies to be more in line with a low-carbon future.
- 6 Rules for allocating free allowances can also have important impacts on the emissions costs under different programs, and on the incentives that are ultimately created. See for example, Harrison et al. 2007. *Complexities of Allocation Choices in a Greenhouse Gas Emissions Trading Program*. Report to the International Emissions Trading Association. September.
- 7 In this case, the only additional costs from the state program are the administrative costs associated with its operation.
- 8 For example, a binding state cap in Texas, which contributes the largest share of US CO₂ emissions annually, would have a larger impact than a state cap of equivalent stringency in Vermont, which contributes the smallest share.
- 9 This result can be derived algebraically. When the state program is more stringent and all sources subject to the state cap are included in the federal program, the sum of [marginal] allowance costs faced by state sources is equal to what the state allowance price would have been in the absence of a federal program.
- 10 While the analysis here focuses on state cap-and-trade programs, this basic result will hold for other state programs that regulate greenhouse gas emissions. An exception is a state program that leads to low- or negative-cost reductions that would not be achieved under the federal cap alone. State energy efficiency programs are often discussed as a potential example. While the prevalence of low- or negative-cost reductions is an empirical question, state programs that elicit them could actually lower the cost of achieving the federal cap.
- 11 The only other option for states to generate additional reductions is through the retirement of federal allowances. However, retirement of federal allowances would come at cost to the state, which must either purchase them or forgo revenue from federal allowances allocated to the state government.
- 12 The Substitute Amendment was debated in the Senate in June, 2008, and is available online: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=aaf57ba9-ee98-4204-882a-1de307ecdb4d. See section 625.
- 13 If the federal program allows for the exchange of state allowances for federal allowances at full value within the federal cap, there will be no impact on the federal allowance price from incorporating state allowances; however, federal allowances in like number would have to be subtracted from the auction or free allocations to other sources. If federal program allowances are provided for banked state allowances *on top of* the cap as early reduction credits, the cap is effectively expanded, and the federal allowance price will be lower than it would have been absent the incorporation of state allowances. Analogous considerations apply to assigning offset credit.
- 14 While spot and forward allowance prices under the program provide a comparison of stringency, variations in design and timing across programs may complicate this comparison.
- 15 For example, proposed federal legislation has tended to regulate gas-fired power plants upstream through regulatory requirements on natural gas processing plants and importers. Where programs like RGGI and the current proposal for AB 32 would regulate gas plants downstream, they would potentially be imposing a duplicative regulatory requirement on some emissions, while a single requirement would remain on other entities in the state where the point of regulation is the same as the federal program.

Reference

McGuinness, Meghan, and A.Denny Ellerman. 2008. "The Effects of Interactions between Federal and State Climate Policies." In A.D. Ellerman, M.D. Webster, J. Parsons, H.D. Jacoby, and M. McGuinness, *Cap-and-Trade: Contributions to the Design of a U.S. Greenhouse Gas Program*. MIT Center for Energy and Environmental Policy Research. Also available as CEEPR Working Paper WP-2008-004.



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