



California's Cap-and-Trade Program and Emission Leakage: An Empirical Analysis

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How “leaky” is California’s cap-and-trade program? California is reducing in-state carbon emissions, but are these reductions partly offset by related increases in other western states? In Monday’s energy policy seminar, Chiara Lo Prete, Assistant Professor of Energy Economics at The Pennsylvania State University, presented her empirical research on this question.

California’s emission trading system, Lo Prete explained, began in January 2013, imposing additional costs on greenhouse gas emitters and targeting significantly reduced statewide greenhouse gas emissions by 2030. Although the electricity sector is only one sector that is affected, it is expected to contribute 25% of total projected emissions reductions by 2030, counting both reductions in in-state emissions and in emissions related to imported electricity.

Currently, Lo Prete explained, electricity generation within the state of California is quite low-carbon. There are no coal plants within the state, and about 50% of generation is zero-carbon renewables, hydro, or nuclear power. However, California’s power grid is interconnected with the grid of other Western states as part of the larger “Western Interconnect,” whose generation resources include coal plants, along with natural gas. Because the systems are interconnected, power production and use in California inevitably impacts the rest of the Western grid, and vice-versa.

Lo Prete noted that an effort has been made by California policymakers to ensure that the carbon trading system includes energy imported into California, as well as energy generated inside California. Importers are required to either specify a particular source and pay an associated carbon charge calculated based on a facility-specific emission factor, or, if the source is “unspecified,” pay a charge based on a default emission factor set by the California Air Resources Board and representative of a fairly clean natural gas plant that is likely to be available for marginal dispatch in the western states outside of California.

How effective are these provisions at preventing “reshuffling” of generation? Lo Prete explained that, in a “reshuffling” scenario, either through contracts or through strategic use of the “unspecified” category for imports from high-carbon sources, California would see *apparent* emissions reductions, but, in fact, looking at the Western Interconnect as a whole, emissions would be unchanged or increasing.

Some simulation-based studies have suggested that California’s system may be vulnerable to such reshuffling; however, Lo Prete said, there have been few empirical studies which assess whether such reshuffling is actually occurring. Accordingly, Lo Prete and her co-authors conducted a set of three regression analyses of the electricity sector that attempt to assess the impacts of California’s cap and trade system on emissions throughout the Western Interconnect.

All three analyses, Lo Prete reported, have results that provide at least some support for the idea that California’s cap and trade system is resulting in less use of (cleaner) natural gas plants in California, and more use of (dirtier) coal plants elsewhere in the West. While the difference in operations seems small, the implication, Lo Prete explained, may be a policy-induced “leakage” of about 65%—that is, 65% of claimed carbon reductions should in fact be understood as shifts in carbon emissions. Lo Prete and her co-authors are continuing to refine their analysis and are drafting a working paper that will further detail the results.

Lo Prete spoke as part of the Kennedy School’s Energy Policy Seminar Series, which is sponsored by the Consortium for Energy Policy Research of the Mossavar-Rahmani Center on Business and Government.

