

Study of California cap-and-trade system suggests refinements

22 February 2013, by H. Brevy Cannon

In the absence of federal action to create a national greenhouse gas emission "cap-and-trade" system, states are taking the lead. Last month, California launched the world's first economy-wide greenhouse cap-and-trade system, which affects power plants and other major greenhouse gas producers like refineries, cement and glass manufacturers.

California's system builds on lessons learned by other pioneering systems, including the nation's first cap-and-trade system for [greenhouse gas emissions](#), which began in 2008 and incorporates more than 200 power plants in nine Northeastern states that make up the Regional Greenhouse Gas Initiative.

University of Virginia economists Charlie Holt and Bill Shobe, who helped design the Northeastern system, have just released [a study of the California auction system](#), recommending some small adjustments and some further study to make the California system more effective.

This is an opportune time to refine and tweak the California system before it expands in 2015 to cover vehicle fuels, increasing the system's size by 2.5-fold, said Shobe, director of the Center for Economic and Policy Studies at U.Va.'s Weldon Cooper Center for Public Service.

The California Air Resources Board sells emission permits through periodic auctions. Subtle variations in market design can significantly affect the costs and revenues of the system as millions of permits are sold, Shobe said, "There are hundreds of millions of dollars at stake."

Under a cap-and-trade system, pollution producers like power companies must purchase enough emissions allowances to cover their annual emissions, giving them a cost incentive to reduce emissions through alternative energy investments or improved efficiency. The allowances can be

bought and sold among [power plants](#), or saved for use in a later year. This enables free-market forces to determine the cheapest and most efficient measures to produce a cumulative reduction in emissions. The total annual emissions allowed (the cap) is ratcheted down from year to year.

Relatively stable carbon emission prices are crucial to spur long-term investments in low-carbon technologies that are key to meeting ambitious emission reduction targets, said Shobe, a professor of public policy in the Frank Batten School of Leadership and Public Policy and an adjunct professor of economics in the College of Arts & Sciences.

The Northeastern auction system has produced relatively consistent prices over time, in contrast to the world's largest emission auction, the European Union's Emissions Trading Scheme, which saw unsettling price volatility in its early years.

In recognition of California's 2001 experience with energy market manipulation that led to rolling blackouts, and the experience of the European Union Emissions Trading Scheme, the California Air Resources Board added two auction features designed to minimize the prospect of excessive price movements and market manipulation: holding limits, which restrict the number of allowances that any one company may hold; and an option to purchase additional reserve allowances at preset prices, which are expected to be significantly higher than normal market prices. The latter feature provides a safety valve of sorts, meant to contain costs in the event of price volatility or sustained high prices.

Shobe and Holt analyzed the impact of those features on market behavior using experiments with student subjects in carefully controlled laboratory settings and simulations with experienced professionals in a richer, but less-controlled market setting. These complementary methods generated

mutually reinforcing results.

The study found that tight holding limits can have a significant negative impact across the board on each of four key market performance indicators: price discovery, efficiency, volatility and most critically, liquidity, which is regarded by many economists as the key factor in defeating market manipulation.

On the other hand, the study found that the reserve allowances lowered the risk of large price spikes, as market participants used it as a "seller of last resort" and as a source of "borrowed" allowances used to hedge against future scarcity.

The study also recommends further study of different forms the reserve allowances could take, including their possible combination with other auction features such as in-auction release of reserves or a hard price cap.

Provided by University of Virginia

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