

# A Comparison of Three Cap-and-Trade Market Designs and Incentives for New Technologies to Reduce Greenhouse Gases

*A source-based market design is preferable for its simplicity, lower costs, faster implementation, more accurate tracking and verification, and greater incentives for the adoption of lower-emitting technologies.*

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## I. Background and Summary

In 2008, California, Oregon, Washington, Arizona, New Mexico, Utah, British Columbia, and Manitoba, which are full participants in the Western Climate Initiative (WCI), as well as 10 states that signed the Midwestern Regional Greenhouse Gas Reduction Accord in 2007, are planning to adopt collaborative frameworks to regulate greenhouse gas

(GHG) emissions. In addition, 39 U.S. states, two Mexican states, three Indian tribes, and four Canadian provinces plan to establish a common GHG registry.

**A**mong the market mechanisms being considered are three potential cap-and-trade market designs for the electric sector: (1) source-based, (2) load-based, and (3) first-seller/deliverer.

In a source-based market, electric generators that burn fossil

fuels will be the affected sources, i.e., the points of regulation. An affected source must comply with GHG regulations by acquiring and surrendering emission allowances (EAs) for each ton of emissions during a specified compliance period. Over time, emissions will be reduced as the number of emission allowances issued for a particular year declines. In a load-based approach, regulated load-serving entities (LSEs) must comply by keeping track of the GHG content of their electricity sales. LSEs are mostly utilities that deliver electricity to customers, i.e., the load, but may include other electricity service providers. In a first-seller/deliverer market, which combines elements of source-based and load-based designs, the regulated first-seller/deliverer is the entity that first sells or delivers electric power into the state where that power is subsequently sold to end-users.

A source-based design has been used in the U.S. SO<sub>2</sub> cap-and-trade market since 1992, when the first trade occurred, and in the European Union's Emission Trading Scheme (EU ETS) for greenhouse gases, since 2005.<sup>1</sup> This design is also used in the Environmental Protection Agency's seasonal and annual NO<sub>x</sub> markets and California's RECLAIM market. In addition, states in the Northeast's Regional Greenhouse Gas Initiative (RGGI) adopted a source-based design, and proposed federal climate legislation to date

incorporates a source-based design. In contrast, public utilities commissions (PUCs) in California, Oregon, and Washington have indicated preliminary preferences for a load-based approach, while the California Air Resources Board Market Advisory Committee has recommended a first-seller approach.

This article evaluates how well each cap-and-trade

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design would meet several basic objectives of environmental markets. Because improved technologies will be essential to achieve significant global GHG reductions, the article addresses the question: *Which cap-and-trade market design will provide the best incentives to develop and utilize advanced technologies?*

The comparisons show that a load-based regulatory system would be more complex, costly, and inaccurate than either a source-based or a first-seller system.<sup>2</sup> The comparisons also indicate that new technologies would realize higher values under source-based and

first-seller/deliverer market designs than under a load-based system.<sup>3</sup> A further conclusion is that the adoption of an integrated, source-based market design covering many sources in many states will provide greater opportunities for the innovation and advancement of new technologies, as well as for the success of regulated cap-and-trade markets for GHG.

## II. Objectives for GHG Cap-and-Trade Market Design

The primary goal for creating a regional GHG cap-and-trade market is to *reduce regional GHG emissions to levels set by emission tonnage caps in an efficient and cost-effective manner*. In general, GHG reductions will occur if a market properly internalizes the costs of emissions in the prices of goods and services. Since different parties will be able to control or avoid emissions at different costs, there will be opportunities for allowance trading. The ultimate success of the market depends on having many buyers and many sellers, such that a competitive supply/demand balance creates a market clearing price signal.<sup>4</sup>

A cap-and-trade market will internalize the costs of GHG and operate efficiently if it satisfies the following objectives:

- Initiates clear market price signals for GHG allowances that are internalized in product prices.

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