Generator-Based vs. Load-Based Caps for the Power Sector

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Presentation Summary

1) Definition and origin of load-based cap concept
2) Advantages, disadvantages and design issues, both generally and in the US context

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Definitions

- Generator-Based Cap – Caps CO_2 emissions at the source of the emissions (e.g., stack or generating station). Examples include RGGI and EU ETS.
- Load-Based Cap – Caps CO_2 emissions at the electricity distributor, or load-serving entity—the utilities that directly serve customers.
  - » i.e., the emissions associated with the electricity sold to customers must meet a given limit.

Load-Based Caps Under Development on the West Coast

- 2-16-06: California Public Utilities Commission establishes intent to develop a load-based cap for investor-owned utilities.
- 4-3-06: Governor Schwarzenegger's Climate Action Team report is released and recommends proceeding with development of a multi-sector, market-based system.
- 9-27-06: Governor Schwarzenegger signs legislation that calls on the California Air Resources Board to regulate emissions from sources to reduce statewide GHG emissions to 1990 levels by 2020. This law allows for the use of market-based approaches in meeting the statewide emissions limits.
- Oregon's Carbon Allocation Task Force
  - » Established to examine the feasibility of, and develop a design for, a load-based carbon cap for the power sector in Oregon.
  - » The Task Force will provide the Governor with its recommendation in time to prepare a legislative proposal for the 2007 session.

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Impetus for Load-Based Caps on the West Coast

- Several reasons why a generation-based cap may not work well on the West Coast:
  - » Significant emissions from imported power would be missed under a cap that covers only California/Oregon generation.
  - » Programs that cover single states or smaller regional areas and where neighboring states are exempt have a risk for leakage.
  - » There is a more limited (and more costly) set of potential mitigation activities from the largely gas-fired fossil electric generating sources in California/Oregon versus opportunities available to coal-fired power plants in other states.

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Understanding Leakage

- Leakage = the transfer of power demand and associated emissions to uncapped sources in neighboring states
- *If* a California/Oregon generation-based cap-and-trade program results in higher costs for in-state generation, generators from out of state will gain a competitive advantage and may increase production. (By the same token, in-state generation would reduce production.)
- While a California/Oregon cap on generation would be met, increased emissions from higher-emitting out-of-state power can reduce, eliminate or even negate the emissions reductions achieved by the cap.
- Leakage can be minimized by 1) designing the cap to have minimal impacts on electricity prices; or 2) expanding the region subject to the cap to include generation from out-of-state power.

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Description of a Cap on Emissions Associated with Power Demand

- Emissions from demand subject to an absolute limit.
- Each LSE must hold allowances for the emissions from power they sell to their customers, regardless of the location of the generating source.
- Compliance options include:
  - » Purchase of emission allowances,
  - » Emissions reduction measures (e.g., efficiency improvements, co-firing, CCS) at their own facilities,
  - » Replacement of high-emitting fossil generation purchases with lower or zero-emitting resources, and
  - » Investments in demand-side energy efficiency.

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Advantages and Disadvantages

Advantages

- Establishes an absolute limit on emissions.
- May encourage development of new low-/zero-emitting resources and longer-term contracting with cleaner resources.
- Limits the potential for leakage.

Disadvantages

- Potential for compliance through contract shuffling.
- Challenges in tracking emissions and monitoring compliance.
- Increased potential for problems with power reliability.

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Issue 1: Contract Shuffling

- A legitimate form of compliance, e.g., an LSE chooses to buy low-emitting gas-fired generation instead of coal
  - » Contract shuffling may be reduced over time as existing clean power is tied up in firm contracts
- Contract shuffling could reduce the net impact of a cap on emissions associated with power demand.
  - » For example, California LSEs would be buying cleaner resources, but there may be no net impact on emissions in the western grid as a whole.
  - » Impact of contract shuffling could be smaller at the national level if all LSEs are capped.

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Issue 2: Tracking Emissions and Monitoring Compliance

- Actual electrons cannot be tracked as they move through the grid based on physics.
- It is difficult to track power sales. Power from a given unit, plant or company may be sold to one or more LSEs through long-term contracts or via the spot market. Power is often resold.
- Emissions attributes of the power are not currently reported or tracked in most parts of the country.
  - » All units serving US LSEs would need to be tracked (or use default)
  - » Ideally, would want reporting and tracking of unit-level CO2 emissions and the quantities sold.
  - » A historic, input allocation would also require reporting of fuel types and quantities.

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Issue 3: Power Reliability

Several issues with power reliability are possible as a result of a load-based cap:

- Changes in power purchases could strain certain transmission lines that were not previously congested (but this could happen under a generation-based cap as well).
- A cap could lead to reduced generation by plants that are relied on for voltage support (but could grant exceptions).
- Risk that insufficient new, clean generation will be built to meet the cap (may have less control over supply).

On the other hand, use of energy efficiency mitigation options could lead to lower compliance costs and reduce shifts in generation.

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Power Sector Offsets Limited under a Load-Based Cap

- Certain power sector measures are “inside the cap” and cannot qualify as an offset as this would lead to “double counting.”
  - Energy efficiency within the capped region
  - Renewable energy delivered to the capped region (“bundled RECs”)
- One effect is that the initiator of the EE/RE project is not automatically rewarded under a load-based cap.
- Options for addressing this concern include:
  - Negotiating with the LSE for a share of the allowance or its value.
  - Auctioning allowances and giving proceeds to support energy efficiency and renewable energy.
  - Establishing an energy efficiency and renewable energy set-aside program within the cap.

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What About "Unbundled RECs"?

- "Unbundled RECs" are renewable energy projects where the power is not delivered to the capped region.
- Allowing unbundled RECs as offsets could perversely encourage renewable energy projects where the power could be delivered to the capped region not to sell power to the capped region, reducing the likelihood for long-term renewable energy contracts.
- In addition, without limits, there is significant potential for contract shuffling, resulting in no "additional" GHG benefits.
- If unbundled RECs are allowed as offsets, they should not be credited with more GHG reductions than would be achieved through bundled RECs. In addition, it will be critical for them to meet the recommended additionality tests.

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Linking

- A ton of CO_2 is a ton of CO_2, and the same kinds of program equivalency should be assessed as in the case of a generation-based cap.
- If the US opts for a load-based cap, there could be problems in reconciling accounting if Canada or Mexico opt for generation-based caps.

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Policy Implementation

- A load-based cap will be new and untested, and will present significant technical and administrative challenges.
- The response of the market will likely be less obvious and less direct than with a generation-based cap.
- Program may benefit by including safeguards
  - » Cap may be phased in over time, but should ultimately be set at levels that exceed those that could be achieved with available and accessible zero-generating resources
  - » Flexibility mechanisms (e.g., a price cap on allowances) may be incorporated

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Conclusions

- A load-based cap is interesting in the way it adds compliance options (e.g., demand-side efficiency; purchase of low-emitting resources) to the power sector's repertoire.
  - » Addresses argument of limited compliance options (typically CCS, fuel switching, reduced production, purchase of allowances)
- Modeling is needed to assess the impacts of different cap levels.
- The success rests on establishing a reliable system for tracking emissions associated with power sales.

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Discussion Questions

- What is the potential for a load-based cap at the national level?
- Is a “load-based” approach applicable to other industry sectors as a way to address concerns about international competitiveness?

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