RTO Markets Must Change to Accommodate State Policies

A fundamental tension exists between RTOs' current market design and states' policies promoting carbon reduction. On the one hand, RTOs have a clear mandate to maintain reliability at least cost. On the other hand, most states' policies promote renewable energy projects and other measures (collectively, Policy Resources), such as demand response and storage, that may not be "least cost"—at least as measured by RTOs' market metrics. Resolving this tension successfully will determine whether RTO's markets will continue as robust, competitive, and liquid markets, or rather decline to a fringe role in a market dominated by utility contracting.

The migration of a large portion of new resource procurement raises numerous problems for RTO markets. The issues are undoubtedly addressed in more detail by the RTO representatives in this proceeding, but two problems of particular concern are addressed by the proposals below. First, if most new entry is procured under contract instead of within the RTO's capacity auction, capacity prices will not reflect the true cost of meeting reliability requirements. As I have testified on several occasions to this Commission, capacity markets should, on average over time, clear at the cost of new entry, reflecting the fact that new generation is generally needed to balance load growth and retirements, and new generators must, over its economic life, have the opportunity to generate competitive returns for investors. Removing the very units that should be setting the capacity price undermines the long-term effectiveness of capacity markets and will likely lead to premature retirement of economic resources and to ever-increasing reliance on utility contracting to support needed new entry. Second, contracted resources typically earn a fixed price per megawatt-hour, and thus are insensitive to price signals in the RTO's energy markets. As the proportion of such resources grows, the frequency of negative LMPs, min-gen emergencies, and uneconomic curtailments will increase. Bringing most state Policy Resources back into the RTO markets will address both concerns.

I see two possible approaches to resolving this tension and integrating state policy preferences into RTO markets:

- First, the RTO markets definition of "least cost" could include an explicit price linked to the states' policy goals. For example, to implement states' carbon reduction policies, an RTO could charge a carbon adder in dispatch. The cost of the carbon adder, as well the earnings expected from including a carbon component in the LMP, would be reflected in generators' offers into the energy and capacity markets.
- Second, RTOs markets could forward procure energy from Policy Resources, running alongside or ahead of capacity markets. Such a "Forward Clean Energy Market" needs to be thoughtfully designed to provide these Policy Resources the correct incentives to operate in the RTO markets and to assure state policymakers that financial support for Policy Resources can be done more cost-effectively through the RTO.

One Approach: Direct Pricing of State Policies

From my perspective as an economist, most states' resource policies arise from a simple market failure: an externality, namely that generators' carbon emissions are largely unpriced.[1] Correcting this externality in the RTO markets is equally straightforward, at least mechanically: the RTO could impose a carbon adder on each generator, equal the product of (a) the unit's carbon emissions rate, (b) its energy output and (c) a tariff-set carbon price. Generators would be allowed to increase their energy offer prices by the carbon adder. The RTO would collect this carbon adder from each generator in settlement and flow this revenue back to customers through a mechanism that minimizes distortions on incentives. Nevertheless, electricity bills would rise, with the incremental revenue flowing back to zero- or low-emitting resources, providing the needed incentive to build new renewable resources and to maintain existing resources.

This tariff-based carbon adder is the functional equivalent of a carbon tax with full pass-through to customers. There is broad consensus among economists that a carbon tax is the most cost-efficient means to reduce carbon emissions. In particular, implementing the adder in RTO energy markets would help achieve state policy goals of reducing carbon emissions in several important ways:

1. The adder (potentially) reshuffles the energy bid stack, tilting the RTO's commitment and dispatch towards lower-emitting resources.
2. Hourly LMPs rise to reflect the marginal carbon intensity. (Some of this higher cost is offset by the flowback of the carbon adder to customers.) With carbon impacts now reflected in LMPs, demand response and storage both become more financially attractive and have an improved market signal about when to operate to reduce carbon emissions.
3. Higher average LMPs create higher energy margins for zero-emitting resources, encouraging new entry of renewables in the long-term, consistent with state policy goals.

Despite its potential merits, a carbon adder as the sole means to implementing state policy goals has several drawbacks, both economically and politically:

1. The carbon adder is applied only to the electric sector, thus working against the electrification of transportation and HVAC, which are policy goals of nearly every state.
2. Setting the carbon price will be contentious at several levels. Different states have different policies, but setting different carbon prices within an RTO footprint would be very challenging. More difficult yet is setting a carbon price that is reasonably likely to bring about the right quantity of state policy resources.
3. Because the carbon price is not market-based, potential renewable energy developers will heavily discount future earnings from the carbon adder, at least until they develop confidence in the stability of the design. Thus the carbon adder might not bring to the market

[1] All New England states, as well as New York and some PJM states, participate in the Regional Greenhouse Gas Initiative (RGGI), which creates a small carbon tax. The fact that these states all have other policies to support renewable power clearly indicates that the carbon price of RGGI alone is insufficient to meet state policy objectives.

the policy resources required at a reasonable price, putting us right back to state-directed procurements.

4. On a related point, suppliers of lower-emission resources, e.g. combined-cycle units, would, if they were risk-neutral, reflect higher expected earnings in the energy market by lowering their capacity offers, thus reducing or eliminating impacts to consumers' bills. Suppliers are not risk-neutral, though, and will therefore heavily discount future earnings from an untested carbon adder when offering into the capacity market.
5. The benefits in dispatch are likely to be small in RTOs—e.g., New England and California—where nearly all fossil-fueled resources are natural gas units and, therefore, there will be little reordering in the supply stack.
6. Most developers still need long-term contracts to secure project financing at reasonable rates. State-mandated PPAs provide not only a higher price to Policy Resources but also an assurance of many years' stability, a benefit that cannot be achieved directly by a carbon adder.
7. State regulators have expressed concern about putting a carbon tax into a FERC tariff, shifting control over key policy drivers from the states to the federal government.

So, although a carbon adder has many economic efficiency merits, its practical drawbacks in this context led the Conservation Law Foundation team, including me and Brattle economists Kathleen Spees and Judy Chang, to develop a supplementary financial instrument to address these deficiencies.

Achieving State Policies Through Forward Markets

After testing several ideas through extensive discussions during NEPOOL's Integrating Markets and Public Policy (IMAPP) process, we have developed a proposal that addresses most, if not all, of the concerns with a carbon-adder-only approach: the Carbon-Linked Incentive for Policy Resources (CLIPR). The CLIPR defines an energy price premium paid to a Policy Resource by ISO, with the cost collected from the responsible load-serving entity. A key feature is that the premium is not fixed, but instead varies in direct proportion to the Marginal Carbon Intensity (MCI) of the dispatch, a direct analog to the LMP but computed as lbs-CO_2/MWh instead of \$/MWh.

ISO would conduct annual auctions shortly before each annual capacity auction to clear resources in each Policy Resource category. The states (collaboratively, we may hope) define the characteristics of Policy Resources. There may be multiple categories of Policy Resources, reflecting differences between policies of the several states or specific goals, e.g. supporting nascent technologies. All resources clearing in a category receive the same clearing price; the market design is not set up with any intrinsic discrimination between, say, new and existing resources. Bids are submitted by the states or their load serving entities/utilities as price-quantity pairs, then aggregated by ISO to form downward sloping demand curves. Bids may be contingent, so that if a bid for a preferred category cannot be filled at the bid price then that quantity can be obtained from a lower tier category.

Resources are competing to obtain an annual purchase contract for a premium above LMP, the Variable Incentive (VI), for a defined quantity of energy. The VI is calculated hourly as:

$$VI_t = S \times \frac{MCI_t}{BCI}$$

where:

VI_t is the variable incentive payment per MWh at hour t;

S is the strike price at which the auction cleared ($/MWh);

MCI_t is the Marginal Carbon Intensity at hour t (lbs/MWh); and

BCI is the Benchmark Carbon Intensity, calculated by ISO prior to the auction based on the historical average marginal carbon intensity of the system. Going forward, it could be calculated as the average marginal carbon intensity of the delivered Policy Resource megawatt hours.

Costs of funding the CLIPR are allocated back to the load entities that bid and cleared in the auction. While the number of MWh delivered under the CLIPR are capped, the financial cost depends on the realized dispatch. This risk is like that of a Contract for Differences, however, and should not present any special difficulties to manage.

While a CLIPR does not fully replicate the stability of a long-term PPA, two market design elements enhance its bankability. First, bid quantities, once placed in the market, could not be reduced for some long duration, e.g. ten years. This "ratchet" ensures that the demand for a Policy Resource, once cleared in the market, is not pulled out soon after, leaving that resource without the opportunity to secure a revenue stream it reasonably expected. Second, multi-year price locks for new resources could be included, as they are in some RTOs' capacity markets.

The CLIPR auction would occur shortly before the initial capacity auction in the RTO (e.g. ISO-NE's FCA and PJM's BRA). The market monitor will treat CLIPR revenues as in-market revenue, thus lowering the expected offer price from these Policy Resources. As an inducement for states to shift to the CLIPR market, though, other exemptions for renewables should be phased out.

Benefits of the CLIPR Approach

Our design for the CLIPR directly addresses most of the issues noted above with the carbon adder. Specific benefits of CLIPR include:

1. The clearing price for a CLIPR is determined by the market, simultaneously removing administrative discretion and assuring that the prices paid are supporting the particular Policy Resources demanded.
2. The Variable Incentive is likely to be zero in all hours with negative prices (as the marginal resource is likely to be zero-emitting). CLIPR, therefore, does not create incentives to bid negative values into the energy market.
3. Delivery rights under a CLIPR can be traded bilaterally. For example, a storage owner could buy energy and the associated CLIPR delivery rights from a Policy Resource overnight,

when both the energy and hourly Marginal Carbon Intensity are low, and sell energy back to the RTO at a time when the energy and Variable Incentive values are higher.

4. Only Policy Resources receive a premium price, so there is no windfall to owners of existing non-Policy Resource units.
5. CLIPR includes multi-year features (bid quantities and price locks) to enhance financing of new projects.
6. Although the RTO administers the markets and settlements, the states make the determination over quantities and maximum prices.
7. Each state bears responsibility only for the costs directly associated with its policy procurement.

This last point does not, however, hold strictly true when the positive externalities of installing more renewables are considered. An aggressive expansion of the renewables fleet funded by one state lowers the LMPs for the entire RTO. For example, a study I testified to in Massachusetts showed that adding the 468 MW Cape Wind offshore wind farm would lower LMPs across New England by about $1/MWh (owing in part to a favorable correlation of wind conditions and peak prices). There would also be a substantial reduction in capacity prices created by inserting hundreds of megawatts of zero-priced capacity. While more than half of these savings would be realized by consumers in the other five New England states, the costs would be borne entirely by Massachusetts rate payers.

One way to mitigate this effect is to combine the CLIPR market with the carbon adder. In this case, the carbon adder would be set at a low level, calculated by the RTO, intended to leave the average LMP unchanged from what would have prevailed but for the Policy Resources procured by other states—easier said than done, I appreciate, but in concept this approach would leave states with no environmental policy no better or worse off, while the presence of the carbon adder would lower the cost of the CLIPRs to those states securing Policy Resources.

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