Role of Retail Regulation in Demand Response

by

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Overview

- This presentation addresses the issue of jurisdictional authority over demand response – FERC vs. the States.
- The answer depends on the nature of the product provided by the demand response.
- Also discussed are the consequences of FERC Order 745 for retail demand response programs.
- In addition, the impact of an inevitable game-changer, the "energy-only" market is discussed.
- It concludes that over time the jurisdictional authority of State regulators over demand response is likely to increase.

Jurisdictional Authority

- All demand response is produced by end-use consumers, i.e., retail customers.
- Retail regulators have authority over demand response that are retail products, i.e., transactions between retail customers and their LSEs.
- Demand response becomes a wholesale product only if it is sold into a wholesale market by either the retail customer's LSE or by an ARC.
  - Retail customers cannot directly trade in wholesale markets.
  - Large customers, like Alcoa, typically set up subsidiaries that are LSEs dedicated to serving one retail customer (the parent).

Jurisdictional Authority

- Retail regulators cede jurisdiction to FERC when demand response becomes a wholesale market product.
- However, retail regulators control which forms of demand response become wholesale market products, and under what conditions, because:
  - they regulate the demand response provider's LSE
  - they decide whether ARCs can participate in their jurisdictions and what rules the ARCs must follow.
- Thus, retail regulators have ultimate authority over demand response because they can prohibit (or reverse) its conversion into wholesale products at any time.

Types of Demand Response

- Demand response (DR) is defined as a reduction in electric energy consumption in response to an energy price increase or to an incentive payment.
- DR can provide three different physical services:
  - Economic DR (reducing load in response to the energy price)
  - Reliability DR (interrupting load when supply is scarce)
  - Ancillary Services DR (contingency reserve and regulation).
- The key difference between a wholesale or retail product is that the former must be centrally coordinated, whereas the latter does not.

Economic Demand Response

- Economic demand response is inherently a retail product because it can be coordinated solely by energy market price signals.
- This can occur either through:
  - retail tariffs that include real-time pricing
  - LSEs that selectively interrupt their customers' loads based on wholesale energy market prices.
- Economic demand response becomes a wholesale product when it is resold into the wholesale market by a retail customer's LSE or by an ARC.

Economic Demand Response

- Retaining economic demand response as a retail product offers advantages over converting it to a wholesale product because:
  - it avoids the marketing and administrative costs that ARCs introduce
  - it avoids the need for "measurement and verification" protocols along with the associated costs, gaming potential and disputes over compliance
  - it allows symmetric application to both times of low energy prices (when consumption should be encouraged) as well as high energy prices (when consumption should be discouraged).

Economic Demand Response

- FERC Order 745 introduced an obstacle to retail economic demand response programs by overcompensating demand response sold through ARCs.
  - ISOs must pay ARCs full LMP with no reduction for the savings to retail customers from avoiding payment under their tariffs.
- Retail customers will generally prefer selling demand response through an ARC, rather than to their LSEs.
  - The LSE can only pay its customer up to (LMP – tariff price).
  - In contrast, a customer selling to an ARC will receive LMP – F (where F is the ARC's fee) and will also avoid paying its LSE the marginal price in its retail tariff ("G").
  - Thus, the customer will sell to the ARC if G > F.

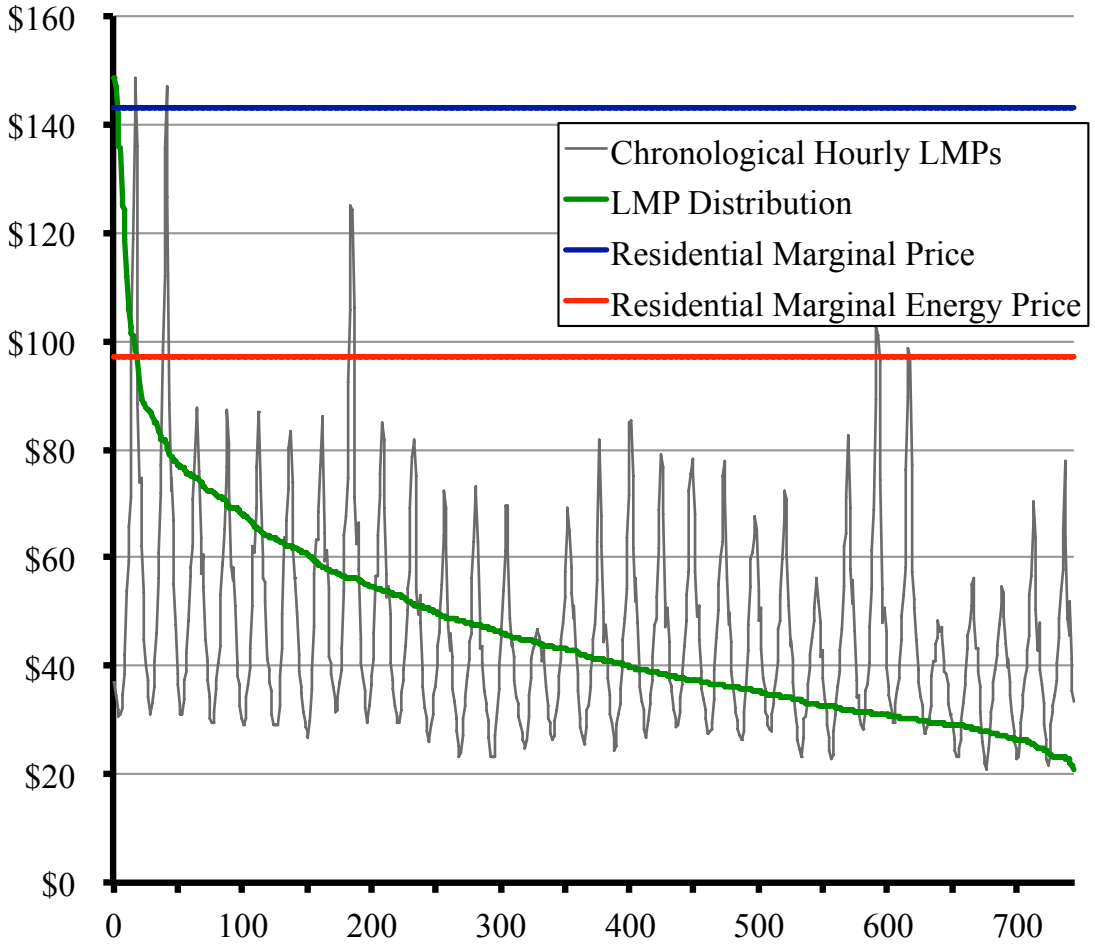
Economic Demand Response

NUMERIC EXAMPLE

- For a large C&I customer taking power at a high voltage, G ≅ LMP, which will always exceed F (since F ≅ .2*LMP)
- For a small residential customer served by Pepco - MD in August 2011, G ≅ $140/MWh, whereas Pepco zonal LMPs ranged from $21 to $149/MWh.
- Thus, both large C&I customers and small residential customers will almost certainly prefer selling economic demand response to ARCs rather than to their own LSEs.
  - Selling to the LSE becomes attractive only if .2*F > G, i.e., if the zonal LMP exceeds ***$745/MWh***.

Economic Demand Response

Pepco-MD Residential Marginal Tariff Price vs. LMPs



Economic Demand Response

- If ARCs were paid the efficient price of LMP – G for economic demand response it is unlikely that they could compete with retail economic demand response programs employing dynamic rates.
  - LSEs would not the marketing and M&V costs that ARCs do, thus could pass these savings on to their customers.
- Nonetheless, ARCs would still play a role in providing capacity and ancillary services as these demand response products are not subsidized.

Reliability Demand Response

- Capacity markets require centralized coordination; therefore reliability demand response is a wholesale product.
- Retail customers that commit to reducing load during emergency events may sell those commitments to their LSEs or to the capacity market through ARCs.
- ARC participation offers several advantages:
  - prevents LSEs from undercompensating their customers, thereby stimulating more demand response
  - Overcomes LSE disincentives to substituting demand response for "iron in the ground"
  - ARCs can diversify across LSE serve areas (portfolio effect).

Reliability Demand Response

- PJM is proposing to allow LSEs (or ARCs) to claim capacity credit for Price Response Demand (PRD) if:
  - the LSE subjects a subset of customers to dynamic energy prices
  - the LSE submits a reasonable estimate of the load reduction that will occur when the LSE's zonal LMP reaches $1,000/MWh
  - the LSE agrees to achieve that load reduction through involuntary interruptions if customer price response is less than estimated.
- Because PRD is a product created by the LSE, its retail regulator must authorize and oversee its creation.
- However, once PRD is offered into a wholesale capacity market it becomes a wholesale product subject to FERC jurisdiction.

Reliability Demand Response

- Capacity markets are not necessary to achieve power system resource adequacy; energy-only markets successfully operate today (e.g., ERCOT and Alberta).
- Energy-only markets achieve resource adequacy by allowing energy prices to rise sufficiently above the marginal cost of a new peaking generator to allow the generator to fully recover its costs and earn a fair profit.
- Transitioning to energy-only markets requires:
  - demand response to compete with supply for capacity credit
  - energy prices to be set by the demand side during times of supply scarcity (i.e., "scarcity pricing")
  - PRD to moderate price spikes (for customer/regulator acceptance).

Reliability Demand Response

- The transition to energy-only markets is very likely.
  - The first prerequisite has largely been achieved for large customers
  - The second two are in the pipeline
  - The necessary PRD may already be achievable through dynamic rates without installing smart meters because most large C&I customers already have interval meters.
- Since energy-only markets substitute retail economic demand response for capacity resources they also supplant FERC jurisdiction.
- Energy-only markets empower retail customers to directly determine how much resource adequacy each wants, thereby obviating the need for centrally planned requirements.

Ancillary Services Demand Response

- As mentioned earlier, demand response currently provides two types of ancillary services:
  - Regulation (i.e., compensating for minute-to-minute random variations in demand and supply)
  - Contingency Reserves (i.e., customer loads standing by to curtail within 10 minutes if a large generator or transmission line feeding energy to the system suddenly fails).
- Both of these services require central coordination, thus are wholesale market products.
  - While it might be possible for each LSE to self-provide these services, it would not be cost-efficient to do so.

Conclusions

- There is, and will remain a significant role for retail regulators in the development and oversight of demand response.
- This role will further increase in the future when energy-only markets emerge and (if) FERC Order 745 is overturned.
- Nonetheless, the coordination between retail regulators and the FERC will still be needed to maximize the value of demand response to retail customers.

That's all Folks!

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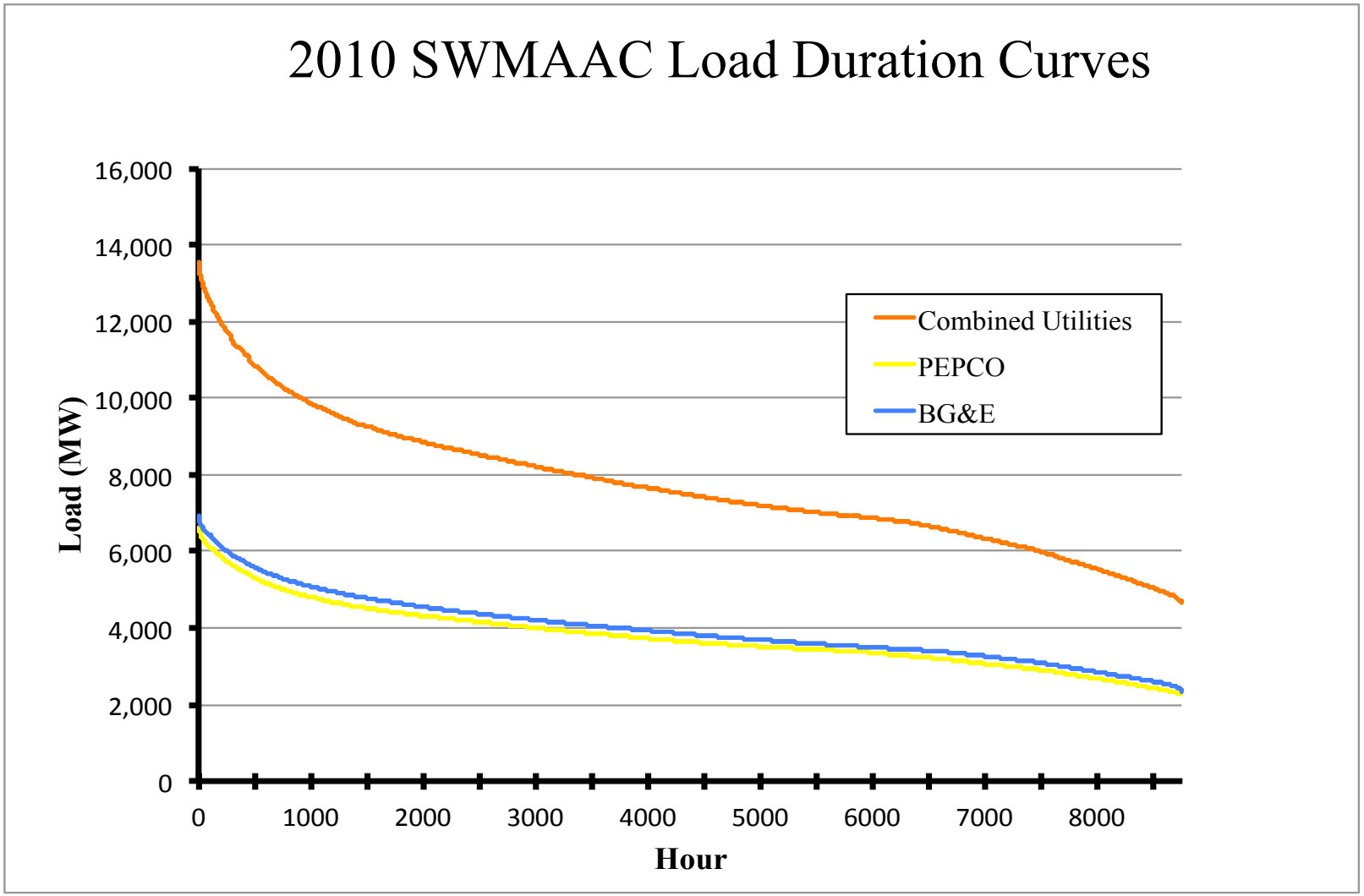
Transitioning to Energy-Only Markets

- Transitioning to energy-only markets requires demand response to be substituted for generating capacity until building new peaking generators is justified solely by the revenues earned from energy and ancillary services sales.
- When that condition is fulfilled capacity payments will no longer be needed.
- This condition will produce the optimal levels of generation *and DR resources* because both will be equally supported by the same energy and ancillary service prices.
- Let's examine how it might work in the SWMAAC region of PJM, predominately served by BG&E and Pepco.

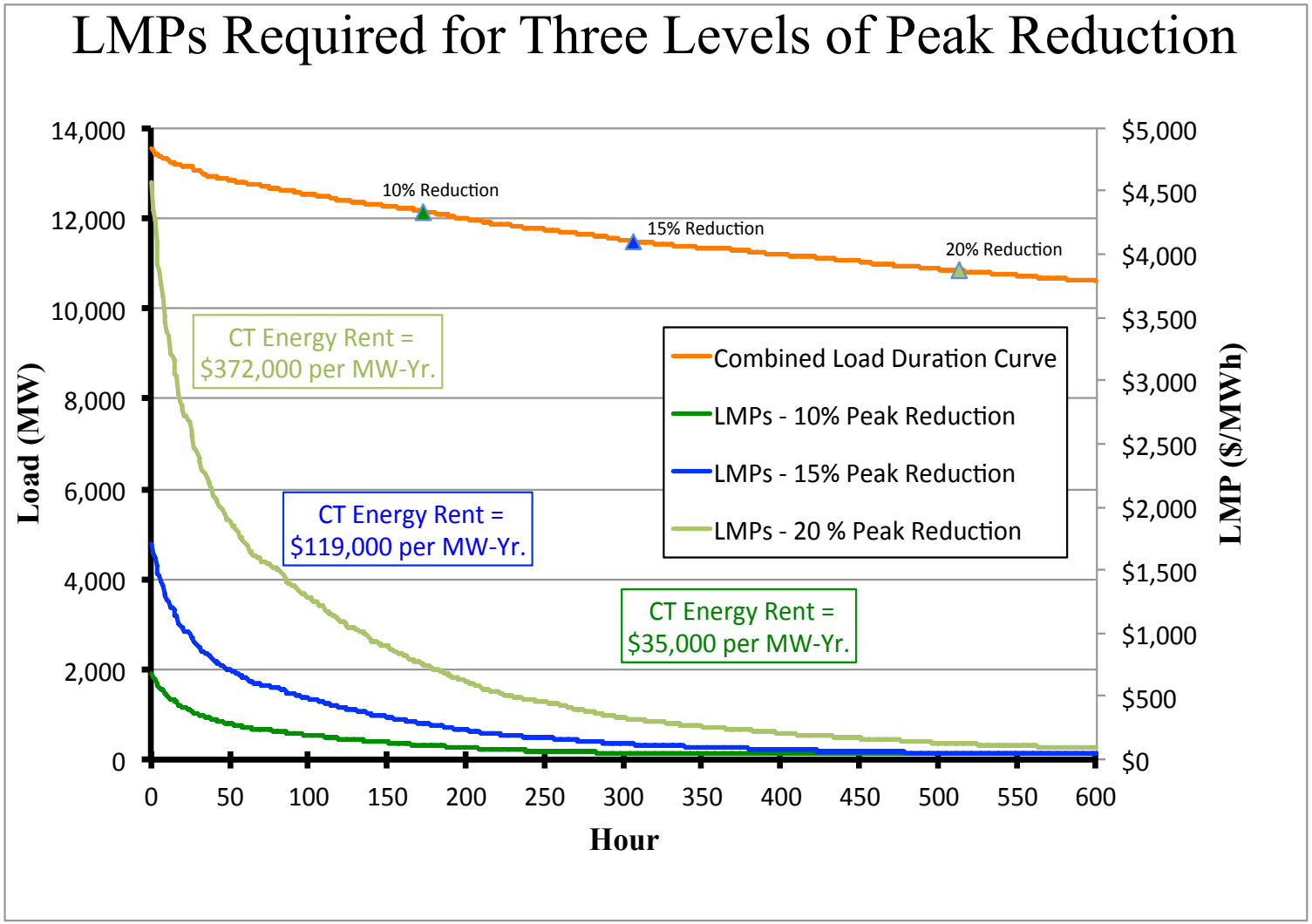
Transitioning to Energy-Only Markets



Transitioning to Energy-Only Markets

- Consider three levels of peak load reduction in SWMAAC: 10, 15 and 20 percent.
- For each level the LMP required to achieve the desired peak load reduction can be "discovered" through the following method:
  - calculate the LMP needed to shave the peak by a chosen reduction level based on Pepco and BG&E 2010 retail tariffs and assumed price elasticities of customer classes
  - determine the energy rents that a new natural gas-fired combustion turbine would have earned in 2010
  - repeat for the other two peak reduction levels.
- The next figure presents the results of these calculations.

Transitioning to Energy-Only Markets



Transitioning to Energy-Only Markets

- Relatively moderate LMPs would have achieved a 10 percent reduction in peak demand.
- But at these LMPs a new gas-fired combustion turbine would only earn energy rents of about $35,000 per MW-Yr., which is clearly insufficient to incent new entry.
  - The Brattle Group has estimated that a new CT in SWMAAC requires about $103,300 per MW-Yr. (real 2015 dollars).
- For a 15 percent reduction new gas-fired combustion turbines would earn energy rents of about $119,000 per MW-Yr., which is just above Brattle's CONE estimate.
- A 20 percent reduction was unachievable because new generation would have entered the market to preclude that.