



Using Demand Response Programs to Benefit the Customer and the Utility

**Patrick J. Oshie, Commissioner
Washington Utilities & Transportation
Commission**

What is Demand Response?

➤ *Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.*

– FERC 2008 Demand Response Assessment

Common Types of Demand Response Programs

Price Options	Incentive- or Event-Based Options
TOU Rates: Rates with fixed price blacks that differ by time of day.	Direct load control: Customers receive incentive payments for allowing the utility a degree of control over certain equipment.
CPP: Rates that include a pre-specified, extra-high rate that is triggered by the utility and is in effect for a limited number of hours.	Demand bidding/buyback programs: Customers offer bids to curtail load when wholesale market prices are high.
RTP: Rates that vary continually (typically hourly) in response to wholesale market prices.	Emergency demand response programs: Customers receive incentive payments for load reductions when needed to ensure reliability.
	Capacity market programs: Customers receive incentive payments for providing load reductions as substitutes for system capacity. Interruptible/curtailable: Customers receive a discounted rate for agreeing to reduce load on request.
	Ancillary services market programs: Customers receive payments from a grid operator for committing to curtail load when needed to support operation of the electric grid (i.e., ancillary services).

CPP = critical peak pricing; RTP = real-time pricing; TOU = time of use.

Source: National Action Plan for Energy Efficiency, 2010

What Demand is Responding?

- Lighting
- Space cooling
- Space heating
- Water heating
- Industrial processes
- Irrigation
- At the limit, whatever customer can do



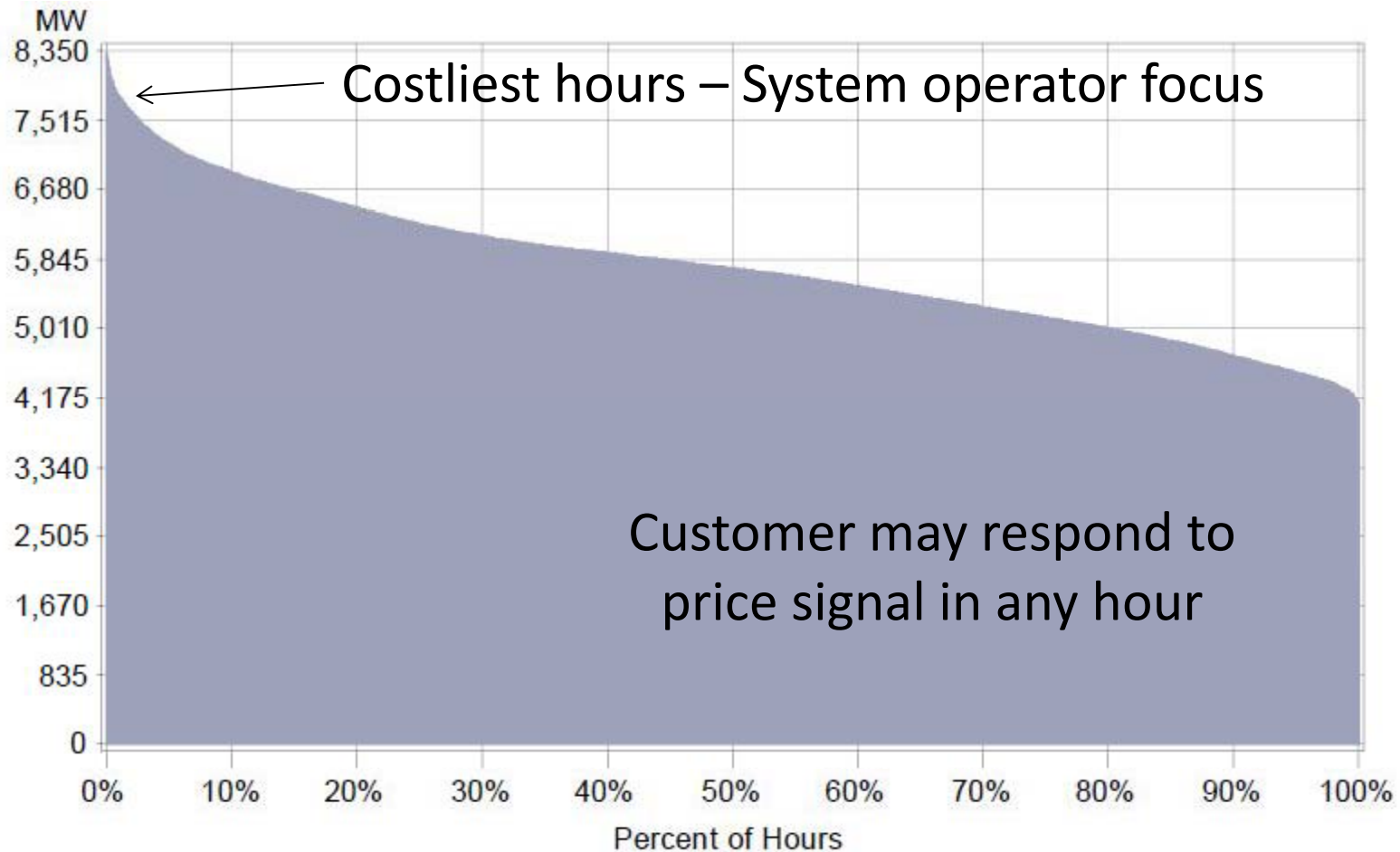
Demand Response Benefits

- Avoided generation capacity costs
- Avoided energy costs
 - Including line losses
- Better asset utilization
- Potential environmental benefits
- Reliability benefits
- Deferred/avoided investments in T&D



See “Guidelines for Cost-effectiveness Valuation Framework for Demand Response Resources in the Pacific Northwest – Pacific Northwest Demand Response Project”

Utility System Load Duration Curve



Demand Response Program Costs

- Utility costs for enabling equipment, IT, information management, billing, marketing, education and contracted experts
- Payments to customers (if applicable)
- Customer costs
 - Investments to curtail peak loads/shift demand
 - Any reduced service levels or reduced production

Utility Concerns About Demand Response

- Reliability
- Reduced need for large assets
- Reduced sales
- Changes in relationship with customer
- Understanding how to do demand response well
 - Pricing/incentives
 - Technology
 - IT, information management and billing systems

Reliability of Demand Response

- If mandatory for customer
 - Controlled by utility or grid operator
 - May be through curtailment service provider
 - Contract-based
 - Specified number and duration of events, damages
- If voluntary for customer
 - Based on historical performance
 - Persistence over a series of events
 - Automation helps (set it and forget it)
 - For example, dispatch pricing signal to programmable communicating thermostat set by customer

Policies That Promote Demand Response

- Treat demand response comparably with other resources in integrated resource planning, resource acquisition, T&D planning and markets
- Address utility disincentives – e.g., through decoupling
- Offer all customers a way to participate
 - Access to useful energy consumption data, evaluation tools and targeted advice
 - Dynamic pricing if advanced metering infrastructure is in place
 - Automated controls through marketplace (foster innovation)
 - Incentives for other types of demand response programs
- Adopt interoperability standards for devices and systems
- Address privacy and cyber-security concerns



Smart Grid Opens the Door to Broad Customer Engagement

Traditional DR

- Primarily utility control
- Focuses on a few end uses
- Limited customer options
- Participation incentives requires
- Primary focus on retail markets

Smart Grid DR

- Customer control
- All end uses
- Unlimited options
- Advanced meters enable dynamic pricing for all
- Wholesale and retail markets linked

Adapted from Roger Levy, Charles Goldman and Rich Sedano

How Demand Response Fits Into Markets

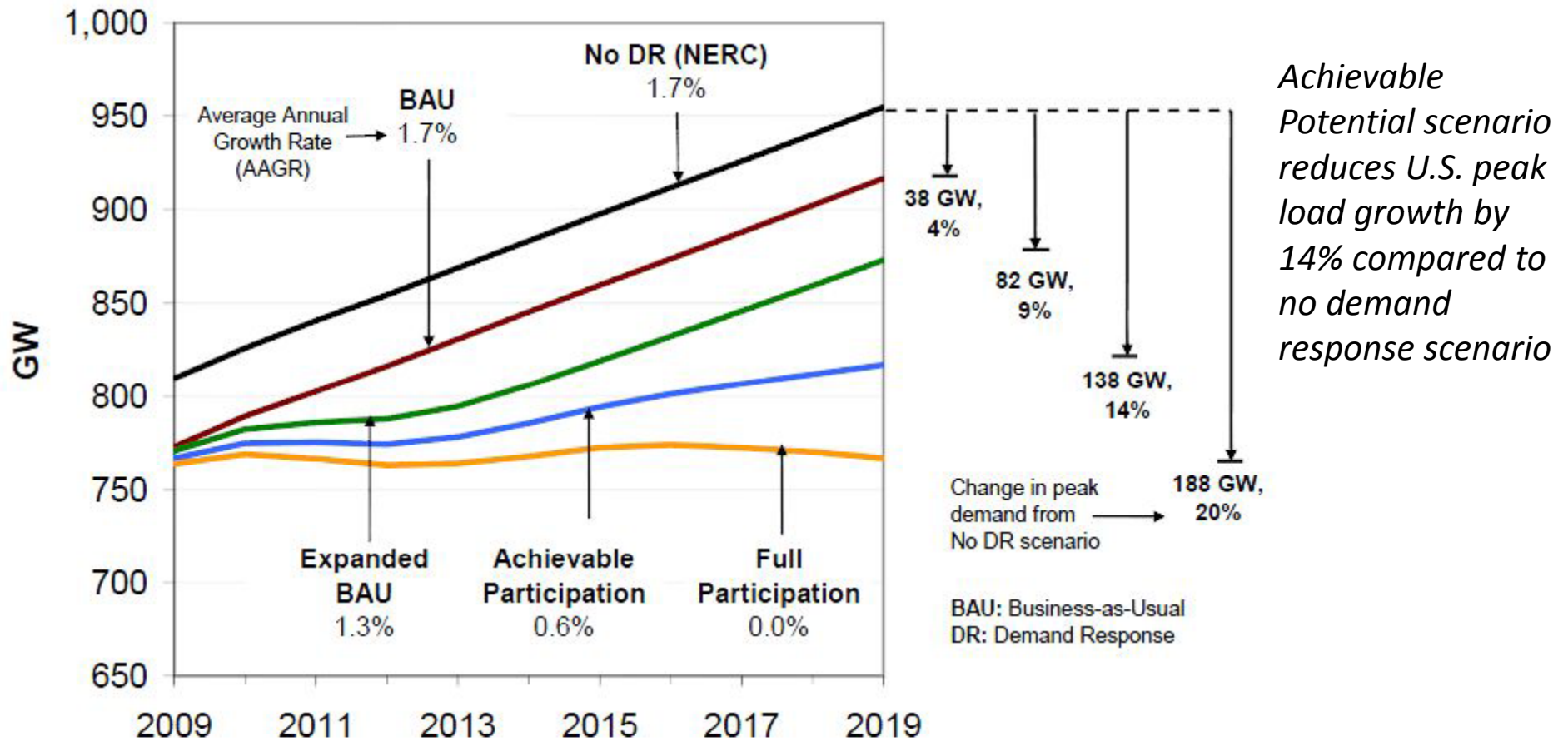
- Reduces prices in energy markets
 - Clearing prices lower with price-responsive demand
- Reduces prices in capacity markets
 - 9,282 MW cleared in PJM 2013/14 auction (6% of capacity);
~63% of cleared DR in higher-price, transmission-limited regions
 - 3,349 MW cleared in ISO-NE 2013/14 auction (9% of capacity)
- Provides ancillary services – e.g., non-spinning reserves
 - Maintain reliability at lower cost

**Effect of Demand-Side Resources on PJM Capacity Market Clearing Price
2012/2013 Base Residual Auction**

Actual Auction Results		Calculated Results Without Demand-Side Resources		Savings (\$/MW-day)
<i>Clearing Prices (\$/MW-day)</i>	<i>Cleared Unforced Capacity (MW)</i>	<i>Clearing Prices (\$/MW-day)</i>	<i>Cleared Unforced Capacity (MW)</i>	
\$16.46	136,143.5	\$178.78	133,568.2	\$162.32

Source: PJM independent market monitor – includes demand response and energy efficiency

FERC Demand Response Potential Assessment



Growth in U.S. Peak Demand by DR Scenario