



Update to ISO-NE Load Response Program

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Agenda

- I What is Demand Response?
- II Why is Demand Response important to our region?
- III Why is Demand Response important to my company?
- IV How do the Demand Response programs work?
- V Who participates?
 - How to participate?
 - Why participate?
- VI What's ahead?



I) What is Demand Response?

- Customers taking predefined actions toward reducing their electric load (kW) in response to either **price** or **system reliability** event. As a consequence of reducing load, electric consumption will be reduced.
- Customers being **paid** for consumption reduction based on wholesale market or preset “Guaranteed” minimum prices (whichever is greater).
- One of the 4 Pillars of a Balanced Market
 - Market Structure
 - Energy Supply
 - Demand Response
 - Transmission
- A way to obtain lower retail energy supply rates.



II) Why is Demand Response important to our Region?

- **Reliability Benefits**
 - Demand Response is a resource to solve short-run planning and reliability problems
 - Accommodates economic growth within existing infrastructure.
 - 1 MW of Demand Response = 1 MW of Generation
- **Regional Economic Benefits**
 - Short-Term: Reduces spot market price spikes
 - Long-Term: Reduces price volatility, risk and lowers prices
 - Limits the energy suppliers power to control rates
 - **Gives Customers “Choice” of energy supply rates**
- **Environmental Benefits**



III) Why is Demand Response important to my company?



The Rest of the Story, Making the Business Case for Demand Response

D E M A N D R E S P O N S E



Integrated Energy Management

Energy Efficiency

Demand Response

Supply Management



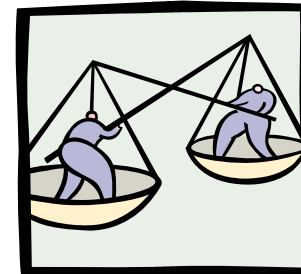
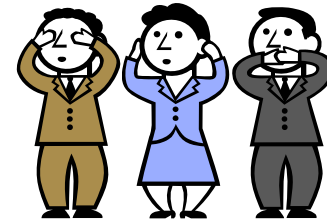
The Three Pillars

- **Energy Efficiency** – Managing energy consumption and energy assets.
- **Demand Response** – Managing load shape.
- **Supply Management** – Managing the supplier relationship and risk.



Supply Management and Demand Response

- **Yesterday:** Prices set by the Regulator. Customers had little interest in the wholesale markets.
- **Today:** Prices set by the Supplier and Customer. Customers have the option of being connected with the wholesale markets





Supply Management and Demand Response – Customer’s Perspective

- **It’s all about risk management!** The price a customer pays for electricity is based on:
 1. The customer’s **credit**
 2. The customer’s **timing** (when they decide to shop for a supplier)
 3. The customer’s **load shape** (how much electricity they use each hour of the day)



Customer's Perspective (Continued)

- Customers who can not control **when** they use electricity transfer risk to their supplier.
- The supplier must assume the risk that at any point in time the customer can increase their consumption without any consideration for the supplier's wholesale costs.
- **Higher risk translates into a higher retail price.**



Customer's Perspective (Continued)

- Customers who participate in a Demand Response Program can:
 - Manage their hourly usage,
 - Respond to wholesale prices or reliability events, and
 - Help lower their supplier's risk.
- **Lower risk translates into a lower retail price.**

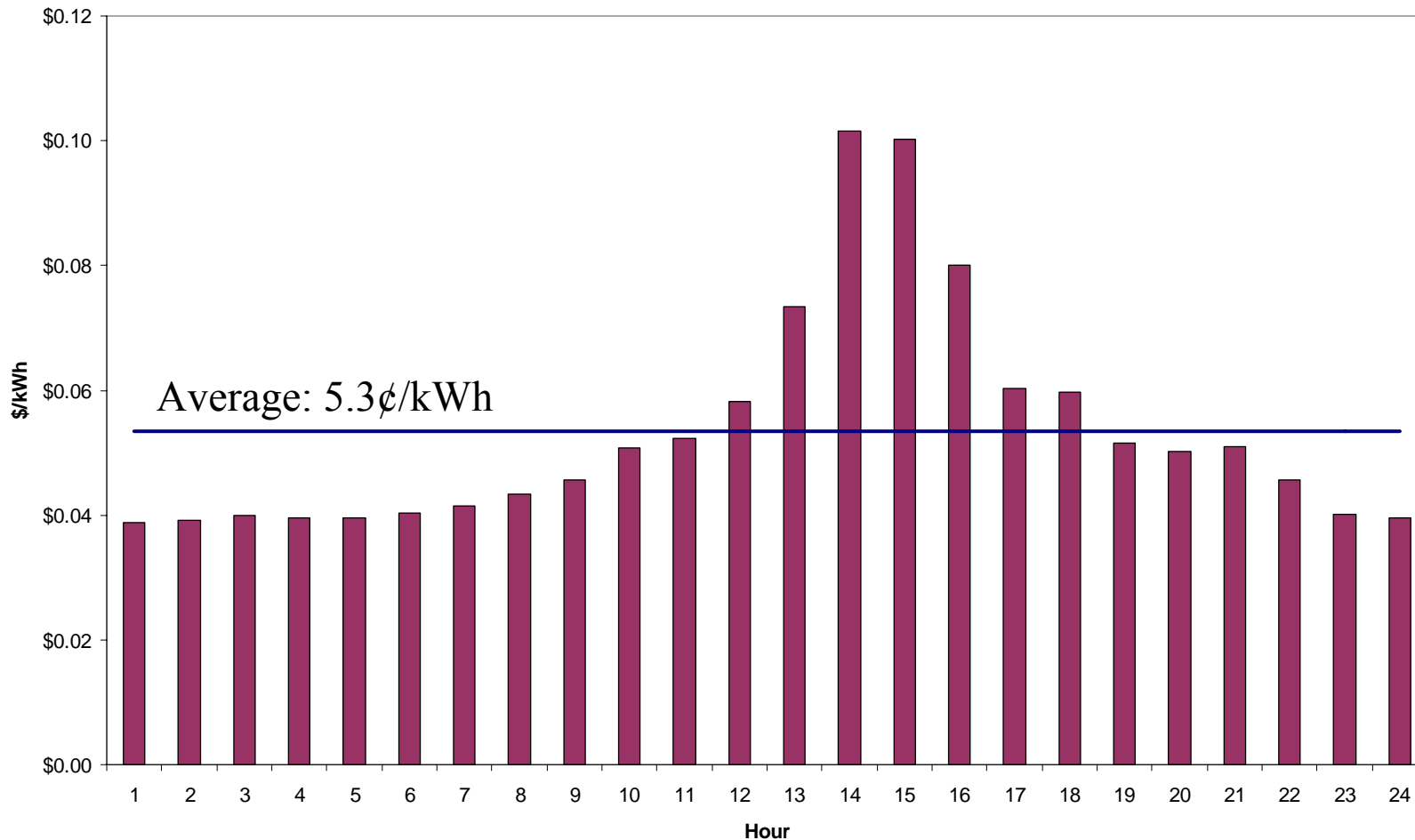


Improving Load Shape Lowers Retail Price

- Different Customers
- Identical Consumption
- Different Load Shapes
- Different Retail Prices

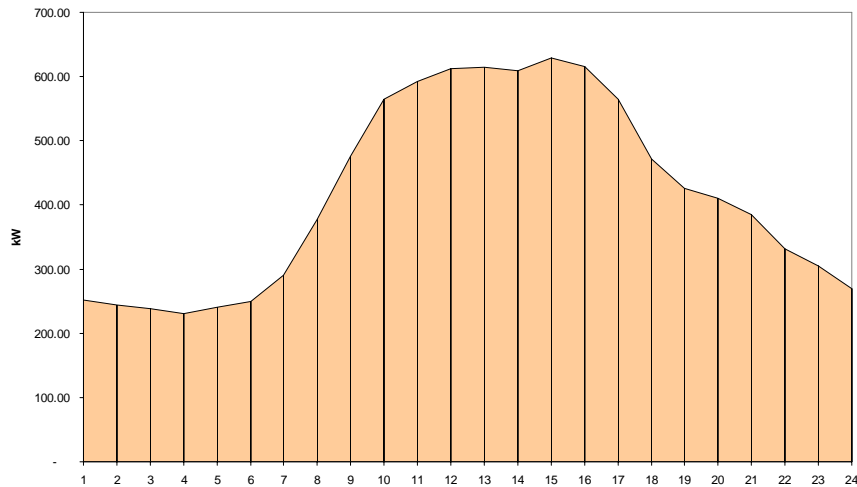


Hourly Real-Time Wholesale Prices

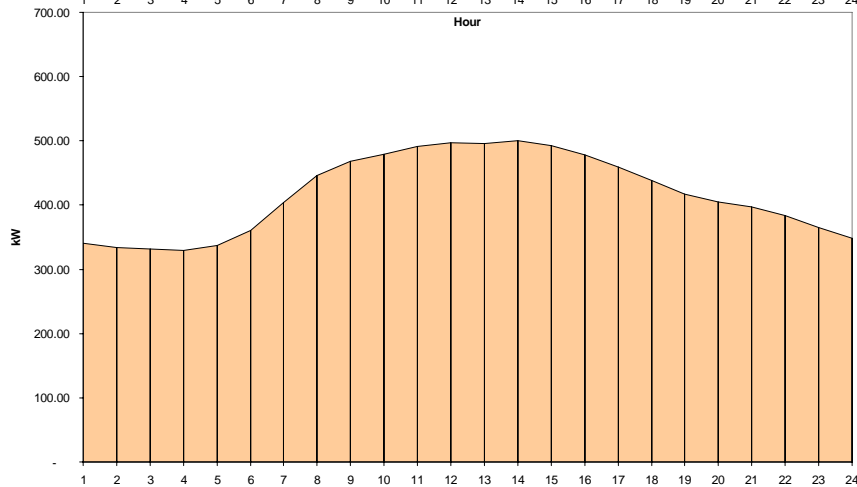
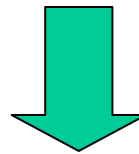




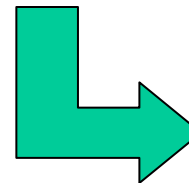
Both Customers use 10,000 kWh



Customer A pays
\$585 averaging
5.8¢ per kWh



Customer B pays
\$554 averaging
5.5¢ per kWh



Flatter Load Shape
5.3% Savings



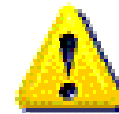
Load Shape and Retail Price

- The more electricity you use when your supplier's costs are high, **the higher your price.**
- The less electricity you use when your supplier's costs are high, **the lower your price.**
- If you want to manage your retail price - **manage your load shape.**
- If you want to manage your load shape - **participate in Demand Response**



IV) How do Demand Response programs work?

Program Types:



- **Reliability (Demand) Programs:**

- Customers respond to System Reliability Conditions as determined by the ISO New England Control Room



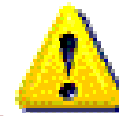
- **Price Programs:**

- Customers respond to Wholesale Spot Prices as determined by the Market.



Supplemental Payment Programs for 2005

Program Types:



- **Reliability (Demand) SWCT Program Supplemental:**

- 30 Minute Customers will be paid \$20/kW for June, July, August, and September.
- 2 Hour Customers will be paid \$10/kW for June, July, August, and September.



- **Statewide Pilot Price Program Supplemental:**

- During an event hour if the LMP exceeds \$0.25/kWh, Customers will be paid an extra \$0.50/kWh for participating each event hour that exceeds \$0.25/kwh.



Demand Response Program

Who?	Individual or Groups (Minimum 100kW reduction)
When?	Respond to ISO Control Room Request
How fast?	Within 30-Minutes or 2-Hours of ISO request.
How much?	Energy Payment: Greater of Real-Time Wholesale Price or Guaranteed Minimum \$0.50/kWh for 30-Minute Response and \$0.35/kWh for 2-Hour Response.
How long?	Minimum 2-Hour guaranteed interruption
Metering?	5-Minute usage data sent to ISO NE via the internet



30-Min Demand Response Program Example (Real time Metering Required) With Supplemental

Enrolled Load Reduction Amount	2,300 kW
Supplemental \$20/kw	\$184,000 June, July, Aug. Sept.
Event Days per Year	1 Day
Hours per Event Day	6 Hours
Hours per Year	6 Hours
Minimum Energy Payment	\$0.50/kWh
Electricity Supply Price	\$0.06/kWh
Minimum Energy Payment	\$6,900.00
Avoided Electricity Purchase	<u>\$828.00</u>
Total Annual Benefit	\$191,728.00



What does **100 kW** load look like?

1,250	17” Computer Monitors
1,000	100 Watt Incandescent Bulbs
910	2’ x 4’ T8 Fluorescent Fixtures
530	150 Watt Metal Halide Fixtures
230	Vending Machines
130	HP Electric Motors @ Full Load
90	Tons of HVAC



Price Response

Who?	Individual or Groups (Minimum 100kW reduction)
When?	Notified by ISO that wholesale prices are forecasted to exceed \$0.10/kWh either the night before or morning of the event day.
How fast?	Voluntary! Customer decides when and for how long.
How much?	Greater of Real-Time Wholesale Price or Guaranteed Minimum \$0.10/kWh.
How long?	Price response “window” open as early as 7AM and remains open until 6PM.
Metering?	<p>Hourly Meter – Meter that records your usage every hour.</p> <p>Hi tech metering – Real time</p> <p>Low tech – hourly via phone line</p> <p>Super low tech – Manual meter read (Meter must be capable of being “read” electronically with a hand held reader).</p>



Price Response Example With Supplemental

(Hours when Energy Price exceeds \$0.25/kWh)

Load Reduction Amount	100 kW
Event Days per Year	5 Day
Hours per Event Day	2 Hours
Hours per Year	10 Hours
Energy Payment	\$0.26/kWh
Supplemental Payment	\$0.50/kWh
Avoided Electricity Supply Price	\$0.06/kWh
Energy Payment	\$260.00
Supplemental Payment	\$500.00
Avoided Electricity Purchase	<u>\$60.00</u>
Total Annual Benefit	\$820.00



Price Response Example Non-Supplemental

Load Reduction Amount	100 kW
Event Days per Year	45 Day
Hours per Event Day	6 Hours
Hours per Year	90 Hours
Guaranteed Minimum Energy Payment	\$0.10/kWh
Avoided Electricity Supply Price	\$0.06/kWh
Minimum Energy Payment	\$1,800.00
Avoided Electricity Purchase	<u>\$1620.00</u>
Total Annual Benefit	\$4,320.00

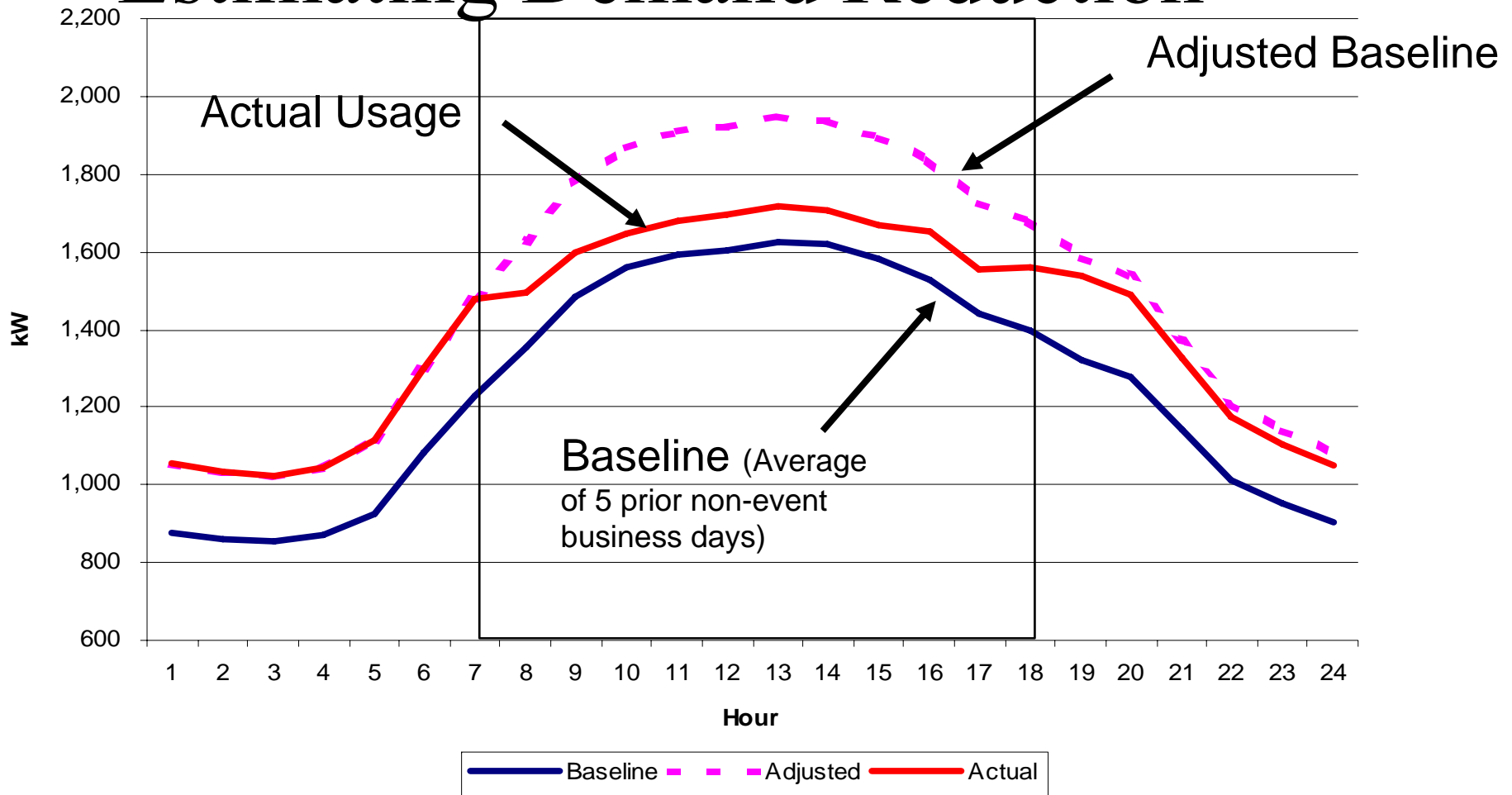


Example 3: Pharmaceutical Company

- Price Response Program
- Participated in thirty (30) event days from January through March 2005
- Total of 239 hours of Demand Reduction
- Average Demand Reduction: 1.3 MW
- Average Payment Rate: \$0.104/kWh
- **Total Energy Payment: \$34,000**



Estimating Demand Reduction





Metering Options

- **Internet Based Communication System (IBCS) ~ Real-Time metering**
 - 5-Minute Usage Data, Event Notification, Internet Access to Usage and Performance.
 - Financial subsidies available from ISO-NE - \$2,200 to \$2,800 (for Real-Time meter hardware).
 - Financial subsidies available from CL&P -\$1,500 SWCT and \$1,000 Non-SWCT (for real-time meter installation/setup)
- **Low Tech and *Super Low Tech* Option:**
 - Hourly data sent to ISO NE either every day or within 3 months of an event.
- **Customized Metering Plans in 2005:**
 - Data from EMS or sub-metering system
 - Statistical sampling allowed
 - Flexibility: Monitor kW, operating times, on/off status, etc.



New for 2005



Annual Audit

- All programs will be activated at least once per year as a test.
- Customers will be paid for the Audit Event
- Only ISO New England will know the difference between an Audit Event and a Real Event.
- Price and Demand Supplemental Programs.



New for 2005



Metering Subsidies for Smaller Facilities

- \$/kW Basis
- Minimum 25kW per Site
- Maximums Apply
- Smaller Sites must be Aggregated to achieve 100 kW

Load Reduction per Site (kW)	Maximum Hardware Reimbursement for Real-Time Demand Programs	
	With Customer Supplier LAN	Without Customer Supplied LAN
25	\$ 550	\$ 700
50	\$ 1,100	\$ 1,400
75	\$ 1,650	\$ 2,100
100	\$ 2,200	\$ 2,800
500	\$ 2,200	\$ 2,800



New for 2005



5-Day Initial Baseline

- Initial Baseline reduced from 10 business days to 5 business days.
- Customers eligible to participate within 5 business days of the start of ISO New England receiving their hourly data.
- Customers must have an hourly meter installed **before** they are eligible to participate.



Program Benefits: Use Demand Response Pricing to Get in Shape for Energy Supply !

- Short-Term
 - Paid for Performance
 - Minimum Payment \$0.10 to \$0.50/kWh
- Long-Term
 - Better Load Shape = Better Retail Price

*** Demand Programs Only**



Customer Characteristics

- Average Building Size: 300,000 to 500,000 Sq. Ft.
- Average Peak Monthly Demand: 2.5 MW
- Company Size:
 - Majority have less than 1,000 employees
 - 1/3 have less than 100 employees
- Air Conditioning and Refrigeration
 - 80% of Price Response Customers
 - 40% of Demand Response Customers
- Emergency Generator
 - 70% of Demand Response Customers
 - 45% of Price Response Customers



Customer Characteristics (Continued)

- Most customers spend less than 10% of their time Buying and Managing Energy
- Electricity represents greater than 5% of the their Total Operating Costs
- Over 90% have made investments in Energy Efficiency in the past 5 years.
- Approximately 50% have installed Energy Management Systems



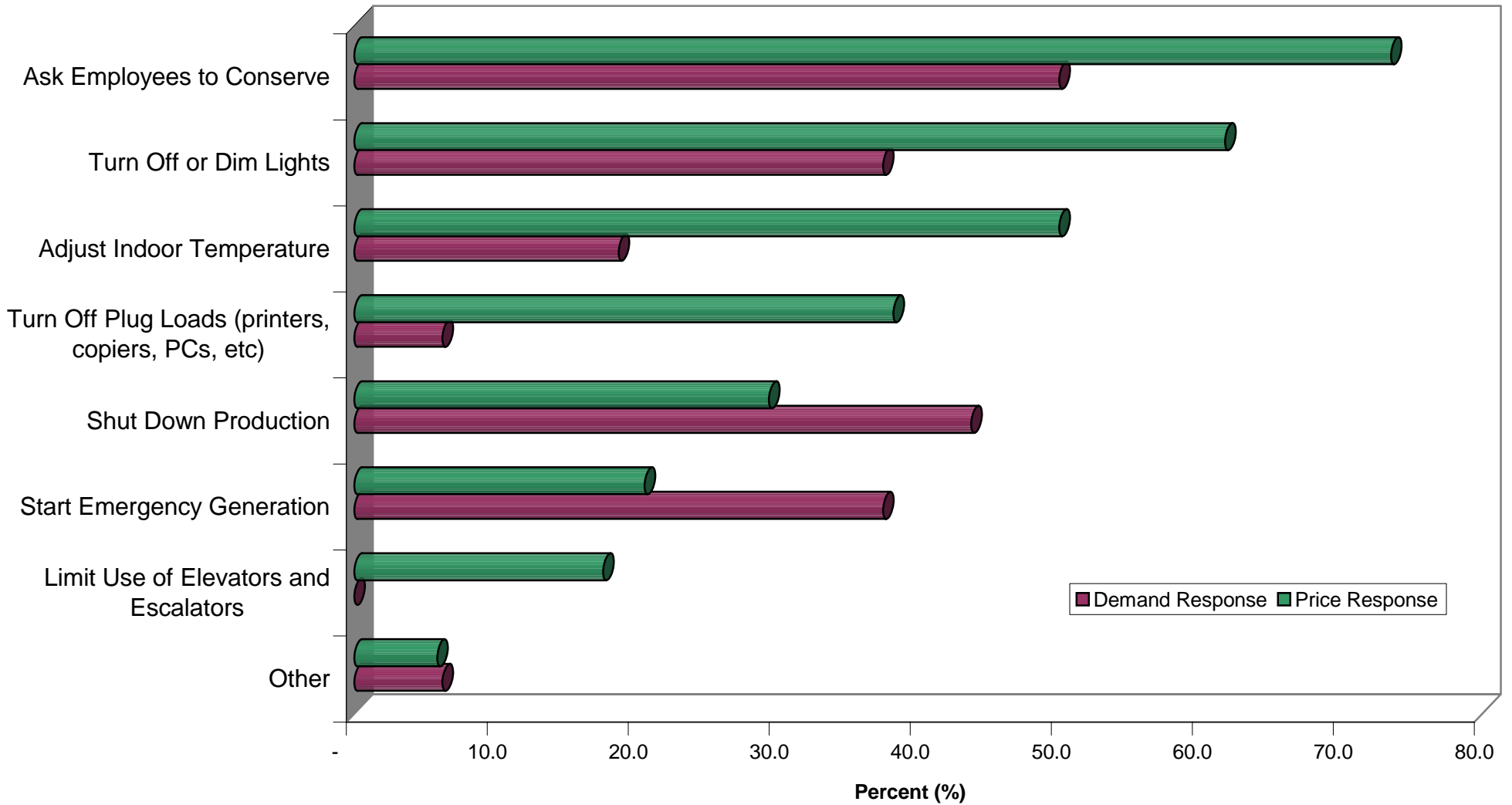
Customer Characteristics (Continued)

- 2/3 of Demand Response Customers have participated in either a Time-of-Use, Interruptible or Real-Time Price rate program.
- 2/3 of all participating customers conducted a Cost/Benefit Analysis prior to enrolling in a Demand Response Program.
- Price Program: 30% of the MWs, 70% of the customers
- Demand Programs: 70% of the MWs, 30% of the customers



What changes do customers make to reduce electricity use?

DEMAND RESPONSE





How do customers make the changes to
reduce electricity use?



Demand Reduction Methods

- **Lighting**
 - Over 85% control their Interior Lighting with Wall Switches and Circuit Breakers.
- **HVAC**
 - 50% use their Energy Management Systems
 - Over 50% say they can increase Temperatures by 1 to 2 °F without effecting Processes or Occupant Comfort.
- **Manufacturing Processes**
 - 45% use Computer or Fully Integrated Manufacturing Controls
- **Emergency Generation**
 - 40% in the Demand Programs start their Emergency Generators
 - 70% say they have Emergency Generators



Why do customers participate in Demand Response Programs?

