
Role of Demand Response and Demand Reduction in Energy Purchasing Strategy

Pit Stop: Timely Procurement Topics

Session 2B

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Role of Demand Response in Energy Purchasing Strategy

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**Pit Stop:
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Topics**

1. What Is Demand Response?
2. Why Is DR Important?
3. How Can DR Reduce Cost?
4. How Do I Implement DR?

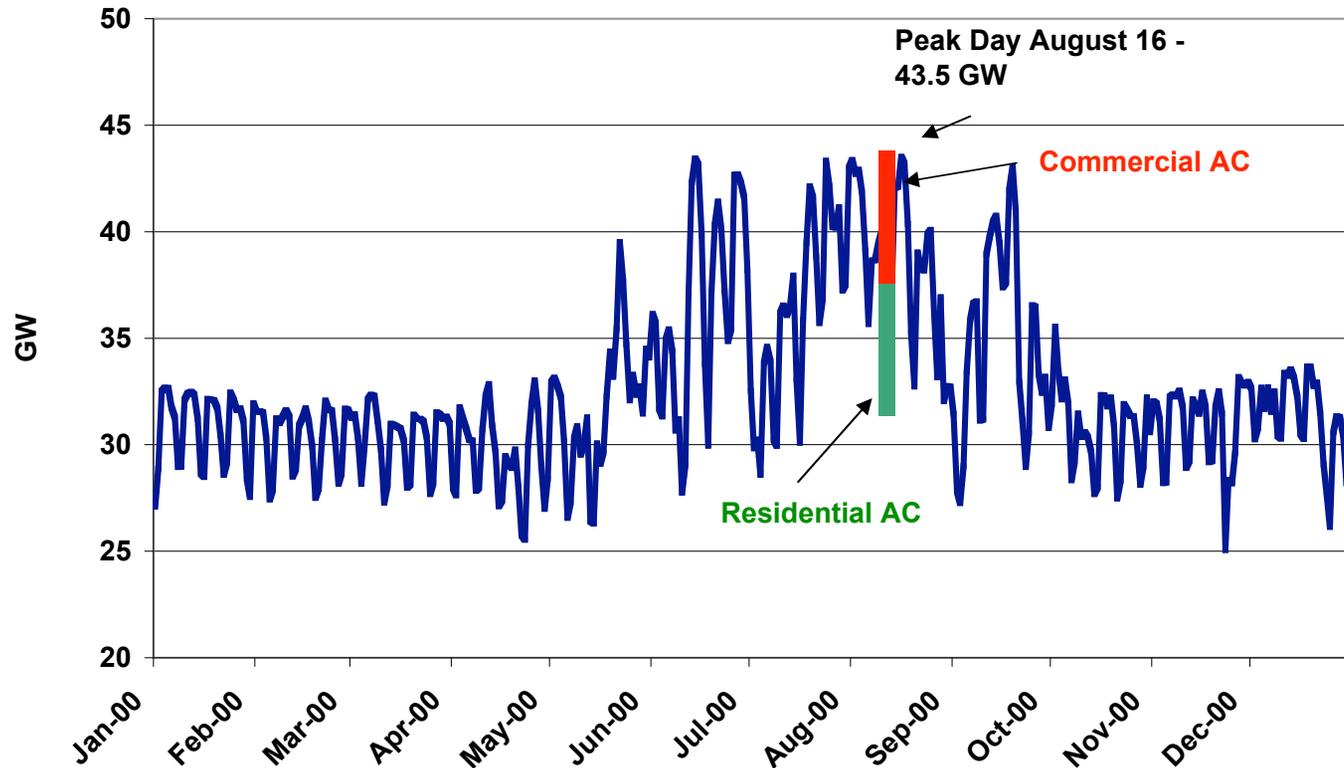


Electricity demand in most US regions peaks during the day time on the warmest summer days due to high use of air conditioning.



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Cal ISO Daily Peak Loads
January 1, 2000 - December 31, 2000



Source: California Energy Commission



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Providing electricity customers in both retail and wholesale electricity markets with a choice whereby they can **respond** to **dynamic** or **time-based** prices or other types of **incentives** by **reducing and/or shifting usage**, particularly during **peak periods**, such that these demand modifications can address issues such as pricing, reliability, emergency response, and infrastructure planning, operation, and deferral.

Source: U.S. Demand Response Coordinating Committee

Why is DR important?



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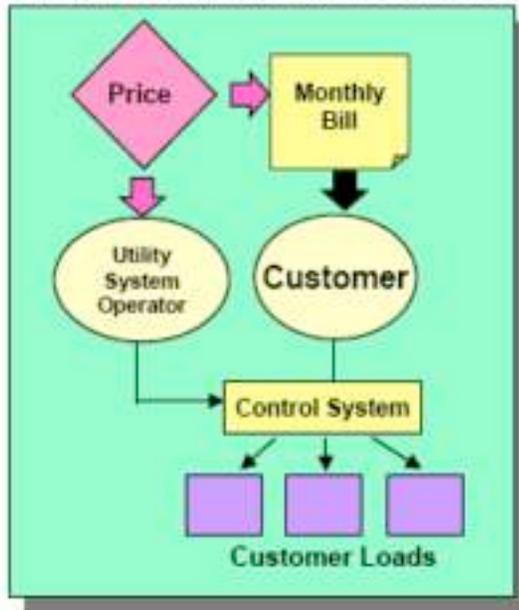
- Lower market prices for energy
- Reduced price volatility
- Improved grid reliability
- Operational savings
- Positive environmental benefits

Most utilities offer two types of demand response programs: reliability response and price response.



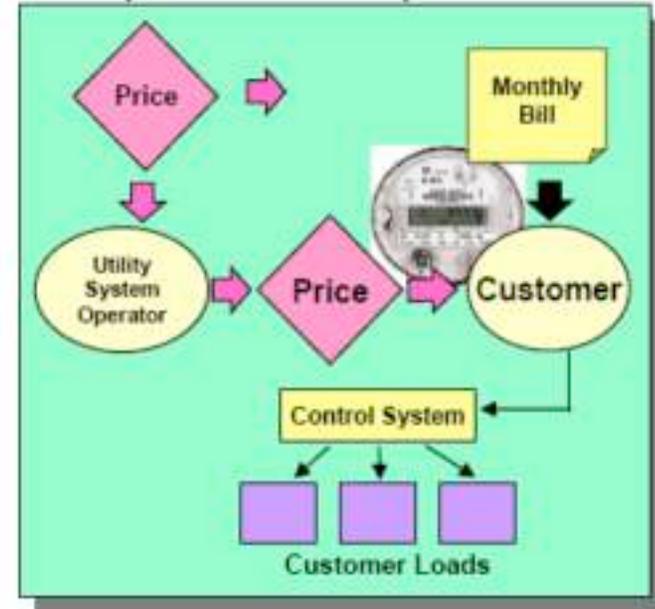
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Option 1: Reliability-Responsive DR



Flat Rate, Fixed Incentive, Direct Control
Voluntary, Partial End-Use Curtailment

Option 2: Price-Responsive DR



Dispatchable Price/Rate, Indirect Control
Shifting or Rescheduling

Source: Demand Response Research Center



Example benefits to an organization from participating in a DR program.



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Load Reduction	500 kW
Event Days per Year	1 Day
Hours per Event Day	6 Hours
Hours per Year	6 Hours
Minimum Energy Payment	\$0.50 /kWh
Capacity Payment	\$1.00 /kW per Month
Electricity Supply Price	\$0.06 /kWh
Minimum Energy Payment	\$1,500
Annual Capacity Payment	\$6,000
Avoided Electricity Purchase	\$180
Total Annual Benefit	\$7,680

Source: ISO New England



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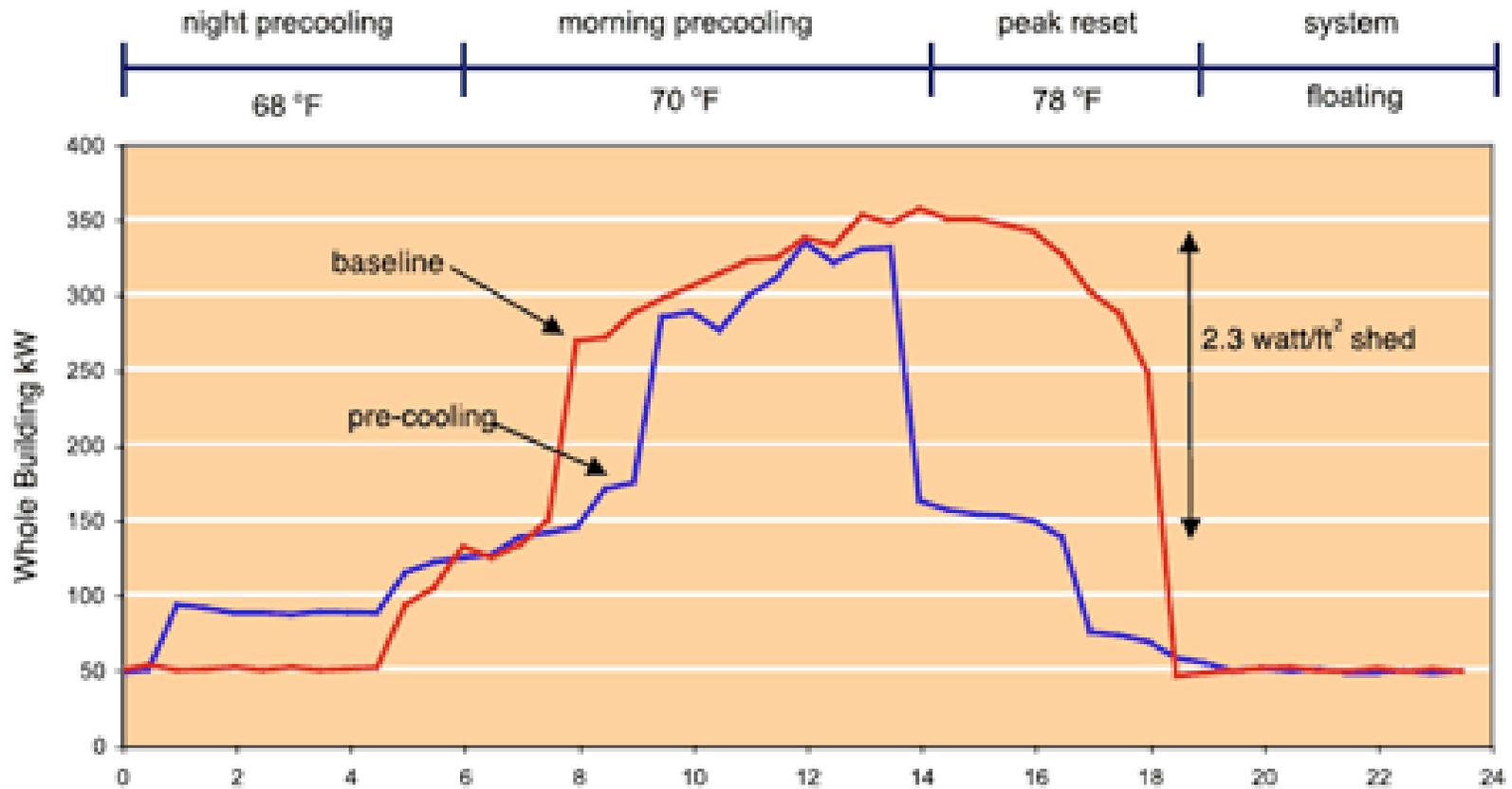
- Air conditioning
 - Thermostat settings
 - Load cycling of package units
 - Temperature on chilled water system
 - Pre-cooling
- Unneeded lighting
- Elevator usage
- Printing facilities
- Equipment not in use
- Vending machines



The Demand Response Research Center studied the effects of pre-cooling in a Federal Building in Santa Rosa, CA.



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Source: Demand Response Research Center

Note: Medium-sized government building (40,000 ft² office + 40,000 ft² courthouse), 3 stories; typical internal loads, 100 occupants (office side).



Improvements in technologies are increasing the opportunity for building managers to capture benefits of DR programs.



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Existing Technologies

- Energy controls
 - Programmable thermostats
 - Remote A/C compressor control
 - Remote water heater control
 - Residential Time-of-Use meters
 - Smart panel
 - User interface
 - Utility/Customer interface
- Energy storage technologies
 - Batteries
 - Ice storage
 - Thermal storage

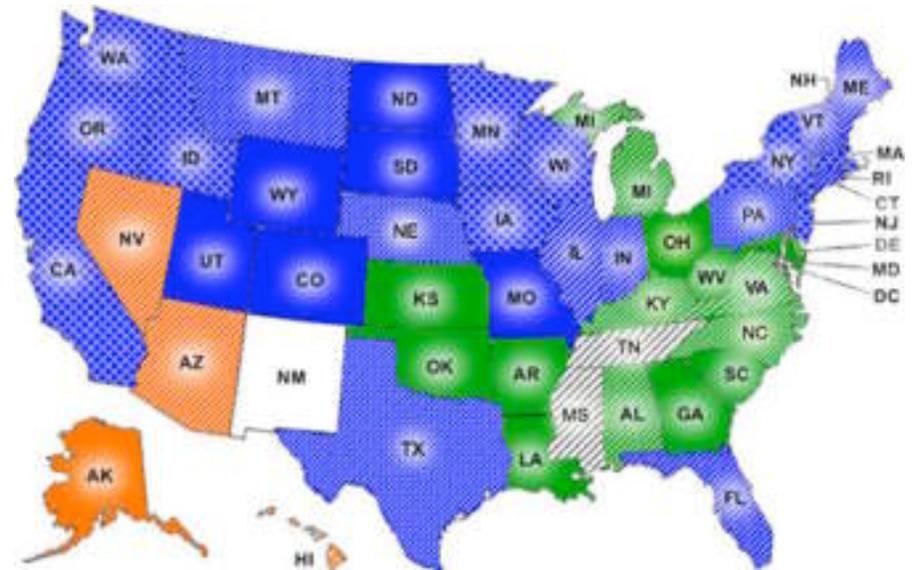
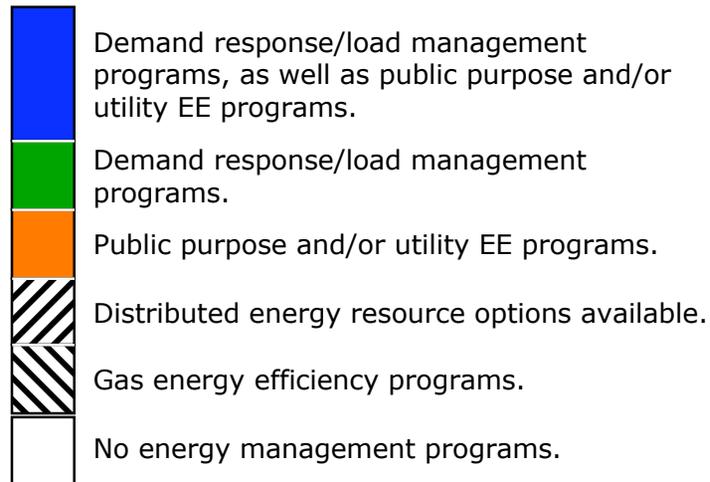
Emerging Technologies

- Energy controls
 - Programmable communicating thermostats linked to the Internet
 - Automated metering infrastructure
 - Smart interactive panels
 - Smart appliances
 - "Black box" appliance-level or panel level switch
 - Utility/customer interface – load curve operates appliances
- Energy storage technologies
 - Flywheels
 - Advanced batteries



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U. S. Energy-Efficiency Funds and Demand Response Programs February 2006



Source: http://www1.eere.energy.gov/femp/program/utility/utilityman_energymanage.html



Representative large DR technology vendors



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■ Integrated Energy Management

- Apogee Interactive
- Echelon
- Electric City
- Itron
- RETX

■ ESCOs

- Ameresco
- Chevron Energy Solutions
- EnerNOC
- Infotility
- Onsite Energy

■ Controls

- GE Consumer & Industrial
- Honeywell Energy Services
- Johnson Controls
- Siemens Building Technologies

■ Other

- Cristopia Thermal Energy Storage
- Ice Energy
- Nexant