Welcome!

- Thank you for joining today's webinar: *OpenADR Implementation for Commercial and Industrial Facilities*
- If you have a question please use the question box located on the right side of your screen.
- Questions for our speakers will be addressed at the end of the presentation.
- This webinar will be recorded for future playback.
- We will begin momentarily.

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OpenADR Implementation for Commercial and Industrial Facilities

Webinar: September 30th, 2014

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Agenda

- Demand Response Overview
- OpenADR Introduction
- Commercial and Industrial ADR Participation
  - Considerations for facility participation
  - Sample implementations
- Expanding C&I Load Participation
  - New program development
  - Technology and standardization

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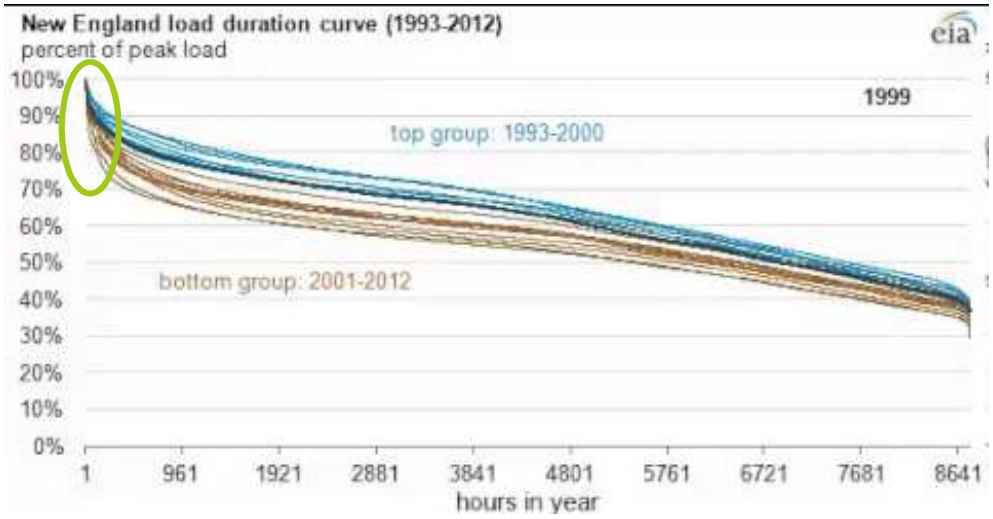
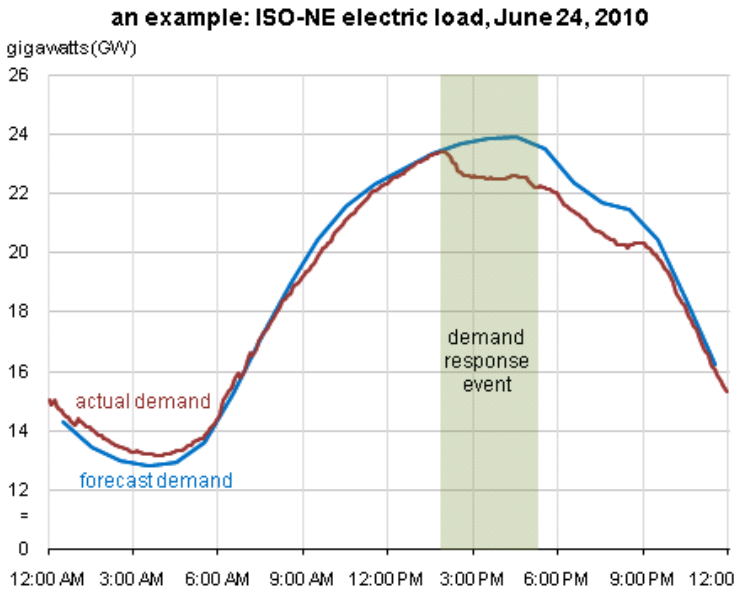
Demand Response Overview

- Impact: Effective demand response can help reduce electric price volatility, mitigate generation market power, and enhance reliability.

  FERC Definition[1]: "*Changes in electric usage by demand-side resources 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.*"





1. Source: FERC , 2. Source: EIA, 3. Source: EIA

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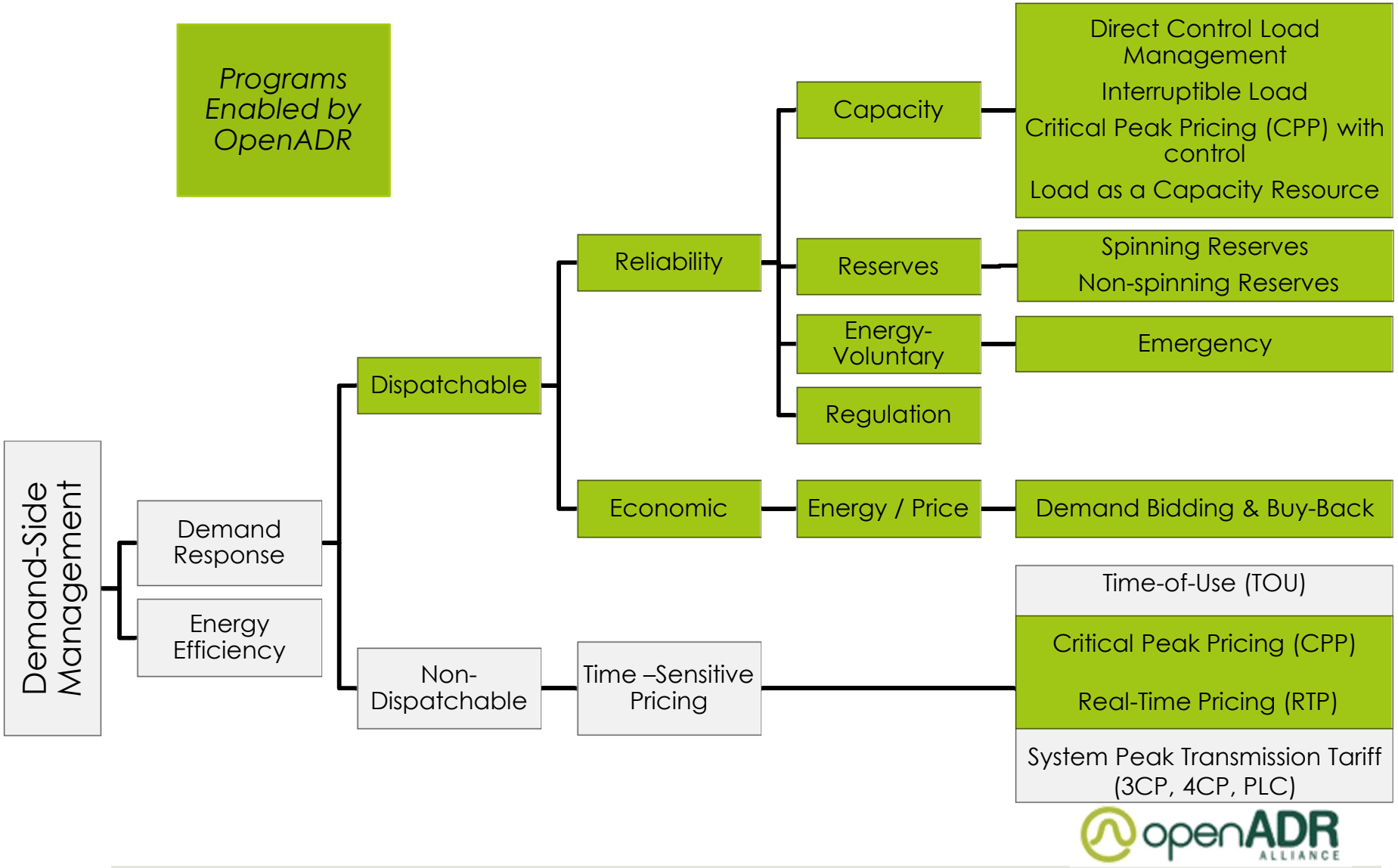
NERC Demand Side Management Categories



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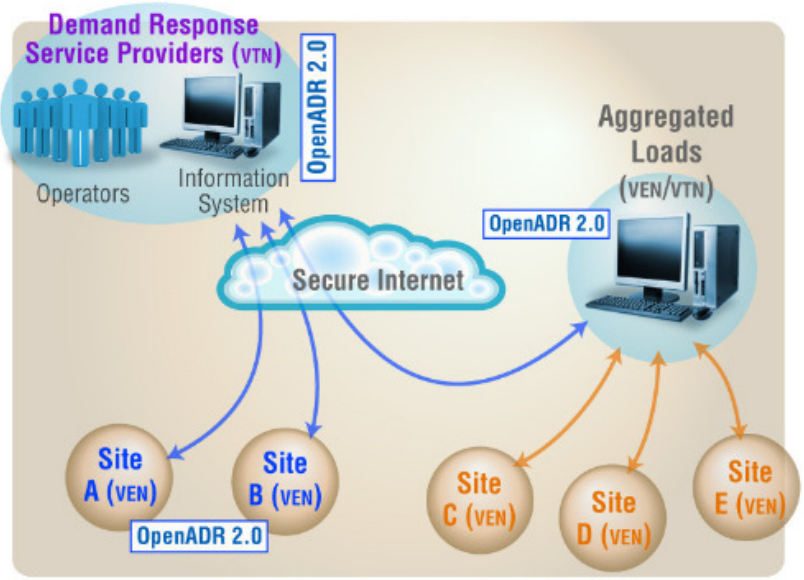
OpenADR Vision

- A non-proprietary, open standardized DR interface that allows electricity providers to communicate DR signals directly to customers using a common language and existing communications such as the Internet.



Source: LBNL

- **Standardize** the interface between electricity markets and customers
- **Automate** the customer resource to fluctuating energy prices and grid instability
- **Simplify** your energy future and maximize the value of your DR capacity

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What is the OpenADR Alliance?

Vision: Facilitate the global deployment of OpenADR to reduce the cost of supplying and consuming electricity, while improving energy reliability and reducing environmental impact.

- California based nonprofit 501(c)(6) corporation
- Member based organization comprised of industry stakeholders interested in fostering OpenADR adoption
- Leverages Smart Grid related standards from OASIS, UCA and NAESB
- Supports development, testing, and deployment of commercial OpenADR
- Enables stakeholders to participate in automated DR, dynamic pricing, and electricity grid reliability

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DR Considerations

Operational Impact Consideration	Industrial	Commercial
Notification Timing	Is manual curtailment possible, or must it be automated	Many only use notification as an FYI, but do not want to act on it
Event Duration	Can the curtailment be absorbed in the manufacturing process, or will it negatively impact throughput	Can curtailment be adjusted to meet comfort issues for long events
Event Frequency	Will multiple events threaten business commitments	Will multiple events impact comfort
Participation Levels	Is it possible to participate with ancillary and non-critical loads	What loads exist in the building that can be curtailed, and by how much
Potential Earnings	Do payments make delaying product worthwhile	Do payments vs. impact on comfort make load shed worthwhile

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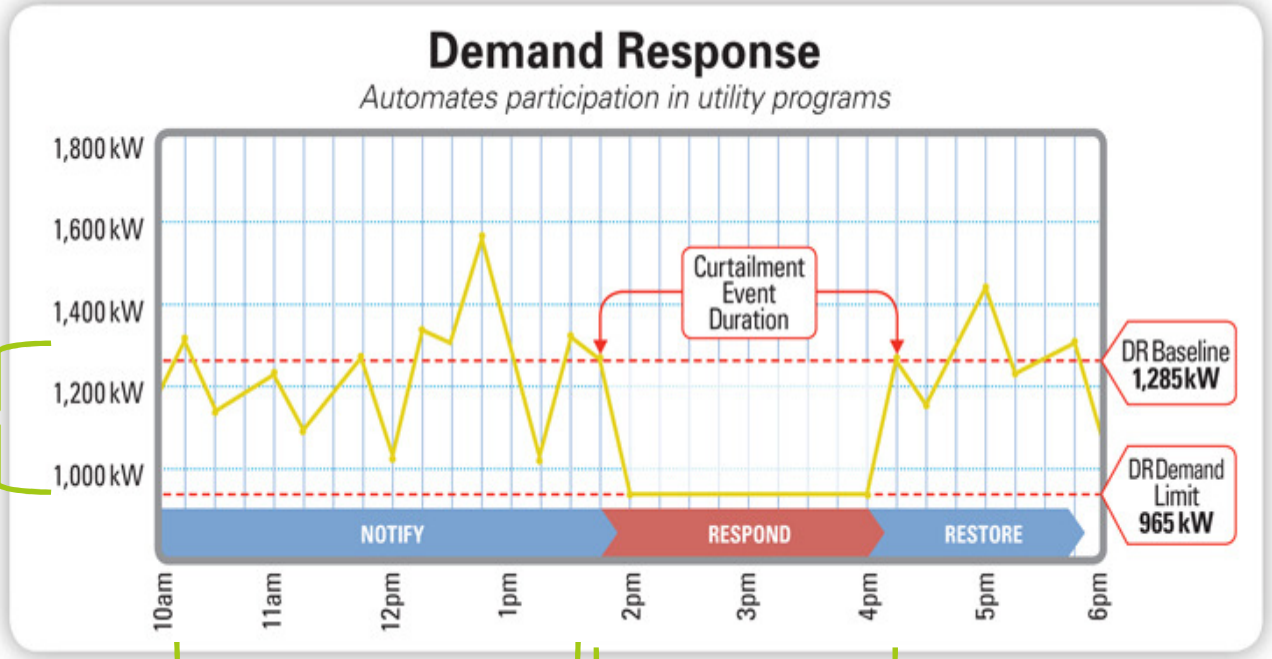
DR Event Elements

- Factors in end-user participation

kW participation will vary for each site, and may vary based on program. Economic programs allow a specific bid level per hour.



Notification windows will vary based on program. Can range from 24 hours to 10 minutes, to seconds.

Event durations vary from minutes to hours (excluding regulation)

Chart source: Powerit Solutions

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Barriers to ADR Adoption

- Facilities managers don't understand impact and how to participate

Barrier*… or Misperception?	Solution
Reluctance on part of building owner or facility manager to hand over management and control	Education by OpenADR Alliance, use of flexible solutions to enable customer control
Majority of existing commercial buildings have simple controls, manual control, or none at all	Strong community of OpenADR certified vendors offer cost effective solutions, other cost savings measures
Cost of retrofitting a building for ADR can be significant	

- *Source: Navigant Research report on **Automated Demand Response** OpenADR, Commercial & Industrial ADR, Residential ADR, and DR Management Systems: Global Market Analysis and Forecasts **Published 1Q 2014**

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Benefits to Automation

- Improved reliability
  - Eliminate dependency on specific people
  - Reduce human error
- Enable participation in short response events
  - Some lucrative programs require 10 minute response or less
- Monitor and protect equipment
  - Closed loop controls and facility monitoring allow for a controlled participation in demand response
  - Ensure that equipment and critical temperatures or processes are being protected
- Enables granular participation
  - Choose which equipment participates in DR based on business requirements

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Industrial Examples

Characteristic	Food and Beverage	Manufacturing
Industrial Process	Table grape cooling, storing	Rubber products
Location	Delano, CA	Orange, CA
Controlled Loads	Precoolers, compressors, condensers, cold storage equip.	Mill, mixer, injector, and extruder motors, ovens
Curtailment Strategy	Precool before events, reduce equipment during event while monitoring fruit and room temperatures	Interrupt operator load controls to turn down equipment
Load Reduction, absolute and % of total	700kW / 80%	900kW / 72%
DR Program(s)	SCE Demand Response Contracts (DRC)	SCE Demand Bidding Program, and Base Interruptible Program
Notification Window	1 hour	DBP: Noon the day before BIP: 15 or 30 minutes
Event Duration	1-6 hours	DBP: 2 hour minimum BIP: 6 hr max.
Event Frequency		DBP: As bid and accepted BIP: 10 max/mo, 120 hrs max/yr
Participation Method	AUTOMATED via OpenADR	
Reference info	SCE Case Study	SCE Case Study

Commercial Examples

Characteristic	Small Commercial	Large Commercial
Building type	Multi-cinema Theater	Large Retail Mall
Location	Kapolei, Hawaii	Brea, California
Controlled Loads	Rooftop HVAC units	
Curtailment Strategy	Reduced duty cycles, smoothed out across all participating loads	
Load Reduction, absolute and % of total	60 kW / 50% of 25% of total building load	100 kW / ~10% of total building load
DR Program(s)	HECO Fast DR	SCE CBP Day Of Program + Load Aggregator
Notification Window	10 minutes	2 hours
Event Duration	15-60 minutes	1-4 hours
Event Frequency	Once per day	Once per day
Participation Method	AUTOMATED via OpenADR	

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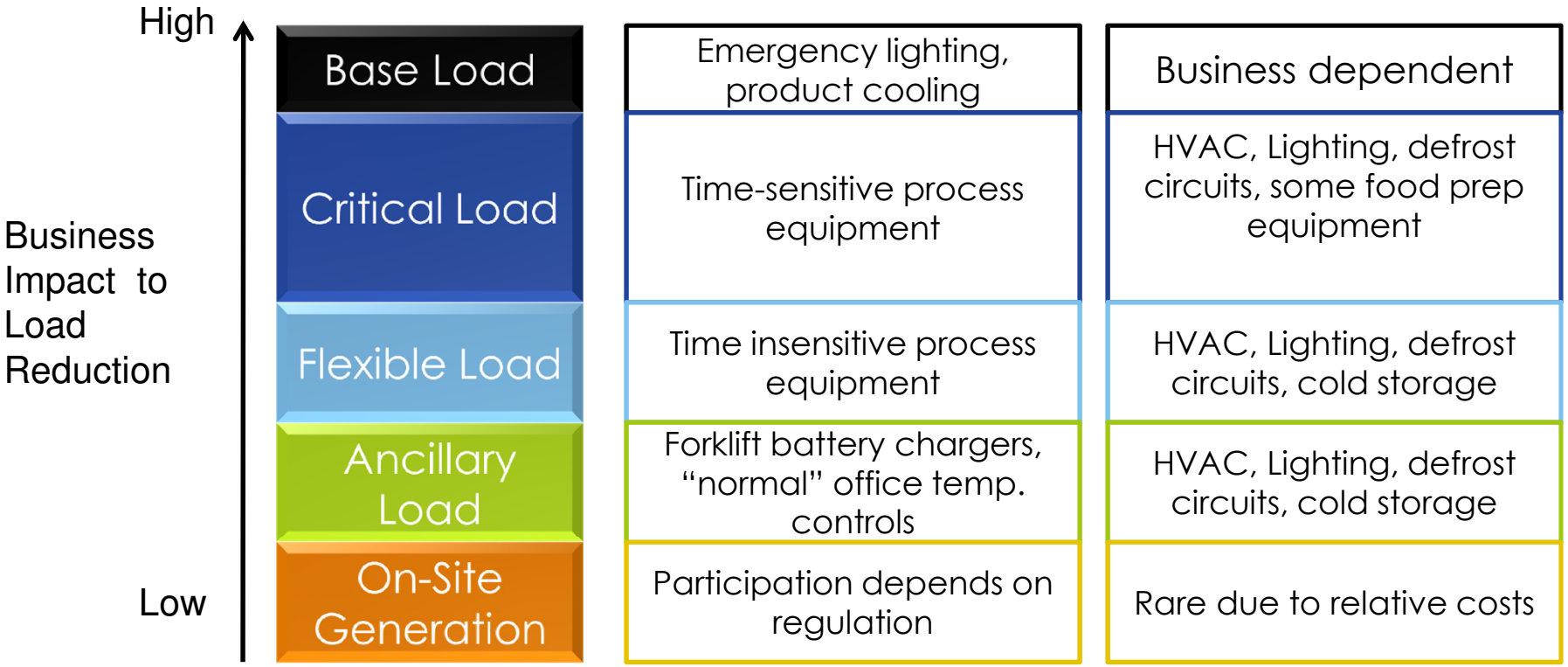
C&I DR Considerations

- Classification of available load for DR participation



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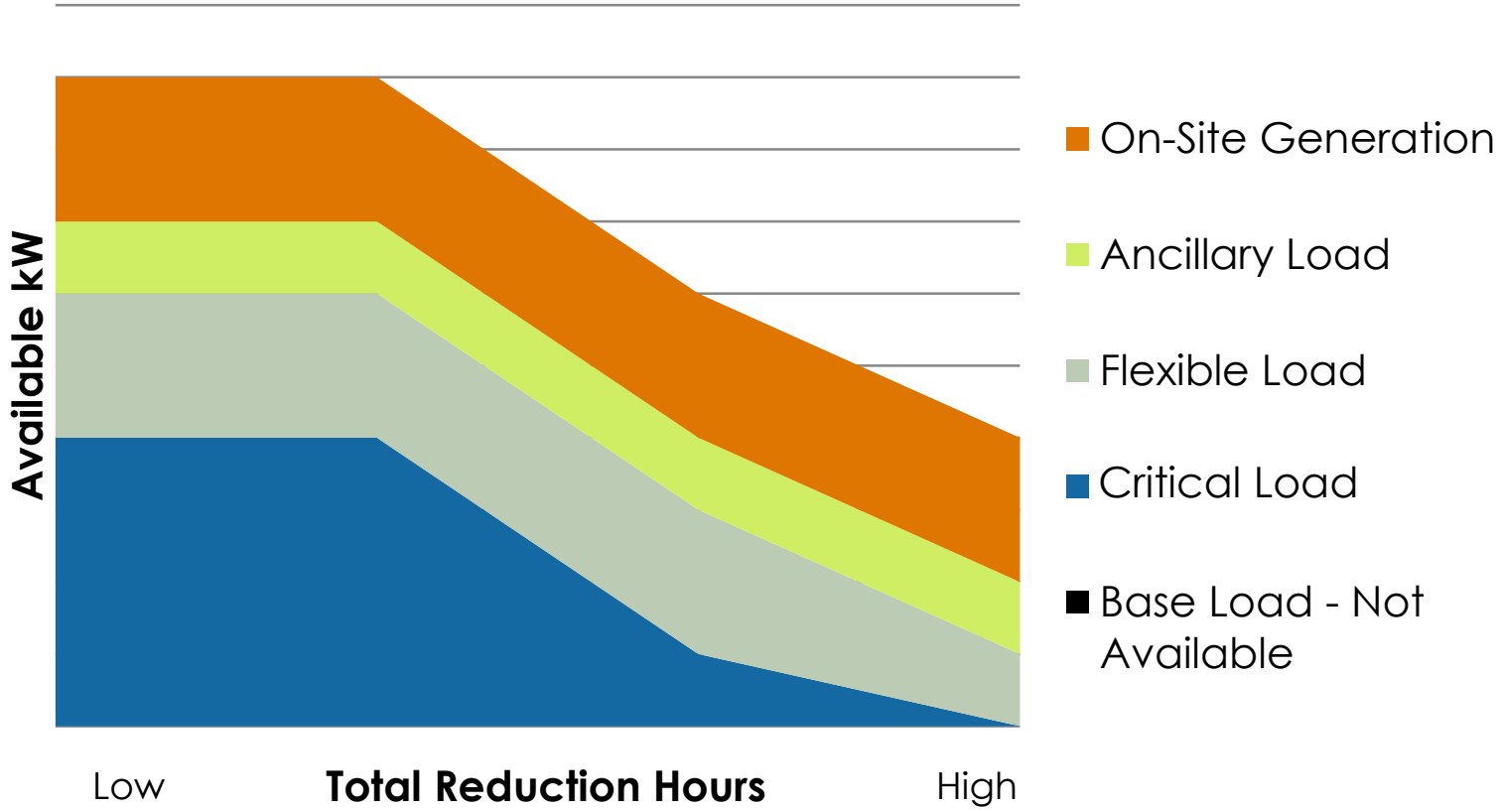
Load Participation Opportunities

- Automated DR increases the availability of C&I loads to participate in different styles of DR programs



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Program impact on DR Participation

- Participation rules should match business capabilities and needs
  - Generator rules vs. load rules (response time, predictability, availability)
  - Business friendly rules = increased load participation
- OpenADR 2.0 enables DR programs of future
  - Migration to more responsive programs means loads must be automated
    - As traditional or capacity DR moves to economic and ancillary programs
  - Standardized communication protocol accelerates market adoption
    - Robust ecosystem of vendors
    - Common utility programs
    - OpenADR2.0b offers bidirectional metering capability

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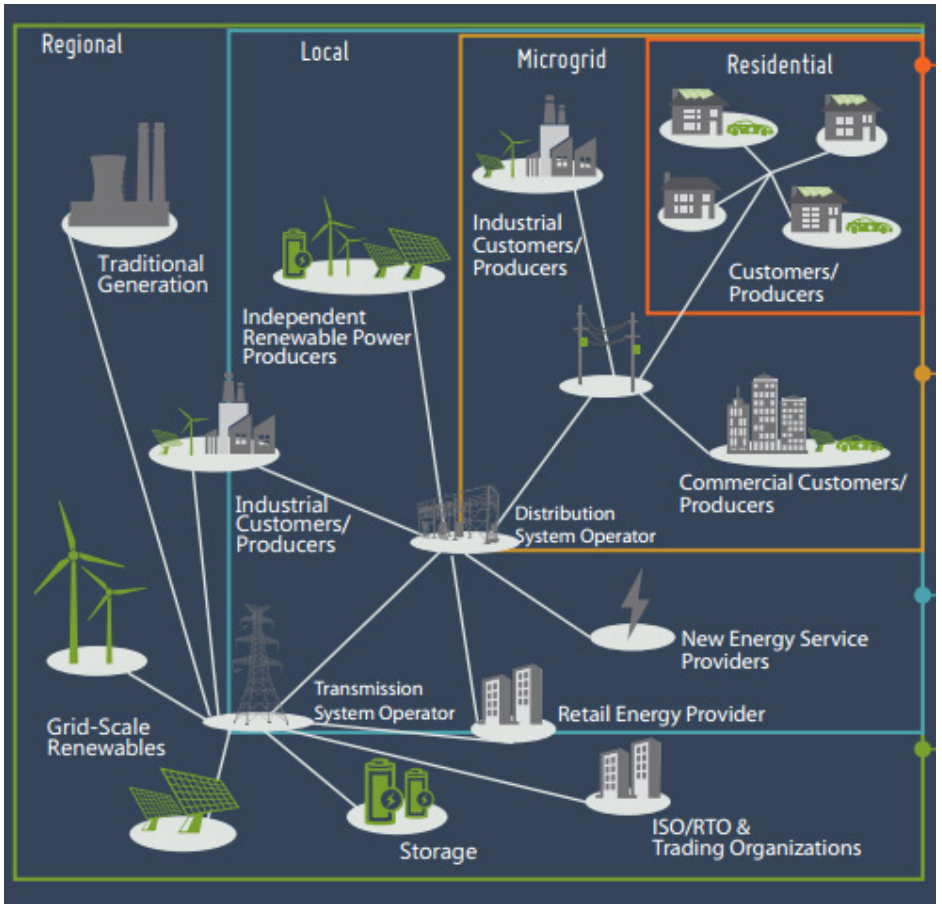
Automated Load Flexibility = Improved Load Value

- Transactive energy models increase the value of loads
- Business-friendly rules + loads that participate in grid balancing = optimized grid
- Facility managers can capitalize on participation in a hands-free manner



Source: GWAC

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Upcoming OpenADR webinars

- **Implementing DR Programs Using an Open Standard**
  - **Oct. 28, 2014, 8am-9am PDT.** Learn how the OpenADR standard can be used to create cost effective, secure and scalable DR programs for residential, commercial and industrial customers.

- **Electric Vehicles and Automated Demand Response**
  - **Nov. 18, 2014, 8am-9am PST.** Learn how utilities are using the OpenADR standard to better manage EV programs, while capturing more revenue.

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Thank you - Q&A

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