Demand Response Solutions

California Mexico Exchange - Technical Workshop

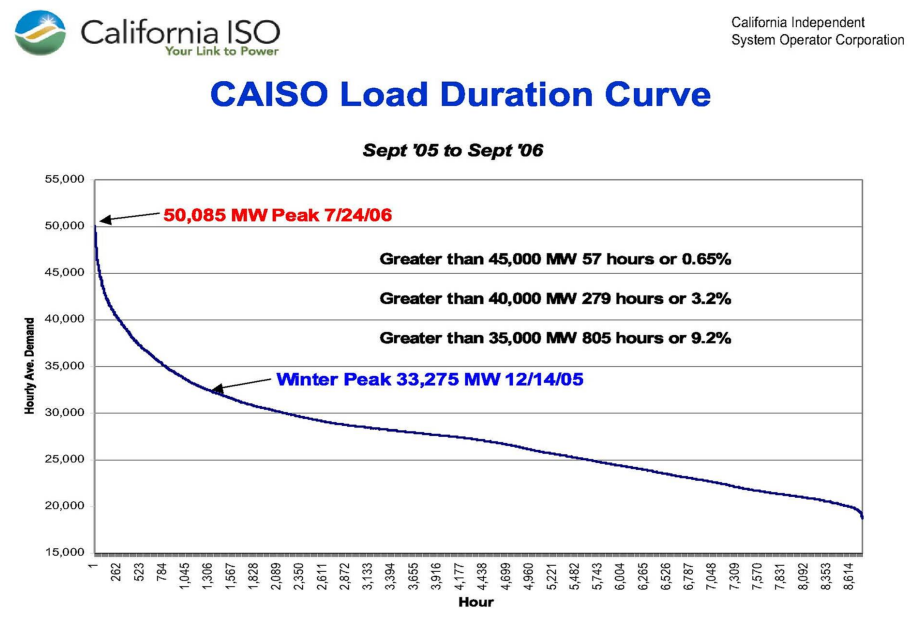
on Efficiency, Renewables and Grid Management on August

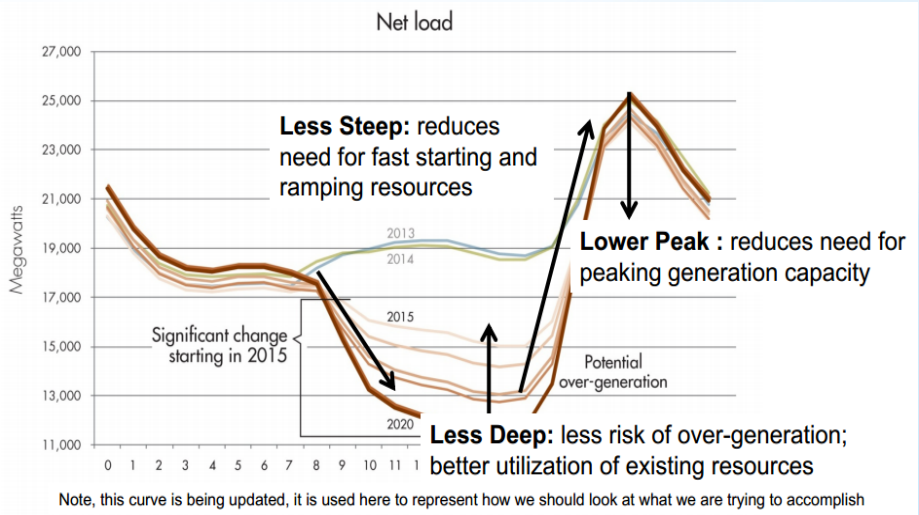
19-21, 2015

Mary Ann Piette

Motivation for Demand Response

- Manage Peak Capacity During Hot Summer Days
- Improve Affordability of Electricity
- Improve Grid Reliability
- Enable More Renewables on Grid
- Mexico also has growing cooling loads





Elements of Demand Response

Objectives

Reliability

Economics

Congestion

Intermittent Resources

Data Model

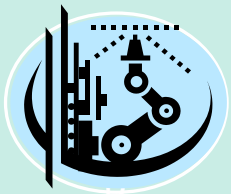
Schedule

Price

Signaling

Automation

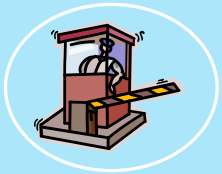
Manual



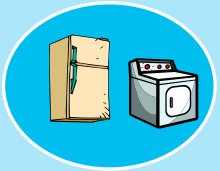
Automated

Control Strategies

Centralized



Gateway



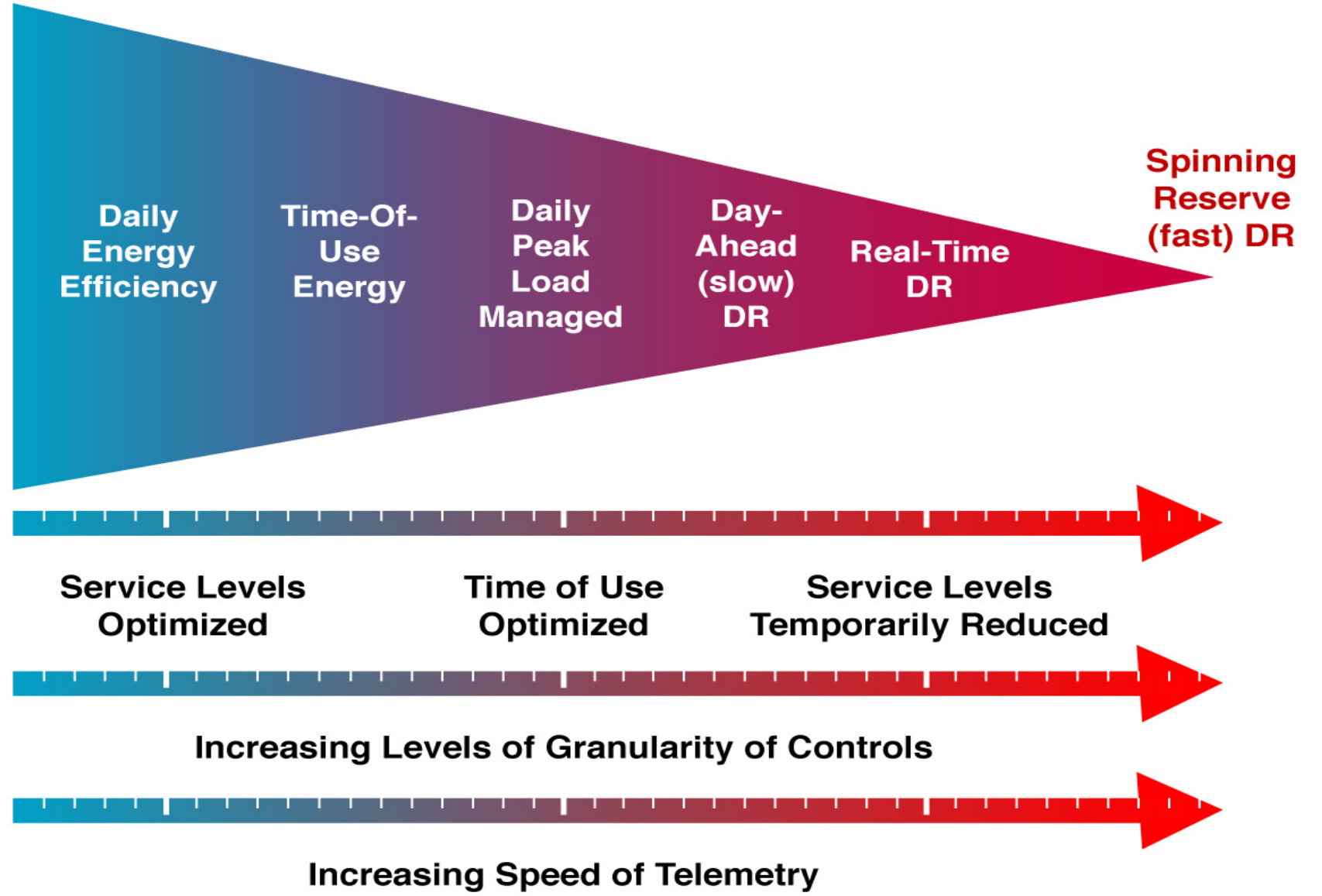
Embedded

Standards

ZigBee™

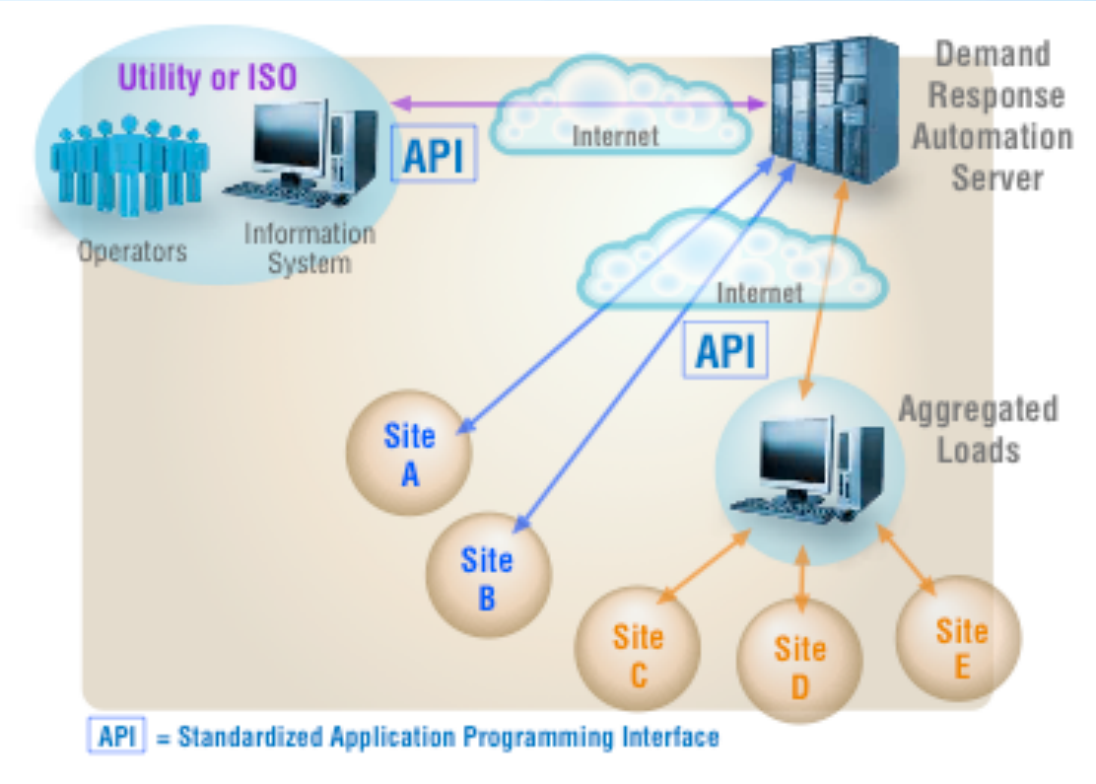
openADR ALLIANCE

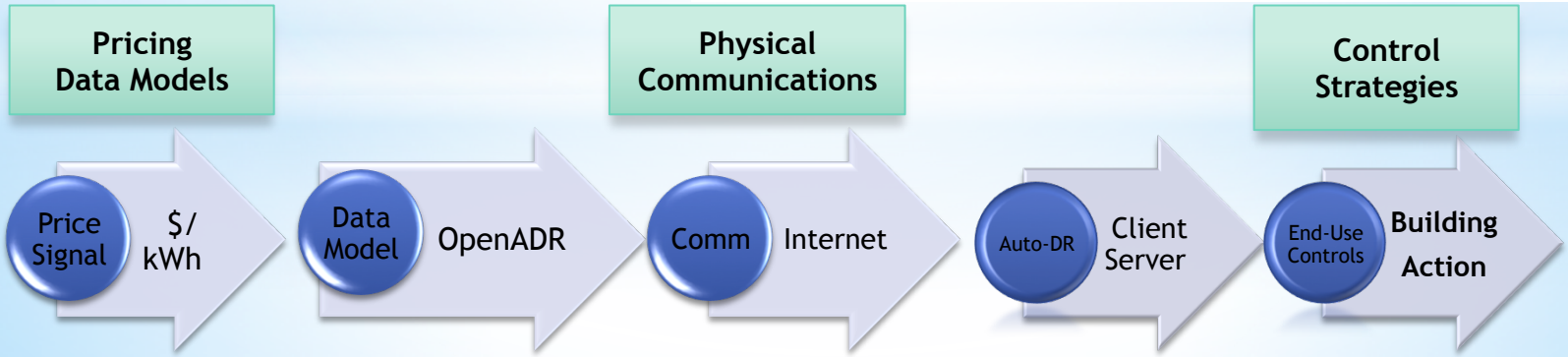
Time Scales of Energy Management



Open Automated Demand Response

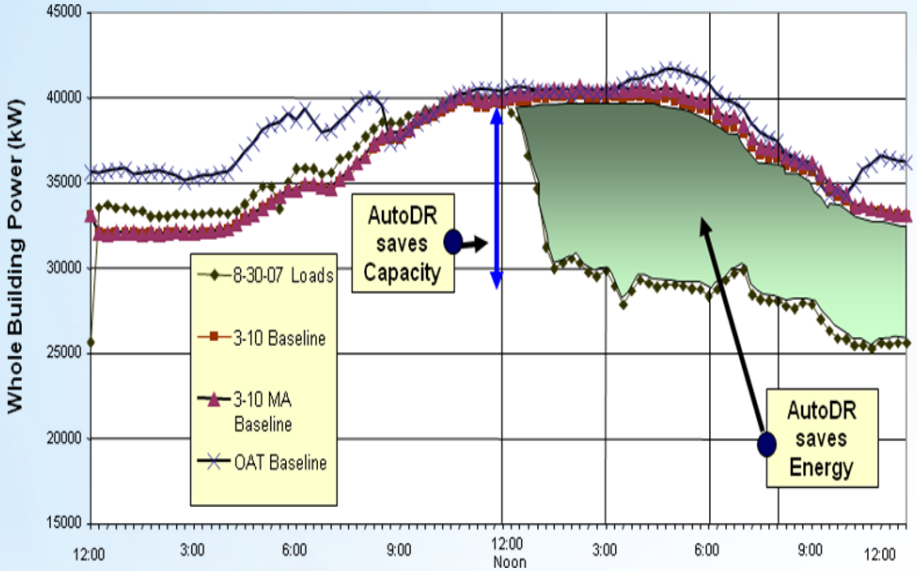
- Open standardized DR interface
- Allows elec providers to communicate DR signals directly to customers
- Uses XML language and existing communications e.g., Internet



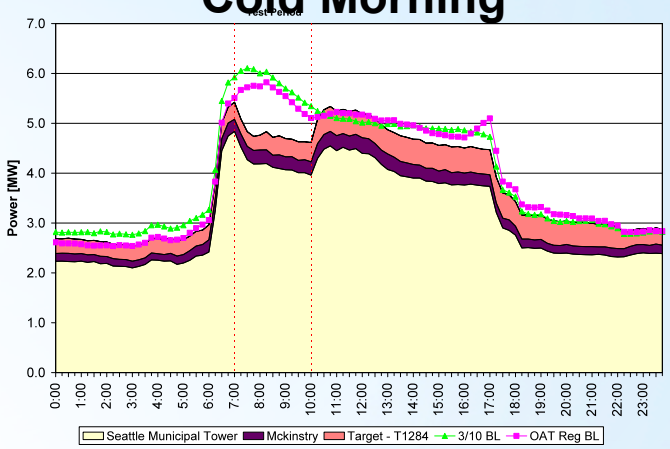


Historic focus on Seasonal Grid Stress

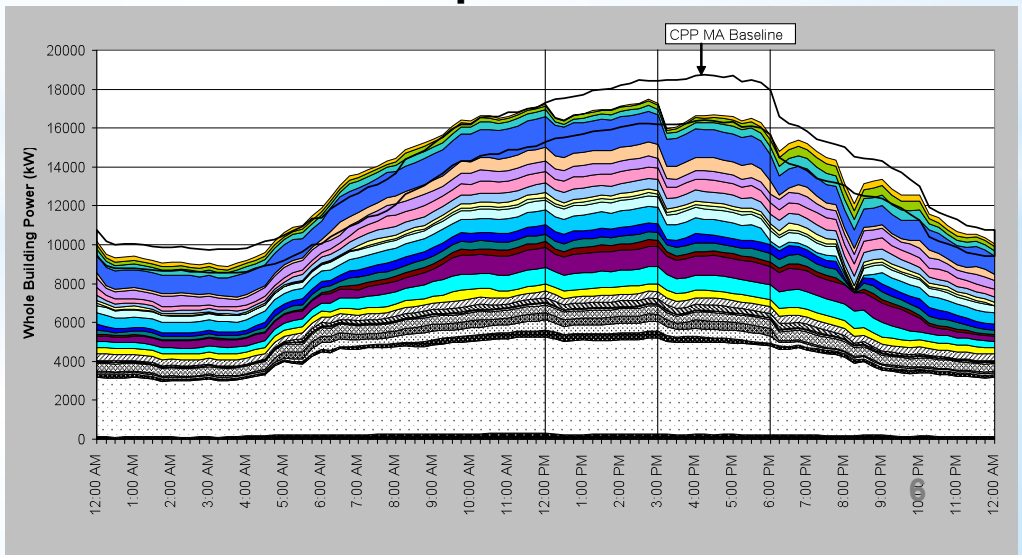
OpenADR PG&E Demand Bid Test Day



OpenADR Northwest Test on Cold Morning



OpenADR Cumulative Shed



Current Status OpenADR in California

Utility	Enabled Load Shed kilowatts (MW)[a]	Cost of Enablement ($M)	Enrolled Service Accounts	Enrolled Load Shed (MW)[b]
Pacific Gas and Electric	81	14	347	71
Southern California Edison	158	37	747	155
San Diego Gas & Electric	11	3	126	8
TOTAL	**250**	**54**	**1,220**	**234**

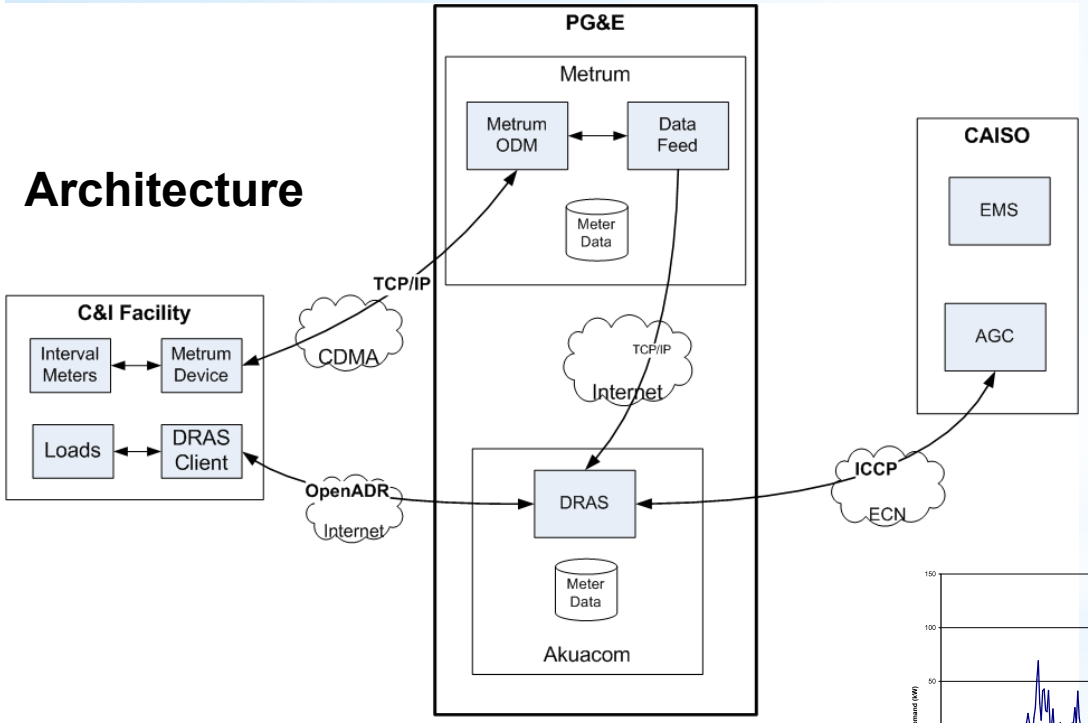
- As 2014, 234 MW, 1200 commercial and industrial accounts currently enrolled
- ~$215/kW statewide average enablement cost
- Plus over 3000 sites with WIFI Thermostats (*SCE Bring Your Own Thermostat Program)*

Using DR for Grid Reliability and Renewable Integration

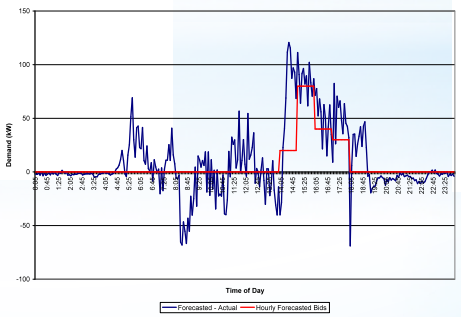
How loads can act like generators

* Development of communication, control and telemetry requirements
* Understanding markets and market participation rules

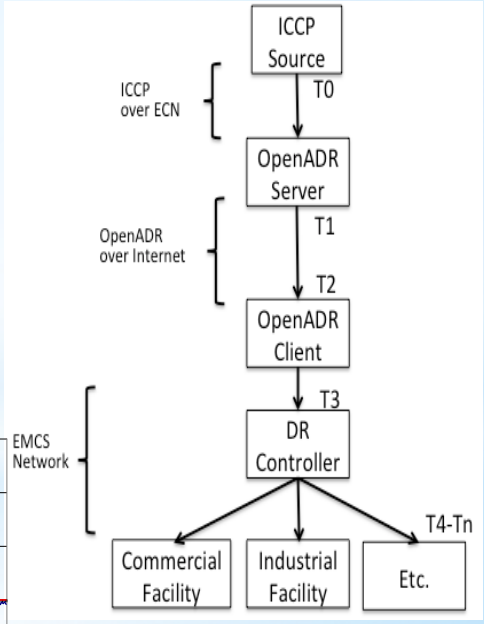
Architecture



Loads



Communication Latency



Identifying Loads for Any Time Demand Response

LOADS

Residential

Municipal

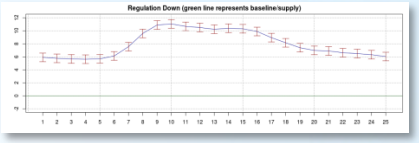
Commercial

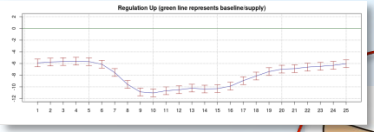
Agricultural

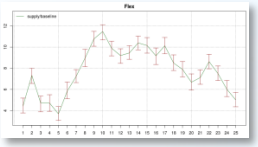
FLEXIBILITY FILTER

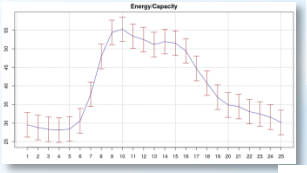
Response Parameters
Flexibility range (reg up, reg down, both)
Speed of Response
Store, Shift or Shed
Size of Response
Controllable
Sizing of Resource
Min and max daily consumption requirements
Cycling Rate Impacts (wear/tear)
Impacts on Overall Response
Rebound/Recovery Issues
Charge/Discharge
How to Predict
Predictable or Variable (daily, seasonal, geographic)
Time or Operational dependence
How it Participates
Individual or Aggregated

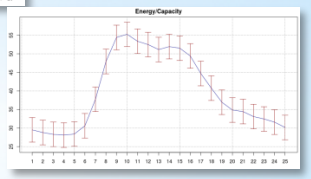
ANCILLARY SERVICES PRODUCTS



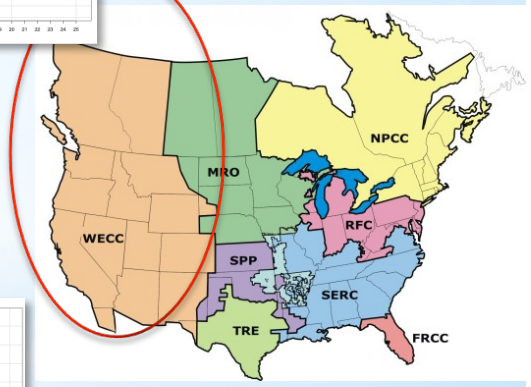


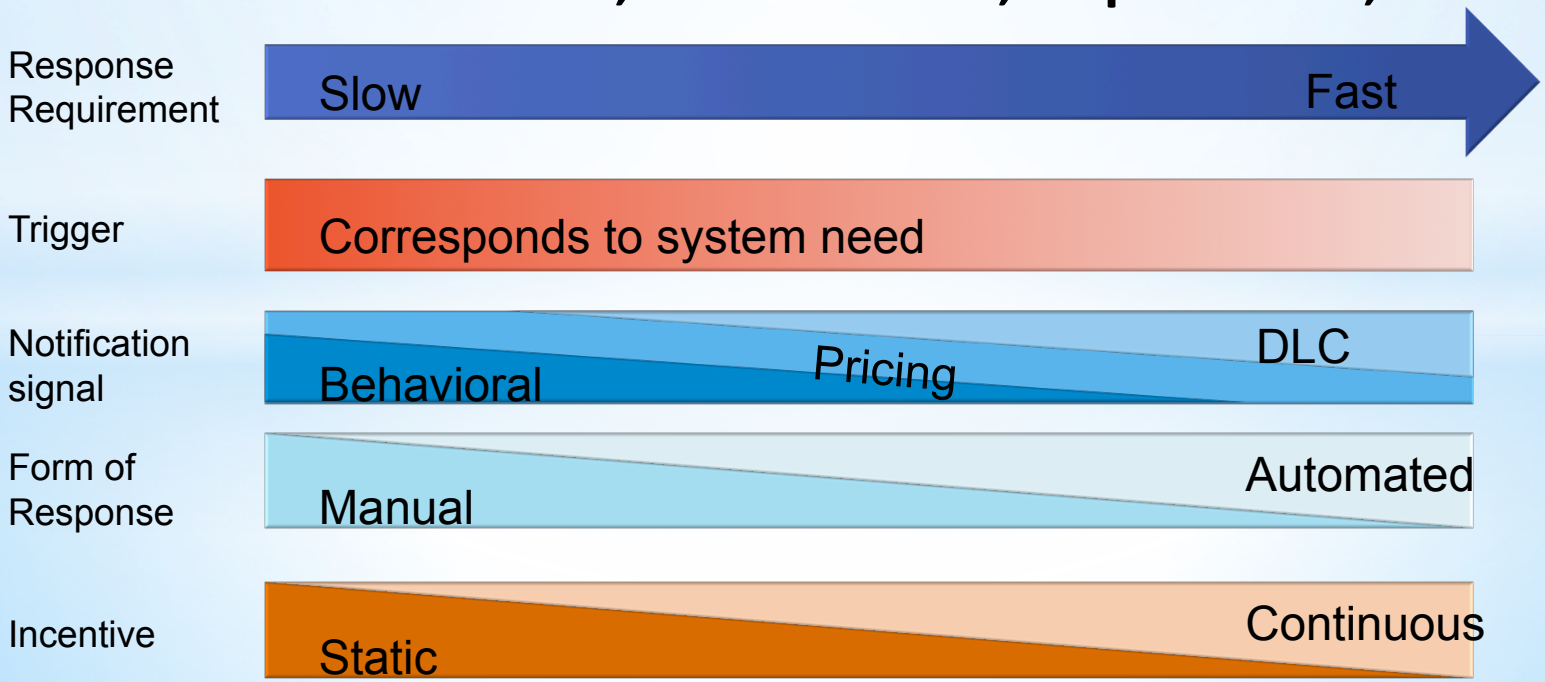






MODELS



Summary and Future Directions

- DR is broadening to include hot summer as well as ancillary services and programs to support renewable integration
- DR communication standards should be considered in North, Central and South America
- Linking efficiency and DR will help pay for both
- **Goals for DR – faster, more reliable, dsipatchable, flexible**