California ISO
Your Link to Power

Direct Participation
High Impact Areas

Utility Integration Solutions, Inc.

April 30, 2009

Agenda

- Introduction to NAESB Demand Response Measurement & Verification Standards
- Impact Areas
  - Qualification and Registration
  - Market Operations
  - Baselines & Settlements

Impact Area #1: Registration and Qualification

- Aggregation
- Credit Requirements
- Periodicity
- Approval Process

Impact Area #2: Market Operations

- Notifications
- Forecasting
- Metering and Telemetry

Impact Area #3: Baselines & Settlement

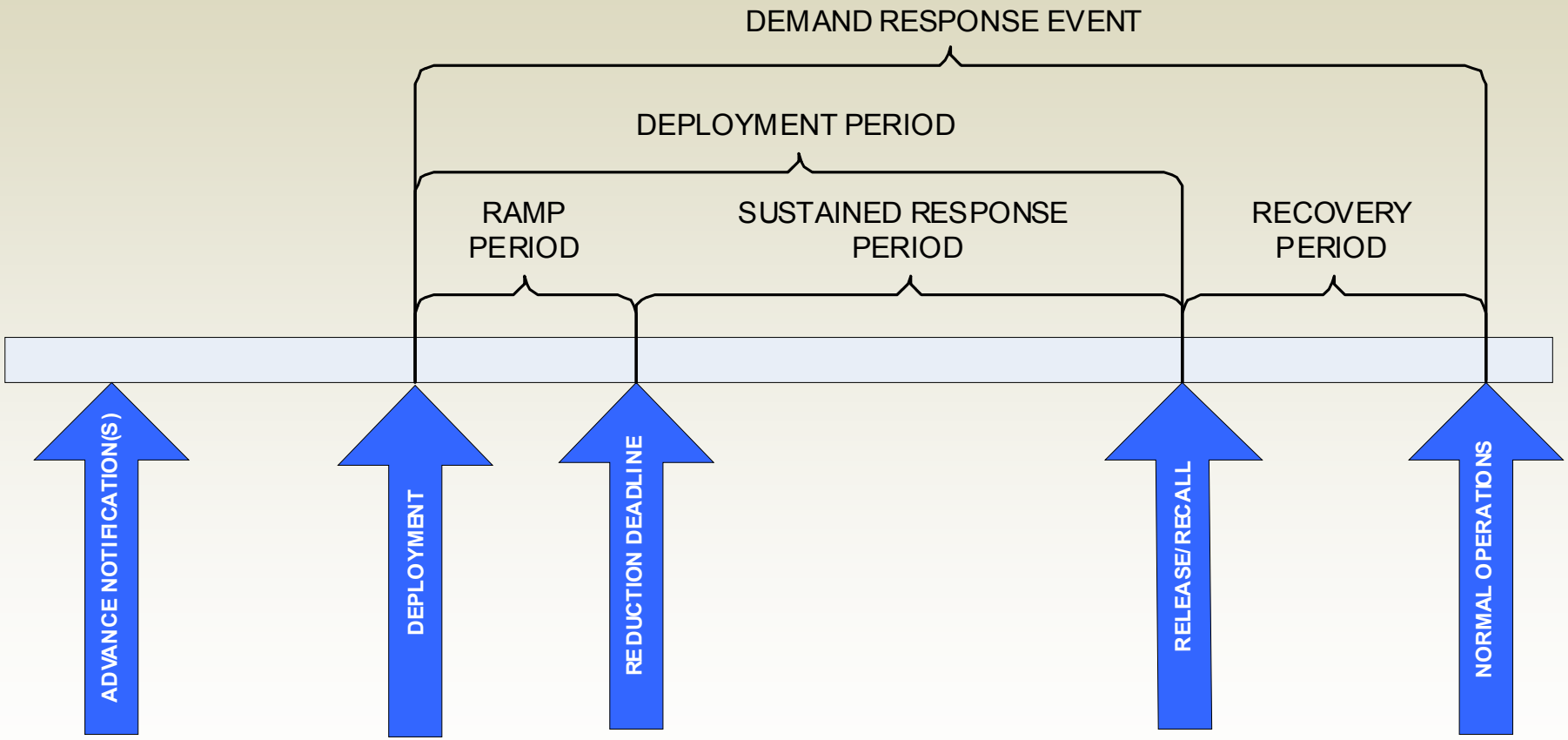
- NAESB Performance Evaluation Models
- Performance Evaluation Models: Pros & Cons
- Baseline Model Variables
- Settlement Program Hierarchy
- Settlement Approval Process

Introduction to NAESB Demand Response Measurement & Verification Standards

Demand Response Services

- **Energy Service:** A type of Demand Response service in which Demand Resources are compensated based solely on Demand reduction performance during a Demand Response event.
- **Capacity Service:** A type of Demand Response service in which Demand Resources are obligated over a defined period of time to be available to provide Demand Response upon deployment by the System Operator.
- **Reserve Service:** A type of Demand Response service in which Demand Resources are obligated to be available to provide Demand reduction upon deployment by the System Operator, based on reserve capacity requirements that are established to meet applicable reliability standards.
- **Regulation Service:** A type of Demand Response service in which a Demand Resource increases and decreases Load in response to real-time signals from the System Operator. Demand Resources providing Regulation Service are subject to dispatch continuously during a commitment period. Demand Resources providing Regulation Service automatically respond to changes in grid frequency (similar to the governor action on a generator), and also are subject to continuous dispatch based on instructions from the System Operator (similar to Automatic Generation Control). Provision of Regulation Service does not correlate to Demand Response Event timelines, deadlines and durations.

Demand Response Event Timing



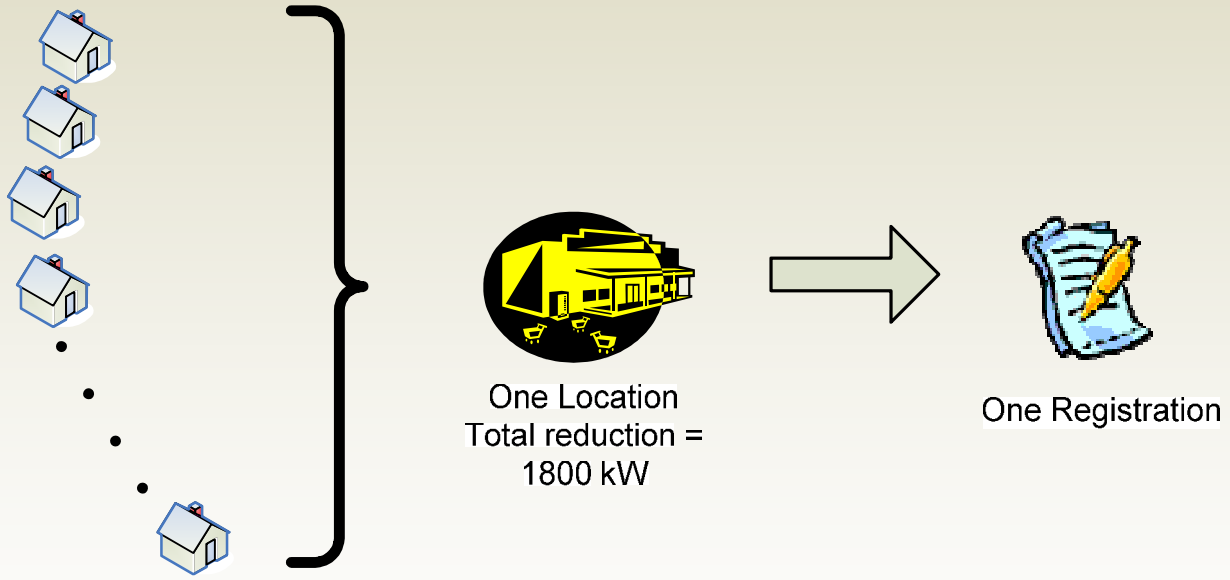
Impact Area #1:
Qualification and Registration

Aggregation

- Locations
- Registrations
- Resources Obligations

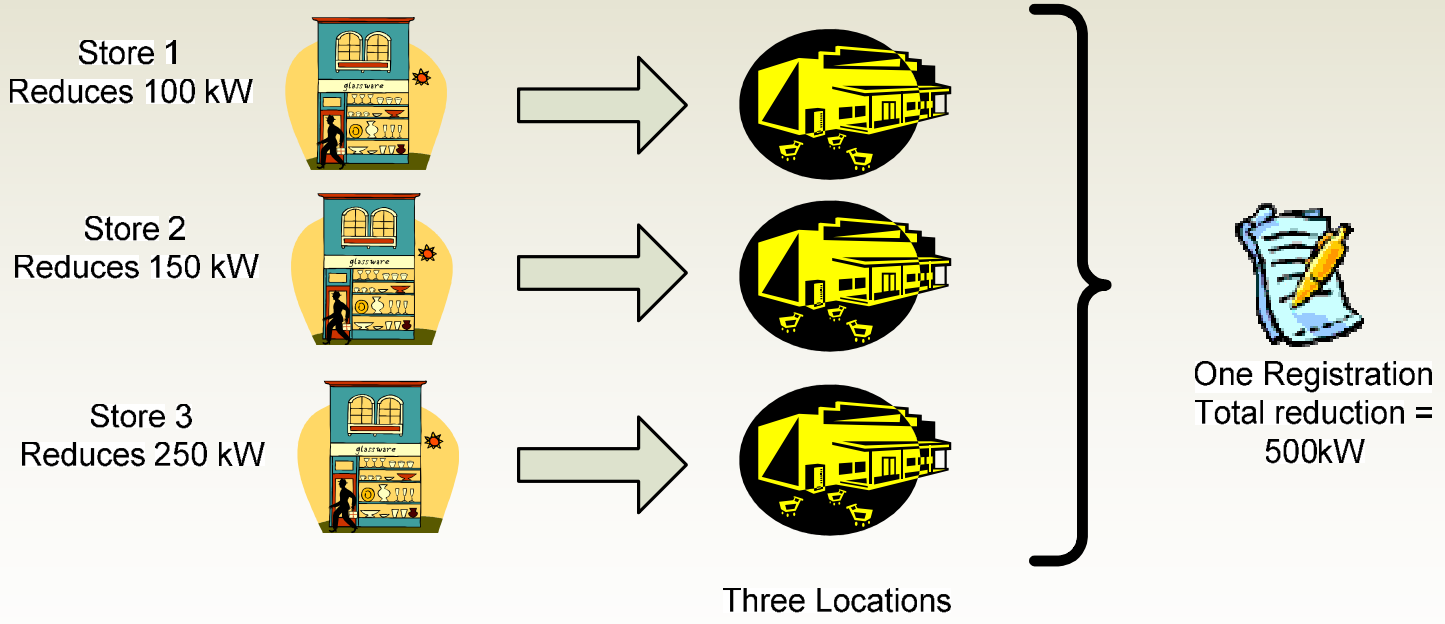
Multiple Customers per Location

Residential Customer Example
(e.g. non-interval meters)



Multiple Locations per Registration

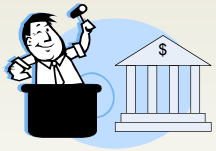
Retail Example
(e.g. a chain store)

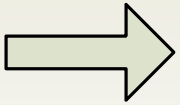


Multiple Registrations per Resource

Auction Resource Example
(e.g. FCA results)

Forward Capacity Auction



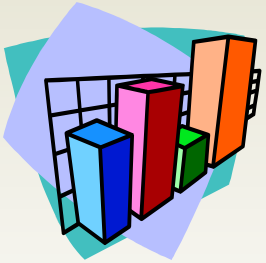


Capacity Resource Obligation 600 kW

Registration 200 kW

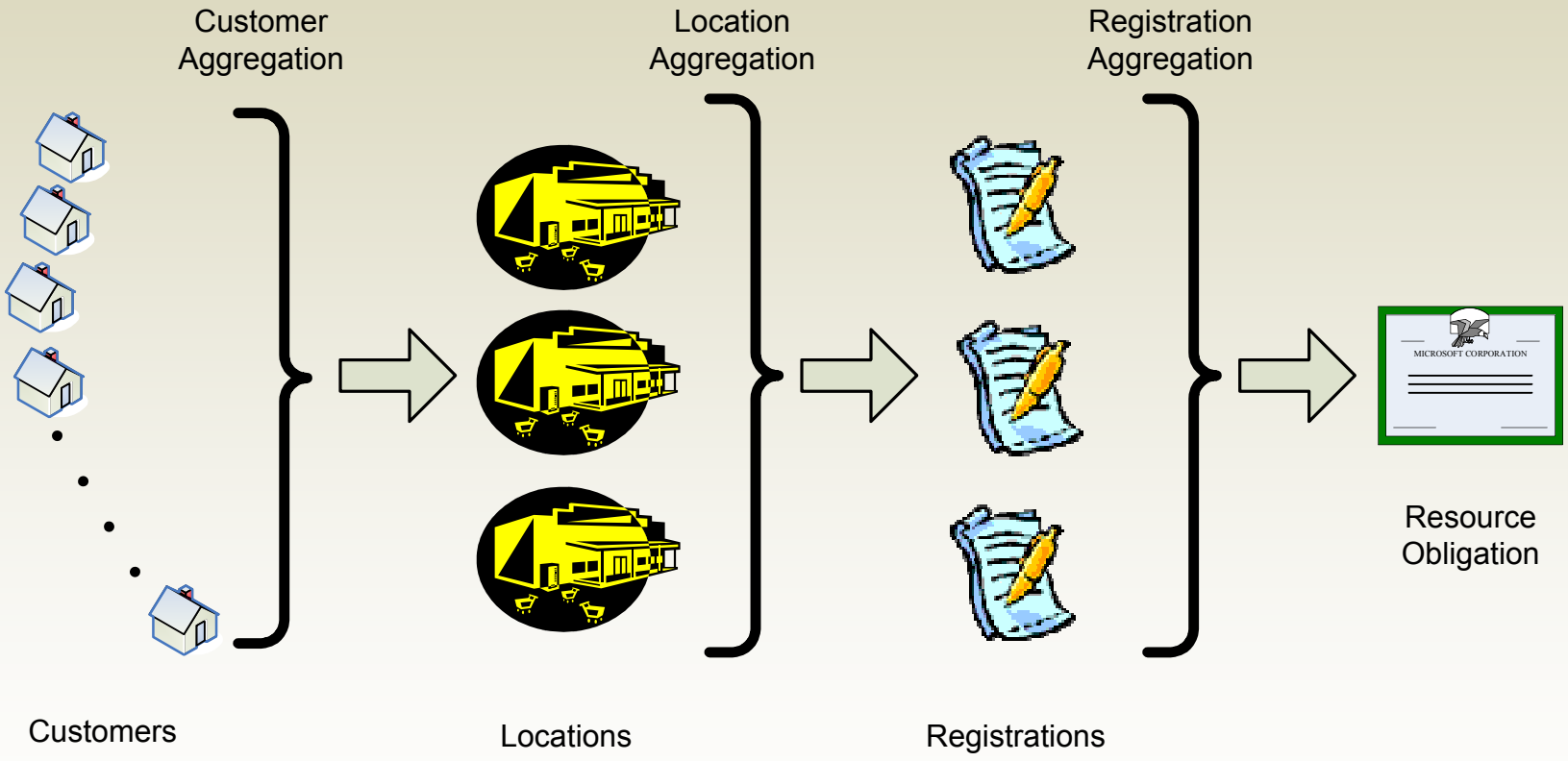
Registration 300 kW

Registration 100 kW



Performance Reports against Obligation

Aggregation Summary



Credit Requirements

- LSE Requirements
- CSP Requirements
  - Emergency Participant-Only
  - Demand Bidding
  - Full Energy Provider

Periodicity

- Effective dates of registrations
- Re-registrations
- Resource transfers between CSP's
- Inactive registrations

Approval Process

- Time length for approval
- LSE Approval
- UDC Approval
- Segmenting visibility of data for LSE/UDC
- Dispute resolution

Impact Area #2:
Market Operations

Notifications

- Types of Notifications
  - Events
  - Offline Resources
- Communications Types
  - Broadcast
  - Acknowledgement required
  - Response required
  - Alternative contacts
- Intra-day Communications
  - CSP-LSE
  - CSP-UDC
  - LSE-UDC

Forecasting

- Impact of CSP as a market participant
- LSE-CSP interaction
- Training & operator experience

Metering and Telemetry

- Data submission rules
  - Format
  - Entities authorized to submit data (CSP, LSE, UDC, MDSP)
- Data access
- Meter data validation and auditing
- Data versioning

Impact Area #3:
Settlement

NAESB Performance Evaluation Models

- **Maximum Base Load:** A performance evaluation methodology based solely on a Demand Resource's ability to reduce to a specified level of electricity demand, regardless of its electricity consumption or demand at Deployment.
- **Meter Before / Meter After:** A performance evaluation methodology where electricity consumption or demand over a prescribed period of time prior to Deployment is compared to similar readings during the Sustained Response Period.
- **Baseline Type-I:** A Baseline performance evaluation methodology based on a Demand Resource's historical interval meter data which may also include other variables such as weather and calendar data.
- **Baseline Type-II:** A Baseline performance evaluation methodology that uses statistical sampling to estimate the electricity consumption of an Aggregated Demand Resource where interval metering is not available on the entire population.
- **Metering Generator Output:** A performance evaluation methodology, used when a generation asset is located behind the Demand Resource's revenue meter, in which the Demand Reduction Value is based on the output of the generation asset.

NAESB Performance Evaluation Models (Part 2)

Performance Evaluation Type	Valid For Service Type			
	Energy	Capacity	Reserves	Regulation
Maximum Base Load	✓	✓	✓	
Meter Before / Meter After	✓	✓	✓	✓
Baseline Type-I	✓	✓	✓	
Baseline Type-II	✓	✓	✓	
Metering Generator Output	✓	✓	✓	✓

Performance Evaluation Methods: Pros and Cons

- **Maximum Base Load**
  - + No historical data needed to calculate base point
  - - May not fit all resource types
  - - Does not account for variations/curves
- **Meter Before / Meter After**
  - + No historical data needed to calculate base point
  - - May require sub-hour metering
  - - Does not account for variations/curves
- **Baseline Type-I & Type II**
  - - Historical (and perhaps a lot) of data needed to calculate base points
  - +Can be customized for specific resources
  - + Arguably the most accurate method to estimate reduction
- **Metering Generator Output**
  - + Perfect calculation of reduction
  - - ONLY applies to generation offsetting load (not applicable in most cases)

Baseline Model Variables

- Day Types Definitions
  - How many are necessary
  - Specific to resource type/class
- Historical Data Exclusion
  - Prior Event Days
  - Statistical High/Low
- Event Day Scalar Adjustments
  - Temperature
  - Load Point
- Model Versioning

Settlement Program Hierarchy

- Multiple Event Settlement Days
- Multiple Program Settlement Days
- Overlapping Events

Settlement Approval Process

- Time period for settlement
- Approvals:
  - LSE
  - UDC
  - CAISO
  - Other entities
- Data changes
  - Before settlement approval
  - Post settlement approval
- Dispute resolution