Load Participation for Ancillary Services for Department of Energy

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Outline

- Comverge Program Summary
- Comverge Megawatts under Management
- Residential Aggregation
- Best Load for Residential Aggregation
- Alternate Residential Approaches
- Alternate Curtailment Approaches
- Real time Monitoring
Comverge’s Unmatched Incumbency for Demand Response

500+ Utility Customers

Multi-year VPC & Turnkey Contracts
Wide Range of Services

**Client Acquisition**
- Prospect analysis
- Segmentation

**Marketing**
- Channel management
- Messaging
- Acquisition tracking

**Client Management**
- **Call center**
  - Work order generation
- Customer tracking
- Customer support
- Accounts / customers
- System topology
- Rate & tariffs
- Trouble ticketing

**Load Control**
- Control strategies
- Notification & alerts
- **Dynamic pricing**
  - Event & device management
  - Constraints
  - Grid operations
  - MW tracking
  - Event reporting

**Measurement**
- Event performance
- **M&V data**
  - Device metrics
  - Forecasting
  - Performance baselines
  - Device operations
  - System operations
  - Event reporting

**Analysis**
- System performance
- Network performance
- Device heuristics
- **Load analysis**
  - System forecasting
  - Customer analysis
  - Segmentation

**Program Refinement**
- Dynamic forecasting
- **Performance modeling**
  - Grid impacts
  - Customer forecasting
  - Weather impact
  - Grid constraints
  - DMS dispatch
Comverge’s Megawatts under Management

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<th>Residential</th>
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Comverge 10-Q – June 30, 2011
Advantages of Residential Aggregation

- Geographically distributed
  - Easy to target specific areas
- Able to tailored reduction MWs to need
  - Vary Cycling Percentage
- Ability to tailor response profile
- Time to response
- Highly reliable
  - Statistical advantages of using more participants
Air conditioning is the best residential load for DR

Peak DR

- **Central AC**: 2.0 kW peak
- **Hot Water**: .31 kW peak*
- **Electric Dryer**: .376 kW peak*
- **Clothes Washer**: .05 kW peak

Flexibility in Device Deployment

Digital Control Units (DCU)

- Features
  - Single device to control multiple loads and/or load types
  - Compatible with multi-stage HVAC systems

- Benefit to Utility
  - Cost-effective and easy to install

Thermostats

- Features
  - Advanced user display
  - Display energy usage, price, tiers, control information, etc.
  - ZigBee-based communications

- Benefit to Utility
  - Energy Efficiency device in client’s name
  - Extend brand into home
Cycling vs. Temperature Offset

50% Adaptive Algorithm Cycling

Cycling:
- Enables a better ramp in by varying curtailment initiation time
- Spreads kW reduction more evenly across response interval
- Provides DR from load use

3F Temperature Offset
Real Time Load Measurement

- Best Practice:
  5 minute load profile data reported, processed and displayed every 30 minutes or better

- Near real time reporting enables verification during DR events
- Near Real time load measurement enables good estimates of DR Potential
  - Better than a “time - temperature matrix”
- Actual measurements are the best estimate of the next few hours
- Dispatch should have access to this data
- 5 minutes enables analysis of response time
Both Residential and Commercial programs incur significant up front marketing costs.

Residential programs have in additional install cost.

Residential DR costs per kW are constant after initial install.

Commercial DR cost tend to rise each year.

Residential programs tend to be more cost effective after about four years, and continue for ten years or more.
Recommendations

• Encourage the broad deployment of interval meters all the way down to the residential levels
• Encourage time of use and critical peak pricing to enable price responsive demand response
• Support market rules in energy markets that encourage long term investments, five years or more, in equipment to enable effective demand response
• In non-market jurisdictions, facilitate rules to encourage long term investments in equipment to enable effective demand response