Welcome!

- Thank you for joining today’s webinar: *Latest Developments and Market Projections on Automated Demand Response*

- If you have a question please use the question box located on the right side of your screen.

- Questions for our speaker will be addressed at the end of the presentation.

- This webinar will be recorded for future playback.
Today’s Speaker

- Brett Feldman senior research analyst, Navigant Research, contributing to the Utility Transformations
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NAVIGANT RESEARCH PROVIDES IN-DEPTH ANALYSIS OF GLOBAL CLEAN TECHNOLOGY MARKETS.

The team’s research methodology combines supply-side industry analysis, end-user primary research and demand assessment, and deep examination of technology trends to provide a comprehensive view of the Energy Ecosystem.
Energy Ecosystem

ENERGY TECHNOLOGIES

BUILDING INNOVATIONS

TRANSPORTATION EFFICIENCIES

UTILITY TRANSFORMATIONS
MARKET DRIVERS AND BARRIERS
Automated DR Drivers

» Standards
  › OpenADR
  › Leadership in Energy and Environmental Design (LEED)
  › California Title 24

OpenADR Members by Country

(Source: OpenADR Alliance)
Automated DR Drivers

» Ancillary services markets
» Renewable integration
  › California
  › Hawaiian Electric Company
  › Europe
Automated DR Drivers

» International growth
  › Europe
  › Asia

20-20-20 Provisions

(Fukushima Nuclear Station)
(Source: World Nuclear Association)

(Fujiuchi Economic-Technological Development Area)
(Source: United States Trade and Development Agency)
Automated DR Barriers

» Customer control concerns
» Lack of building automation systems (BAS)
» Cost
» Federal Energy Regulatory Commission (FERC) Order 745 court case
TECHNOLOGY TRENDS
Two-Way Communication

» Programmable thermostats
  › Bring your own thermostat/device

» Grid interactive water heating
  › Large storage capacity
  › Fast response capability
## Network Functionality Comparisons

<table>
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<tr>
<th>Function</th>
<th>AMI</th>
<th>Wi-Fi</th>
<th>Smart Grid</th>
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<tbody>
<tr>
<td>Speed</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Network Availability</td>
<td>Always on</td>
<td>Customer-dependent</td>
<td>Always on</td>
</tr>
<tr>
<td>Load Control</td>
<td>Scheduled</td>
<td>Immediate</td>
<td>Immediate</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>Next meter read</td>
<td>Immediate</td>
<td>Immediate</td>
</tr>
<tr>
<td>Customer Engagement</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(Source: Navigant Research, Comverge, Silver Spring Networks)
SAMPLE PROJECTS
Bonneville Power Administration (BPA) developed an ADR platform to implement DR pilots targeted for commercial and industrial customers:

- **Pilot 1: Integration of DR and renewable energy in cold storage warehouses across four utility territories**
  - Compressor and evaporator loads were controlled up and down using ADR signals
  - 51 load control events across the five participating refrigerated warehouses
  - Average of 976 kW of load decrease and 462 kW of load increase

- **Pilot 2: Integration of DR and renewable energy for a paper mill site in the city of Port Angeles:**
  - ADR control strategies included turning on and off mechanical pulping motors
  - 11 load control events for the paper mill
  - Average 21.5 MW of load decrease and 17.6 MW of load increase
Purpose of Fast DR:
“Quick-start bridge resource”
to manage the intermittency of renewable energy generation

- Pilot overview
  - Commercial sector, ~20 customers, each ~100 kW load drop
  - Automated response to HECO signal
  - Akuacom DRAS/Honeywell implementation

- Customer incentives
  - Up to $10/kW-month
  - 50 cents/kWh during events
  - Enablement reimbursement (~$300/kW)

- Schedule
  - 2012: customer enrollment and technical audits
  - Winter/spring 2013: enablement
  - 2013-14: Fast DR event execution
  - 2014: Full year operation; possible filing for full-scale implementation

(Source: Navigant Consulting)
Honeywell working with two partners on ADR projects

- **Scottish and Southern Energy (SSE)**
  - Allows the utility to alert customers when energy use is expected to peak and create grid congestion
  - Controller communicates with building management system (BMS), which makes short-term changes based on parameters set in advance

- **Stor Generation**
  - Automatically adjusts energy use in buildings to help stabilize the electrical grid in National Grid’s Short Term Operating Reserve (STOR)
  - Combines and feeds power from onsite generators into the grid as well
Ministry of Economy, Trade and Industry (METI) directing various efforts to bring more DR deployment

- Emphasis to have a well-established OpenADR standard
- OpenADR task force includes Japan Smart Community Alliance (JSCA), major electric utilities, and Japanese equipment manufacturers (Toshiba, Hitachi, Mitsubishi, Fujitsu, etc.)
- Testing of reference OpenADR systems with factories and commercial buildings took place in late 2013/early 2014
- Kyocera is partnering with IBM and Tokyu to demo an ADR network consisting of 25 demo sites
» Challenge: Grid reliability
  › Managing rapid increase in demand and influx of renewables
» Conducted ADR pilot in the Tianjin Economic-Technological Development Area
» Peak load reduction system pilot and feasibility study involved standards-based ADR based on OpenADR
» Two commercial buildings and one industrial facility participated as demonstration sites
» China wants to prepare for a nationwide deployment starting in 2016, with a goal of 150 MW to 200 MW within smart cities dedicated to ADR
INDUSTRY NEWS
Press Releases: AutoGrid

» $12.75 million round of funding from E.ON
  › Develop new applications for Energy Data Platform software

» Selected by BPA to implement and manage advanced DR demonstrations

(Source: AutoGrid)
Comverge’s IntelliSOURCE

» Released a new suite of IntelliSOURCE advanced applications for demand management optimization
  ‣ Machine-learning system that utilizes Big Data analytics and two-way device telemetry to improve forecasting capabilities
  ‣ Can determine the most cost-effective assets for a utility to deploy, taking customer and environmental factors into account
» Introduced a new utility DR product called Demand Manager
  › Software as a service (SaaS) platform that provides utilities and retail electric providers with the tools to manage DR programs
  › Includes a data integration application programming interface (API) that allows EnerNOC’s software to integrate with utility interval meters, thereby leveraging smart meter investments
Conducted pilot at PJM for DR in ancillary services

- Included Walmart, the Lawrence Berkeley National Laboratory, and Schneider Electric
- Sent signals to Walmart’s BMS for synchronous reserve and Schneider’s variable frequency drive (VFD) lab for frequency regulation

Bought North America Power Partners (NAPP) to add aggregation functions
Press Releases: Landis+Gyr

» Working with Consolidated Edison to manage energy use at electric vehicle charging stations
  › Load control switches at 50 homes
  › Study how customers respond to DR requests at different times of day

» Released updated version of Power Center, an operating software for DR applications
  › Links Landis+Gyr load control switches to the advanced metering infrastructure (AMI) network

(Source: Landis+Gyr)
Press Releases: Powerit

» Published Electrical Demand Automation Software specification
» Offering Spara load control hardware and software on a white-label basis to OEMs and service providers that want to build advanced demand management into their branded products
» Releasing Spara software onto third-party hardware for companies such as Mitsubishi and Siemens

Powerit’s SparaHub

(Source: Powerit)
Press Releases: Siemens

» Signed deal with Direct Energy to provide DR management system (DRMS)
  › Largest DRMS deal for a non-utility retail energy supplier
  › Integrates with multiple independent system operators (ISOs) and DR programs
  › Supports consumer-bidding DR programs
Press Releases: Silver Spring Networks

» Introduced CustomerIQ Thermostat App
  › Mobile energy management and DR event control without reliance on residential broadband or Wi-Fi
  › Can work with any ZigBee Smart Energy protocol device
  › Available as iOS and Android apps and a web version
MARKET FORECASTS
» Number of ADR sites expected to grow to almost 2 million by 2023

ADR Sites by Region, World Markets: 2014-2023

(Source: Navigant Research)
ADR Capacity expected to grow to over 30 GW by 2023

ADR Capacity by Region, World Markets: 2014-2023

(Source: Navigant Research)
ADR Spending expected to grow to over $180 million by 2023

ADR Spending by Region, World Markets: 2014-2023

(Source: Navigant Research)
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Q&A

- Recording and slides from this presentation will be available at [www.openadr.org](http://www.openadr.org).

- The OpenADR Webinar Series will continue throughout 2015. More information on future topics and registration details coming soon.
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Thank You!

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