BPA Commercial & Industrial Demand Response Pilot Projects

Stakeholder Meeting #2

Seattle (July 20, 2010)

Presenters

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Today's Meeting Agenda

- Introduction
- Project Objectives
- Demand Response (DR) Overview
- Discussion on Potential Pilot Options
- Pilot Project Implementation Process
- Open Q&A session
- Next Steps

Background: Why is BPA interested in DR?

- Hydropower system has met needs for years, but has increasing demands on system
  - Want to keep the system
    - Reliable
    - Flexible
    - Cost-effective (i.e. low rates)

- Why now?
  - Better to pilot strategies before capacity issues become critical
  - The 6th Power Plan stresses need for BPA to engage pilots; It's possible that the 7th Power Plan may have DR targets
  - There are many unknowns needing research regarding how to develop DR as a resource in Pacific Northwest

Pilot: Goals and Objectives

- Test DR strategies that provide value to BPA, customer utilities, and/or end users
- Successfully execute pilot projects with engaged partners
- Increase BPA's understanding about utility needs & considerations in regard to DR
- Share findings with customer utilities and other stakeholders

Key Drivers

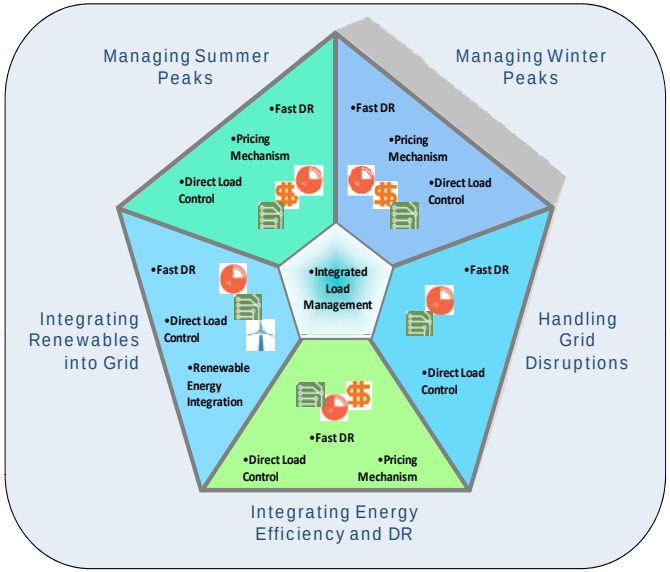
1. Managing system loads during prolonged summer heat waves when river levels are lowest and electrical demands are very high due to cooling loads and/or irrigation needs
2. Managing system loads during winter cold spells when electrical demands are very high due to heating loads
3. Integrating growing wind generating resource and the associated challenges brought on by its variable availability
4. Mitigating effects of disruptions on the power grid due to generation unit outages or limitations
5. Integrating energy efficiency with demand response activities

What are your drivers?

- Shed, shift, or shape your load?
- Do you have capacity issues?
- Service Issues?
- Rate Issues?
- Increased renewable energy use?

Determine Approach Based on Drivers

- Pilot Concepts
  - Integrated Load Management
  - Fast DR
  - Direct Load Control
  - Renewable Energy Integration



- Vary the approach based on additional characteristics:
  - Load management strategy
  - Targeted customer types, sizes, and/or locations
  - DR event notification and response time
  - Duration and frequency of DR events
  - Technology requirements

Integrated Load Management

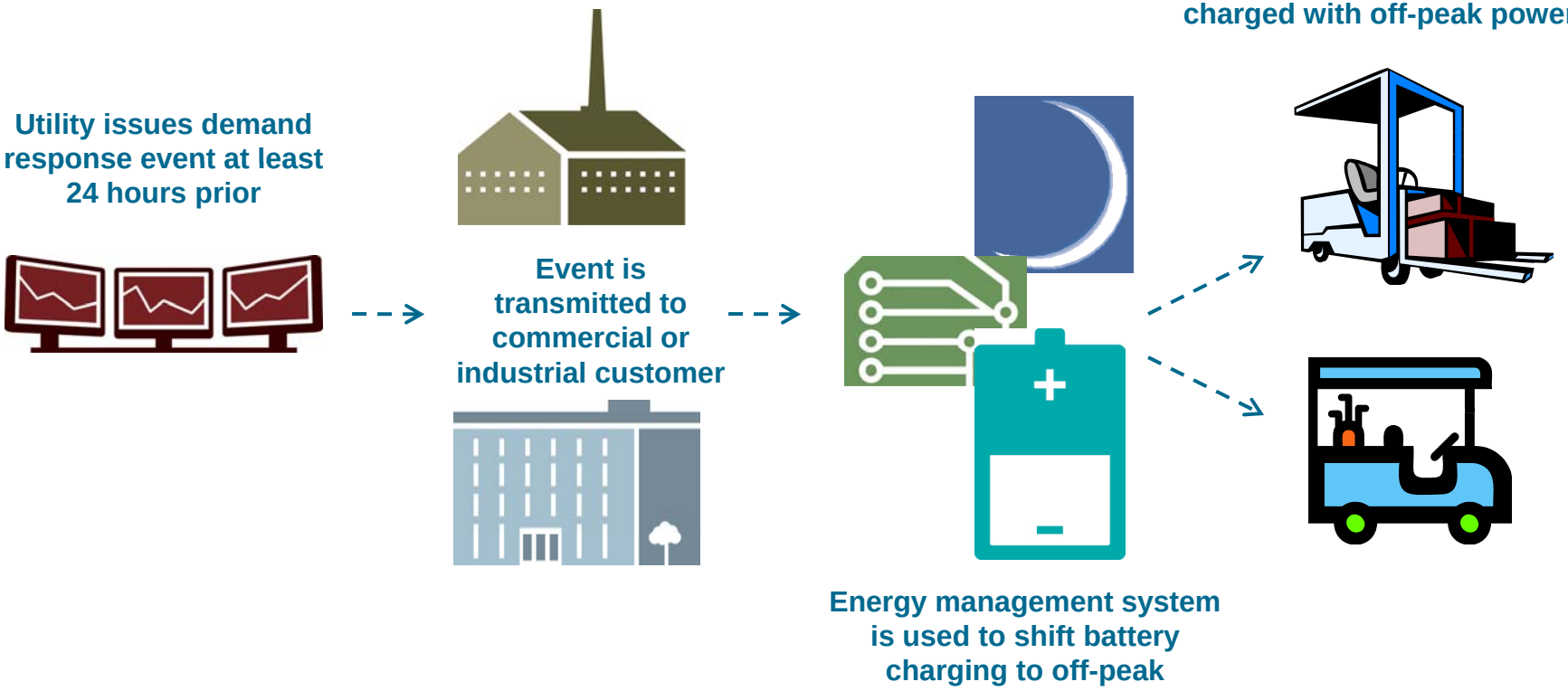
- Combines load shifting from peak to off-peak periods with load curtailment during times of system requirement
- Leverages energy storage options such as building thermal mass, chilled water, ice storage systems, etc.
- Integrates energy efficiency measures with DR strategies
- Variability of renewable resources, such as wind, managed through enabling technologies
- Application examples- wastewater facilities, refrigerated warehouses, data centers, commercial buildings, off-peak electric vehicle charging

Integrated Load Management with Load Shifting

Examples of Pilot Ideas	Objective
Idea 1: Integrated Load Management/ Energy Efficiency Strategies in Wastewater Facilities	Test load shifting strategies from peak periods to off-peak periods in wastewater treatment facilities; use specific systems and analysis tools that shift process-related demand
Idea 5: Integrated Distributed Resources	Test the integration of a number of distributed energy options at the customer end for effective load management and energy reduction; use a real-time distributed resource dispatching system
Idea 6: Thermal Energy Storage Coupled with Demand Reduction and Energy Efficiency Strategies	Test a combination of load-shifting strategies from peak to off-peak hours; use thermal energy storage facilities, along with demand reduction strategies during times of system requirement
Idea 7: OpenADR with Integrated EE/DR in Energy Intensive Industries	Test Auto-DR strategies using OpenADR platform, integrated with load shifting and energy efficiency measures in energy intensive industries such as refrigerated warehouses
Idea 11: Load Shifting with Pre-Cooling, Integrated with Load Reduction and EE Strategies	Test a combination of load-shifting strategies from peak to off-peak hours by pre-cooling buildings; combine with demand reduction strategies during times of system requirement
Idea 12: Auto-DR Strategies for Data Centers	Test Auto-DR strategies for data centers
Idea 13: Chiller Replacement and Thermal Energy Storage Systems	Demonstrate the load shifting potential of thermal energy storage and the water saving potential of air-cooled chillers
Idea 14: Off-Peak Non-Road Electric Vehicle Charging	Shift loads associated with non-road vehicle charging to off-peak periods
Idea 15: Off-Peak Water Pumping to Gravity Storage	Shift electric pumping loads for municipal water utilities to off-peak periods through the use of elevated water storage and advanced pump scheduling controls

Integrated Load Management with Load Shifting

Example:
Off-Peak Non-Road Electric Vehicle Charging



Other Types of Integrated Load Management

Examples of Pilot Ideas	Objective
Idea 8: Super Peak Time of Use Tariffs for C&I Customers	Test customer response to time of use price signals that encourage reductions in peak demand
Idea 9: Interruptible/ Curtailable Option for C&I Customers	Test load reductions realized from eligible C&I customers (typically C&I customers with greater than 200 kW of maximum demand) during times DR events are called, triggered by system requirements
Idea 10: Demand/Capacity Bidding using Auto-DR with Load Aggregators	Test load reductions realized from eligible C&I customers (typically C&I customers with greater than 200 kW of maximum demand) during times DR events are called, triggered by system requirements
Idea 19: Load Aggregation by Utility	Test load reductions achieved through an aggregator program, where the utility itself acts as an aggregator of a number of customer loads, and delivers load reduction during times DR events are called.

Other Types of Integrated Load Management

Example:
Interruptible/Curtailable Option for Large C&I Customers

Customer enters contract with utility to curtail specified load

Utility issues demand response event at least 24 hours prior

Event is transmitted to commercial or industrial customer

Energy impacts from curtailed load are measured

Customer receives capacity and energy payment

Fast DR

- Suitable for load participation in the Ancillary Services market (emphasized in the Sixth Power Plan)
- Extremely fast response of load (less than 10 minutes) to address system requirements
- Especially suitable for integration with fluctuating renewable supply resources such as wind
- Requires advanced metering and communications technologies to enable fast response
- Application examples- air liquefaction industry, chemicals industries, offices, retail stores

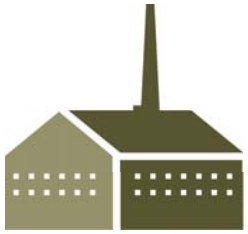
Fast DR

Examples of Pilot Ideas	Objective
Idea 2: Fast DR for C&I Customers with OpenADR (Open Automated Demand Response)	Test fast DR strategies with OpenADR architecture for C&I customers
Idea 4: Fast DR for Small and Medium C&I Customers	Test reduction strategies from small and medium sized C&I customers (with maximum demand, say, less than 200 kW), within 10 minutes or less of event notification.

Fast DR

Example:
Fast DR with OpenADR for Large C&I Customers

Utility issues demand response event with ≤10 min. notification (e.g., could be due to variability in wind resources)



Event is transmitted to commercial or industrial customer

Controls are pre-programmed and automated to react quickly to event

Non-critical loads are shed automatically

Direct Load Control

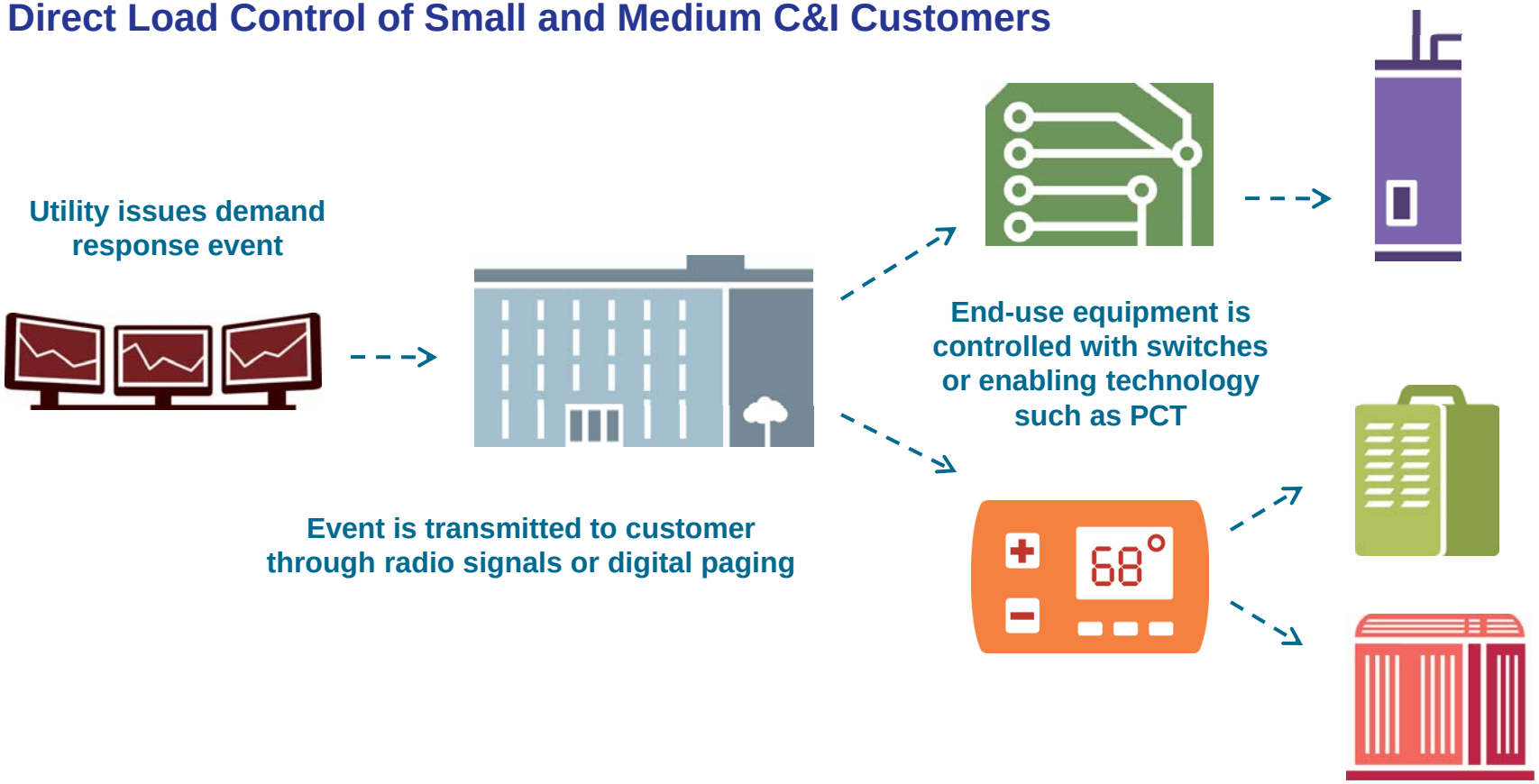
- Direct control of end-use equipment through controls such as switches and smart thermostats
- A variety of end-uses can be controlled such as air-conditioning, electric space heating, irrigation pumps
- Instantaneous shut-down of load during times of system requirement, with short notification time to customers
- Integration with wind possible through advanced technologies
- Hundreds of program examples from utilities throughout North America

Direct Load Control

Example of Pilot Ideas	Objective
Pilot Idea 3: Direct Load Control (DLC) for Small and Medium C&I Customers	Test demand reduction strategies during times of transmission and/or distribution system or power system constraint, by directly controlling the end-use equipment at the customer level

Direct Load Control

Example:
Direct Load Control of Small and Medium C&I Customers



Renewable Energy Integration

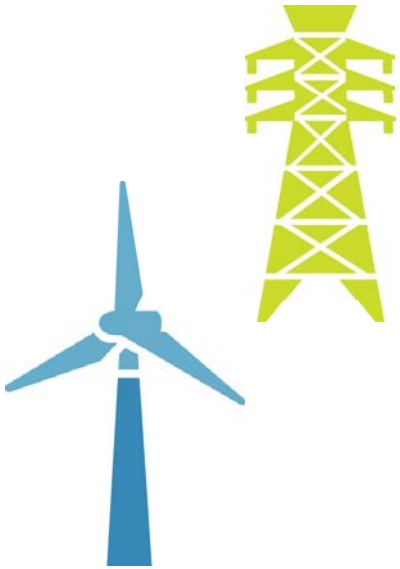
- Utilizes renewable energy, when available, for energy storage
- Allows integration with wind and management of supply fluctuations
- Especially suitable for locations with gravity water storage, such as municipal water districts
- Stored energy can be used as a supply resource during times of capacity constraints, or when wind is not available

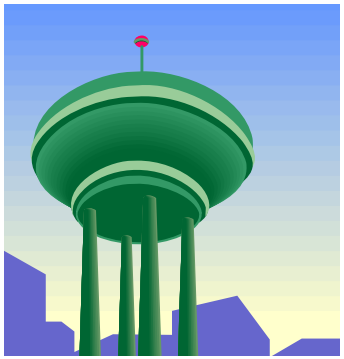
Renewable Energy Integration

Examples of Pilot Ideas	Objective
Pilot Idea 16: Water Pumping for Reducing Variability of Renewable Generation	Test the integration of renewable energy resources with municipal water pumping systems
Pilot Idea 17: Wind/PV-Powered Pumped Water Storage for Electric Energy Storage	Test using renewable energy to pump water to elevated storage tanks for the purpose of energy storage
Pilot Idea 18: Wind/PV-Assisted Municipal Water Pumping and Building Water Systems	Test the use of an off-grid dedicated renewable-powered water pump to supplement utility grid energy for pumping water in municipal distribution systems and in high-rise buildings

Renewable Energy Integration

Example:
Water Pumping for Reducing the Variability of Renewable Generation





Pump water to storage whenever renewable resources are available

Use stored water to help meet water demands, e.g., for residential needs

The concept for this pilot is essentially the opposite of conventional DR; instead of reducing loads during capacity shortfalls, it calls for increasing loads during times of excess renewable capacity

What does the process look like?

Begin

- Start with knowledge of your customers and of your utility's priorities
- Call Global for a short, high-level conversation to refine your ideas

Develop

- Develop the concepts into a proposal
- Global assists through in-depth phone consulting and on-site walkthrough

Commit

- Gain commitment from your utility management team and your customer
- Submit your proposal to BPA by Sept 30

Begin – Understand your utility priorities

- What are your C&I loads?
  - %'s of industrial, commercial; types of companies
- Who is (should be) involved?
  - Could be power, conservation, engineering, customer service
- What are your drivers?
  - Night-time load building?
  - Integrating renewables?

Begin – Understand your customers

- Do you have end-users in mind?
  - Industrial
    - Light: e.g. Data Centers
    - Heavy: e.g. pulp and paper, food processors, cold storage
  - Commercial
    - Big-box stores
    - Water/Wastewater
  - Ag
    - Irrigation
- Their ability to respond to events?

Develop – In-depth Utility Information

- What types of DR event triggers
  - event duration, timing and frequency
- What requirements for real-time load data monitoring
  - a prerequisite in certain specific markets
- What procedures and methods for establishing customer baselines, for M&V
  - To measure load reduction impacts
- Preferred incentive structures?

Develop – In-depth Customer Information

- Facility Loads
  - Connected load vs. actual demand
- Customer drivers
  - Energy cost
- Technical requirements
  - Interval meter (either Smart Meter or able to accommodate a temporary clamp-on metering device)
  - Communication capabilities (high speed internet or WiFi)
  - Energy management or building automation control system
  - Programmable communicating thermostat
- BPA/Global Communication Protocols
  - Objectivity maintained during proposal preparation and selection.

Develop – Customer Onsite Walkthrough

- Assess full potential*
- Understand any control systems
  - e.g. EMCS, SCADA, etc
- Establish specifications for technological components to ensure interoperability

*Global available to walk through facility

Commit – Gain Utility Buy-in

- Executive statement
  - Does not have to be board mandate
  - Should express utility priorities and support for participating in pilot
- Expresses commitment to share cost
  - Can be in-kind cost share of personnel or equipment
  - Can ramp-up in FY 2012

Commit – Gain Customer Buy-in

- Does not have to be formal board-level mandate
  - Can be management-level statement that they're committed to project
- Address end-user customer needs to gain buy-in*

* Global can assist in buy-in process

Commit – Submit Proposal

- Form proposal*
  - "Core" proposal up to 15 pages
- Proposal Includes specifics
  - Clear connection to BPA focus area and your utility driver
  - Clear explanation of your strategy – project description
  - Executive commitment statement
- Submit to BPA by Sep 30, 2010

* Global can assist in proposal development

Commit – Proposal Content

- Project Description: general overview, rationale, goals & objectives, end-user impact, incentives, and persistence of assets
- Technology: type proposed to address objectives
- Scale: size of project (expected MW/KW impact), including potential if expanded
- Readiness: ability and commitment to move forward for utility and customer; availability of technology
- Tasks: activities to be accomplished
- Project timeline: with key phases
- M&V: how to evaluate success
- Deliverables: defined work plan
- Challenges: primary expected challenges
- Key personnel: background & roles of utility and vendor team
- Budget: complete and appropriate, with cost-shares

Pilot Project Proposal Process

- Selection Criteria and Proposal Requirements are clearly stated in the BPA Project Implementation Plan (PIP)
- Pilot selection will be made by BPA's DR Team
  - Market Assessment and Pilot Impact Opportunity
  - Ability to meet a resource need at the utility level
  - A clear linkage to BPA focus areas (see PIP)
  - Potential benefit(s) to region
  - Not redundant with other regional DR pilots
  - Clear goals
  - Evaluation Plan

* The PIP has been revised as of July 20, 2010

Pilot Project Proposal Guidelines

- Award Information: 2-6 awards ranging from $100k-$500k
- Eligibility: BPA PF Customer Utility (slice or load following)
- Proposal Evaluation Considerations: (See PIP)
  - Meets basic eligibility and mandatory requirements
  - Project Approach clearly identifies information outlined Proposal Submission Guide
  - Technology is viable and ready within the pilot timeframe
  - Project is scalable to other end-users or utilities
  - Project team is clearly identified (including vendors)
  - Budget shows cost and value to BPA ratepayers
  - Cost-share is stated (can include in-kind staff support, equipment, M&V)
  - Commitment expressed by Utility Management / Board and by End-use Customer
  - At least one technology or objective is demonstrated and/or tested

Next Steps: Public Outreach

- BPA Ongoing Outreach
  - **Website with resources:**
    - http://www.bpa.gov/Energy/N/demand.cfm
- Stakeholder Meetings
  - **Seattle: July 20, 10 AM – noon**
    - Seattle City Light, 901 5th Ave, 5th Floor, Seattle, 98164
    - Dial In #877-278-8304 pin 3992
    - https://www.livemeeting.com/cc/eventbuilderpro/join?id=637RP4&role=attend&pw=B%40FDf%5D7
  - **Spokane: August 10, 10 AM – noon**
    - Inland Power and Light, 10110 W. Hallett Rd., Training Room, Spokane, 99224
    - Dial In #877-278-8304 pin 3992
    - https://www.livemeeting.com/cc/eventbuilderpro/join?id=QS4475&role=attend&pw=B%40FDf%5D7
- Final Q&A on proposal process
  - **Conference Call Only: August 18th 10 AM – 11 AM**
    - Dial In #877-278-8304 pin 3992

FAQs

- Do I need AMR/AMI to participate?
- What type of cost-sharing is required? What is the budget for each project?
- What is Global's role in this project?
  - Developing strategy
  - Guidance on project development
  - Technical aspects of proposal
  - Contracting
  - Maintaining communication protocols to assure objectivity in proposal preparation and selection

For more information contact:

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