Welcome!

- Thank you for joining today's webinar: **How Demand Response Can Benefit From the Growth in Microgrids**
- 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.

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Today's Speakers

- Patty Solberg
  Vice President of Products and Marketing

Patty is responsible for product definition, market analysis, corporate marketing, and engaging with strategic partners to define integration strategies. She began working at Powerit in 2011. Patty comes to the CleanTech community from telecommunications products, where she has a background in product marketing and product management DSL equipment and fiber communications and test equipment.

- Russell Carr
  Senior Engineer

Russell Carr is a Chartered Electrical Engineer specialising in energy and water systems. Russell is experienced in the use of a range of renewable energy software particularly WindPRO, WAsP and PVsyst. Russell leads Arup's microgrid and energy storage consulting business development in San Francisco. He is responsible for developing business strategy and identifying consulting opportunities to leverage Arup's technical and commercial microgrid and energy storage experience.

Agenda

- Defining Microgrids
- Microgrid Design Approach
- Need for standards in microgrid deployments
  - Today it's a custom solution and install
  - Protocols and controls are varied
  - IEEE addressing
- Interplay of microgrids and demand response
- Furthering the goals of the OpenADR Alliance

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Defining Microgrids

- **DOE: Microgrids** are localized grids that can disconnect from the traditional grid to operate autonomously and help mitigate grid disturbances to strengthen grid resilience[1].

- Wikipedia: A *microgrid* is a localized grouping of electricity generation, energy storage, and loads that normally operates connected to a traditional centralized grid (macrogrid). This single point of common coupling with the macrogrid can be disconnected. The microgrid can then function autonomously.[36]

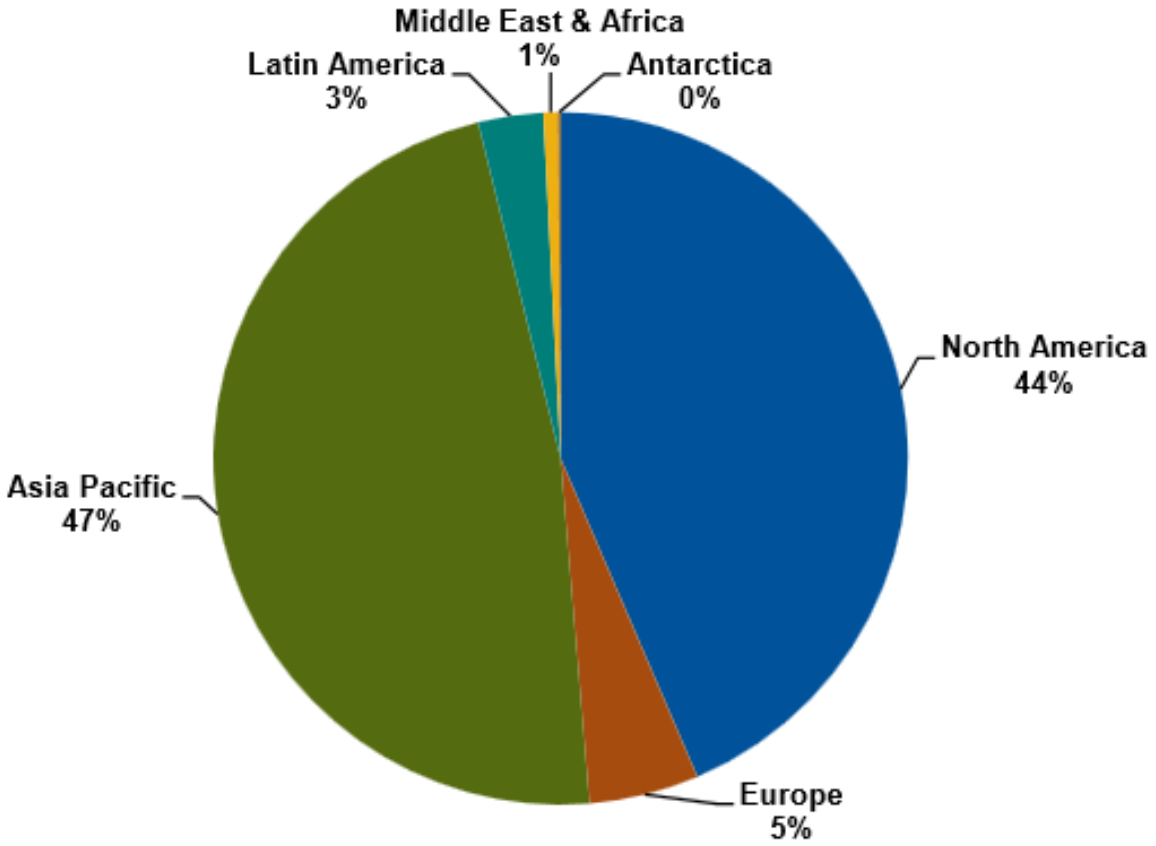
1. http://energy.gov/oe/services/technology-development/smart-grid/role-microgrids-helping-advance-nation-s-energy-system

Key Microgrid Applications

- Islands or Off-grid Systems
  - Actual islands
  - Geographically isolated locations
  - Military Operations
- Utility Emergency Systems
  - Uptime for Critical Assets
  - Emergency backup for hospitals, communications infrastructure, transit, and government facilities
  - Identification and prioritization of need
- Facility Microgrids or Grid-Tied Systems
  - Business and campuses controlling all energy assets to optimize performance and cost

Geographic Capacity Snapshot

Chart 1.1 Total Microgrid Capacity Market Share by Region, World Markets: 2Q 2015



(Source: Navigant Research)

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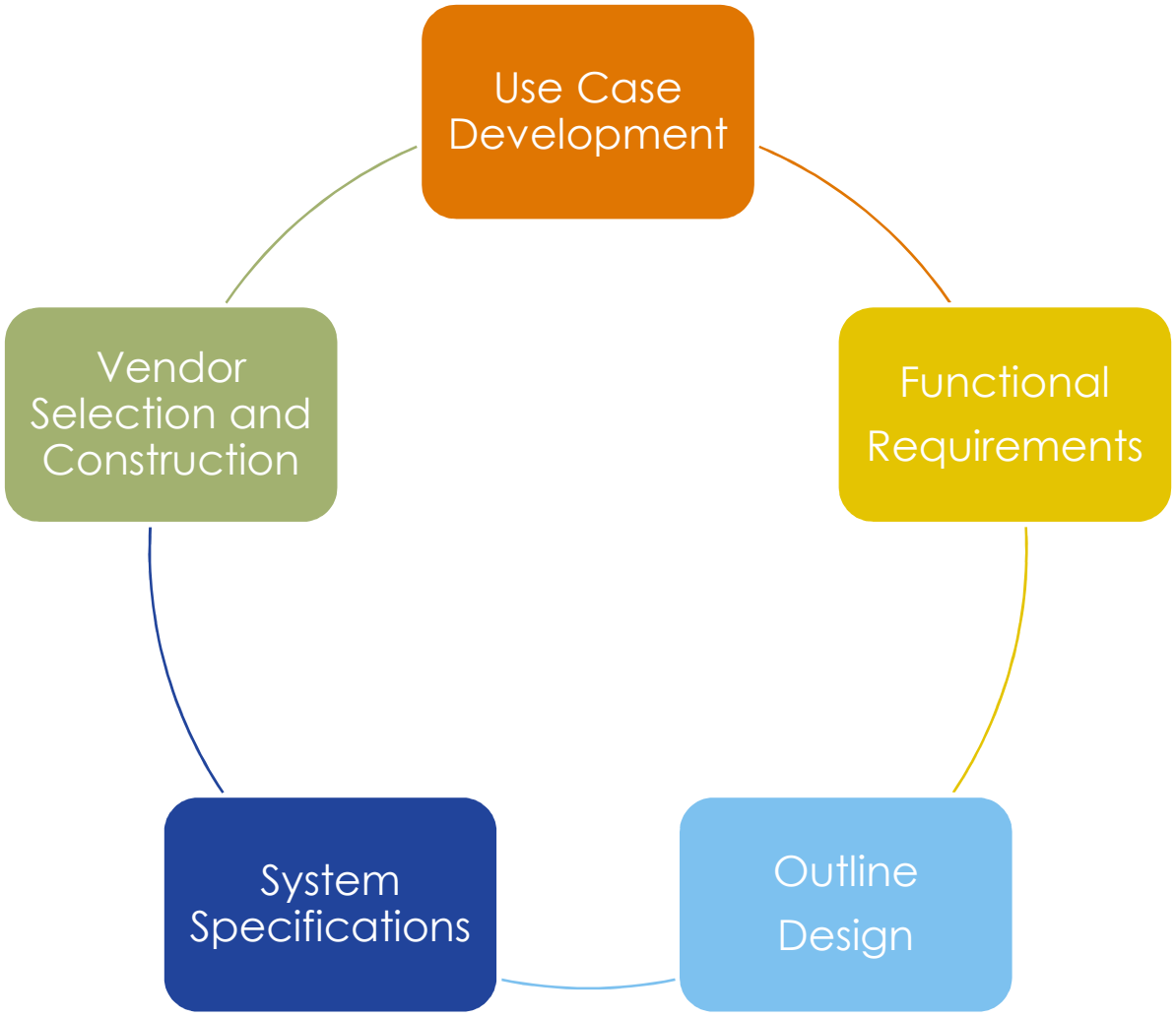
Microgrid Design Approach

Design Process



Use Case and Functional Requirements

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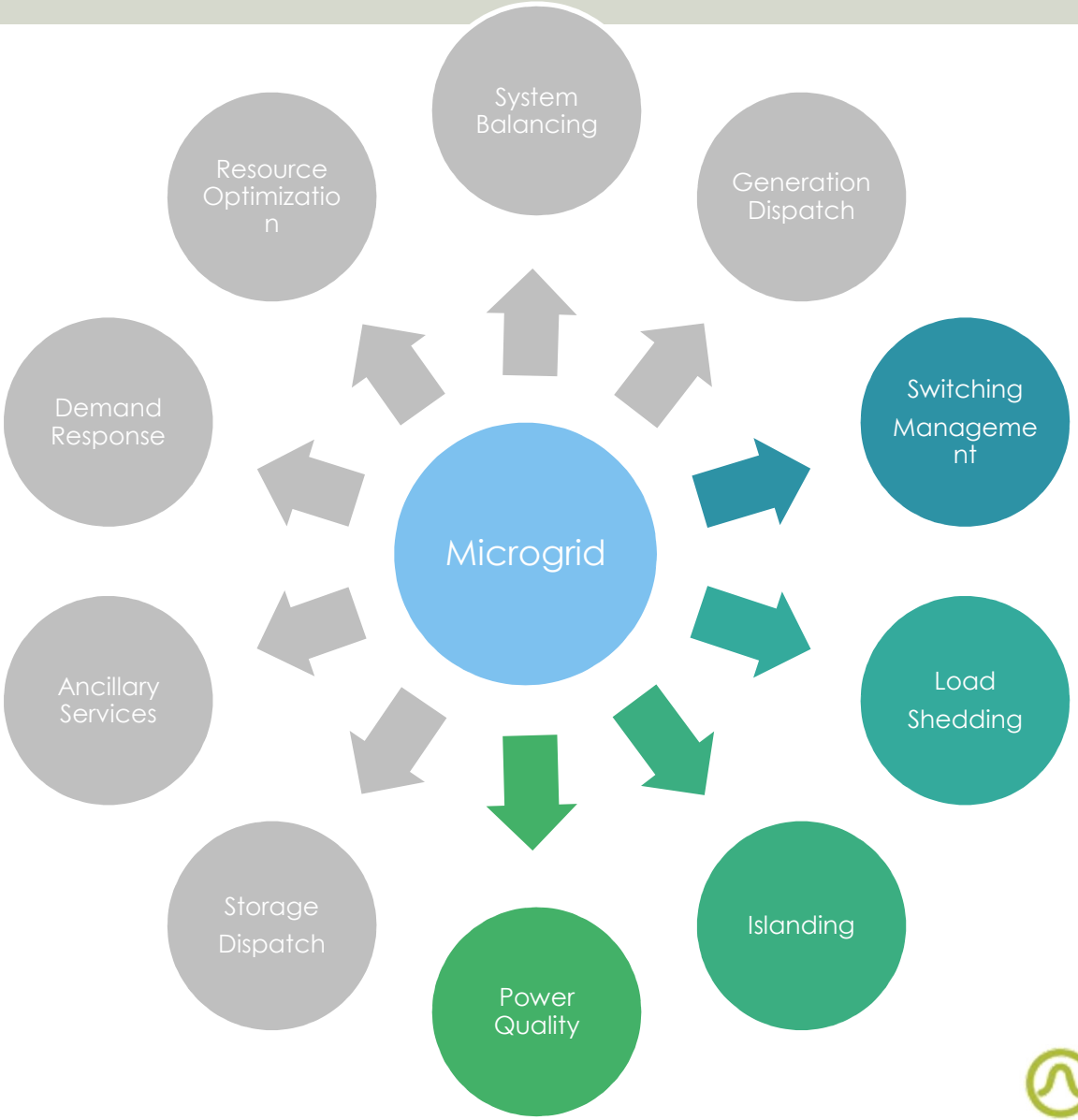

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Use Case and Functional Requirements

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Key Use Case Outcomes

- Generate majority of electricity on site
- Participate in energy storage markets
- Maintain majority of building loads in an outage
- PV and Fuel cells to provide the majority of electricity in island mode

How are DR and Microgrids Related?

- It's all about grid stability
- **Demand Response** (DR) programs **help utilities maintain grid reliability** and enable customers to realize significant value. (www.openadr.org)
- Microgrids can further the goals of the OpenADR Alliance, and by encouraging stable grid islands with sophisticated control can provide valuable grid balancing resources which can be utilized in demand response programs

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Microgrid Benefits

Benefits for system developers, utilities, end user

1. Energy efficient or lower energy cost
2. More reliable / resilient
3. Greener, and may be net zero

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Standards Required

- Microgrid installations are as varied as the many definitions suggest
  - Often built on Proprietary Systems
    - Metering, data archiving
    - Customer dashboard
    - System communication, status, controls
    - Battery sizing / approach
- Standards Required
  - At the utility meter, inverter
  - Communications and dispatch
  - Grid integration

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Battery Sizing

- For grid connected microgrids, no standard approach to battery sizing has emerged

Storage Solution	Storage Application				
	Peak Shaving	Load Shifting	Capacity Demand Response	Emergency Backup	Regulation Demand Response
Virtual Storage	X	X	X	-	X
Basic Battery (~10% of facility peak)	X	-	-	-	X
Deep-Storage Battery	X	X	X	X	X

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So, how does this work with DR?

- Many benefits to localized grid control
- Control on the demand side:
  - Makes the facility more predictable, and a better demand side resource
  - Identifies and harnesses flexibility for demand response programs
  - Encourages full resource management (generation, load, and storage), bringing more into the fold for demand response
  - Sets the stage for next generation "DR2.0" programs
  - Incents consumers to become more energy savvy

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Microgrids can learn from DR Rollouts

- Microgrids can learn from demand response
  - Regulation and a predictable regulatory environment are key to encouraging investment
  - Utility and ISO incentives can spur desired behavior, and encourage investment in beneficial communications and automation technologies
    - Incentives must be structured to reward the desired behavior
  - Standardized communications technologies can
    - create a rich vendor network
    - improve interoperability of solutions
    - reduce deployment costs

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Summary

- Ultimately, sophisticated grid and microgrid controls will help contribute to a more stable and efficient energy environment.
- The broad deployment of stabilized, responsive, islanded loads offers a rich set of resources for demand side management.

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Thank you - Q&A

- Recording and slides from this presentation will be available at www.openadr.org.
- The OpenADR Webinar Series will start again in September 2015. More information on future webinar topics can be found on www.openadr.org.

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Thank You!

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