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MEMBER
FORUM
XVI

ENERGY IN MOTION

Distributed Energy Storage

John Steigers

Generation Project Development

Energy / Business Services

Distributed Energy Storage

Sited within Utility & Serving One or More Value Propositions

- **Peak Shaving** / Load Shifting - at Multiple Scales
- Power Supply Reserves & Management; “**Demand Response**”
- **Defer Investments** in Transmission / Distribution Infrastructure
- **Integrate Intermittent Renewables**
- Voltage Management (VAR Control)
- Frequency Regulation
- Black Start / Uninterruptible Power Supply

Modular and Dispatchable Battery Energy Storage System (ESS)

Demonstration and Evaluation Project

- Self-Contained & Portable; Flexible Distributed Deployment
- Lithium-Ion Battery-Based; On-Board Power Electronics
- 500 kWh Energy Storage - 120 kW Charge/Discharge Capacity
- Remote Control & Monitoring

Project Partners

- Powin Energy
- Energy Northwest
- City of Richland
- PNNL
- BPA



Project Status

ESS Remote Monitoring, Control, & Operability Demonstrated

All Phase II (Nine Canyon Wind) Use Cases Implemented

- **Load Shifting** - Intermittent Generation from Off to On Peak
- **Manage to Schedule** - Actual Production vs. Scheduled
- **Compliance Management** - System Curtailment Events

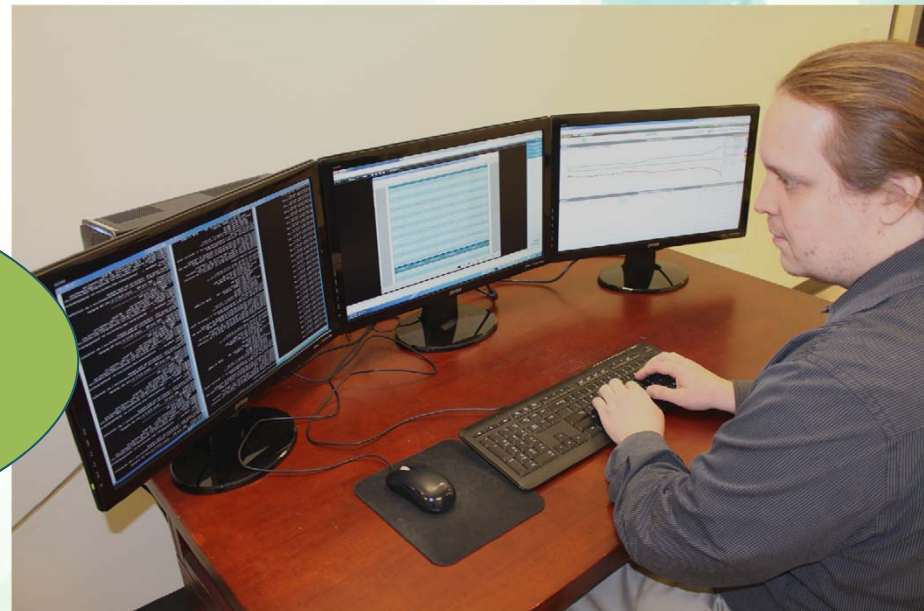


ESS Remote Monitoring, Control, & Operability

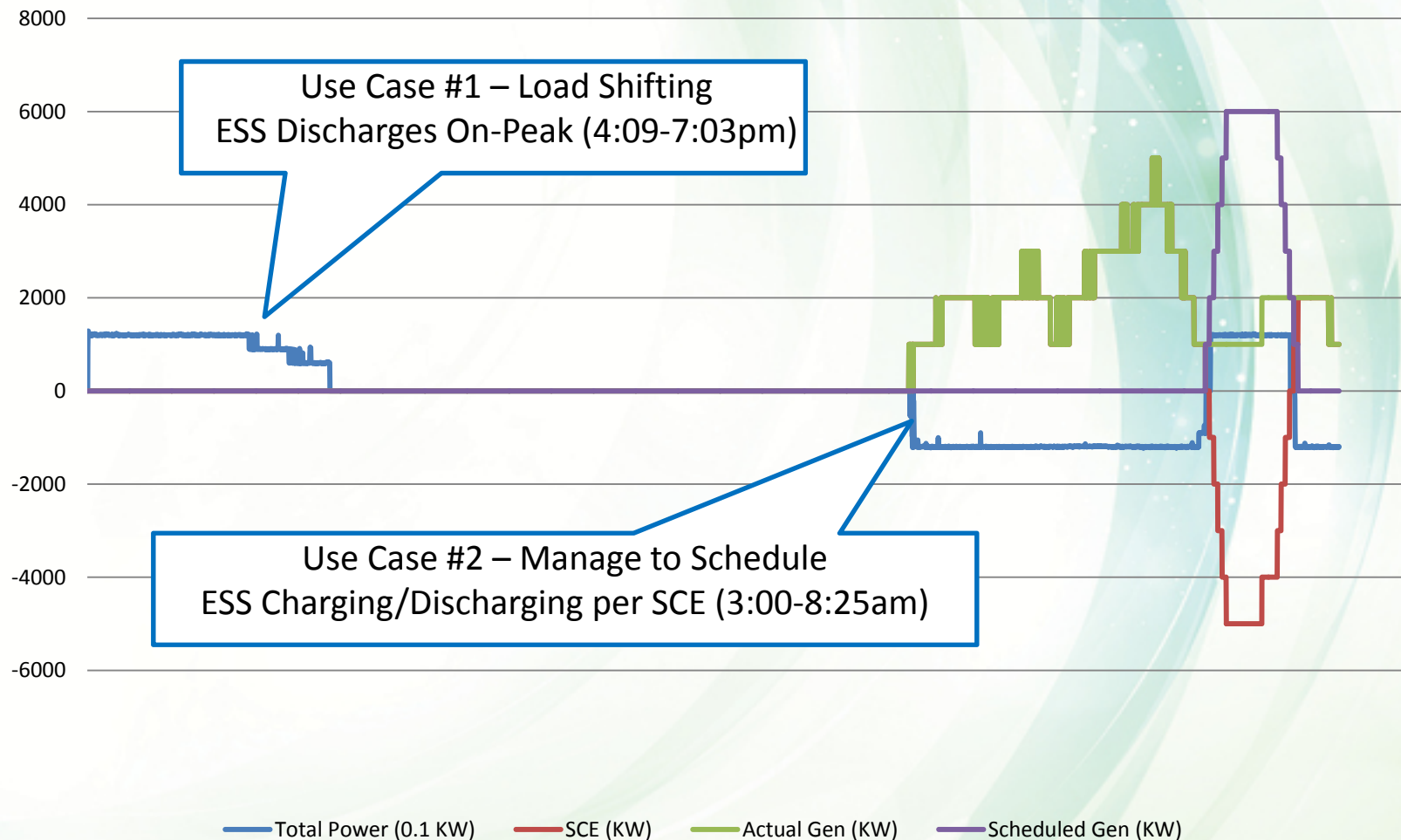
Robust Communication Links In Place and Demonstrated

- **Powin** (Tualatin OR) ↔ **ESS** (Nine Canyon) ↔ **PNNL** (Richland WA)
- Inputs from BPA's Integrated Curtailment and Redispatch System (iCRS)
- Web-Based Communications - Typical Signal Latency < 22 Seconds
- Mobile Device Enabled (Smart Phone, Tablet)

Complex
Decision-Making &
Prioritization
Demonstrated

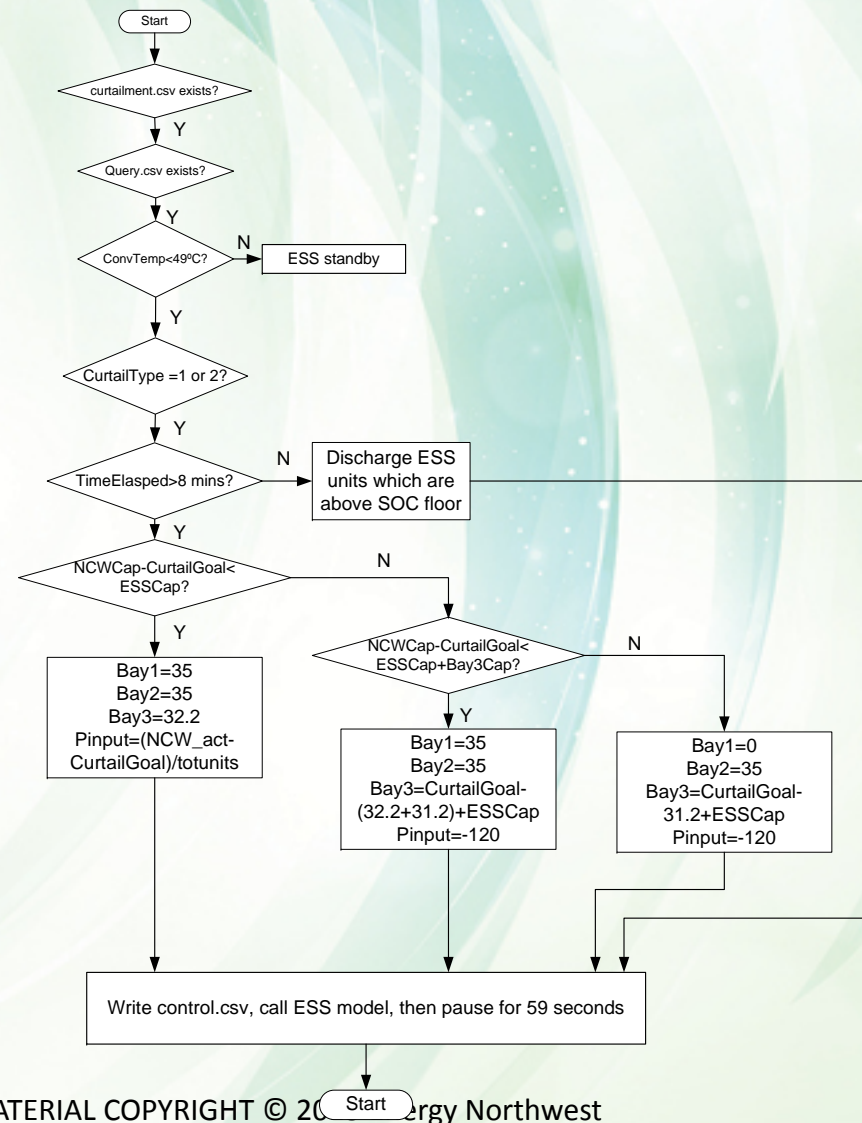


Plot of Data Logs for 16-17 October 2013



Compliance Management

- Use Case Successfully Demonstrated Using Actual May 2013 Event Files
- Real-Time Event(s) Expected in 2Q 2014



Energy Storage Project Next Steps

- **Nov 2013** - Relocate ESS to a City of Richland Distribution Substation for Phase III Testing
 - Phase II Use Case Testing will Continue Through Phases III & IV
- **Feb 2014** - ESS as Fast Demand Response Asset
- **May 2014** - ESS Relocates to PNNL's Richland Campus for Phase IV Testing; Behind-the-Meter Applications & Distributed Solar Integration
- **Nov 2014** - Project Close & Final Report

Demand Response

Leo Quiachon

Manager, O&M Professional Services

Energy / Business Services

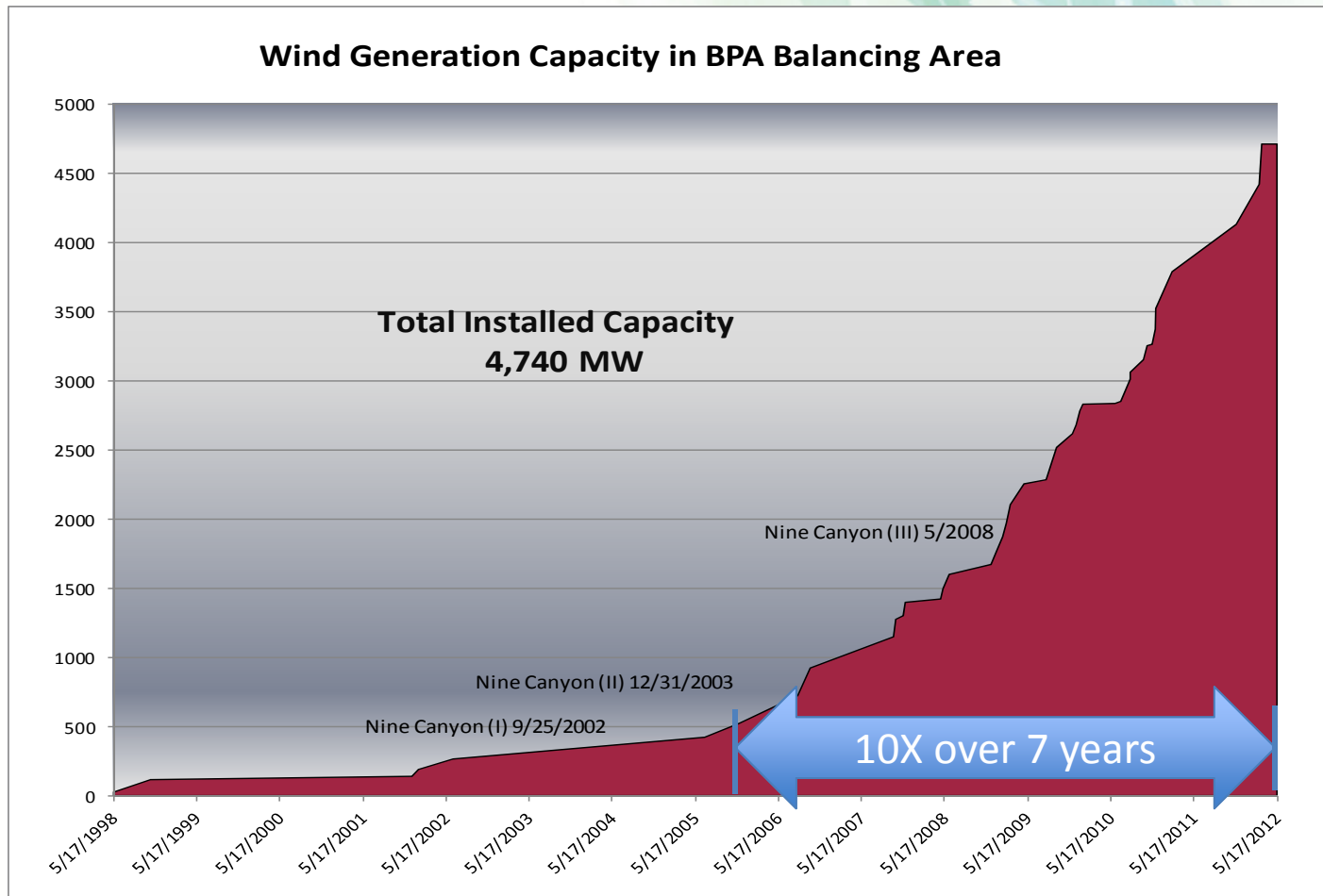
Demand Response (DR)

- An electric grid's ability to manage consumption of electricity in response to power supply conditions

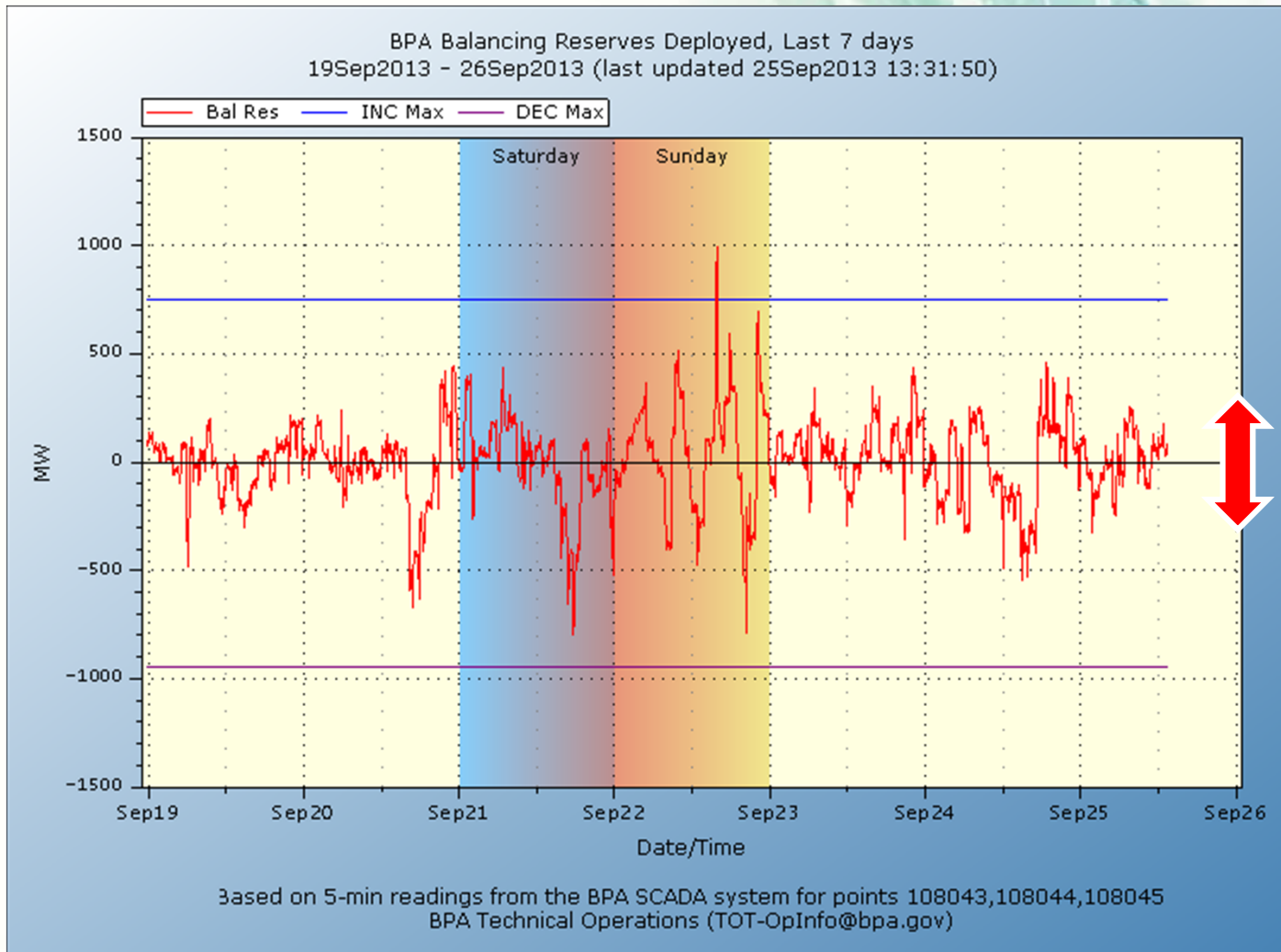


- Wind integration driving the need for BPA to secure additional Generation Reserves both Increasing (INC) and Decreasing (DEC) Balancing Reserves

Wind Integration



Generation / Load Imbalance

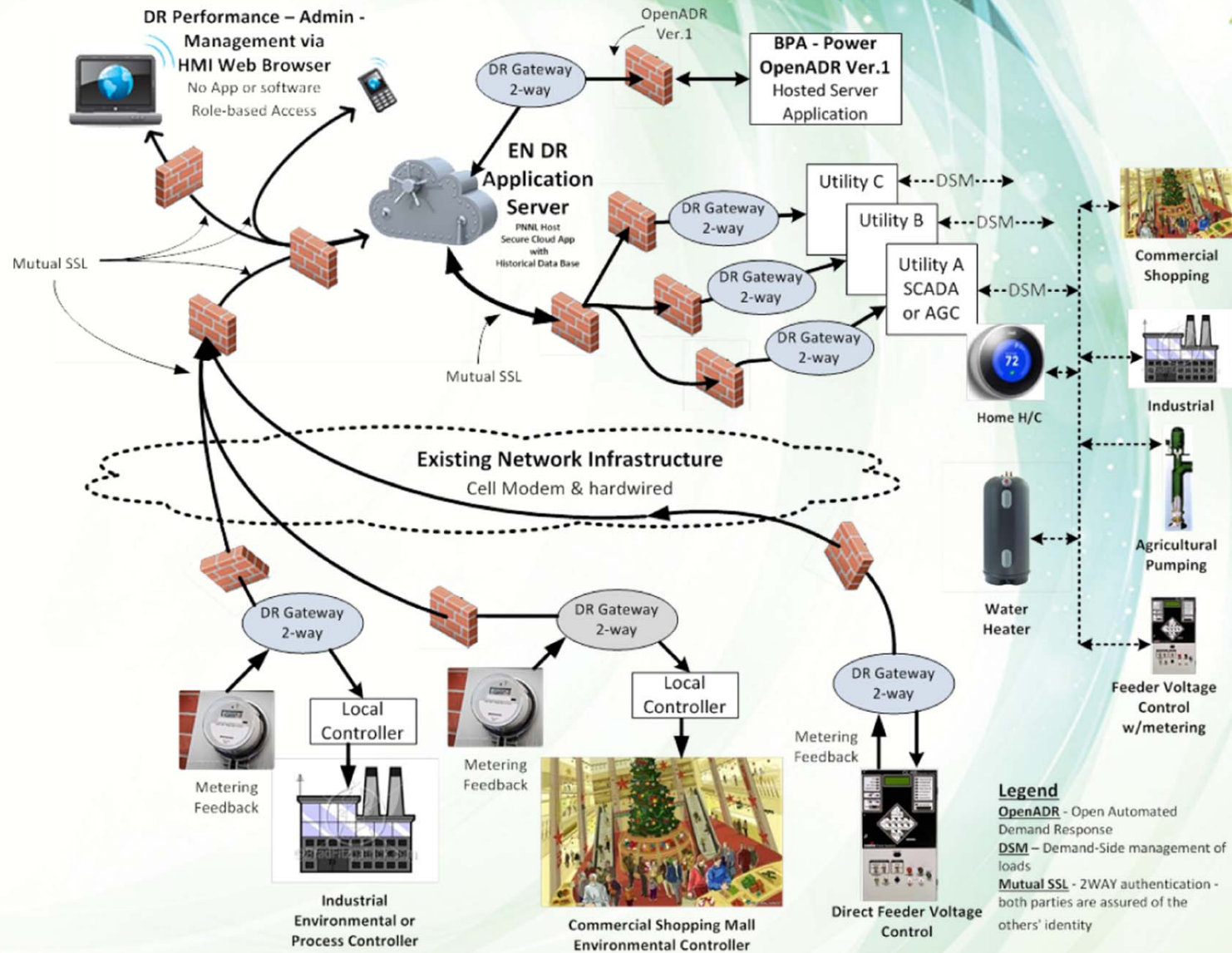


Regularly swings +/- 100-300MW and sometimes much more

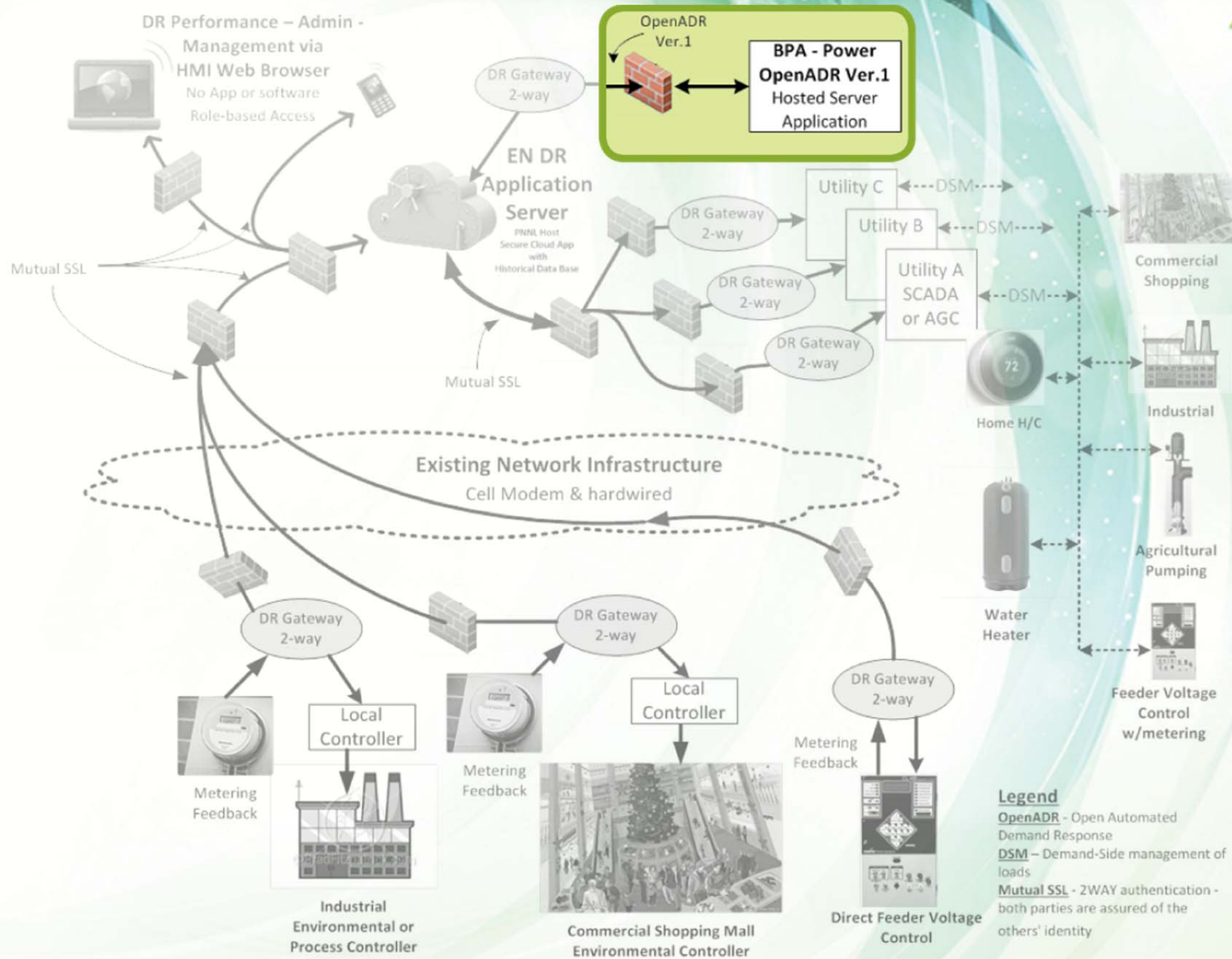
BPA Demand Response Pilot Project

- BPA Project Solicitation April 2013
- Energy Northwest is Partnered with 6 Electric Utilities to Provide over 50 MW of DR Assets to BPA
- Unique “By Public Power, For Public Power” Cost-Based Solution
- Energy Northwest Team Selected - \$3.2M per year over 2-year duration
- Develop and Demonstrate Demand Response Control Network
- Project to provide up to 50 MW of aggregated DR product (INC and DEC)
 - Fast (< 10 min)
 - Hour Ahead
 - Day Ahead

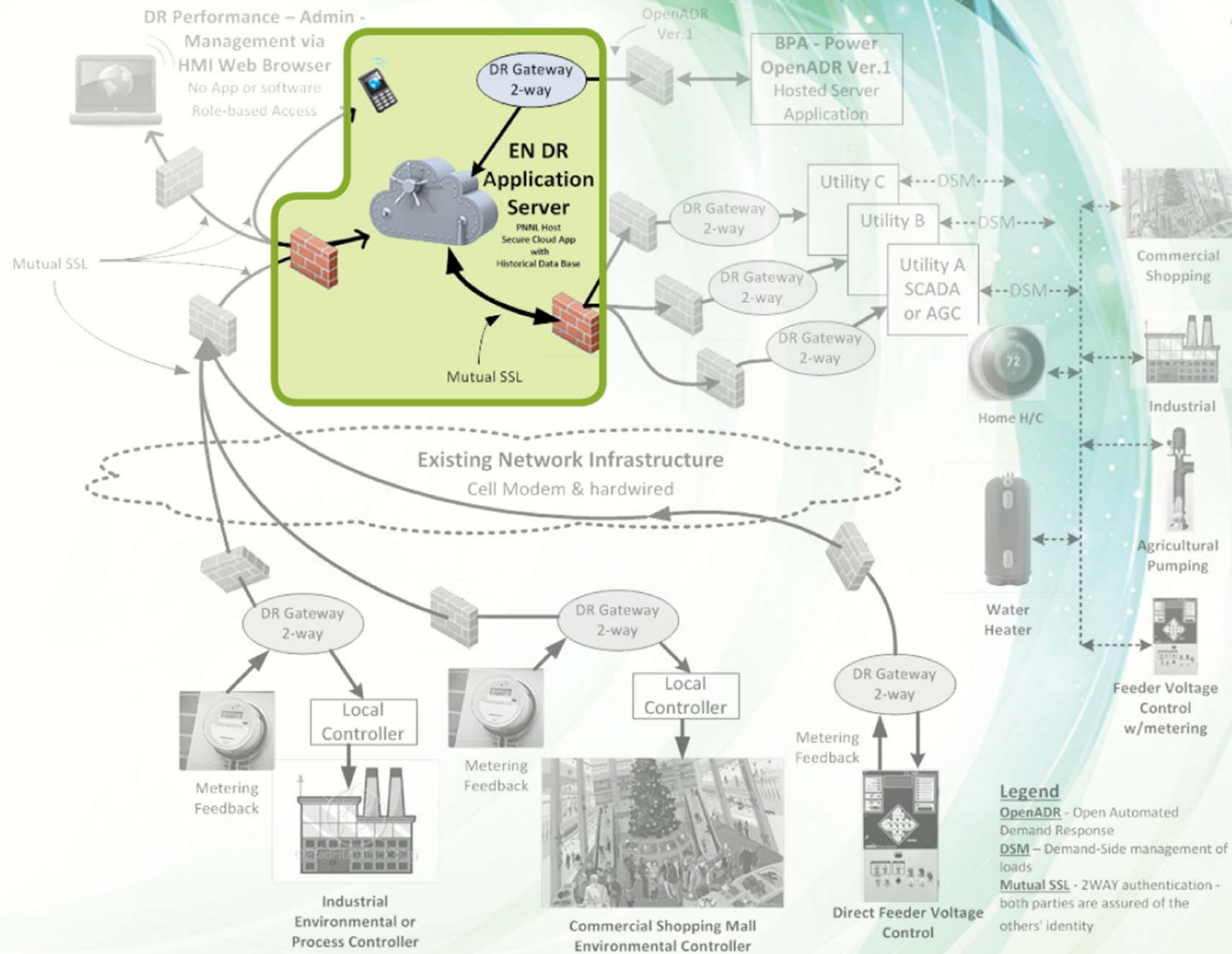
DR Aggregation Across Utilities and Load Segments



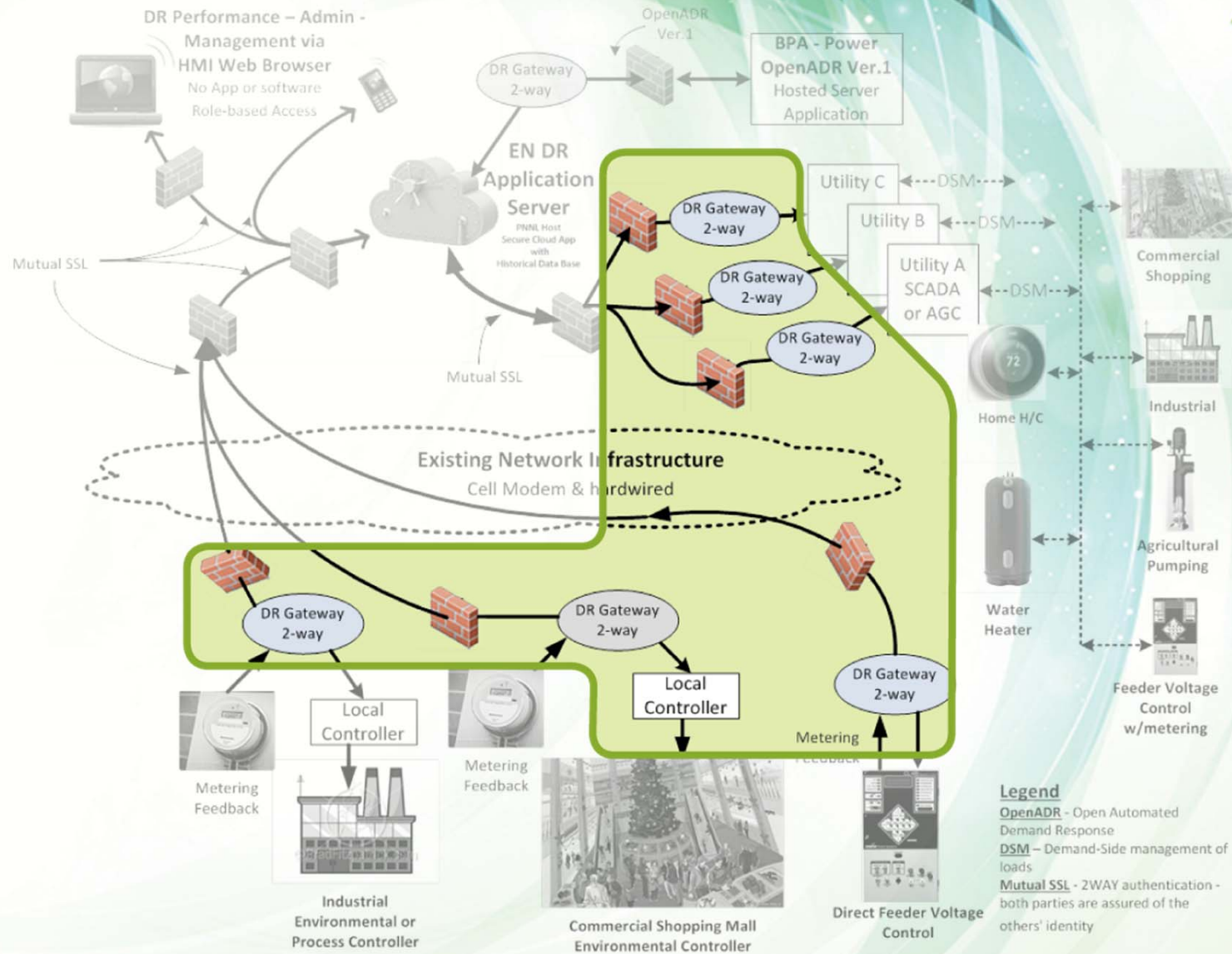
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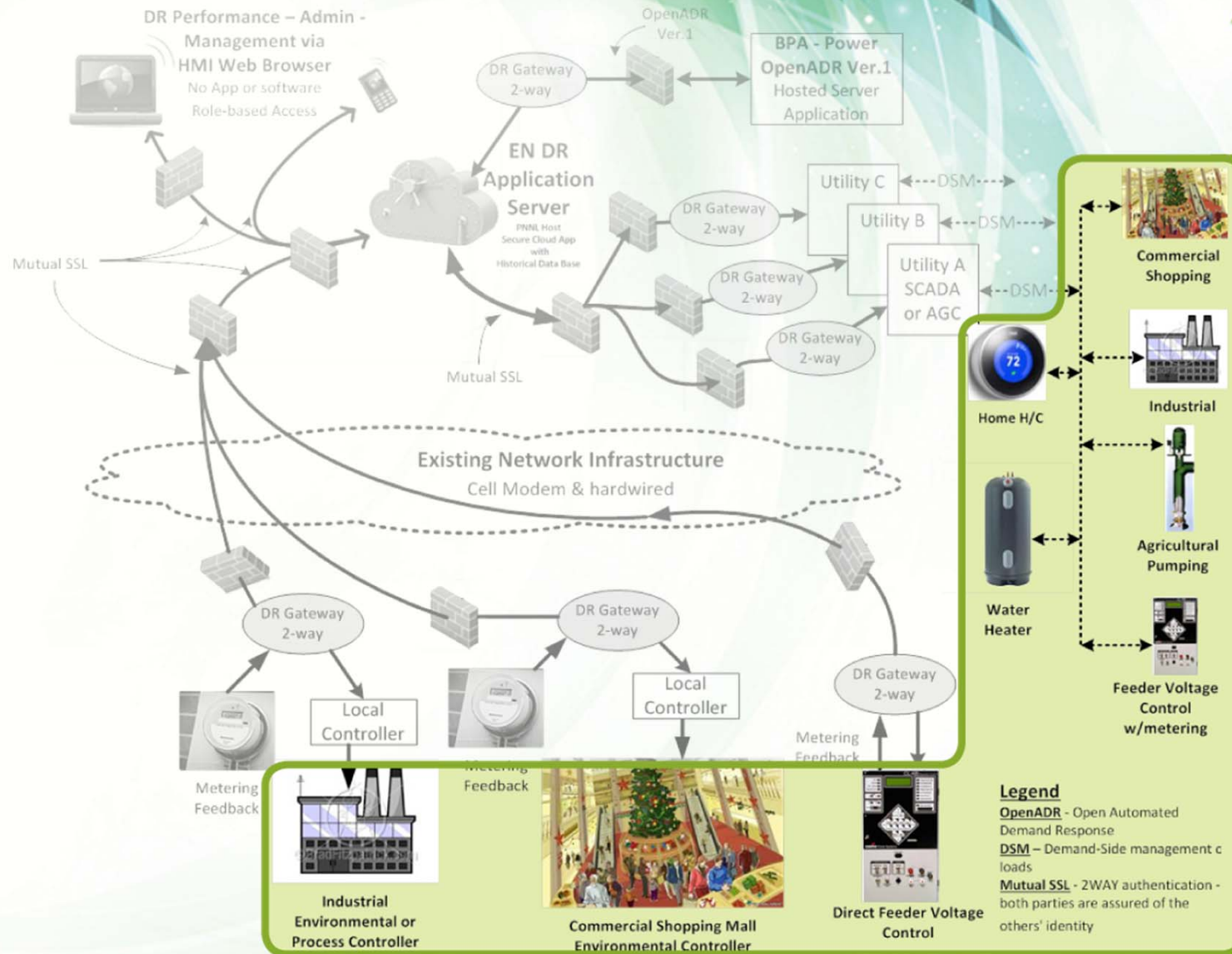
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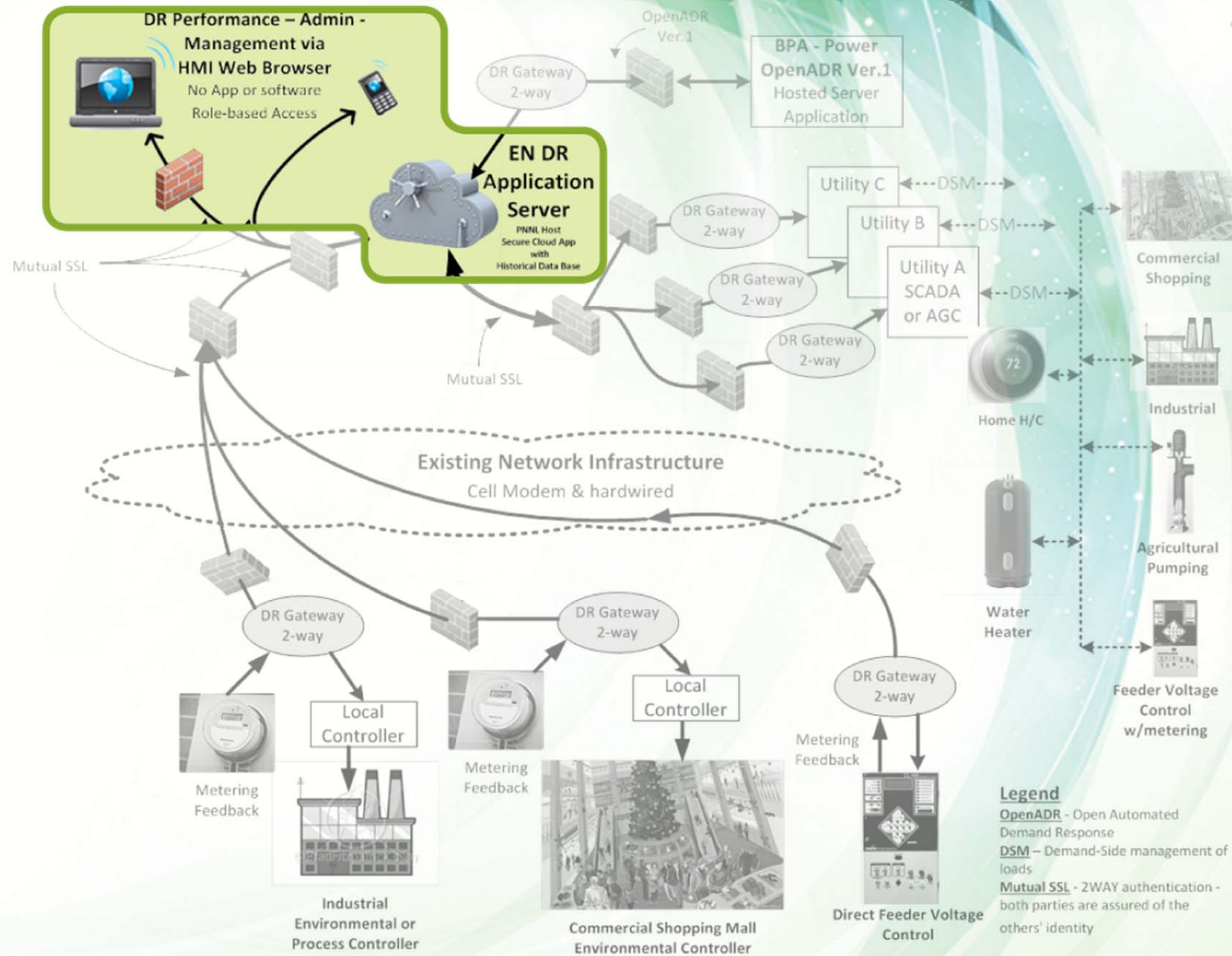
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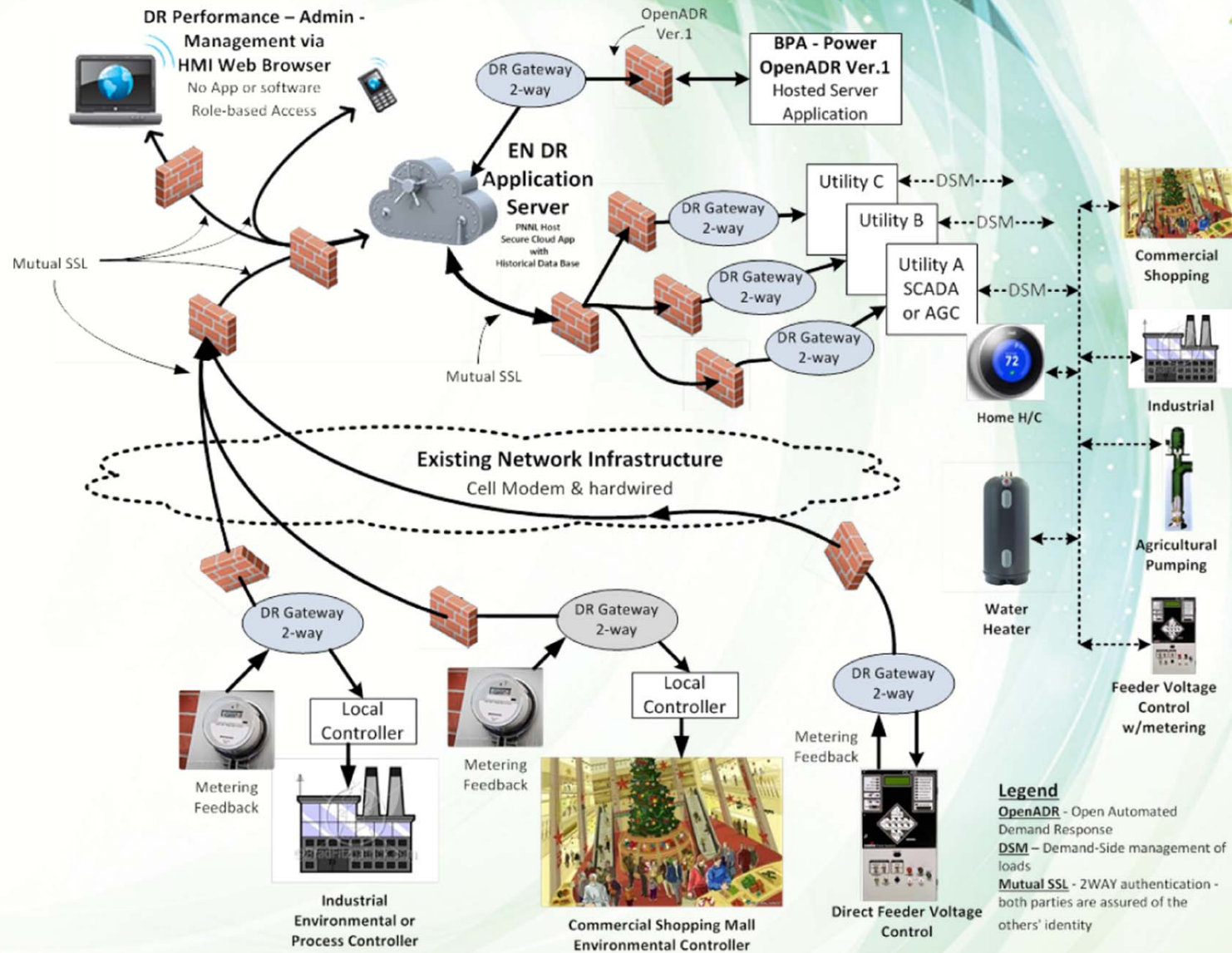
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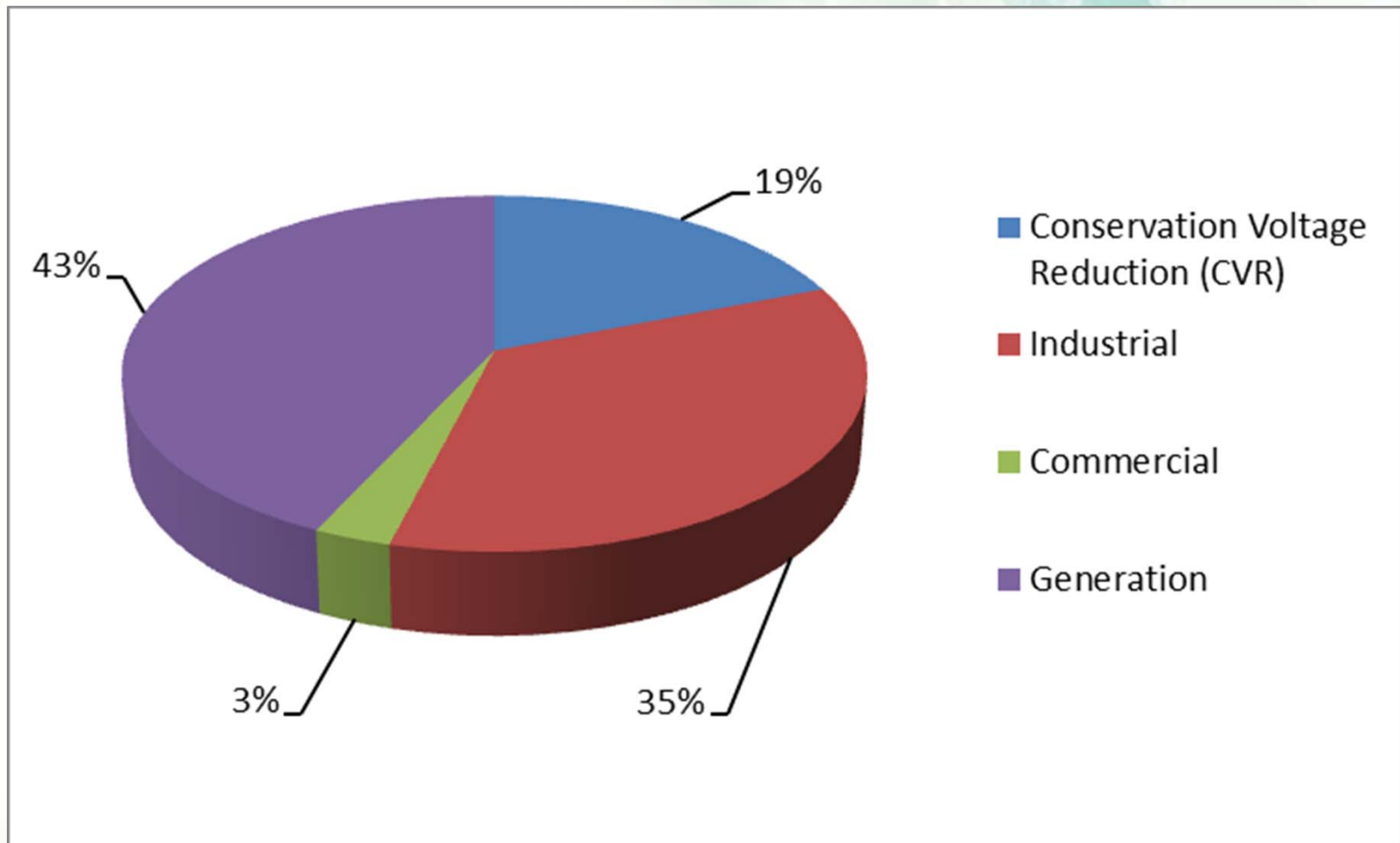
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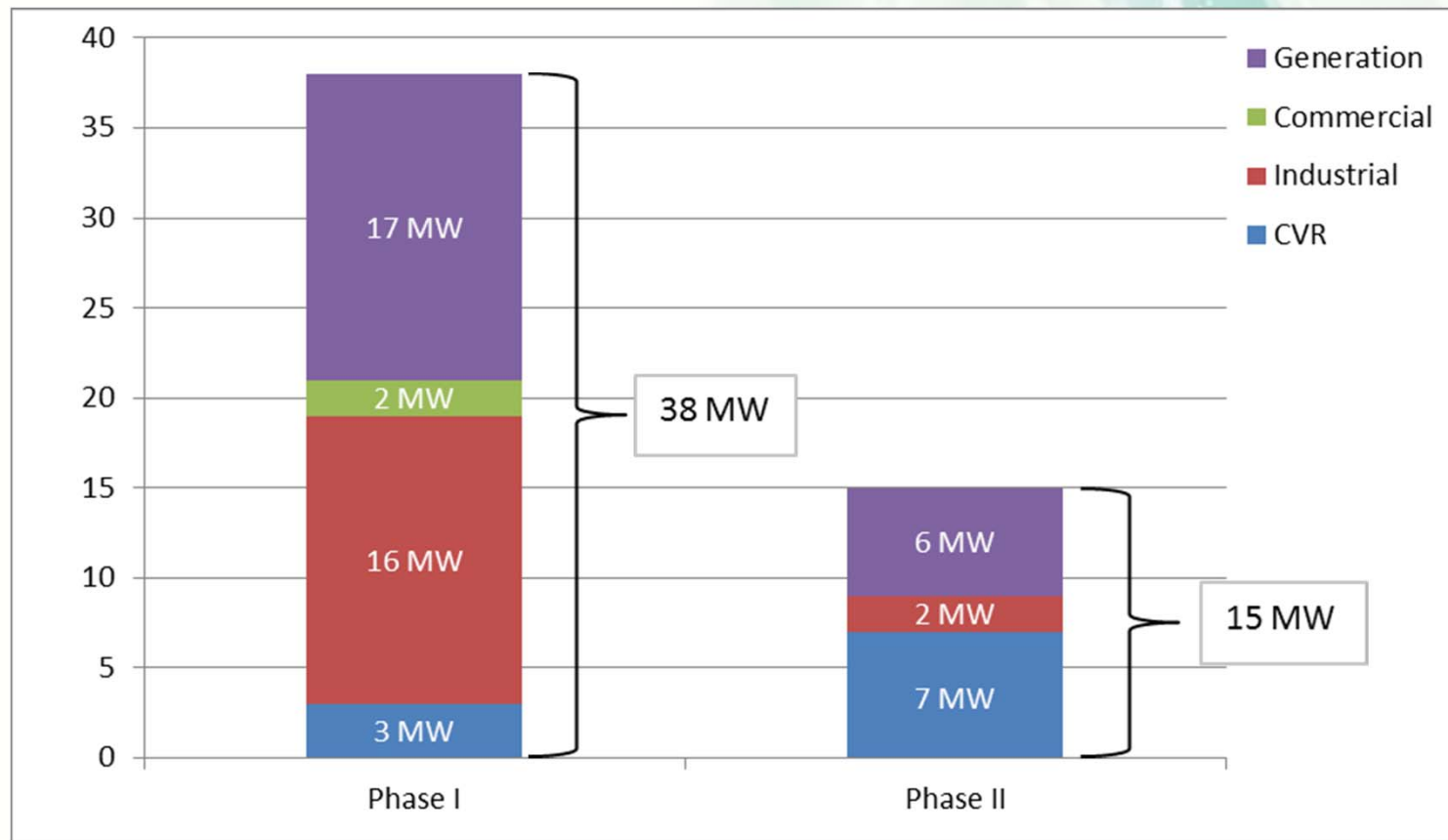
DR Aggregation Across Utilities and Load Segments



DR Assets

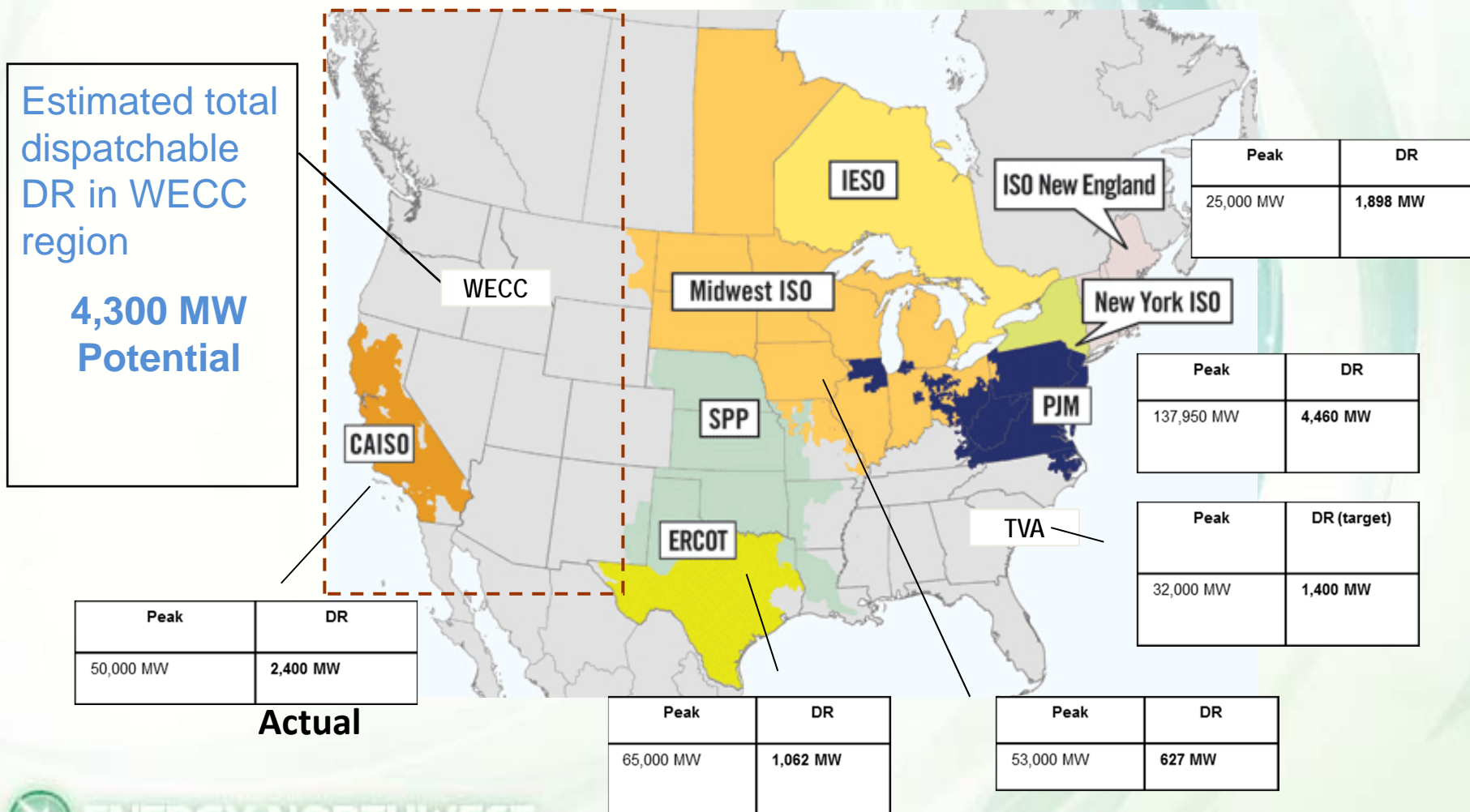


DR Assets

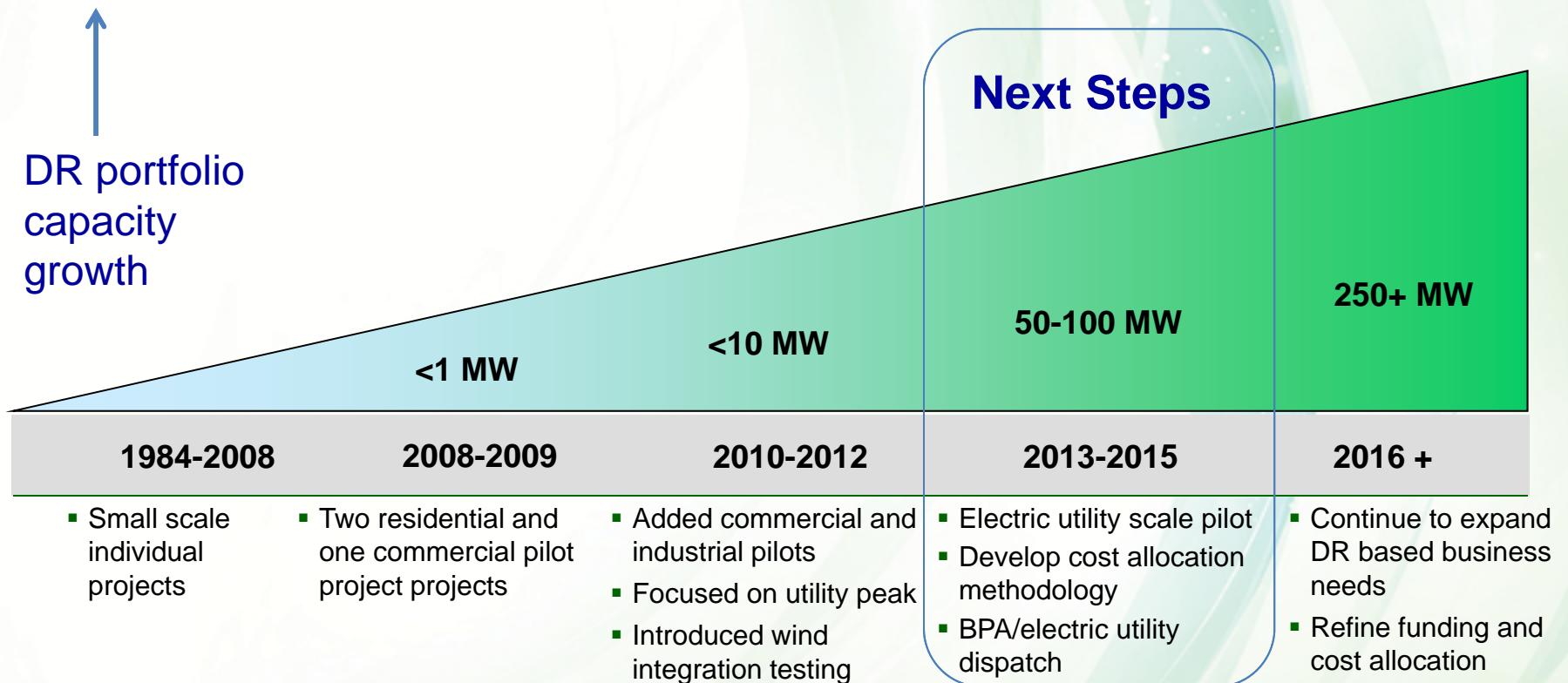


Demand Response - US Actuals

NERC Reliability Assessment



Building DR in the Northwest



Distributed Storage Development Next Steps & Opportunities

Emerging Opportunity

- Washington Clean Energy Funds - “Smart Grid Grants to Utilities”
- \$15M Matching Funds Available

Timeline

- **Nov 14, 2013** - RFP Issued
- **Dec 5, 2013** - Proposals Due
- **Dec 20, 2013** - Selection
- **1Q 2014** - Contracts
- **3Q to 4Q 2014** - Deploy First Units
- **1Q 2016** - Full Build-Out

Distributed Storage Development Clean Energy Funds Proposal - Conceptual

Energy Northwest & Participating Members Team Targeting 25–35 MW
of Distributed Storage Using Next-Gen Powin ESS / Similar

All Member Utilities are
Invited to Participate

- Units Available to Participants via Long-Term Lease
- Owned and Maintained by Energy Northwest
- Advanced Comms/Control Infrastructure Not Needed by Utility
- Unit Tasking By and All Benefits Flow To Participant Utility
- Long-Term Performance Warranties
- Anticipated Deployed Cost - \$1.5k to \$2.5k per kW Capacity

Contacts

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