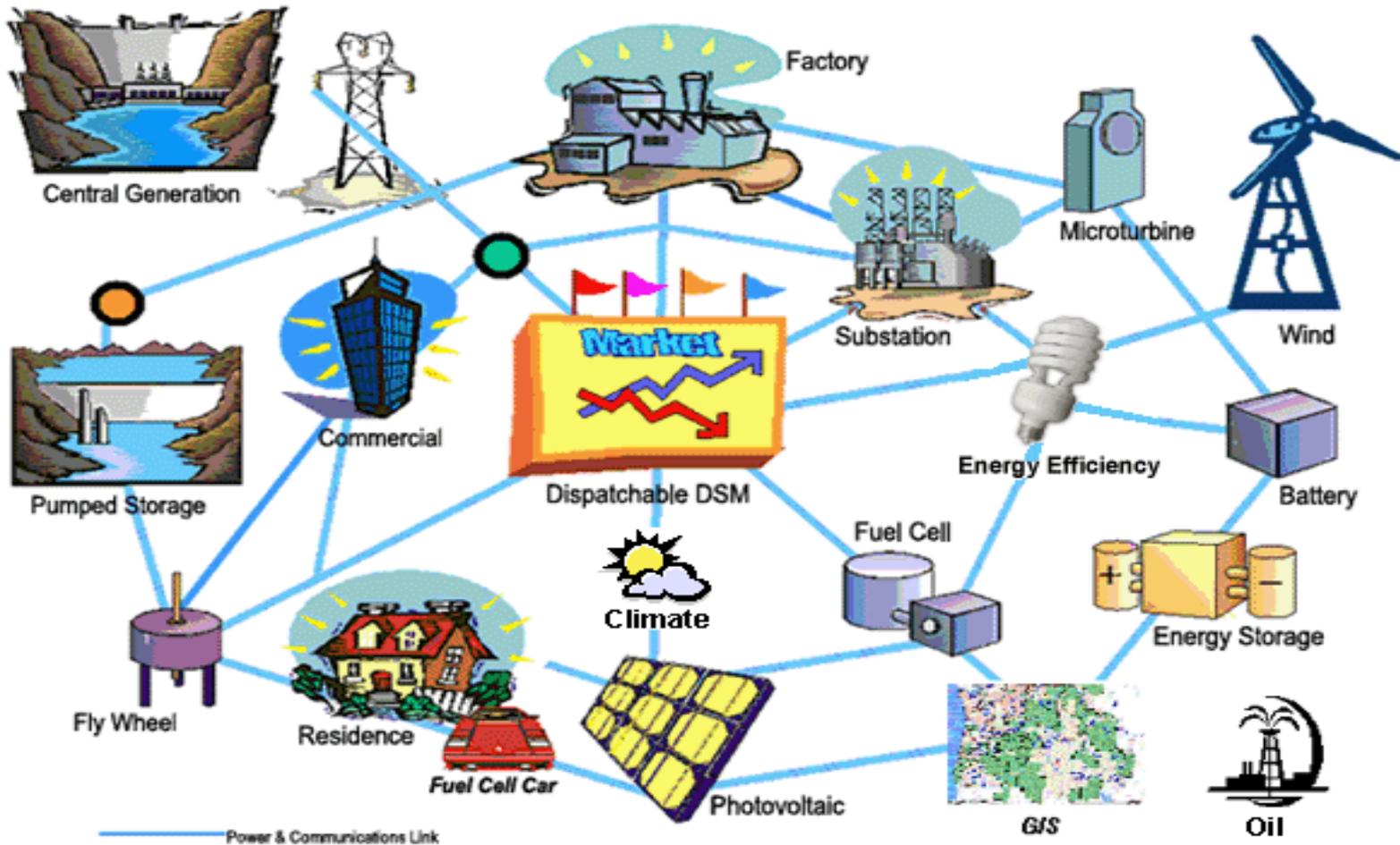


BPA's Role

- BPA seeks to enable a smarter more efficient Pacific Northwest Power Delivery System.
- BPA seeks to promote the Pacific Northwest as forerunner in Smart Grid technology.
- BPA seeks to empower customers to make smart energy usage choices while lowering the cost of energy and the customers overall bill.
- BPA seeks to take advantage of distributed generation resources.
- BPA seeks to find ways of integrating wind power



BPA: The Energy Web a New Kind of Network



The GridWise™ Demonstration Project consisted of two separate demand response studies.

1. The Grid Friendly Appliance Project
And
2. The Olympic Peninsula Project

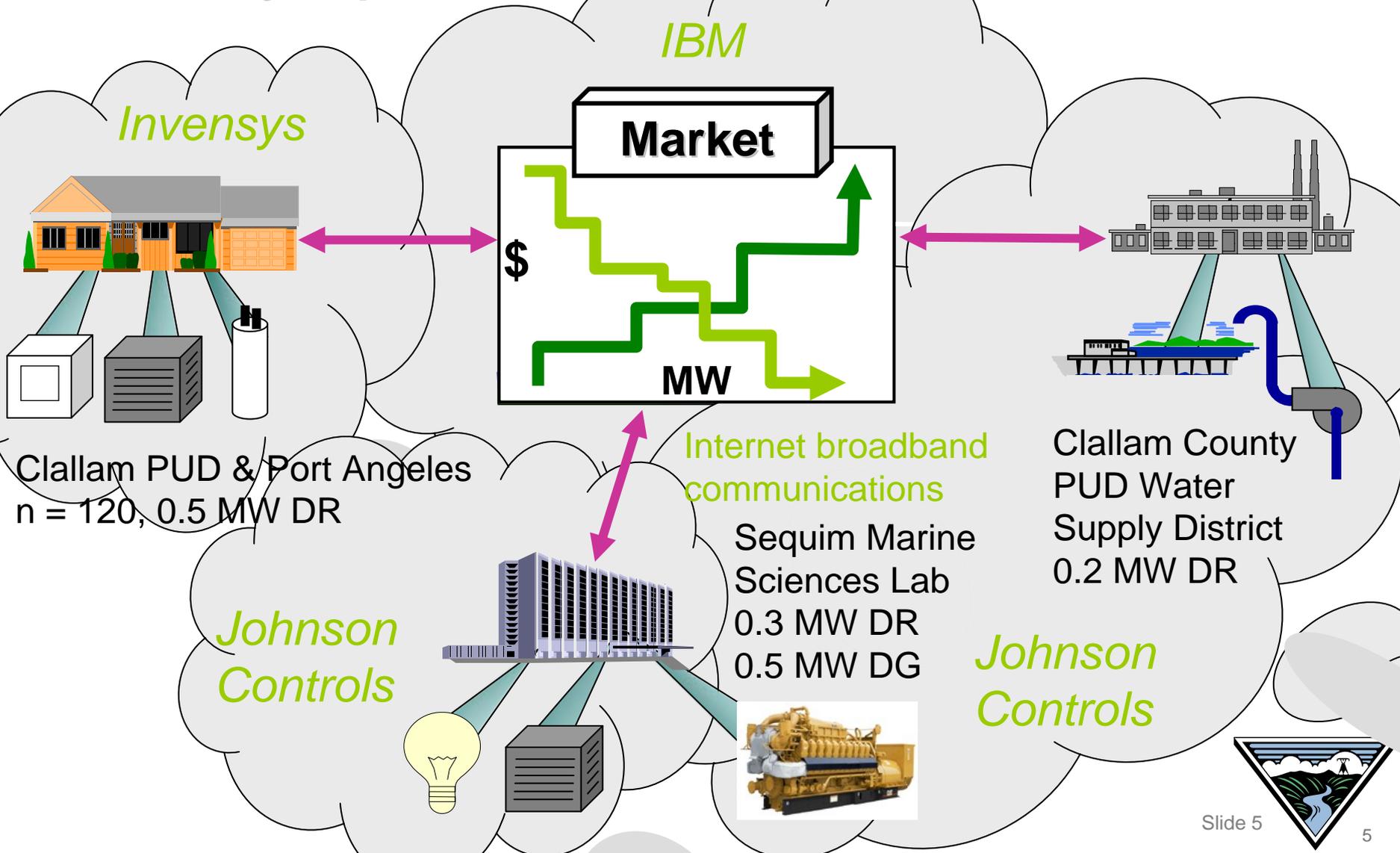


The Olympic Peninsula Project

- Looked at how consumers responded to real-time energy pricing information.
- Automated control technology to reduce peak demand.
- Smart appliances in 112 residential homes.
- Internet-based event-driven software from IBM Research created virtual thermostats and water heaters that could translate between market prices and device setting, and also enabled the devices to submit market bids and react to changing prices.
- Backup generators were used to displace additional demand and produce power locally



Olympic Peninsula Demonstration



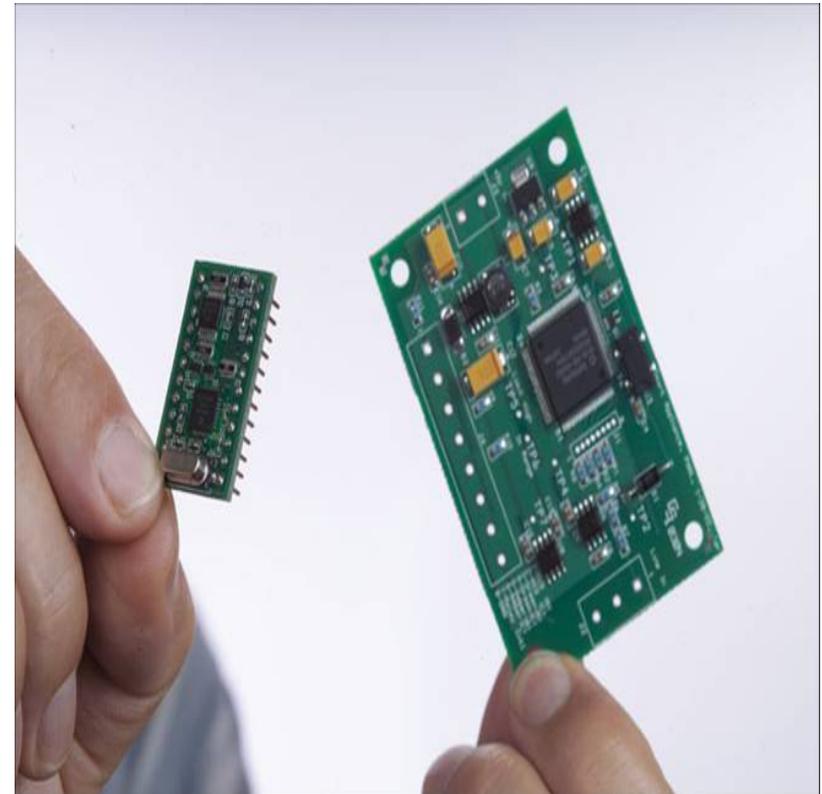
Results

- An internet-based network coordinating demand response can save money and reduce peak load by 15 percent .
- Customers will sign up for and respond to a real-time price
- On average, consumers saved approximately 10% on electricity bills.
- A combination of demand response and distributed generation reduced peak distribution loads by 50 percent.



Grid Friendly™ Appliance Project

- Autonomous detects under-frequency events, sheds load for up to a few minutes
- No one noticed in hundreds of events
- An ancillary service that can displace spinning reserves and increase reliability
- Reacts within ½ second
- Delays and randomizes service restoration to avoid shocking the grid, eases cold load pickup after an outage
- Low cost no communications required



Results

- GFA controllers can help manage contingencies and prevent power outages.
- Consumers reported no inconvenience, and generally did not notice the automatic reduction (in hundreds of events).
- Most homeowners stated they would be willing to purchase an appliance configured with such grid-responsive controls.



BPA's Smart Grid Project

- Follows the success of the Grid Wise Demonstration Project
- Seeks to incorporate the technology and lessons learned in the Grid Wise Demonstration Project.
- Looks to augment the size and scope of the Grid Wise Demonstration Project



Project Goals

- Pilot the future electricity network
 - Reliability
 - Reduced cost
 - Autonomous controls
 - Advanced sensors
 - Distributed intelligence
- Test and demonstrate the benefits, issues and opportunities of Smart Grid, on a scale that allows confidence in the results, in a robust learning environment.

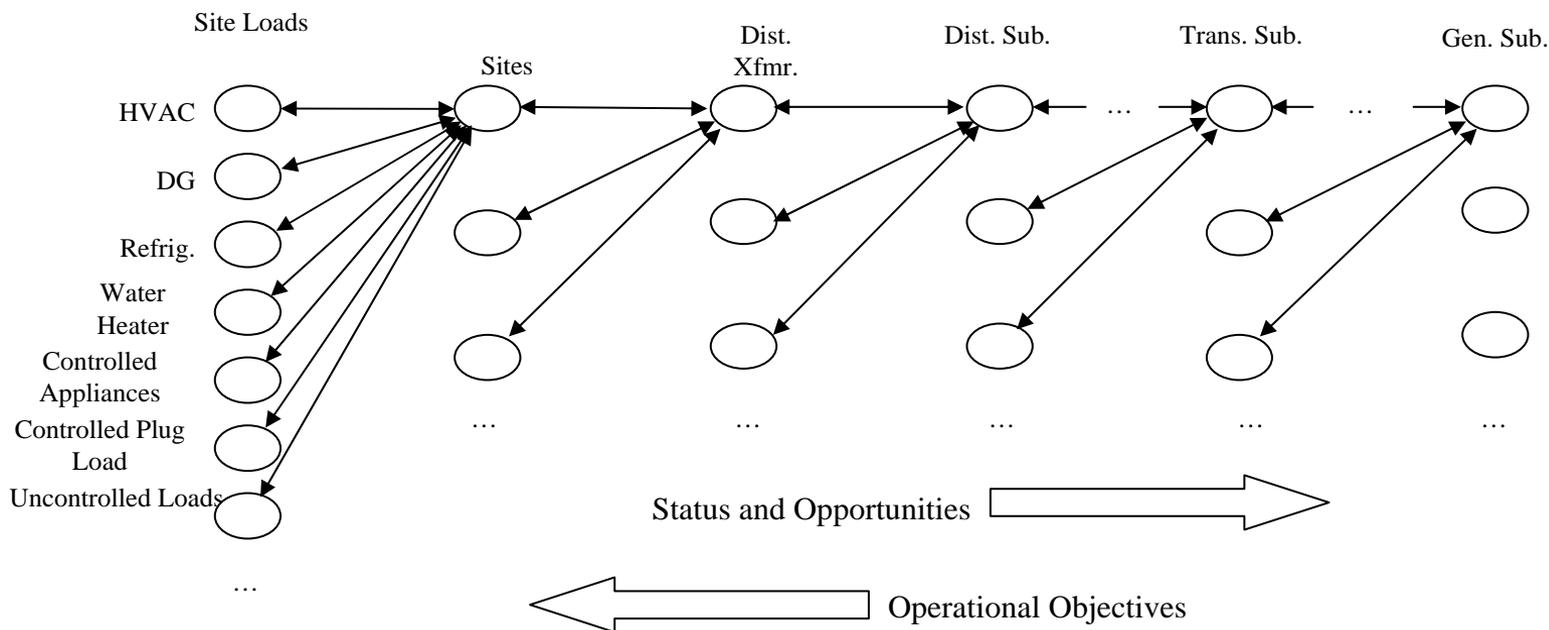


Project will Create

- Scalable Hierarchical Communications and Controls Pathway.
- Nodal Information, control and valuation system.
- Distribution Automation System for each feeder line.
- Communication protocol between nodes, utility service territories, transmission operations, generation operations, and market operations.
- Energy management systems at the end-users site.
- Pricing and signaling system down to the end-user and up to the systems operator.



Hierarchical Communications and Control Pathway



Synopsis

- Reverse the model by matching demand to available supply
- Utilize real-time information and connectivity rather than long term models and averages to model the system
- Maximize renewable and DER assets with automated dispatch and control.
- Create the capability to know where our power is and where it is needed.



Benefits to the Utility

- Improved Reliability
- Deferred Capital Spending for Generation, Transmission and Distributed Investments
- Reduced Operations and Maintenance Costs
- Integration of Renewable Energy and Distributed Resources
- Improved System Security



End-User Benefits

- Lower energy costs
- Increased reliability
- Greater consumer choice
- Reduced carbon emissions
- Consumption Management
- Distributed Generation utilization
- Greater Cost Saving through Energy Efficiency

