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December 5, 2017

### MEMORANDUM

**TO: Council Members**

**FROM: Tina Jayaweera, Senior Analyst**

**SUBJECT: Puget Sound Energy  
Demand Response, Behind-the-Meter Technology, and Future Risks**

### BACKGROUND:

**Presenter:** David Mills, Senior VP Energy Operations, Puget Sound Energy

**Summary:** PSE's 2017 Integrated Resource Plan shows that up to 103 MW of demand response and 50 MW of storage would be cost-effective in our portfolio by 2023. Moreover, connected homes, cities, vehicles and other "Internet of Things" technologies provide new opportunities to serve customers, and new challenges. Now and in the future, PSE will continue to work towards providing customers with carbon-free resource options, integrating new technology, planning for decentralization of assets, and managing increased market reliance.

**Relevance:** Puget Sound Energy's effort to procure demand response is helpful for the region in achieving the minimum 600 MW of DR identified in the Seventh Plan. (Action Item [RES-4](#))

**Background:** David Mills is senior vice president of Energy Operations for Puget Sound Energy.

Mills leads a team that is responsible for managing PSE's generation and natural gas resources, energy trading and transmission services, including the load office.

From 2012 to 2015, Mills was vice president of Energy Supply Operations. Mills joined PSE in 2002 as the director of Energy Supply & Planning, responsible for power and natural gas trading, generating plant dispatch, merchant transmission issues, and the company's long-term integrated resource planning. His team also managed integrating renewable resources in to PSE's generation portfolio.

Prior to joining PSE, Mills was the trading floor manager for the Bonneville Power Administration in Portland, Ore. He has more than 25 years of experience in energy operations, transmission and energy trading. Mills is currently the vice chair of the Pacific Northwest Utilities Conference Committee and serves on the executive committee of Columbia Grid, the executive committee of the Western Systems Power Pool, and the board of directors for Hire America's Heroes.

More Info: <https://pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx>

# Demand Response, Behind the Meter Technology and Future Risks

Remaining relevant in a flexible energy future.



**David Mills**  
Senior Vice President, Energy Operations

December 12, 2017

# PSE's 2017 IRP Action Plan

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**Energy storage, demand response and market resources can help push PSE's need for capacity resources out 8 years, to 2025.**

1. Acquire energy efficiency. Acquire cost-effective renewable resources to meet RPS requirements
2. **Demand Response**
  - **Address prudence and cost-recovery policy issues**
  - **Release RFP for up to 103 MW of Winter Peak Capacity by 2023**
3. Energy Storage
  - Install a small-scale flow battery to gain experience with the operation of this energy storage system in anticipation of greater reliance on flow batteries in the future
4. **Redirect firm transmission and increase market reliance**
5. All-source RFP
6. Develop options to mitigate risk of market reliance
7. Continue to participate in energy imbalance market
8. Regional Transmission

# Current Demand Response Effort

- Commercial/Industrial Pilot Program with Enbala Power Networks
- 3 Site Implementations planned/underway for winter 2017-18
- Key Priorities: Demonstration of aggregation software and customer implementation process



# Utility Business Model: Balancing Priorities

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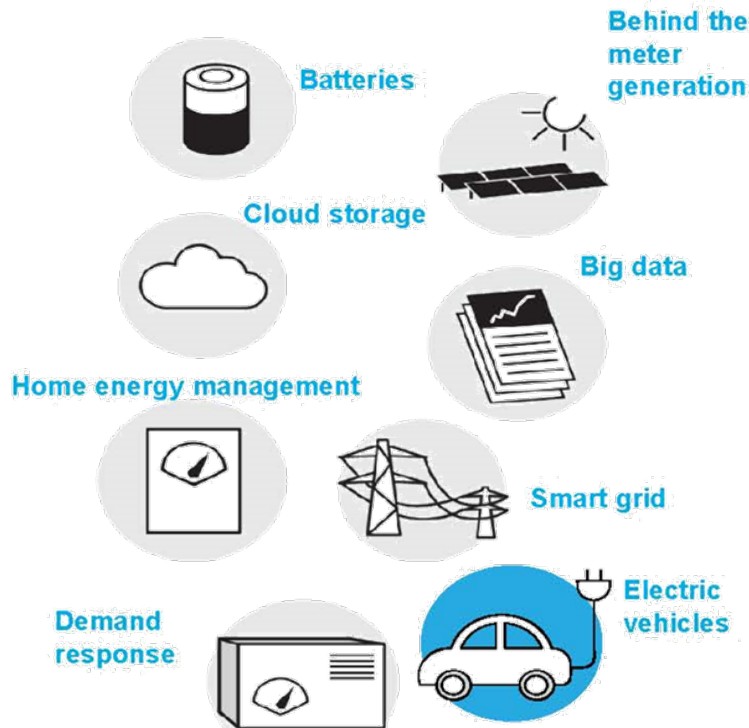
Utilities will compete across several dimensions to provide services to our customers.

Behind the meter programs and technologies will help PSE balance customer expectations for reliability, demand for carbon-free resources and choices in energy supply.

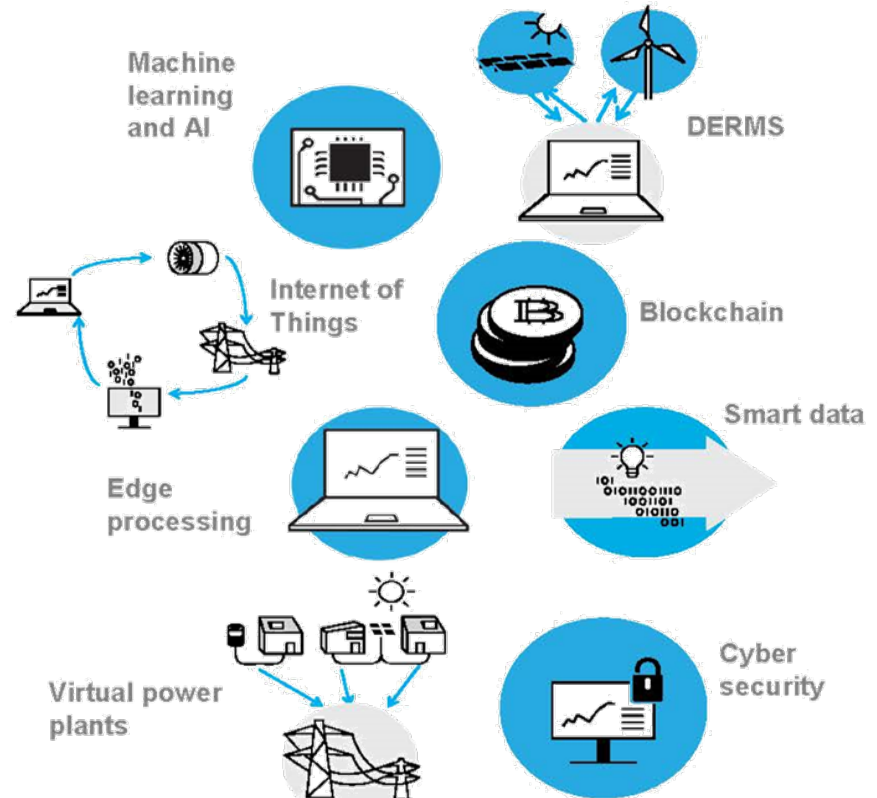


# Technology is quickly driving a fundamental change in utility operations and customer relationships.

## Existing Technologies



## Emerging Technologies



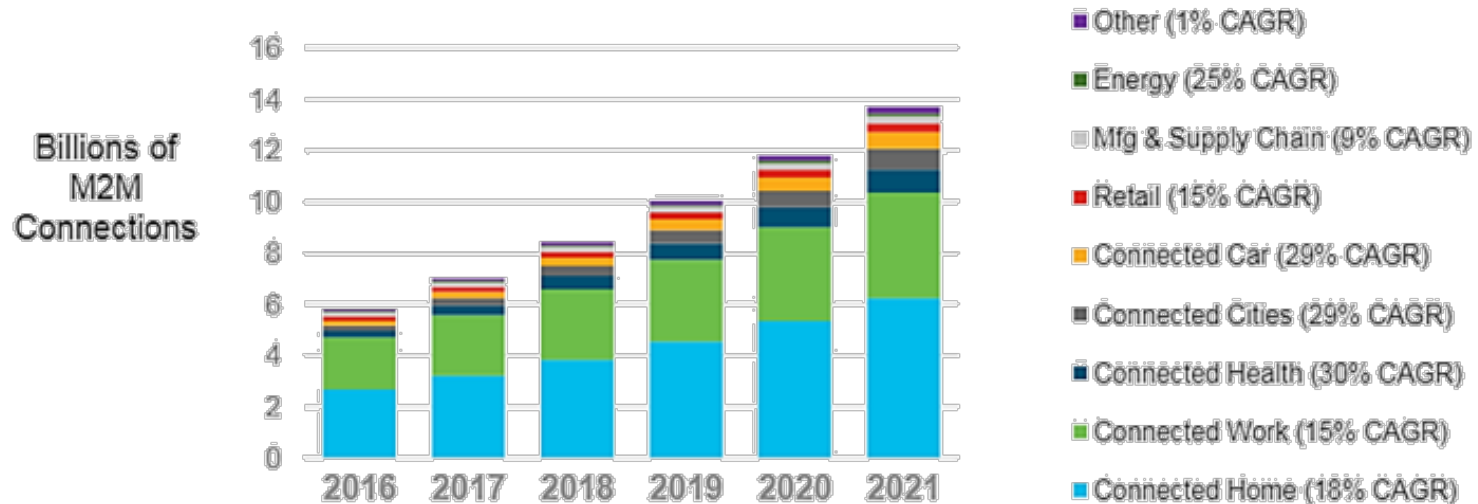
Source: Bloomberg New Energy Finance

# IoT growth will provide new opportunities to improve the efficiency and utilization of distributed resources.

## Global M2M Connections/ IoT Growth

By 2021, connected home largest, connected health fastest growth

19% CAGR  
2016–2021



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Source: Cisco VNI Global IP Traffic Forecast, 2016–2021



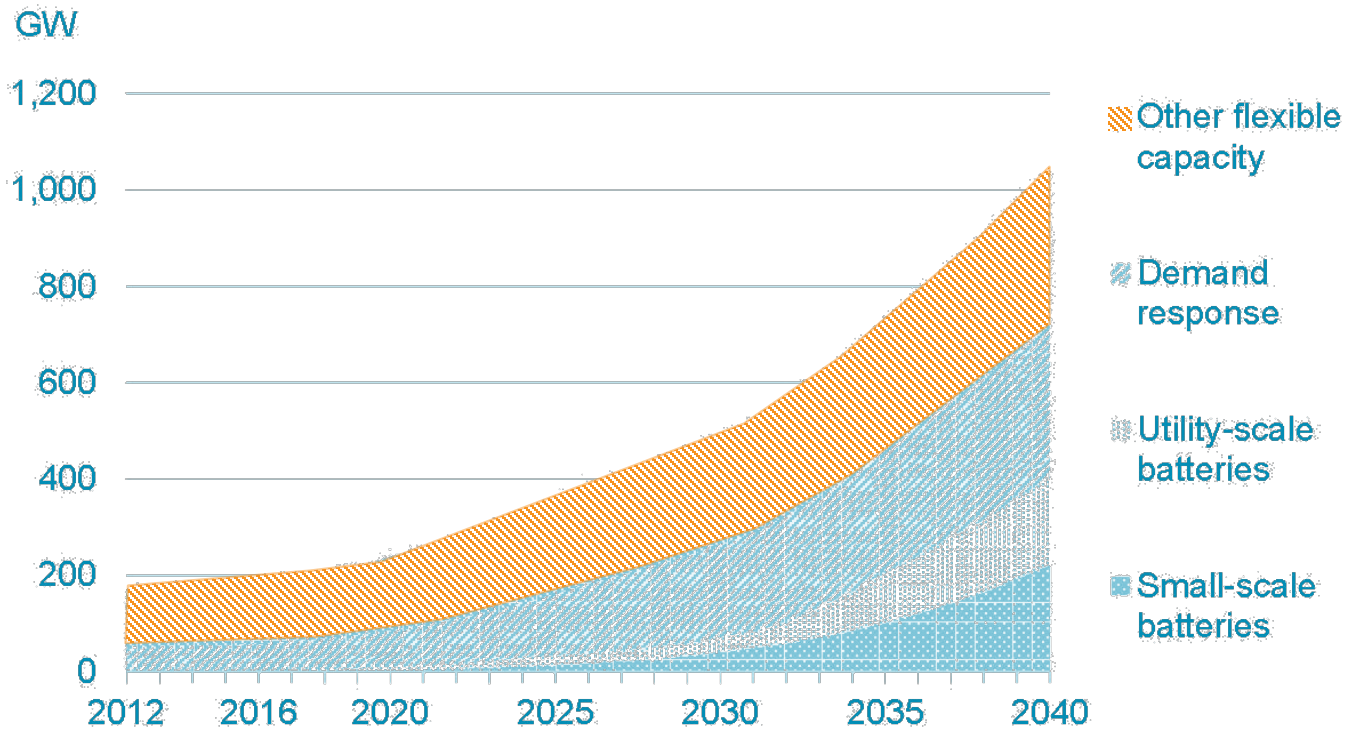
# Partnerships with Industry

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- With the rise of distributed energy resources and behind the meter technology, the value of utilities lies in distribution infrastructure and customer products/services
- Utilities will need develop partnerships to fully realize the benefits of digitization, and to provide opportunities for customers to be active grid participants
  - Solution and App Providers
  - Cloud/Data Center Providers
  - Network Operators
  - IT and Technology Vendors
  - Regulatory Agencies

Demand Response and batteries can help meet peak demand and help balance the grid. The most valuable resources will be those that provide flexible capacity.

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Source: Bloomberg New Energy Finance

# Risks and Challenges

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1. Market reliance and resource adequacy
2. New grid-scale generation? When, where, how?
3. New metrics in decision making for acquisitions of flexible capacity
4. Realizing the potential of behind the meter technologies
5. Regulatory framework

# Conclusions

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- PSE is making strides to develop distributed resources and provide carbon-free options to customers.
- Resource planning in a world of decentralization and behind the meter technologies will continue to become more complex.
- The regional dialog needs to begin to embrace the new challenges facing utilities.
  - Resource adequacy
  - Market reliance
  - Role of distributed energy resources
  - Communicate/educate at a policy and regulatory level