

# Dispatchable Load “SmartDR” Assessment



Elaine Markham, Senior Market Analyst  
Puget Sound Energy

Gavin Hume, Vice President, Utility Solutions  
Enbala Power Networks

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# Background and Context

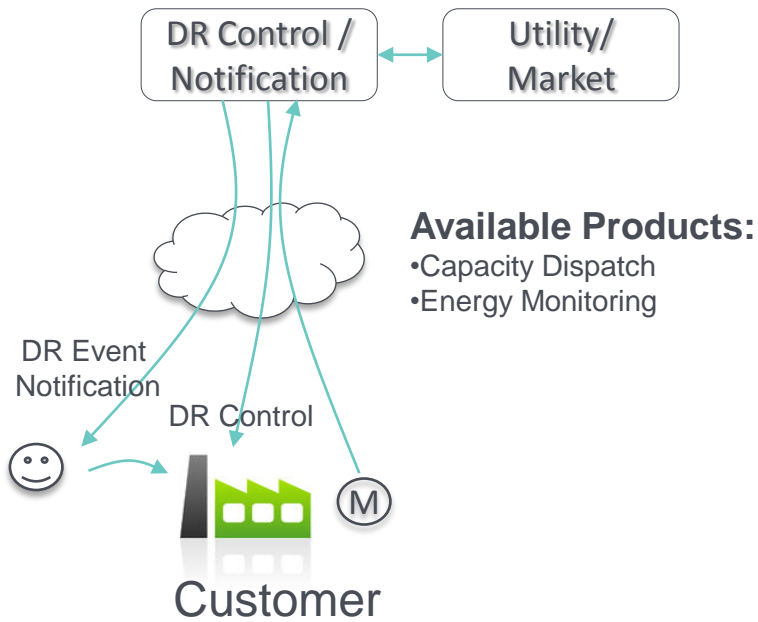
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- Previous Demand Response Pilot
  - Event Based
  - Manual Operations
  - Unpredictable Participation
- New Technology
  - Better Customer Interaction
  - Predictable
  - More Opportunities for Use

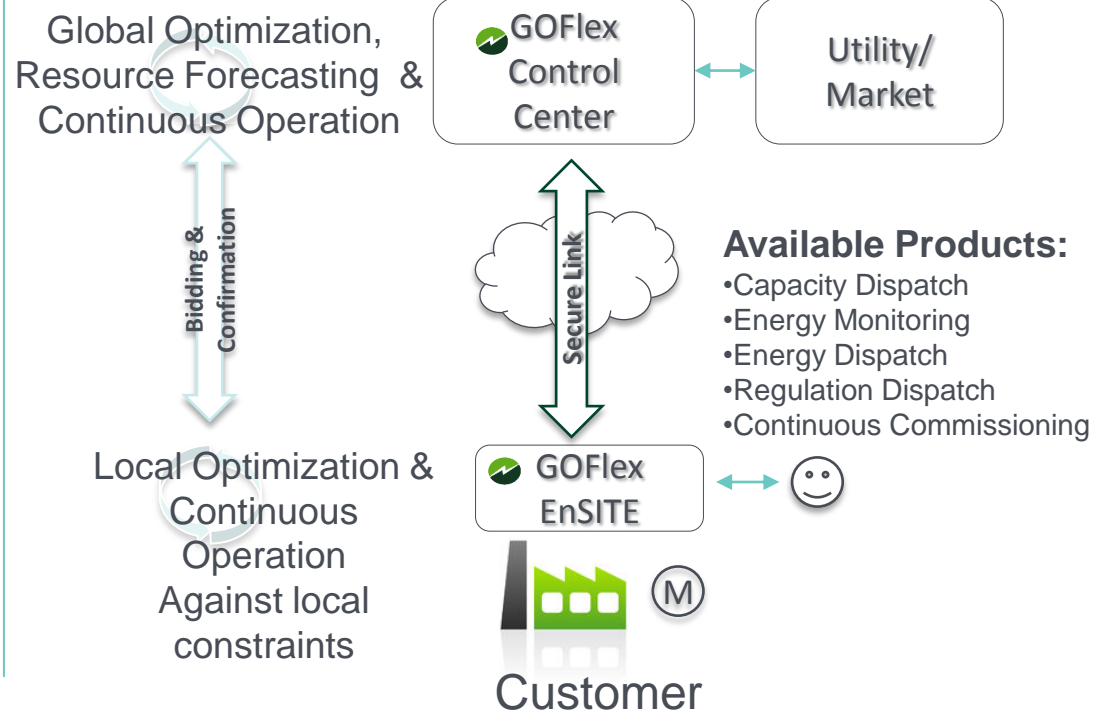


# Distributed Architecture

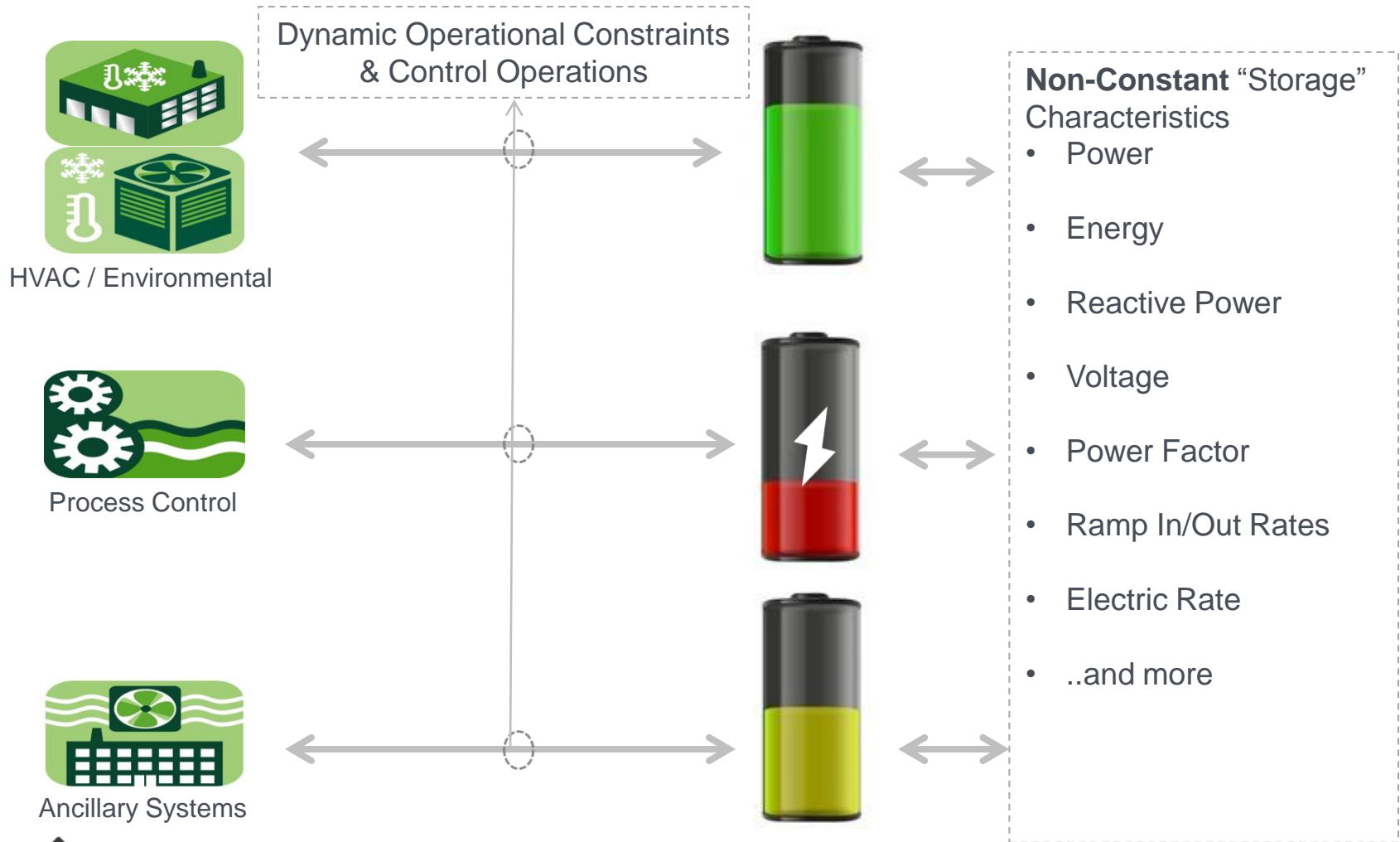
## Traditional Applications



## Enbala Architecture



# Constraint Based Forecast and Control



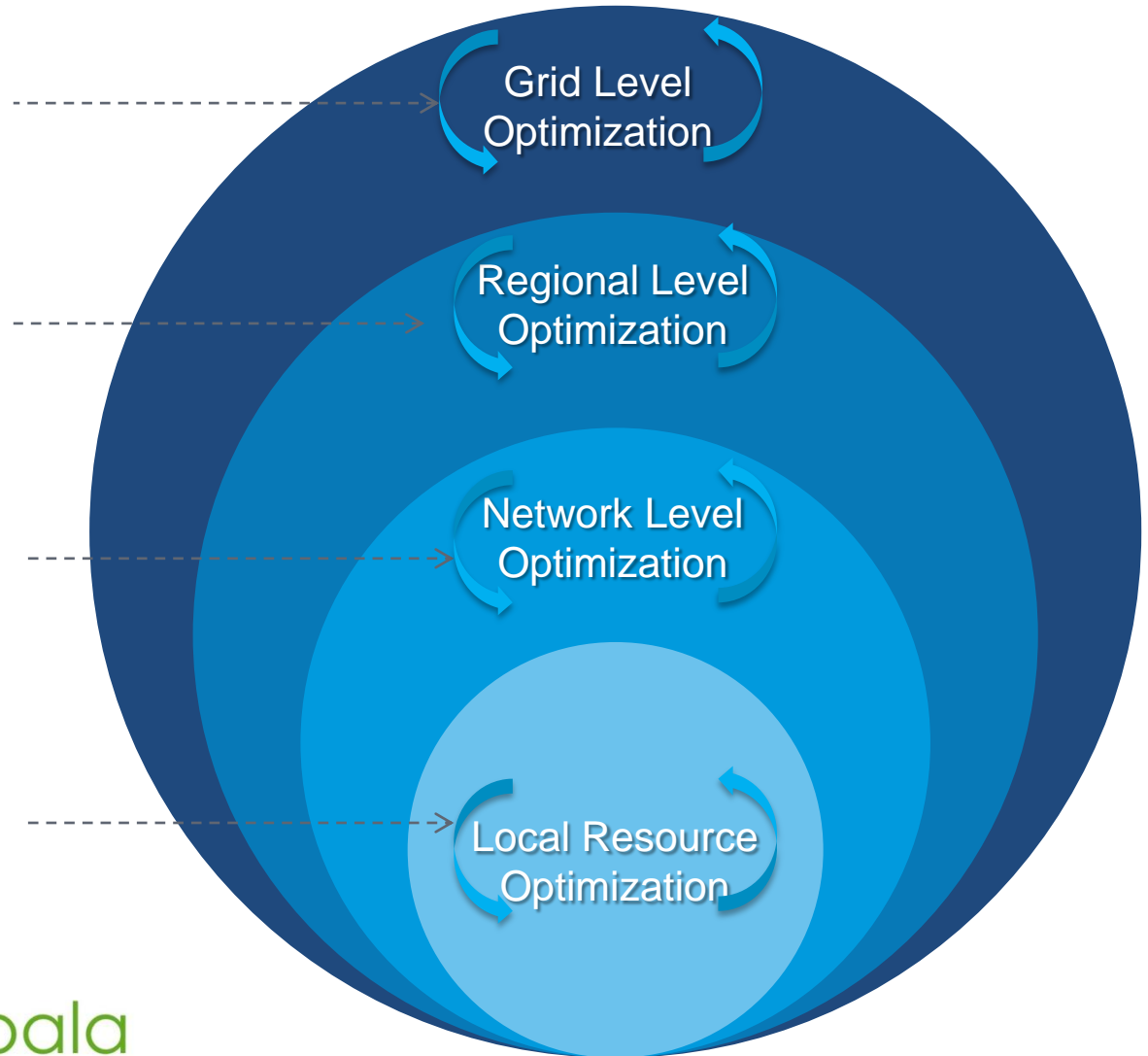
# Multi-Layer Optimization Technology

**Grid Level** Optimization for  
Grid/Service level objectives  
(i.e. Grid Regulation,  
Capacity)

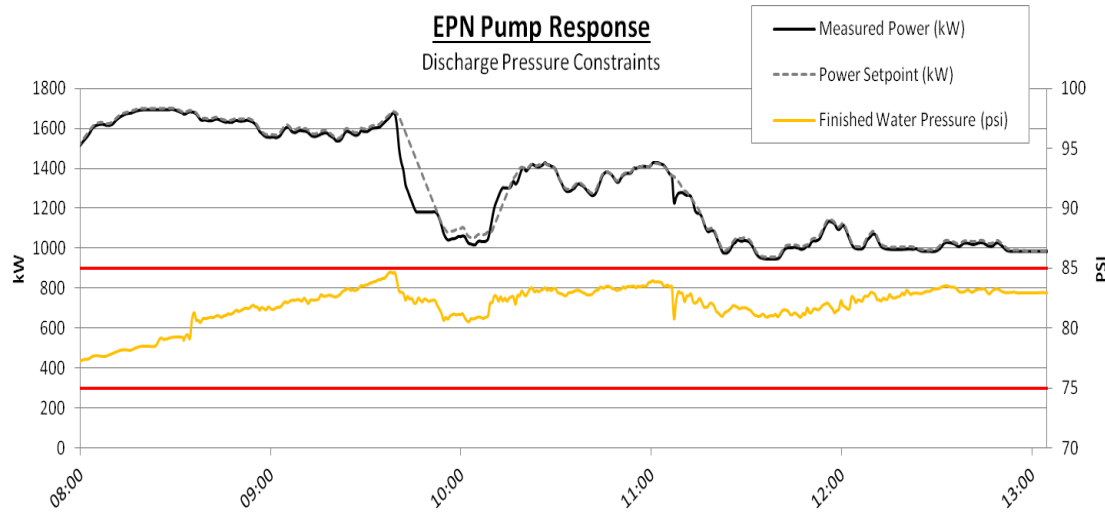
**Collection of Networks**  
Optimizing for the Network  
Scale objectives  
(i.e. Substation or Region)

**Collection of Local  
Resources** into a Network  
Level Optimization  
(i.e. Campus, Feeder etc.)

**Local Constraint** Based  
Optimization of the Objective  
based on Local Conditions  
and Operations  
(i.e. DER, Load, System)



# Parameter Based Load Control



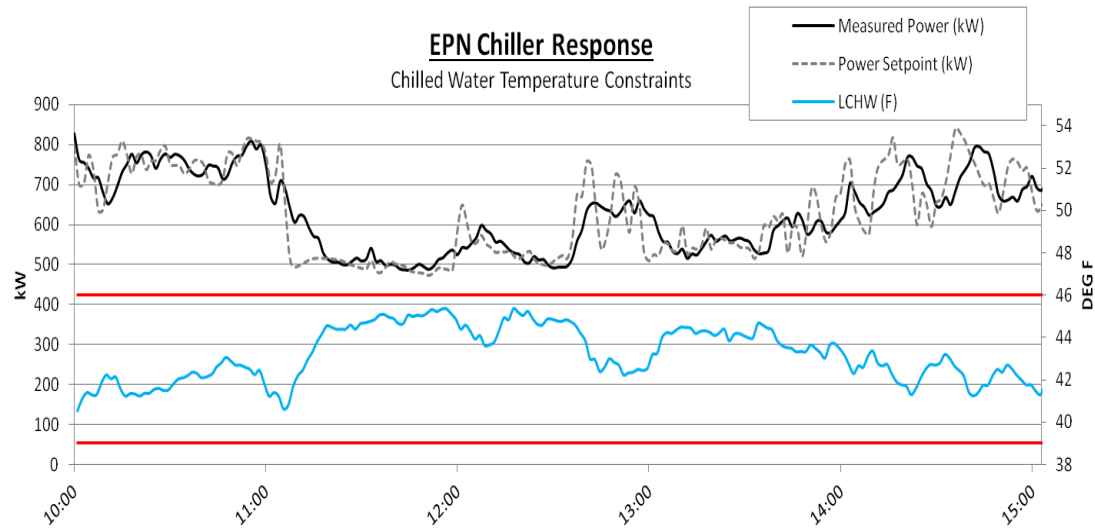
## Water Treatment, High Lift Pump

Range: 600 kW

Operation:

Direct control of pump speed setpoint observing discharge pressure constraints (75 to 85 psi).

Elevated tanks and system piping act as storage for pumping DSM sites.



## District Chilled Water, Chiller

Range: 300 kW per chiller  
1000 kW aggregated

Operation:

Leaving chilled water setpoint reset within site-defined constraints (39 to 46F). This chiller is one of five chillers integrated at the same site.

Secondary loop and building thermal mass acts as storage for chilled water DSM sites.

# Assessment Workstreams

1. Qualification of Value
2. Dispatchable Load Potential
3. Enablement at Customer Sites
4. Integration with PSE's Energy Management System
5. Final Report and Pilot Design



# Internal Stakeholder Process





# Value Qualification

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## Primary use cases:

1. Contingency Reserves (Spinning and Non-Spinning Reserves)
2. System Capacity

## Secondary use cases:

1. Substation Upgrade Deferral
2. Balancing (Automatic Generation Control)
3. Over Supply
4. Energy Arbitrage

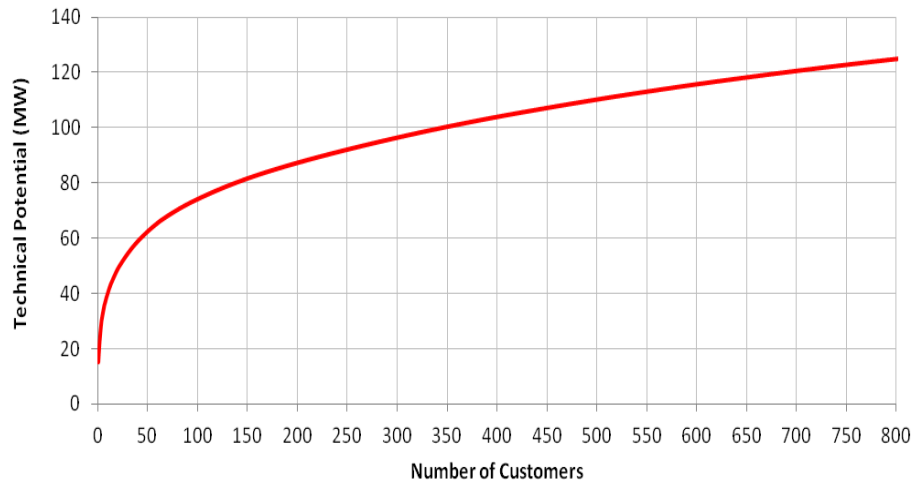
Use Case Ranking	Use Case	Value (\$/kW-yr)
1	Spinning Reserve Capacity	111
2	Non-Spinning Reserve Capacity	108
3	System Capacity (Starting 2021)	156*

\*\*Leveraged modeling from battery analysis

# Load Potential – large C&I

## Puget Sound Energy

Dispatchable Load Technical Potential



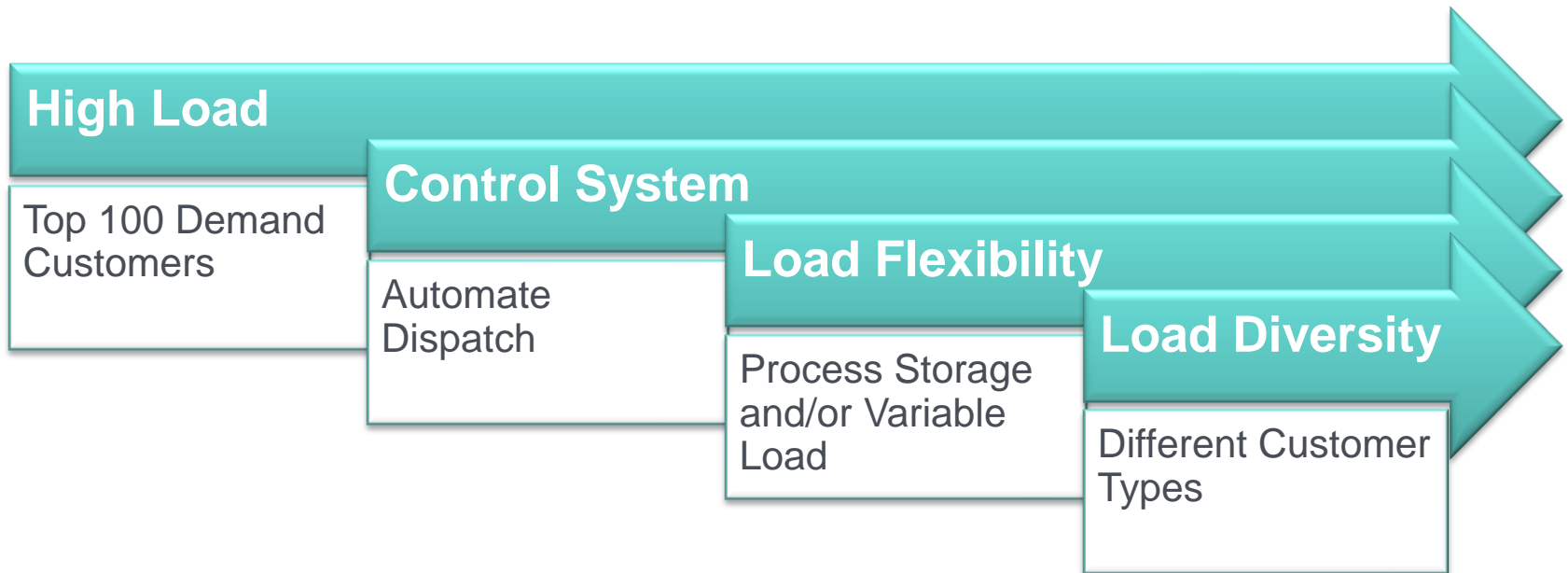
- Total technical potential found to be 125 MW Across 803 sites
- Cut-off at 200kW average demand
- Assuming 20% participation rate  
25MW of market potential identified

## Methodology:

1. Define customer sectors, market segments and applicable end uses
2. Estimate potential based on sector, segment and end-use
3. Screen segments for eligibility
4. Estimate technical potential
5. Estimate market potential

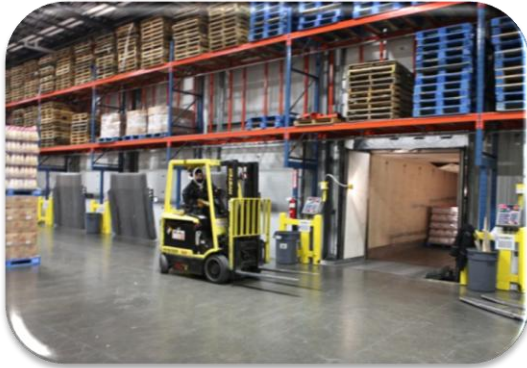
# Customer Engagement

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# Customer Engagement

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Cold Storage



Wastewater Treatment



High School



Industrial Gas Manufacturing

# Contact Information

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## **Elaine Markham, PE, CEM, CMVP**

Senior Market Analyst

Energy Efficiency Program  
Development

PUGET SOUND ENERGY

(425) 424-6866

Elaine.Markham@pse.com

## **Gavin Hume**

VP Utility Solutions

Enbala Power Networks

(604) 998-8902

ghume@enbala.com

