

# Energy Northwest Forum



**Snohomish County PUD**

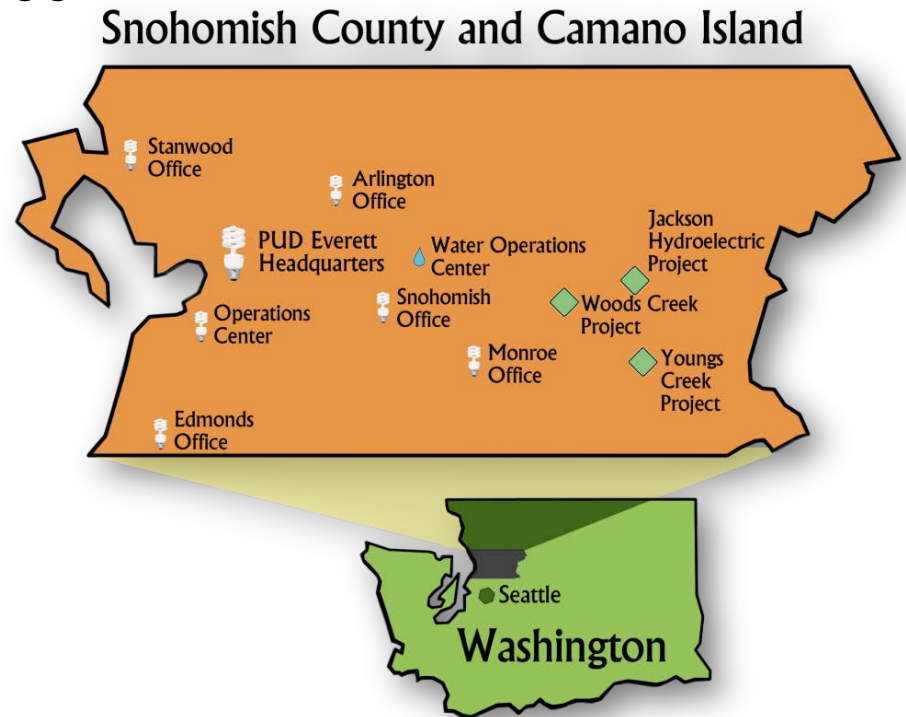
**Jason Zyskowski, PE**

**10/24/14**



# Snohomish County PUD Company Profile

- **Total Electrical Customer:** 327,000
- **Energy Sales:** 8,520,941 MWh
- **Generating Capacity:** 120 MW
- **Residential Rates:** 9.4¢ per kWh
- **# of Substations:** 86
- **# of Circuits:** 396
- **Resource Mix:** 8% Renewables
- **Average # of Employees:** 978



# Energy Storage



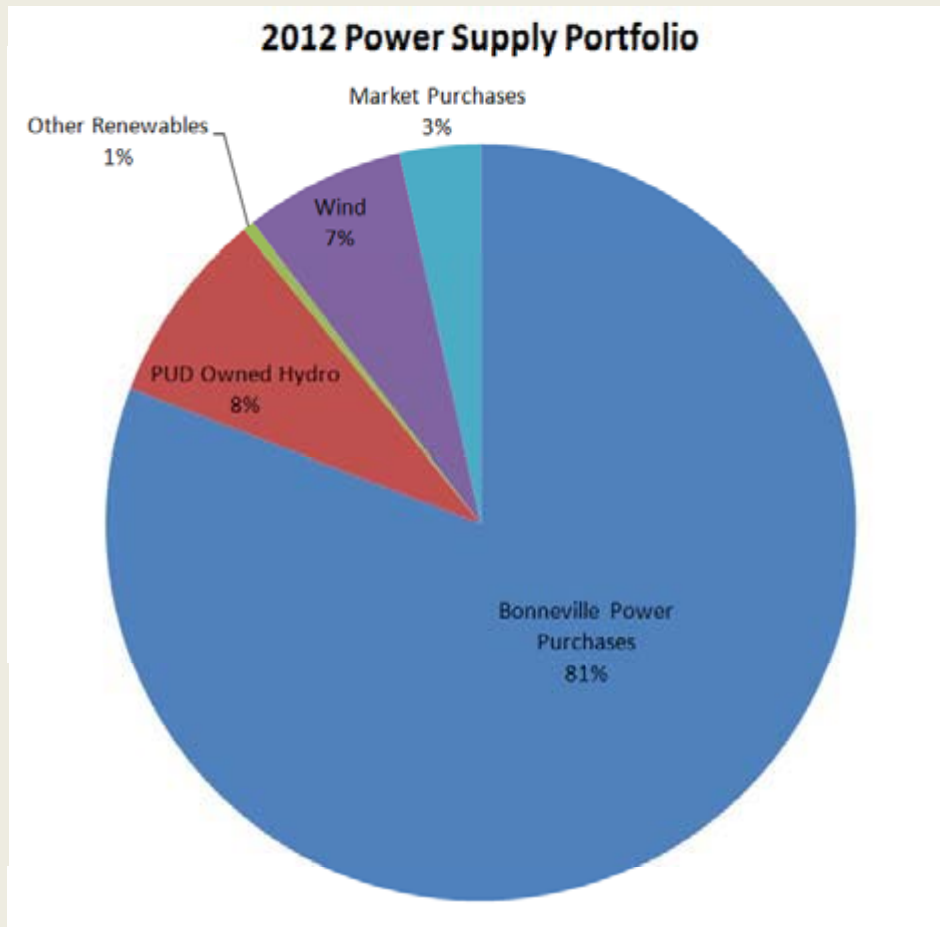
- Allows the generated power to be stored until it is needed by the end customer.
- Various Types
  - Large Batteries, Flywheels, Compressed Air, Pumped Hydro
  - Connected directly to the Electrical System



# Why is Energy Storage needed?



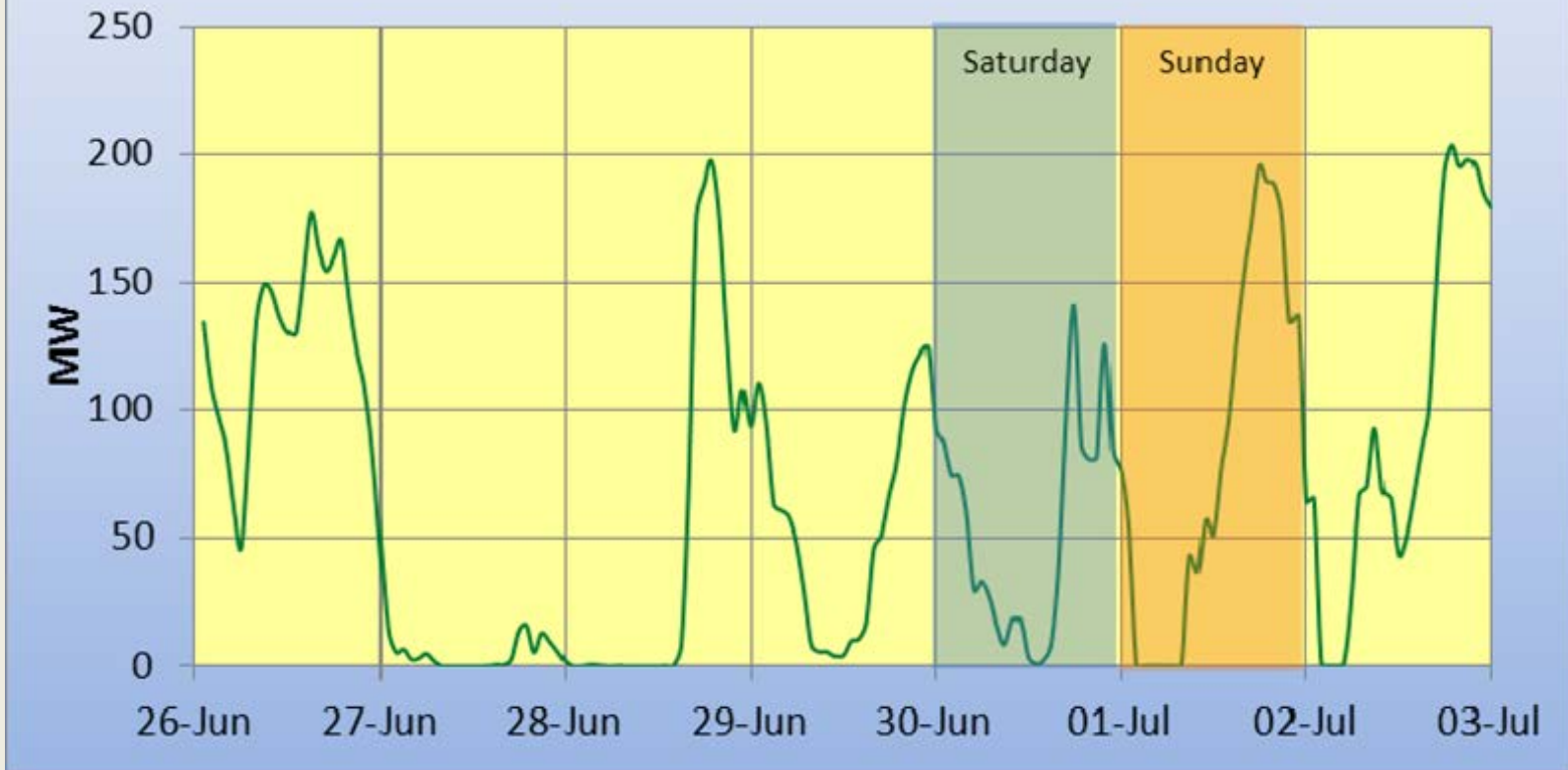
**Challenge:**  
Meet load growth and renewable portfolio standard requirements without the use of fossil fuels



# Renewable Energy is Variable



## Snohomish's Aggregated Wind



# Modular Energy Storage Architecture (MESA)

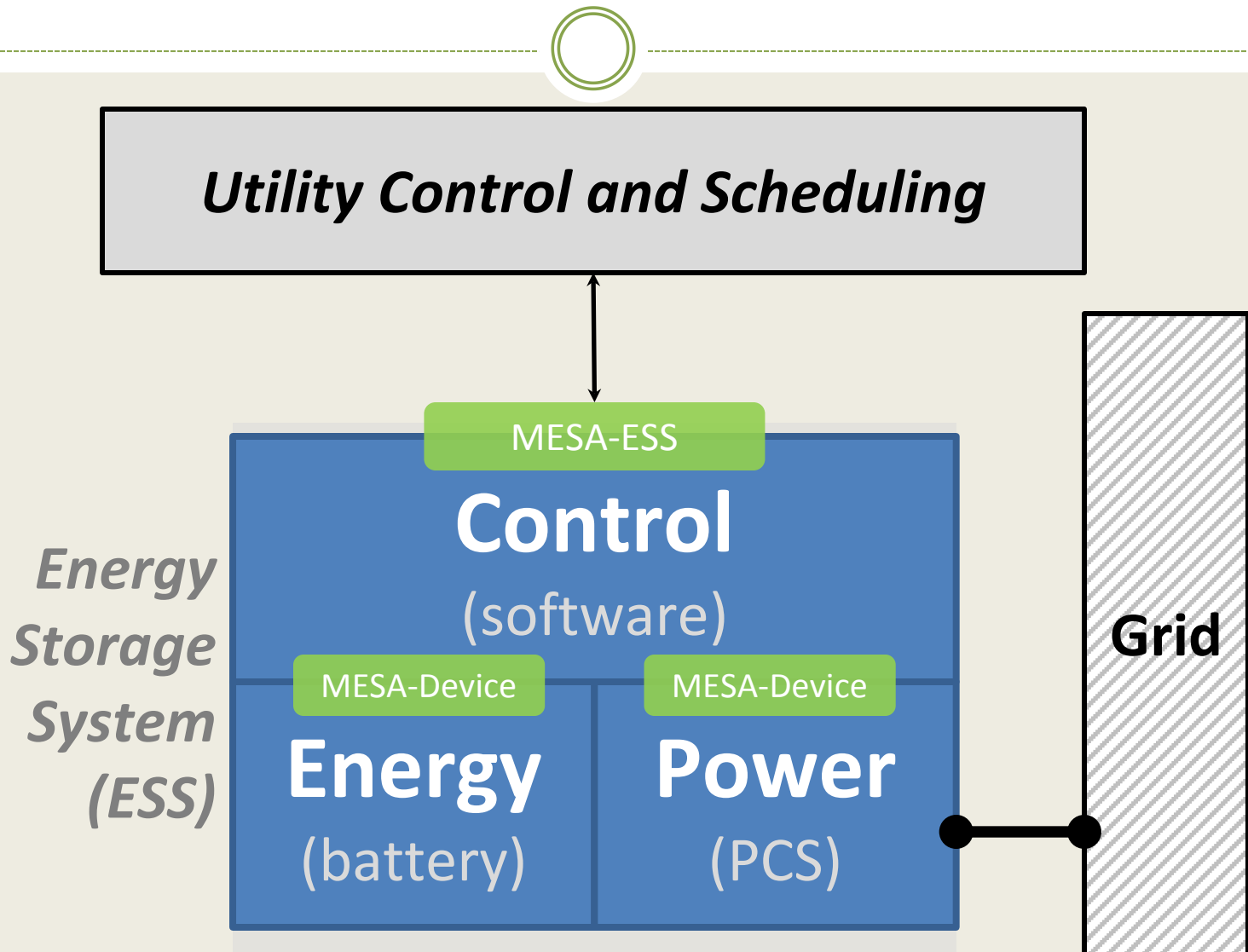


- **Current grid energy storage offerings**
  - Expensive (\$100k for 25 kw-hr system) →
  - Lack modularity
  - Lack interoperability
  - Lack scalability
  - Lack standardization
  - Monolithic; vendors operate beyond core expertise
- **Large gap between battery manufacturers and utilities**
  - Core suppliers cannot easily serve core customers

For \$30k you can get 24kw-hr of Li-ion storage with a Nissan Leaf wrapped around it...



# MESA Standardization



*Modular Energy Storage Architecture*

# MESA Standards Alliance



- Open Standards for Energy Storage
- Founding Members and Strategic Partners





# Current Energy Storage Projects

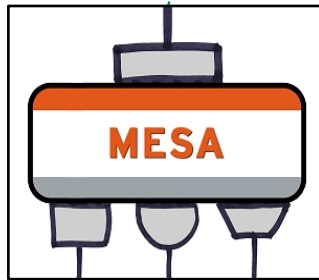
MESA 1A  
1MW/.5MWh  
Li-Ion



MESA 1B  
1MW/.5MWh  
Li-Ion

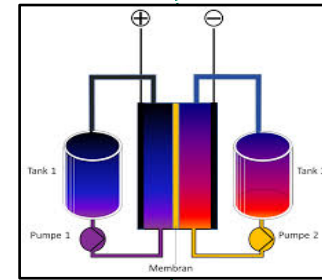


MESA  
Standards  
Alliance

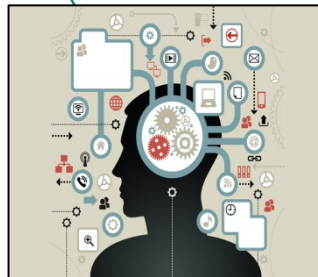


SNOHOMISH COUNTY  
**PUD**  
PUBLIC UTILITY DISTRICT NO. 1

MESA 2  
2.2MW/8MWh  
Vanadium Flow



Analytics –  
Measurement  
and Verification



Controls  
Integration -  
Optimization



Projects partially funded through Washington State - Clean Energy Fund

# MESA 1 Site – Hardeson Substation



# MESA 1



- 2MW/1MWH Lithium – Ion System
- Schedule
  - Design: through 1Q 2014
  - Implementation: 2Q 2014 through 4Q 2014
- Partners



# District Led Team Effort



- **Substation Engineering / Construction**
- **Communications, SCADA, and IT**
- **System Planning and Protection**
- **Environmental and Safety**
- **Power Scheduling**
- **Facilities**
- **Cyber Security**





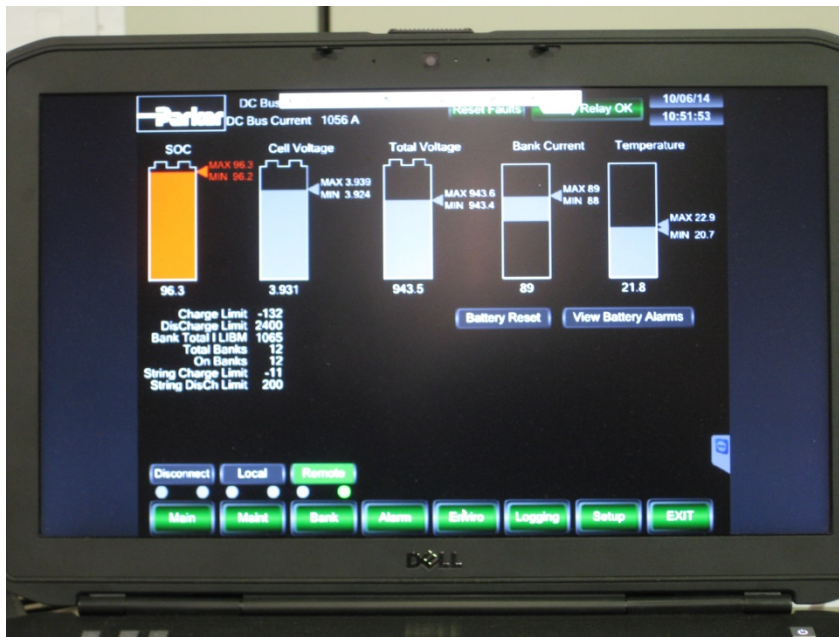
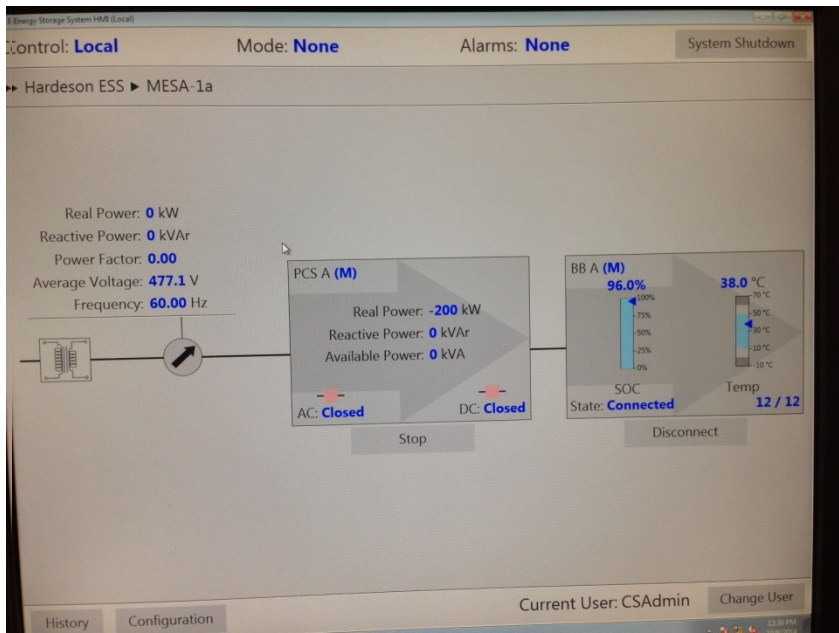
















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