Energy Storage Safety & Reliability

The Arlington Microgrid > Lessons Learned

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About Snohomish County PUD

- Snohomish County & Camano Island
- Second largest PUD in the state.
- Began operation in 1949
- Serves population of about 907,000
- 361,000 customers and growing
- ~85% of our power is from Bonneville Power Administration
- 3-Elected commissioners

- Five hydro generation systems
  - Jackson – 100 MW
  - Young’s Creek – 8 MW
  - Hancock Creek – 6 MW
  - Calligan Creek – 6 MW
  - Woods Creek – 650 kW

- Two existing battery energy storage systems
  - MESA 1 and Arlington Microgrid
Arlington Microgrid

The multiple uses of energy storage
1MW / 1.4MWh - Battery Energy Storage System
Initial - Fire Suppression System Basis of Design

• Built prior to Arizona Public Service McMicken Battery Storage Facility Incident (April 19, 2019)

  o Did not address lithium-ion batteries

• Design included minimal fire safety equipment
  o Smoke detection
  o Clean Agent – FM 200
Final - Fire Suppression System Basis of Design

• Post Arizona Public Service McMicken Battery Storage Event (April 19, 2019)

• DNV GL Final Report for Consolidated Edison, New York, NY
  o Considerations for ESS Fire Safety
  o Report No. OAPUS301WIKO (PP151894), Rev 3, January 18, 2017

• New York Fire Department
  o 608-01 outdoor stationary battery systems 4-23-19 publication draft
  o Notice of Public Hearing and Opportunity to Comment on Proposed Rule
  o Section 608-01 to Title 3 - Rules of the City of New York - Outdoor Stationary Battery Systems
BESS Safety: Four-stage System

1st Stage: Early warning
- Li-ion Tamer to detect off-gas before thermal runaway
- Stop charging or discharging
- Open AC / DC contactors

2nd Stage: Smoke Detection
- VESDA (Very Early Smoke Detection Apparatus)
- Novec 1230 Clean Agent Fire suppression system
- Horn strobe on outside of container
- Signal to Fire Department and Snohomish PUD

3rd Stage: Gas Venting
- 10-minutes after Novec 1230
- Mechanical exhaust to remove explosive gases, with back-up manual switch.
- PNNL Intellivent, automatically opens all container doors to remove explosive gases and provide visual inside container

4th Stage: Water/Deluge
- Fire sprinkler water deluge System
- Dry pipe to a Fire Department Connection (FDC) ~100’ away from container
- Water can also be sprayed directly on batteries through open doors.
Additional Fire Safety Equipment Added

• PNNL IntelliVent™ System
  o Meet future code requirements for deflagration gas venting
  o Currently - open all battery container doors 10 min. after clean agent is triggered
  o Doors are held closed with magnetic locks
  o Adding future system to immediately open doors if heat is detected on battery modules
IntelliVent™ Testing at SnoPUD

Smoke Test – Interior View

Smoke Test – Exterior View
BESS Fire Safety > Lessons Learned > Design, Planning & Training

• Comprehensive System Level Approach
  o Select reputable, well-established vendors
  o Focused on quality and safety
  o Modules and Battery Mgmt System
  o UL 9540 Listing - Future Systems

• Proper environmental controls
  o Heating, cooling and humidity

• Engage Authorities Having Jurisdiction (AHJ)
  o Codes – WA State Fire Code, NFPA 855

• Continuous Training
  o First responders – Fire Department
  o SnoPUD crews
Thank you!

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