

**Snohomish County PUD Arlington Microgrid  
V2G Demo Project  
Integration Insights for NASEO – NARUC GEB**



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**SNOHOMISH**  
**PUD**

*Energizing Life In Our Communities*

# Agenda

1. Who is Snohomish PUD?
2. The Role of V2G at the Arlington Microgrid
3. Lessons Learned
4. Questions

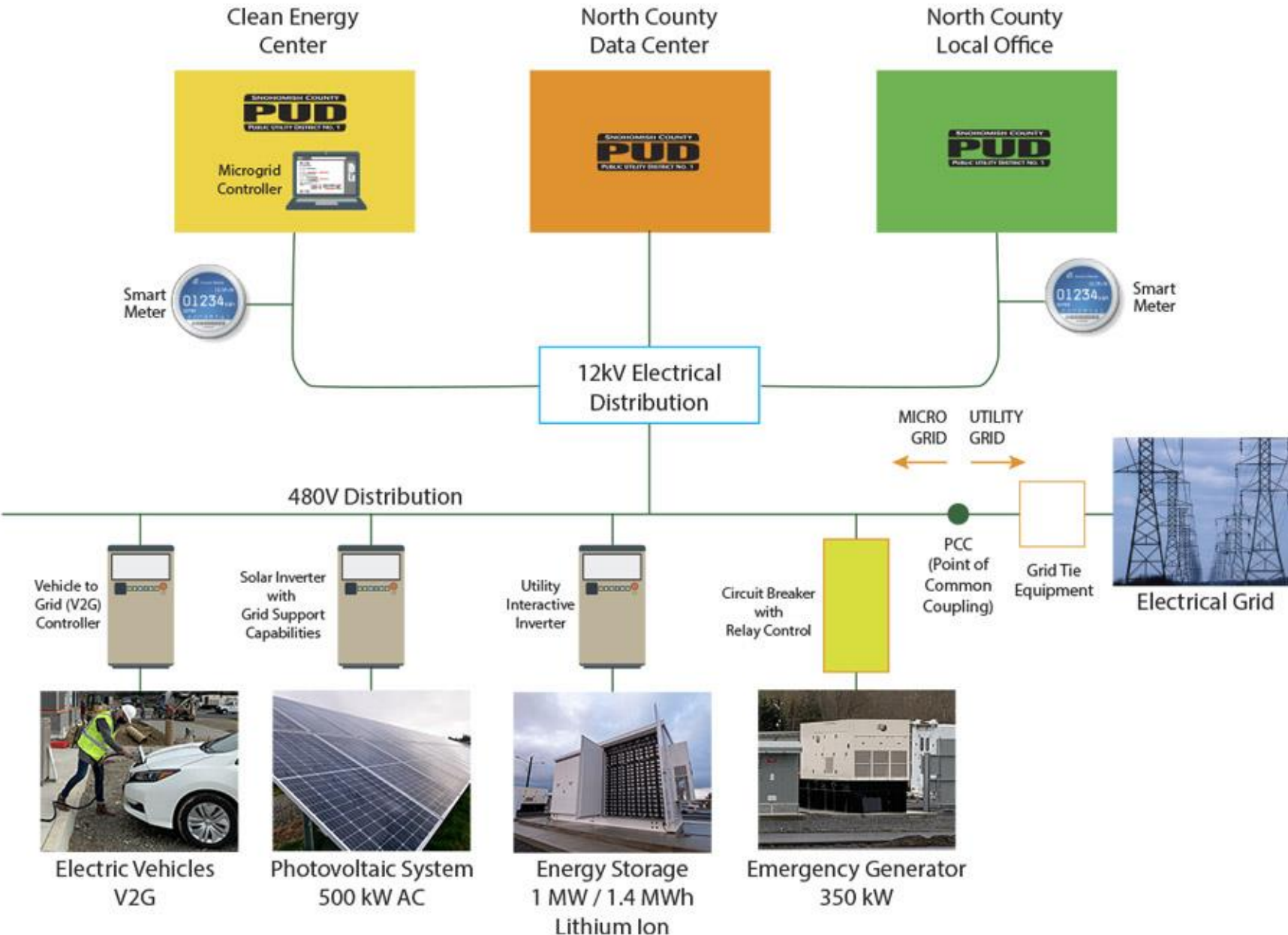
# About Snohomish County PUD

- Snohomish County & Camano Island
  - Largest PUD in WA State
  - Began operation in 1949
  - Serves population of about 907,000
  - 367,000 customers and growing
  - ~ 75% of our power is from Bonneville Power Administration
  - 3-Elected commissioners
  - 97% Carbon Free – mostly due to hydro
- 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

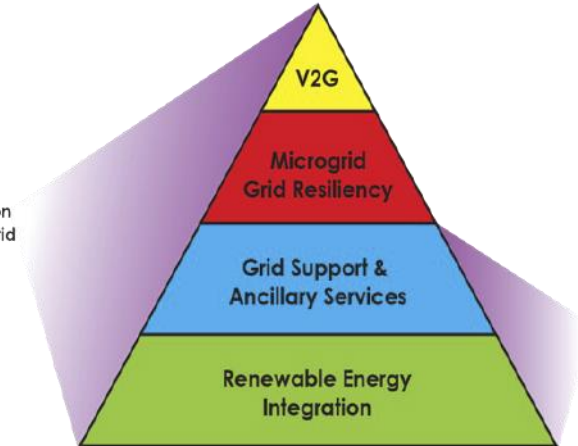


# Arlington Microgrid

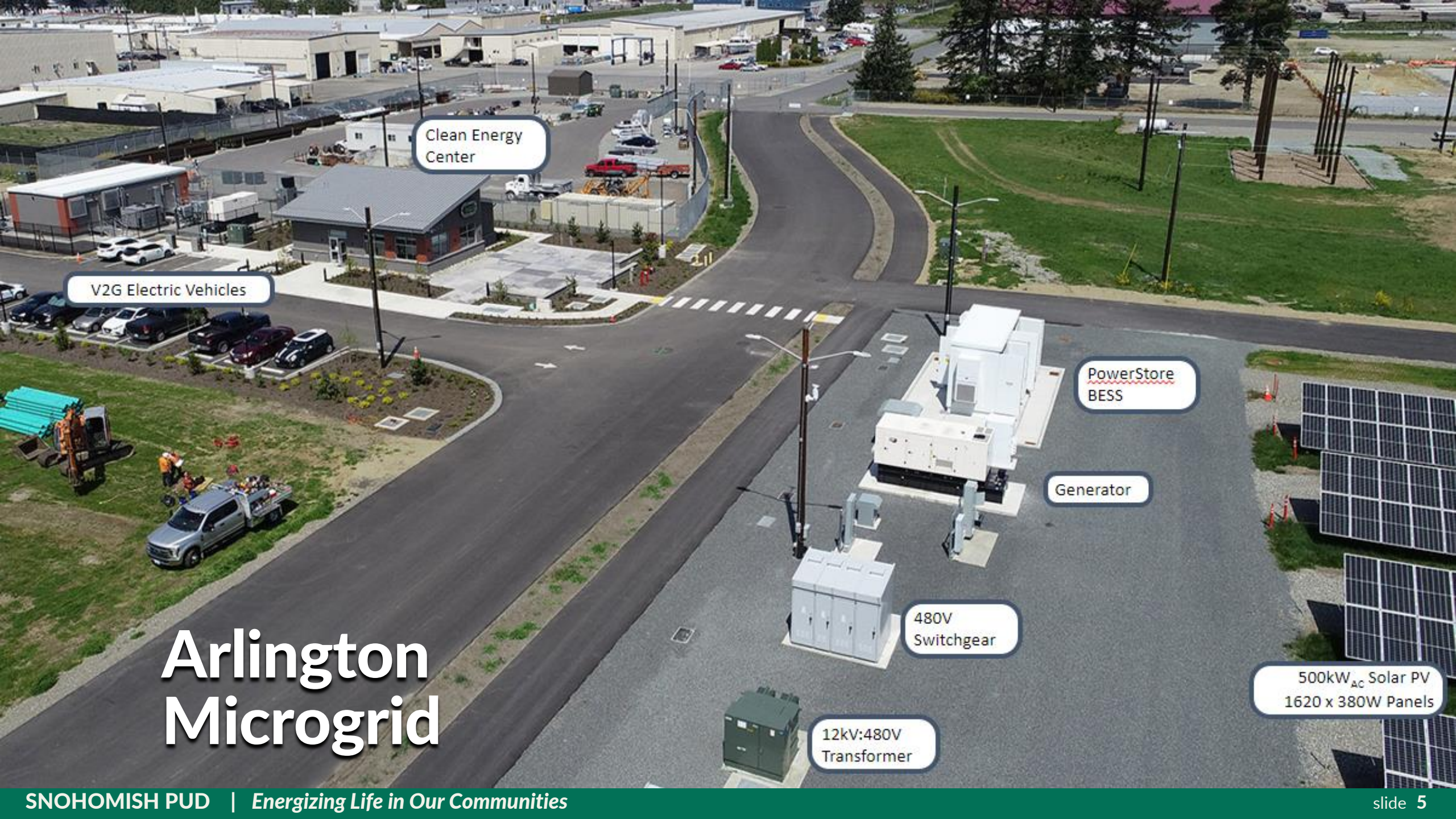
The multiple uses of energy storage



MESA 3  
Arlington  
Microgrid



MESA 1  
MESA 2



Clean Energy Center

V2G Electric Vehicles

PowerStore BESS

Generator

480V Switchgear

12kV:480V Transformer

500kW<sub>AC</sub> Solar PV  
1620 x 380W Panels

# Arlington Microgrid

# Vehicle-to-grid (V2G)

- 2 x Level 2 chargers (Mitsubishi Electric)
  - 6kW bi-directional
- 2 x Electric Vehicle
  - Nissan Leaf
  - 40kWh and 62kWh
- Microgrid Control
  - When islanded
- DERMS Control
  - When grid connected
- Communications
  - Device to Device - Modbus
  - Device to Microgrid controller - MQTT



# Lessons Learned

1. Current charger and vehicle technology is ready to make this work – V2G is possible.
2. Need Utility rate structures to change – offset battery degradation.  
*Likely focus on fleet vehicles and buses first - versus residential.*
  - Time of use rates
  - Demand charges
  - Value for capacity
3. Need standards for connections and communications
  - OCCP? Open Charge Point Protocol
  - CHAdeMO, IEC 62196, Tesla, SAE J1772, CCS, etc
4. Need more affordable chargers and vehicles that are bi-directional capable
  - Cars: **Nissan Leaf, Ford F150 Lightning**, GMC Hummer, Mitsubishi Outlander, Volvo EX90, etc
  - Chargers: **Fermata, Sunrun, NUVVE**, etc