

EMERGING LEADERS FORUM





ARLINGTON MICROGRID

COLLABORATION

PARTNERSHIPS

LESSONS LEARNED

YOUR PRESENTERS



Mike Dempsey
Senior Associate Electrical Engineer
Burns & McDonnell



Scott Gibson, P.E.
Energy Storage Program Manager
Snohomish County PUD



John Glassmire
Senior Advisor, Grid Edge Solutions
Hitachi Energy

MICROGRID DEFINITION

A microgrid is

“a group of interconnected loads

and distributed energy resources

within clearly defined electrical boundaries

that acts as a single controllable entity with respect to the grid

[and can] connect and disconnect from the grid

to enable it to operate in both grid-connected or island-mode.”

- the U.S. Department of Energy

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BURNS & MCDONNELL ROLE IN ARLINGTON MICROGRID

Burns & McDonnell

- Request for Statement of Qualifications July 2017
- WA State Clean Energy Fund 2 (CEF2)
- Initial Scope Developed by PUD
- Initial Feasibility Study
- PV Glare Study
- Reprogram Arlington Office Project
- Microgrid Topology Development
- Right-size Standby Generator
- Upsize BESS
- Add Load Bank for Testing

Evolution of the project

- Inception: 2017 WA Clean Energy Fund Grant
- Phase 1: Site Work: Aug – Dec 2018
- Phase 2: Solar: March – June 2019
- Phase 3: Microgrid Control and BESS contract: 2019 – 2021 (Hitachi Energy)
- Phase 4: Facilities – Clean Energy Center & Data Center: 2019 – 2020
- Phase 5: Microgrid Civil Construction: June – July 2020
- Phase 6: Microgrid Construction: April 2020 – Dec 2020 (SnoPUD Substation Crews)
- Testing and Reports: 2021 – 2022, (UW & PNNL)

Collaboration and Flexibility are Key to Success

ARLINGTON MICROGRID - EVOLUTION

- Solar Array
 - Created Community solar program
 - Program Required in service by June 2019 to take advantage of Washington Production Incentive
- Data Center
 - Critical load added to microgrid
- MESA and DERMS
 - Worked through evolving requirements for MESA and DERMS
- V2G – Vehicle to Grid
 - Worked through evolving communications and control requirement
- In-house construction
 - Revised drawings and construction package to allow for in-house construction versus contracting for construction

ABOUT SNOHOMISH COUNTY PUD

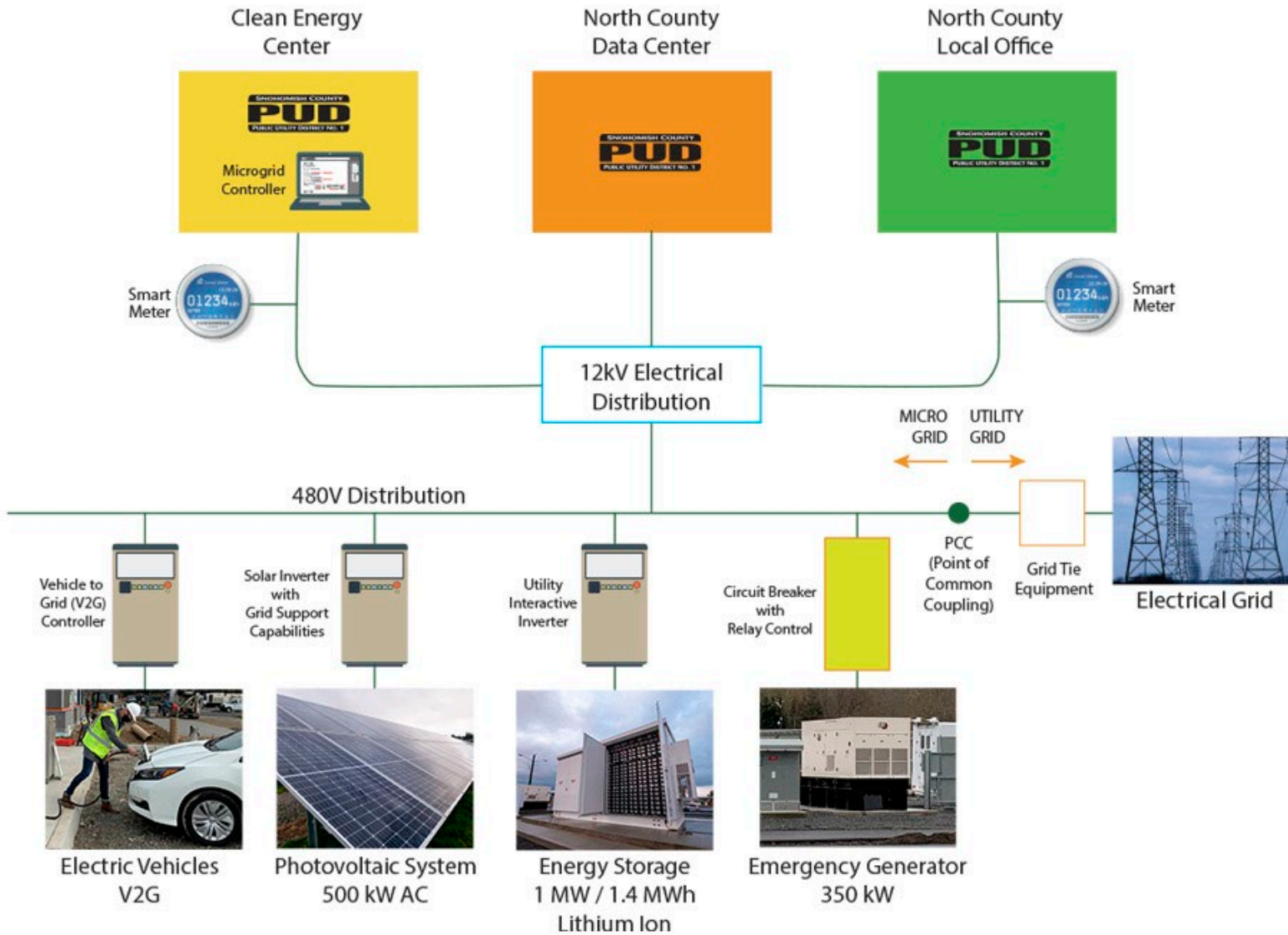
- **Snohomish County & Camano Island**
- 2nd largest public electric utility in the Pacific Northwest
- **Began providing electric service in 1949**
- Serves population of over 907,000
- **367,000 customers and growing**
- ~ 80% of our power is from Bonneville Power Administration
- **3 elected commissioners**



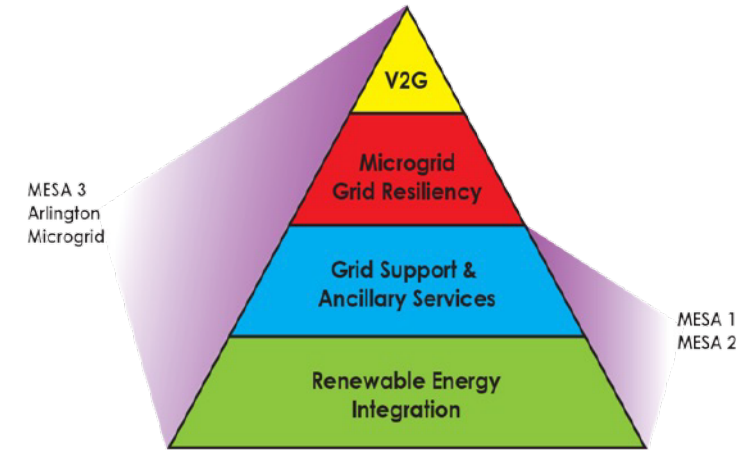
- **Five hydro generation systems**
 - Jackson – 100 MW
 - Young's Creek – 8 MW
 - Hancock Creek – 6 MW
 - Calligan Creek – 6 MW
 - Woods Creek – 650 kW
- **Two existing battery energy storage systems**
 - MESA 1 and MESA 2
- **Third battery energy storage system**
 - Arlington Microgrid

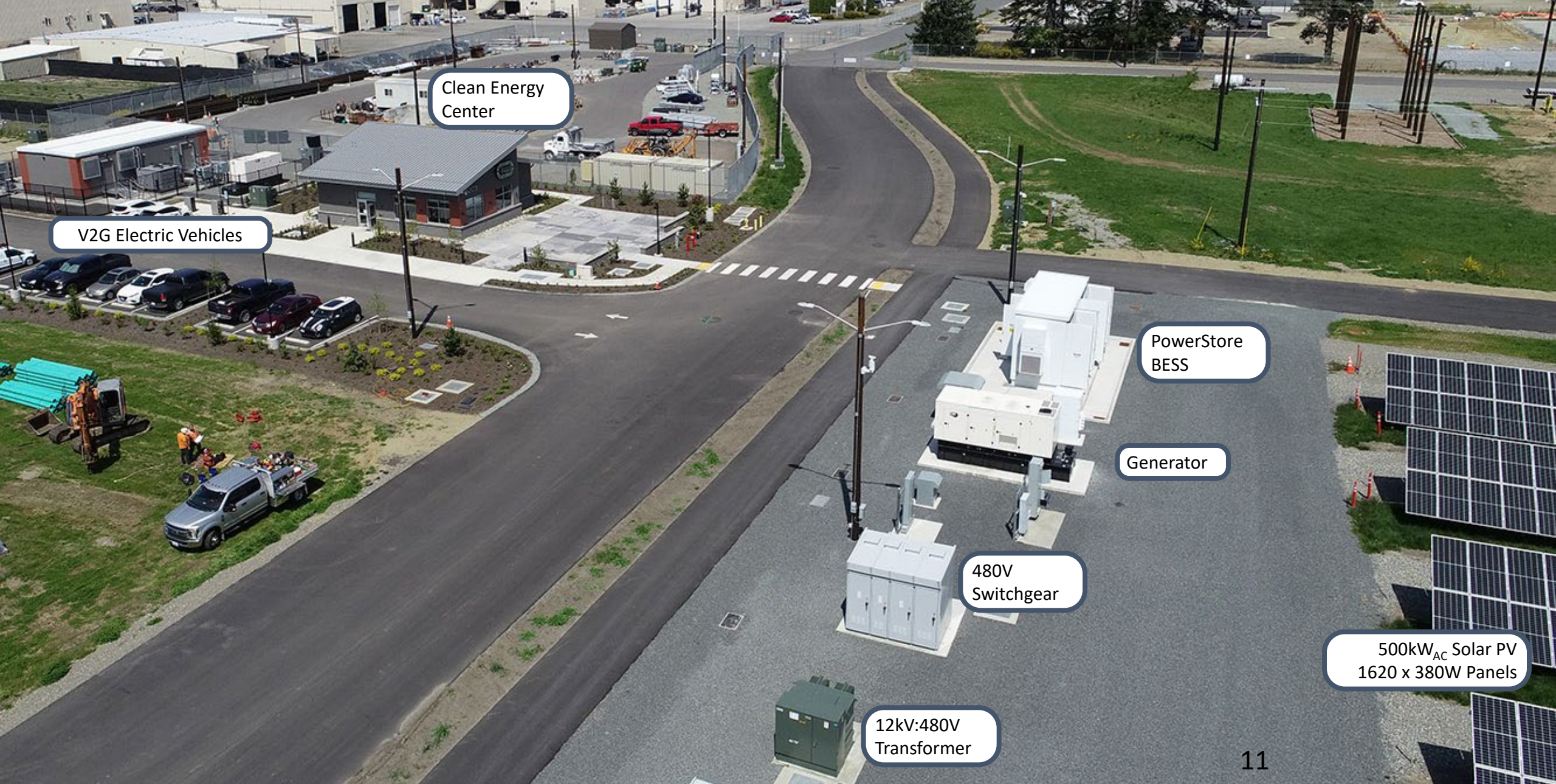
WHY PARTNERSHIPS ARE IMPORTANT

Arlington Microgrid Contributors	
Snohomish County PUD	Utility - Owner
WA Dept of Commerce	Financial Partner – CEF2 Grant (Clean Energy Fund)
University of Washington and Pacific Northwest National Labs (PNNL)	Contract – Modeling, Data Analysis & Reports and Fire Protection
Burns & McDonnell	Contract – EPC - Owner’s Engineer
Mitsubishi Electric	Contract – V2G - Equipment and Support
A&R Solar	Contract – Solar Array Construction
Hitachi Energy	Contract – Microgrid Equipment, BESS and Controls
DERMS	Doosan GridTech
Standards	MESA - Modular Energy Storage Architecture
PUD Substation Crews	Microgrid Equipment Install and Operations



The multiple uses of energy storage





Clean Energy Center

V2G Electric Vehicles

PowerStore BESS

Generator

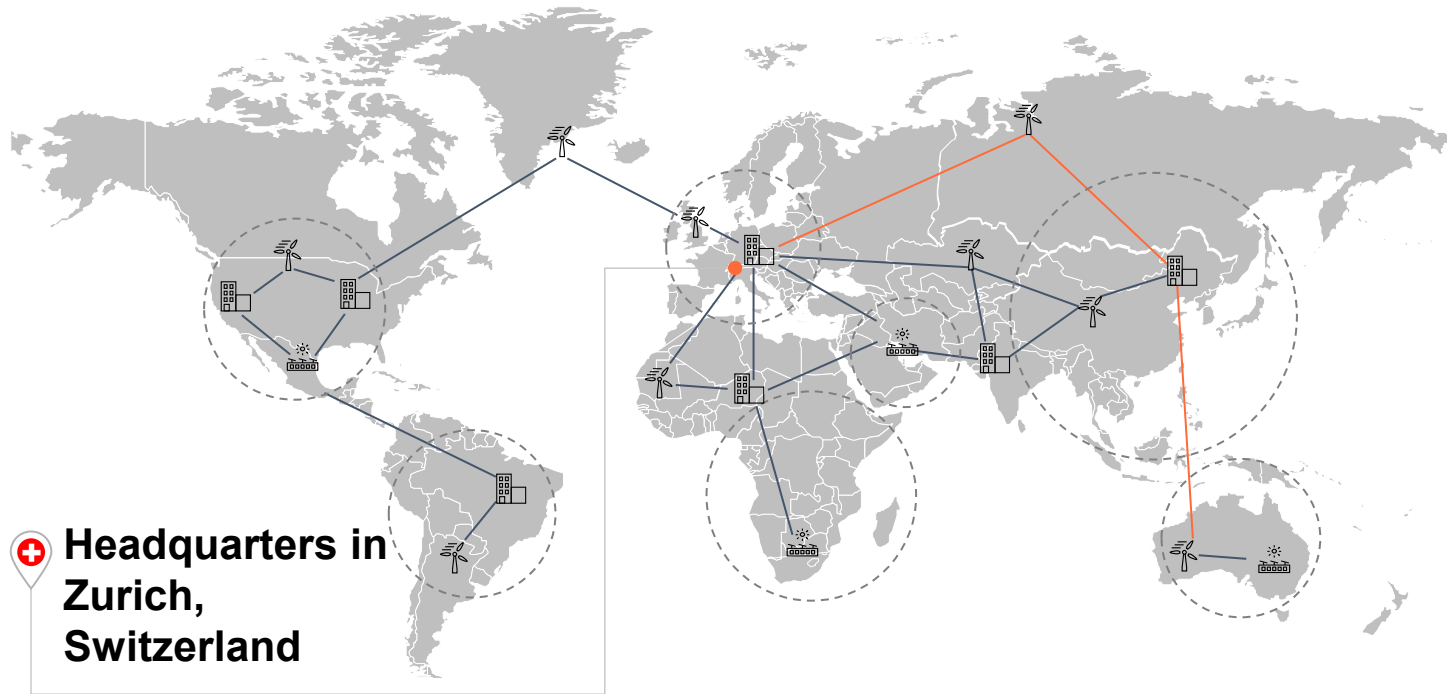
480V Switchgear

500kW_{AC} Solar PV
1620 x 380W Panels

12kV:480V Transformer

11

ABOUT HITACHI ENERGY



38,000 employees

90+
countries with
200 offices

~250
years' heritage
combined

5,500
sales employees
& field engineers

2,000
engineers &
scientists in R&D

Four Business Units

**Grid
Automation**

**High Voltage
Products**

Grid Integration

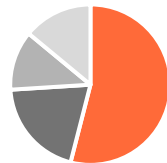
Transformers

Customers



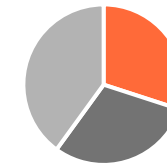
- Transport & Infrastructure
- Industry
- Utilities

Offering



- Services
- Software & Automation
- Systems
- Products

Geographies



- Asia, Middle East & Africa
- Americas
- Europe

ARLINGTON MICROGRID – SERVICES & BENEFITS

Grid Connected Operation

- Individual control of assets
- BESS
 - Renewable integration / solar smoothing
 - Energy arbitrage
 - Demand reduction
- V2G (vehicle-to-grid)
 - Grid support
- Solar PV
Energy export

Transition Capability

- Seamless islanding
 - Planned
 - Unplanned
- Seamless resynchronization

Islanded Operation

- 100% renewable operation
- Ancillary services in MG provided by GFM BESS
 - Inertia (frequency)
 - System strength (voltage)
- Hybrid operation of BESS, V2G, solar, and back-up generator for resilience
- Disaster support

LESSONS LEARNED

- **Communications and Control Standards for Energy Storage and Microgrids**
 - Need clear understanding of requirements and needs for utilities
 - Particularly design and specifications for major components
- **Battery Energy Storage System Safety**
 - Battery safety and fire mitigation are rapidly evolving
 - Engagement with local first responders and code officials is important for success
- **Microgrid Modeling**
 - System Stability Modeling - allows for more reliable transitions from grid connected to islanded
 - Grid Forming Inverters are still new to utilities; need assistance system design and specifications
- **Electric Vehicle Grid Impacts and Vehicle to Grid Systems (V2G)**
 - Need more work on communications, control, uses cases, economics and vehicle battery degradation



Thank you !

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