UNIVERSAL ELECTRIC CORPORATION

Renewable Integration

DC MicroGrids for Commercial Buildings

Steve Ross – CTO
Chris Myer – Project Manager

Universal Electric Corporation

- Who we are
  - Manufacture Track Busway
  - 160,000 sf Canonsburg, PA
  - Family owned
  - Employ 320 people (office + manufacturing)
  - Sell products globally
- Markets
  - Data Center
  - Industrial/Commercial Buildings
  - Retail

Agenda

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- Building Scale MicroGrids
- On-Site Power Distribution
  - Why use 380VDC?
  - Business Case
- System Integration
- System Design Examples

Building Scale MicroGrids

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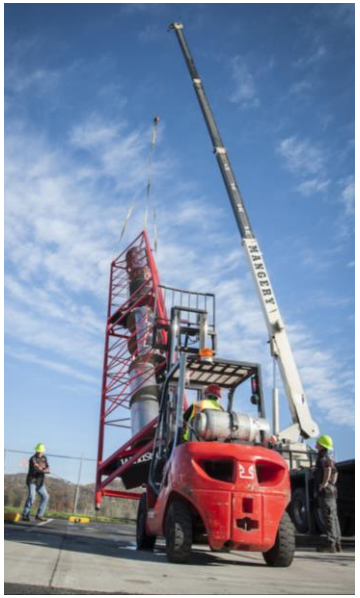

- What do they consist of?
  - On-site power generation
  - On-site energy storage
  - Powering building loads
  - Tracking efficiency through on-site metering
  - Grid tied supplemental power
- Size
  - 50kW – 300kW total system output is typical
  - Includes all sources – Wind/Solar/Other

Building Scale MicroGrids

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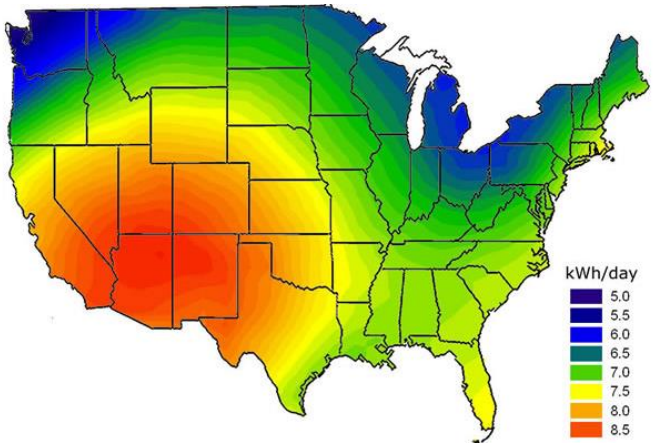
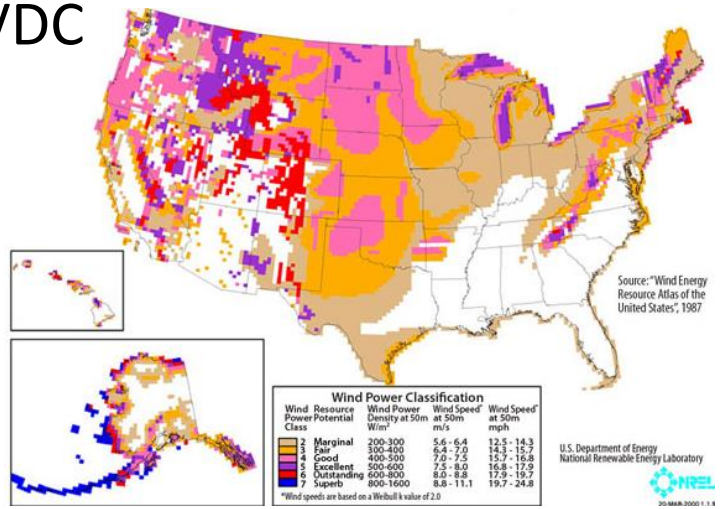
- Why use them?
  - Energy cost savings
  - Reduce grid energy usage
  - Reduce carbon footprint
  - Improve power distribution efficiency
    - From source to load if using HVDC





380VDC Power Distribution

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- What is it?
  - Utilizing 380VDC from renewable sources to load
  - Emerging standard through many industries
  - Renewables and loads can be and are inherently dc
    - Batteries, lights, HVAC, computers, EV charging
- Why use 380VDC?
  - Simplicity
  - Efficiency
  - CAPEX

System Integration

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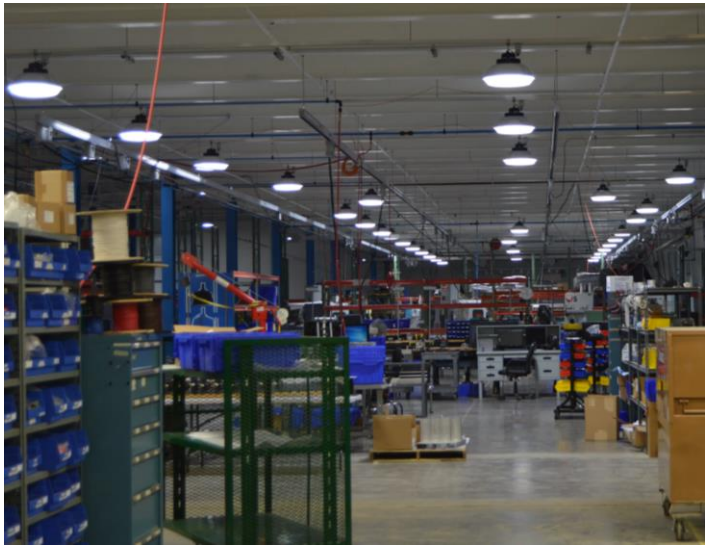

- System Operation
  - Components
  - Communication
  - Hierarchy
    - Highest voltage wins
- Grounding
  - High Resistant Mid-Point Ground
  - Ground fault detection

Pitt-Ohio Project

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- Includes Wind, Solar and Storage
  - All outputs onto common 380VDC bus
  - 50kW Solar
  - 5.5kW Wind
  - 75kWh Lithium Iron Phosphate batteries
- Powers ac Lighting Load
- All sources produce 380VDC
- Uses grid power for backup

Pitt-Ohio System Layout

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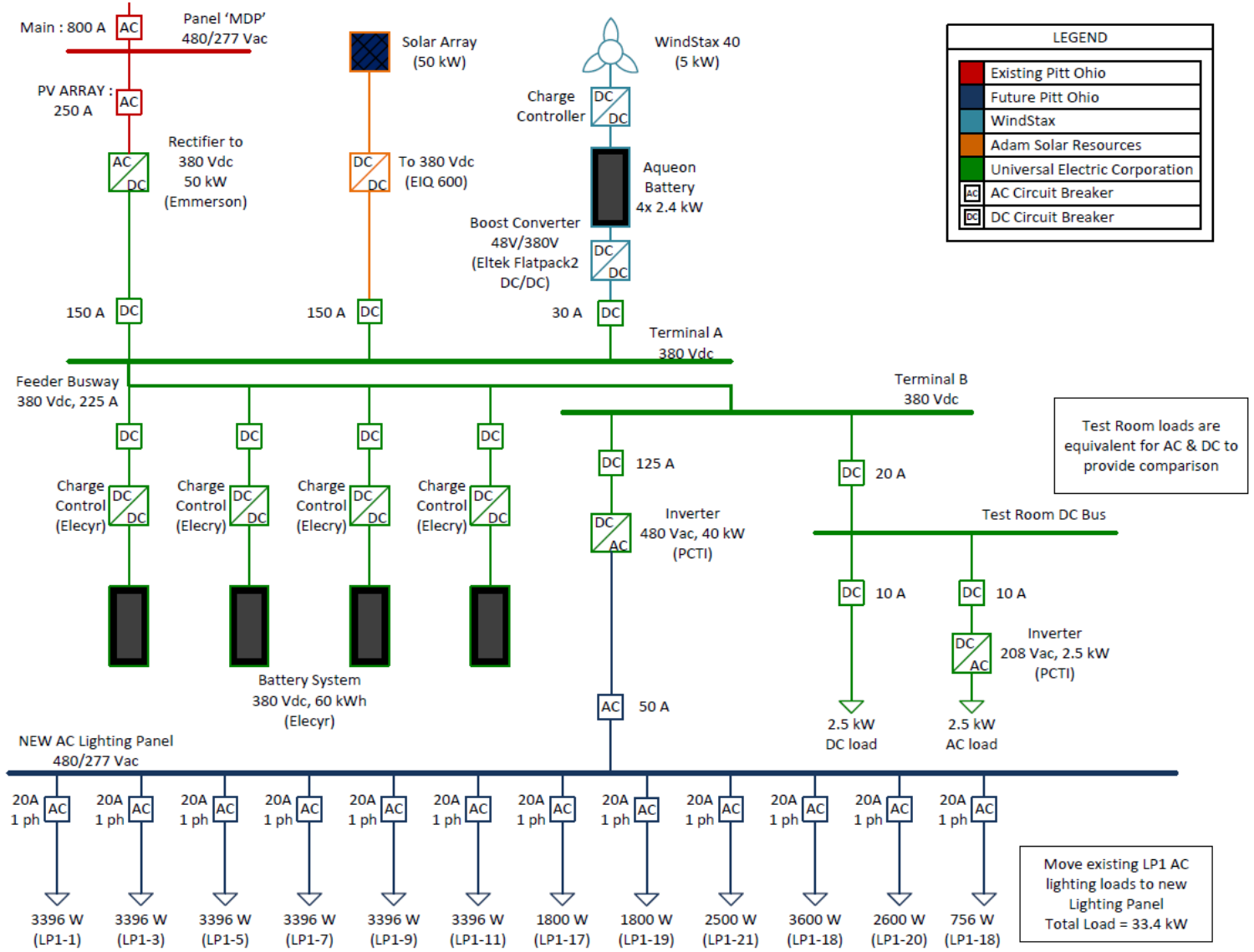

Project Collaboration

Universal Electric Project

- 50kW Solar array producing 380VDC
- 60kWh Lithium Iron Phosphate Batteries
- Rectified grid power as backup
- 380VDC Lighting Load
  - 21 kW load
  - 72 High Bay, 42 Low Bay fixtures
  - LED lights take 380VDC directly
  - Most efficient power distribution
- Cost & ROI

Universal Electric Project

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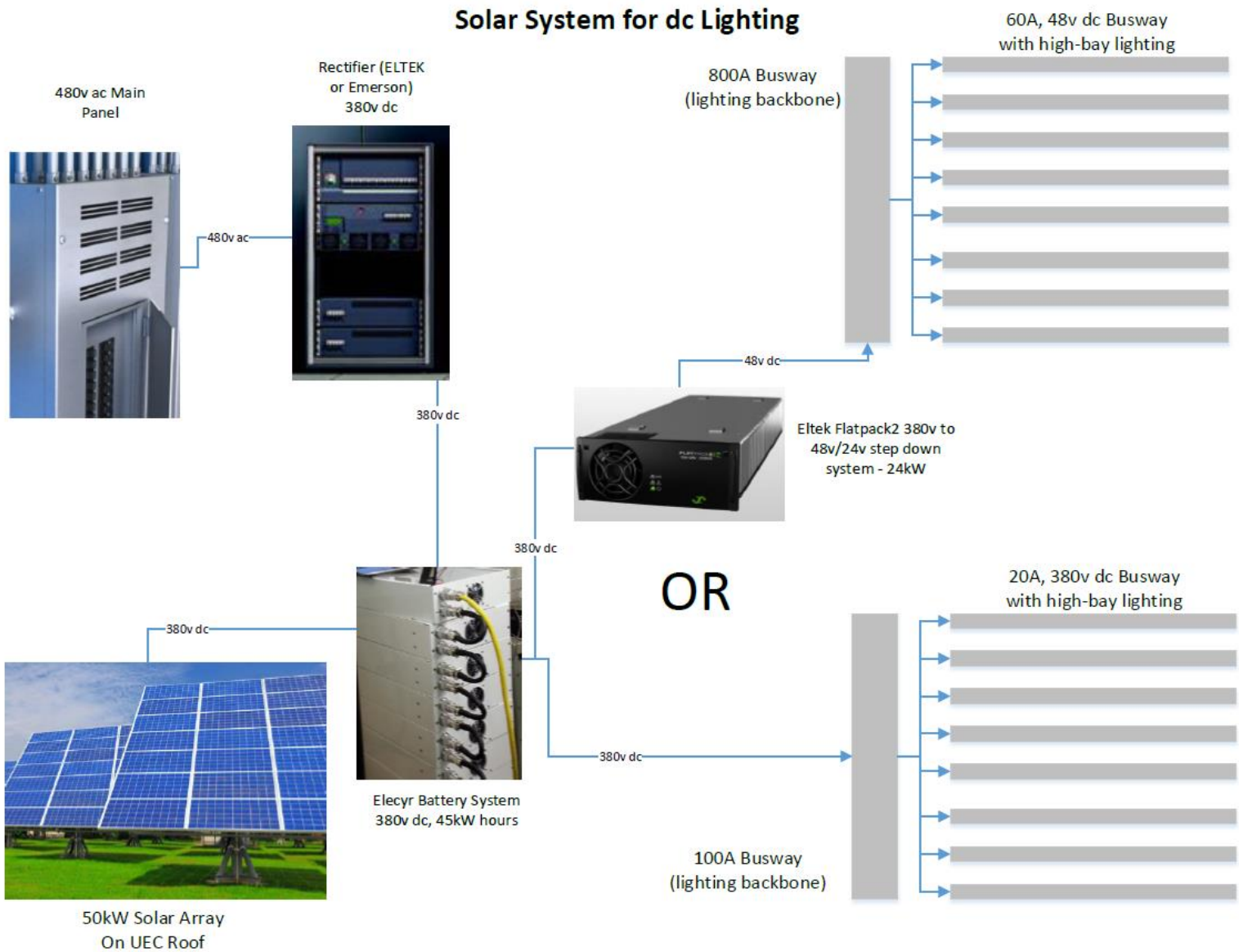

Questions and Answers

Thank You

Q&A – 5 Minutes

Contact

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