Overview of Microgrid Activities @ Georgia Power

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October 22, 2024

Georgia Power

Agenda

- What is a Microgrid
- Planned Military Microgrid Projects in Georgia
- Tech Square Microgrid
- Questions

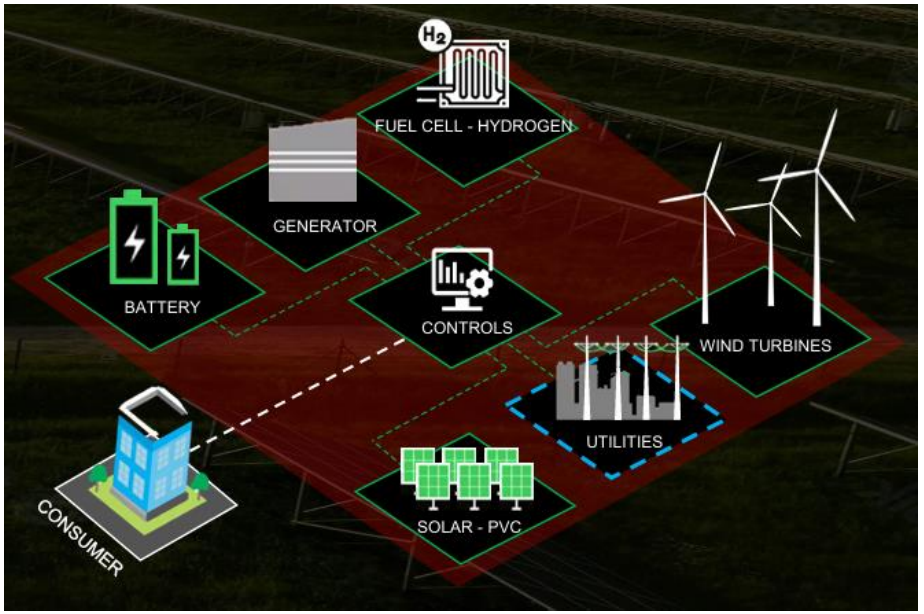
What is a Microgrid

Microgrid Definition, Operating Modes & Use Cases

- **Definition**
  - A group of interconnected loads and distributed energy resources within a clearly defined electrical boundary that acts as a single controllable entity with respect to the utility grid

- **Operating Modes**
  - Grid Connected (e.g., Peak Shaving Mode)
  - Grid Disconnected or Island Mode

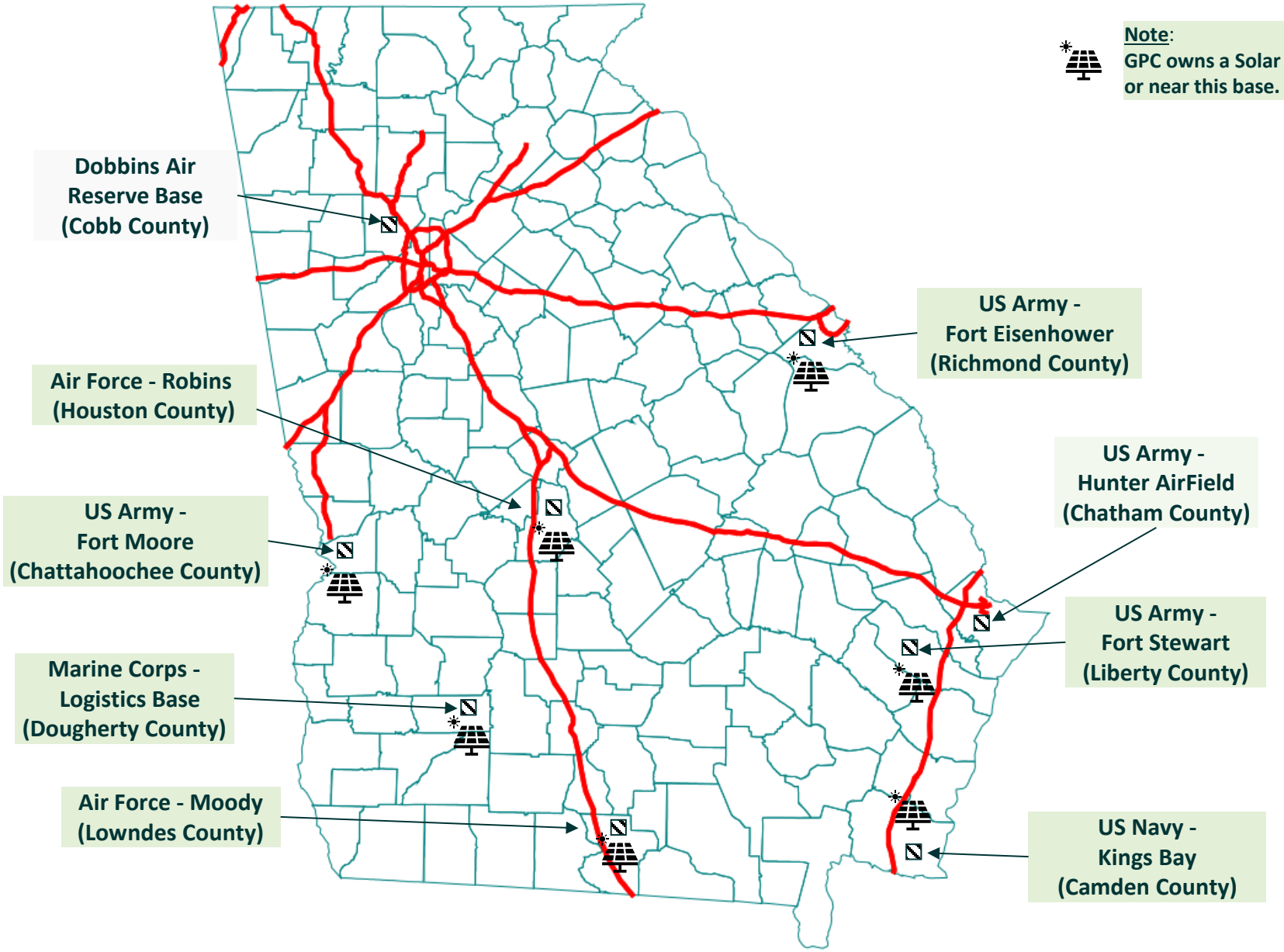
- **Primary Use Cases**
  - Resiliency – Ability to respond to and recover from disruptive power system events
  - Financial – Cost savings including energy for a facility or deferred capital expense for a utility
  - Sustainability / Decarbonization depending on DER technology



Source:
Cummins Power

Planned Military Microgrid Projects in Georgia

Potential Sites for Military Microgrids in Georgia



Potential Sites for Military Microgrids in Georgia

Drivers

- Support DOD mission critical & other critical loads at the base during utility grid outage for a certain minimum number of days based on installation type (e.g., 14 days for US Army Installations)
- Reduce reliance on existing backup diesel generators with 3 days of fuel storage typically
- Reduce installation electricity bill

Design

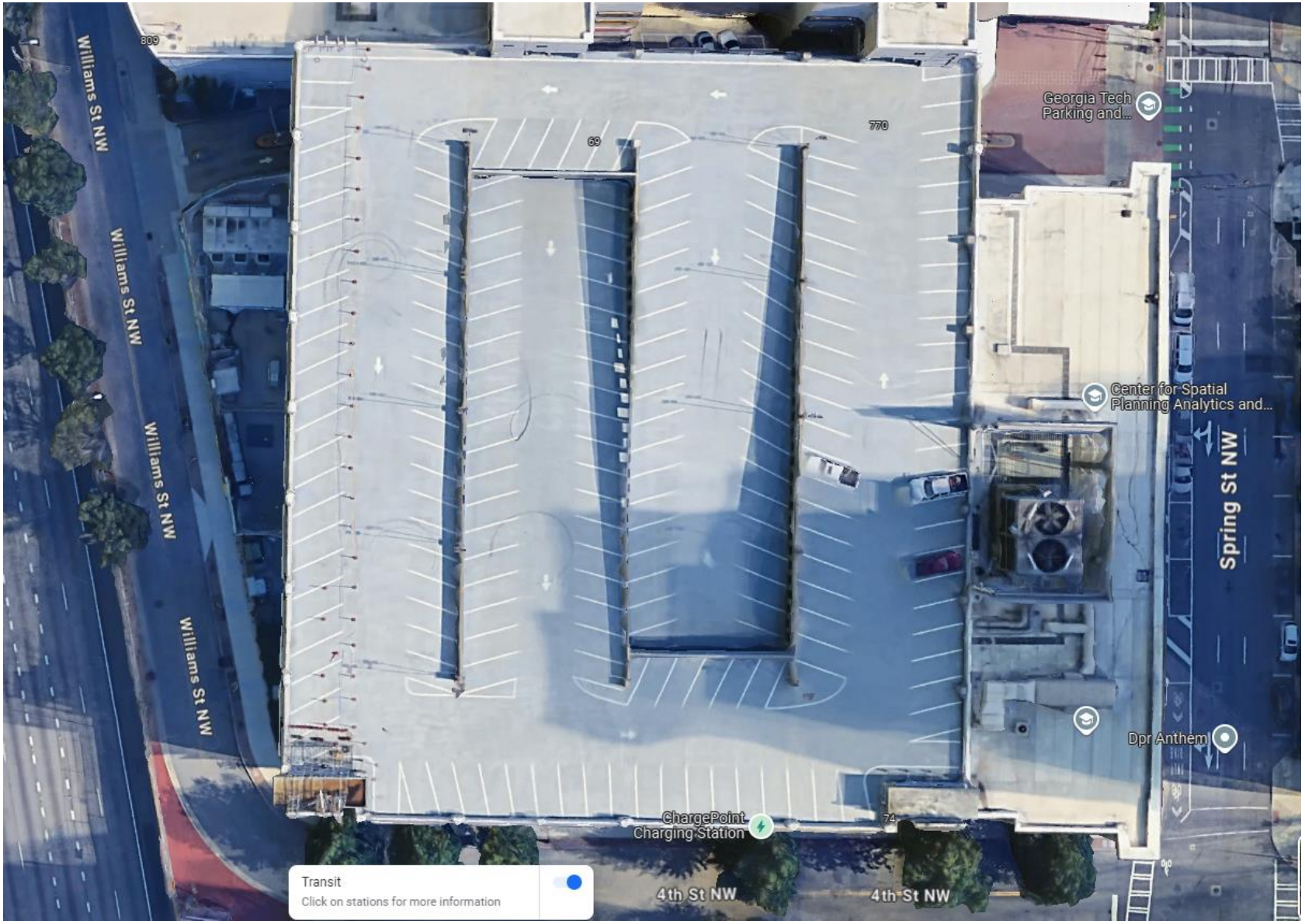
- Primary generation resources
  - DOD-owned natural gas generators
  - GPC-owned solar PV + battery energy storage, where available
- Generation & load to be controlled by a microgrid controller
- Monitoring by & Information Exchange with Georgia Control Center over a cybersecure communications medium

Use Case(s)

- Peak Shave based on real-time electricity price
- Planned / Unplanned Island

Tech Square Microgrid

Tech Square Microgrid Project Site



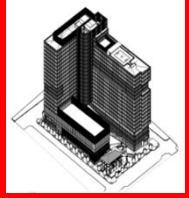
Tech Square Microgrid Resources

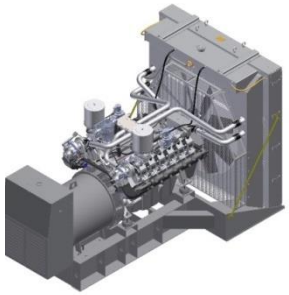
Radial Distribution Feeder Service

Secondary Spot Network Underground Service

Battery
[redacted] kW
[redacted] kWh

CODA BLDG





Natural Gas Generator
[redacted] kW

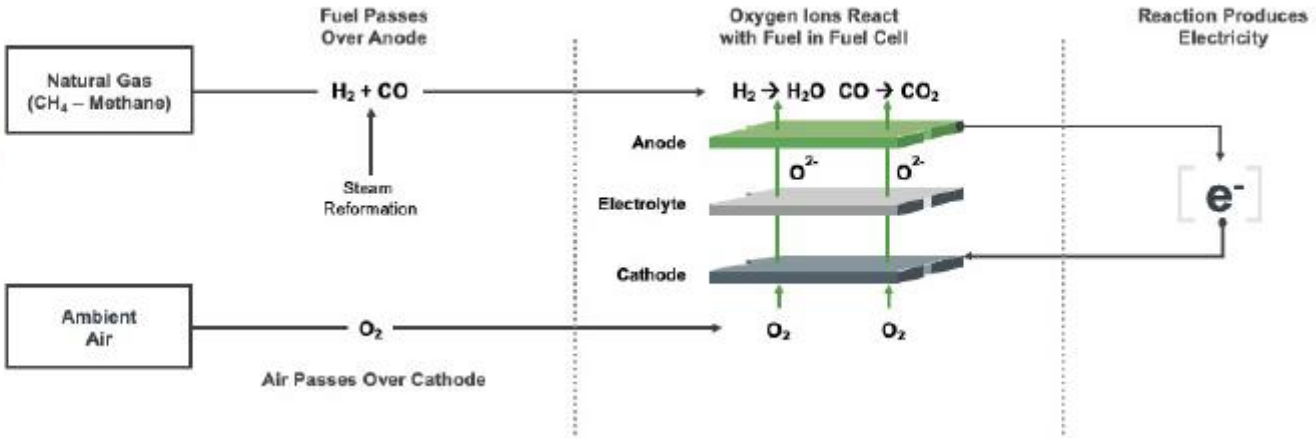
Bloom Fuel Cell
[redacted] kW

Diesel Generator
[redacted] kW

Tech Square Microgrid Fuel Cell Technology

Figure 5:

Natural Gas Solid Oxide Fuel Cell

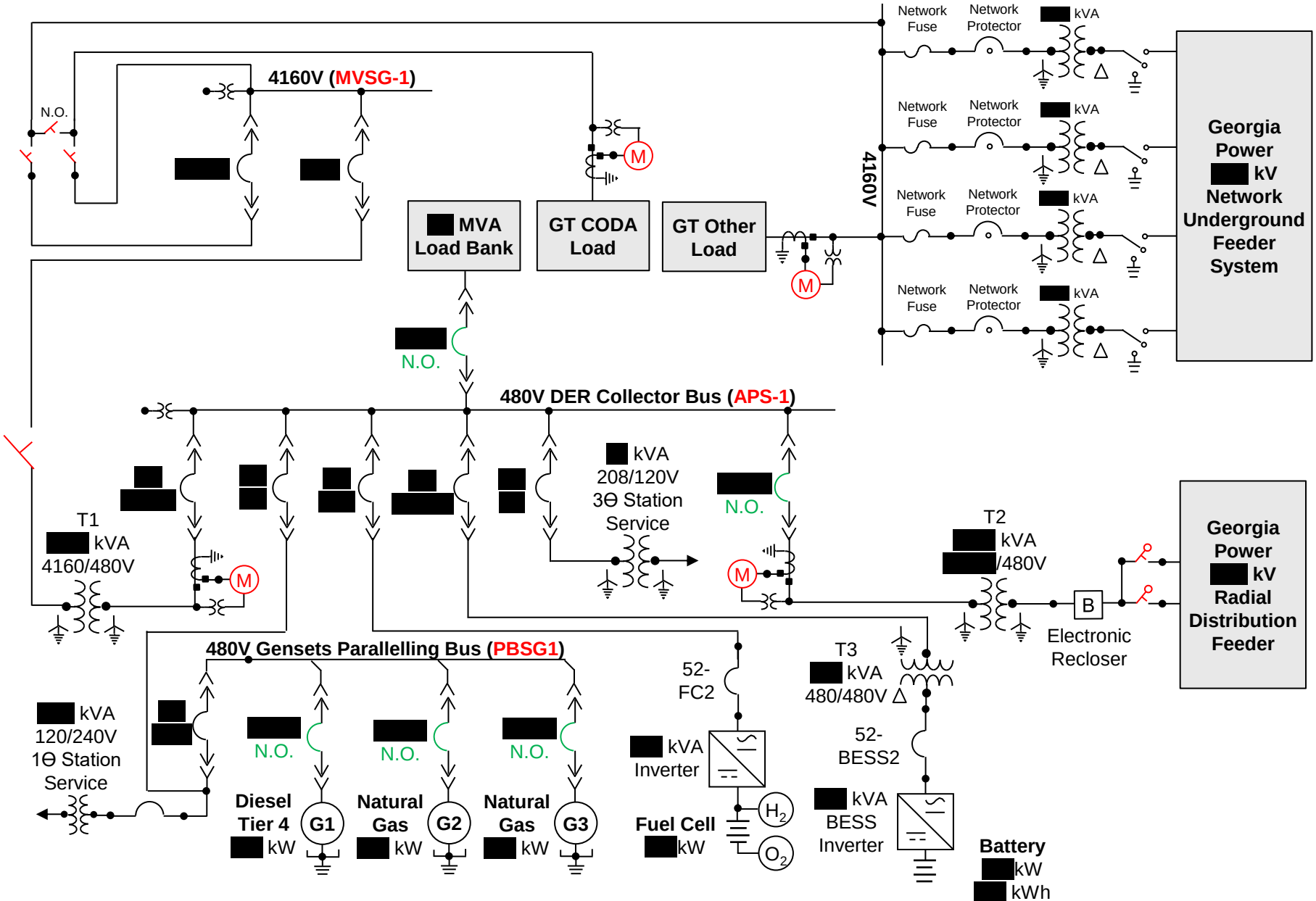


Source:
Hydrogen Power Generation and the Significance of Efficiency
2023 Bloom Energy

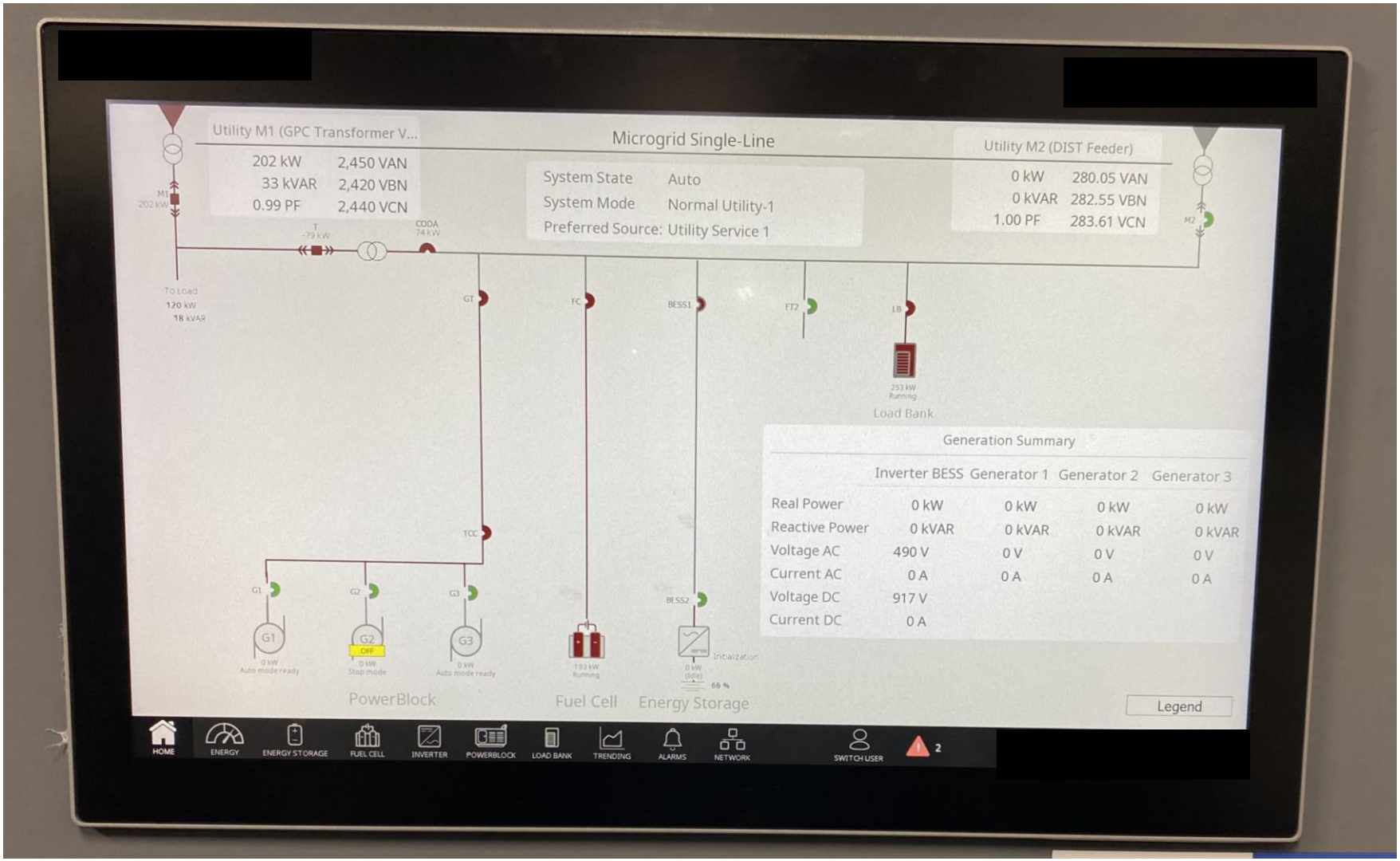
Energy Production Process

- Ambient air, O_2, enters cathode side.
- Steam mixes with natural gas fuel entering the anode side of fuel cell to produce a reformed fuel, $H_2 + CO$.
- As the reformed fuel crosses the anode, it attracts oxygen ions, O^{2-}, from the cathode.
- The oxygen ions combine with the reformed fuel, $H_2 + CO$, to produce electricity, steam, and carbon dioxide, CO_2.

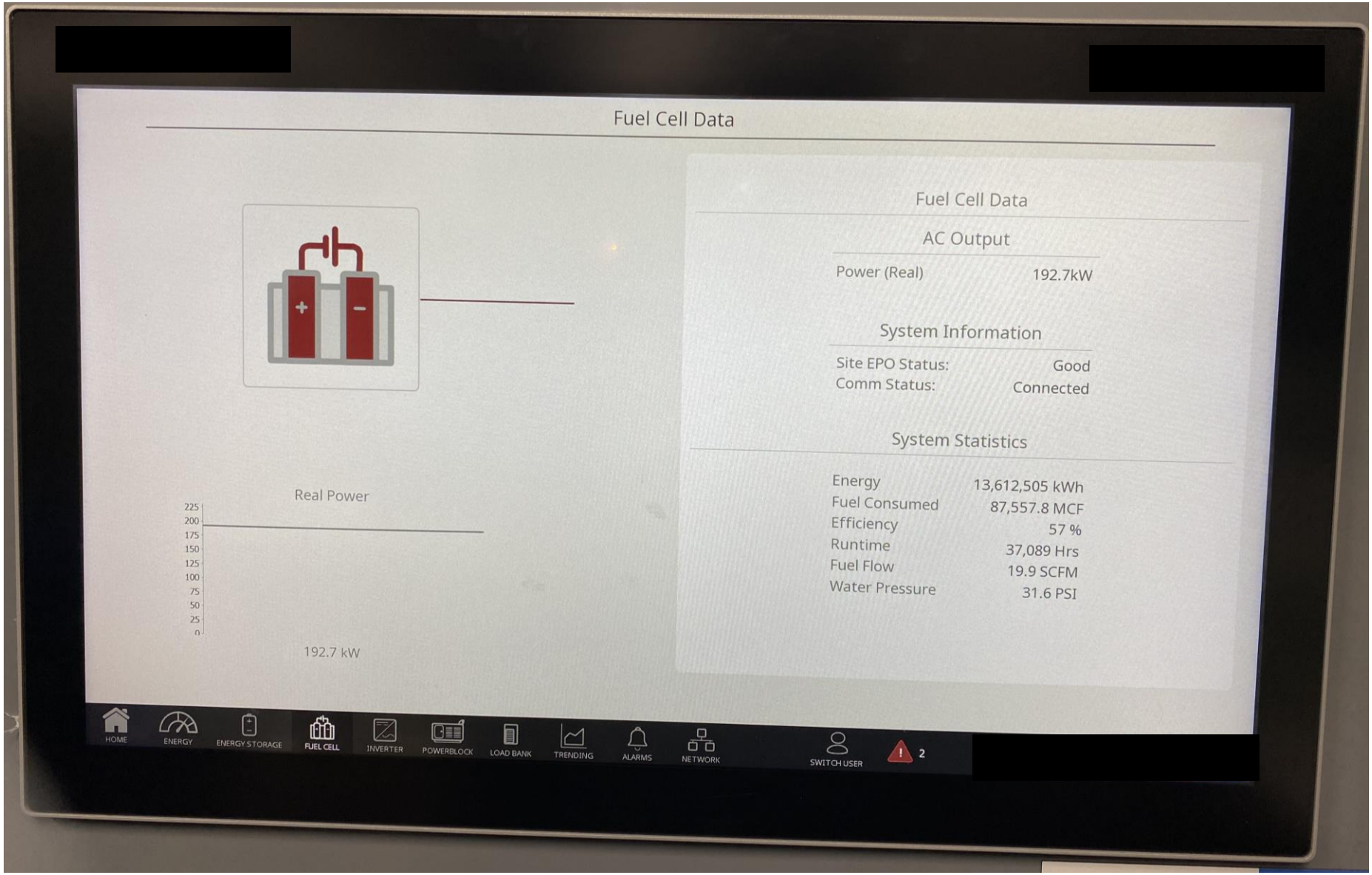
Tech Square Microgrid – Single Line Diagram



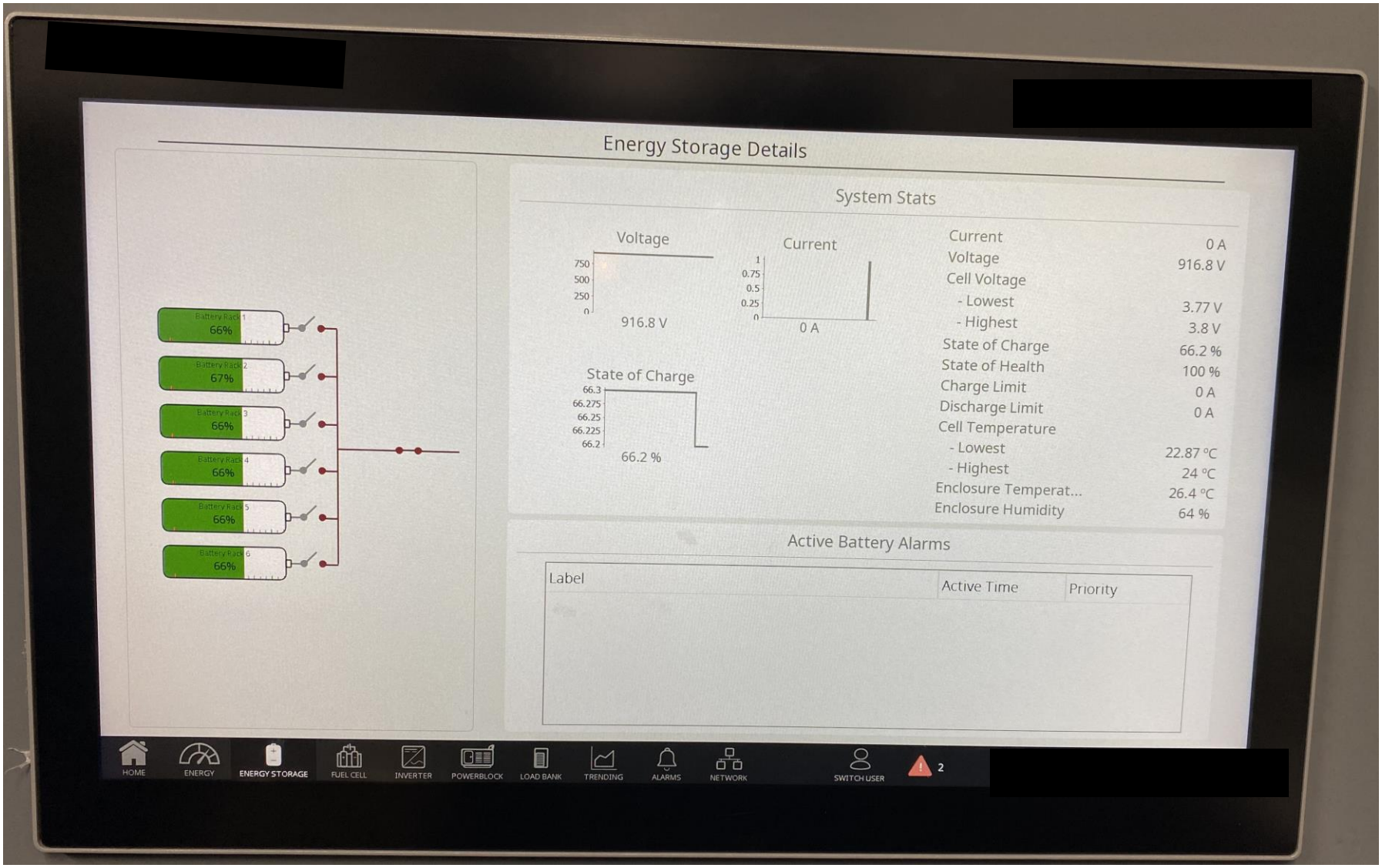
Tech Square Microgrid HMI – Single Line



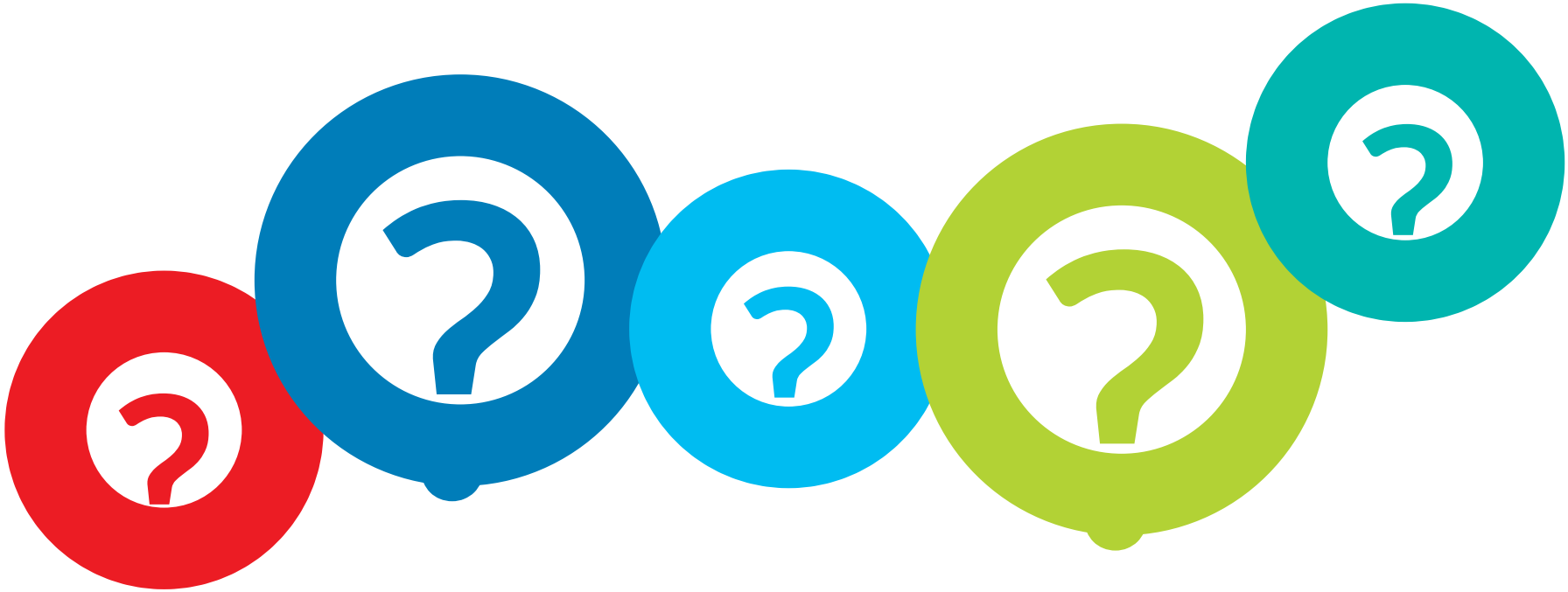
Tech Square Microgrid – Fuel Cell HMI Display



Tech Square Microgrid HMI Display – BESS



Q & A

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