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Paragon Solutions, Inc.  
Battery Day Event –  
Capitol Hill  
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# EV Charging with Lead Battery Energy Storage

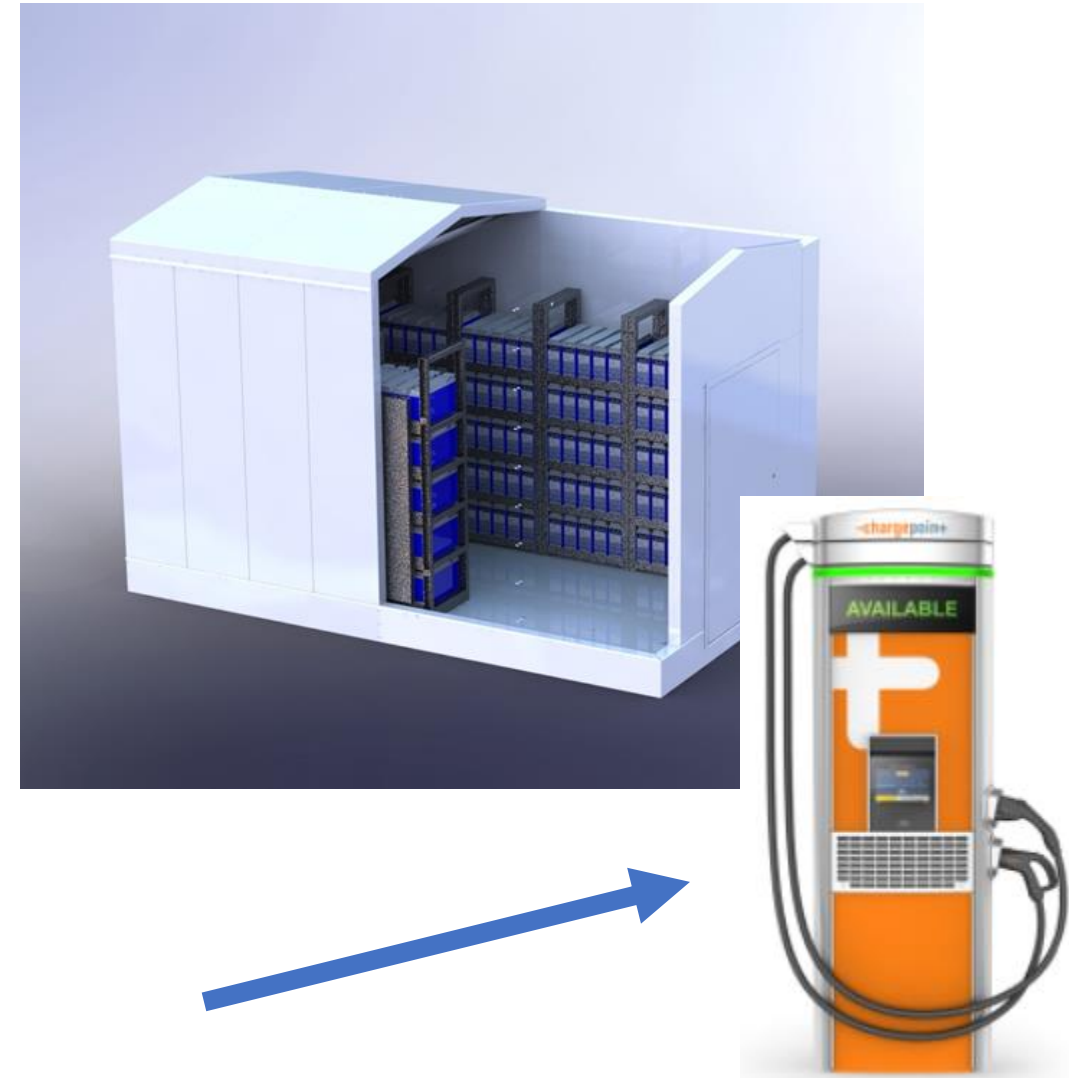
# Electric Vehicle (EV) Charging Infrastructure



- Widespread EV adoption is dependent upon access to efficient EV charging
  - Availability of rapid charging at public charging stations is key
- U.S. is using gas station model
  - DC Fast Charger (FC) can charge EV in 15 minutes or less
- However... DCFC can cause dramatic increases to business owner's electricity bill
  - Electricity Demand Charges

# Lead Batteries and EV Fast Charging – Concept

- On-site lead batteries can charge and discharge using direct current (DC)
- Batteries charge from the grid when demand is lower, store the power, and release it when demand is higher
- When a car arrives, the battery can quickly deliver electricity to the EV charger without drawing power from the grid, avoiding demand charges



# EV Fast Charging Plan for Missouri



## Missouri DNR: VW Trust Beneficiary Mitigation Plan

- \$6M identified
- Develop network of EV FC stations highway corridors - promote adoption of EVs in Missouri

## Ameren Missouri: Charge Ahead Program

- \$4.4M EV FC Corridor Plan – PSC approved in February 2019
  - 11 sites selected
- \$6.6M Multi-Family, Workplace, & Public Charging PSC approved October 2019



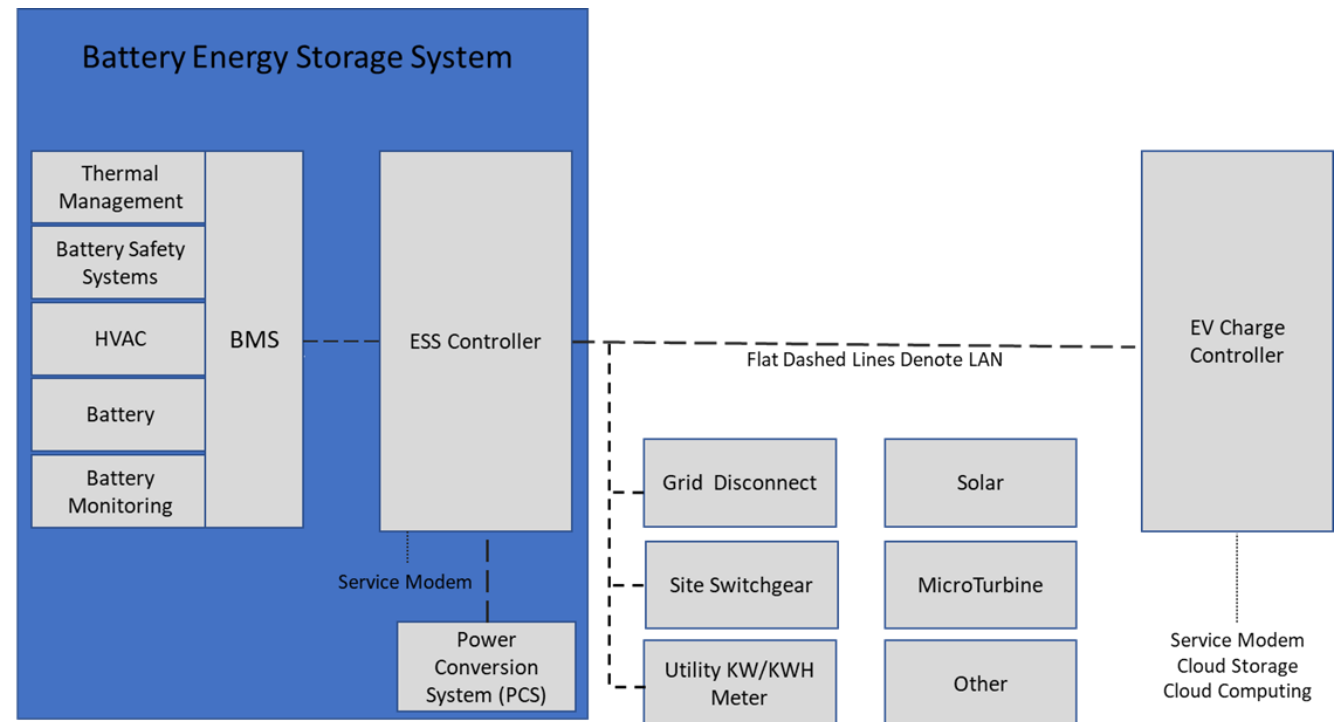
# Integration of Lead Battery Energy Storage Feasibility Study

- Grant from MO Division of Energy
- Analysis of actual electricity data for Kum & Go Gas Station, Springfield, MO
- City Utilities, Springfield applies a demand charge tariff for maximum amount of energy used during any 30-minute time period
- EV DCFC will increase demand charges for K&G
- Integration of 200 kWh lead battery energy storage system will mitigate demand charges



# Lead Batteries with EV Fast Chargers – Proposals Under Development

- Missouri DNR EV Fast Charger RFP
- In support of Army's plan to increase the use of EV's
- At Ameren HQ
  - Demonstration and Proof-of-Concept
  - Smoothing of peaks created by DC Fast Charging
  - Support larger roll-out of electric vehicles



# Our Team

- Consortium for Battery Innovation (CBI)
  - Coordinating donation of batteries and matching funds for proof-of-concept demonstrations
- Paragon Solutions, Inc.
  - Project management and coordination
  - Missouri Woman Owned Small Business
- LilyPad EV
  - Electric Vehicle charging stations and installation
  - Ameren's EV Charging contractor
- EAI Grid Storage
  - Battery integration experts

# Timing is right for Advanced Lead Battery Energy Storage

- Missouri Senate Bill 564 – 25% of utilities’ capital investment plan to grid modernization projects
  - PSC can approve utility investments in pilot projects including but not limited to “renewable generation, microgrids, or energy storage”
- Army Directive 2017-07, Installation Energy and Water Security Policy
  - Establishes requirement that all Army installations ensure available power and water to sustain critical missions for a minimum of 14 days
- US DOE Energy Storage Grand Challenge
  - Design new technologies to strengthen U.S. manufacturing and recyclability, and to reduce dependence on foreign sources of critical minerals



# Paragon Point of Contact

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