



December 3, 2021

Energy Storage and Microgrids

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Alliant Energy

Serve customers and build stronger communities

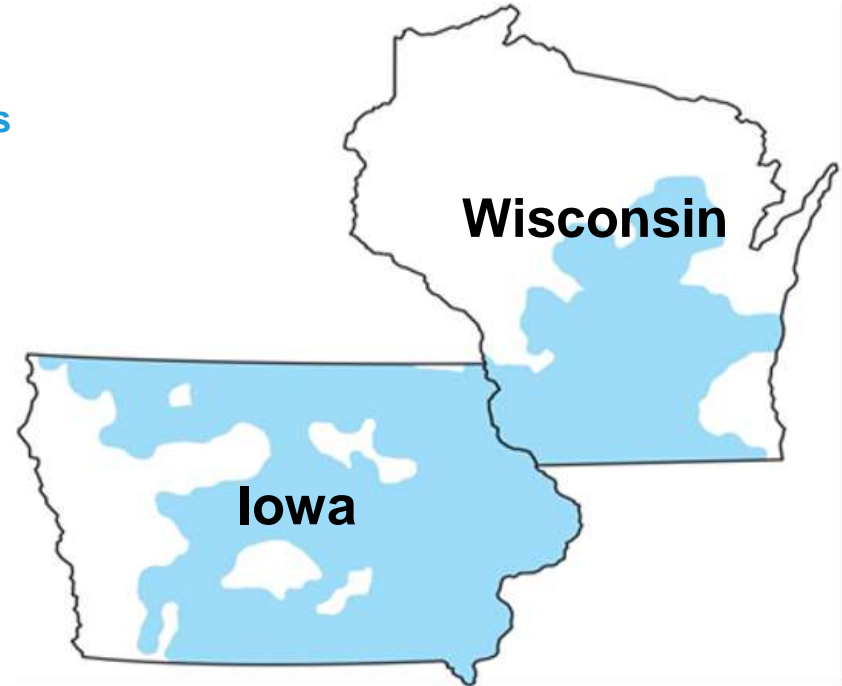
In Iowa:

- 495,000 Electric customers
- 225,000 Gas customers

In Wisconsin:

- 480,000 Electric customers
- 195,000 Gas customers

Named a Top Utility in
Economic Development by Site Selector
Magazine last three years

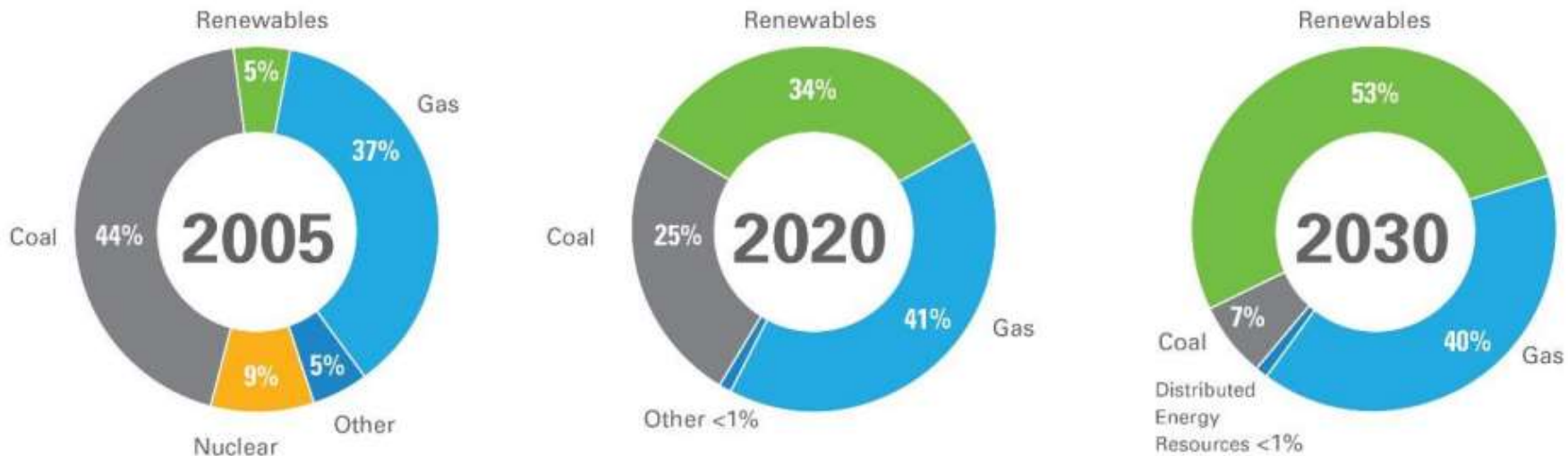


**Blue shading reflects service territory*

975,000 total electric customers

420,000 total natural gas customers

Transitioning to cleaner energy resources



Based on approximate capacity in megawatts as of July 2021 including owned generation resources and utility purchase power agreements. Does not include customer-owned distributed energy resources. Actual energy in megawatt-hours to serve customer load will differ from capacity due to participation in regional energy markets. Future projections are subject to change and Alliant Energy undertakes no obligation to update publicly such statements to reflect subsequent events or circumstances.

Pilots with Energy Storage



Wellman Battery



- In-service December 2019
- 672 kW/2652 kWh NMC Battery
- Use case was to stabilize voltage on a circuit with high PV penetration

Sauk City DNR Off-Grid Solar/Battery



- In-service January 2020
- 6 kW PV Array and 16kW/45.6kWh LFP batteries
- Use case was to offset distribution costs to serve small customer

Decorah Battery



- In partnership and collaboration with the US Department of Energy's Office of Electricity Delivery & Energy Reliability, Sandia National Laboratories, Iowa State University, and Iowa Economic Development Authority
- In-service December 2021
- 2.5 MW/2.9 MWh NMC Battery
- Use case is to increase hosting capacity with real and reactive power support

Portage Battery

- In-service December 2021
- 5 MW/10 MWh LFP battery
- Use case is to participate in the MISO ancillary market



Marshalltown, Deer Run Battery

- Marshalltown Generating Station (MGS) Battery
 - In-service October 2020
 - 250 kW/584 kWh NMC Battery
 - Use case to investigate operation with MGS PV installation
- Deer Run Battery
 - In-service February 2022
 - 5 MW/10 MWh LFP battery
 - Use cases are to participate in the MISO market and peak shave/deferral of distribution upgrades

Boaz Reliability Microgrid



Selection Process

- Started with a list of 17 potential locations
- Developed a list of criteria
- Collected data for each location
- Ranked locations based on criteria
- Determined equipment size based on backup time
- Checked for available land for microgrid location

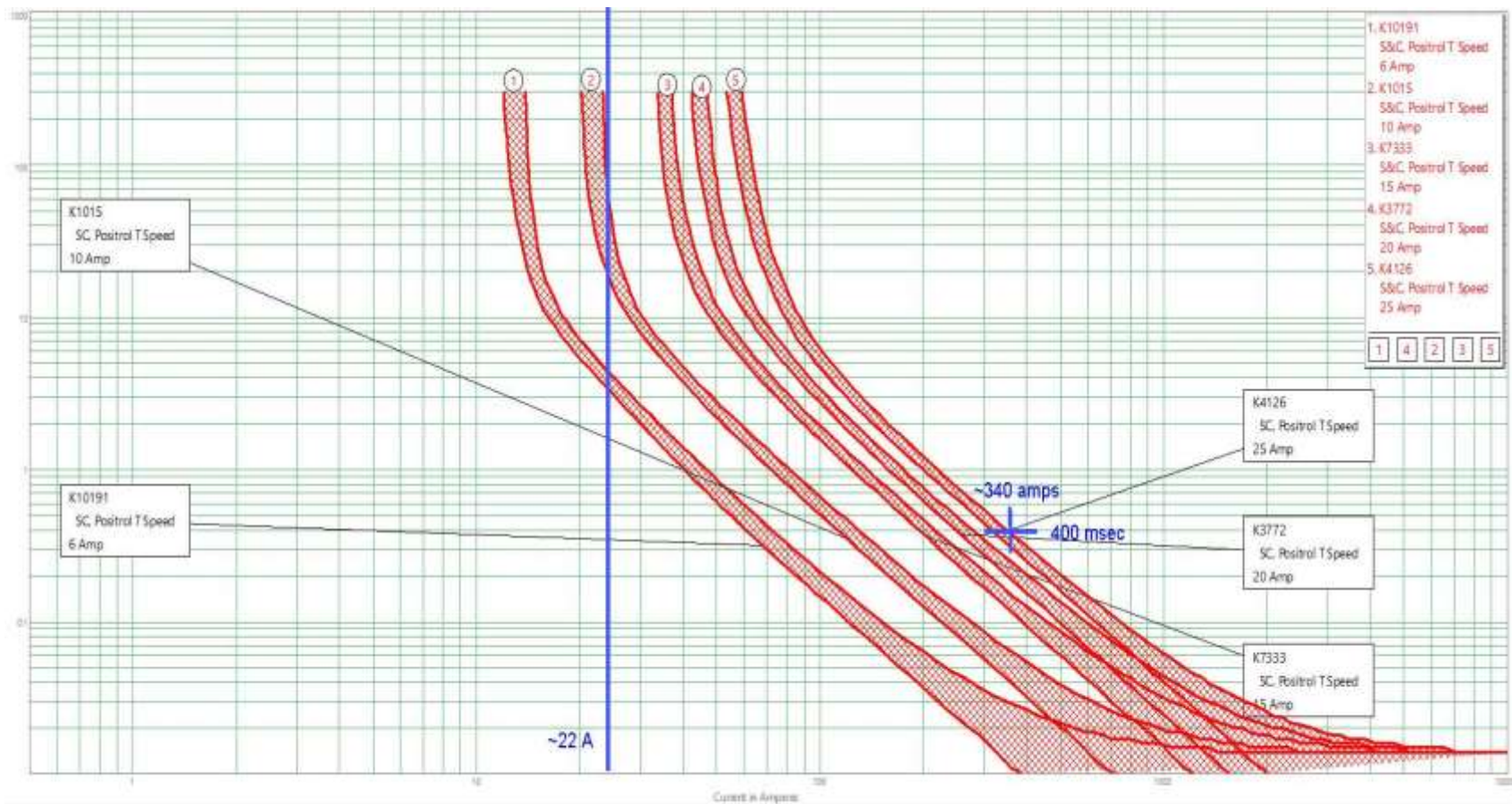
Village of Boaz came out on top

Developing the RFP for an EPC Project

New equipment for Alliant Energy

Contracted with Fractal Energy Storage Consultants

- Assisted with Technical requirements
 - 400kW/3200kWh capacity
 - Maintain system protection scheme even when islanded
 - Fault current capable of clearing an S&C Positrol T, 25 Amp fuse in 400 ms
- Recommended companies to include in RFP
- Assisted in reviewing bids and comparing equipment





Boaz Reliability Microgrid

- Scheduled completion – 3rd Quarter, 2022
- 3 – 1.2 MVA inverters for 3.6 MVA
 - 3rd inverter would operate in island mode only
- 2 – 1.6 MWh LFP batteries modules for 3.2 MWh
 - Over 8 hours of backup at peak load
- Breakers and SEL relays used to “island”
- Designed to seamlessly transition off and on grid
- Microgrid will be 15 miles from substation with two reclosers in the line

Use case is to improve reliability

Other Microgrid Equipment Issues

- Delta transformer winding is required because of inverters over 500 kVA size
 - Not Standard in Wisconsin so this became a Pilot within a Pilot
 - System Protection required an SEL 487V relay to detect open phase conditions.
- Inverter AC voltage needed to be under 600 volts for work rules
 - Using 550 volts which is not a standard voltage
 - Unique transformer requires a backup
 - The transformers for the Portage and Deer Run batteries use the same voltage and windings but are larger. Microgrid can be designed to allow room for the larger transformer, reducing backup inventory
- Internal Communication Standard Changes
 - Began as full EPC to include communication equipment
 - Standard changed to include “Trusted” box that contains firewalls and managed switch
 - Required change order

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