



Masters of
the Environment

Strategic Land Aquisition for Battery Storage Development in the PJM RTO



Team: Nicole Abrahamson, Alec Parker, Aakash Senthilkumar, and Nolan Welsh
Advisor: Joshua Radoff



PEREGRINE ENERGY

Our partner is Peregrine Energy Solutions, a developer based in Boulder, CO, is focused on utility scale storage projects to meet renewable energy targets and provide solutions to reliability issues

Our Project

PJM, the oldest power market in the US, has seen retiring generation coupled with increasing load growth, leading to worries that it will not have adequate supply to meet it future needs. On top of that transmission constraints, lack of available land, and a paused interconnection queue have led to no new generation coming online. Utility scale batteries, having a low land area requirement and high energy density, have the opportunity to make a real impact in PJM. There is also a strong financial opportunity from high energy arbitrage that batteries can take advantage of. Peregrine Energy Solution tasked our team to find areas within PJM that were favorable for batteries, and identify land parcels suitable for developing such a project.

Methods

State Level Research

We began by analyzing state policies, utility integrated resources plans, federal and state incentives, and grid needs and congestion to identify favorable regions for battery storage. We this could mean a state law mandating an amount of storage procurement by a particular year, or a utility request for proposal looking to purchase power from battery projects. This preliminary research identified several states to focus our next level of search.

Parcel Identification

To narrow down high potential, profitable locations for battery storage, we conducted local level analyses within states identified to see where financial, regulatory, and transmission constraints line up to set up a potential project for the greatest success.

Local Level Research

Using GIS, we searched for suitable land parcels next to electrical substations with high pricing signals. Each of these parcels was examined for size, land use, ownership, environmental, and regulatory factors. We developed a parcel ranking system based on the sum of these factors, with the highest ranking parcels moving forward to development

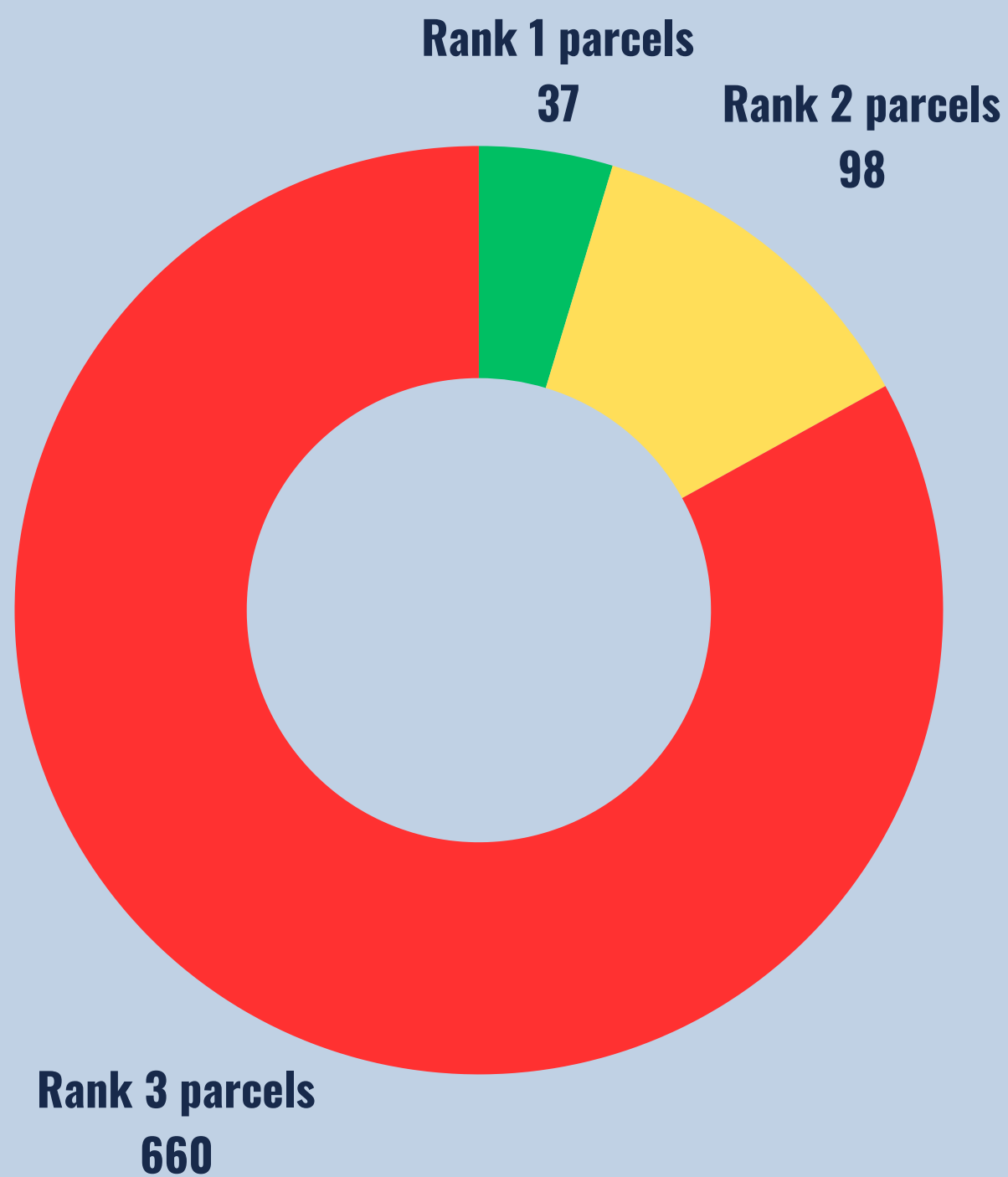


PEREGRINE ENERGY

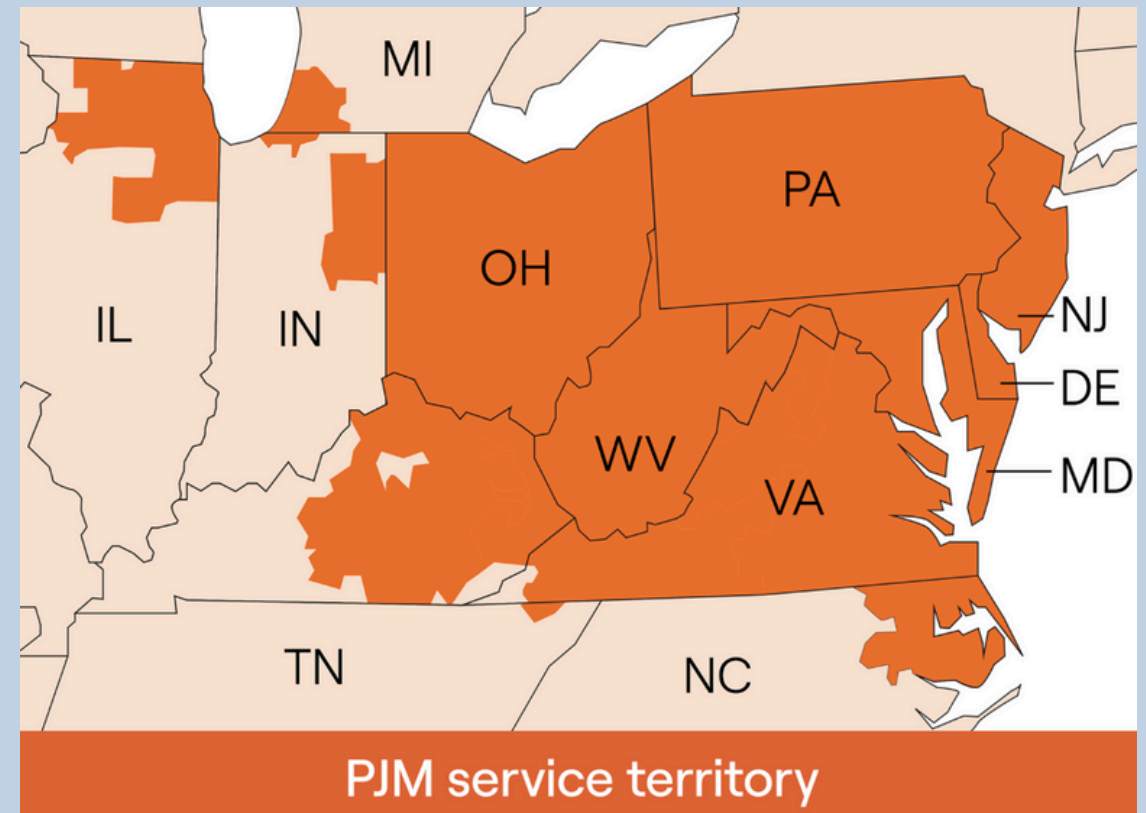


Masters of the Environment
UNIVERSITY OF COLORADO BOULDER

Results



Rank 1 = Ideal parcel, moves to next development stage
Rank 2 = Moderate parcel, has some limitations, needs more research
Rank 3 = Poor parcel, significant issues



Our methods yielded **21 local areas** within **9 PJM states** to review for land parcels. We delivered the state and local regulation review in slide deck and GIS format for Peregrine to review.

Within those local areas, we looked at **795 parcels**. Of those parcels, **37 were identified as suitable for development**, representing **3.7 GW of storage potential**.

Our parcel research was delivered in a excel spreadsheet and GIS database, for easy indexing for Peregrine. These parcels will be further examined by origination, markets, and transmission teams to identify what parcels have the most value. The development and land teams will then set up outreach to land owners and land leasing terms, with the goal of developing a viable storage project.

Key Takeaways

Our team left this project with a greater understanding and appreciation for the complexity of developing a utility-scale battery project, especially within PJM. We also gained valuable project development, GIS, and presentation skills, which strengthened our ability to analyze and communicate effectively.

While land positions in PJM may be hard to find, the market dynamics and added incentives within PJM create an enticing opportunity for battery development.