NPS 100C-27: Kentucky's First 'Large' Wind Turbine

Northern Power Systems Case Study

DWEA
February 2025

Northern
POWER SYSTEMS

Summary

1. History Overview
2. Global Deployment
3. Site Details
4. System Details
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6. Operating History/Data

1. NPS – Brief History

- **1974** - Founded in Vermont, USA. Pioneered direct drive wind turbines and remote power systems for extreme environments.
- **1990's** - Developed **first 100 kW wind turbine**, proven in the extreme Alaskan environmental conditions.
- **2000's** - Start of series production of 100kW wind turbines, initially as Northwind 100, later **NPS 100**.
- **2010** – Developed **NPS 2.3-93** utility scale wind turbine Prototypes installed in Michigan in 2012. Utility scale business sold to WEG in 2015.
- **2019** - Management buyout of EU business, acquired IP, Headquarter moved to Italy.
- **2023** - Re-entry into the US market, following implementation of IRA (Inflation Reduction Act).

- **NPS100** – PMDD generator offering best in class power performance and durability for renewable energy generation in **micro-grids, remote locations as well as grid-connected applications**.
- **Proven Reliability** - Survives **extreme environmental conditions**, from Alaskan colds to Caribbean hurricanes.
- **Global reach** - **>900 turbines** installed worldwide; more than 91 million operating hours.

2. NPS – Global Deployment

Key markets:

- Europe
- Americas
- Select markets elsewhere

900+ units worldwide

91M+ operating hours

WEG (Partner) 2MW WTGs

3. Case study: Site Details

Customer:
Louisville Gas & Electric / Kentucky Utilities

Site:
E.W. Brown Generating Station, Research Microgrid (Harrodsburg, KY)

First “large” (non-residential-scale) wind turbine in Kentucky, to our knowledge!

4. Case study: System Details

NPS 100C-27-37

- **90kW** power
- **27m** rotor diameter
- **37m** hub height

Electrical

480V research microgrid, co-located with:

- **10MW** solar PV
- **1MW / 2MWh** Li-Ion battery

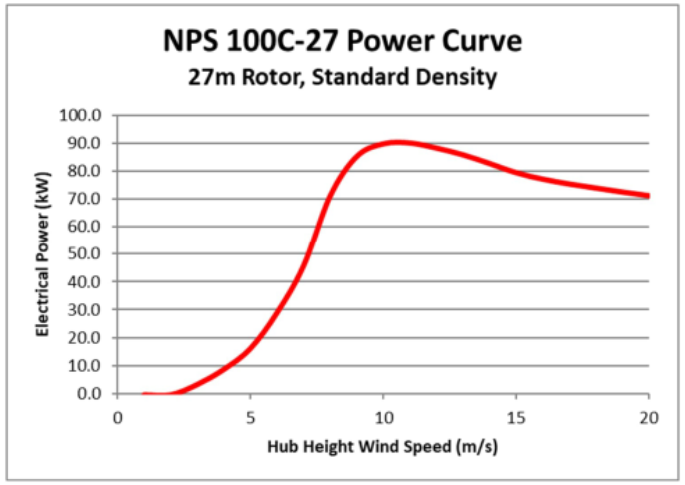
Foundation

Concrete monopile

Installed

December 2023

5. Case study: Cost & Performance



Annual Energy Production (AEP)	
Average Annual Wind Speed (m/s)	Annual Output (MWh)
4.0	134
4.5	179
5.0	226
5.5	271
6.0	313

Cost:

- **Turbine cost:** ~$380k (delivered)
- **Foundation:** $$$
- **Installation:** $$

Total overall cost: ~$750k

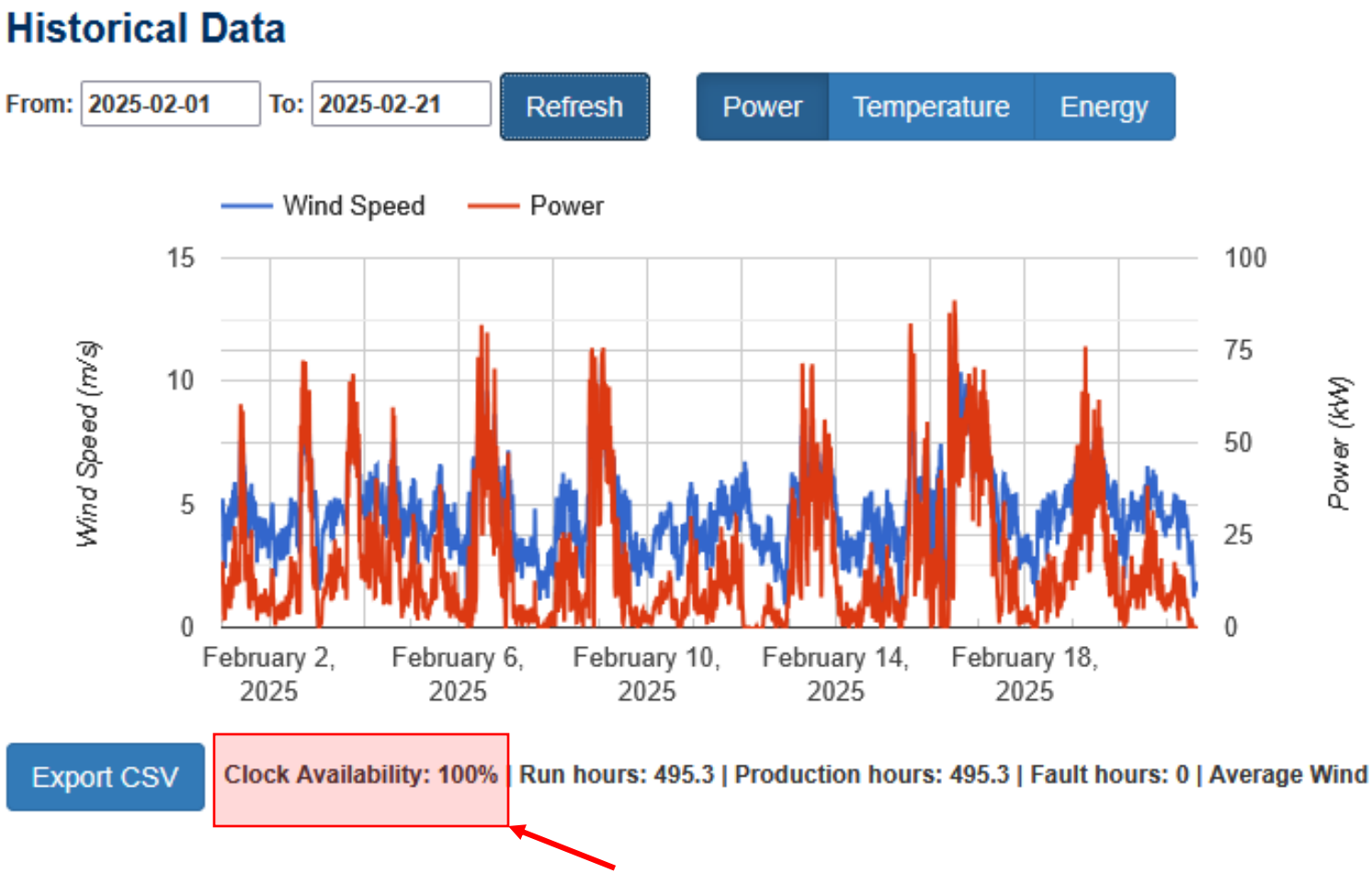
Performance:

Performing well, but not very windy…

- GWA predicted **~5 m/s average wind speed**
  - No existing wind turbines nearby to "sanity check" this estimate, so we knocked it down to **~4.5 m/s** and expected **~20% capacity factor**
- Actual wind speed only **~3.6 m/s** lifetime average
  - ⇒ **~10% capacity factor actual**

6. Case study: Operating History/Data

Feb 2025 Data:



Total production

~ 82,000 kWh

⇒ ~10% capacity factor

Max power

~ 90kW

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We’re excited to be back in the US!

Thank you

For additional information please visit our website: **nps100.com**

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