2024 Distributed Wind Energy Summit

Deciding on Distributed Wind

Pacific Northwest NATIONAL LABORATORY

NREL Transforming ENERGY

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Mapping Opportunity

September 19, 2024

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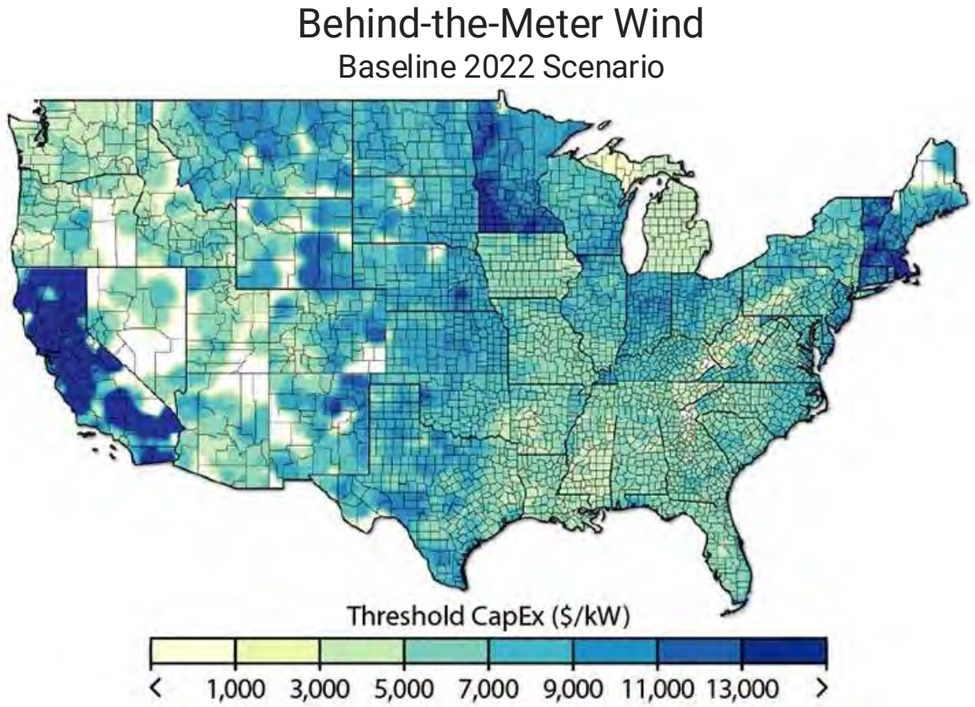
The Distributed Wind Energy Futures Study

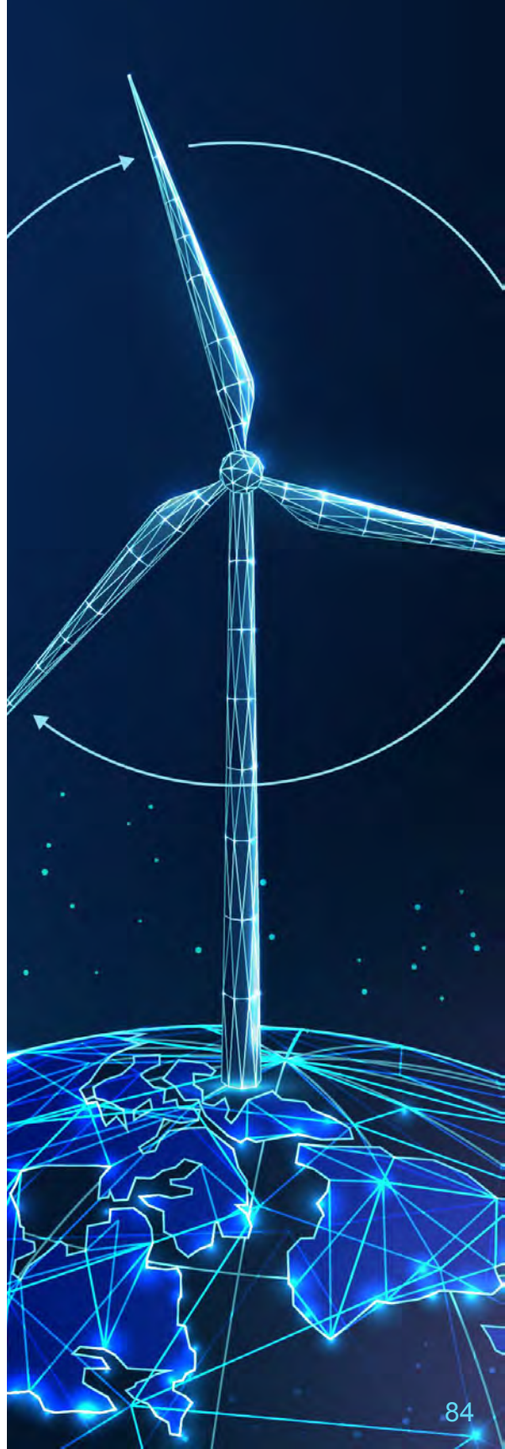
What is the US opportunity for distributed wind now through 2035?

Key Innovation: An **every-single-parcel** assessment of land use, wind resource, and siting. We assess each parcel's technical and economic viability, policy financing and incentives, and performance improvement pathways to 2035.



Result from 2022 study

This is a long running NREL-led project with prior studies in 2012, 2016 and 2022.



Example: Parcel Sampling & System Sizing

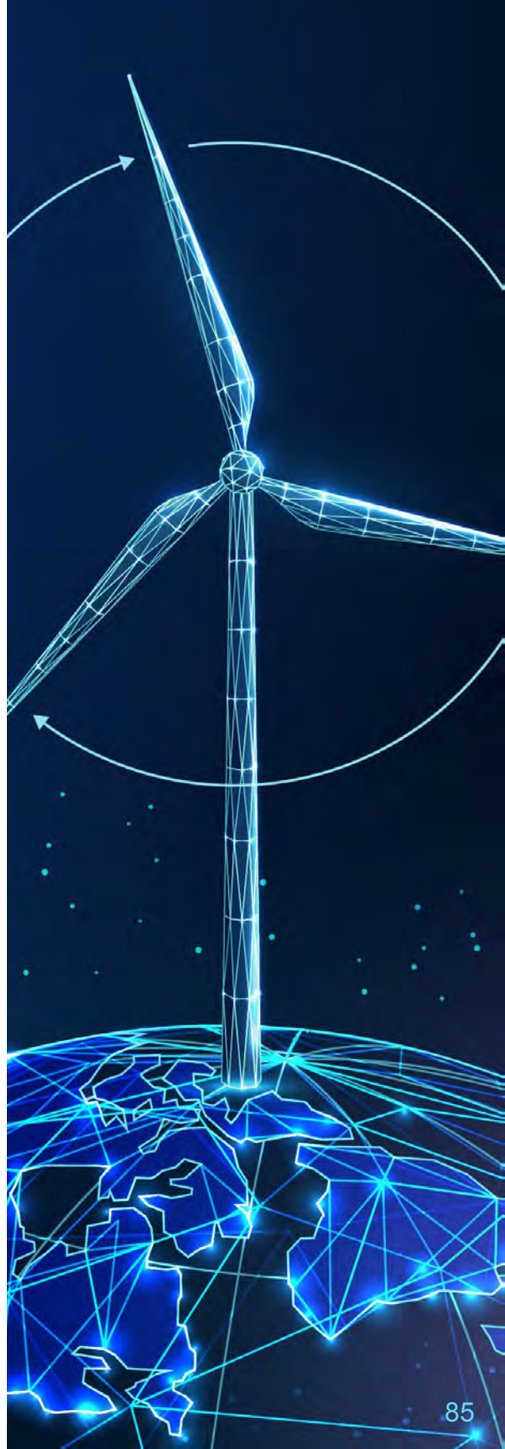
- For every parcel in the continental US (~155 million parcels):
  - **Find largest possible wind turbine system (see below)**

1. Example of a parcel in Southwestern Utah.

2. Remove building geometries from parcel.

3. Remove exclusions: Slope > 20%, federal lands, water, forests, etc.

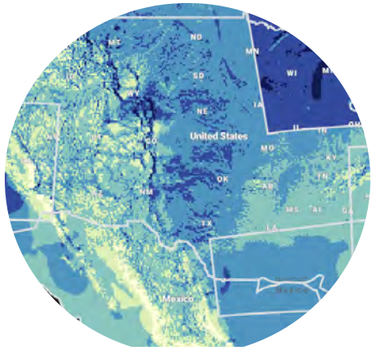
4. Biggest circle in remaining polygon determines maximum turbine size.



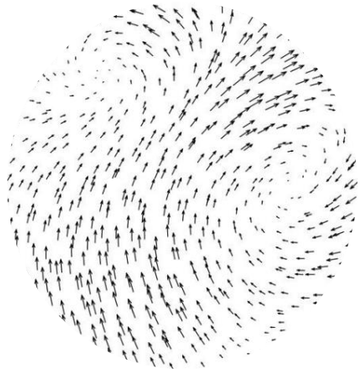
Example: Wind Resource & Model Turbine

- For every parcel in the continental US (~155 million parcels):
  - Find largest possible wind turbine system
  - **Estimate potential power and energy generation**

1. Example of a parcel in Southwestern Utah.

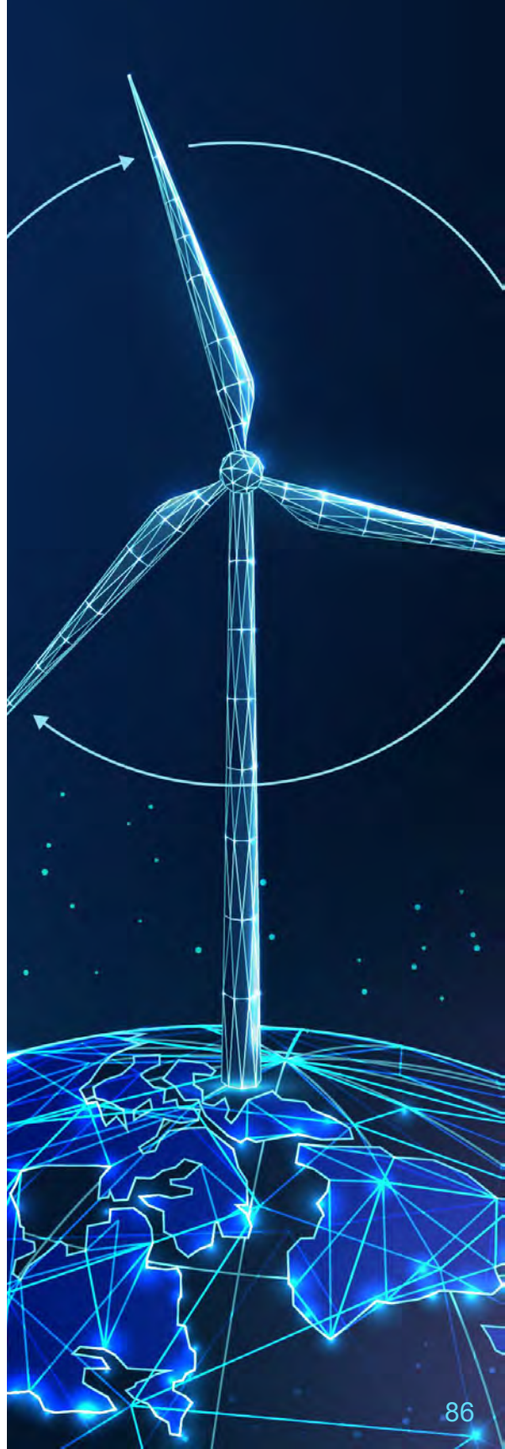


2. Use NREL's WIND Toolkit Dataset



3. Extract hourly average windspeed and direction

4. Using turbine power curve, estimate generation



Example: Valuation Framework and Costs

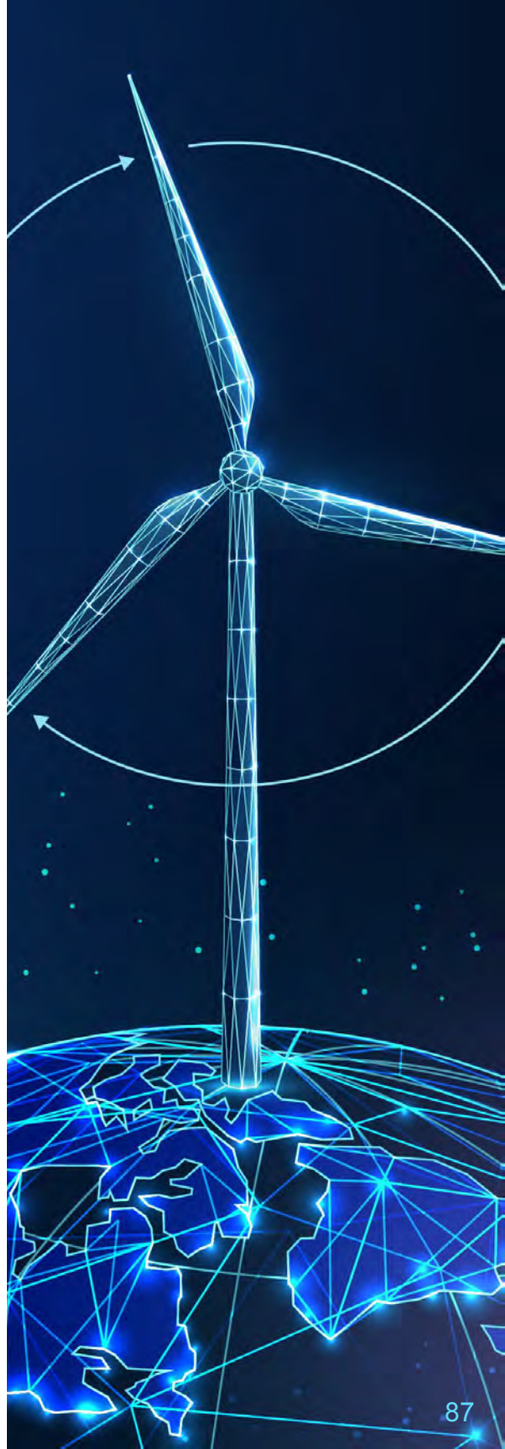
- For every parcel in the continental US (~155 million parcels):
  - Find largest possible wind turbine system
  - Estimate potential power and energy generation
  - **Apply valuation framework, calculate cost**

1. Example of a parcel in Southwestern Utah.

2. Wind resource and turbine model

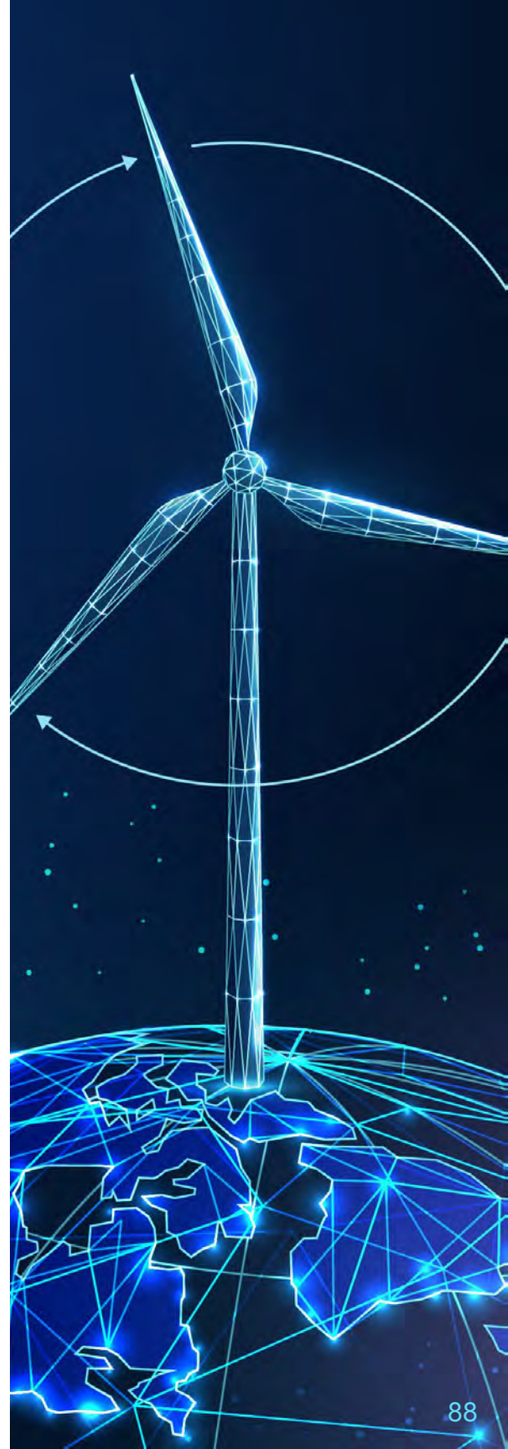
3. Cost of energy, building loads, and regulatory constraints

4. Determine break-even cost and system cost viability

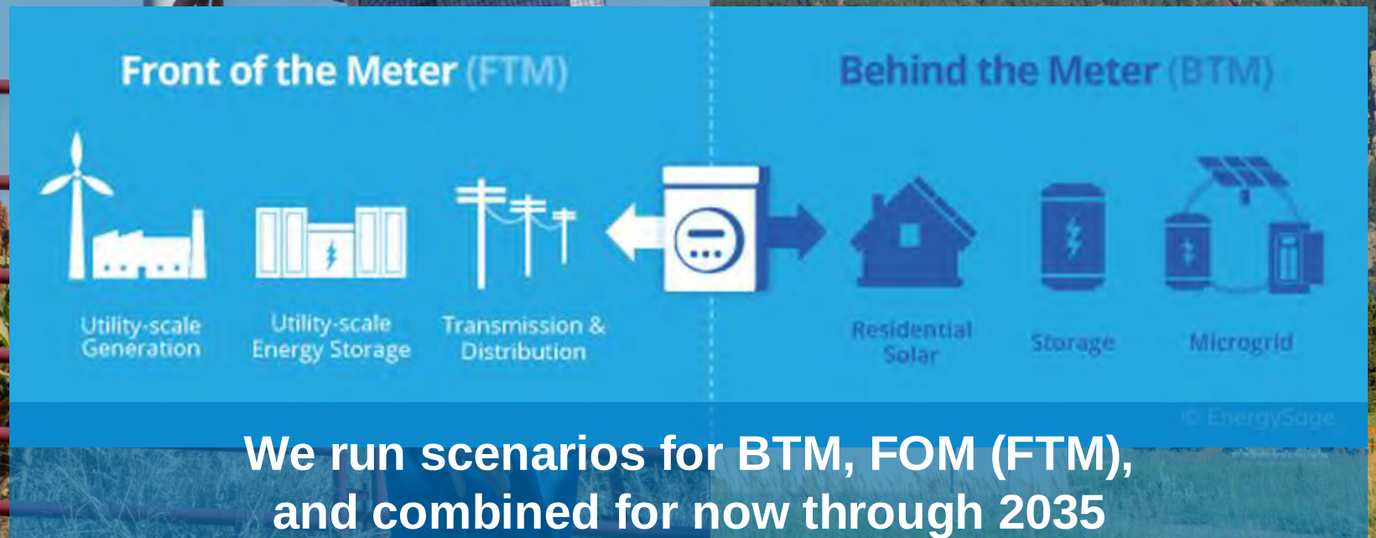


Prepare parcels dataset → Make parcel exclusions → Size Systems to Parcels → Assess resource potential → Apply valuation framework → Calculate breakeven cost

- -Spatial trends
- -Supply curves
- -Compare results



While computationally costly, this workflow is performed in parallel on NREL's supercomputer Kestrel



We run scenarios for BTM, FOM (FTM), and combined for now through 2035

Power

Technical Potential

Generation (KW) if All Turbines Running at Nameplate Capacity

Energy

Annual Energy Productivity (AEP)

Energy Production (KWh), accounting for technology and wind resource

Cost

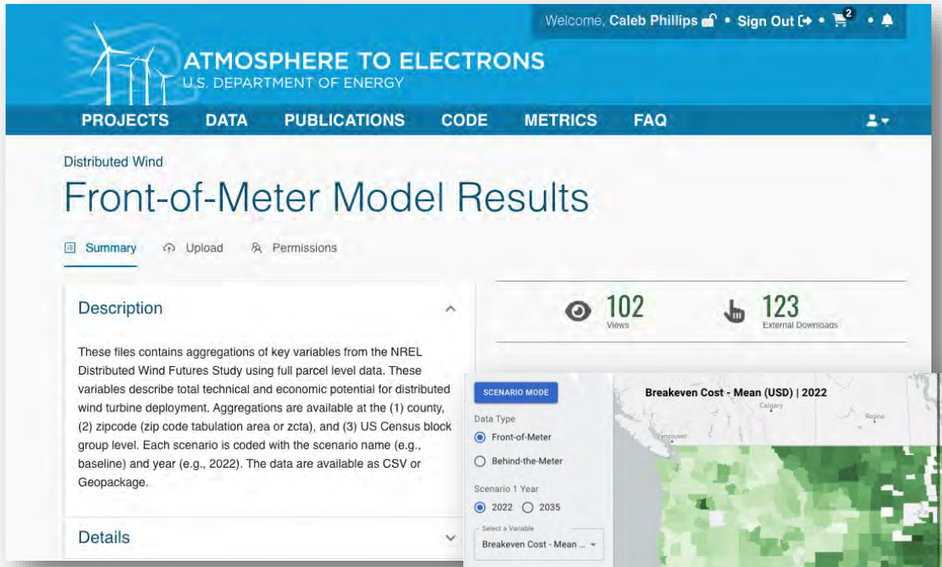
Breakeven Cost

Capital & O/M cost at which a turbine would pay for itself, in $/kW

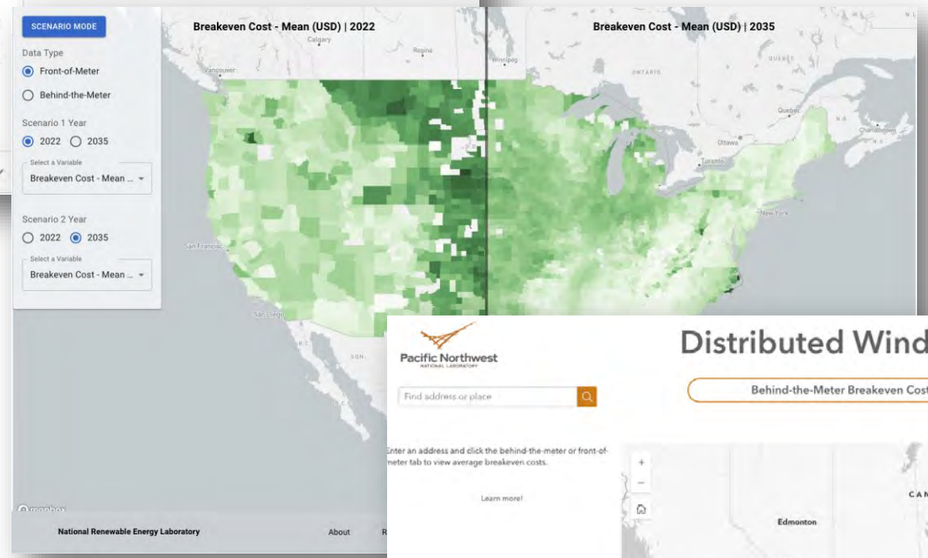
Cost Viable

Technical Potential

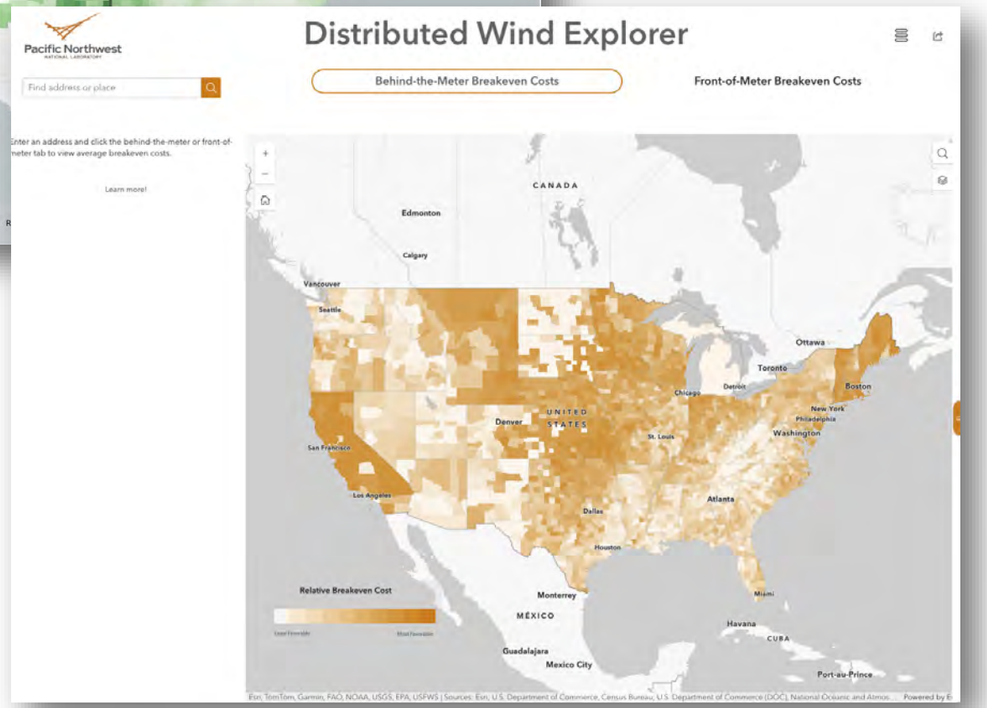
Annual Energy Productivity



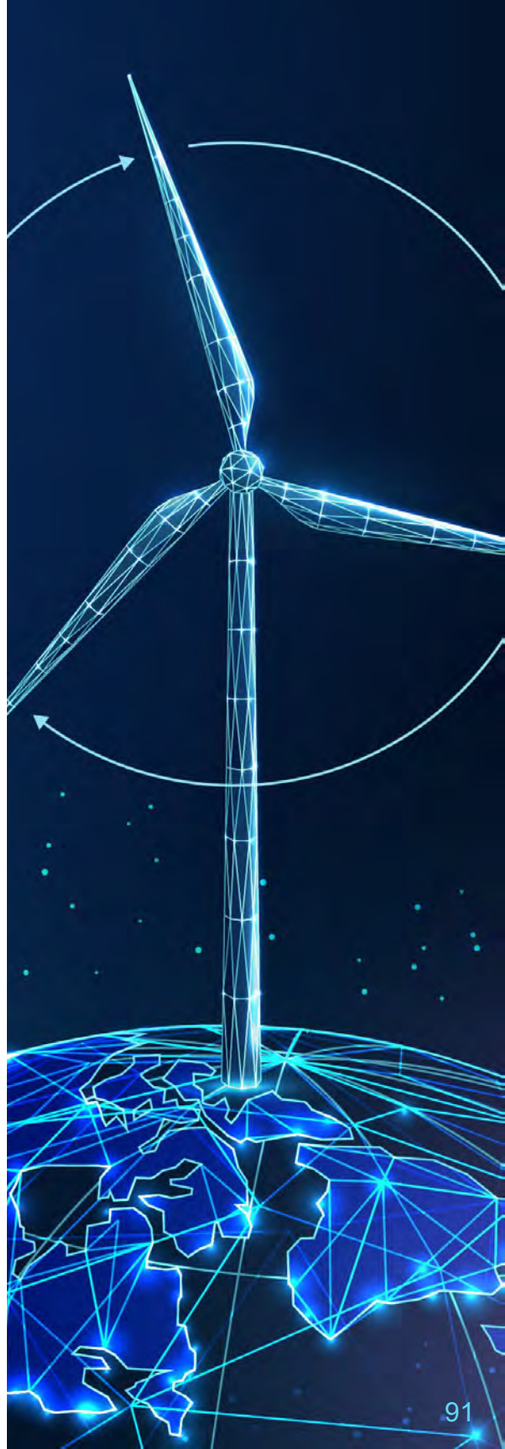
A2E Wind Data Portal



DWEFS Scenario Visualizer



DW Explorer



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Distributed Wind Explorer

September 17, 2024

Danielle Preziuso
Socio-Technical Systems Engineer

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PNNL-SA-203614

Distributed Wind Explorer

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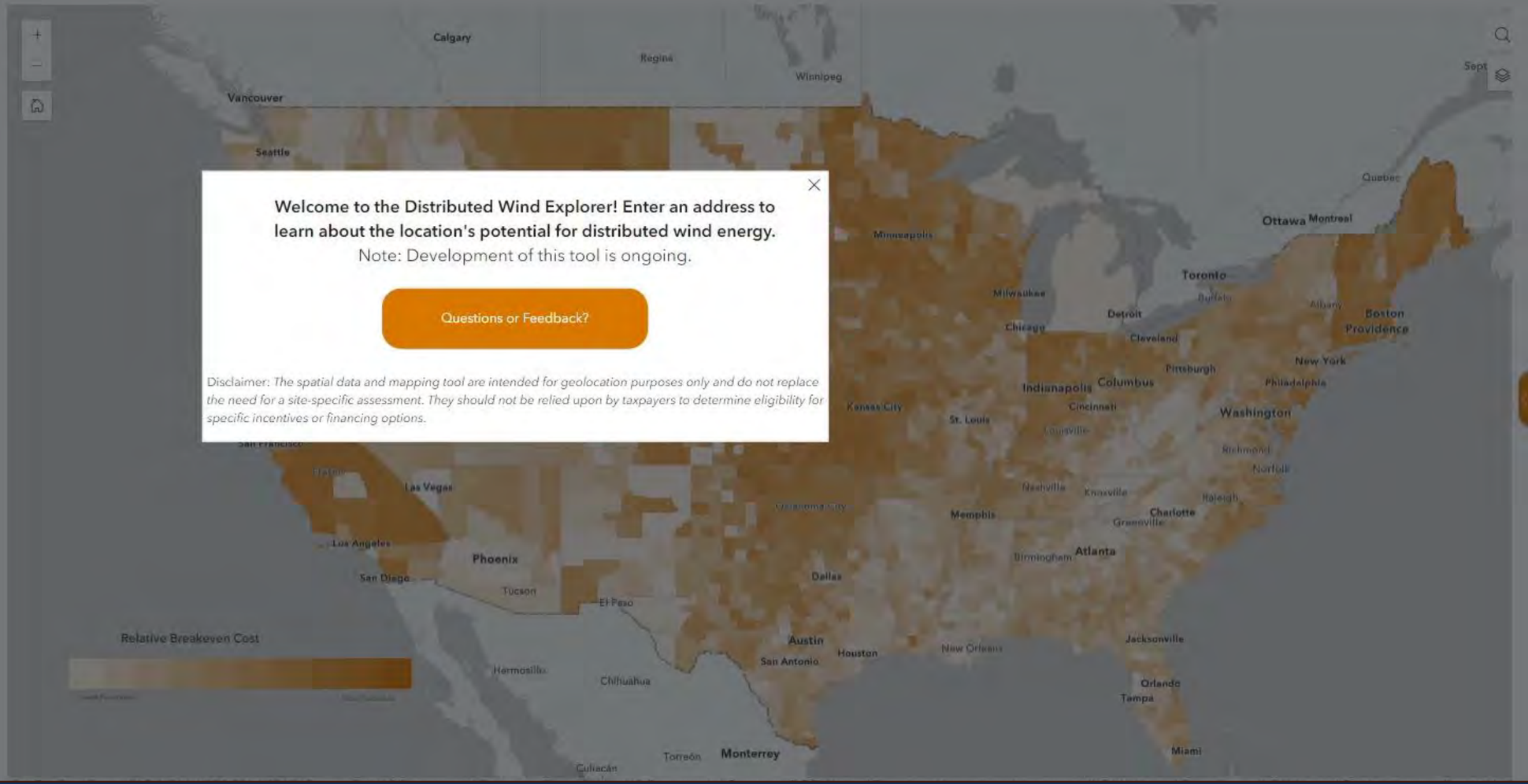
Find address or place

Behind-the-Meter Breakeven Costs

Front-of-Meter Breakeven Costs

Enter an address and click the behind-the-meter or front-of-meter tab to view average breakeven costs.

Learn more!



Welcome to the Distributed Wind Explorer! Enter an address to learn about the location's potential for distributed wind energy.

Note: Development of this tool is ongoing.

Questions or Feedback?

Disclaimer: The spatial data and mapping tool are intended for geolocation purposes only and do not replace the need for a site-specific assessment. They should not be relied upon by taxpayers to determine eligibility for specific incentives or financing options.

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WindWatts

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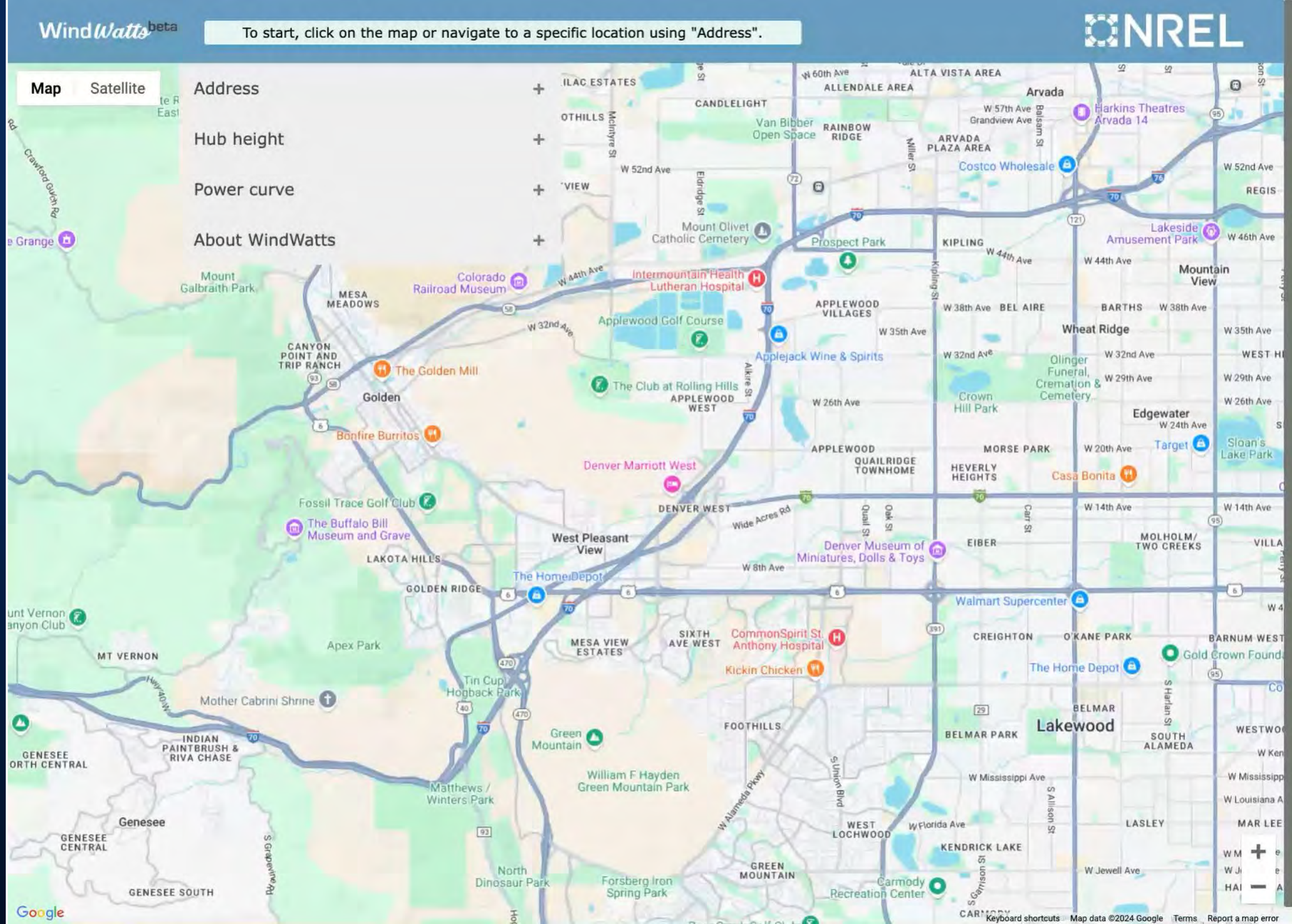
WindWatts.nrel.gov



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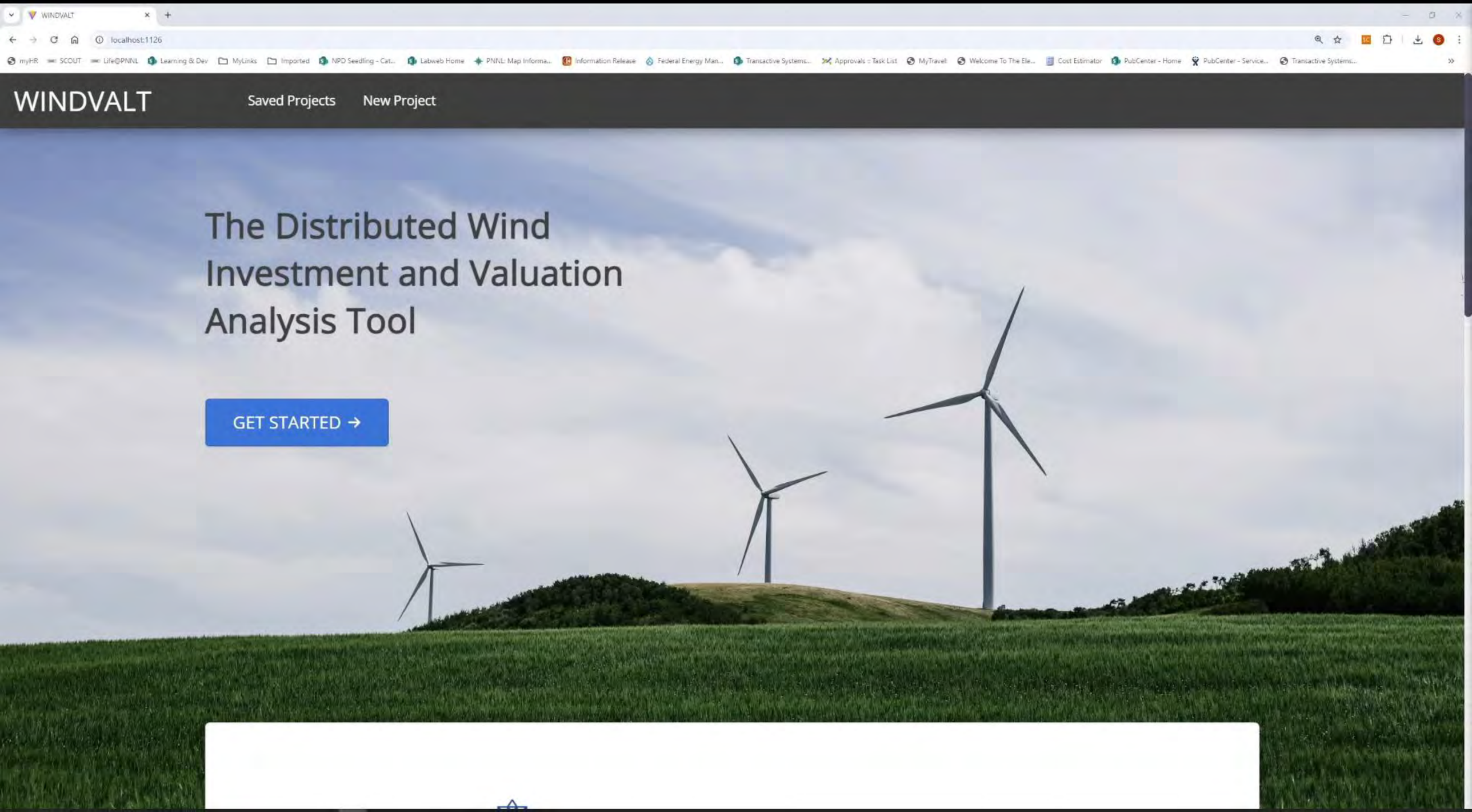
WINDVALT demonstration

September 17, 2024

Sarah Barrows and Avinash Joshi
Pacific Northwest National Laboratory

PNNL-SA-203697


WINDVALT
localhost:1126
WINDVALT
Saved Projects
New Project
The Distributed Wind Investment and Valuation Analysis Tool
GET STARTED →

Want to be a WINDVALT test user?

Follow the link to sign up!

To contact the research team:

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