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Distributed Wind Energy Technology Data Update

2026 Edition Summary

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U.S. DEPARTMENT of ENERGY BATTELLE

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Bergey Excel 15
Cody Buhrman

Distributed Wind Energy Technology Data Update: 2026 Edition

Purpose, Scope, and Data

- Summarizes U.S. distributed wind annual data through the end of 2025
- Analyzes distributed wind projects of all sizes (categorically distinguished as small, mid, and large)
- Provides data and analysis that are separate from wind energy connected for utility-scale generation
- Includes data from turbine manufacturers, project installers, state agencies, American Clean Power Association (ACP), U.S. Energy Information Administration (EIA), Federal Aviation Administration (FAA), U.S. Department of Agriculture (USDA), U.S. Geological Survey (USGS) Wind Turbine Database, and others.

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U.S. Department of Energy's (DOE) Integrated Energy Systems Office

Products and Availability

- This summary is complemented with a data file
- All products available at: https://www.pnnl.gov/distributed-wind/technology-update

Distributed Wind Energy Technology Data Update: 2026 Edition

Data Collection, Categorization, and Analysis Methodologies

To collect data on distributed wind installations, sales, and related activities that occurred in calendar year 2025, the PNNL team collected publicly available data for distributed wind projects using midsize and large turbines,* and issued data requests to:

- Small wind turbine manufacturers and suppliers,
- Distributed wind developers, installers, and operations and maintenance (O&M) providers,
- State and federal agencies, and
- Utilities and service providers.

The 2026 Edition includes data from past data requests and presents the distributed wind market from 2003 through 2025, with a focus on the last decade, from 2016 through 2025, drawing from two PNNL-maintained datasets:

(1) Master project dataset that captures all projects identified through annual data-request and data-review processes.
(2) Small wind sales dataset based on the sales reports provided by turbine manufacturers and suppliers each year.*

Each year's reported annual deployed capacity is a combination of the small wind sales and the installed projects using midsize and large turbines installed in that year. The reported total number of small wind turbine units and capacity deployed each year, domestically and abroad, exclusively come from the small wind sales dataset. Project installation costs draw from the master project dataset and are inflated to the given year of reporting.

Please note: Figures and statistics convey sample sizes with known or reported project attributes for analysis; for example, only projects with reported installation costs are used to calculate the annual average cost of installation. Additionally, data are subject to change edition-to-edition as new project information becomes available (e.g., when projects installed in past years but not previously recorded are identified, turbines are confirmed to be decommissioned or removed for end-of-life disposal).

*Midsize and large turbines are subject to reporting requirements that facilitate project tracking compared to small wind turbines. Furthermore, many small wind turbine units sold are not tracked at the project level, such as off-grid turbine units sold by the manufacturer to distributors for resale to end users. As a result, the PNNL team is unable to include them in the master project dataset.

Distributed Wind Definitions

Distributed wind turbines are distributed energy resources connected at the distribution level of an electricity system or in off-grid applications to serve to serve electric demand at or close to its point of consumption, either for specific onsite end-uses or local loads.

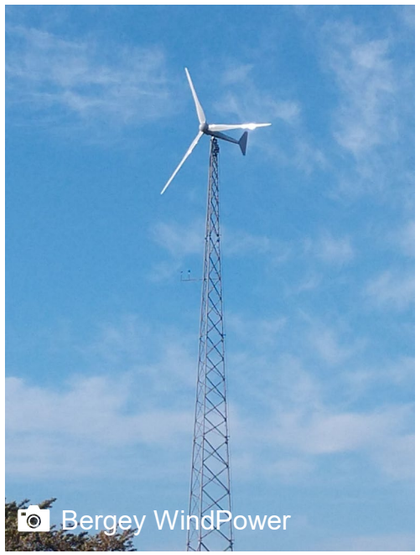
Two primary interconnection types exist for grid-connected distributed wind:

- On-site use, which includes the following applications:
  - *Behind-the-meter:* connected to the local distribution grid behind a customer's utility meter—typically to offset all or some of the on-site energy needs.
  - *Remote net-metering:* a virtual behind-the-meter project, which allows a customer to receive net-metering credit, or credit for excess electricity sent back to the local utility grid, from a remote distributed wind project (as if it were located behind the customer's own meter).
  - *Grid-connected microgrid:* connected to the local distribution grid as part of a group of distributed energy resources that serve interconnected loads within defined electrical boundaries, which can operate in either a connected or disconnected (islanded) mode from the local utility grid.
  - *Off-grid:* serves a single load (such as a remote telecommunications site) and is not connected to any utility distribution grid that could provide backup energy or accept excess energy.
- Local use, which includes the following applications:
  - *Load-serving distribution line:* connected to the local distribution grid as a generation resource—typically to provide energy and grid support and help serve the interconnected local loads on the same distribution system.
  - *Isolated grid:* serves many loads (such as a whole community) and is not connected to a larger grid system.

Distributed Wind Definitions

Distributed wind installations can range from a less-than-1-kilowatt (kW) off-grid wind turbine at a remote cabin or telecommunications platform, to a 15-kW wind turbine at a home or farm, to several multi-megawatt (MW) wind turbines at a university campus, at a manufacturing facility, or connected to the distribution system of a local utility.

Small Distributed Wind Turbines:
Capacity ≤ 100 kW



Installed in 2019, this 15-kW Bergey wind turbine serves an agricultural customer in New York.

Midsize Distributed Wind Turbines:
100 kW < Capacity ≤ 1 MW



Installed in 2014, this 850-kW Gamesa wind turbine serves a commercial flour milling facility located outside Hudson, Kansas (the first distributed wind-powered flour mill in North America).

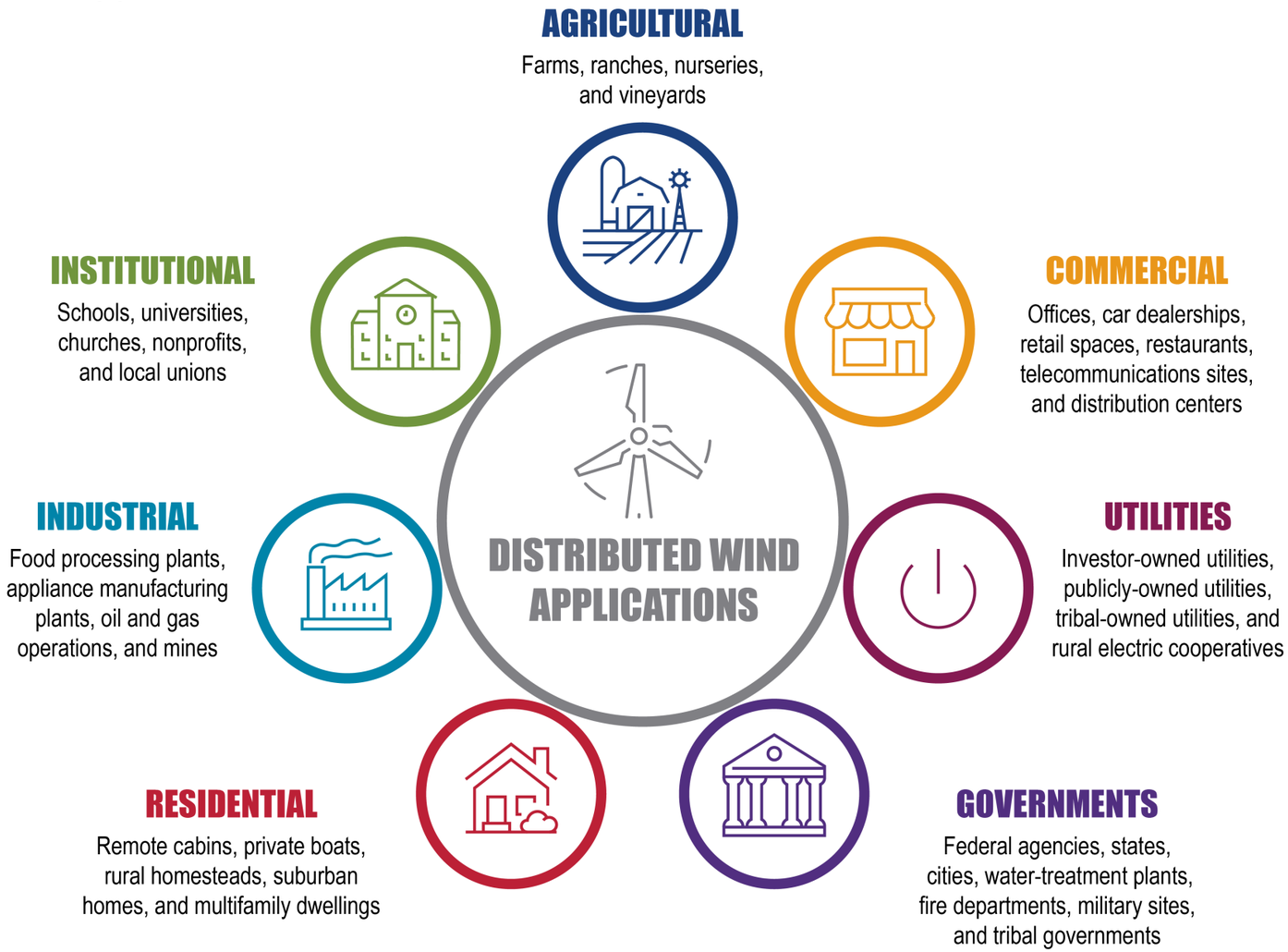
Large Distributed Wind Turbines:
Capacity > 1 MW



Installed in 2022, this is one of two 2.8-MW General Electric wind turbines powering a food processing plant in Soledad, California.

Distributed Wind Definitions

Distributed wind projects provide energy for a wide range of customer types. PNNL categorizes distributed wind projects according to seven customer applications.



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- Policies, Incentives, and Market Insights
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- Distributed Wind Performance
- Distributed Wind Markets
- Distributed Wind Technology
- Outlook and Market Potential



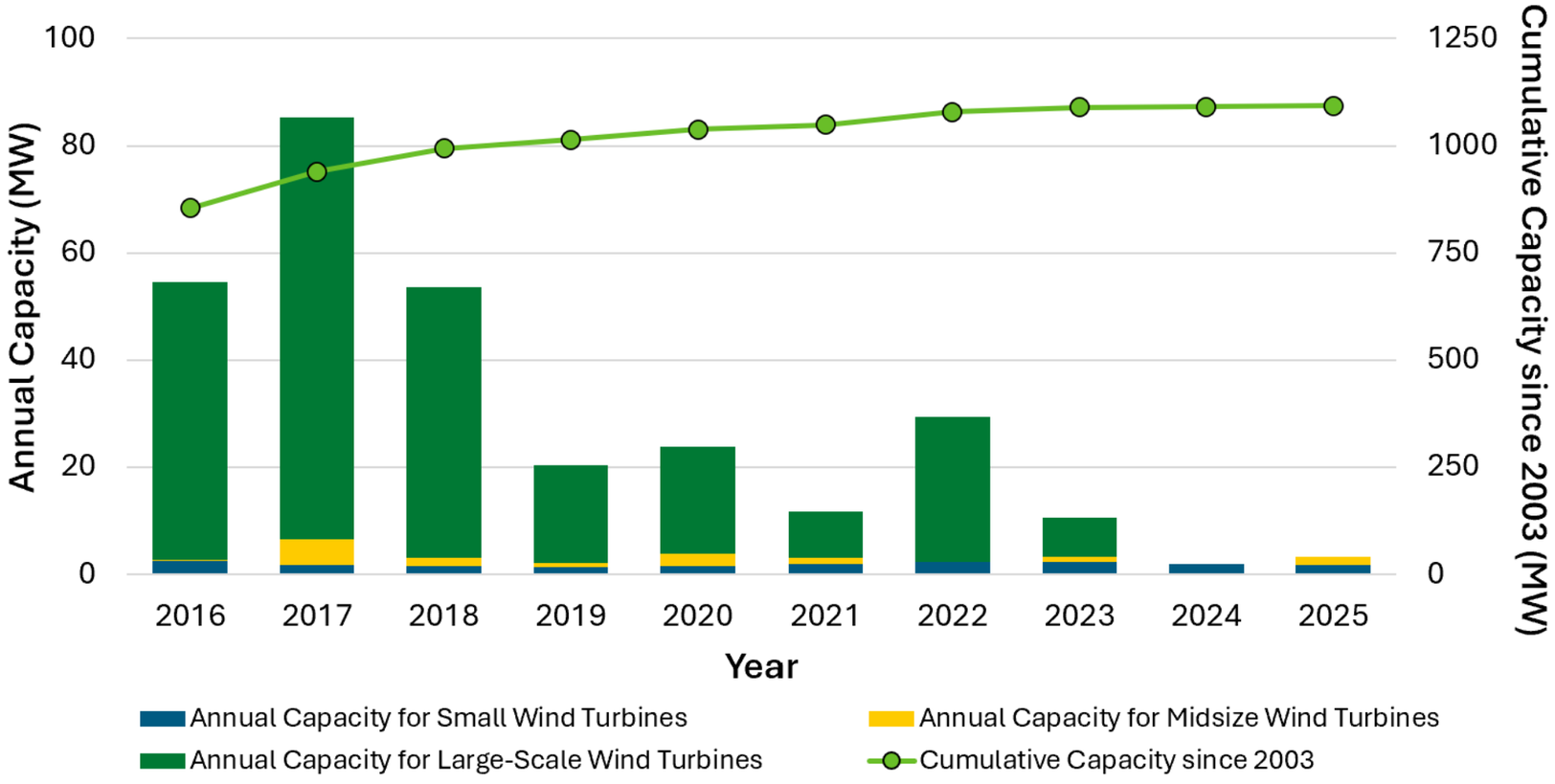
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U.S. Distributed Wind Installations



Skystream 3.7
Ryan Loiacono

Distributed Wind Capacity in the United States



Distributed wind capacity in the United States

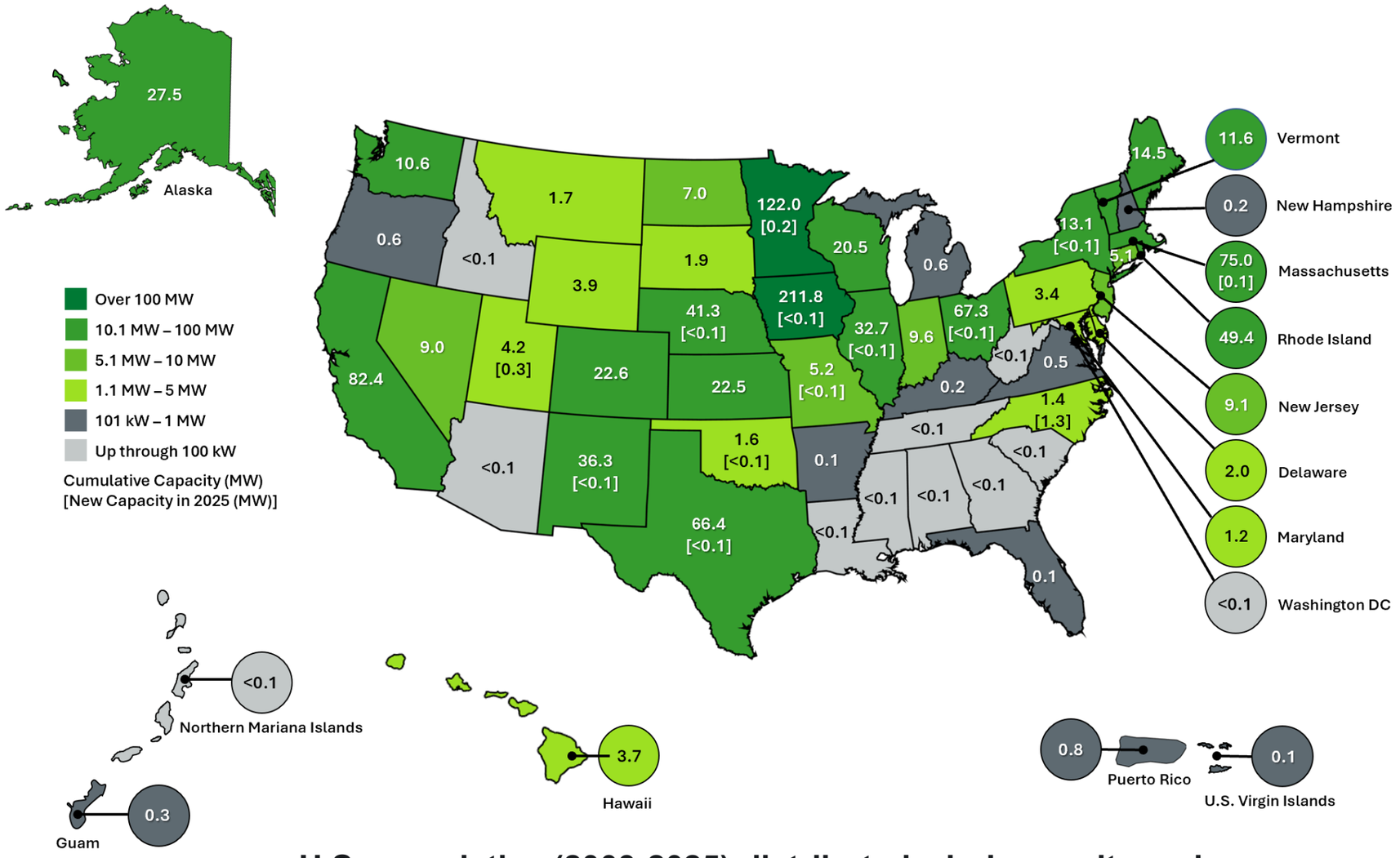
- A total of 3.2 MW of distributed wind capacity was installed in the United States in 2025.
- Cumulative distributed wind capacity reached 1,093 MW in 2025 from over 93,000 wind turbines deployed across all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, the Northern Mariana Islands, and Guam.

Sources: PNNL, EIA, FAA, USGS

U.S. Cumulative Distributed Wind Capacity and Capacity Additions in 2025

In 2025, new distributed wind projects were documented in 13 states:

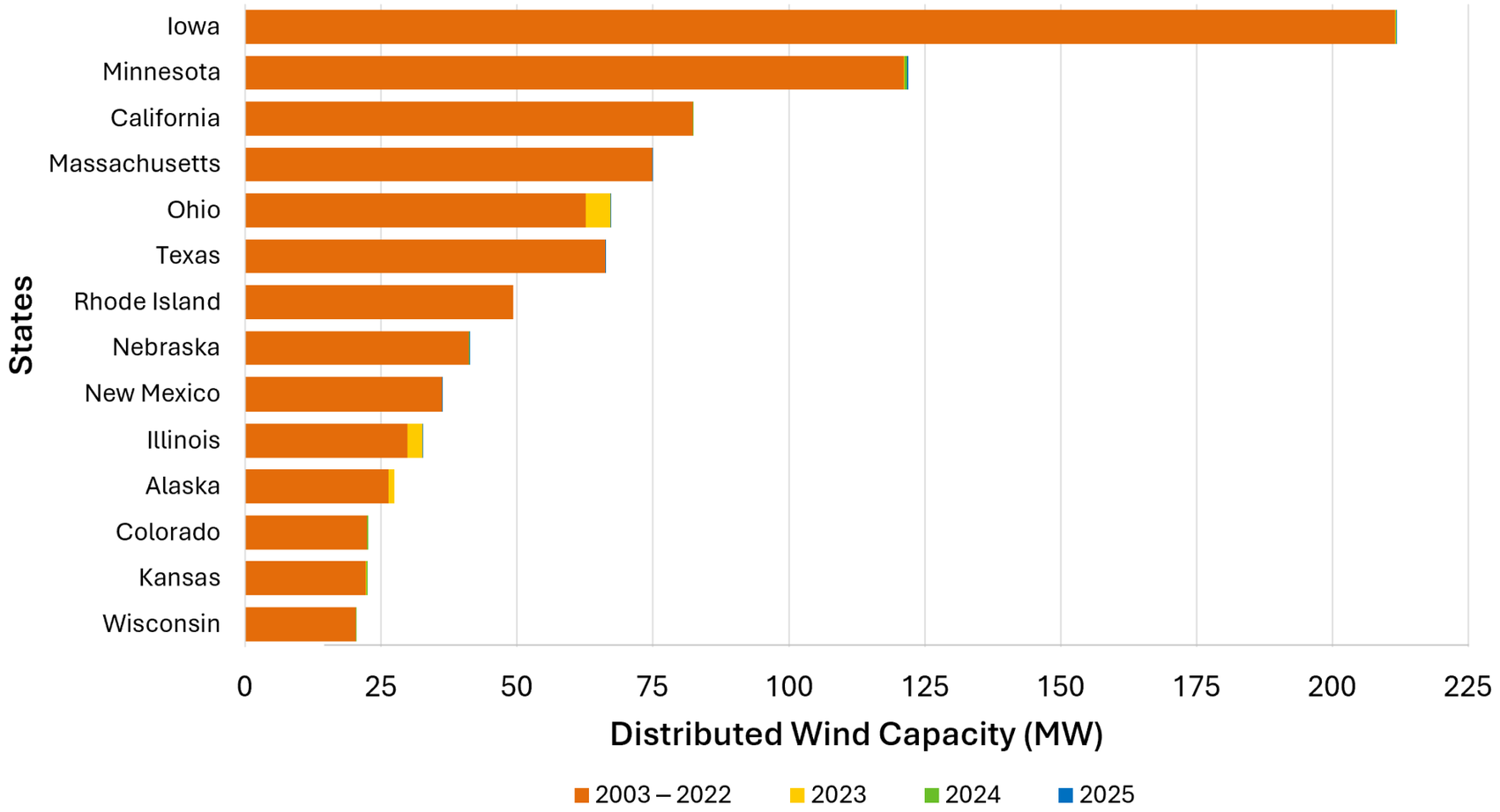
- Illinois
- Iowa
- Massachusetts
- Minnesota
- Missouri
- Nebraska
- New Mexico
- New York
- North Carolina
- Ohio
- Oklahoma
- Texas
- Utah



U.S. cumulative (2003-2025) distributed wind capacity and capacity additions in 2025 for distributed wind by state

Sources: PNNL, EIA, FAA, USGS

States with Cumulative Distributed Wind Capacity Greater than 20 MW

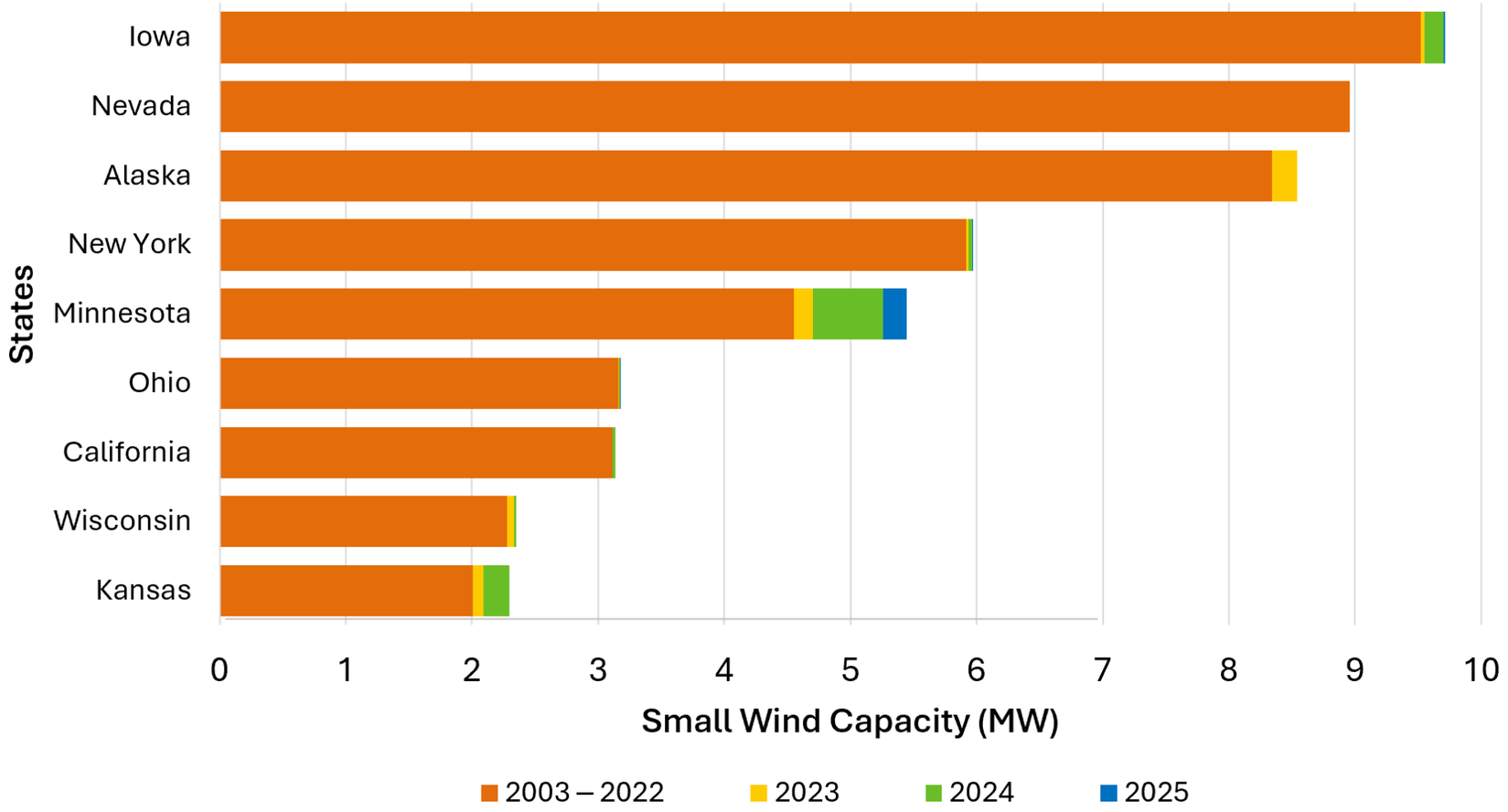


States with distributed wind capacity greater than 20 MW, 2003-2025

- Iowa (IA), Minnesota (MN), and California (CA) lead the United States in cumulative distributed wind capacity.
- These states (IA, MN, CA) have moderate to strong wind resource quality, active presence of wind turbine suppliers and project installers, and long-standing federal and/or state incentive programs (e.g., U.S. Department of Agriculture Rural Energy for America Program (REAP), CA Public Utility Commission Self-Generation Incentive Program (SGIP)).

Sources: PNNL, EIA, FAA, USGS

States with Cumulative Small Wind Capacity Greater than 2 MW

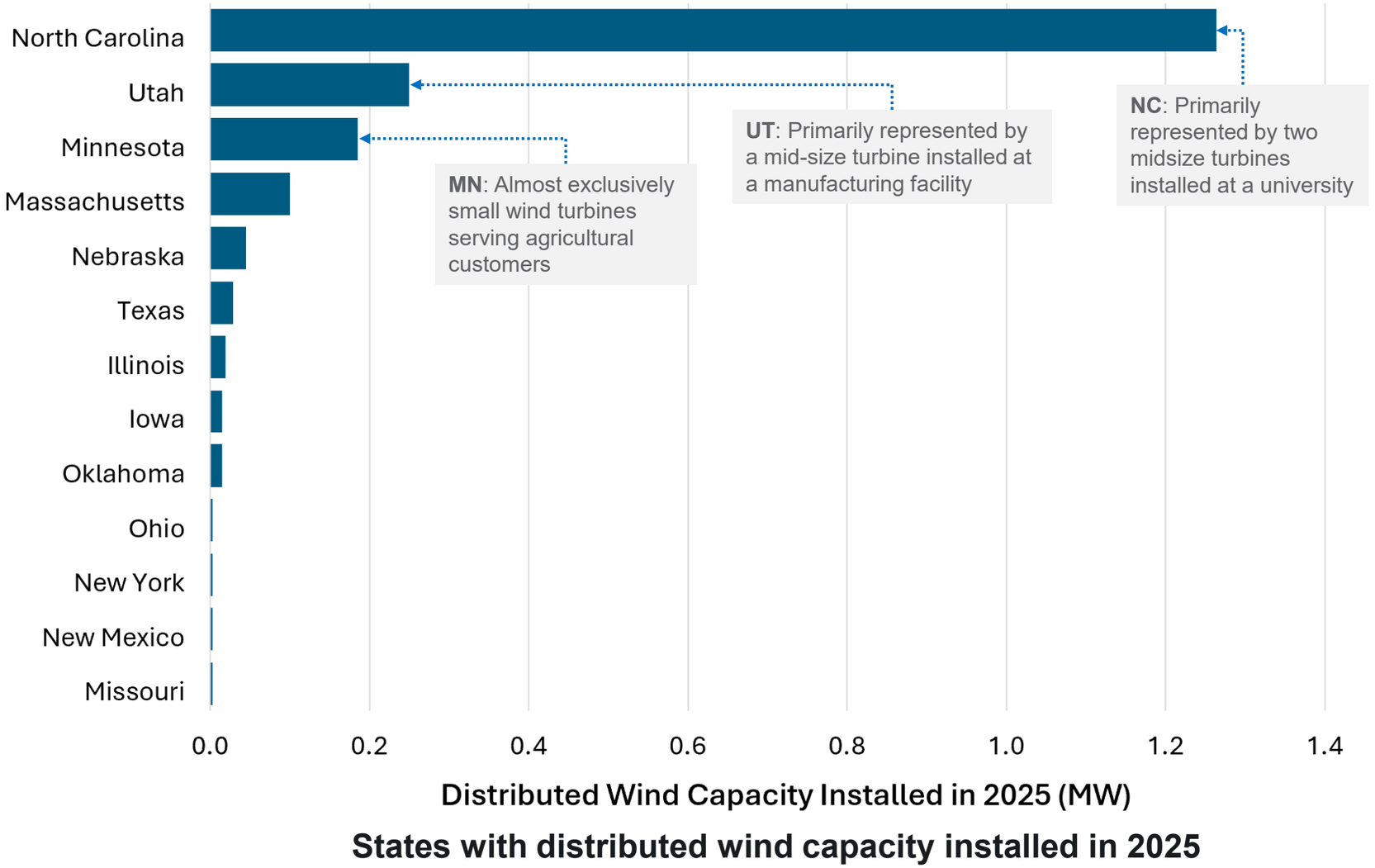


States with small wind capacity greater than 2 MW, 2003-2025

- Iowa (IA), Nevada (NV), and Alaska (AK) lead the United States in cumulative small wind capacity, although there were no new small wind installations recorded for Alaska and Nevada in 2025.
- In these states, small wind installations have predominately supported on-site use applications for various customer types (IA, NV) or isolated grid applications in remote areas (AK).

Source: PNNL

States with New Distributed Wind Capacity Installed in 2025



- All new distributed wind capacity installed in 2025 is from projects featuring small or midsize wind turbines.
- North Carolina (NC), Utah (UT), and Minnesota (MN) led the United States in new distributed wind capacity additions in 2025.
- In these states, new installed capacity varies across project size and customer type.

Sources: PNNL, EIA, FAA, USGS

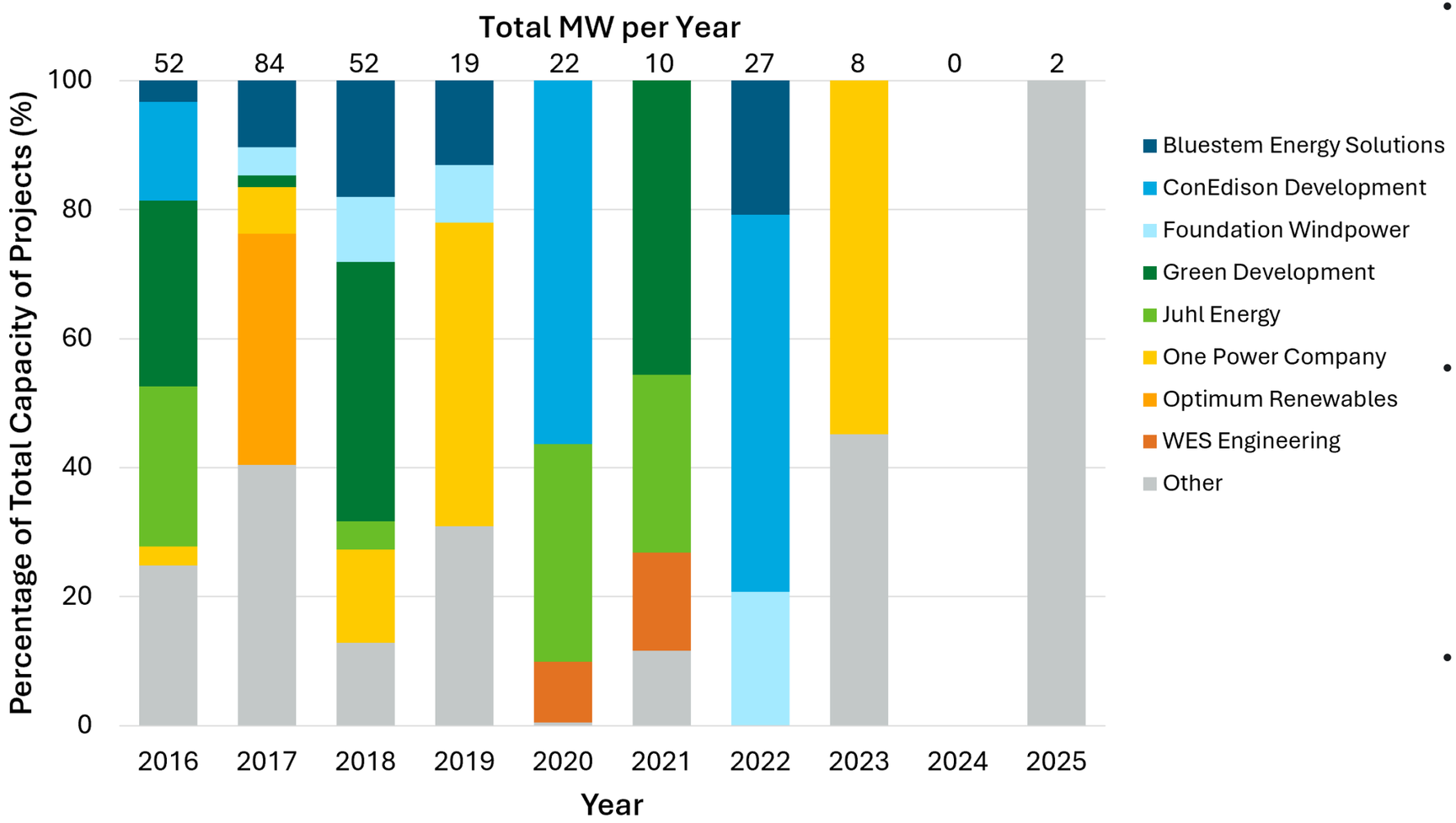
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U.S. Distributed Wind Projects and Sales



GE 2.3-116
Charles Newcomb

Project Developers Using Midsize and Large Wind Turbines

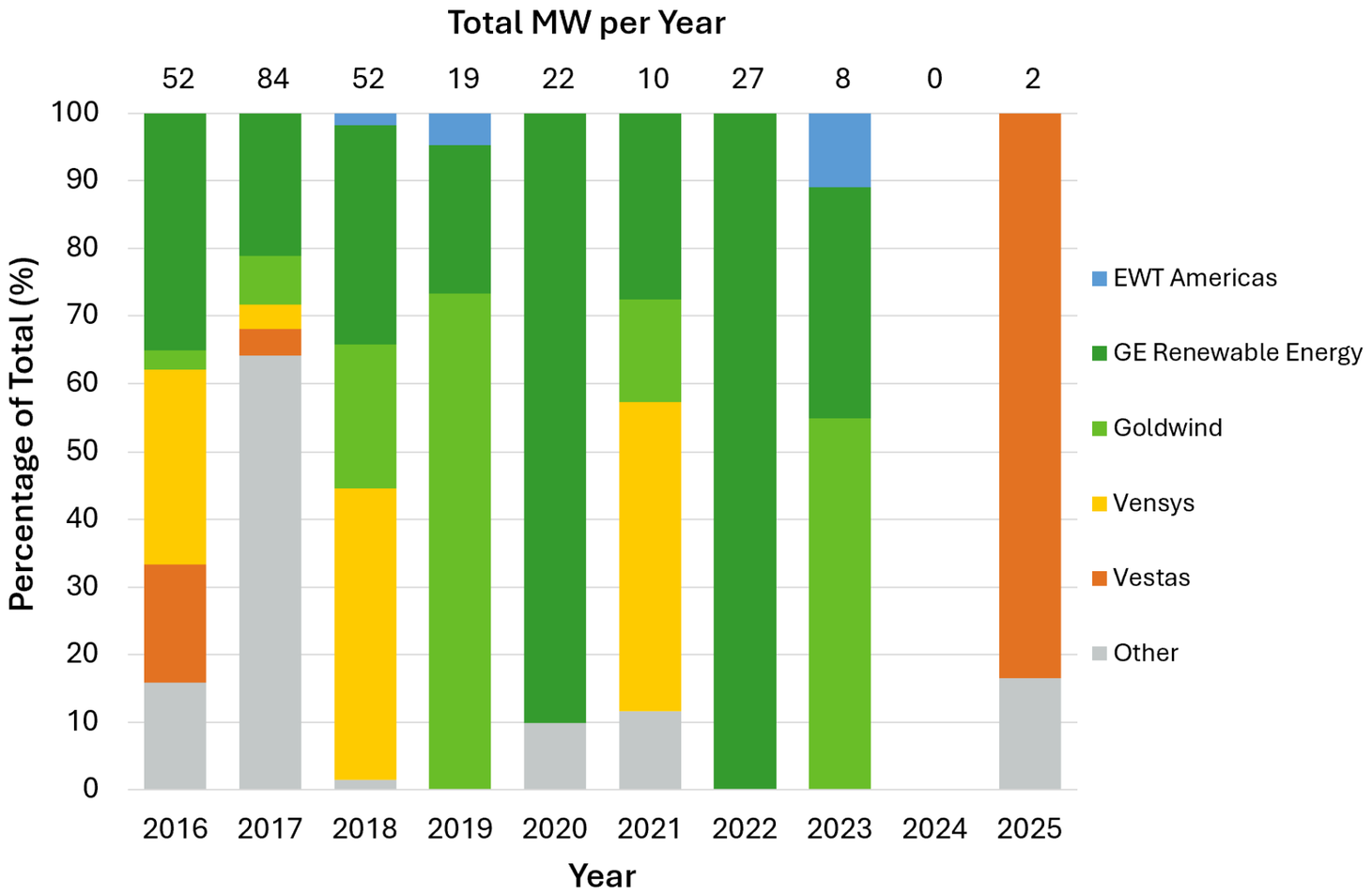


Project developers using midsize and large wind turbines, 2016-2025

- While eight developers have accounted for 76% of the distributed wind capacity from projects using midsize and large turbines since 2016, other developers (Leitwind and Mountaineer Energy P3) were responsible for the two projects installed in 2025.
- The eight developers work almost exclusively in a single state or region and may not install projects each year because large-scale projects can take two to four years to develop.
- Installation trends for distributed wind projects using turbines of any size are impacted by the cost of materials, local zoning and permitting requirements, availability of developers, and availability of incentives.

Source: PNNL

Wind Turbine Manufacturers of Midsize and Large Turbines with a U.S. Sales Presence



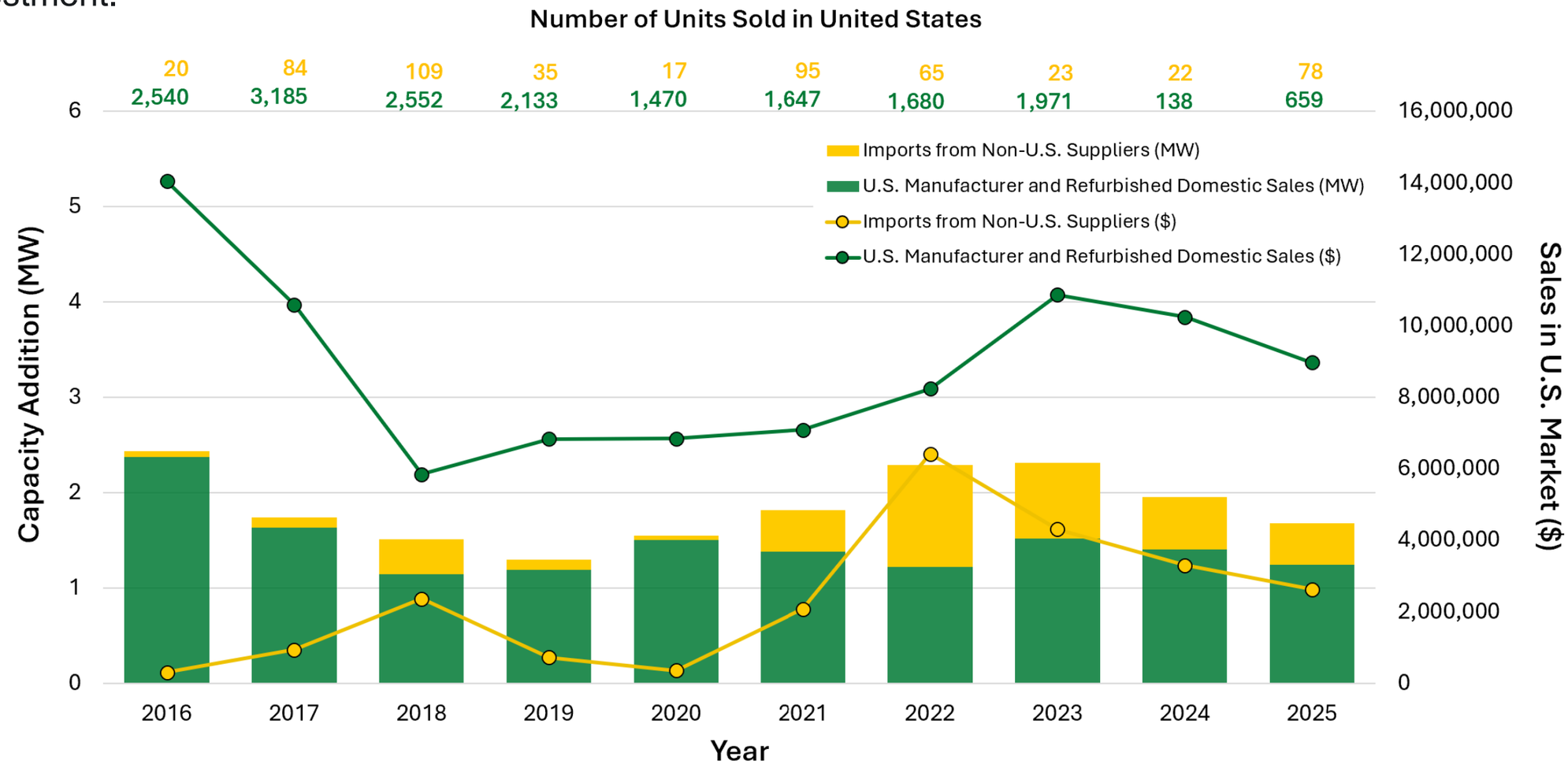
Wind turbine manufacturers of midsize and large turbines with a U.S. sales presence, 2016-2025

- Vestas turbines accounted for 83% of the installed capacity for turbines greater than 100-kW in 2025.
- A Leitwind turbine provided the remaining 17% of installed capacity in 2025.
- Developers, particularly those that also operate the distributed wind projects they build and sell the power through power purchase agreements to customers, report that they source their wind turbines from one manufacturer to facilitate easier operations and maintenance across their fleet of projects.

Source: PNNL

U.S Small Wind Turbine Sales

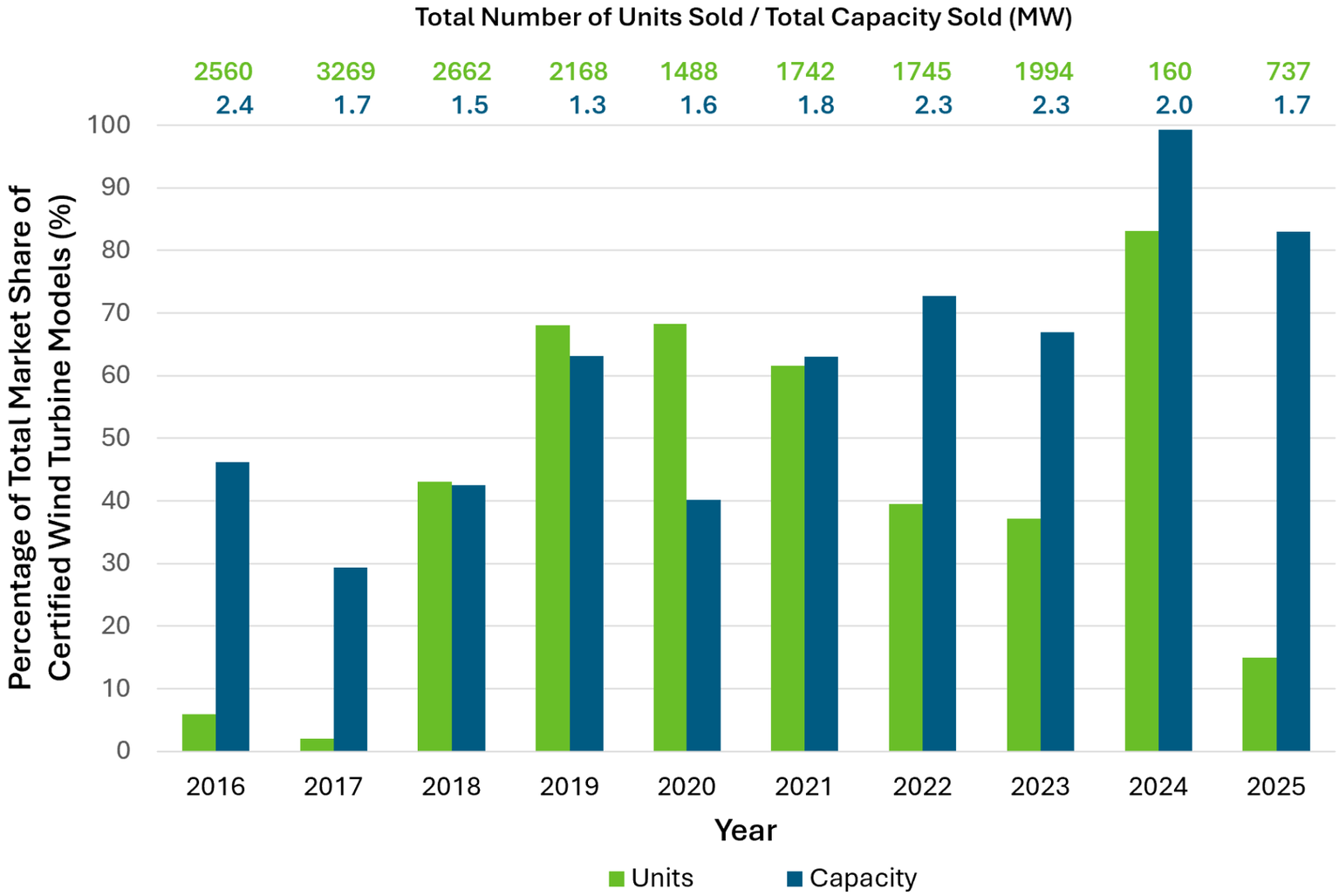
In 2025, 1.7 MW of small wind were deployed in the United States from 737 turbine units representing $11.6 million in investment.



U.S. small wind turbine sales, 2016-2025

Source: PNNL

Market Share of Certified Small Wind Turbine Models



Market share of certified small wind turbine models, 2016-2025

Certified wind turbines represented the largest share of small wind capacity sold in 2025, accounting for 83% of the total capacity but only 15% of the total number of turbine units installed in 2025.

Sources: PNNL, National Laboratory of the Rockies, Small Wind Certification Council, SGS (Société Générale de Surveillance)

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Small Wind Certification



Bergey Excel 15
Jordan Nelson, Nelson Aerial Productions

Small Wind Certifications as of July 2026

Nine small wind turbines were certified in the United States as of July 2026.

Sources: National Laboratory of the Rockies, Small Wind Certification Council, SGS

Applicant	Turbine Model	Date of Initial Certification	Certified Power Rating[a] @ 11 m/s (kW)	Sound Level[b] (db(A))	Certification Standard[c]
Bergey Windpower Company	Excel 15	02/05/2021	15.6	48.5	AWEA 9.1
Eveready Diversified Products (Pty) Ltd.	Kestrel e400nb	02/14/2013	2.5	55.6	AWEA 9.1
Eocycle Technologies, Inc.	EOX S-16	03/21/2017	28.9	43.5	AWEA 9.1
HI-VAWT Technology Corporation/Colite Technologies	DS3000	05/10/2019	1.4	42.3	AWEA 9.1
Kodair Wind Designs Ltd.	KW20	02/20/2025	20.3	41.8	ACP 101-1
Kodair Wind Designs Ltd.	KW30	03/12/2025	29.3	46.5	ACP 101-1
SD Wind Energy, Ltd.	SD6	06/17/2019	5.2	43.1	AWEA 9.1
SkyWind Energy GmbH	SkyWind NG	06/20/2025	0.31	N/A	ACP 101-1
Wind Resource, LLC	Skystream 3.7	04/12/2023	2.1	41.2	AWEA 9.1

a) Power output at 11 m/s (24.6 mph) at standard sea level conditions. Manufacturers may describe or name their wind turbine models using a nominal power, which may reference output at a different wind speed.

b) Decibel (sound) limit not to be exceeded by the wind turbine 95% of the time at reference wind speeds. Calculated at a distance of 60 meters from the rotor hub and excludes any contribution of background sound.

c) The American Clean Power Association (ACP), the successor to AWEA, published its new American National Standards Institute (ANSI) consensus standard, ANSI/ACP 101-1-2021, in October 2022 to facilitate easier certification compliance.

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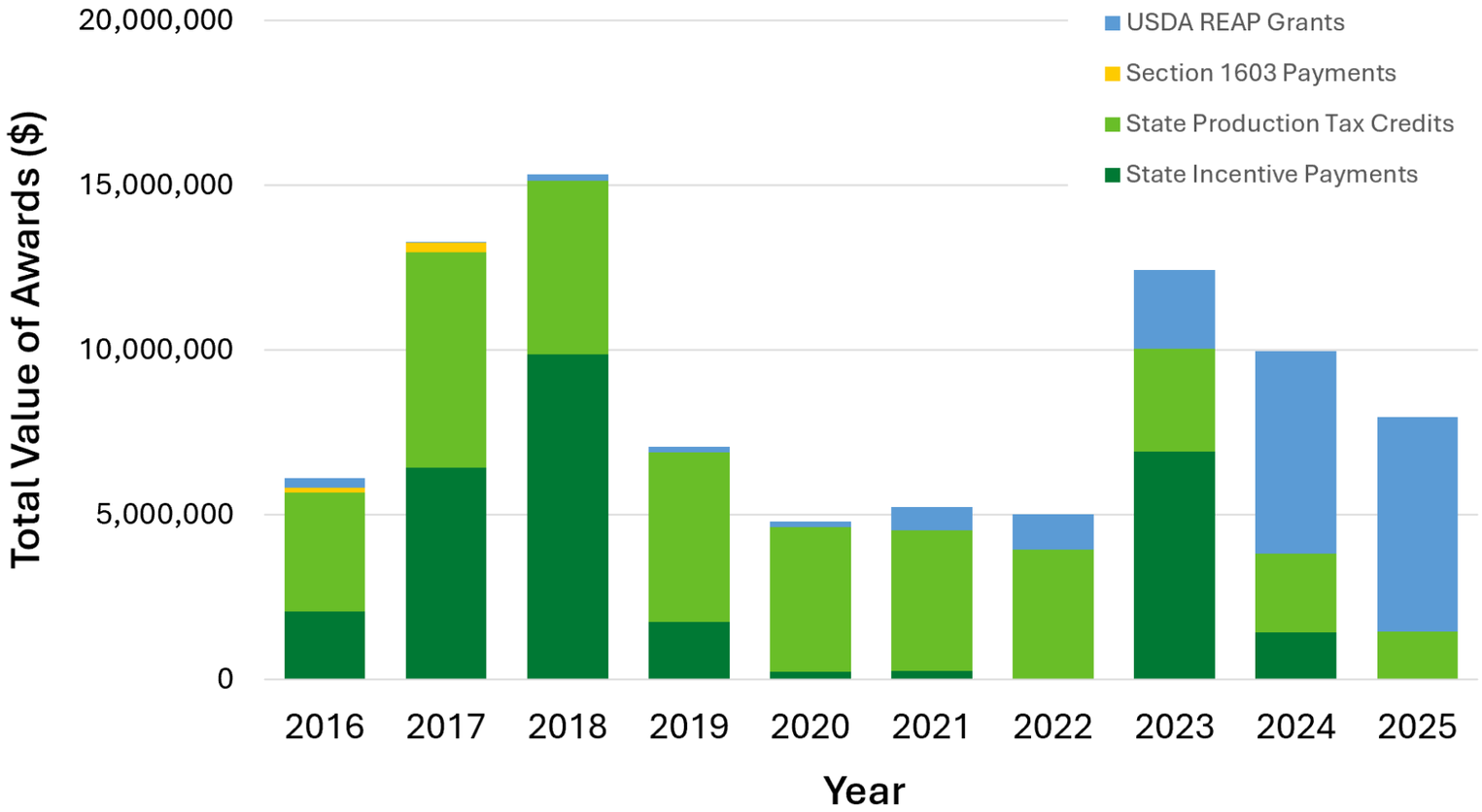
Policies, Incentives, and Market Insights



Bonus MK3
Jacob Garbe

U.S. Distributed Wind Incentive Awards

The combined value of U.S. Department of Agriculture (USDA) Rural Energy for America Program (REAP) grants, state-level incentives, and state-level production tax credits allocated to distributed wind projects in 2025 was $8.0 million across 11 states.



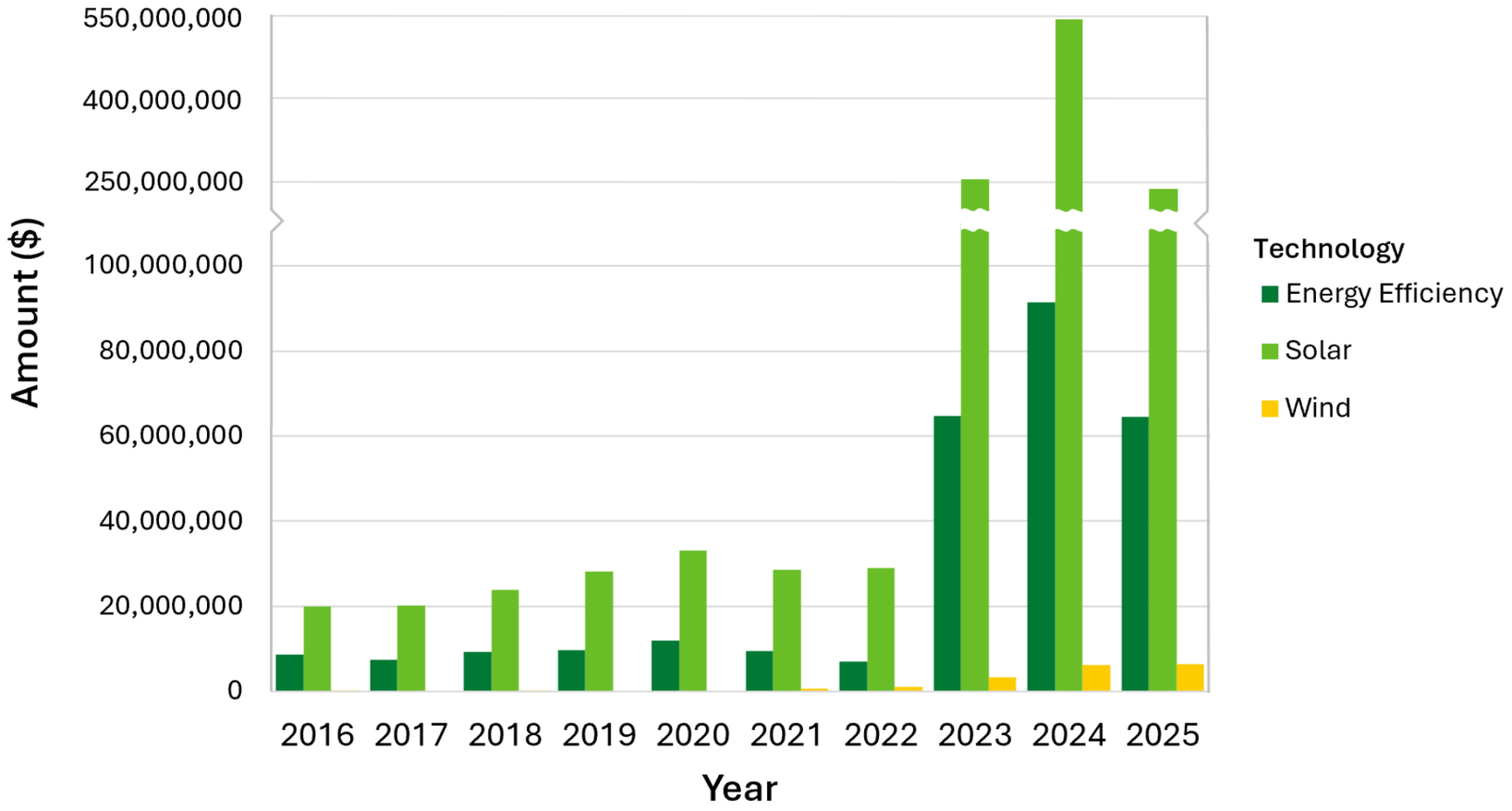
U.S. distributed wind incentive awards, 2016-2025

The 11 states with projects receiving incentives are:

- Indiana
- Iowa
- Kansas
- Minnesota
- Missouri
- Nebraska
- New York
- Oklahoma
- South Dakota
- Texas
- Wyoming

Sources: USDA, California Self-Generation Incentive Program, New York State Energy Research and Development Authority, Iowa Utilities Board, U.S. Treasury, New Mexico Energy, Minerals, and Natural Resources Department

USDA REAP Grants by Technology



USDA REAP grants by technology, 2016-2025

- Of the $8.0 million in incentives awarded to distributed wind projects in 2025, $6.5 million came from USDA REAP grants.
- The 36 projects receiving REAP awards represent over 2 MW of capacity from 45 turbines across 11 states.

Source: USDA

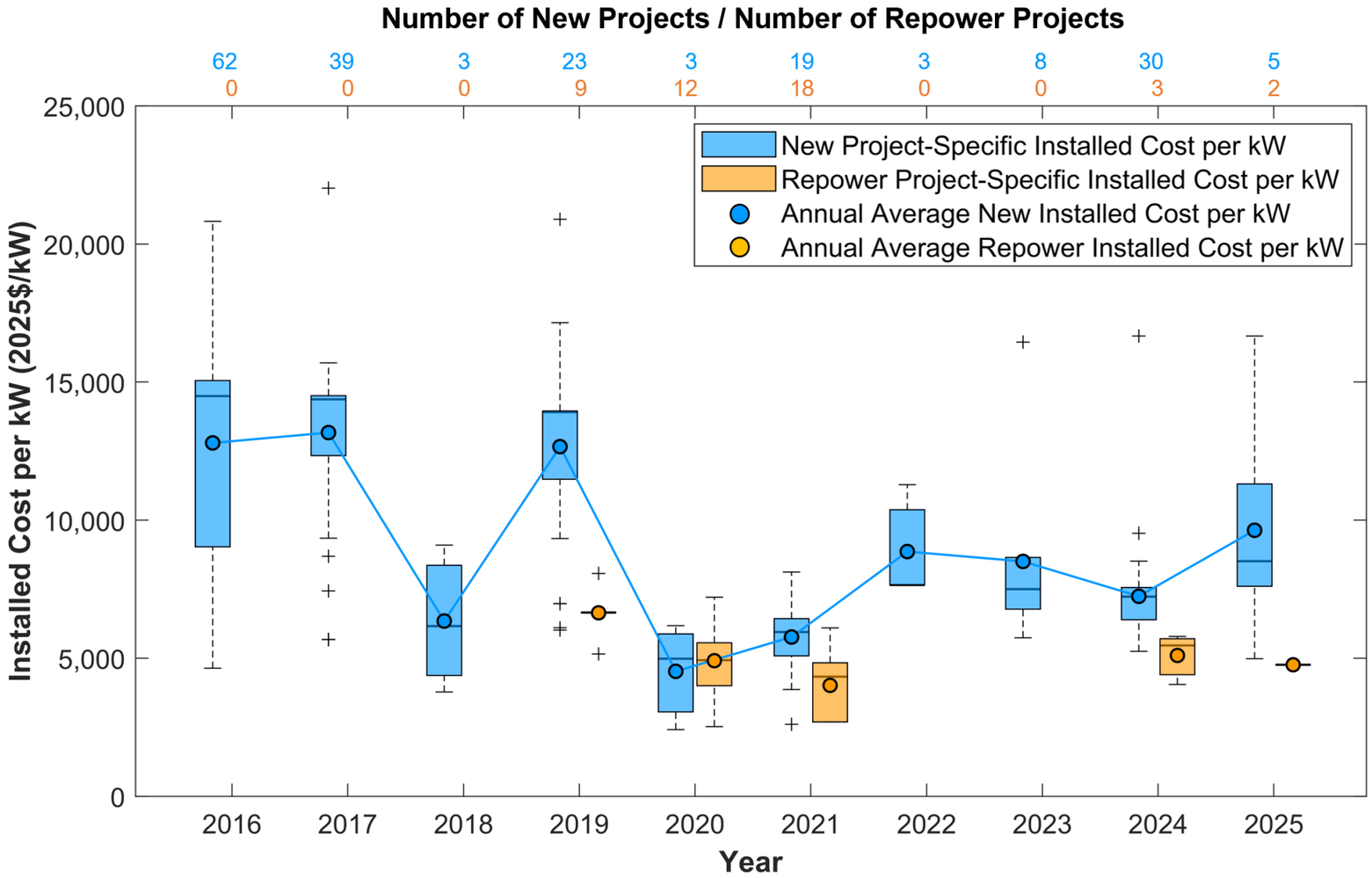
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Distributed Wind Costs



Raptor G4
Kamila Kazimierczuk

Installed Costs for Projects Using Small Wind Turbines

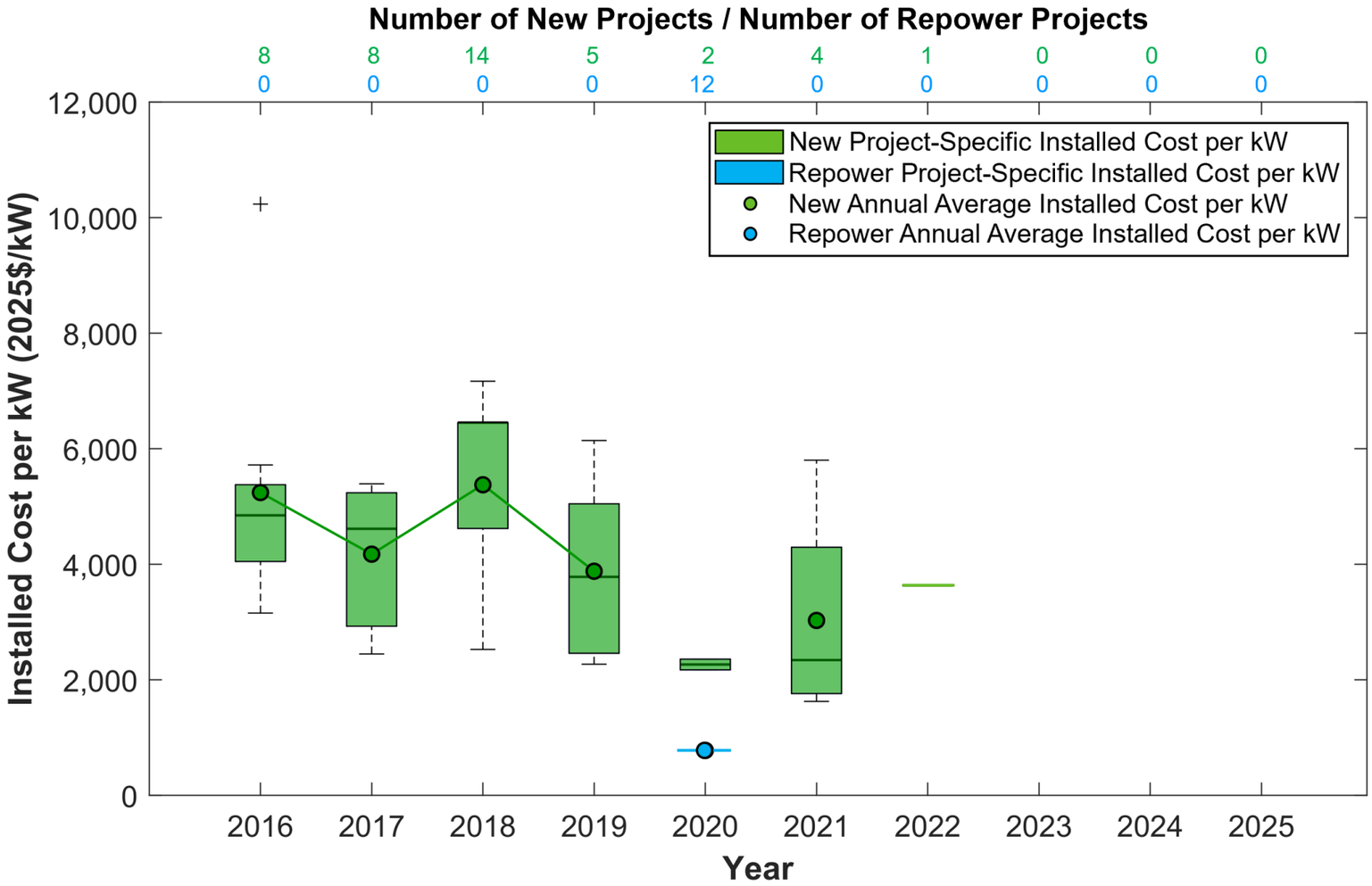


Annual average and project-specific new and repowered small wind installed project costs, 2016-2025

- The average installed cost for new small wind projects in 2025 was $9,630/kW based on a sample size of 5 projects (that reported costs), which collectively use 29 wind turbines with a combined rated capacity of 130 kW.
- Over the last ten years, from 2016 through 2025, the average inflation-adjusted installed cost was $8,910/kW.

Source: PNNL

Installed Costs for Projects Using Midsize and Large Wind Turbines



Annual average and project-specific new and repowered small wind installed project costs, 2016-2025

While no installed costs were reported for projects using midsize and large turbines in 2023 through 2025, the average inflation-adjusted capacity-weighted installed cost for the period of 2016 through 2022 was $3,775/kW.

Source: PNNL

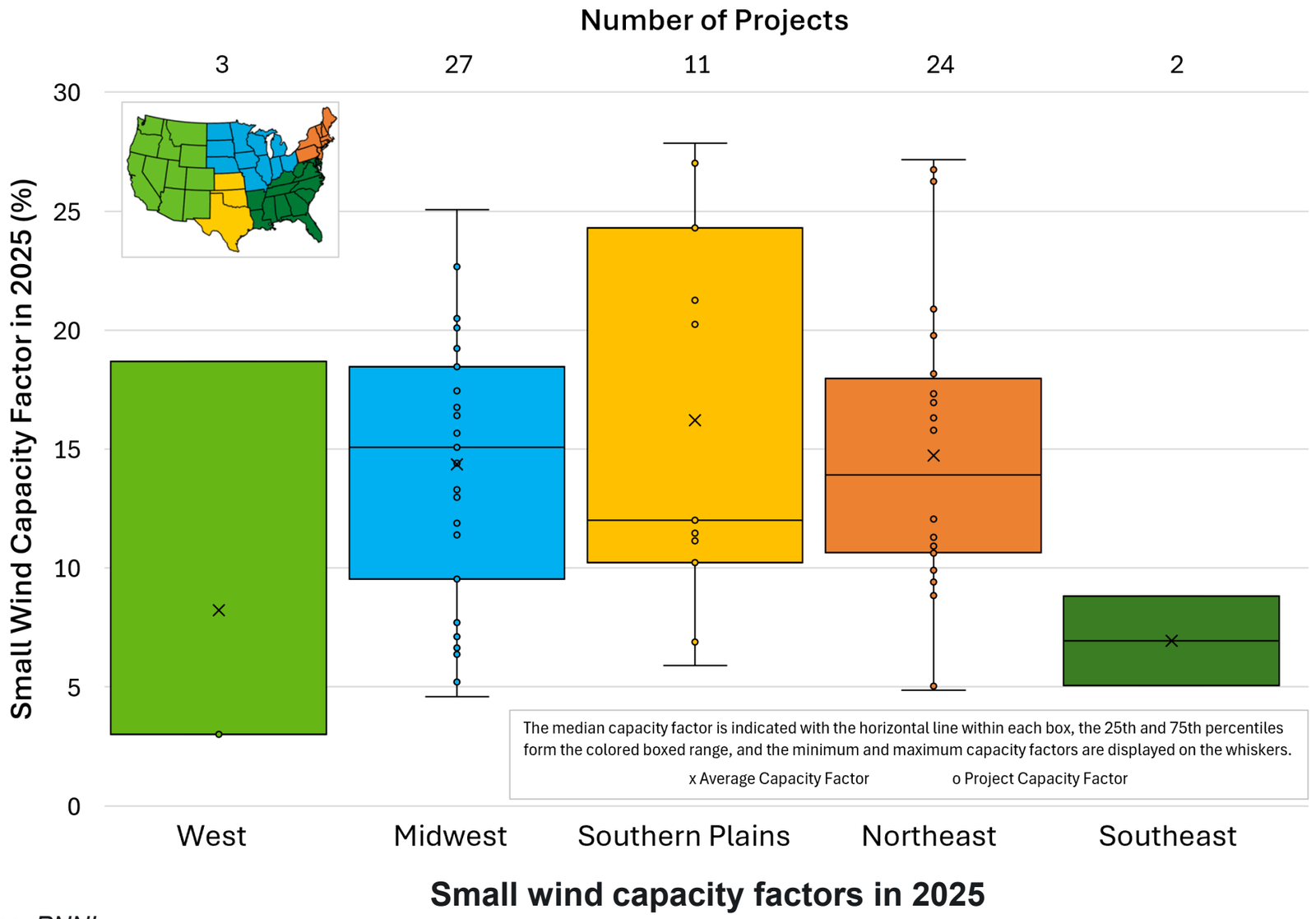
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Distributed Wind Performance



Skystream 3.7
Lindsay Sheridan

Capacity Factors in 2025 for Projects Using Small Wind Turbines



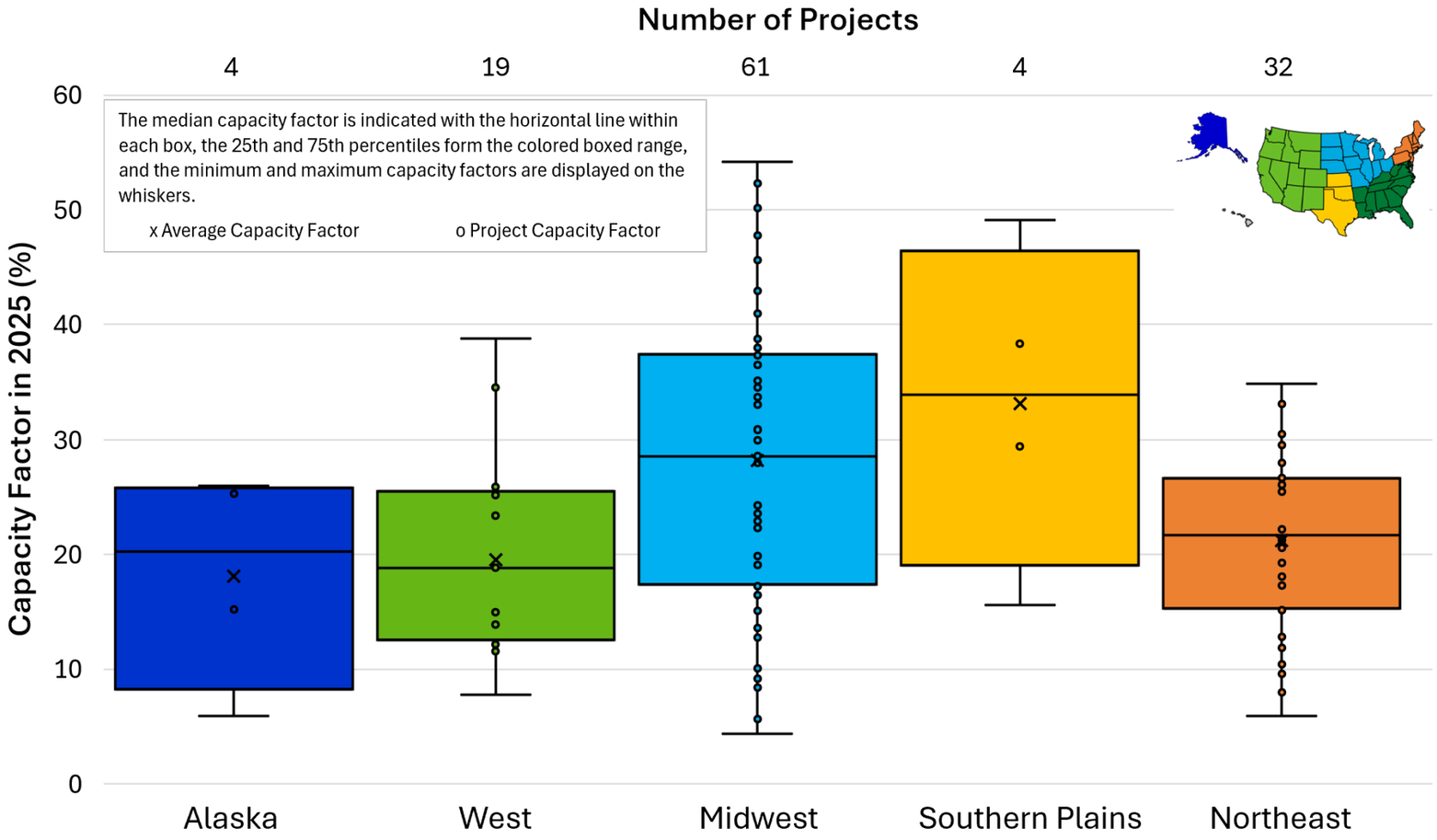
Small wind capacity factors in 2025

- The nationwide average capacity factor in 2025 across a sample of 69 small wind projects was 14%.
- Small wind projects in the Southern Plains had the highest capacity factors, with an average of 16%, followed by the Northeast (15%) and Midwest (14%).
- The sample of small wind projects totals 1.0 MW in rated capacity from turbines ranging from 2 kW to 90 kW installed from 2009 through 2024.

Regions with a single small wind project (Alaska: 23%; Hawaii: 18%) are not displayed in the figure but are incorporated in the nationwide capacity factor metrics.

Source: PNNL

Capacity Factors in 2025 for Projects Using Midsize and Large Wind Turbines



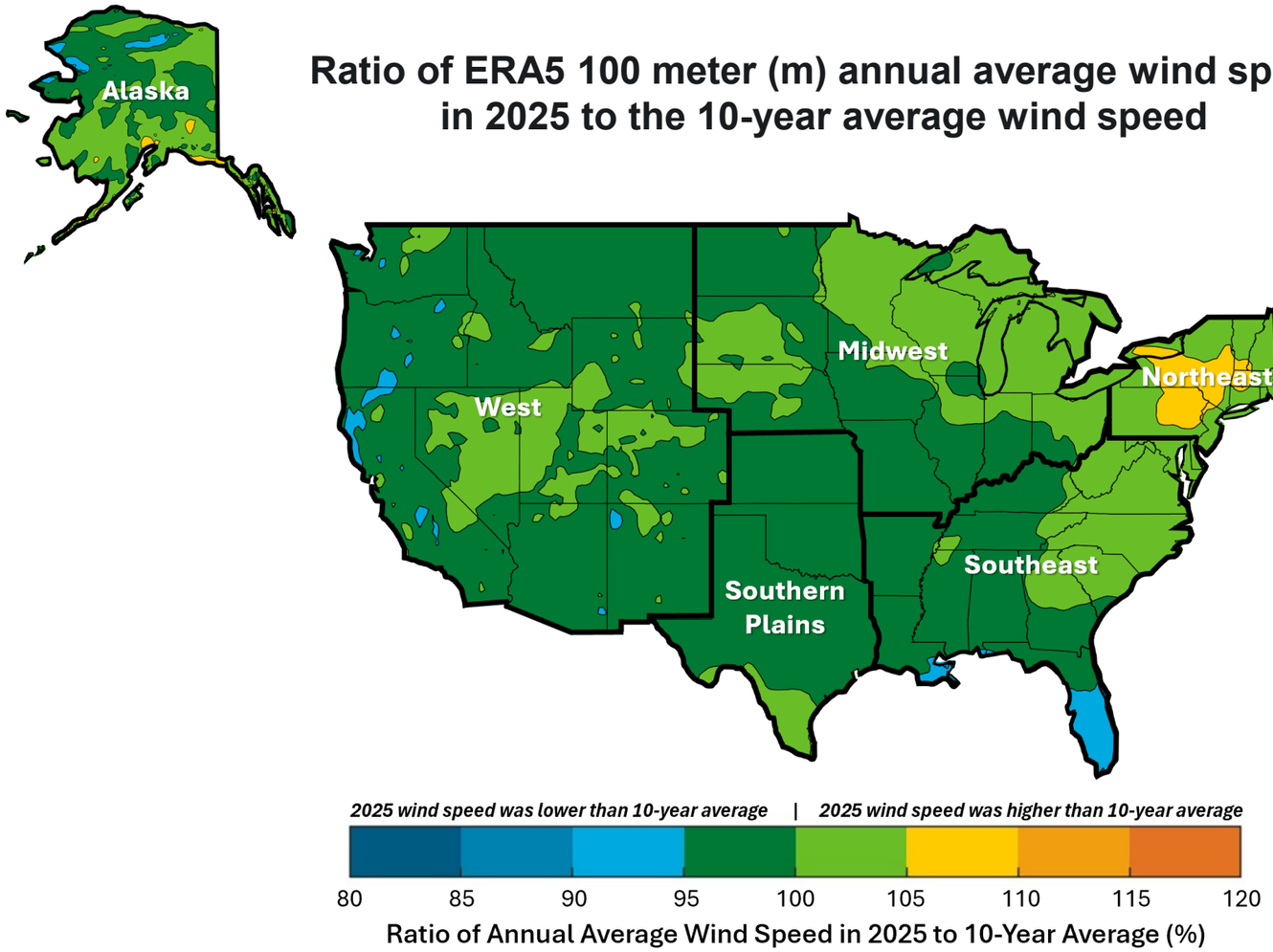
Capacity factors in 2025 for projects using midsize and large turbines

- The average capacity factor in 2025 across 121 projects using midsize and large turbines was 25%.
- Projects in the Southern Plains had the largest average capacity factor in 2025 (33%).
- Multiple projects in the Midwest, all located in Nebraska, had capacity factors in 2025 that exceeded 50%.
- The sample includes projects using midsize and large turbines installed from 2003 to 2022, across 21 states, totaling 422 MW in combined capacity.
- Turbine nominal capacities used in the projects ranged from 225 kW to 3.6 MW.

Regions with a single wind project (Southeast: 28%) are not displayed in the figure but are incorporated in the capacity factor metrics.

Sources: PNNL, EIA

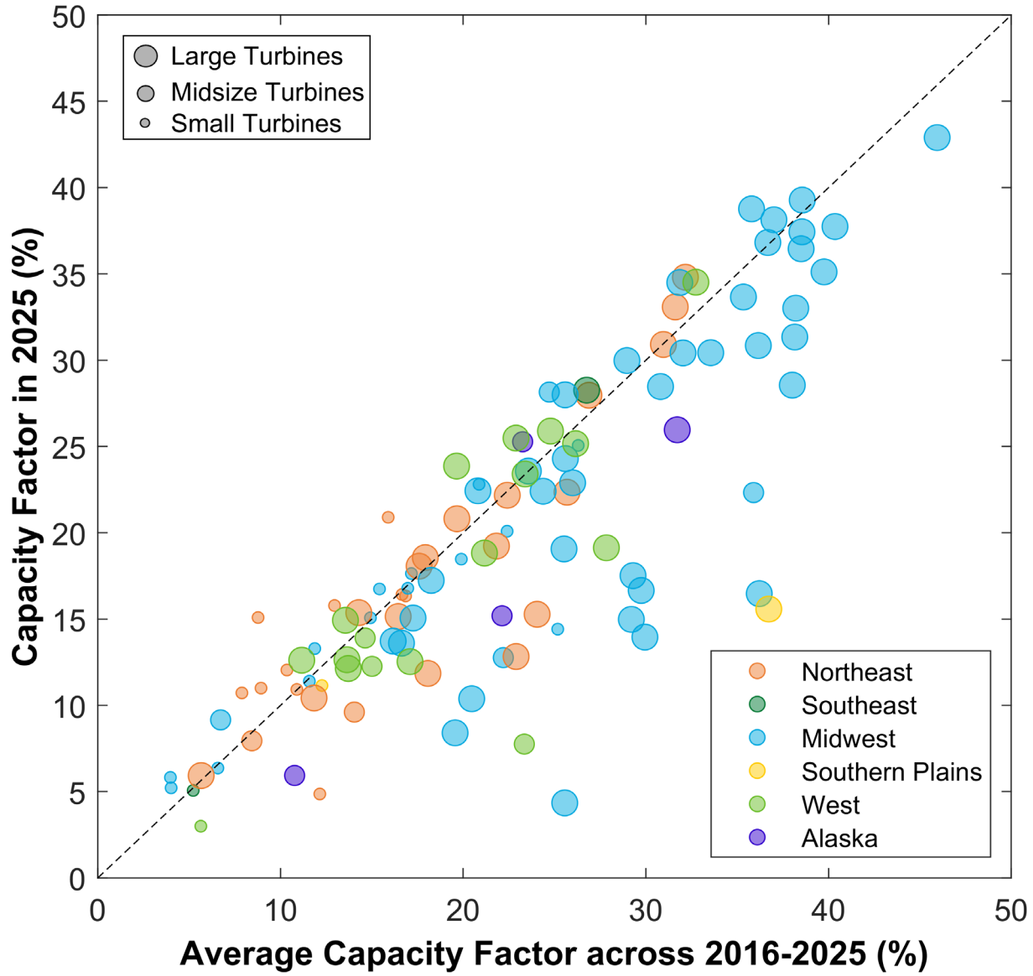
Ratio of Annual Average Wind Speed in 2025 to the 10-Year Average Wind Speed



- Across most of the continental United States and Alaska, 2025 was an average wind resource year.
- The Northeast had an above average wind resource year.

Source: European Centre for Medium-Range Weather Forecasts ERA5

Comparison of Distributed Wind Capacity Factors in 2025 to their 10-Year Average Capacity Factors



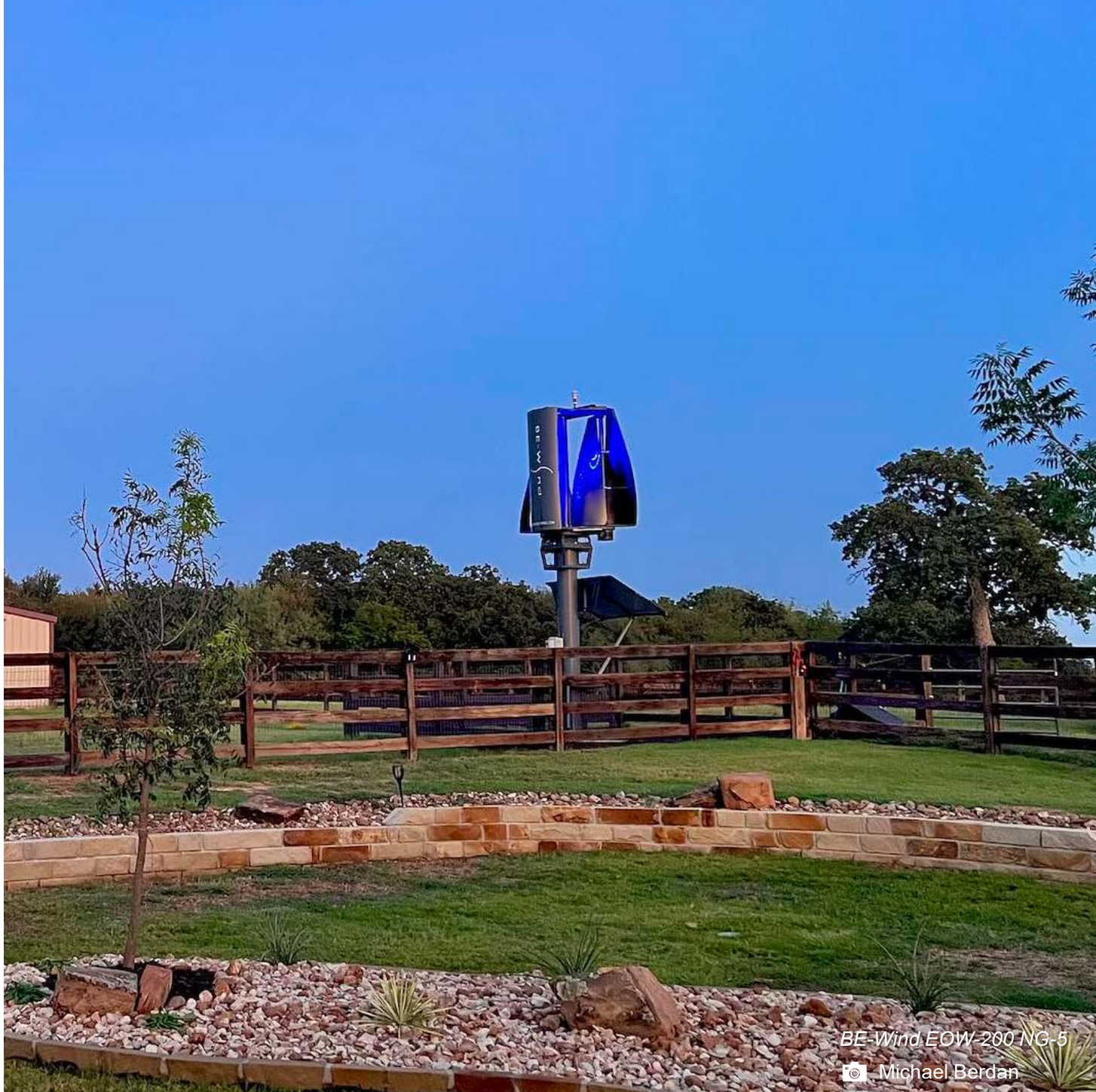
Distributed wind capacity factors in 2025 compared with average capacity factors over 2016-2025

- Of 111 projects with consistent 10-year generation records, 38 (34%) of the projects exceeded their 10-year average capacity factors.
- 64 projects (58%) underperformed relative to their long-term average capacity factors.
- 9 projects (8%) performed similarly compared to their long-term average capacity factors.
- Factors including turbine degradation, tree growth, and nearby building expansion can impact the capacity factors considered in the 10-year averages.
- Across the projects, the average capacity factor in 2025 was 20% and the average long-term capacity factor was 23%.

Sources: PNNL, EIA

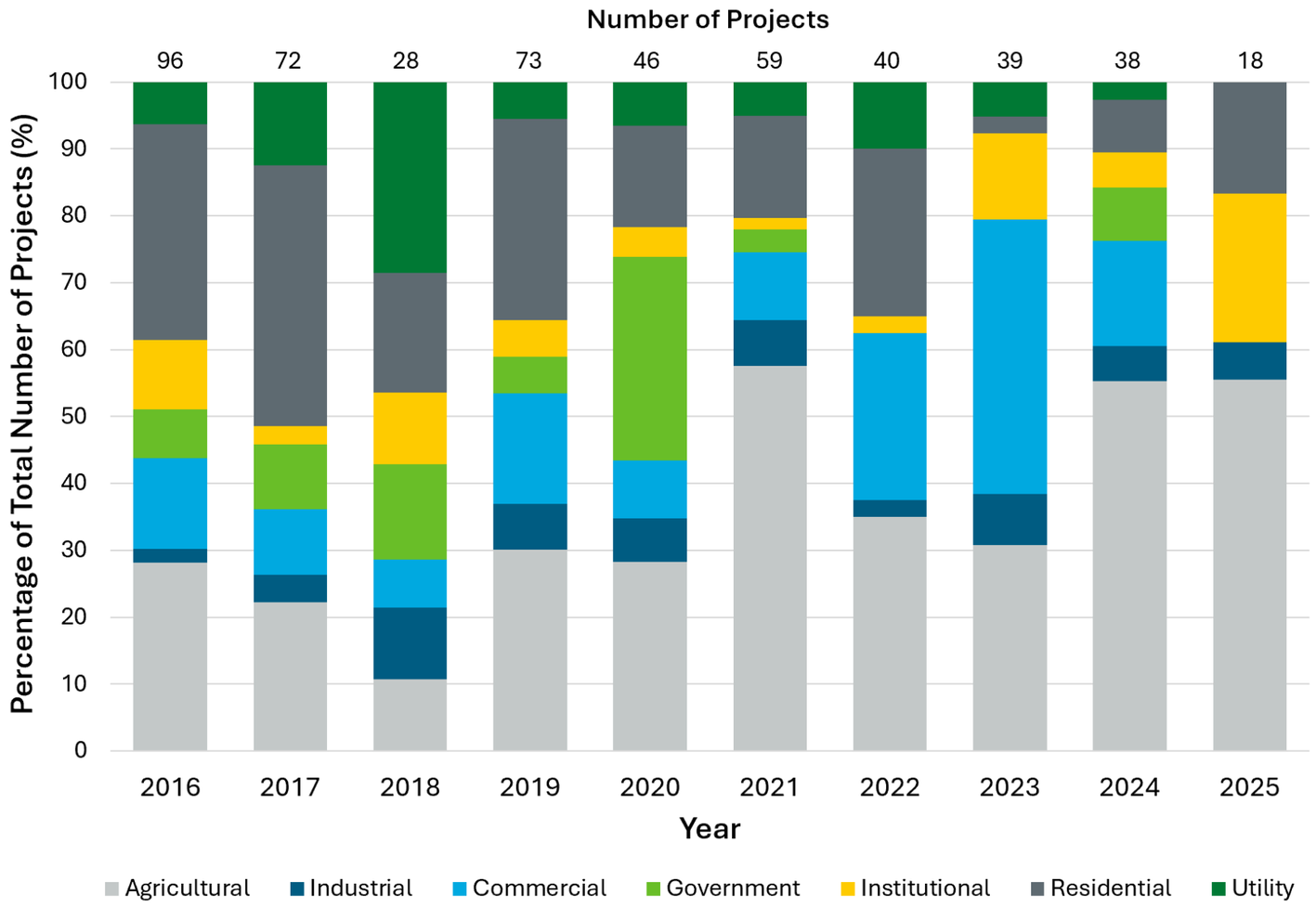
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Distributed Wind Markets



BE-Wind EOW-200 NG-5
Michael Berdan

Distributed Wind End-Use Customer Types by Number of Projects Installed in 2025

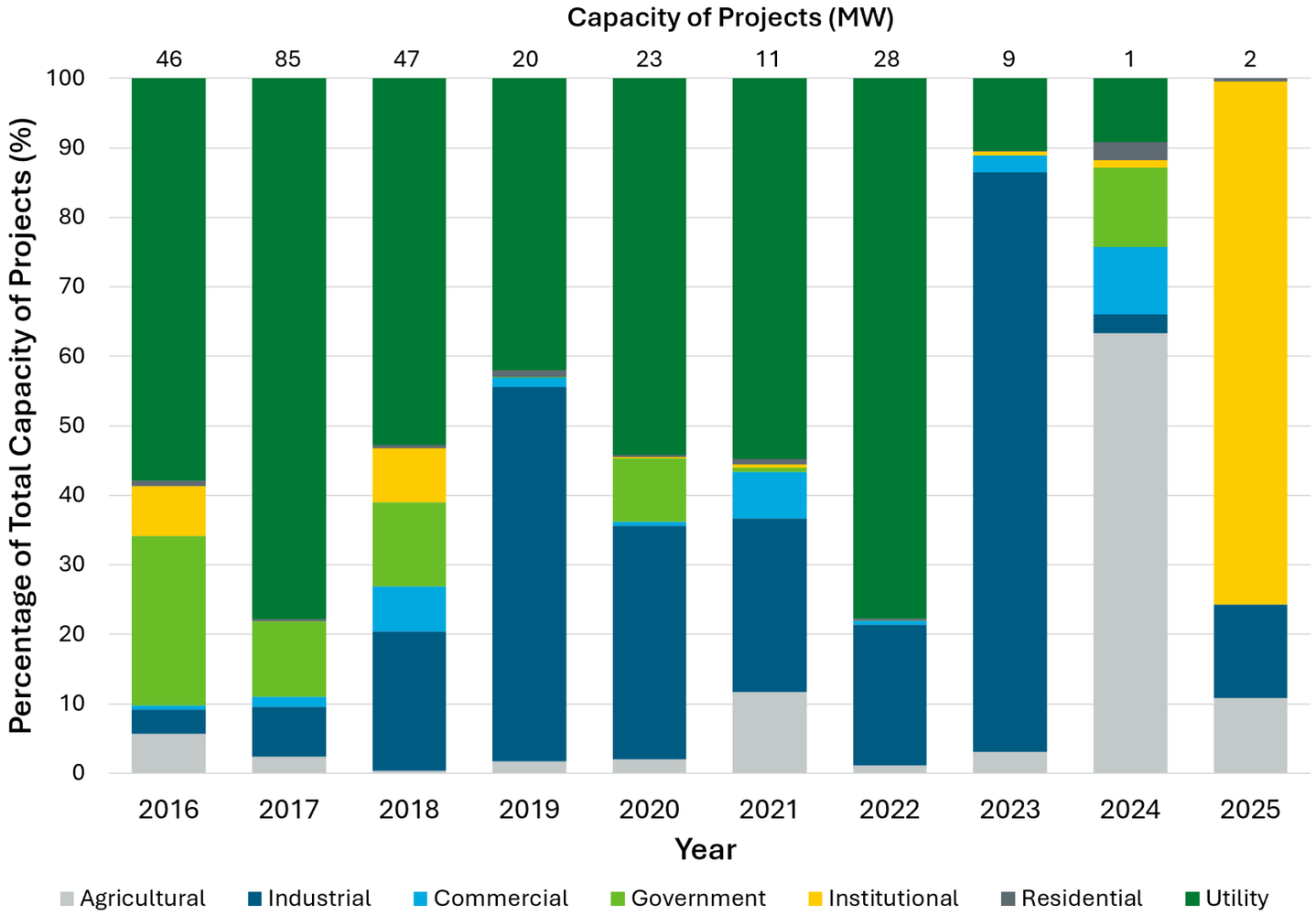


Distributed wind end-use customer types by number of projects with reported customer end-use, 2016-2025

- Distributed wind deployed for agricultural customers accounted for 56% of the number of projects installed in 2025.
- Institutional customers accounted for the second largest share of the number of projects installed in 2025 with 22%, followed by residential customers with 17%.

Sources: PNNL, USDA

Distributed Wind End-Use Customer Types by Capacity of Projects Installed in 2025

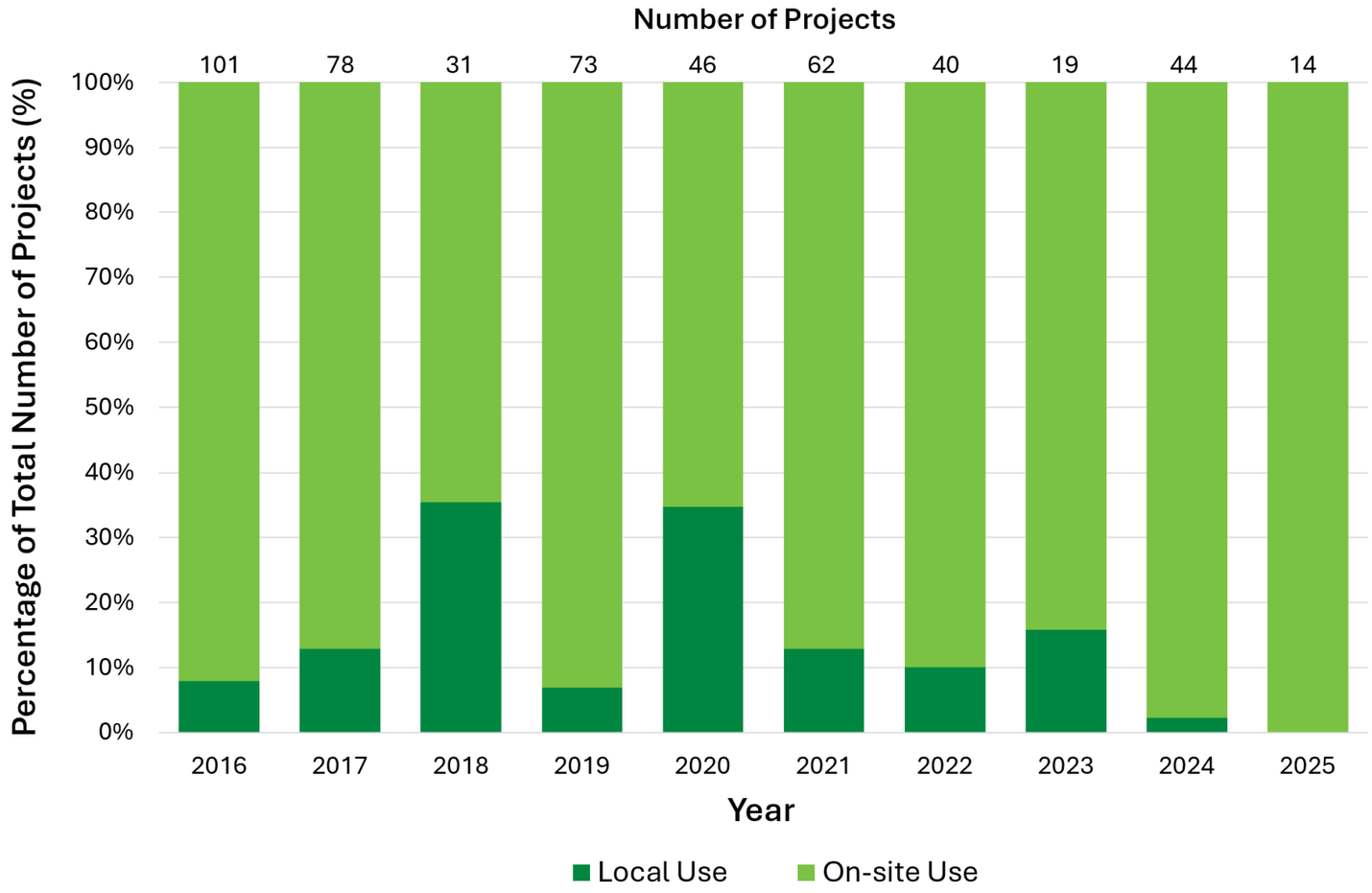


Distributed wind end-use customer types by capacity of projects with customer end-use, 2016-2025

- Distributed wind deployed for institutional customers represented 75% of the total capacity installed in 2025.
- Industrial customers represented the second largest share of total capacity in 2025 with 13%, followed by agricultural customers with 11%.

Sources: PNNL, USDA

Distributed Wind for On-Site Use and Local Loads by Number of Projects



Distributed wind for on-site use and local loads by number of projects with reported interconnection type, 2016-2025

Two primary interconnection types exist for distributed wind:

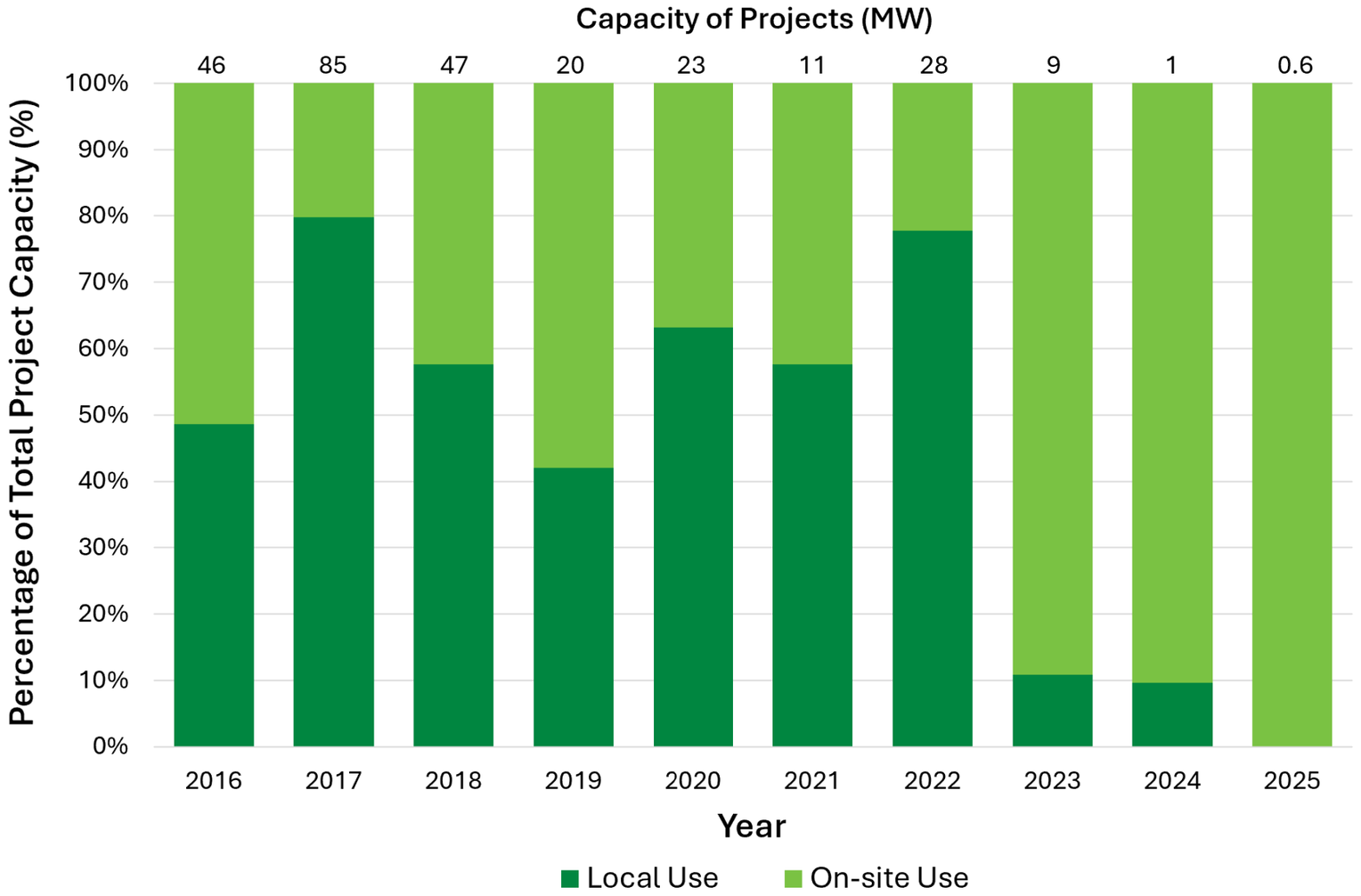
- On-site use
  Behind-the-meter, remote net-metering, grid-connected microgrid, and off-grid applications
- Local use
  Load-serving distribution line and isolated grid applications

In 2025, 100% of distributed wind projects were interconnected to provide energy for on-site use.

Of the on-site use projects in 2025, 13 were deployed as behind-the-meter installations and one has an unknown secondary interconnection type.

Source: PNNL

Distributed Wind for On-Site Use and Local Loads by Capacity of Projects



Distributed wind for on-site use and local loads by capacity of projects with reported interconnection type, 2016-2025

- In 2025, 100% of distributed wind capacity was deployed for on-site use.
- Projects for local use have traditionally represented more of the installed distributed wind capacity due to the projects' larger sizes and use of larger wind turbines.

Source: PNNL

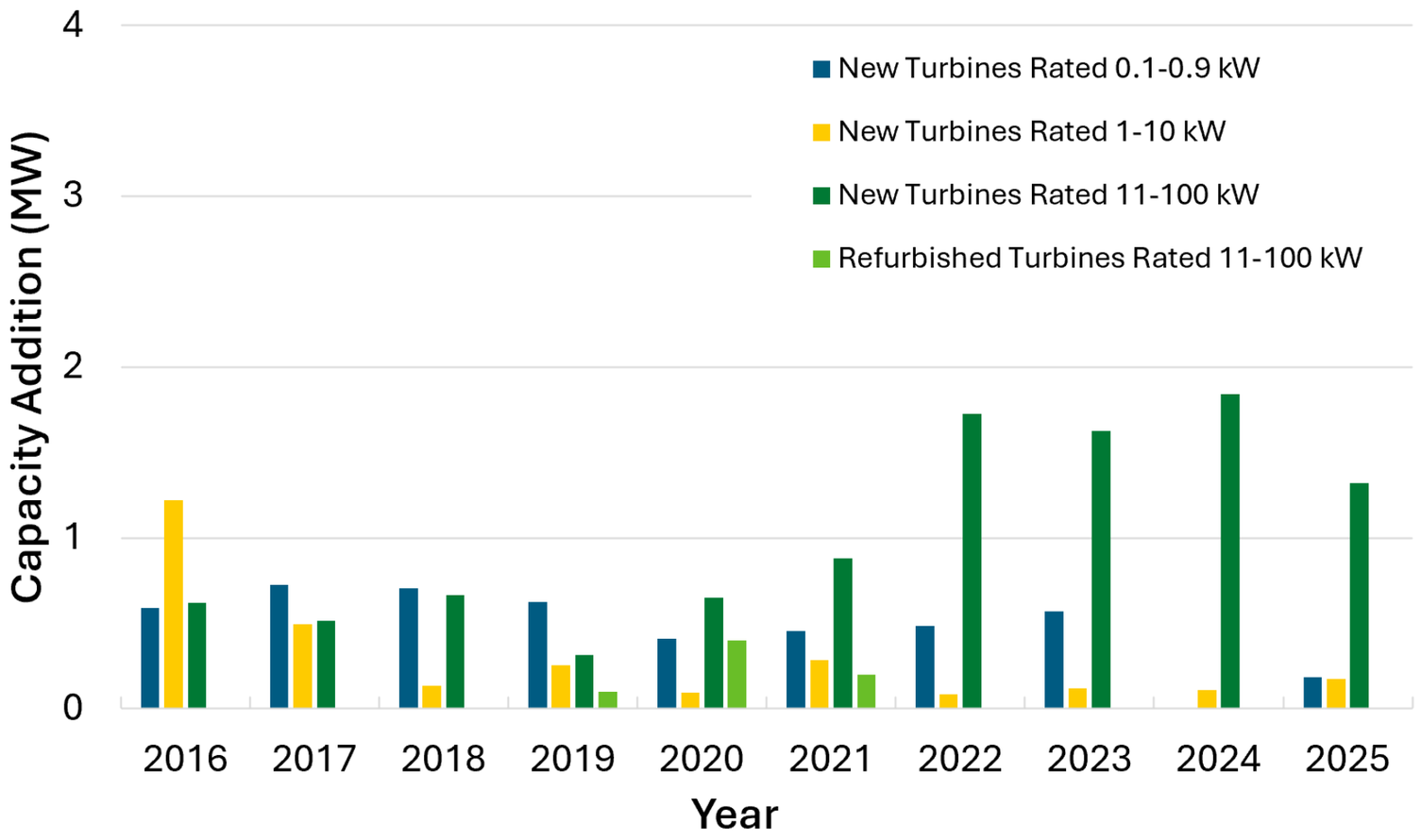
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Distributed Wind Technology



Northern Power Systems 100
Padma Kasthuri

U.S. Small Wind Sales Capacity by Turbine Size

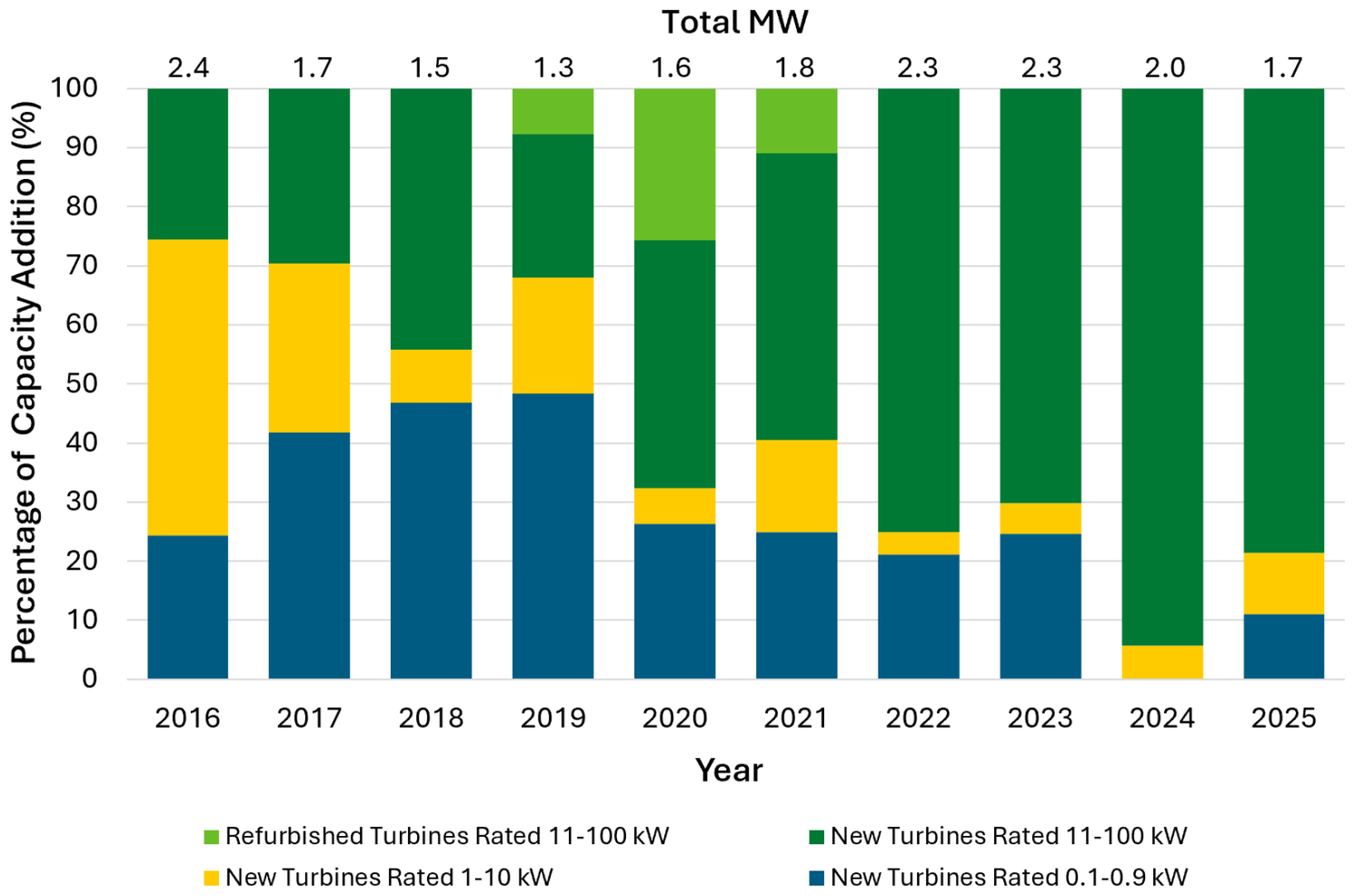


U.S. small wind sales capacity by turbine size, 2016-2025

- Turbines in the size segment of 11-100 kW accounted for a total of 1.3 MW of small wind sales capacity in 2025. This is a slight decrease from the 1.8 MW of small wind sales capacity for the 11-100 kW size segment in 2024.
- The size segments of less-than-1-kW and 1-10 kW each accounted for around 0.2 MW in 2025.

Source: PNNL

U.S. Small Wind Sales Percentage of Capacity by Turbine Size



U.S. small wind sales percentage of capacity by turbine size, 2016-2025

- Turbines in the size segment of 11-100 kW represented 79% of the small wind sales capacity in 2025, the most of any size segment.
- The size segment of 1-10 kW accounted for 10% and the size segment of less-than-1-kW accounted for 11%.

Source: PNNL

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Outlook and Market Potential



Data Center Impacts on the U.S. Distributed Wind Market

- The rapid expansion of data center development across the U.S. will increase energy demand and therefore opportunities for a variety of energy technologies to deliver power.
- A number of data center projects plan to integrate wind generation through new infrastructure or by directly acquiring or connecting to existing utility-scale wind farms.
- While distributed wind projects in the U.S. have traditionally been under 50 MW in capacity, data centers are redefining and expanding distributed wind project attributes.


Soluna

Soluna buys 150 MW Briscoe wind farm to power Project Dorothy AI campus

- Briscoe County, Texas
- 150 MW of onsite, behind-the-meter wind generation to directly support a new data center campus
- The acquisition makes Soluna the owner of both the generation and the data center infrastructure for Project Dorothy, shifting the site from buying energy to producing it for data center demand, with excess sent to the grid

Satoshi Energy launches behind-the-meter data center at Texas wind farm

- Howard County, Texas
- Co-located data center sized to match the Elbow Creek wind farm's capacity of 122 MW
- The co-location of the data center allows computing workloads to benefit from low-cost energy generated on-site

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See past and current Distributed Wind Energy Technology Data materials:
https://www.pnnl.gov/distributed-wind/technology-update

To contact the authors:
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For PNNL's Project Database, visit:
https://www.pnnl.gov/distributed-wind/data

For PNNL's Photo Gallery, visit:
https://www.pnnl.gov/distributed-wind/photo-gallery

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