

WOW!

Wind Market Portfolio

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Project and strategy goal

WOW! is a clean energy private equity firm looking for a market analysis for future investments.

Our goal is to assess the strength of the U.S. wind power market and determine potential clients to fund based on our findings.

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01

Background



Data Overview

70,808

Wind Turbines

1,708

Power Plants

63

Manufacturers

619

Plant Operators

- Limits
 - Only 2 offshore projects in our US data
 - Energy production data from 2020 only
- Assumptions
 - Preference for renewable energy focused companies

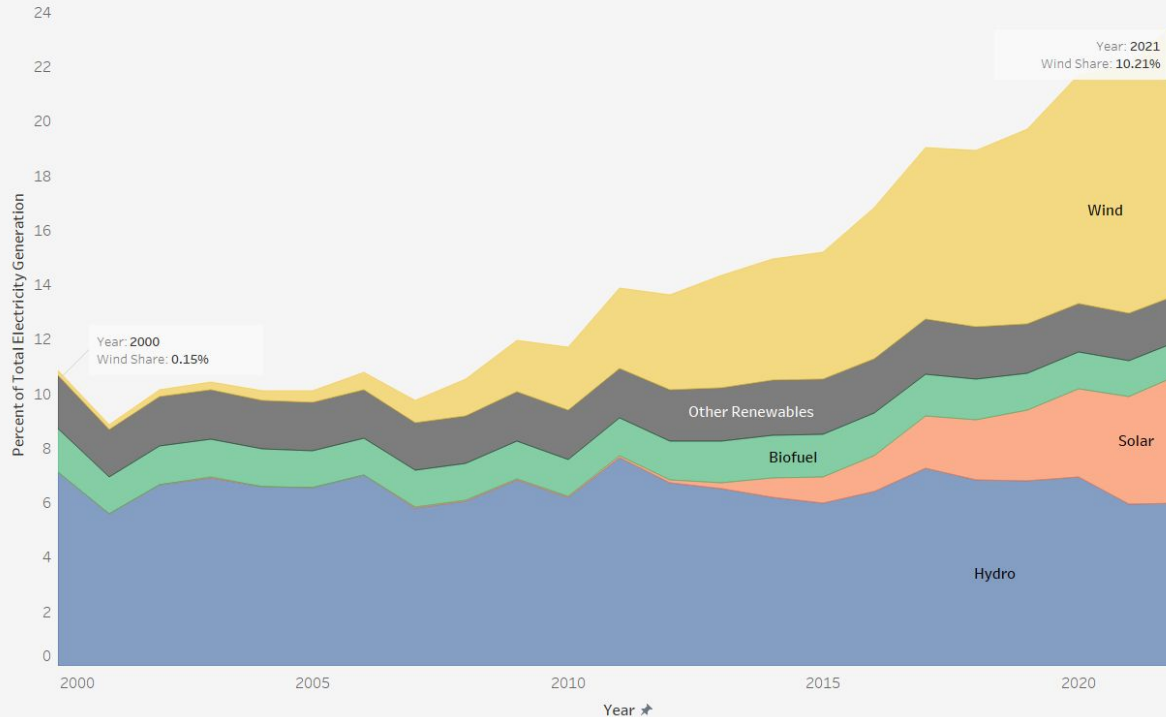
02

Key Findings



Wind Market Share Growth

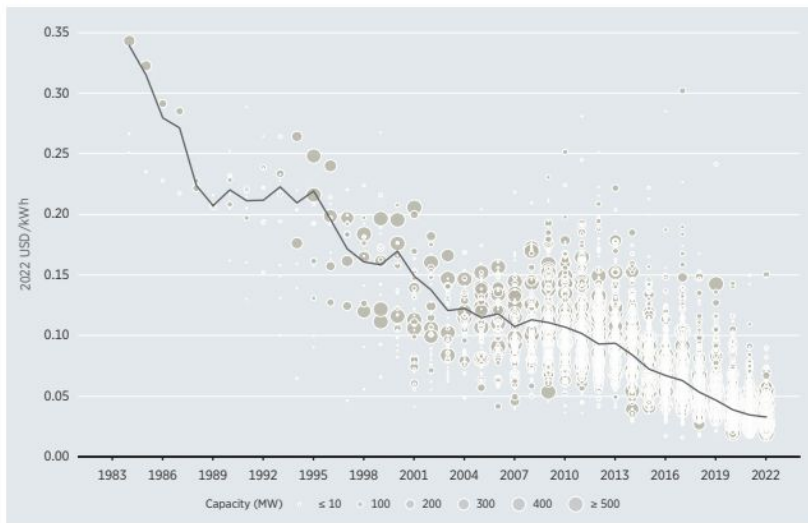
Renewable Energy Electricity Generation over Time



- Over **6400%** expansion of share in the renewable energy market since 2000
- Wind energy production key tool for COP26 and IPCC to meet net zero emissions

Levelized Cost of Energy / Purchase Price Agreements

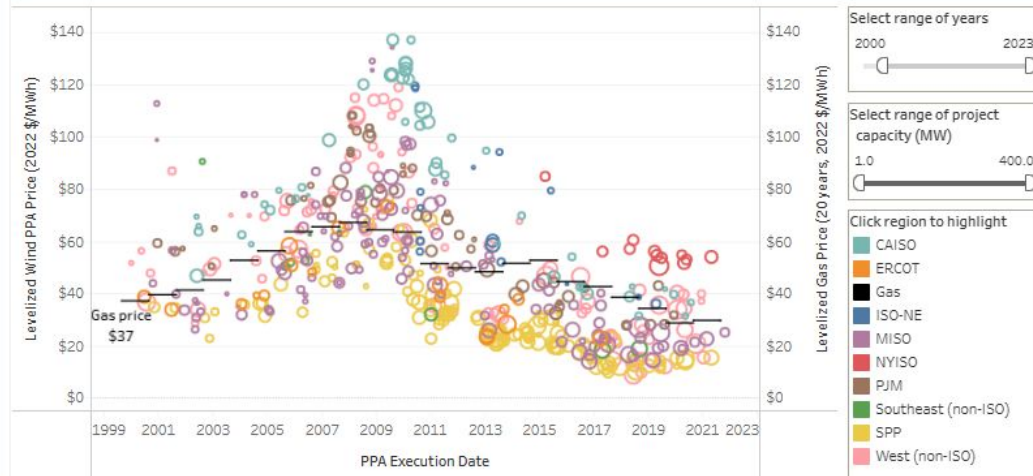
Figure 2.11 LCOE of onshore wind projects and global weighted average, 1984-2022



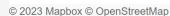
IRENA – 2022 Renewable Power Generation Costs

Wind Power Purchase Agreement (PPA) Prices

Land-Based Wind Market Report: 2023 (WindReport.Ibl.gov)

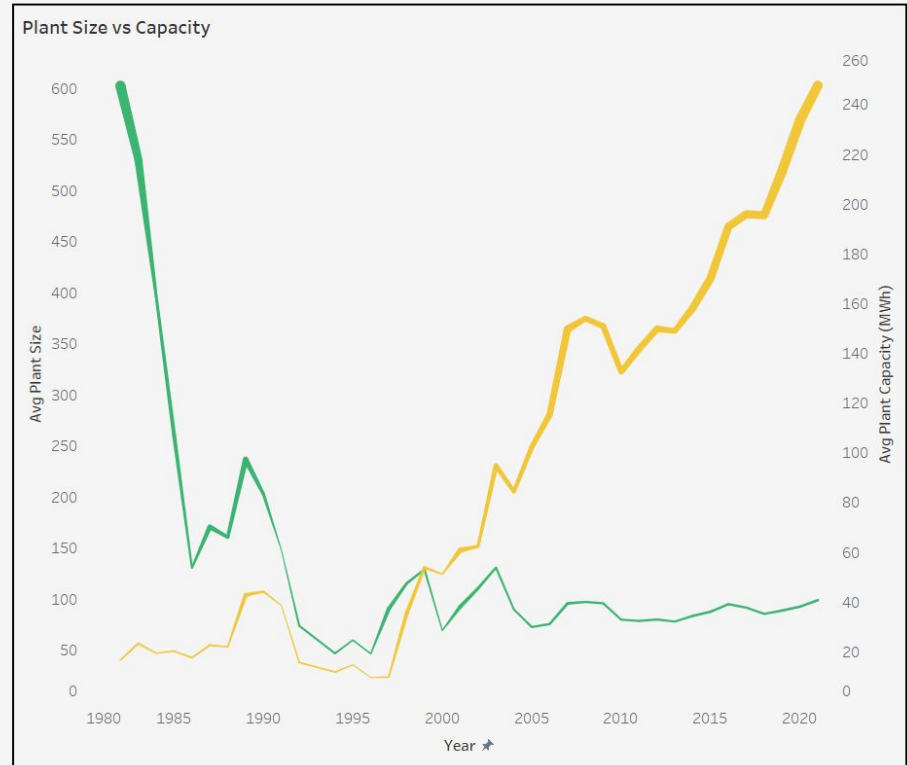
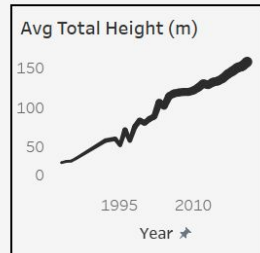
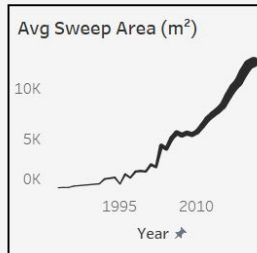
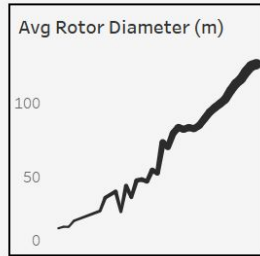
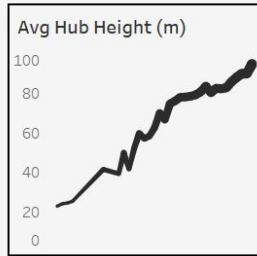


Berkeley Lab – 2023 PPA Prices Dashboard



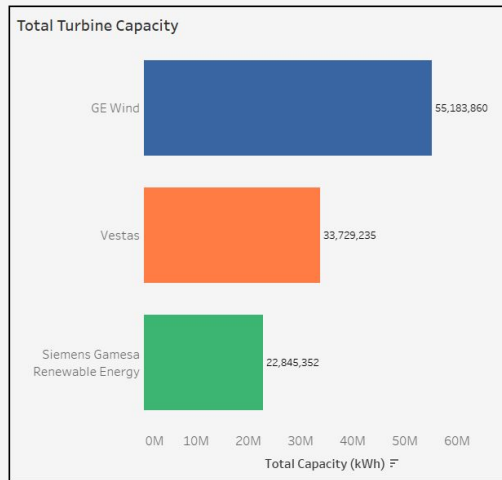
Turbine Efficiency

As capacities have increased, plant sizes have optimized, leading to more efficient energy production.



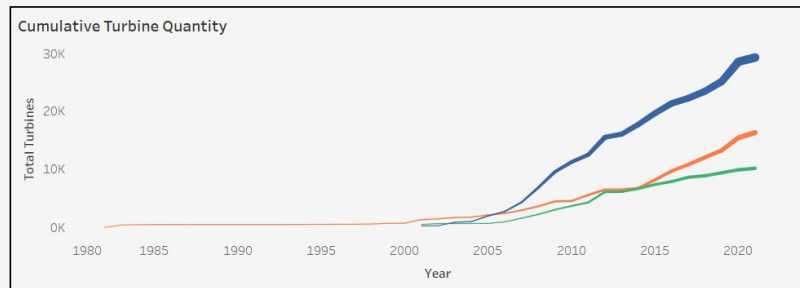
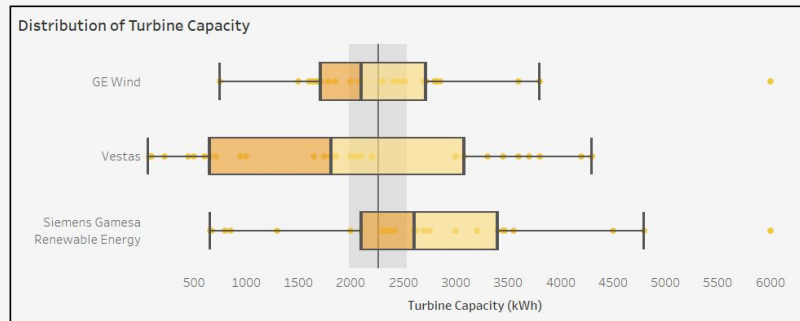
Top U.S. Turbine Manufacturers

- 78% of production controlled by top 3 manufacturers
- Siemens Gamesa overall leader in turbine capacity performance
- GE Wind and Siemens Gamesa demonstrate much higher investment in retrofitting machinery



Percent of Retrofitted Turbines

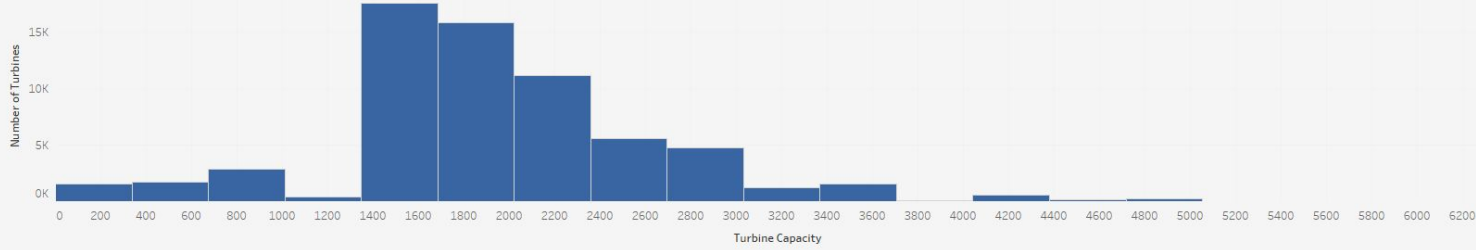
	GE Wind	Siemens Gamesa Renewable Energy	Vestas
	15.10%	10.64%	2.81%



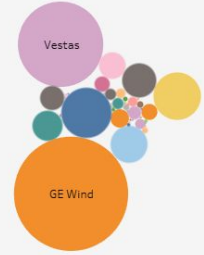
¹ [U.S. Wind Turbine Database](#)

Wind Turbine Capacities and Manufacturers by State

Distribution of Wind Turbine Capacities

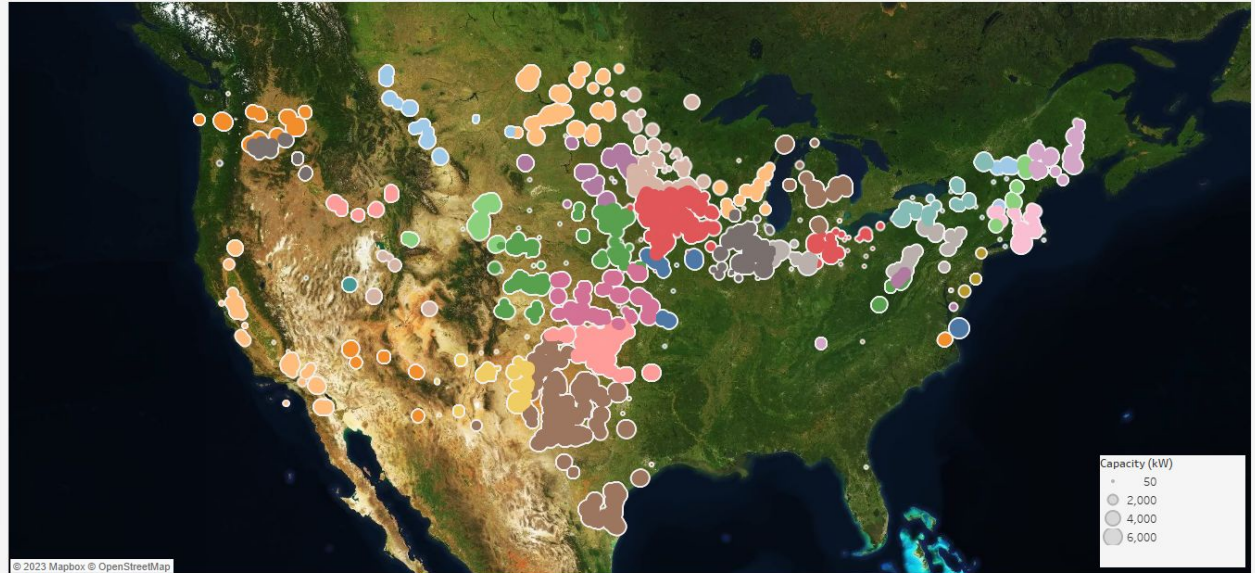
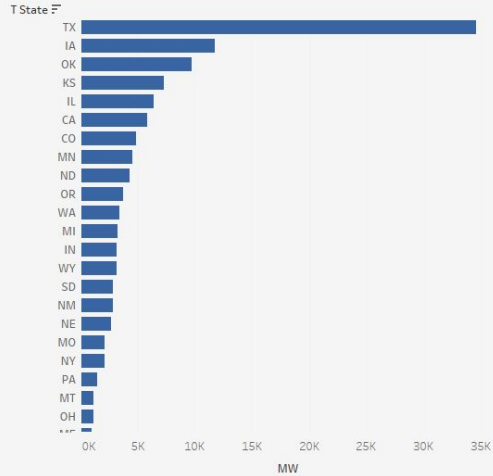


Turbine Manufacturers

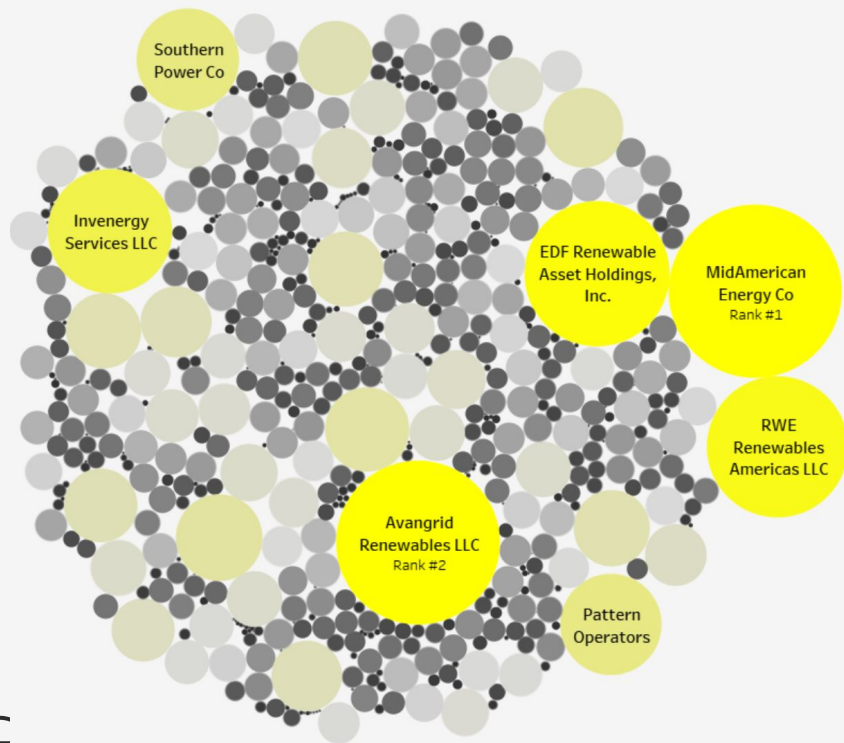


To Navigate: Choose State From List Below

State Capacity (MW) Rankings



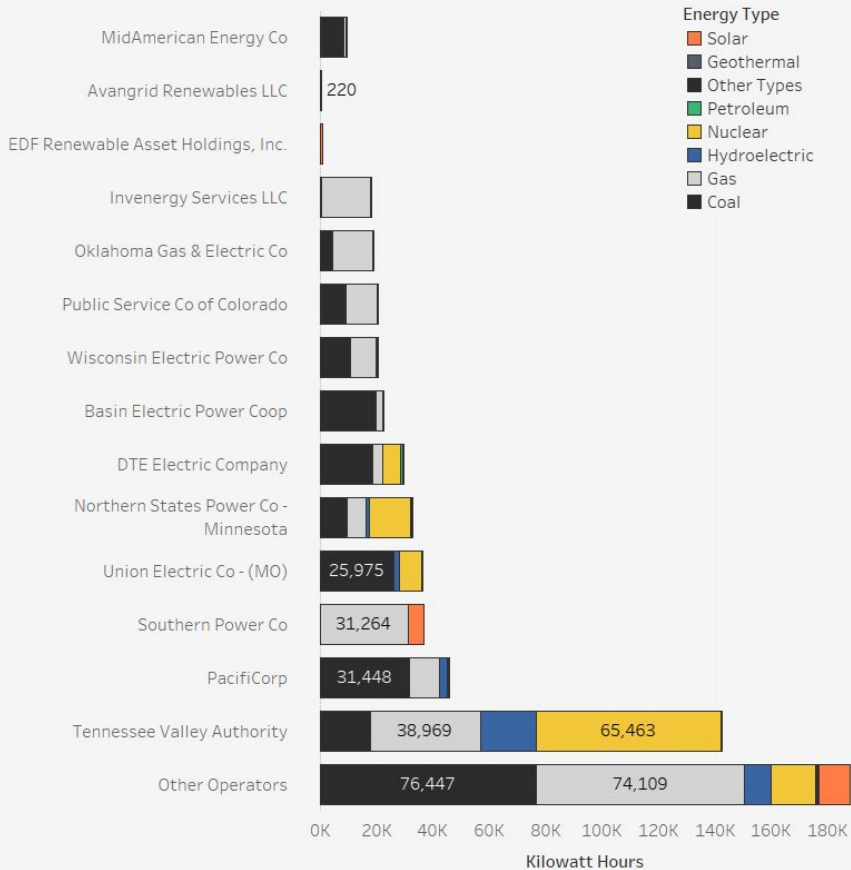
Operator Net Generation in 2020



Operator Name (Generation By ..	Net Generation (KWH)
MidAmerican Energy Co	20,542
Avangrid Renewables LLC	18,373
EDF Renewable Asset Holdings, Inc.	14,438
RWE Renewables Americas LLC	13,645
Invenery Services LLC	10,598

Alternative Plant Types

Other Energy Types

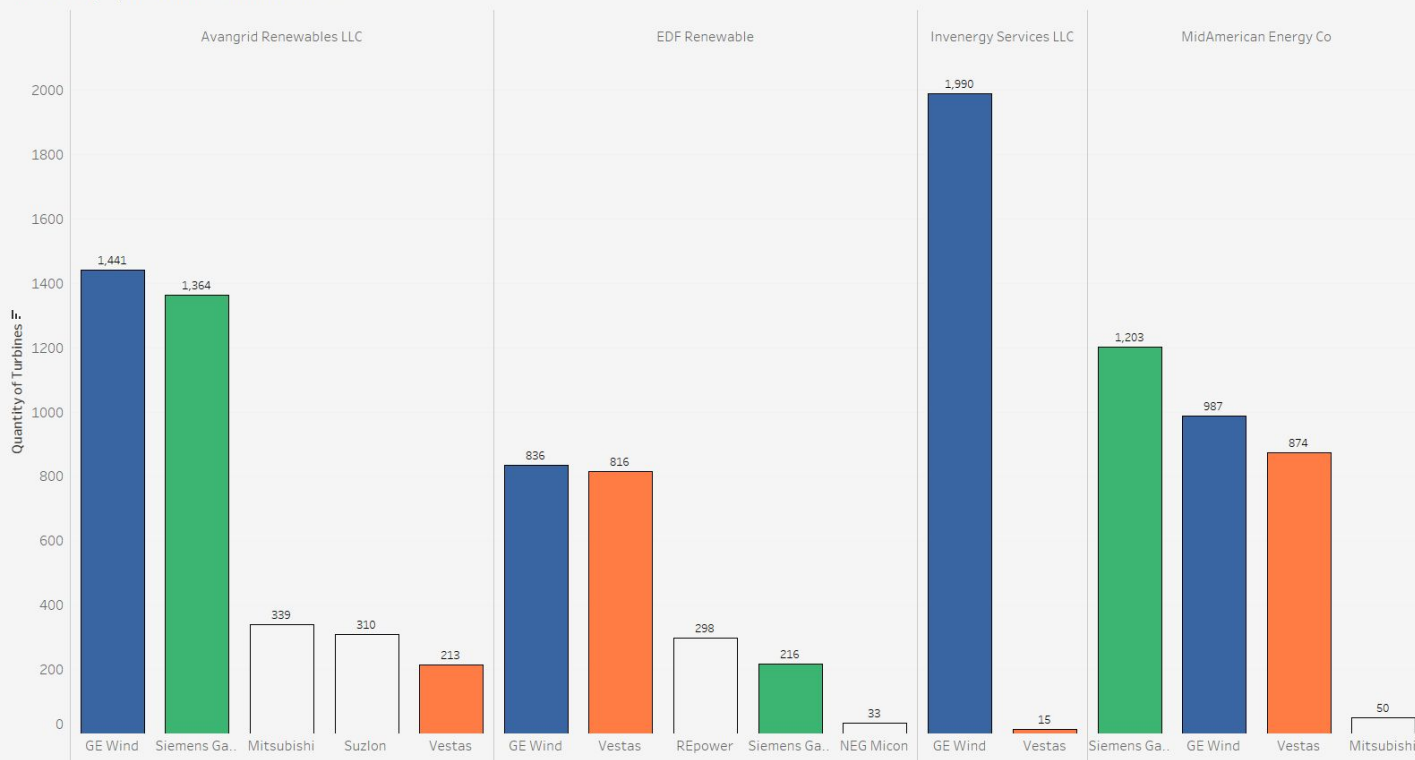


- **MidAmerican** – Coal, Petroleum
- **Invenergy** – Gas

- **Avangrid** – Solar
- **EDF** – Solar

Manufacturers

Turbines by Operator and Manufacturer



GE Wind,
Siemens-Gamesa,
Vestas all high
contributors
among top
operators

03

Proposal



Potential Investment Routes

	Companies	Notes
Manufacturers	Look to invest with companies like: <ul style="list-style-type: none">• Siemens-Gamesa*• Vestas*	All key manufacturers in US Wind Energy Market *Signed COP26 to quadruple wind installations
Operators	Look to invest with companies like: <ul style="list-style-type: none">• EDF**• Avangrid**	Key operators in the US Wind Energy Market **Renewable energy focused
Both	Diversify investments and choose a selection of investment routes <ul style="list-style-type: none">• EDF Renouvelables	EDF Renouvelables is a notable company with a hand in manufacturing AND operations

04

Next Steps



Further Exploration Topics

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graph TD; A[Further Exploration Topics] --- B[Offshore]; A --- C[Environment]; A --- D[Stocks];
```

Offshore

As more data becomes available, keep an eye on offshore development and initiatives for wind energy plants for potential future investment

Environment

Take a closer look at the environmental issues that present when building wind turbines

Stocks

Take a closer look at stock market performance for key players in wind energy manufacturing and operations



Thanks!

Any questions?

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Wind

DATASPRINT

Energy Questions:

TRELLO || GITHUB || PRESENTATION

Tableau Stories:

STORY 1 || US Renewable Energy History

STORY 2 || Manufacturers & Turbine Capacity

STORY 3 || Wind Operators & US Population



STORY 4 || Wind Speed & Project Capacity



STORY 5 || Manufacturers by Operators

STORY 6 || OEM And Turbines

1. What is the place of wind in the global energy market?
2. What are the dynamics of the wind turbine market in the U.S.?
3. Are there trends in the wind turbine industry?
4. What are key features of wind turbines?
5. Who are the main players in the equipment manufacturer market?
6. Who operates wind turbines in the U.S.?
7. Where are wind turbines located across the U.S.?
8. How do turbine locations relate to population density & wind speed?
9. How transferable is wind power? How far can it travel?
10. Which turbine operators should WOW! invest in?

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  ANDREW COLLIE



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Datasets:

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2. [U.S. Wind Power Plant Operators](#)
3. [Our World in Data Energy](#)
4. [NCEI U.S. Wind Speed](#)

Additional Research

5. [Land Technologies Market Report](#)
6. [COP26 Wind Industry Manifesto](#)
7. [Inflation Reduction Act](#)
8. [Global Landscape of Renewable Energy Finance 2023](#)
9. [Renewable Energy Modernization Rule](#)
10. [Biden Administration Offshore Wind Energy Auction](#)
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22. [Offshore Wind Farms in the U.S.](#)
23. [Wind Market Reports 2023](#)
24. [Wind Turbine Operation and Maintenance Market](#)
25. [Wind Turbine Costs](#)
26. [Wind Power Purchase Agreement PPA Prices](#)
27. [Energy and Water Development Fiscal Year 2024](#)
28. [Republican 2024 Interior Environment Funding Bill Endangers Americans Health](#)
29. [IPCC Wind Energy](#)