

WHY SWITCH TO WIND TURBINES ?

A POTENTIAL TO AMPLIFY
YOUR INVESTMENT



OUR COMPANY

**WE ARE AN IMPACT-DRIVEN, RESULTS-ORIENTED
CONSULTANCY.**

A team of consultants with over 25 years in energy investments. Analyzing data sources and proposing solutions to strategic planning problems. Aim to provide data-driven decision support.



OUR TEAM



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A stylized illustration featuring a large white wind turbine on the left, set against a light green background with rolling hills and a city skyline at the bottom. The city is represented by a series of green buildings of varying heights. The sky is white with a few small white clouds. The overall theme is renewable energy and urban development.

INTRODUCTION

Wind Turbines over HydroPower? Each promises different benefits, the best way to plan your investment is to examine to understand the environmental and economic benefits.

How Does Wind Energy Work?

Wind blows past turbines, rotating their blades.

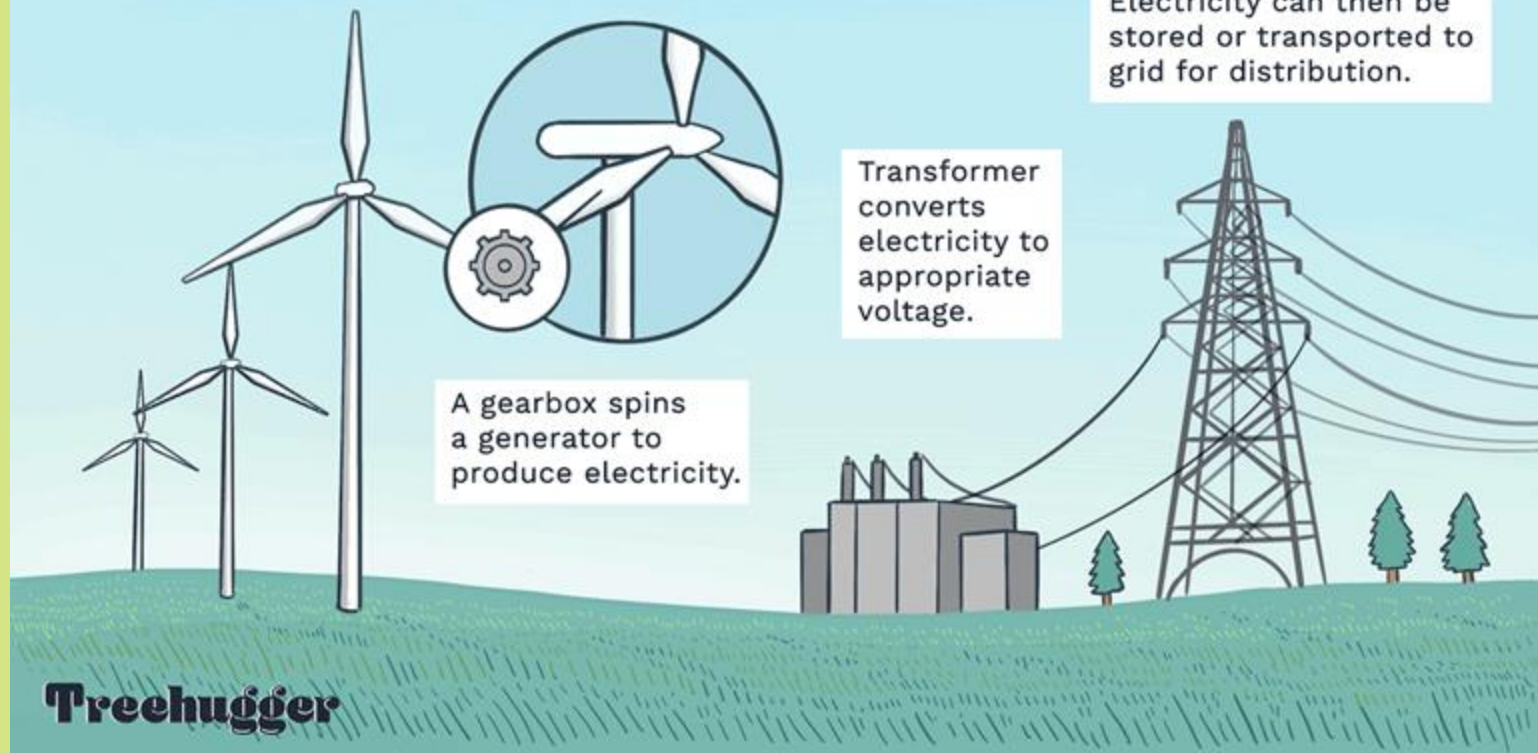
The kinetic energy is transformed into mechanical energy.



Electricity can then be stored or transported to grid for distribution.

Transformer converts electricity to appropriate voltage.

A gearbox spins a generator to produce electricity.



WIND MARKET We Are Focused On?

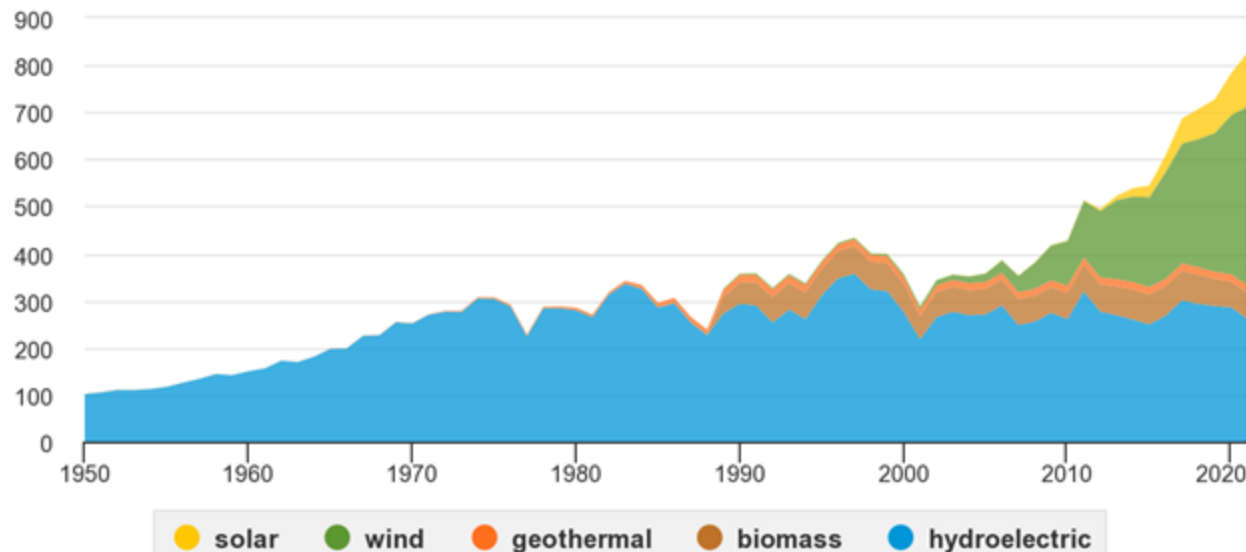
USA



Rank of Wind Power & HydroPower

U.S. electricity generation from renewable energy sources, 1950-2021

billion kilowatthours



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 7.2a, January 2022 and *Electric Power Monthly*, February 2022, preliminary data for 2021

Note: Includes generation from power plants with at least 1 megawatt electric generation capacity. Hydroelectric is conventional hydropower.



The percentage shares of total U.S. utility-scale electricity generating capacity by primary energy source in 2021 were:

43%
natural gas

18%
coal

27%
renewables
(total)

16%
nonhydroelectric
9%
hydroelectric

8%
nuclear

Wind vs. Hydro Plants

1235

WIND OPERATING
PLANTS

653

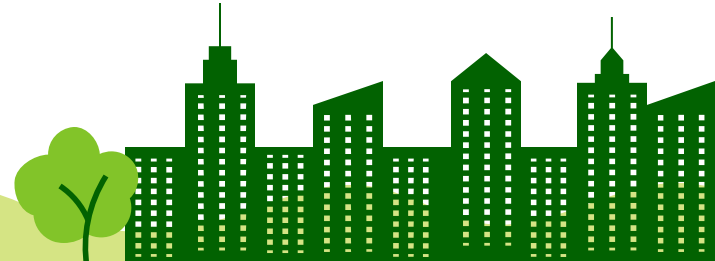
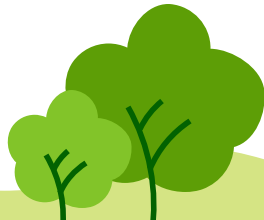
WIND OPERATORS

1457

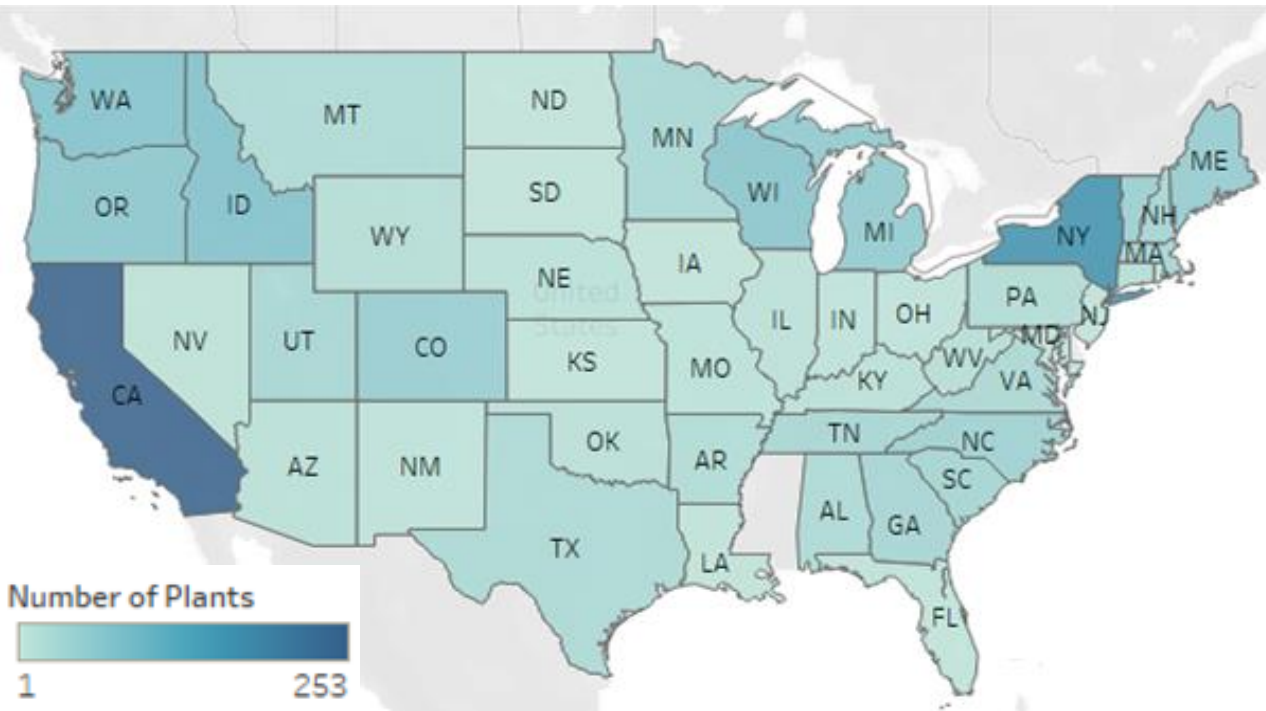
HYDRO OPERATING
PLANTS

469

HYDRO OPERATORS

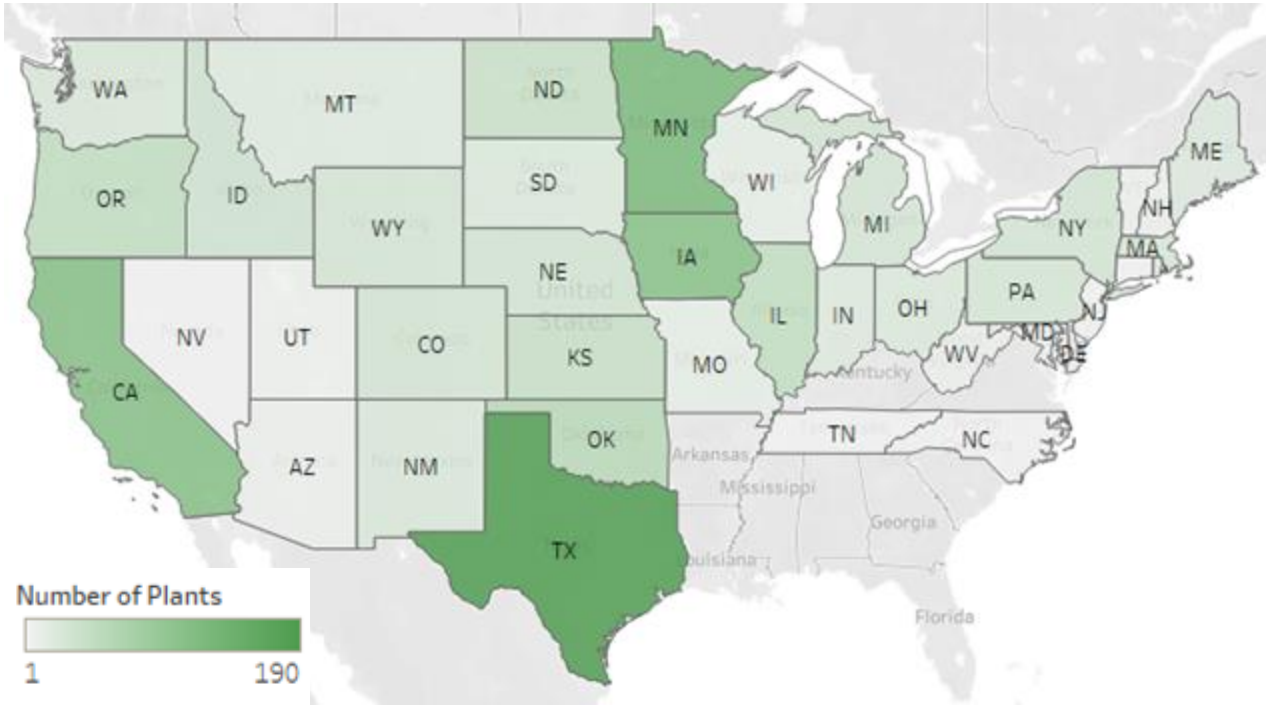


Hydro-Powered (Plants per State)



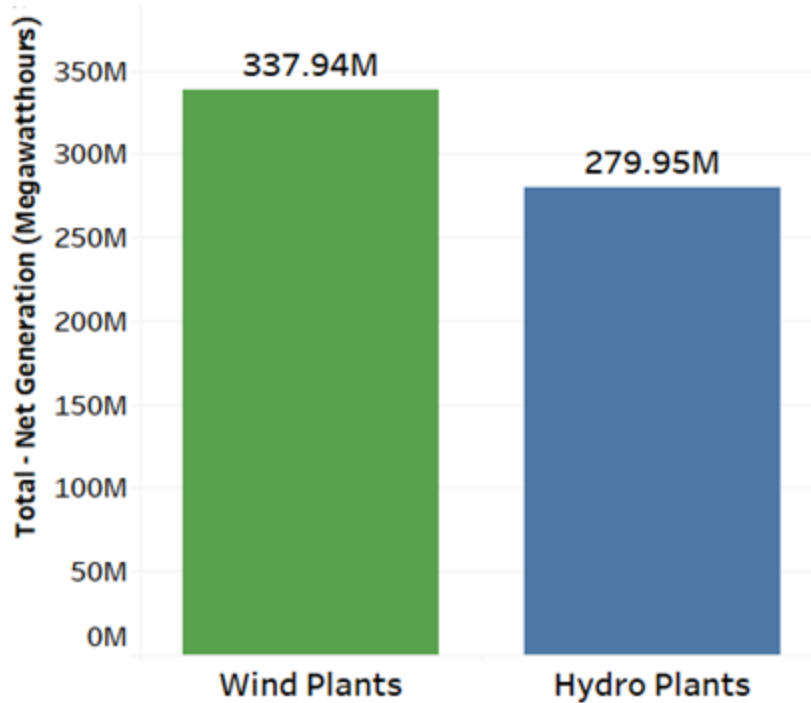
Hydro Operating Plants	
STATE	NUMBER OF PLANTS
California (CA)	253
New York (NY)	165
Washington (WA)	74
Indiana (ID)	74
Wisconsin (WI)	66

Wind-Powered (Plants per State)



Wind Operating Plants	
STATE	NUMBER OF PLANTS
Texas (TX)	190
Minnesota (MN)	129
California (CA)	114
Iowa (IA)	112
Oklahoma (OK)	57

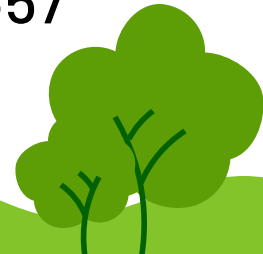
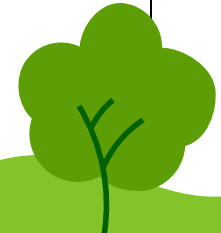
Total Electric Output



In 2022, Wind-powered plants generated around **17%** more than Hydro-powered plants.

Top Wind-Powered Plants

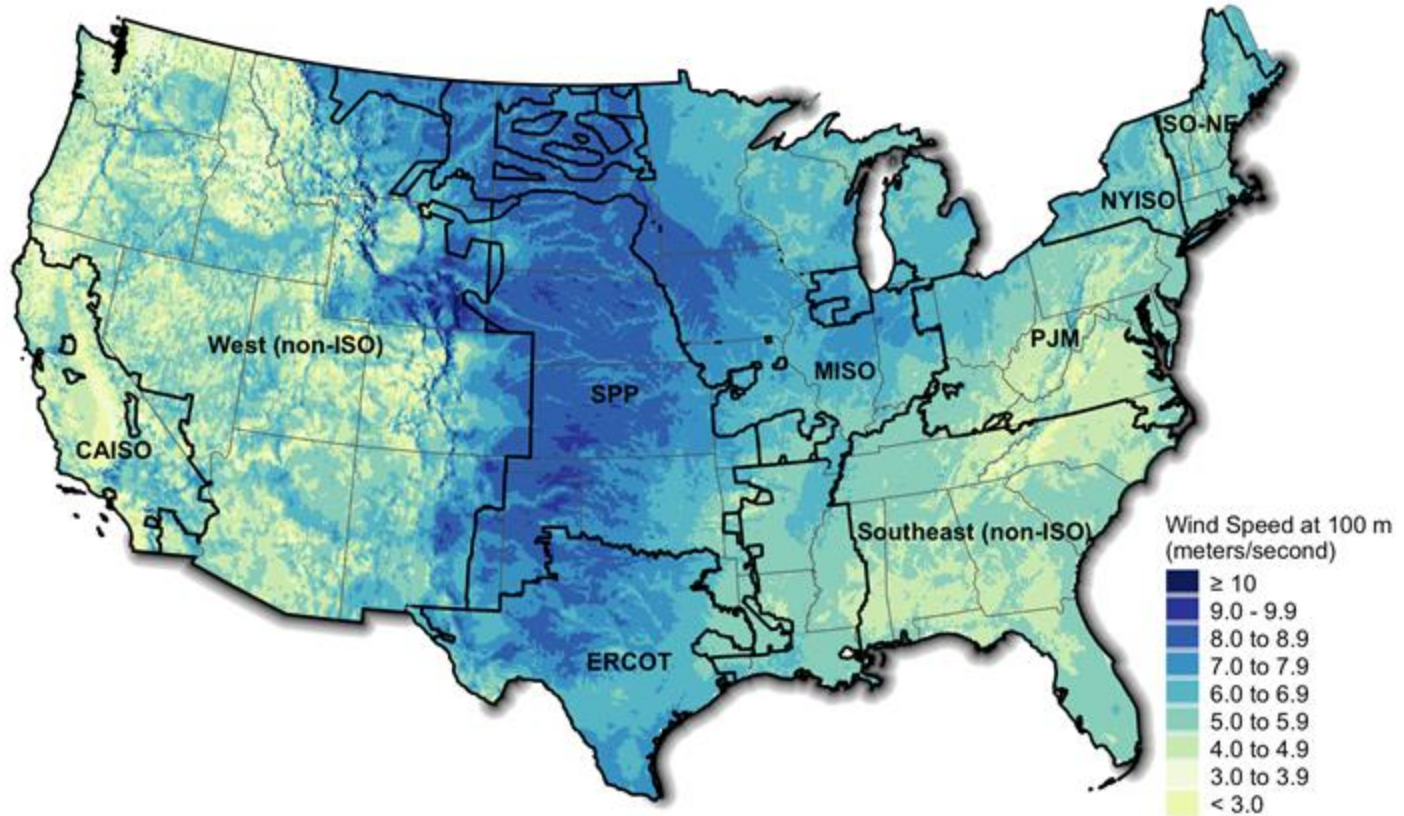
- **By number of Plants per Operator:**
 - **Willmar** : Has two plants operating in Minnesota (MN)
 - **High Plane** : Has two plants operating in Texas (TX) and Wyoming (WY)
- **By Total Electric Output (in MegaWattHour):**
 - **Horse Hollow Wind Energy Center (TX):** 2,513,457
 - **Capricorn Ridge Wind LLC (TX):** 2,259,411
 - **Hale Community Wind Farm (TX):** 2,083,677



Wind Speed



The Average Annual Wind Speed At 100 meters



Offshore Vs Onshore



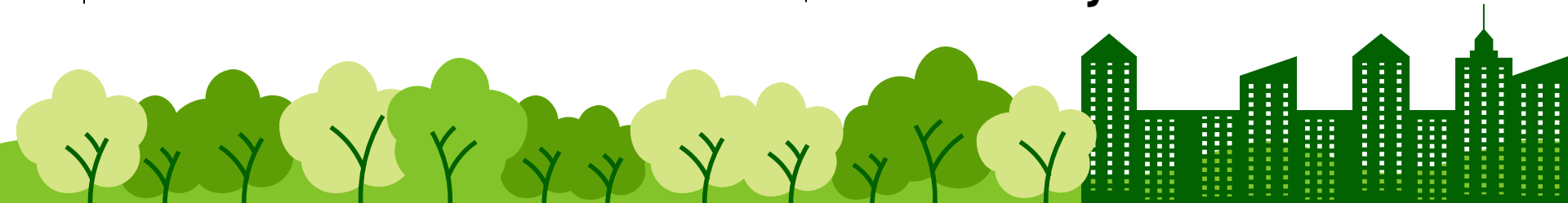
Offshore

Advantages

- **Offshore wind turbines are more efficient**
- **Reduced environmental impact**
- **More space to construct in**

Disadvantages

- **Higher installation cost**
- **More challenging to maintain and repair**
- **It has an effect on the marine life and ecosystem**



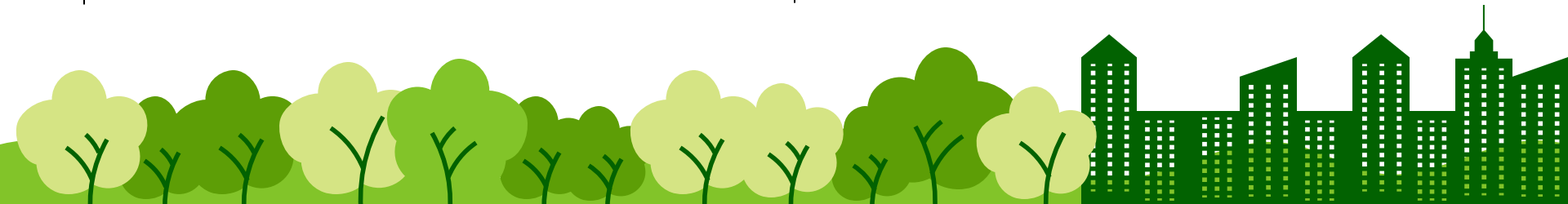
Onshore

Advantages

- **Reduced environmental impact**
- **Cost effective**
- **Quicker installation and easier maintenance**

Disadvantages

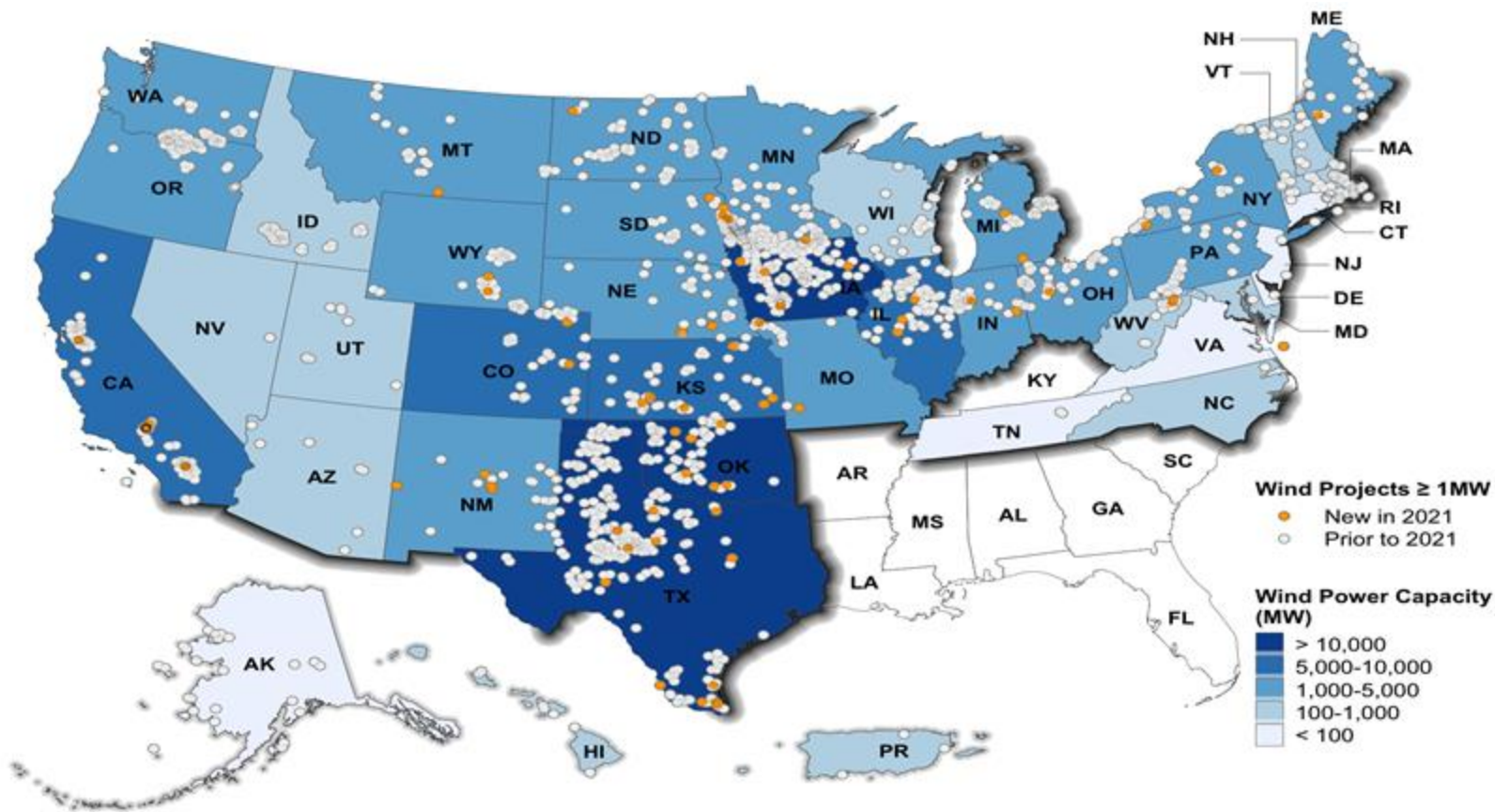
- **Less power generation than the offshore**
- **Some residents could complain about the noise**



Wind Market

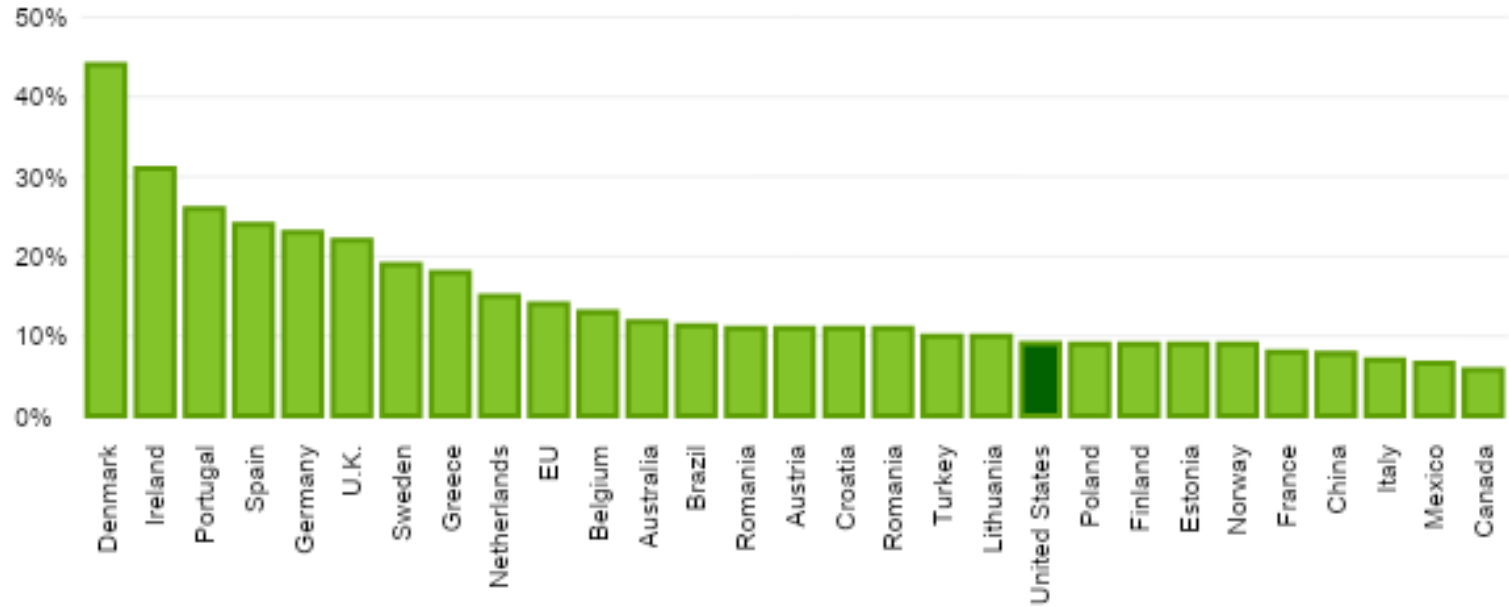


U.S. Wind Power Installations By State



Wind Energy Penetration In Subset Of Top Global Wind Markets

Wind as Percentage of Total Generation in 2021



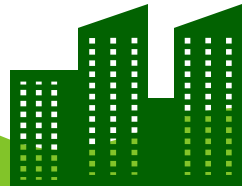
International Rankings Of Total Wind Power Capacity

Annual Capacity
(2021, GW)

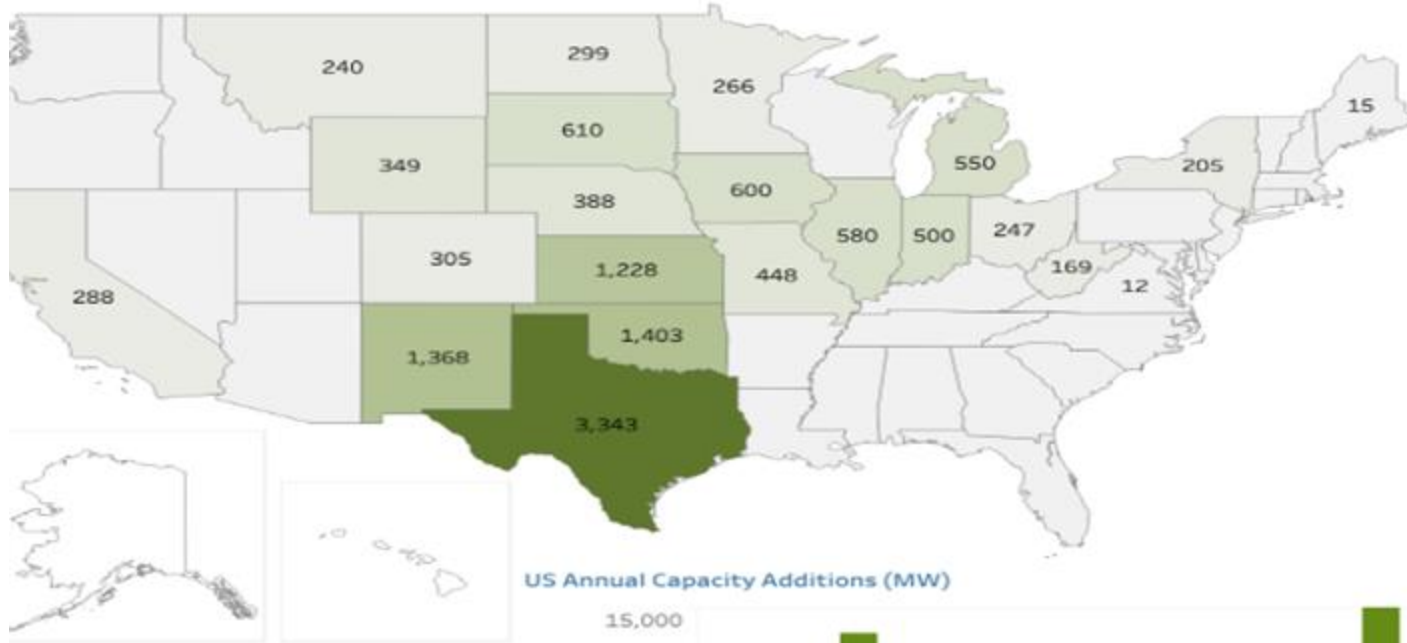
China	47.6
United States	13.4
Brazil	3.8
Vietnam	3.5
United Kingdom	2.6
Sweden	2.1
Germany	1.9
Australia	1.7
India	1.5
Turkey	1.4
<i>Rest of World</i>	14.7
TOTAL	94.3

Cumulative Capacity
(end of 2021, GW)

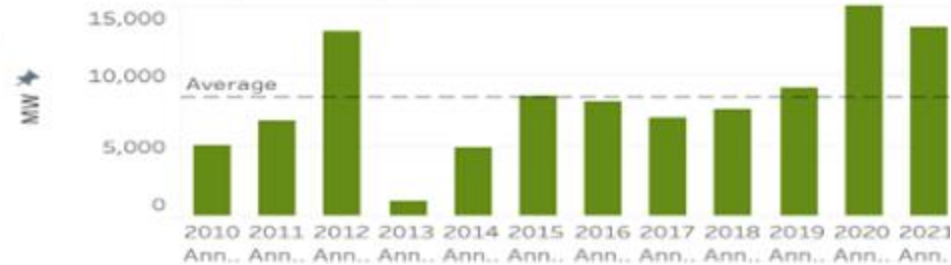
China	338.3
United States	135.9
Germany	64.5
India	40.1
Spain	28.3
United Kingdom	26.6
Brazil	21.6
France	19.1
Canada	14.3
Sweden	12.1
<i>Rest of World</i>	138.1
TOTAL	838.9



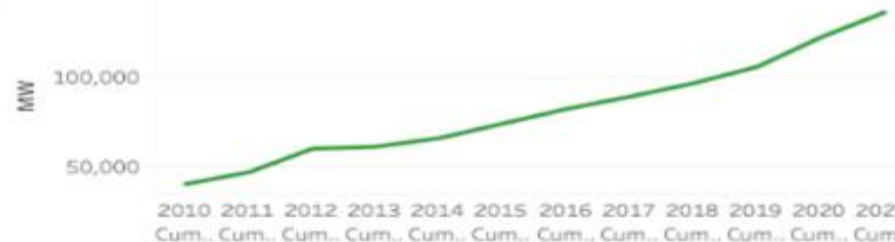
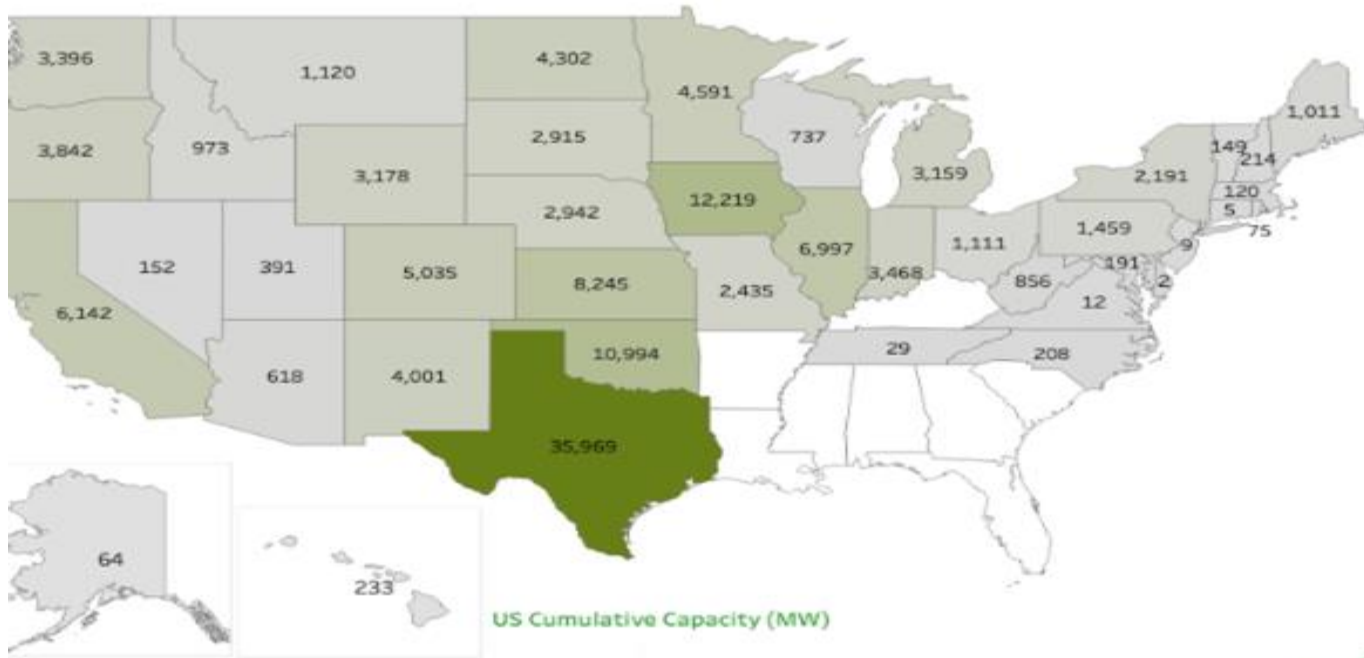
Annual Wind Capacity Installations (MW) 2021



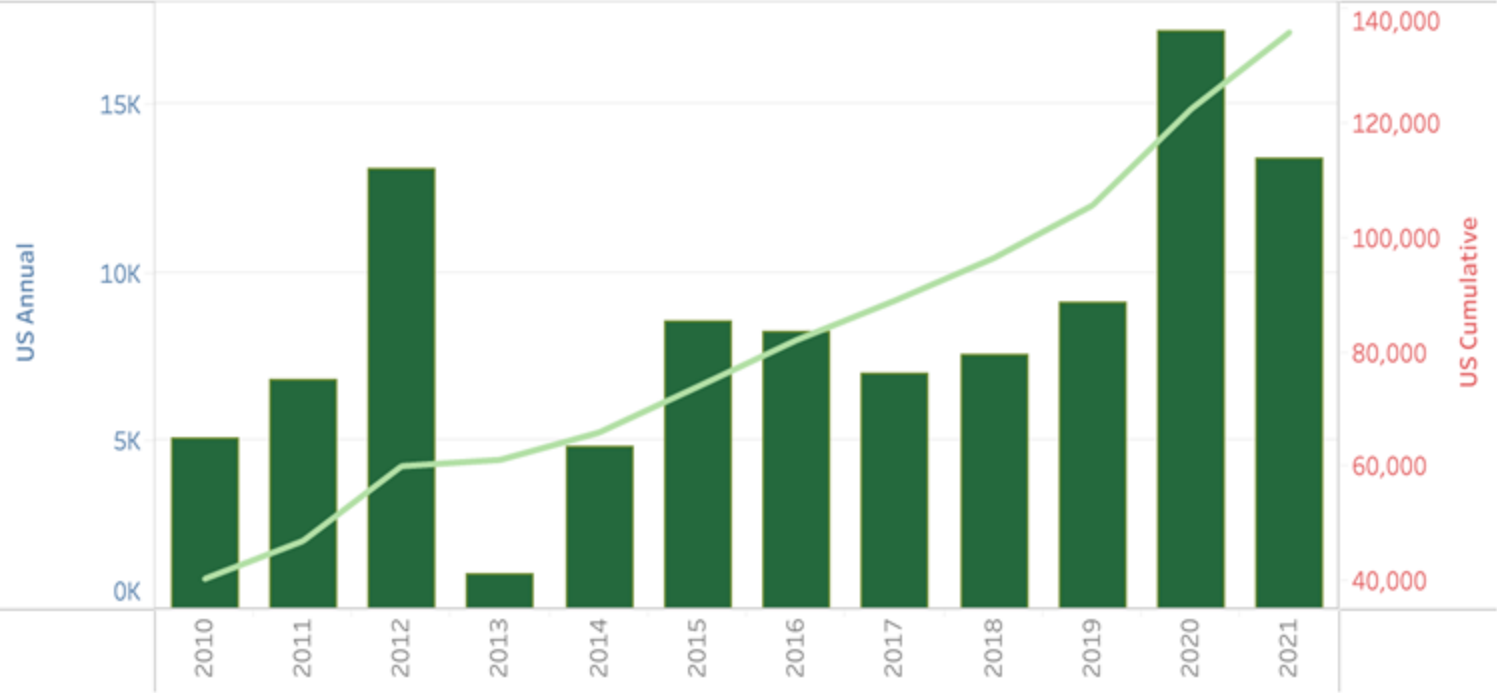
US Annual Capacity Additions (MW)



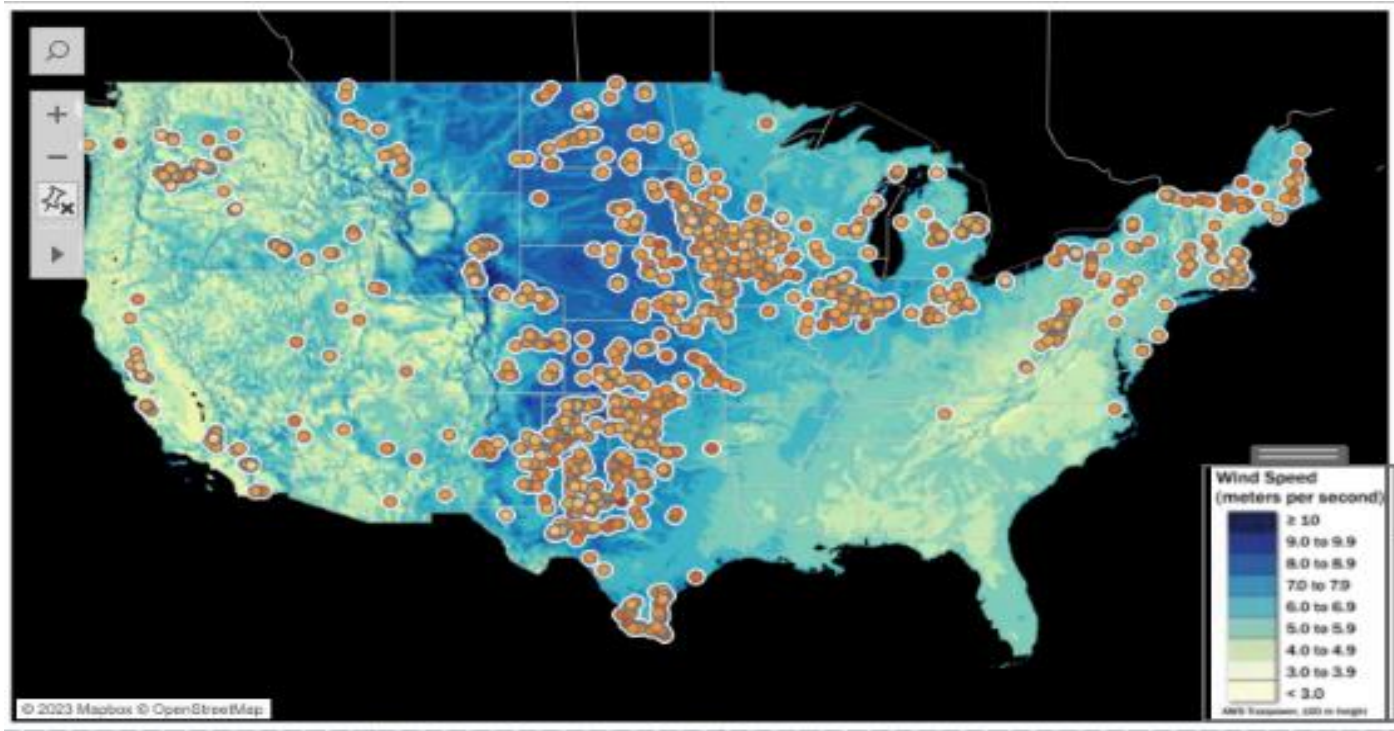
Cumulative Wind Capacity (MW) 2021



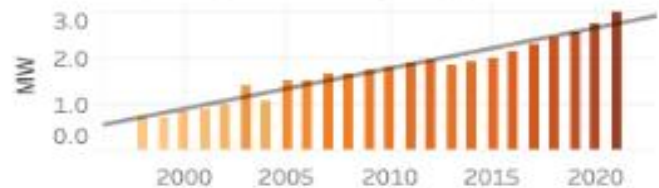
US Annual and Cumulative Capacity Additions (MW)



Turbine Capacity



Turbine capacity trends (avg.MW)

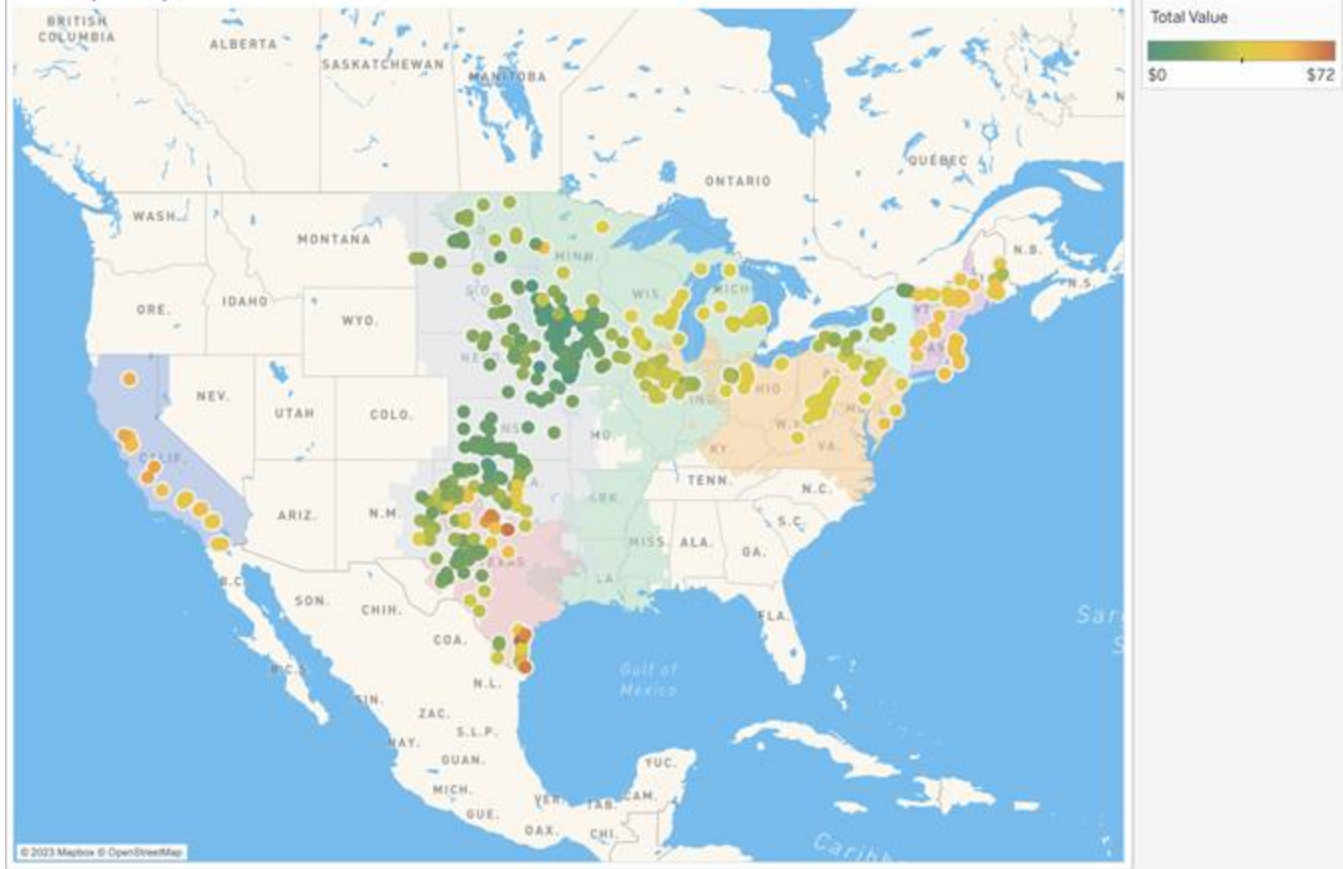


Value & Cost

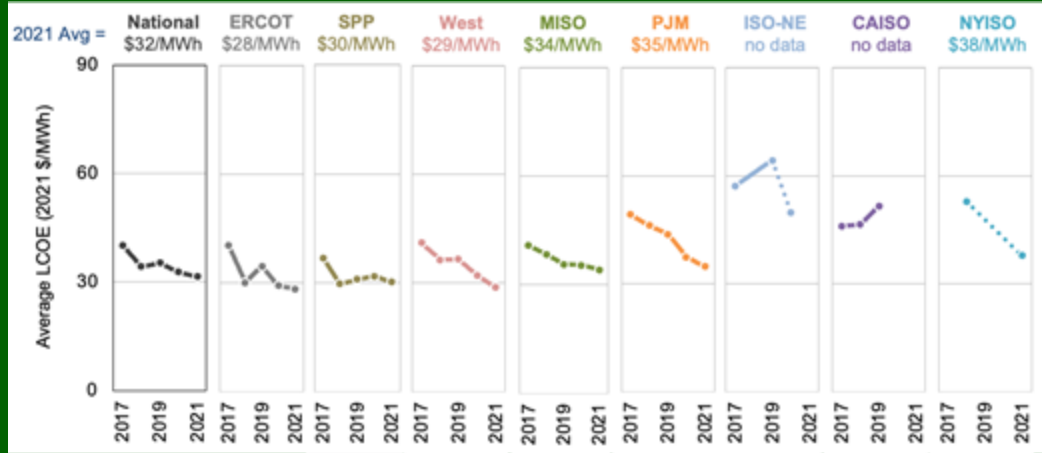


Wind Market Value for 2021

Energy + Capacity Value per year, by project and ISO capacity-weighted average (All values in 2018\$/MWh)



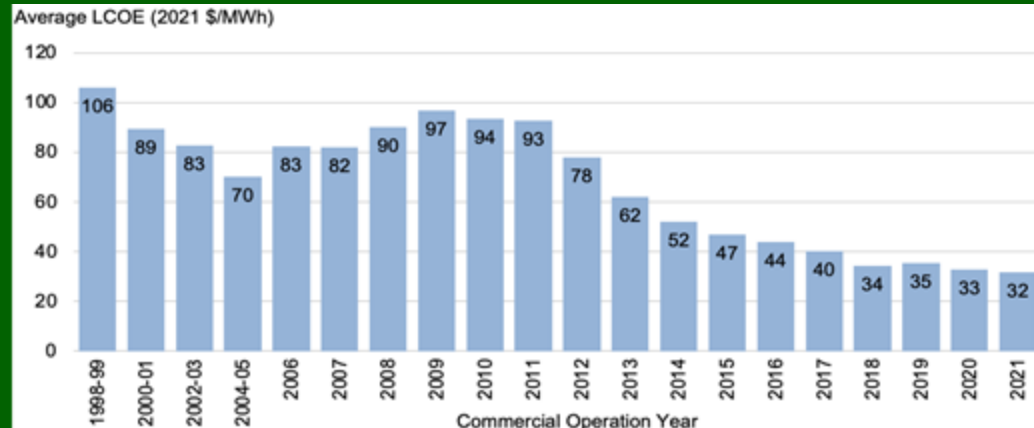
Estimated levelized cost of wind energy by region, over last five years



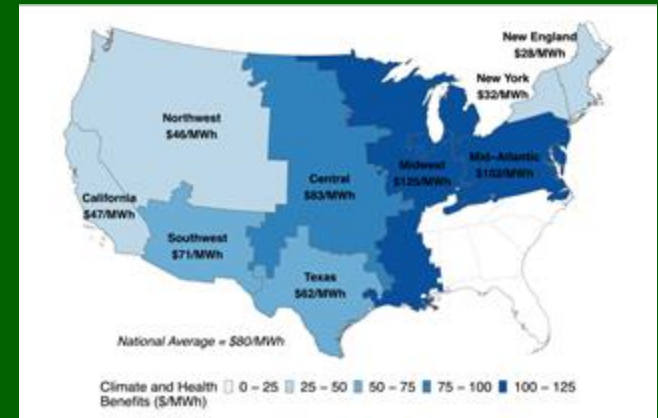
Value factor of wind energy



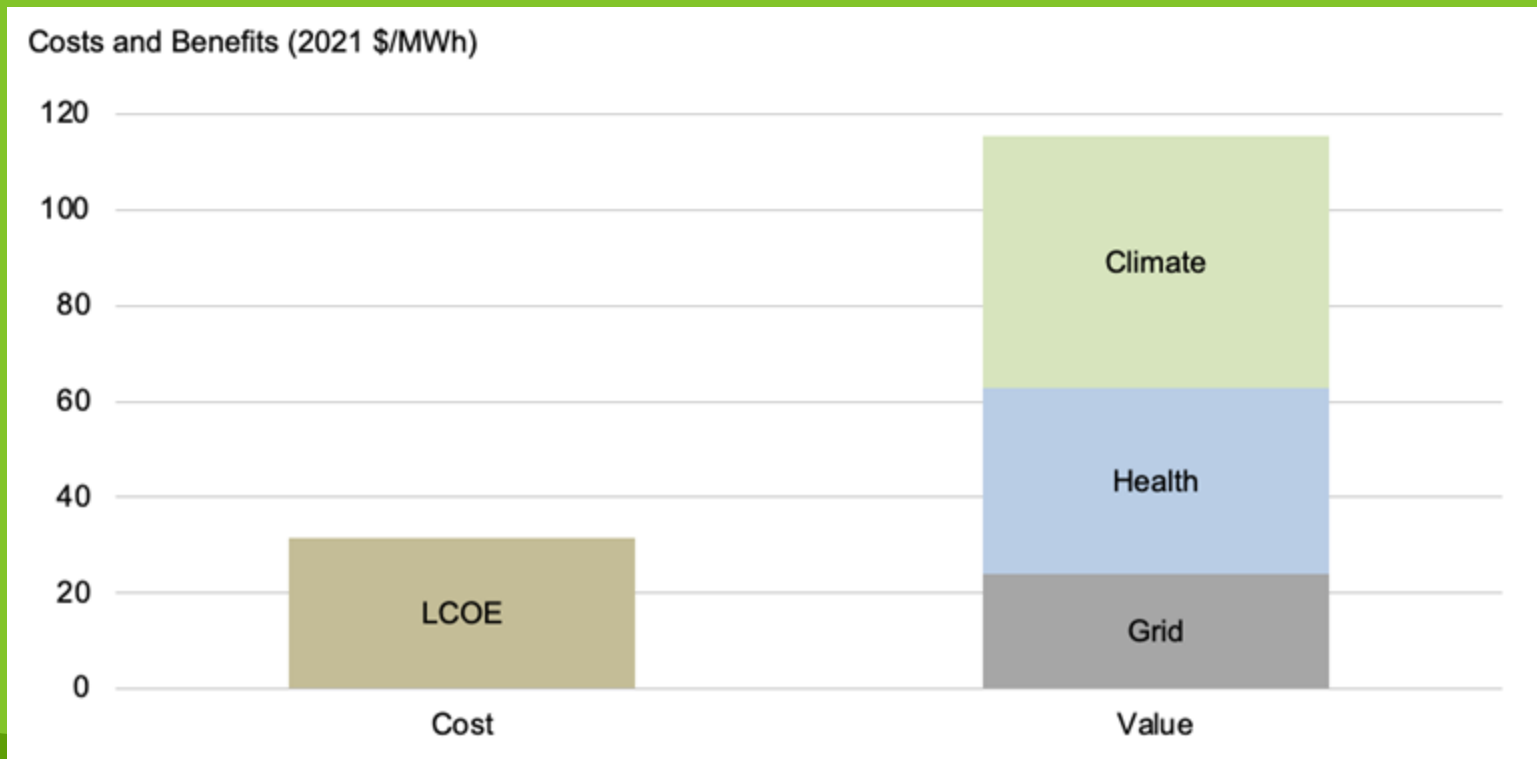
Estimated levelized cost of wind energy by commercial operation date



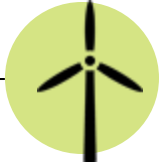
Marginal health and climate benefits from wind generation by region in 2021



Marginal Health, Climate, and Grid-Value Benefits From Wind Generation Versus LCOE in 2021

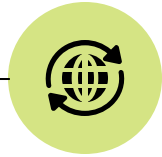


Recommendation



Wind Power

Wins over other
energy investments



Environment Friendly

It has less damage
than hydropower



Good Investment

It is a growing
market and it is
cost effective



Texas Onshore

High wind speed
and a higher
electricity output
and has a levelized
cost.



Thanks For listening!



STAY GREEN

