

Illinois Utility-Scale Wind and Solar

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About Me



- Bachelor of Arts Degree from Illinois State University – Visual Communications
- Worked as Website & Social Media Manager for a mental health treatment center for seven years
- Started in the energy industry four years ago at Strategic Economic Research



Goals for today's presentation

- Learn some basic terms & definitions as it relates to utility-scale renewable energy in Illinois
- Learn about the historical growth of utility-scale renewable energy projects in Illinois
- Learn about the economic impact that utility-scale renewable energy has had in Illinois



Terms & Definitions

What is “Utility-Scale” ?

- The definition of “utility-scale” is typically determined by size.
- The **Solar Energy Industries Association (SEIA)** defines a solar project as “utility-scale” if it has a name-plate capacity of 1 million watts or 1 megawatt (MW).
- However, the **National Renewable Energy Laboratory (NREL)** labels a solar project “utility-scale” if it has 5 MW of solar energy capacity. Other institutions may go even higher, using a 20 MW solar capacity threshold.

What is "Utility-Scale" ?

- Several different categories of solar energy projects:
 - Residential
 - Commercial
 - Utility-scale
 - Community

- **“Residential solar”** means solar panels to power a single house. The panels are typically mounted on a homeowner’s roof, but could also be mounted in the backyard (this is called a “ground-mount array”) or on the roof of another structure on the property, such as a detached garage, carport or shed. A residential solar array typically consists of anywhere from eight to 20 panels.

- **“Commercial solar”** is simply solar for a commercial business. The business could be as small as a gas station or as big as a manufacturing facility or the headquarters of a multinational corporation and involve a dozen panels or several thousand panels. As with residential solar, panels are typically mounted on the roof of commercial buildings but could also be mounted on the ground adjacent to or nearby the facility.

A “utility-scale solar” project is a typically a very large array comprising hundreds or even hundreds of thousands of panels. The power generated by a utility-scale project is purchased either by:

- A utility, municipality (if the electric utility is owned by a city), or an electric cooperative (in more rural areas) to serve both residential and commercial customers in their service area
- A corporation to power its needs in a particular region
- One or more large universities or other institutions in the same area that pool together to buy electricity

- **“Community solar”** is something of a hybrid. Community solar is a solution for consumers who want to obtain their power from solar energy but cannot install an array on their house because, for example, they live in an apartment, or because their roof does not face south. In response, some utilities offer their customers a community solar option. The utility builds a utility-scale array sized to meet the power needs of interested customers, then offers those customers special pricing and contract structures to obtain their power from that array. In essence, community solar projects are small utility-scale projects developed for a specific reason, with the power they generate sold in a unique business model.

What is a megawatt (MW)?



Definition: “A unit of power, equal to one million watts.” (Dictionary.com)

Carboncollective.co - The total possible output or production of a generator or plant is expressed in megawatts. This is the generating capacity of the plant. It can be compared to a horsepower rating, it is how a generating plant is designed to produce energy at full load. (Carboncollective.co)

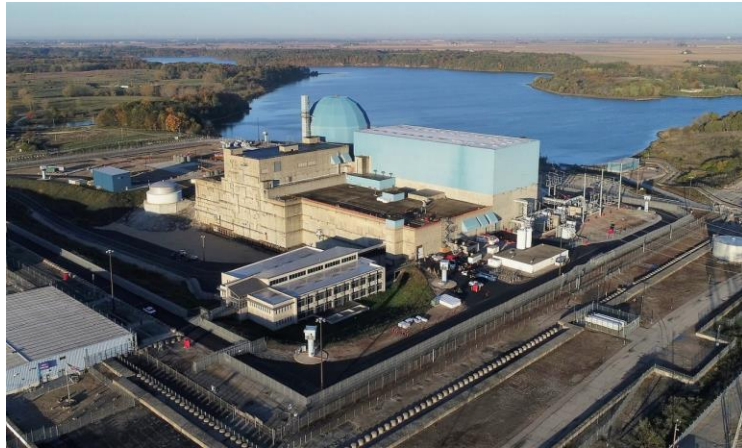
The current national average (through Q1 2024) of homes powered by a MW of solar is 172. (SEIA)

What is capacity?



Capacity is the amount of electricity a generator can produce when it's running at full blast. This maximum amount of power is typically measured in megawatts (MW) or kilowatts and helps utilities project just how big of an electricity load a generator can handle.

What is capacity?



Clinton Nuclear Power Plant
1,080 MW



Twin Groves Wind Farm
Largest Wind Farm in IL
396 MW



**Double Black Diamond
Solar Project**
Under Construction
800 MW

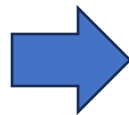
What is the grid?

The **electrical grid** is the intricate system designed to provide [electricity](#) all the way from its [generation](#) to the customers that use it for their daily needs. These systems have grown from small local designs, to stretching thousands of [kilometers](#) and connecting millions of homes and businesses today.

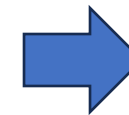
The grid consists of countless complex interconnections, however there are three main sections—[electricity generation](#), [transmission](#) and [distribution](#).



Electricity Generation



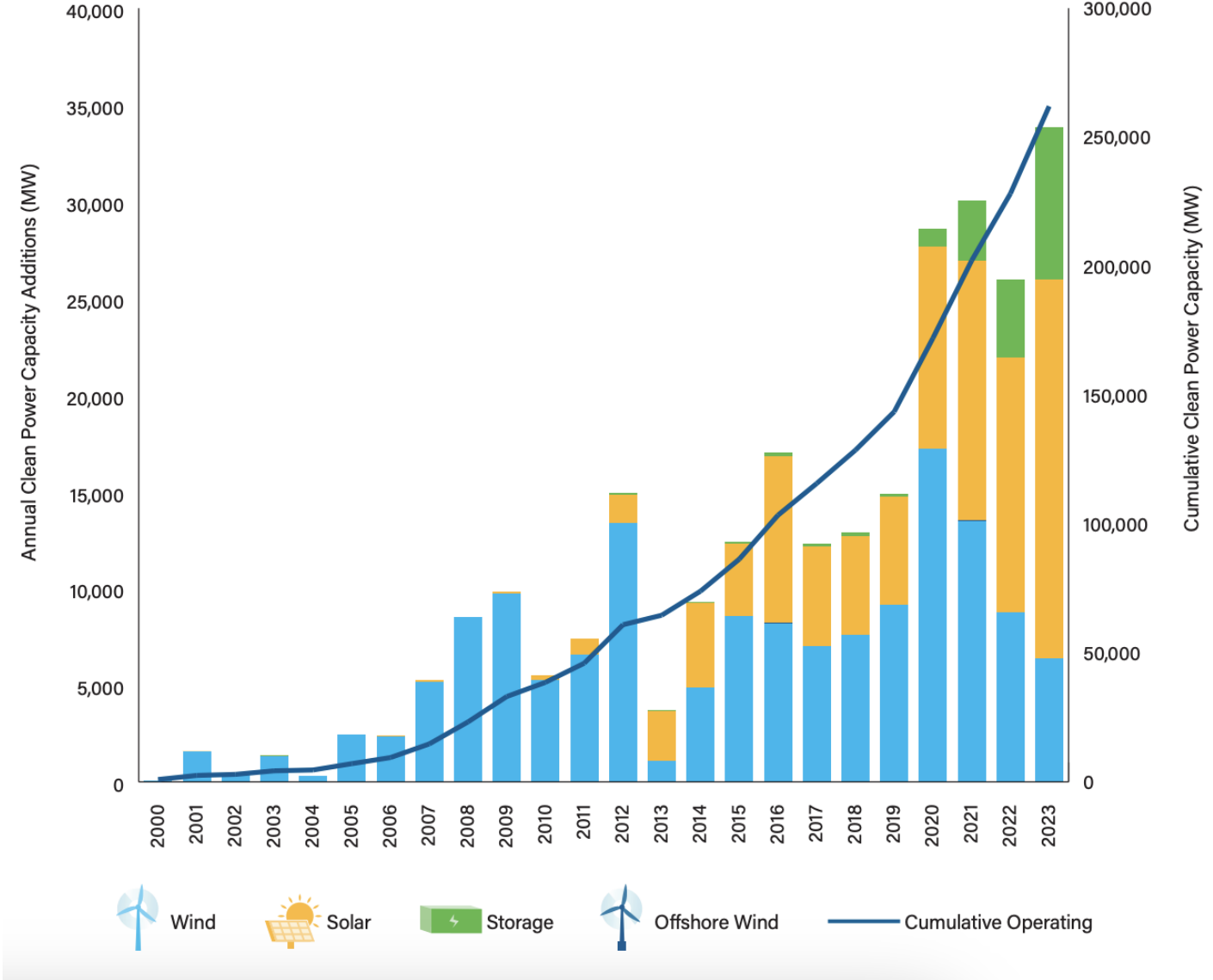
Transmission



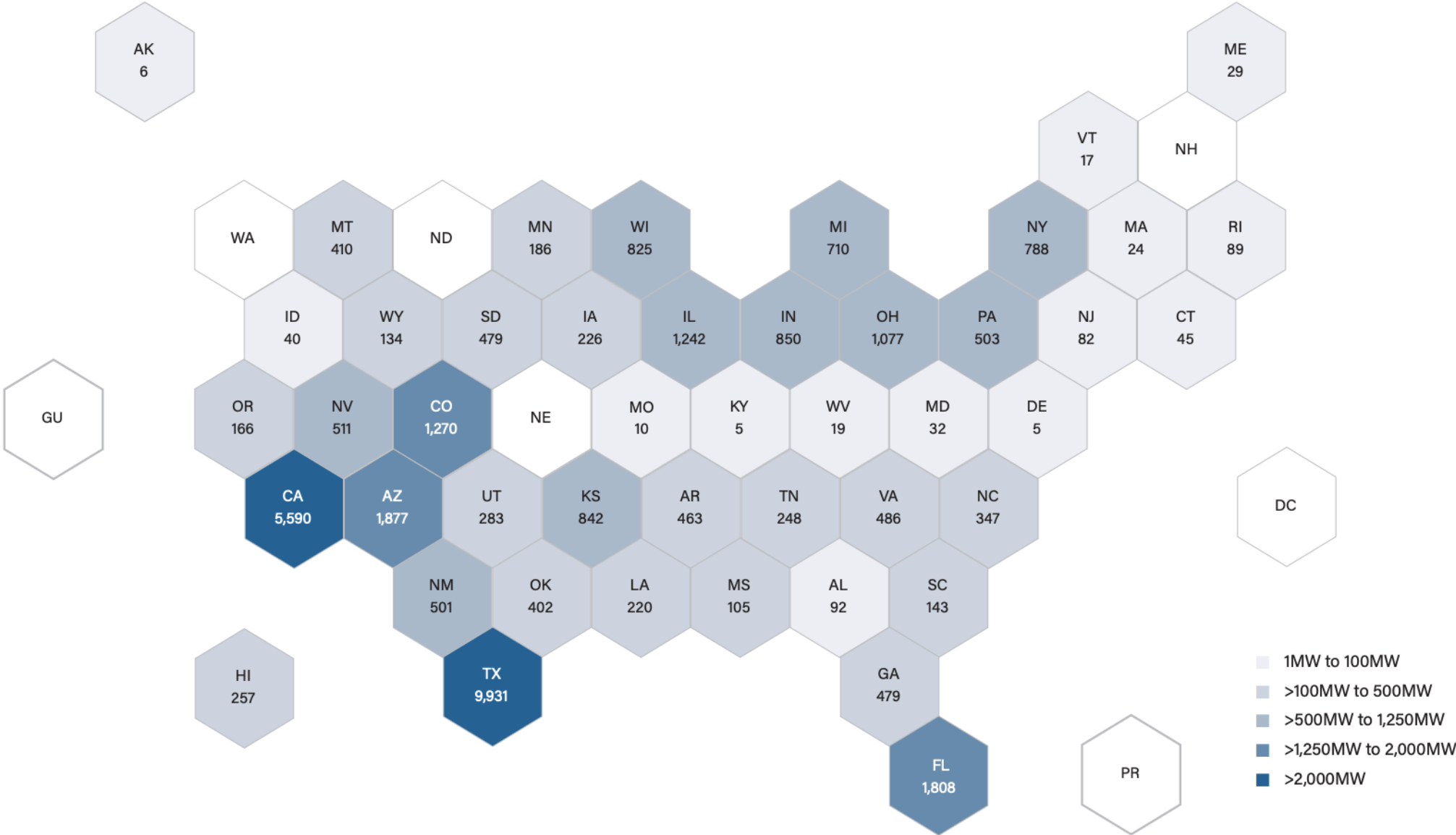
Distribution

Growth of Wind and Solar in Illinois

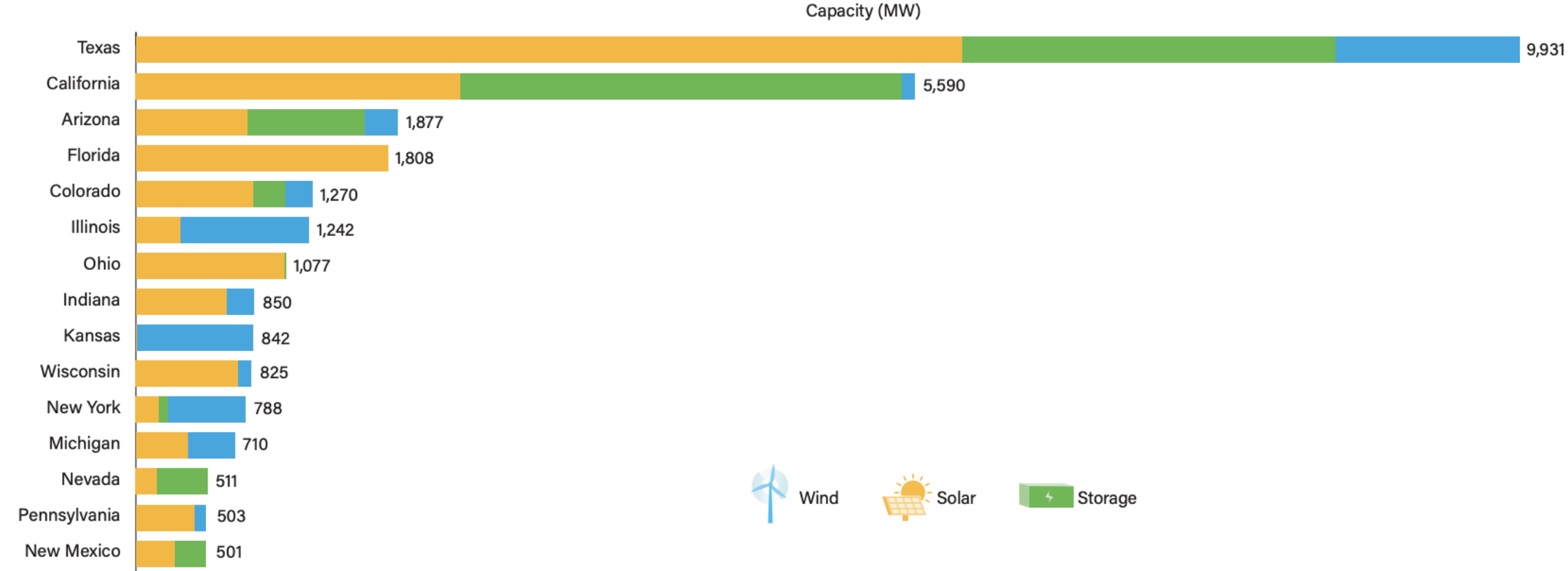
U.S. Annual and Cumulative Utility-Scale Clean Power Capacity Growth



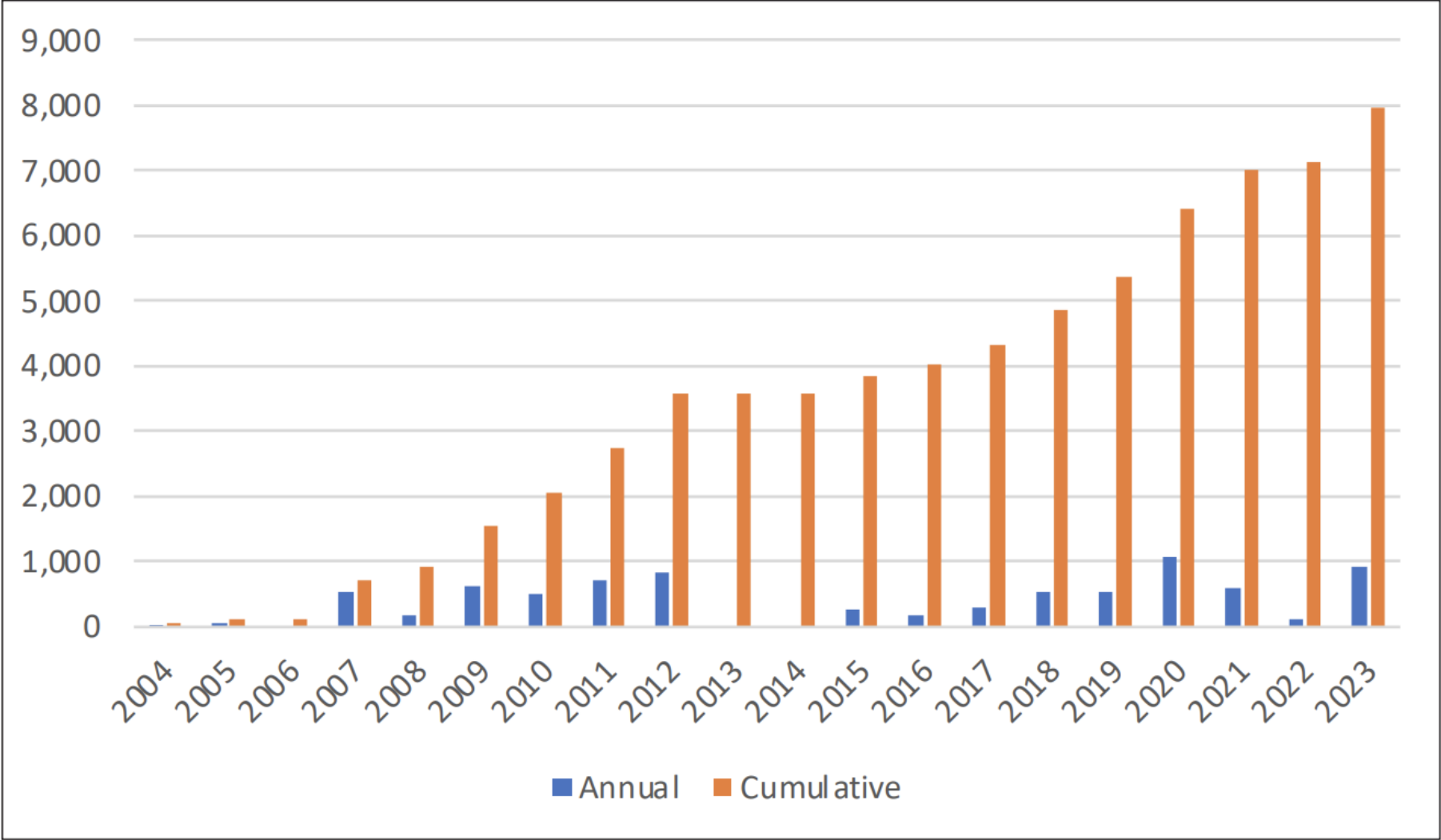
Clean Power Projects Installed in 2023



Top States for Clean Power Additions in 2023

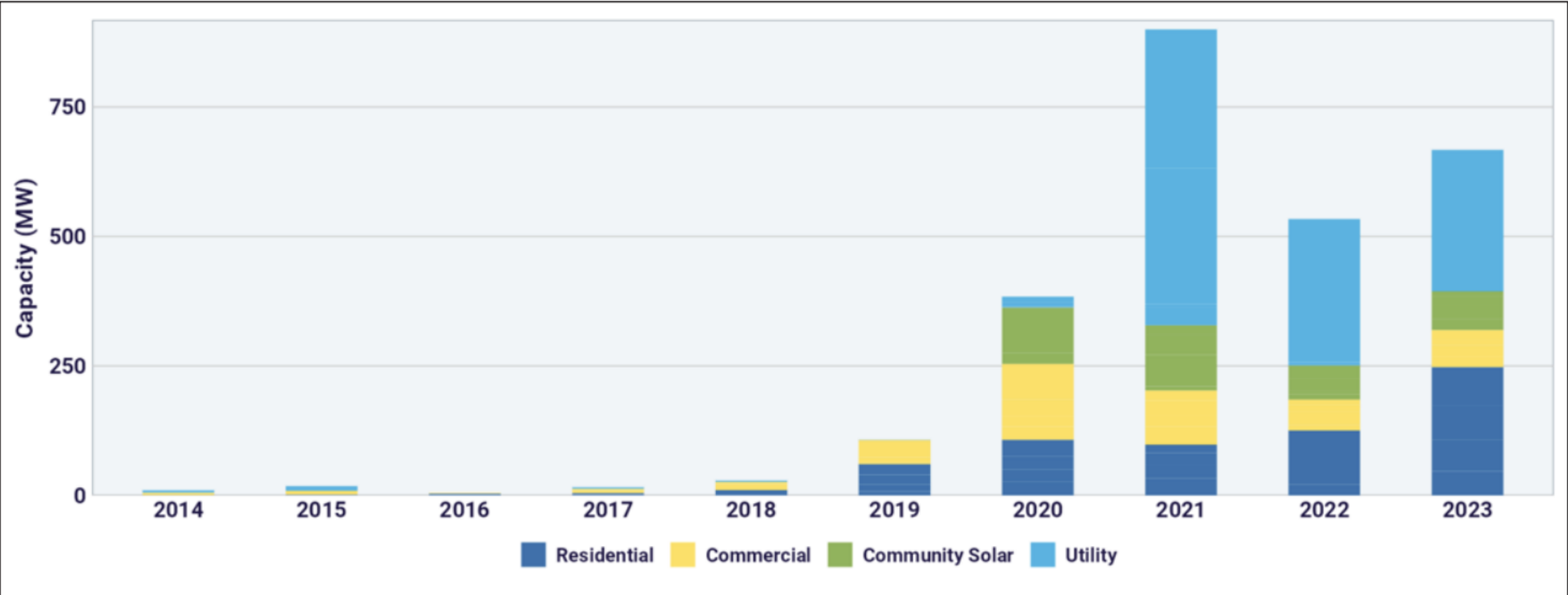


Illinois Annual Wind Installations



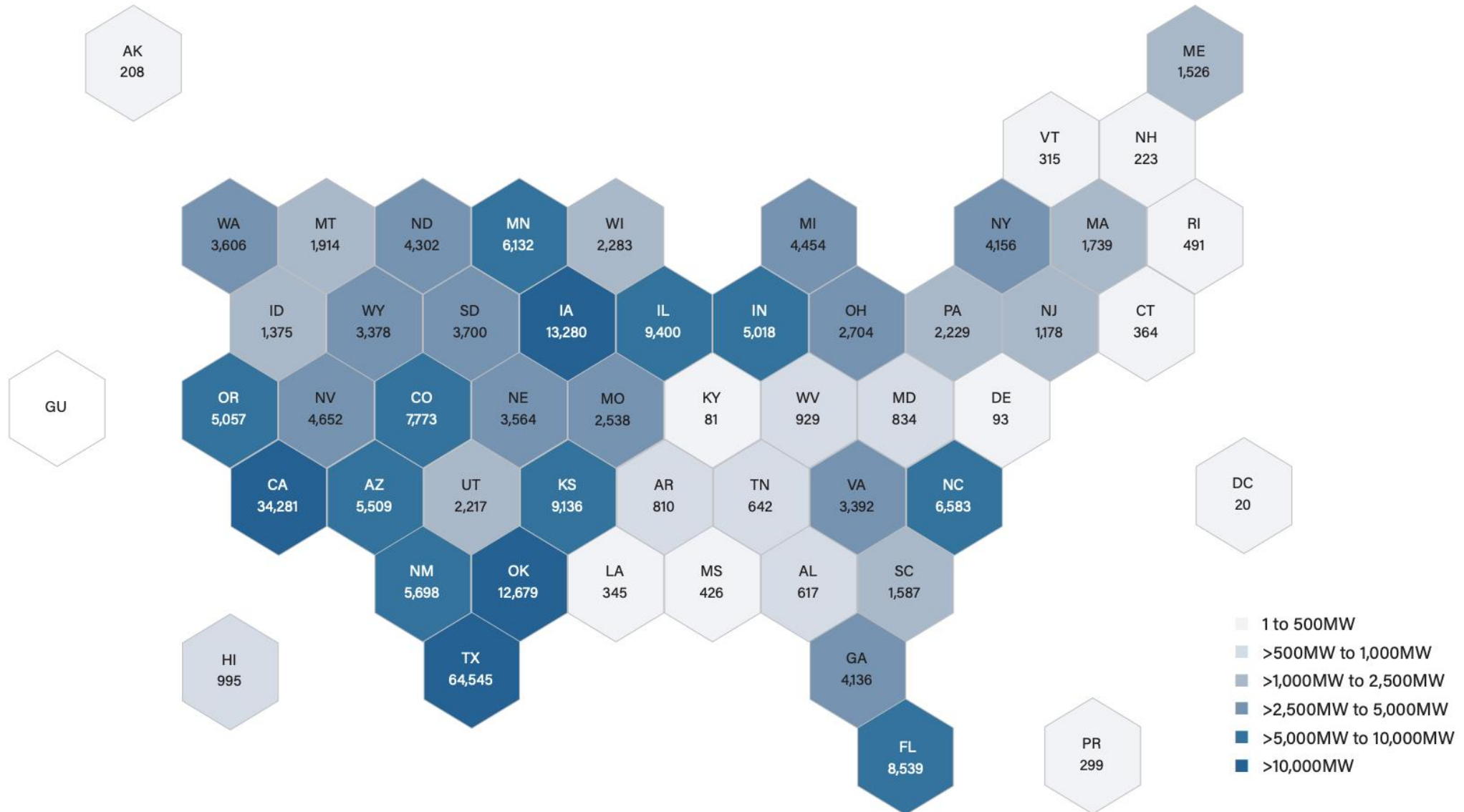
Source: American Clean Power, July 2024, Illinois

Illinois Annual Solar Installations

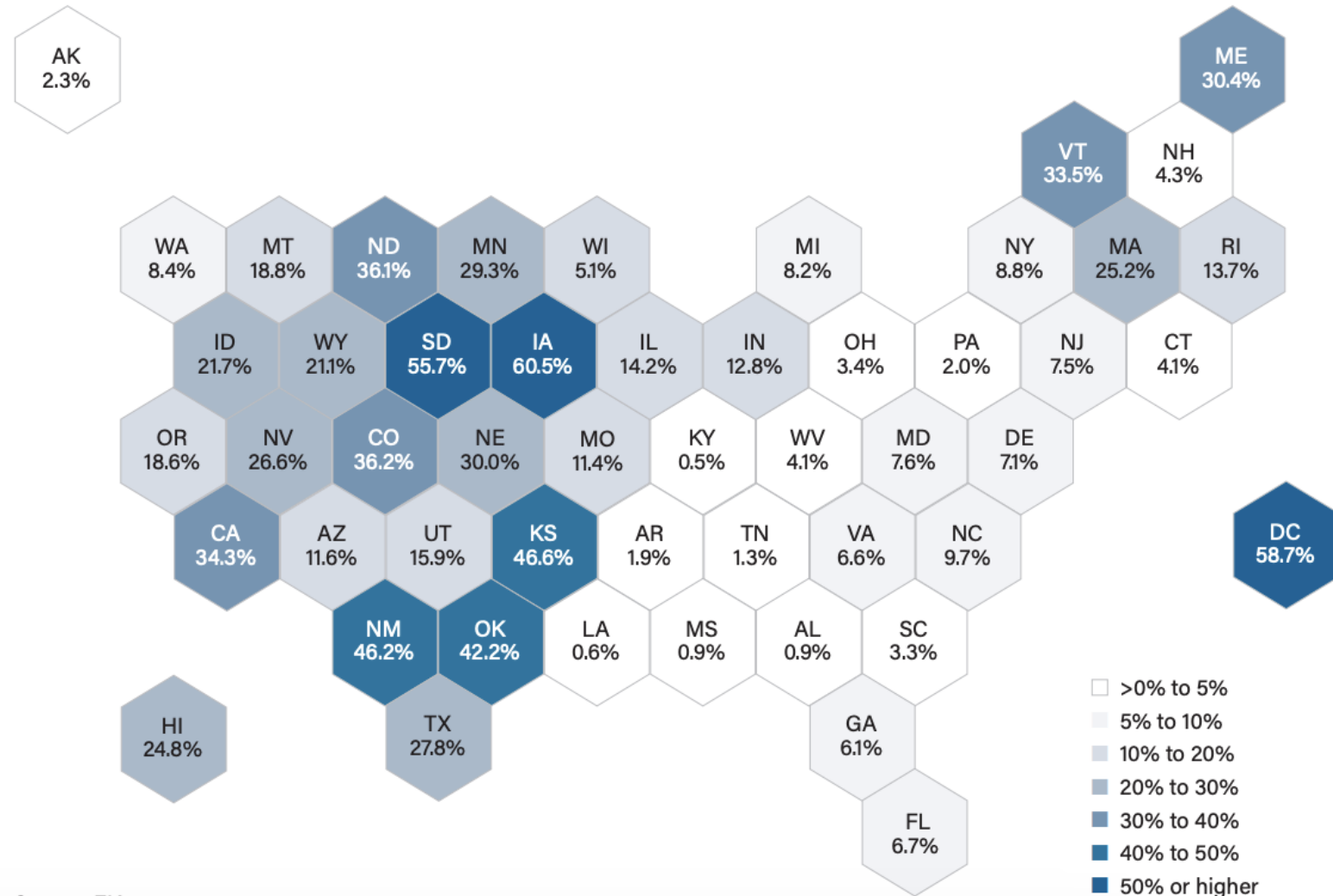


Source: Solar Energy Industries Association, Solar Spotlight: Illinois, Q4 2023

Operational Clean Power Capacity, by State

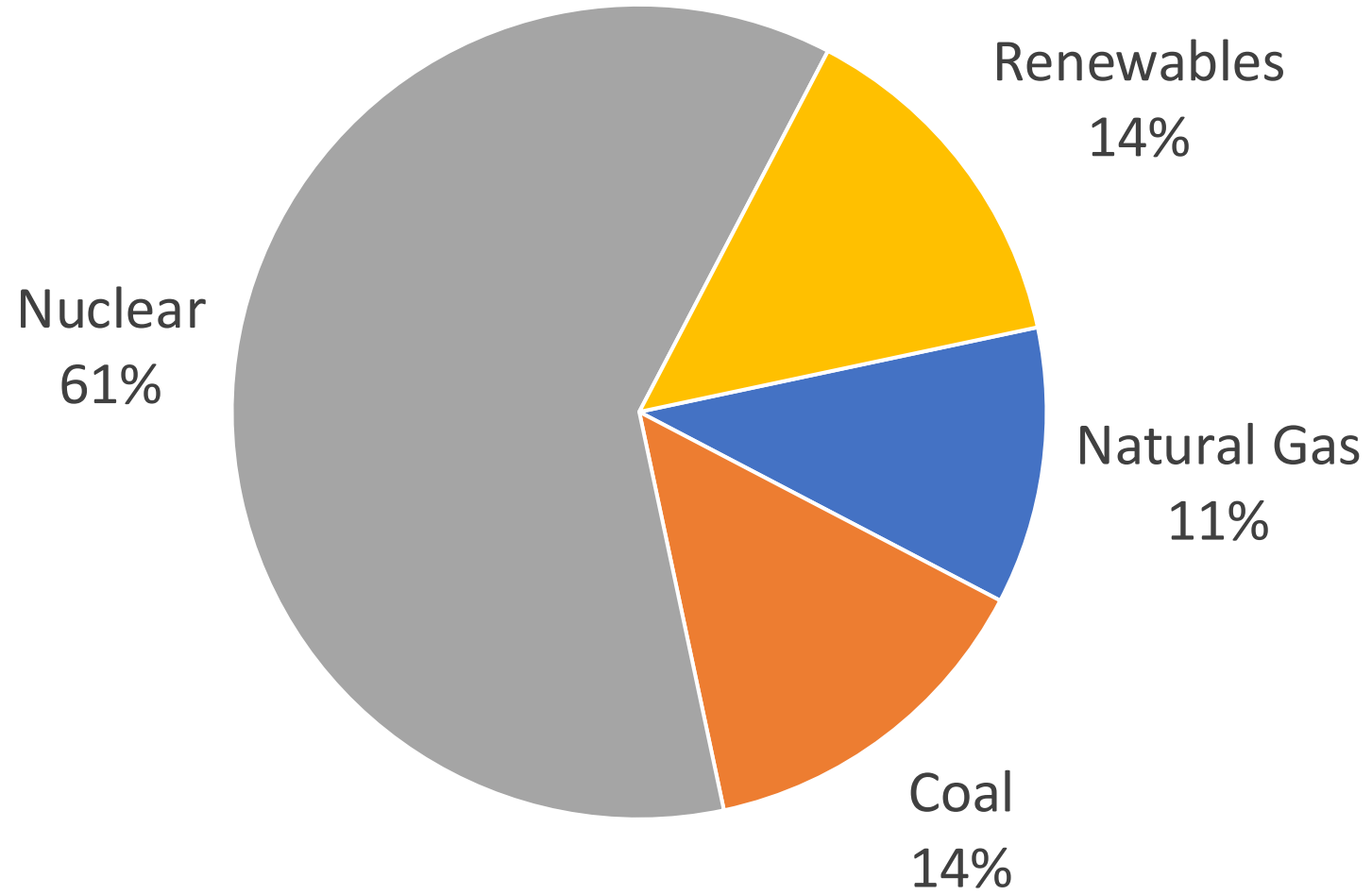


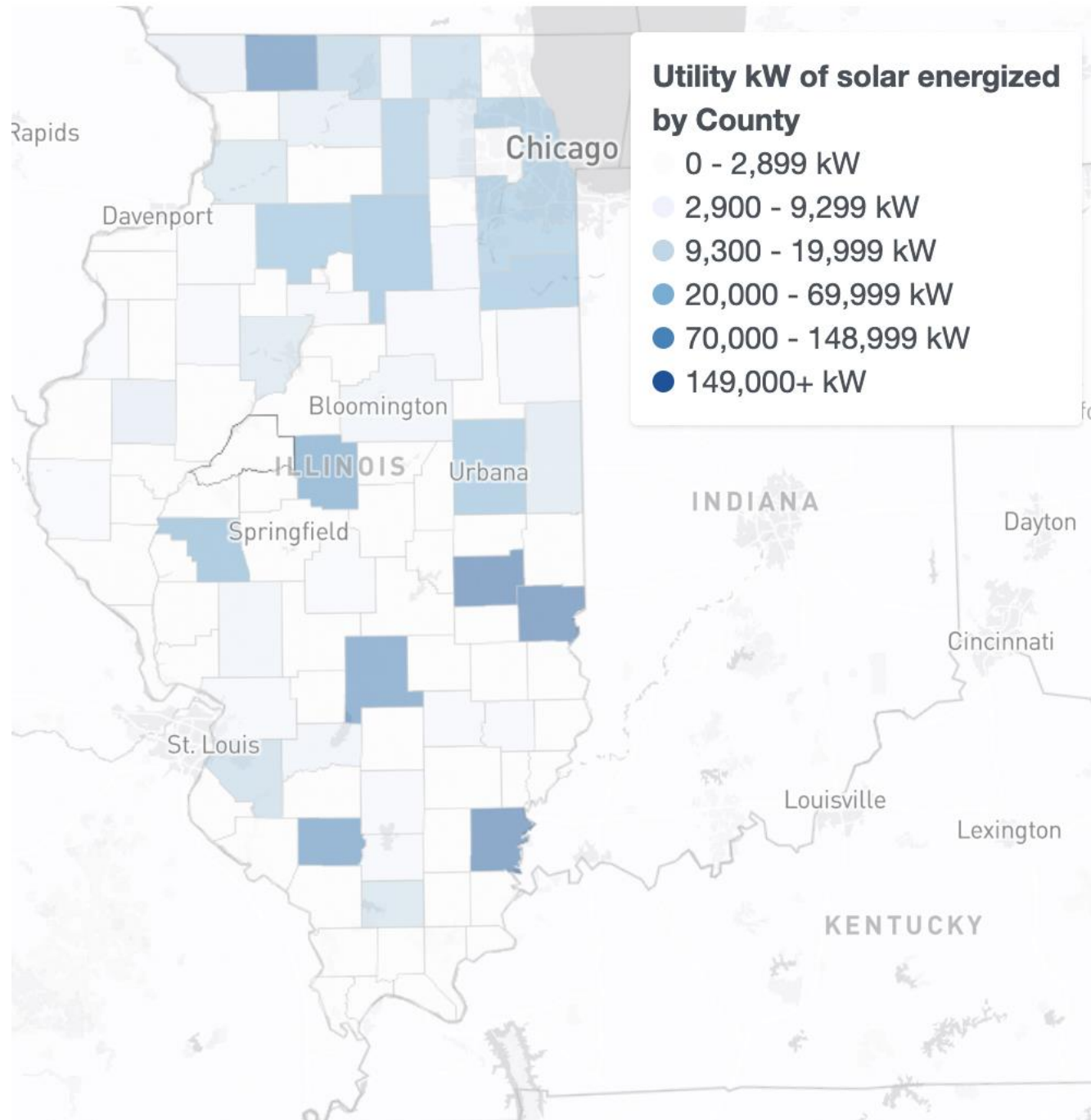
Wind + Solar Share of State Electricity Generation

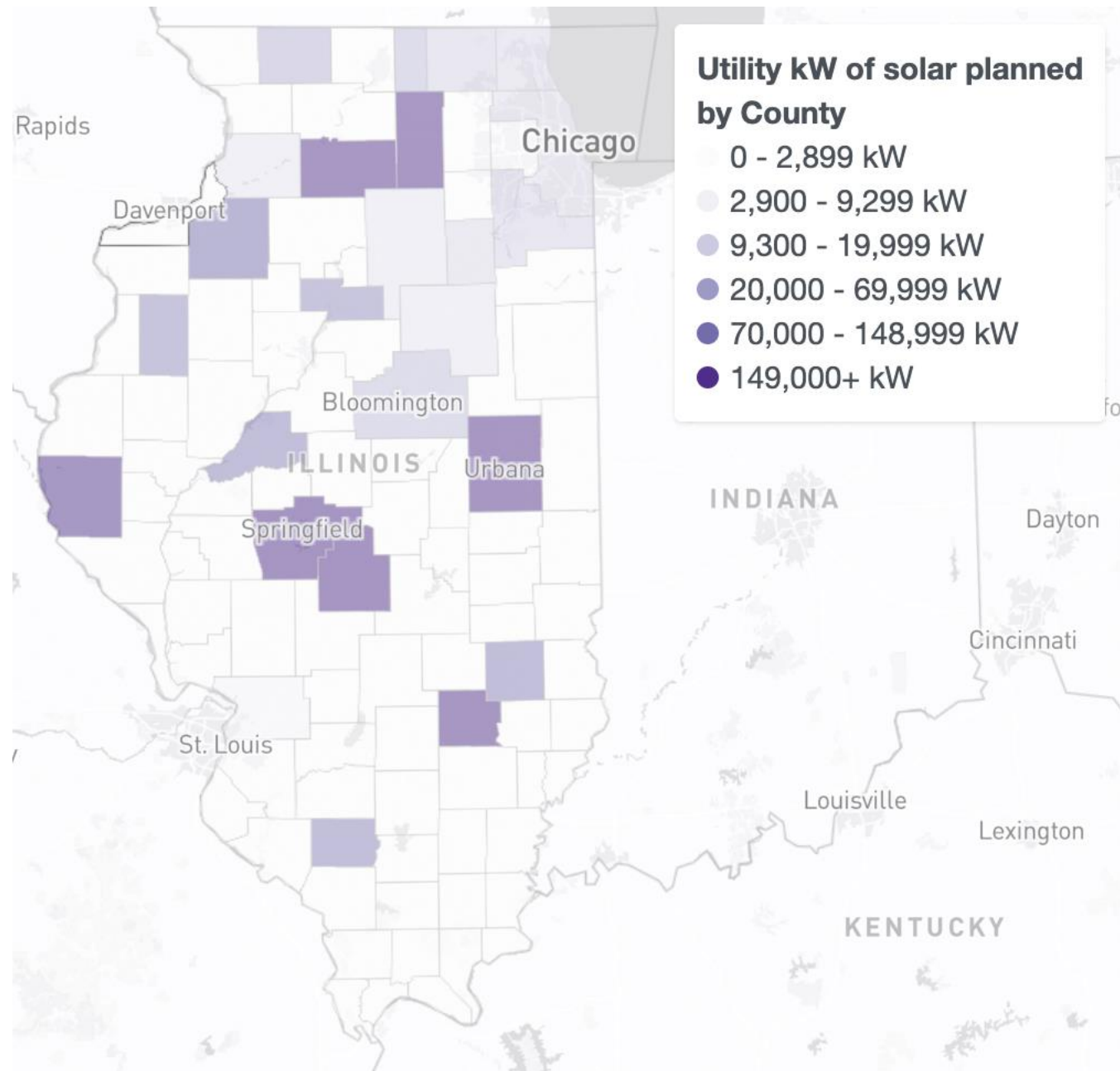


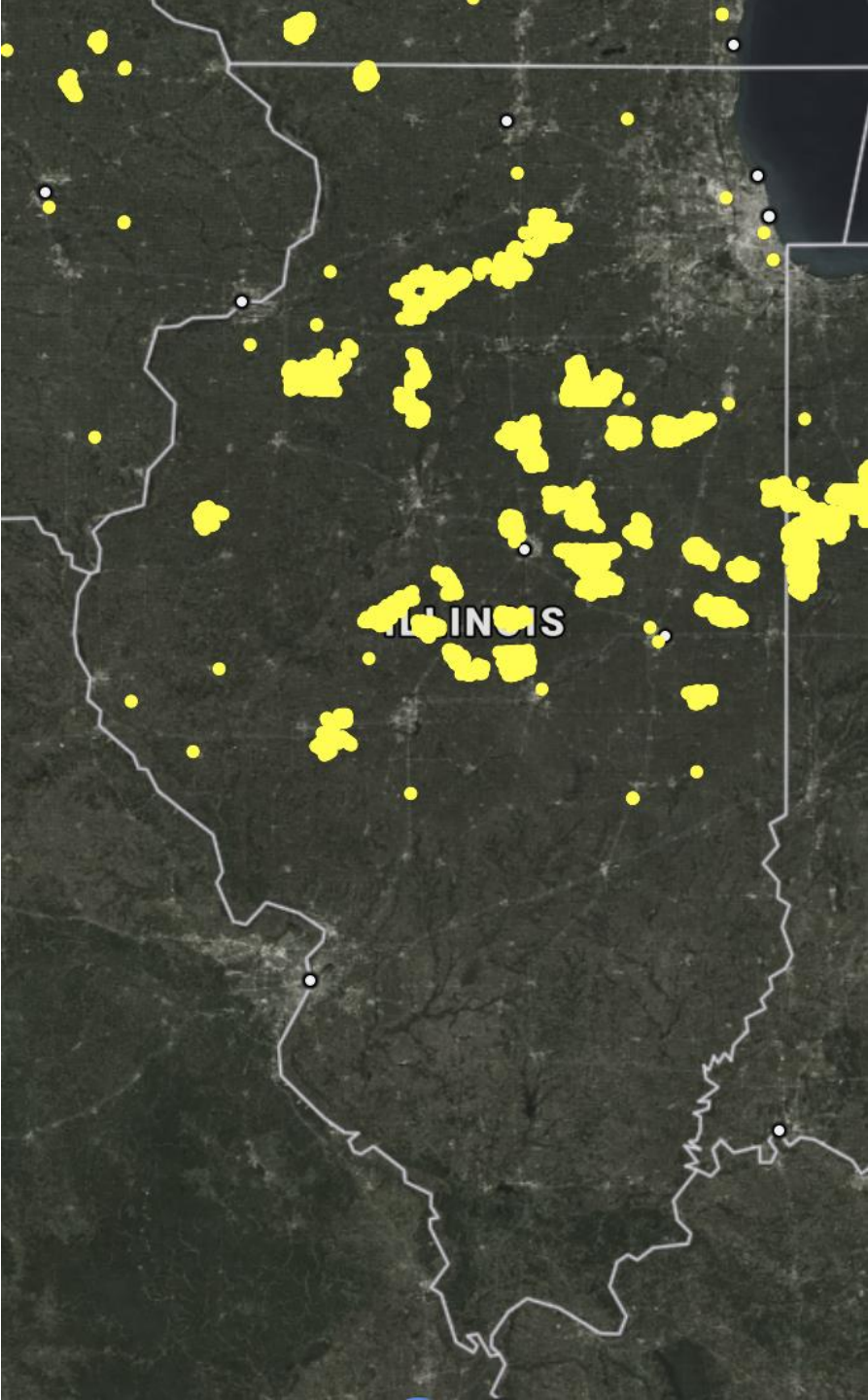
Source: EIA

Illinois Electricity Generation Mix

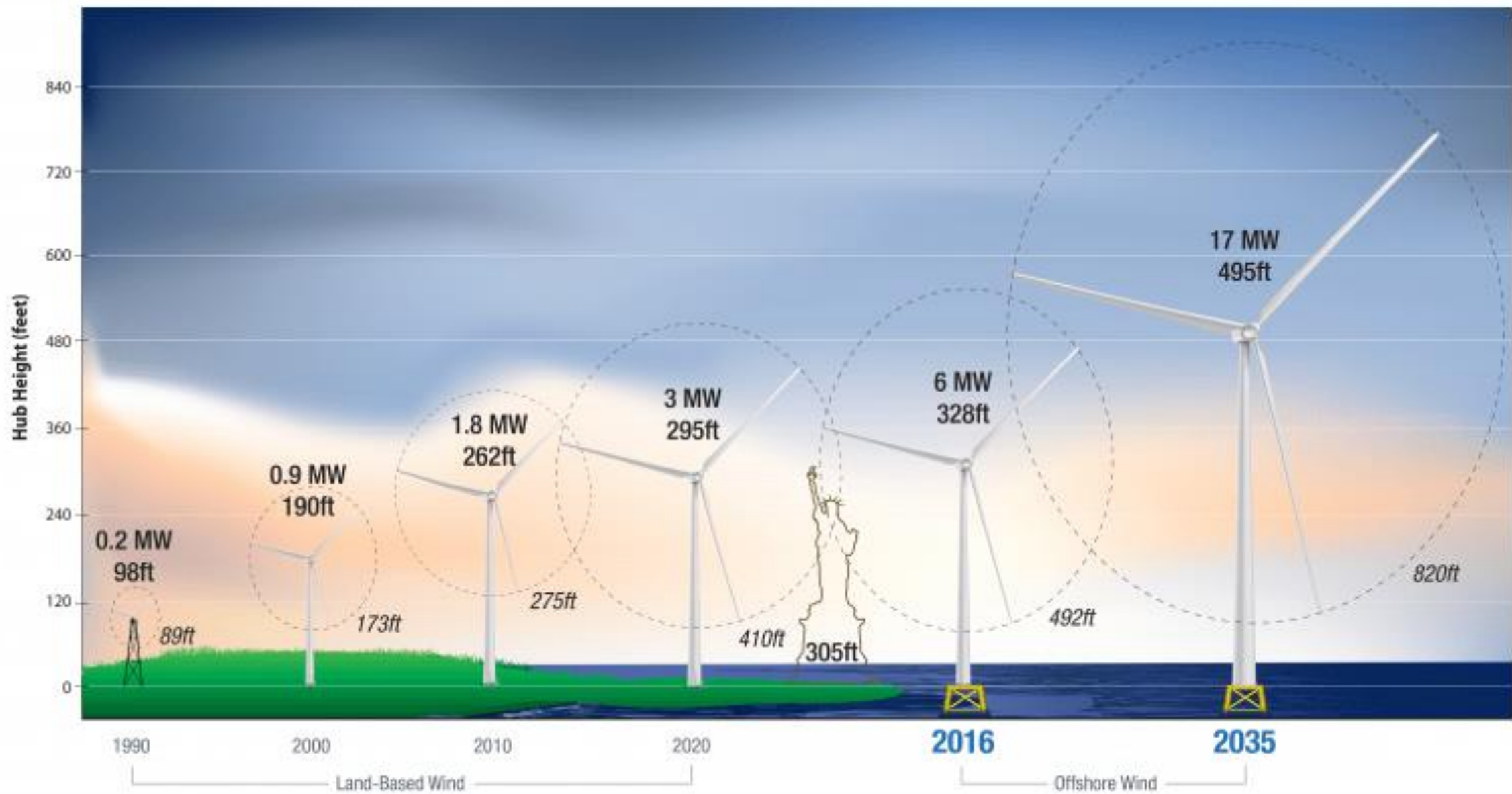








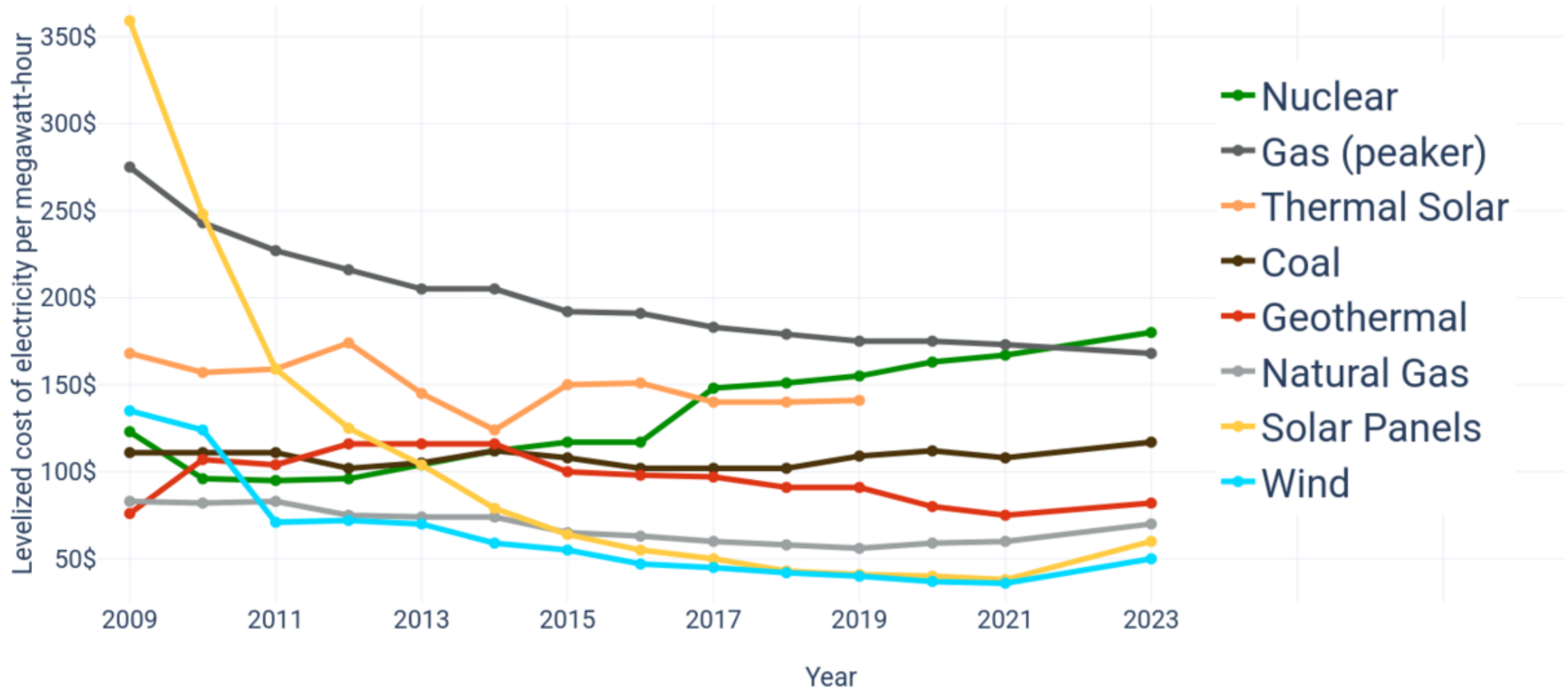
Wind Turbines



Wind Turbine Capacity (Megawatt) | Hub Height (feet)
 Rotor Diameter (feet)

Levelized Cost of Energy

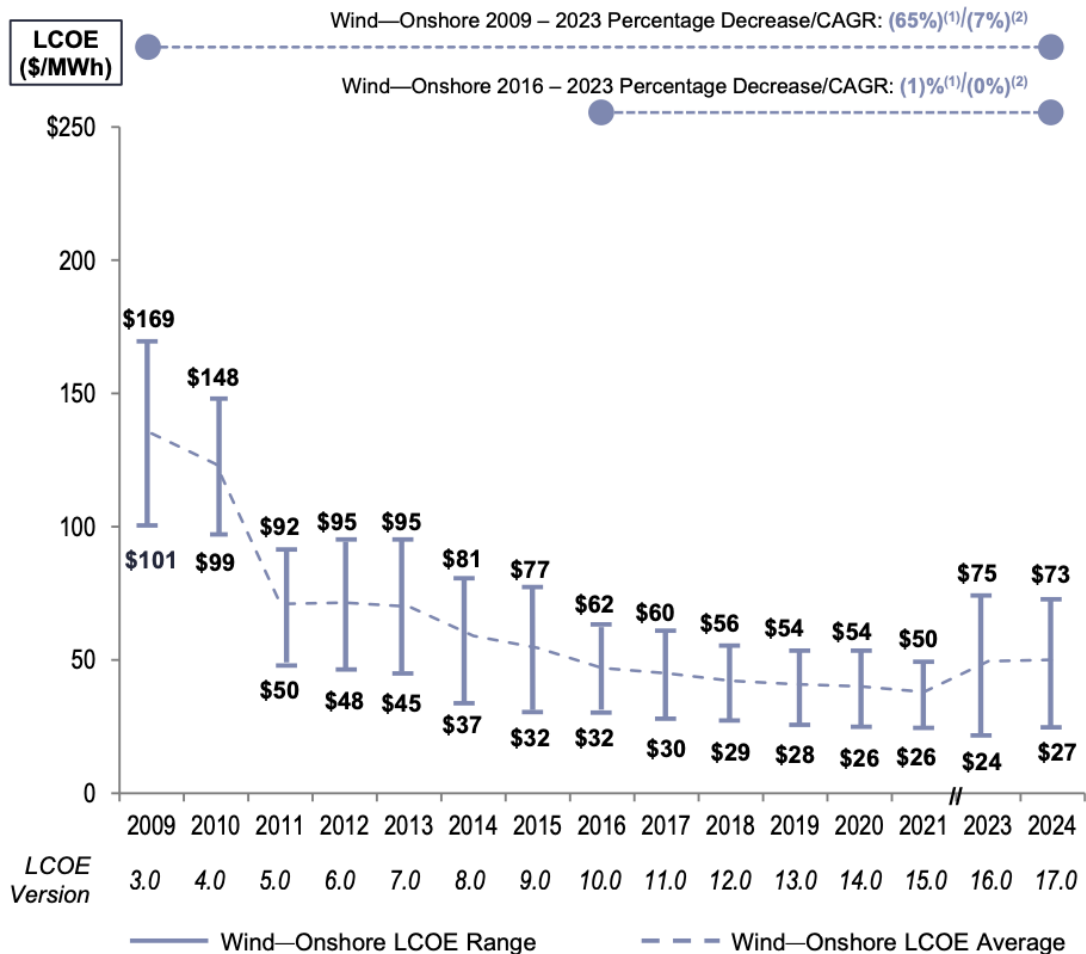
Electricity costs according to data from Lazard



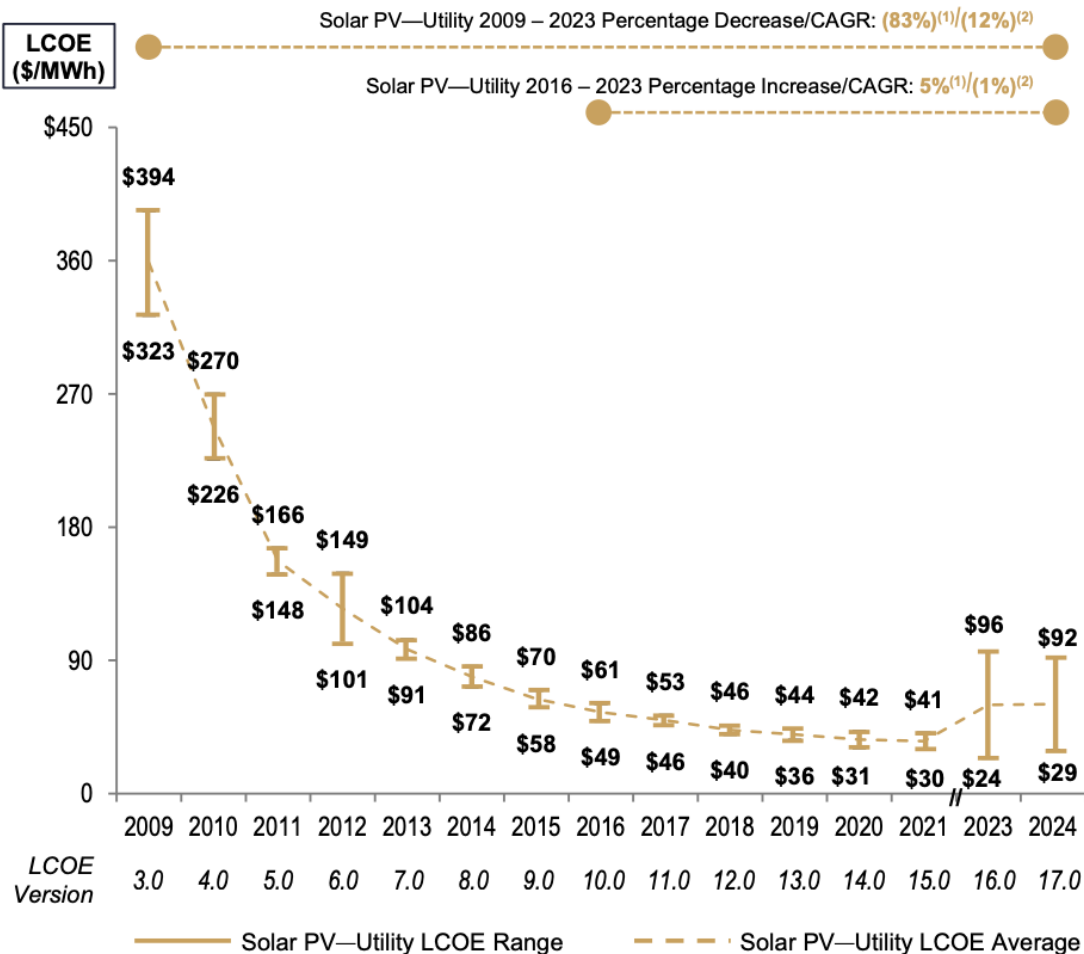
Levelized Cost of Energy Comparison—Historical Renewable Energy LCOE

While the low end of the LCOE for both wind and solar has increased slightly, reflecting current market conditions, the average has remained nearly flat and the overall range has narrowed, reflecting, among other things, reconciliation of the supply chain challenges that were notable last year

Wind—Onshore



Solar PV—Utility



Illinois Renewable Portfolio Standard (RPS)

Illinois Renewable Portfolio Standard (RPS)



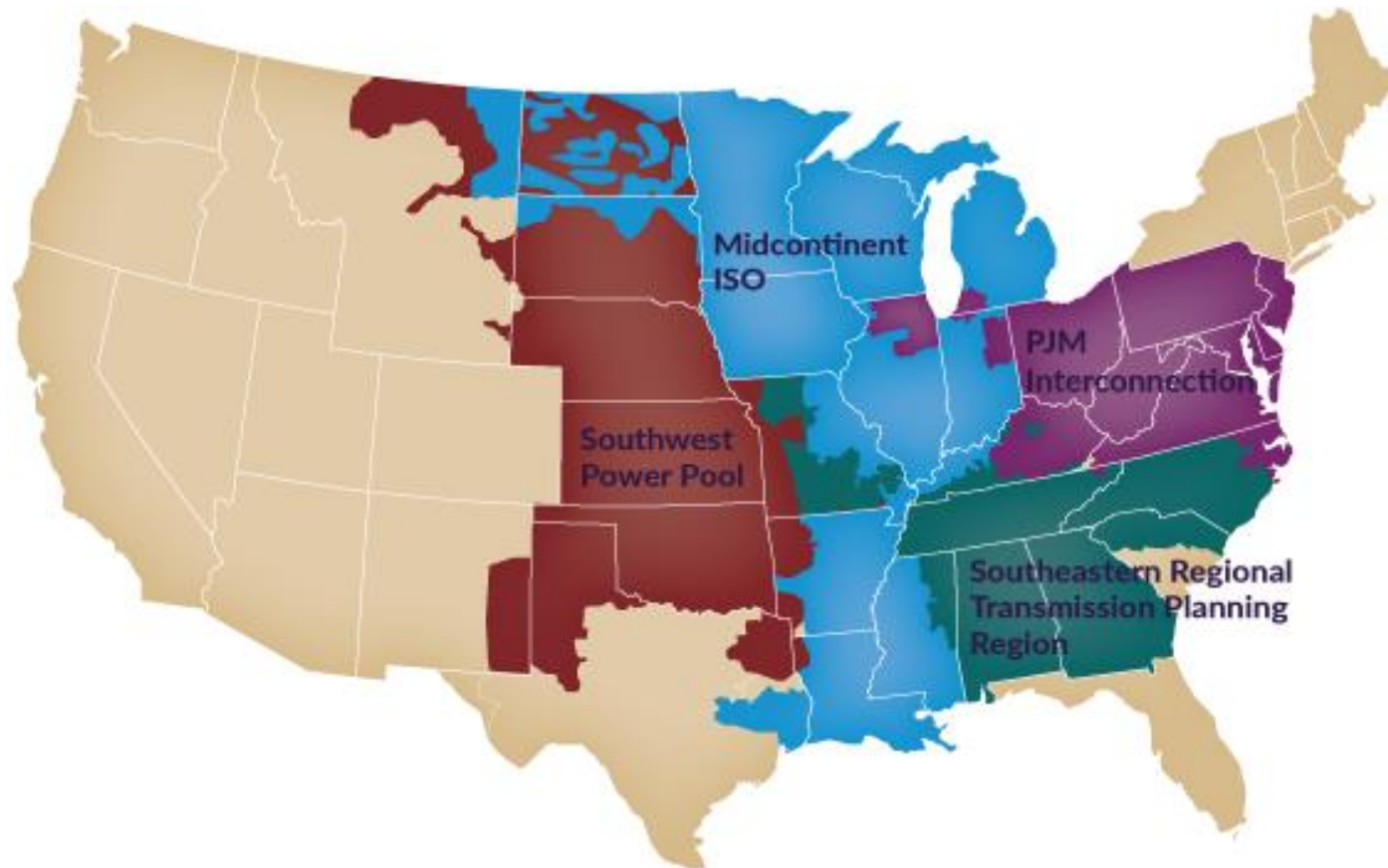
The Renewable Portfolio Standard sets the following goals for each year:

- 25% renewable energy by 2025
- 40% renewable energy by 2030
- 50% renewable energy by 2040

The Illinois Renewable Portfolio Standard ("RPS") was first established in 2007 and has been substantially updated through [Public Act 99-0906](#) (the "Future Energy Jobs Act") and [Public Act 102-0662](#) (the "Climate and Equitable Jobs Act").

PJM & MISO

PJM & MISO



Midcontinent Independent
System Operator (MISO)

Pennsylvania-New Jersey-
Maryland (PJM) Interconnection
RTO

Both ISOs and RTOs are organizations formed with the approval of the [Federal Energy Regulatory Commission](#) (FERC) to coordinate, control and monitor the use of the electric transmission system by [utilities](#), [generators](#) and [marketers](#).

History of Renewable Energy in IL

History of Renewable Energy in IL – Early Years

2003

2007

2009

- **First Wind Farm in IL:** Mendota Hills (51.66 MW) in Lee County
- Crescent Ridge (54.45 MW) and Pike County (1.65 MW) in 2005



Mendota Hills Wind Farm, Photo by David Wilson, Flickr.com

- Twin Groves Wind Farm in McLean County (396 MW)
- Five other wind farms from 2007-2008



Twin Groves Wind Farm, Photo by Ron Frazier, Flickr.com

- Six more: Grand Ridge, EcoGrove, Rail Splitter, Lee-DaKalb, Cayuga Ridge, Top Crop



EcoGrove Wind, Photo by JanetandPhil, Flickr.com

History of Renewable Energy in IL

2010

- Two more wind projects. Slower year in terms of capacity added to the grid.
- Streator Cayuga Ridge Wind and Walnut Ridge Wind

2011

- Four wind projects: White Oak, Big Sky Wind, Settlers Trail, Pioneers Trail

2012

- Grand Ridge Solar, first utility-scale solar project in Illinois. Owned and operated by Invenergy
- More wind: Minonk, Shady Oaks, Bishop Hill I and II, California Ridge

History of Renewable Energy in IL



2013-2014

2015

2016

2017

- Slow years; virtually no wind or solar built during this time.
- Slow ramp up again: Hoopeston Wind, Pilot Hill Wind
- Kelly Creek Wind
- Future Energy Jobs Act (FEJA)
- Radford’s Run Wind

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BUSINESS

State’s renewable energy fund lacks power to fulfill purpose

*“The point of the law is to create an environment in which renewable energy can flourish in Illinois, so that we can get cleaner air, economic development and be competitive with states around us,” said Barry Matchett, co-legislative director and policy advocate for the Chicago-based Environmental Law and Policy Center. “While we were able to achieve those goals for the last few years — the renewable energy industry created 19,000 jobs in Illinois in the last five years alone — **unless the law is fixed, we won’t see much, if any, more solar or wind energy built in Illinois.**”*

History of Renewable Energy in IL

2018

2019

2020

2021

- Three wind projects: Bishop Hill III, HillTopper, Walnut Ridge

- Four wind projects: Bright Stalk, Green River, Mendota Hills, Whitney Hill

- Six Wind: Blooming Grove, Cardinal Point, Harvest Ridge, Lone Tree, Otter Creek, Sugar Creek

- Dressor Plains Solar

- Climate and Equitable Jobs Act (CEJA)
- Wind: Bennington, Glacier Sands, Lincoln Land,
- Solar: Prairie State, Prairie Wolf

History of Renewable Energy in IL – Recent Years



2022

- Wind: Ford Ridge
- Solar: Amazon Solar Farm, Big River

2023

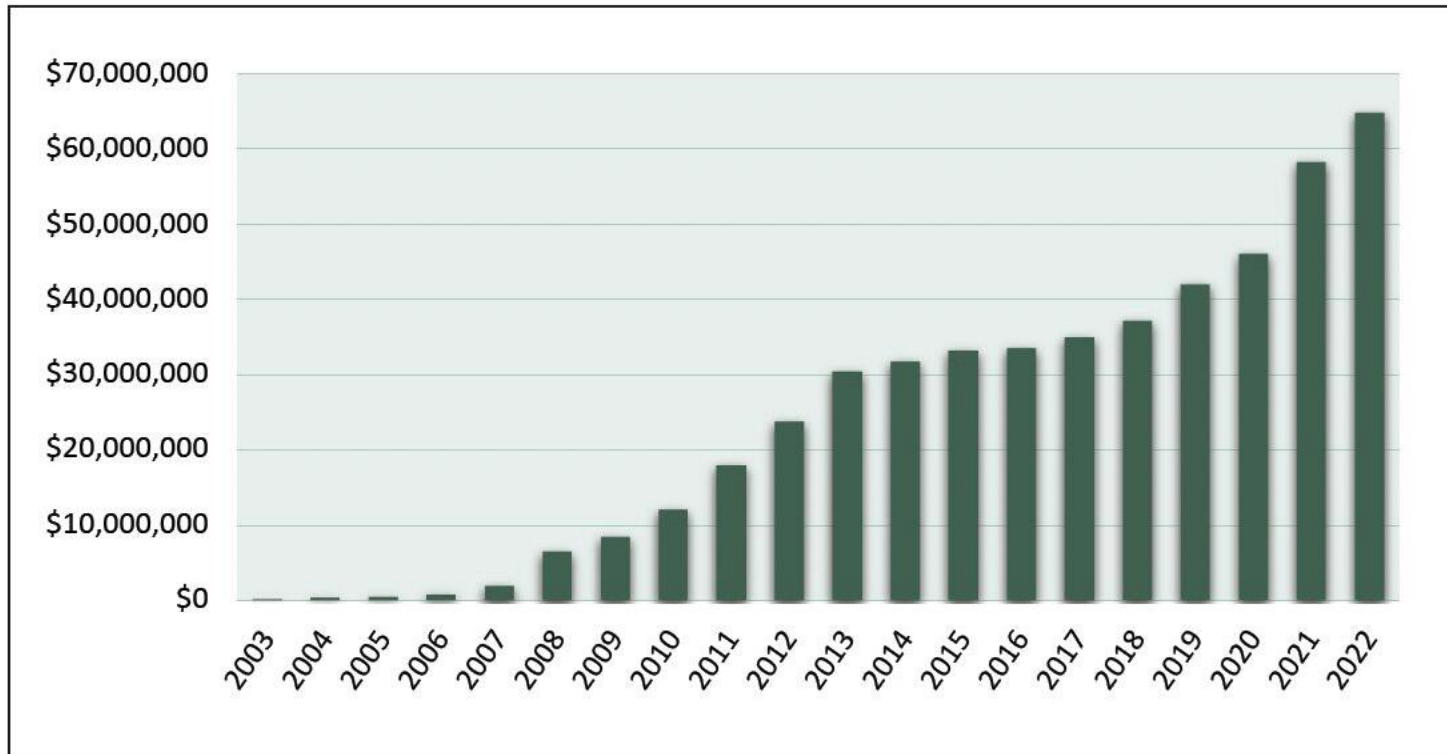
- Wind: Alta Farms II, Glacier Sands, GSG Wind Farm, Avangrid, Sapphire Sky, Shady Oaks,
- Solar: High Point Solar, Prairie Creek Solar, River Ferry Solar

2024

- Solar: Earp Solar

Economic Impact of Utility-Scale Projects on the State of Illinois

Figure 1 – Illinois Tax Revenue per Year

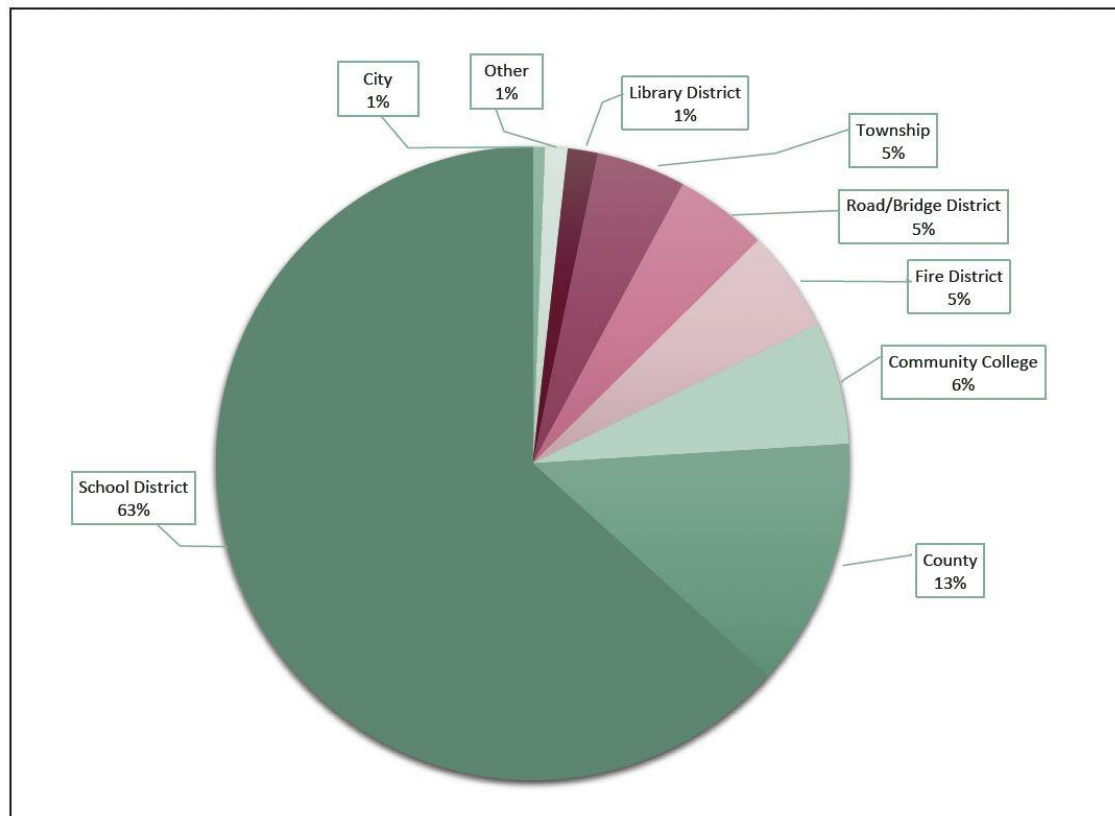


Source: County Tax Records and Author's Calculations

Grand total
property tax
revenue paid by
wind farms to
taxing entities
throughout the
state of Illinois:
**Over \$483.8
million**

Economic Impact

Figure 2 – Property Tax Revenue by Taxing Area

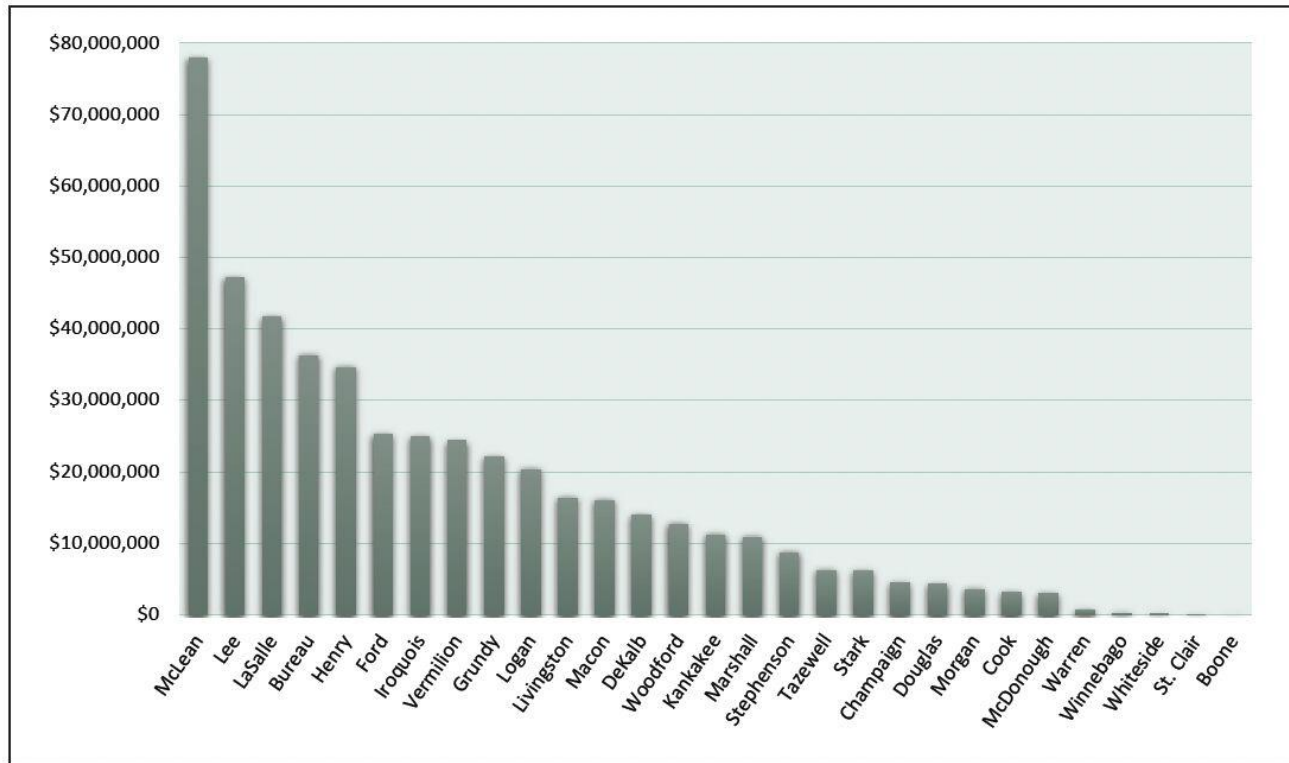


Source: County Tax Records and Author's Calculations

School districts in Illinois have received over **\$306.3 million**

Economic Impact

Figure 3 – Tax Revenue by County from 2003-2022



Source: County Tax Records and Author's Calculations

McLean County collects property taxes on six different wind farms, two of which were built in 2007/2008.



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