

THE SOLAR INDUSTRY: WHAT DRIVES THE NEED FOR RENEWABLE ENERGY? WHAT SHOULD INDIANA EXPECT OVER THE NEXT 3-5 YEARS

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Community Leaders and Public Officials

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State Utility Forecasting Group

State Utility Forecasting Group (SUG)

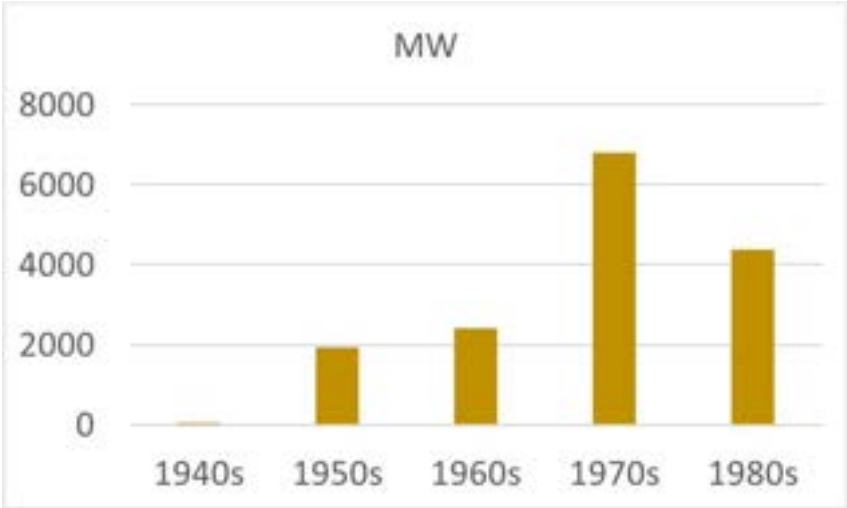
SUG

- Performs independent policy and economic analyses of issues affecting the electric utility industry
- Formed in 1985 by act of the Indiana General Assembly
- Housed at Purdue University, which has a contract with the Indiana Utility Regulatory Commission (IURC)
- Works proactively with Indiana utilities, state government, public interest groups, and other stakeholders
- Staff have backgrounds in electrical engineering, industrial engineering, economics, and public affairs

How Did We Get Here?

- Indiana saw rapid growth in demand for electricity (5-8% per year) in the 1960s and early 1970s
- Utilities built several new coal-fired generating plants to meet the load growth
- Load growth slowed starting in the mid-1970s
 - Energy Crisis in 1970s
 - Rust Belt Recession in early 1980s
- Utilities were slow to react, which led to excess generating capacity

Coal-Fired Generating Capacity in Indiana by Decade Installed



Decade	MW	# of Units
1940s	45	1
1950s	1937	20
1960s	2415	10
1970s	6799	17
1980s	4373	9

Over the Next 25 Years

The Capacity Surplus Meant Little New Construction

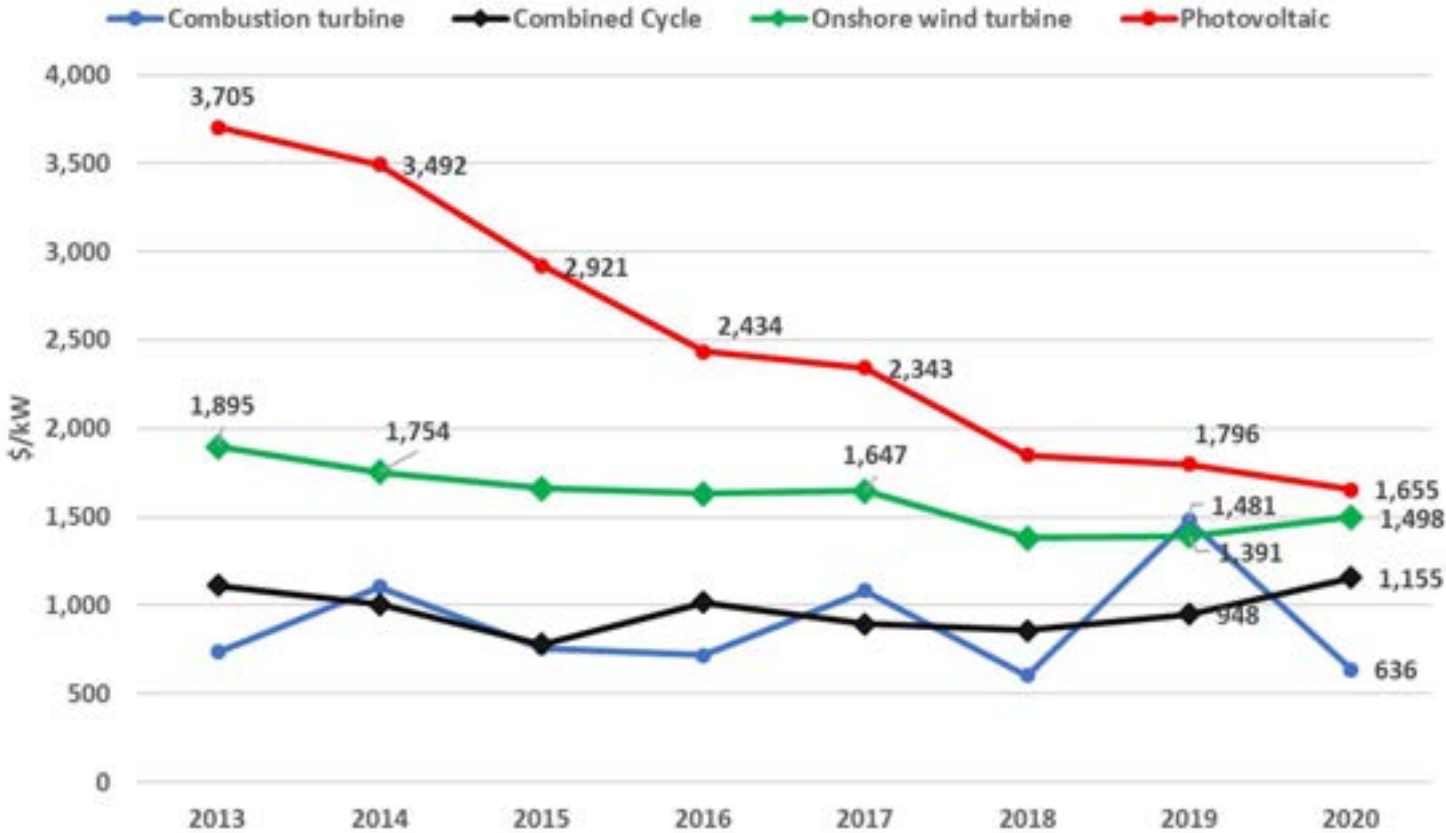
- Load growth occurred at a more moderate rate
- Some older, smaller, less-efficient coal capacity retired
- New pollution control equipment was installed on the remaining coal units
- Some new natural gas-fired capacity was added

Over the Last 15 Years

Lower costs of renewables and lower, more stable natural gas prices

- Very little load growth
- Hydraulic fracturing and horizontal drilling (aka fracking) techniques changed the natural gas industry
- Utility-scale wind farms start showing up in 2008
- Small solar farms (~20 MW) start showing up in 2013, larger in 2021
- More coal-fired units retire

Capital costs of generation technologies (data source: Energy Information Administration)



Where Are We Now?

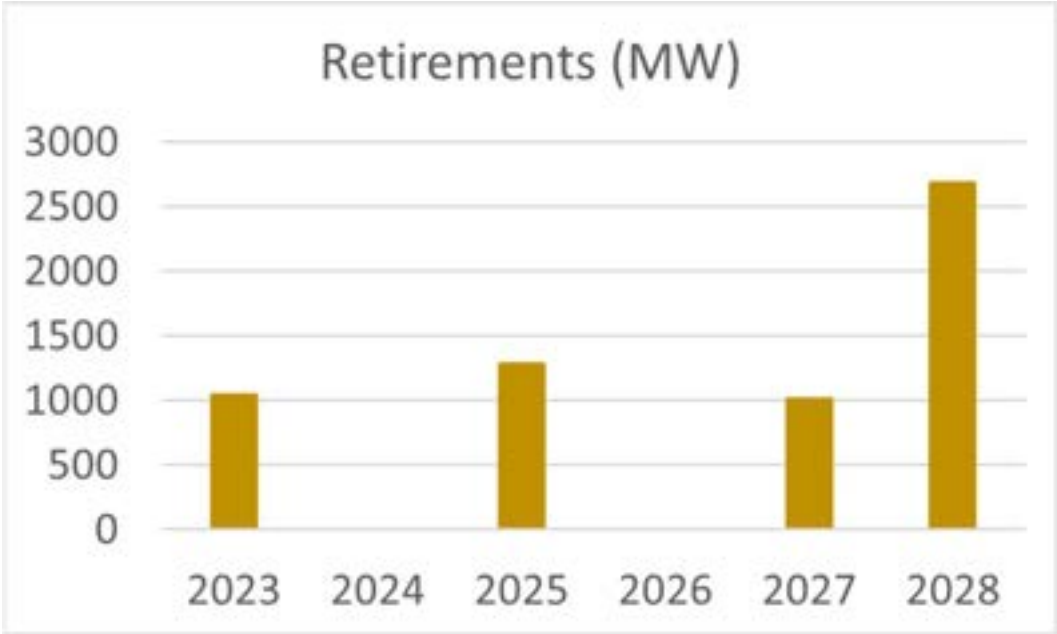
A transition period

- Most of the coal fleet is near or past its design life and has difficulty competing economically with natural gas and renewable sources
 - Maintenance costs increase with older equipment
 - Renewables have no fuel costs
 - Natural gas combined cycle units are more efficient in converting fuel to electrical energy
 - Coal units face more costs in meeting environmental regulations

- A significant amount of coal-fired generation is scheduled for retirement

Scheduled Coal Unit Retirements

At the end of 2028, there is scheduled to be 1,535 MW left in operation



Where Do We Go From Here?

A number of options

- As with most things in life, the various options have relative advantages and disadvantages
- Utility plans generally include a combination of solar, wind, natural gas, and energy storage
- Current plans indicate that coal and nuclear are too expensive, although some additional consideration of small, modular nuclear reactors is seen

Future Resources

Advantages

- Natural gas: dispatchable, lower cost than other fossil fuel sources
- Wind: no fuel cost, no emissions, higher average output than solar, tax credits
- Solar: no fuel cost, no emissions, aligns better with load than wind, tax credits
- Storage: manage intermittent nature of wind & solar, arbitrage capability, tax credits

Disadvantages

- Natural gas: some fuel cost, some emissions (nitrogen oxides, carbon dioxide)
- Wind: intermittent, wind often stronger during periods of low demand
- Solar: intermittent, relatively low total energy output
- Storage: does not produce its own energy, some losses in charge/discharge cycle

Import Tariffs on Solar Panels

Uncertainty and supply disruptions have affected the solar industry

- The Trump Administration imposed tariffs on imports of Chinese-made components in 2018
- Manufacturers in four SE Asian countries (Cambodia, Malaysia, Thailand, and Vietnam) were accused of circumventing the tariffs
- Biden Administration issued a 2-year moratorium on tariffs, which expires in June 2024
 - House and Senate approved a resolution ending the moratorium but the President vetoed it; there were not enough votes to override the veto
- U.S. Commerce Department issued preliminary determination in December that 4 of 8 manufacturers were doing it
 - Final determination expected in August

Solar Investment Tax Credit

Created by the Energy Policy Act of 2005

- A 30% investment tax credit (ITC) for solar offsets some of the costs
- The ITC was originally set to expire at the end of 2006, but has been extended numerous times and eligible technologies have been changed
- Most recently, the Inflation Reduction Act of 2022 extended the ITC through 2032, subject to prevailing wage and apprenticeship conditions
- Prior to the Inflation Reduction Act, the ITC was scheduled to scale down to 26% for projects starting construction in 2022, 22% starting in 2023, and 10% starting afterwards

Solar is Poised to Grow Rapidly

As of 2022, we were aware of 682 MW of installed PV in Indiana

- There is over 6,800 MW of additional solar that has been approved* by the Indiana Utility Regulatory Commission (IURC)
- Most of that is currently scheduled to be operational this year or next, but some delays or cancellations are to be expected
- Additional petitions are also to be expected

Expected Operational Year	MW
2023	2,402
2024	3,005
2025	815
2026	200
2027	200
Unknown	220
Pending approval	595

* IURC approval includes waiver of jurisdiction for non-utility developers

Indiana Utility Plans

Utilities file an Integrated Resource Plan (IRP) with the IURC

- Indiana utilities are required to file updated IRP at least every 3 years, which includes their preferred plans for meeting electricity demand for the next 20 years
- The most recent IRPs include over 11,000 MW of solar resources in the utilities' preferred plans
- While some of that is farther out in the future, much of it is indicated in the short term and utilities are taking actions now to try to acquire solar resources
 - A number have issued requests for proposals for new capacity

What is Driving the Need for Renewables

A number of factors

- Declining costs, particularly for solar
- Extension of tax credits in the Inflation Reduction Act
- Need for replacement resources due to the retirement of aging coal units
- Diversification of supply resources to minimize risk of future events and policies
- No air emissions or water usage

THANK YOU

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