

# Meeting Carbon Reduction or Renewable Energy Targets: Are the Rumors of Coal's Death Exaggerated?

PRESENTED BY  
Roger Lueken

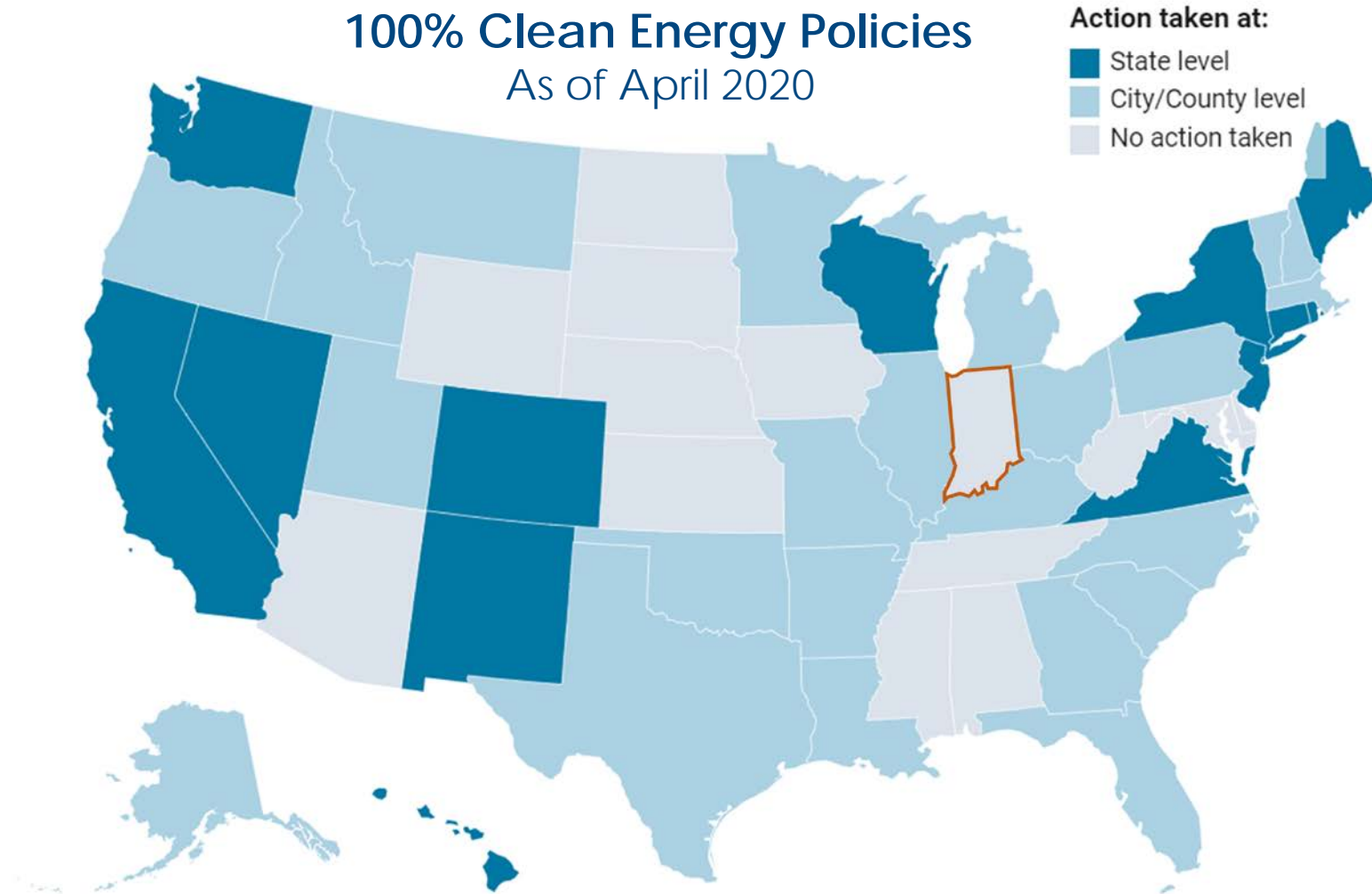
PREPARED FOR  
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THE **Brattle** GROUP

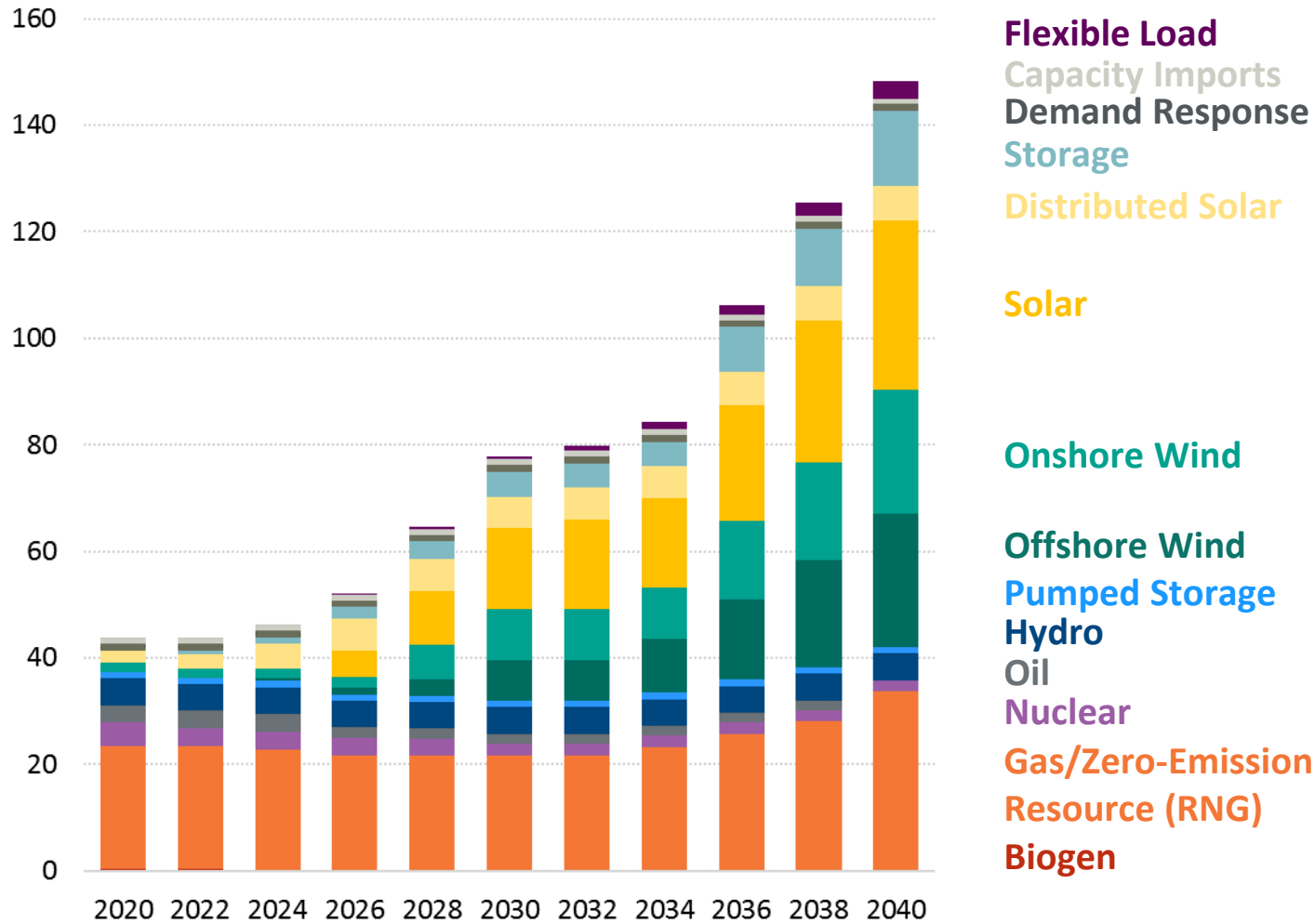


# Absent Federal leadership, a patchwork of state approaches has emerged that vary in stringency and approach



# New York: In states with decarbonization mandates, massive need for renewables and storage

Total Capacity (ICAP GW)



Source:

Lueken et al., The Brattle Group [New York's Evolution to a Zero Emission Power System](#). Prepared for New York ISO. June 22, 2020.

## Resources that grow in capacity

- **Renewables** to meet zero-emissions mandate
- **Storage and flexible load** for short-term balancing
- **Dispatchable zero-emission resources:** gas-fired generators switch to zero-carbon fuel (RNG) in 2040, for long-term balancing

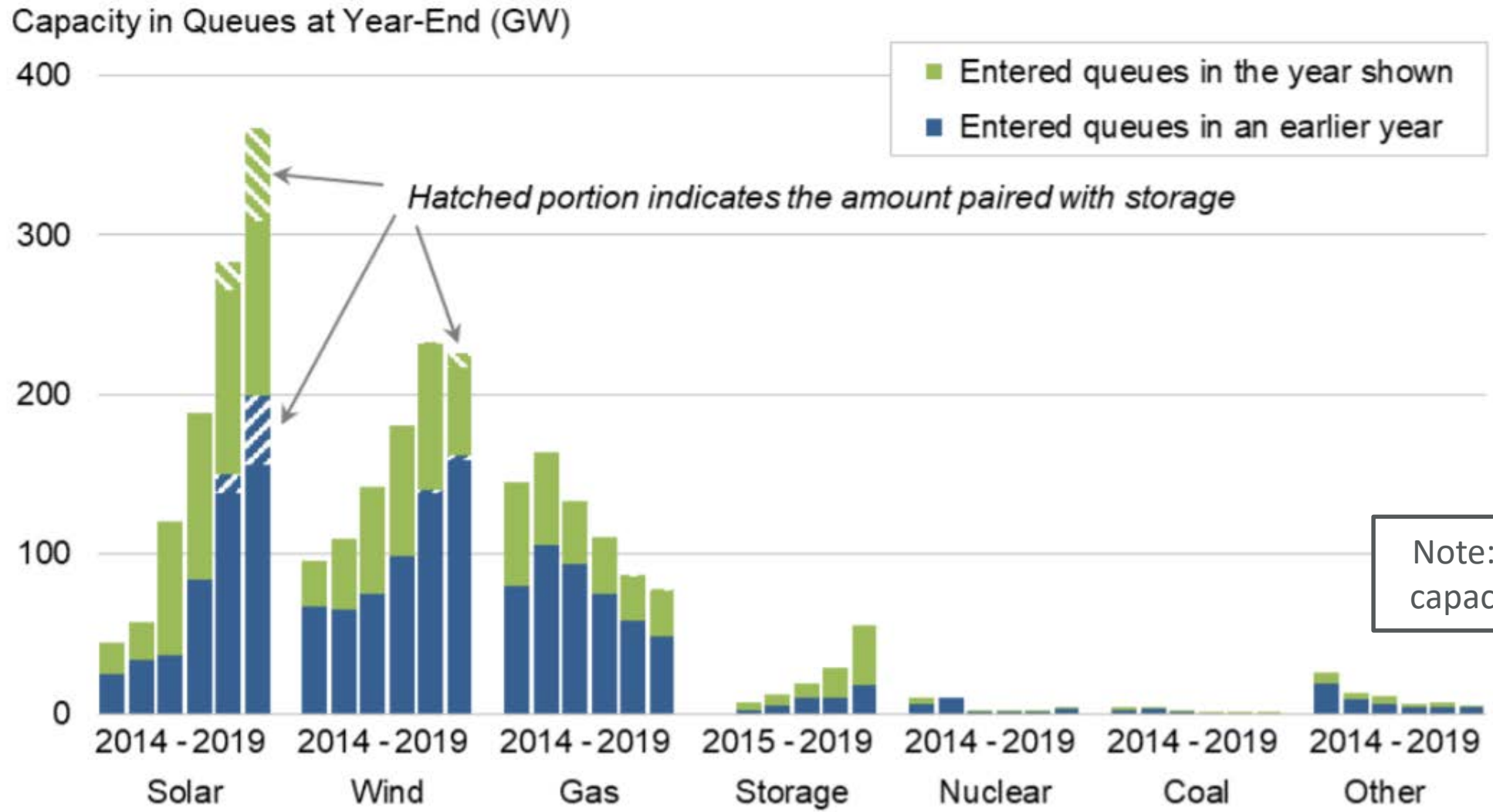
## Resources that maintain their capacity

- **Pumped storage** for short-term balancing
- **Hydro** continues to provide clean power

## Resources that shrink in capacity

- Portion of **nuclear fleet** retires by 2030 due to high refurbishment costs
- **Oil-fired generation** fully retires by 2040

# New renewables are outcompeting new fossil throughout the country - even in regions without decarbonization mandates.

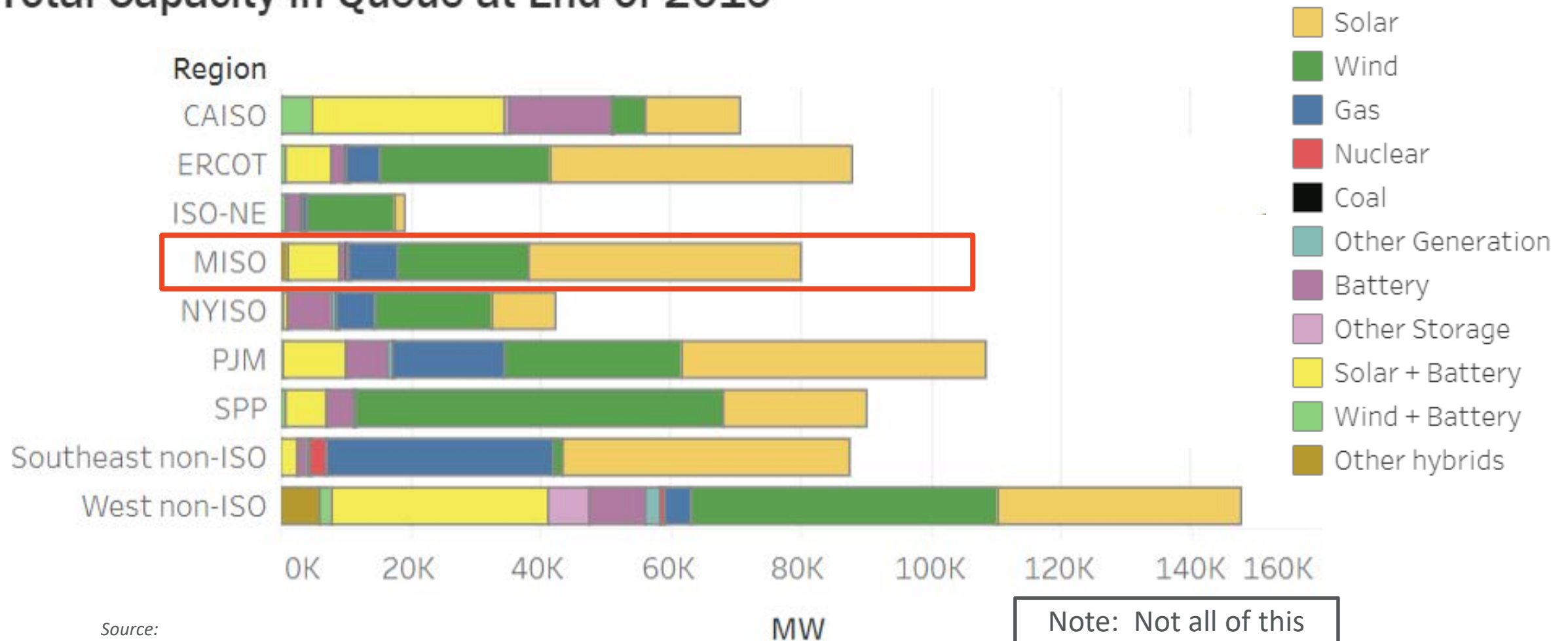


Source:

LBNL. [Hybrid Power Plants: Status of Installed and Proposed Projects](#). July 2020. Includes 7 RTOs and 30 utilities, representing 80% of U.S. load.

**In MISO**, more than 90% of capacity in the queue is renewable or storage

## Total Capacity in Queue at End of 2019

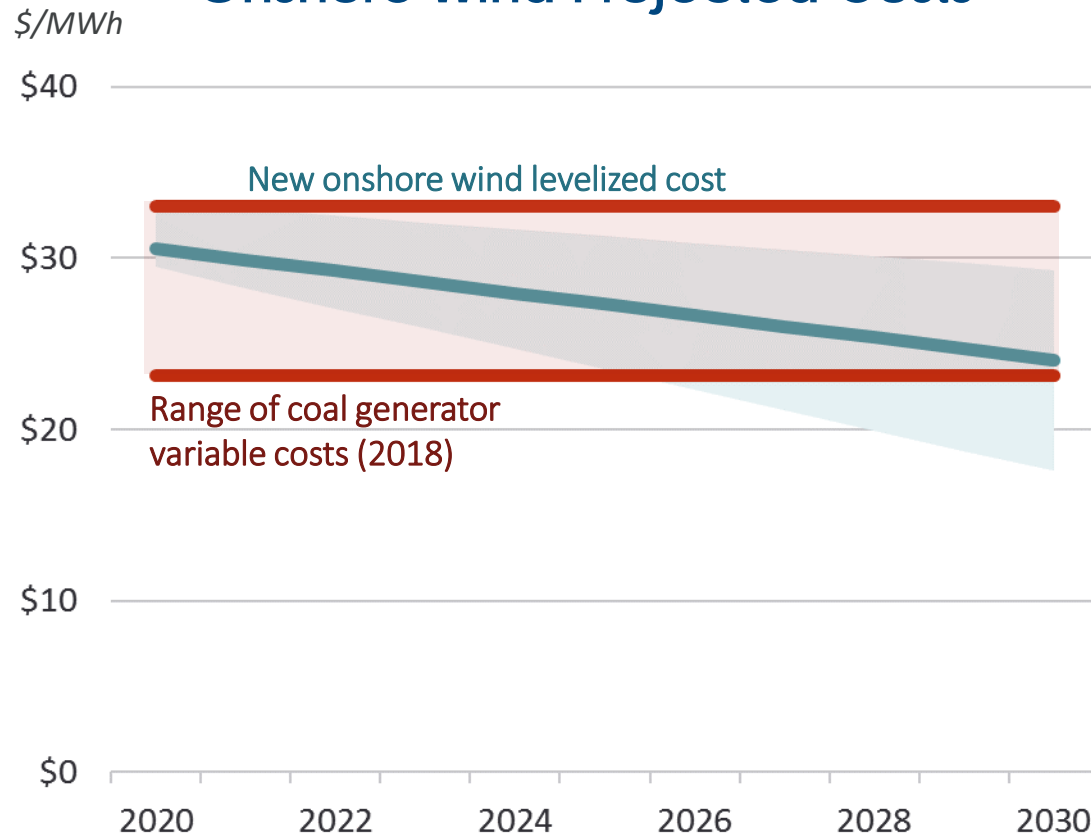


Source: LBNL. [Generation, Storage, and Hybrid Capacity in Interconnection Queues](#)

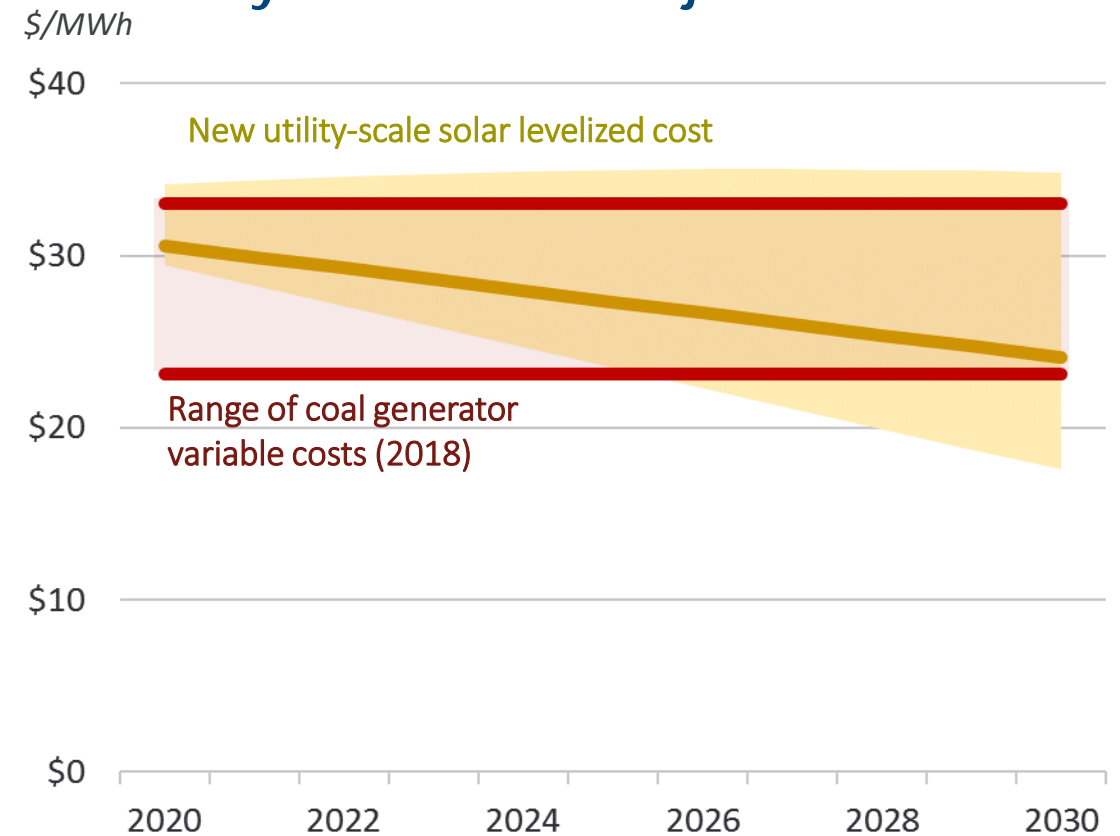
Note: Not all of this capacity will be built

**Increasingly, new renewables are out-competing existing fossil**, with the all-in costs of renewables falling below the variable costs of coal

### Onshore Wind Projected Costs



### Utility-Scale Solar Projected Costs



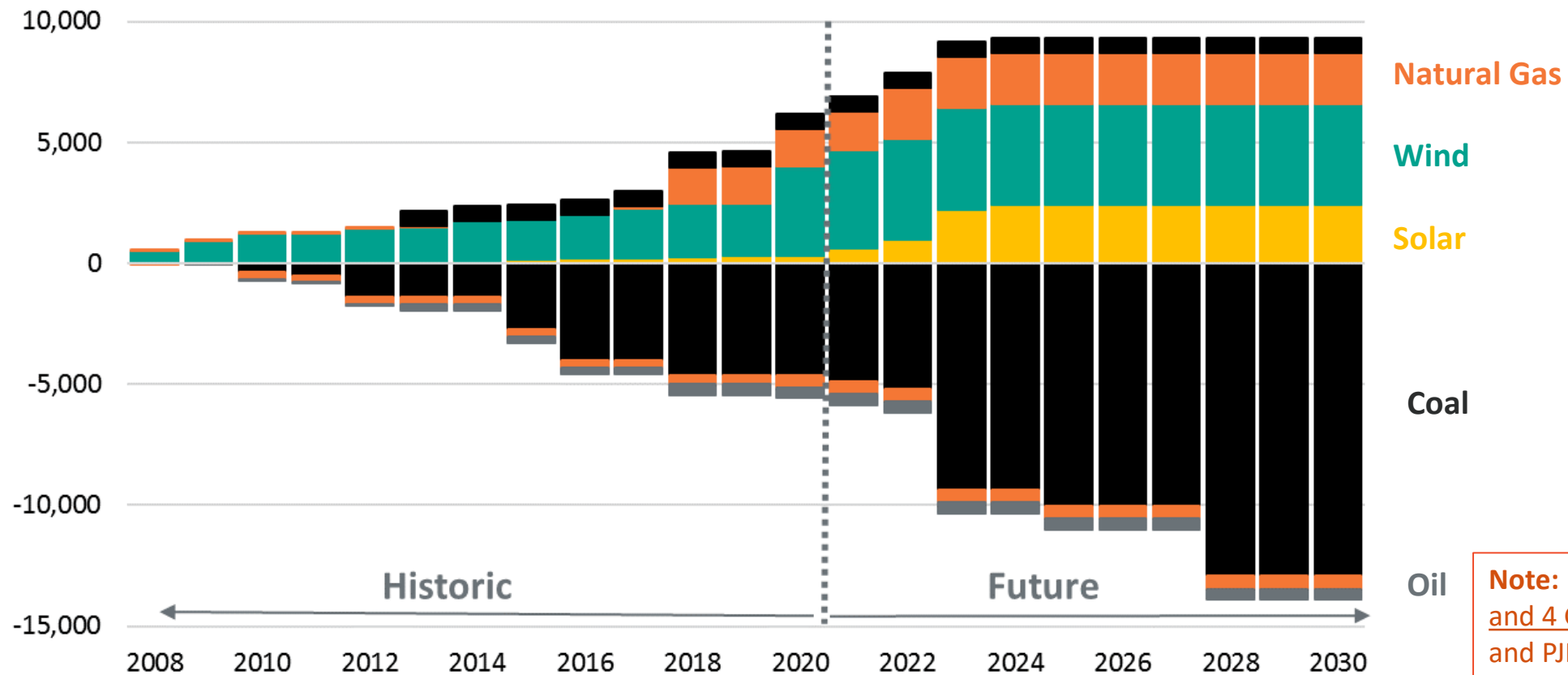
Source:

Cost projections per NREL ATB. Solar cost projections for Chicago (Conservative) and Kansas City (Advanced). Wind projections for Class 5 (Conservative) and Class 4 (Advanced). Coal costs assume heat rate of 6.9 – 11.6 MMBtu/MWh, coal cost of \$2.11/MMBtu, and VOM of \$8.5/MWh.

# Indiana's past and upcoming coal retirements reflect the changing economics of the generation fleet

- Since the beginning of 2008, about **4.5 GW** of coal has retired, with over **8 GW** more planned to retire by 2030
- **Wind** and **solar** builds have continued to grow since 2008, reaching about **4 GW** and **2.5 GW** of additional build by 2030, respectively.

Total Capacity (ICAP MW)



**Note:** There is ~20 GW solar and 4 GW wind in the MISO and PJM queues for Indiana.

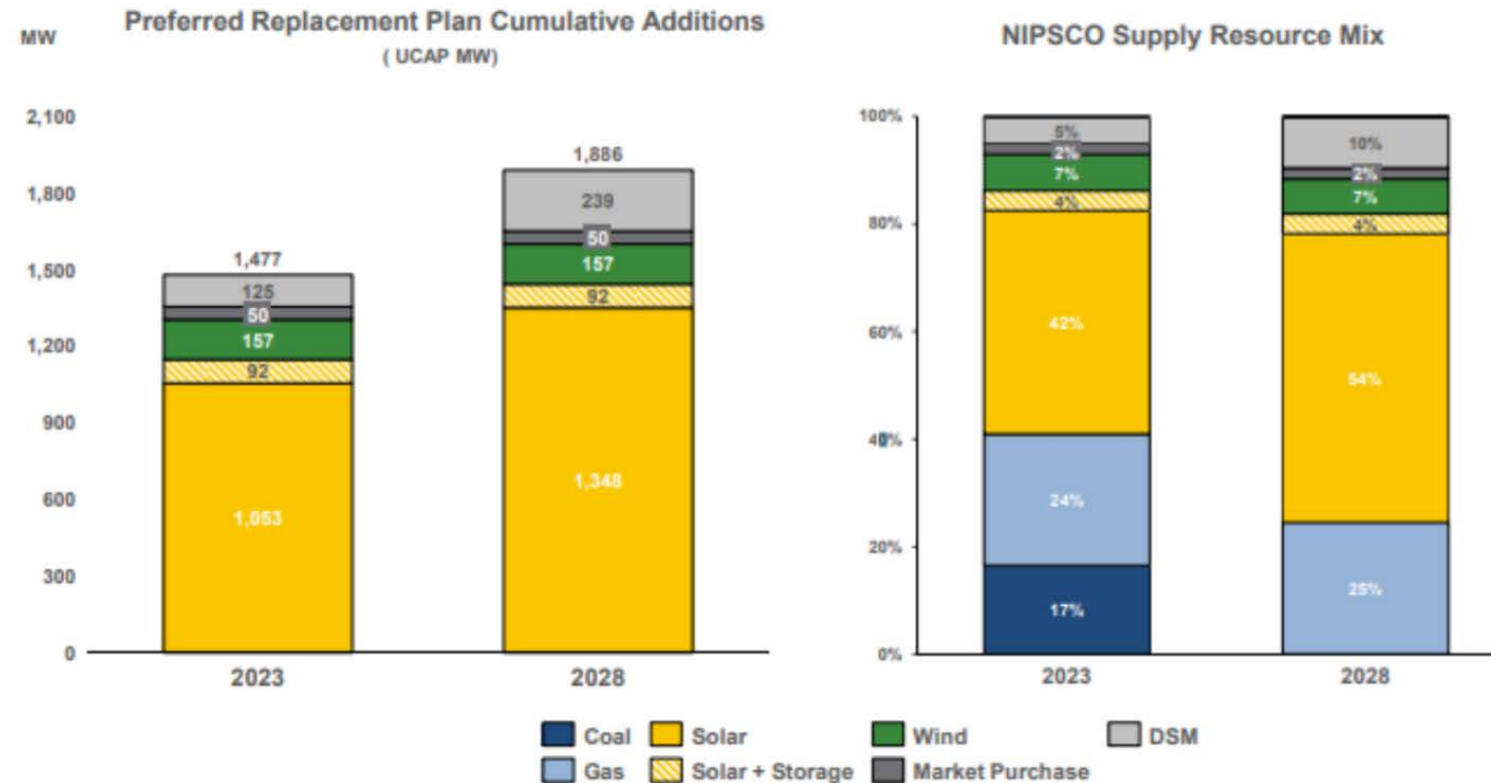
Source:

Velocity Suite, data accessed October 6, 2020. Planned builds per Velocity Suite, including units under construction, permitted, and proposed.

# NIPSCO: An Indiana utility replacing coal with renewables

- 2018 IRP identified renewables + storage as cheaper than existing coal
- In 2019, issued RFP for 300 MW of wind, 2,300 MW of solar and solar+storage. Has since signed PPAs for 300 MW of solar
- Plans to retire bulk of coal fleet by 2023 and be coal free by 2028

## NIPSCO 2018 IRP Results



Source: NIPSCO 2020. [NIPSCO's 2019 Request for Proposals Results](#).



# Takeaways

- **Aggressive decarbonization mandates** are driving renewable and storage investment in many parts of the U.S.
- **Rapidly declining costs** of these resources are driving investment in areas without decarbonization mandates
- These resources make up the **majority of new investment**, and are **increasingly competitive with existing resources**
- Indiana utilities have recognized these trends and are adjusting their planning accordingly
- **COVID-19's** near-term impact is unclear, but long term it will not reverse these trends

## Author Bio & Contact information



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**Dr. Roger Lueken** is a Senior Associate at *The Brattle Group* with expertise in decarbonization, the economics of energy storage, and wholesale market design. Dr. Lueken has worked with clients throughout the U.S. and internationally, including market operators, investors, regulated utilities, and other market participants.

Dr. Lueken earned his Ph.D. in Engineering and Public Policy from the Carnegie Mellon Electricity Industry Center at Carnegie Mellon University, and a Masters of Engineering and Public Policy from the University of Maryland. He received a B.S. in Mechanical Engineering from Purdue University.

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