

INTEGRATING RENEWABLES

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**NATIONAL ASSOCIATION OF
REGULATORY UTILITY COMMISSIONERS**

SEPTEMBER 13, 2018



1. A GRID IN TRANSITION

2. THE COMPETITIVE LANDSCAPE FLIPPED

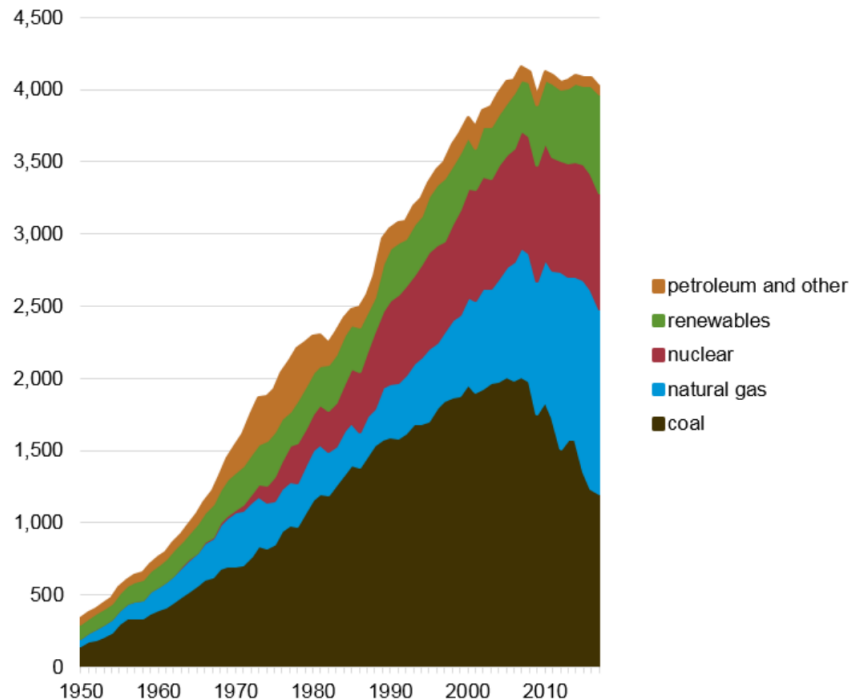
3. QUESTIONS FOR REGULATORS

A GRID IN TRANSITION

LOOKING BACK

U.S. electricity generation by major energy source, 1950–2017

billion kilowatthours



Note: Electricity generation from utility-scale facilities.

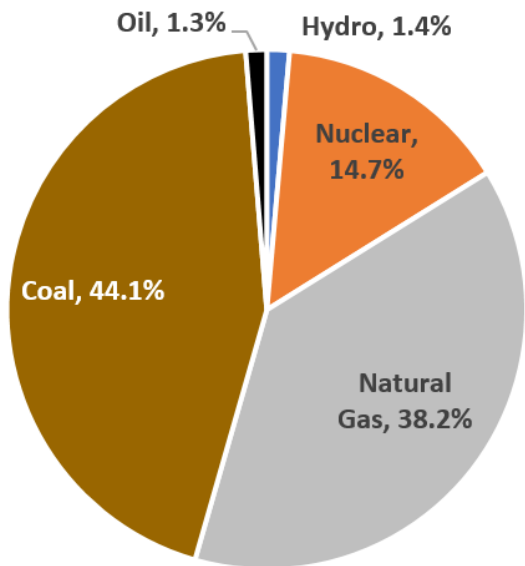
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 7.2a, March 2018, preliminary data for 2017

A GRID IN TRANSITION

LOOKING FORWARD

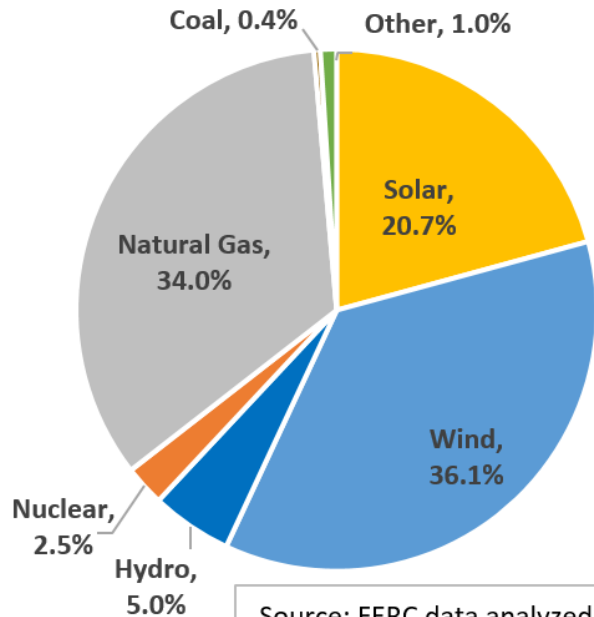
Proposed Wholesale Retirements

June 2018 - June 2021



Proposed Wholesale Additions

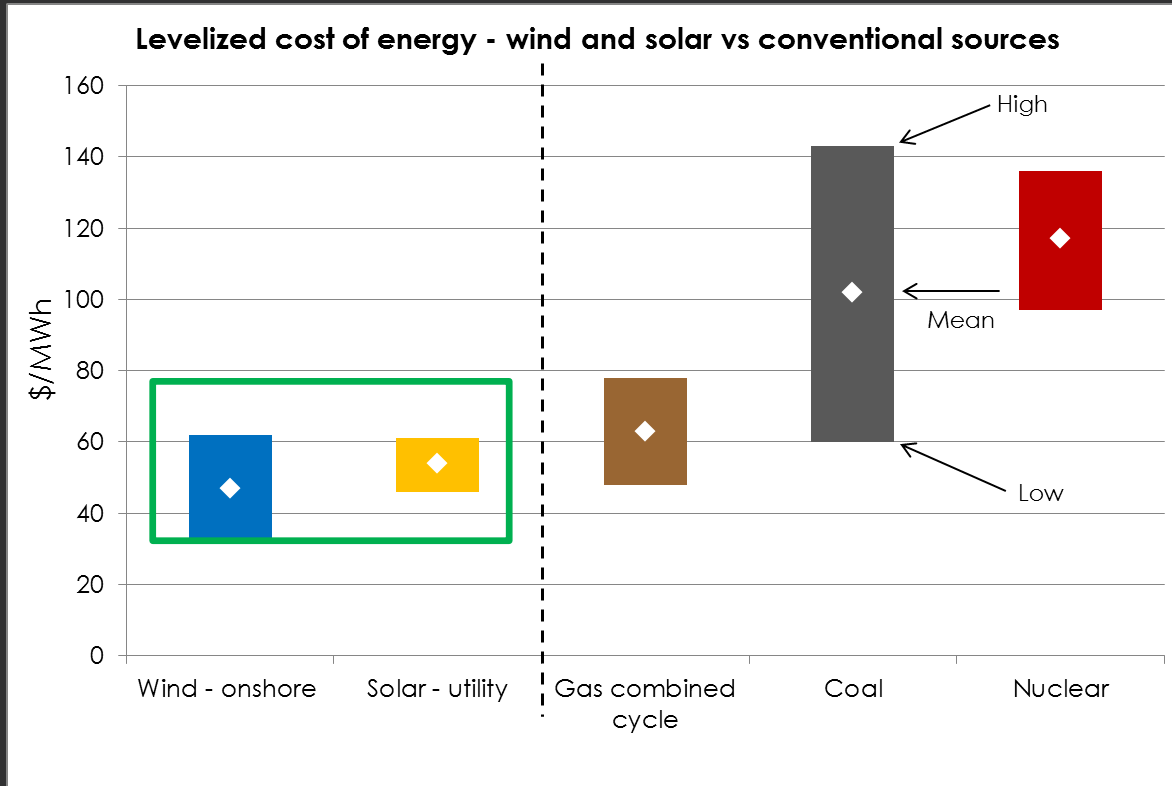
June 2018 - June 2021



Source: FERC data analyzed by AEE

THE COMPETITIVE LANDSCAPE FLIPPED

NEW VS. NEW



Wind: \$32-62/MWh

Solar: \$45-61/MWh

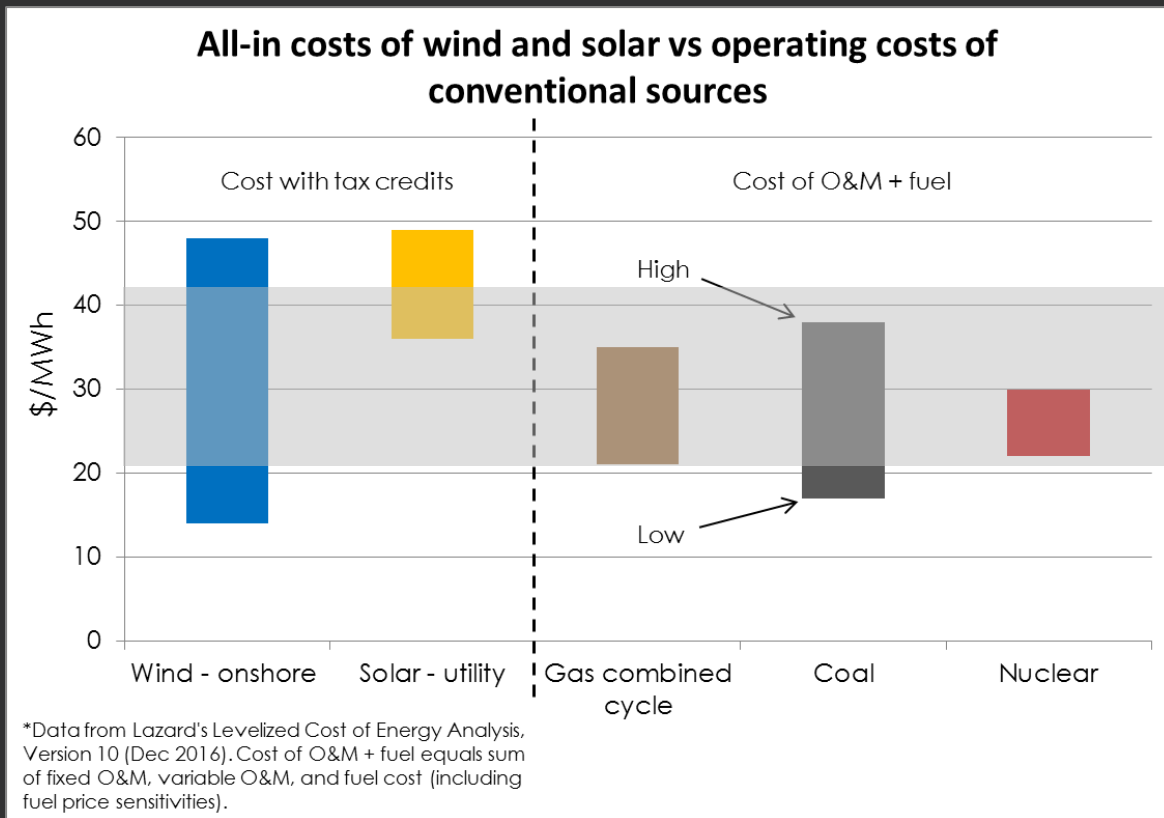
Gas: \$48-78/MWh

Coal: \$60-143/MWh

Nuclear: \$97-136/MWh

THE COMPETITIVE LANDSCAPE FLIPPED

NEW VS. EXISTING



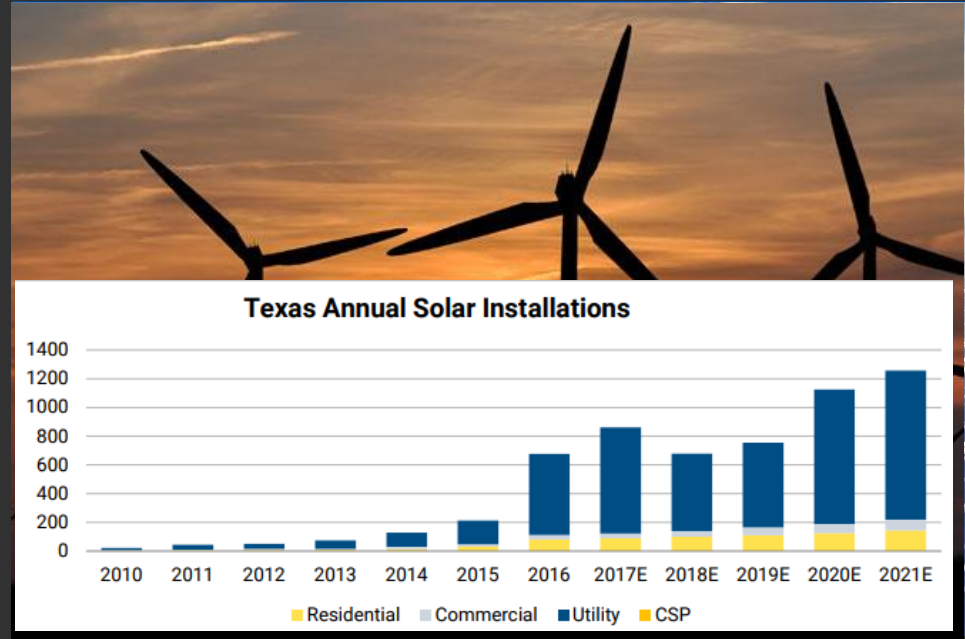
In some regions, building *new* wind and solar (with existing tax credits) is cheaper than simply running *existing* fossil fuel plants

Trend particularly acute for older, less efficient coal plants – retiring because of nat gas, wind price pressure

THE COMPETITIVE LANDSCAPE FLIPPED

RESPONDING TO THE TREND: STATE EXAMPLES

- Texas: Top wind market in U.S., fastest growing solar market in U.S.
- Wyoming: 3 GW, 1,000 turbine project is largest in U.S.
- Iowa: 37% of power supply from wind, most reliable grid in U.S.
- Colorado: 30% renewable power by 2020, wind cheaper than coal
- Minnesota: largest utility proposing 60% renewables by 2030, 2 GW solar + 800 MW wind
- Missouri: utility says early retirement of a coal facility would save customers \$325M after wind replacement



QUESTIONS FOR REGULATORS

- How are you working with your ISO / RTO to manage these shifts?
- If your state does integrated resource planning, do utility plans reflect this cost crossover?
- The system can go through periods of oversupply during times of transition; how is your state managing power plant retirements?
- Are distribution utilities planning for flexibility across the transmission / distribution interface? What about resources that can provide cost-effective flexibility at the distribution scale?

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THANK YOU



THE POWER SYSTEM IS OVERSUPPLIED

RESPONDING TO THE TREND: STATE EXAMPLES

New York: provided a buffer of lost tax revenue to Tonawanda after coal plant retired there

Kentucky: 22 school districts participate in a cooperative supporting new pathways for students in coal communities

Colorado: draft legislation would enable some savings from wind replacing coal to pay for community transition assistance

Minnesota: proactive planning anticipates baseloads retirements in 2030s, plans for a portfolio of resources to replace it

California: proactive planning anticipates a nuclear retirement in 2025, begins deploying a portfolio of resources to replace it