



MAREC
ACTION

Pennsylvania Air Quality Technical
Advisory Committee:

Renewable Energy & Generation Dispatch

Bruce Burcat, Executive Director

Mid-Atlantic Renewable Energy
Coalition (MAREC Action)

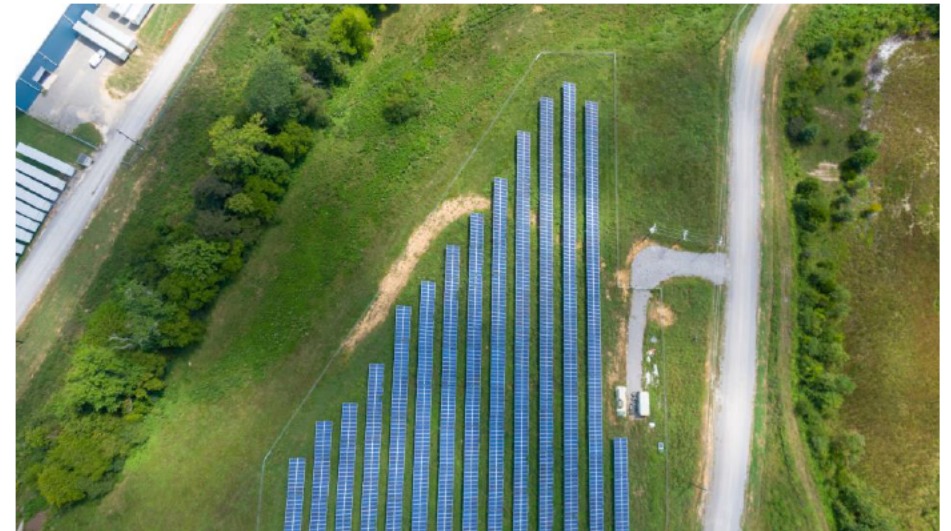
June 10, 2021

Topic for Discussion Today

1. About MAREC Action
2. Solar and wind projects in PA
3. Economic and environmental benefits of wind and solar
4. Cost of wind and solar
5. National and regional RPS policies
6. The PA AEPS
7. The AEPS market drivers
8. Benefits to agriculture
9. PJM wholesale energy and capacity markets
10. PA wind and solar policy drivers
11. Concerns raised about utility-scale wind and solar development
12. 10% solar energy by 2030
13. Questions?

About MAREC Action

- **501c4 member organization**
- **Members include major solar and wind energy developers, manufacturers, and other organizations**
- **Active in 9 states and D.C.**
- **Considerable development interest in PA renewable resources**





Renewable Projects in PA

- 2123 MW operating wind and solar in PA (1459 MW wind; 664 MW solar)
- Enough to power more than 500,000 homes
- Amounts to about 1.7% of the in-state electricity production
- PA Ranks 42nd among states

Source- American Clean Power

Solar and Wind Economic Benefits

Support over 6,600 in-state clean power jobs.

Represent over \$4 billion in private capital invested in the state.

Will pay an estimated \$7.2 million in PA state and local taxes in 2021 alone.

Will generate an estimated \$5.2 million in yearly lease payments to PA landowners in 2020.



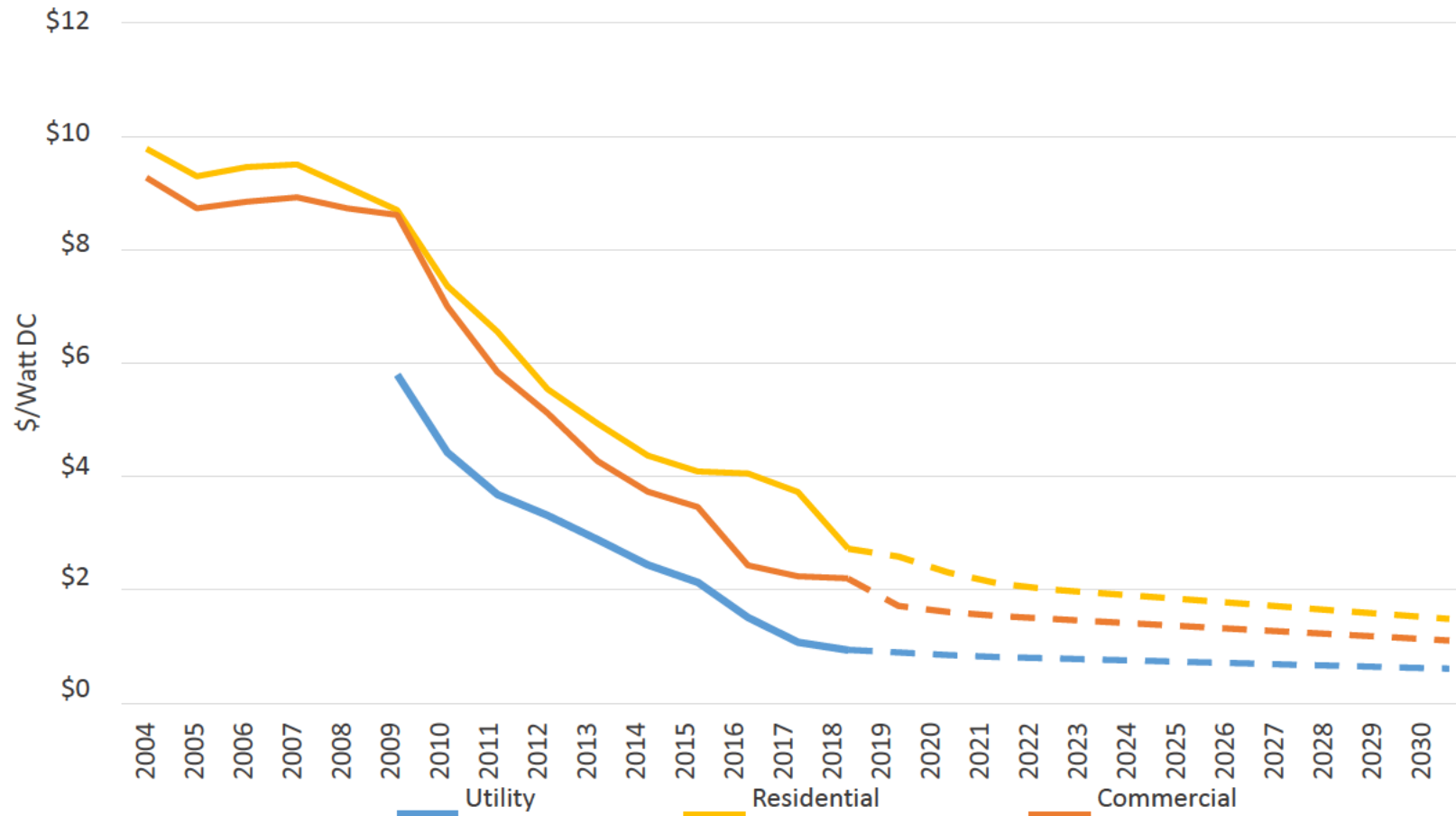
Solar and Wind Environmental Benefits

- Wind and solar, zero emissions.
- Wind and solar avoids 3.075 million metric tons of CO2 emissions, like taking 670,000 cars off the road.
- Water savings of 155 million gallons

Source – American Clean Power

Solar Cost Decline Since 2010

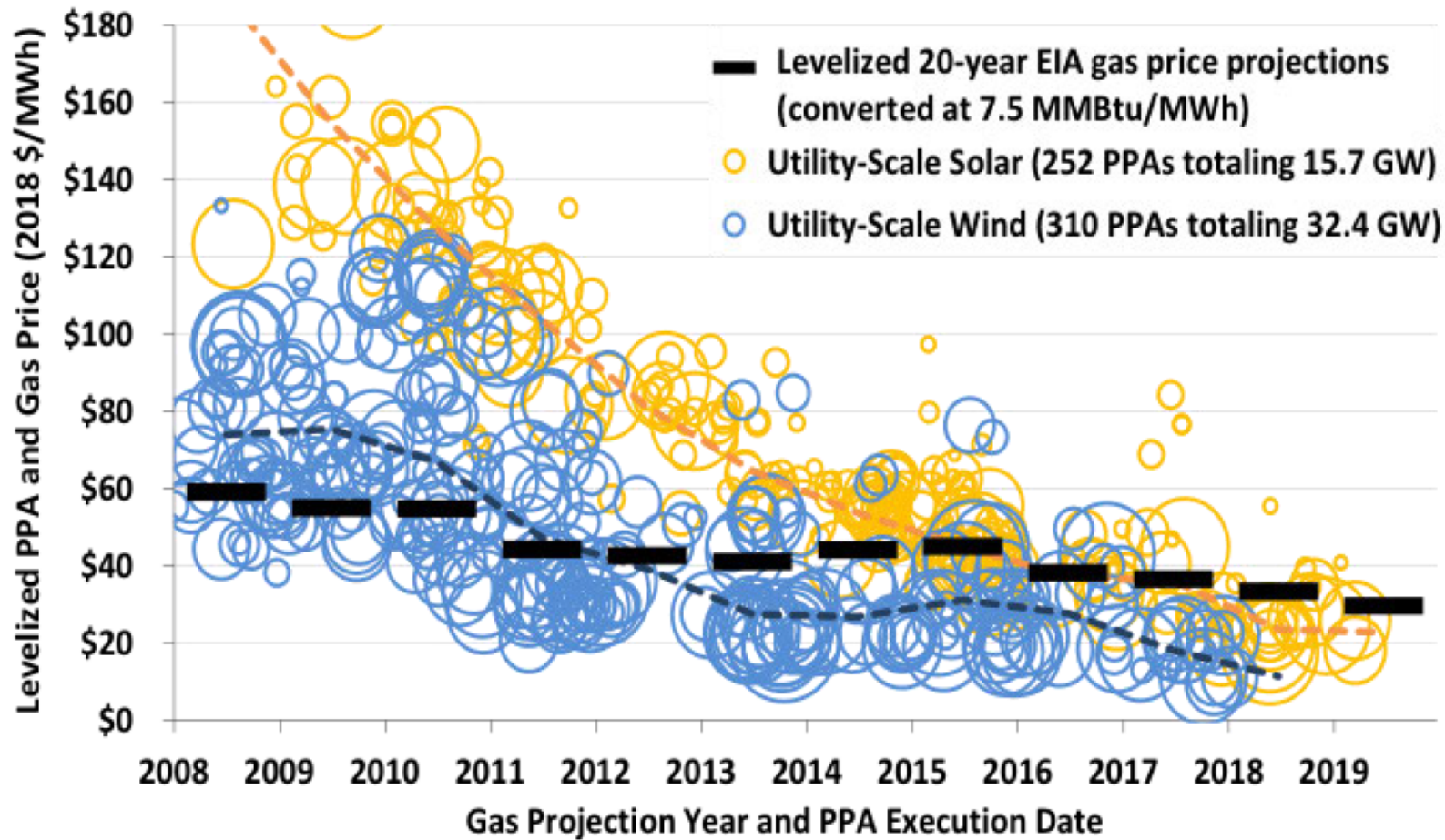
U.S. Solar Historic Installed Costs and Cost Forecast



Sources: Tracking the Sun, Installs Price trends for Distributed PV Systems in the US, 2016 and 2018 Edition, LBNL; Utility-Scale Solar Price Trends 2016 Edition, LBNL; NREL, U.S. Solar Photovoltaic System Cost Benchmark: Q1 2018; Open PV

[Link to excel with historic cost data](#)

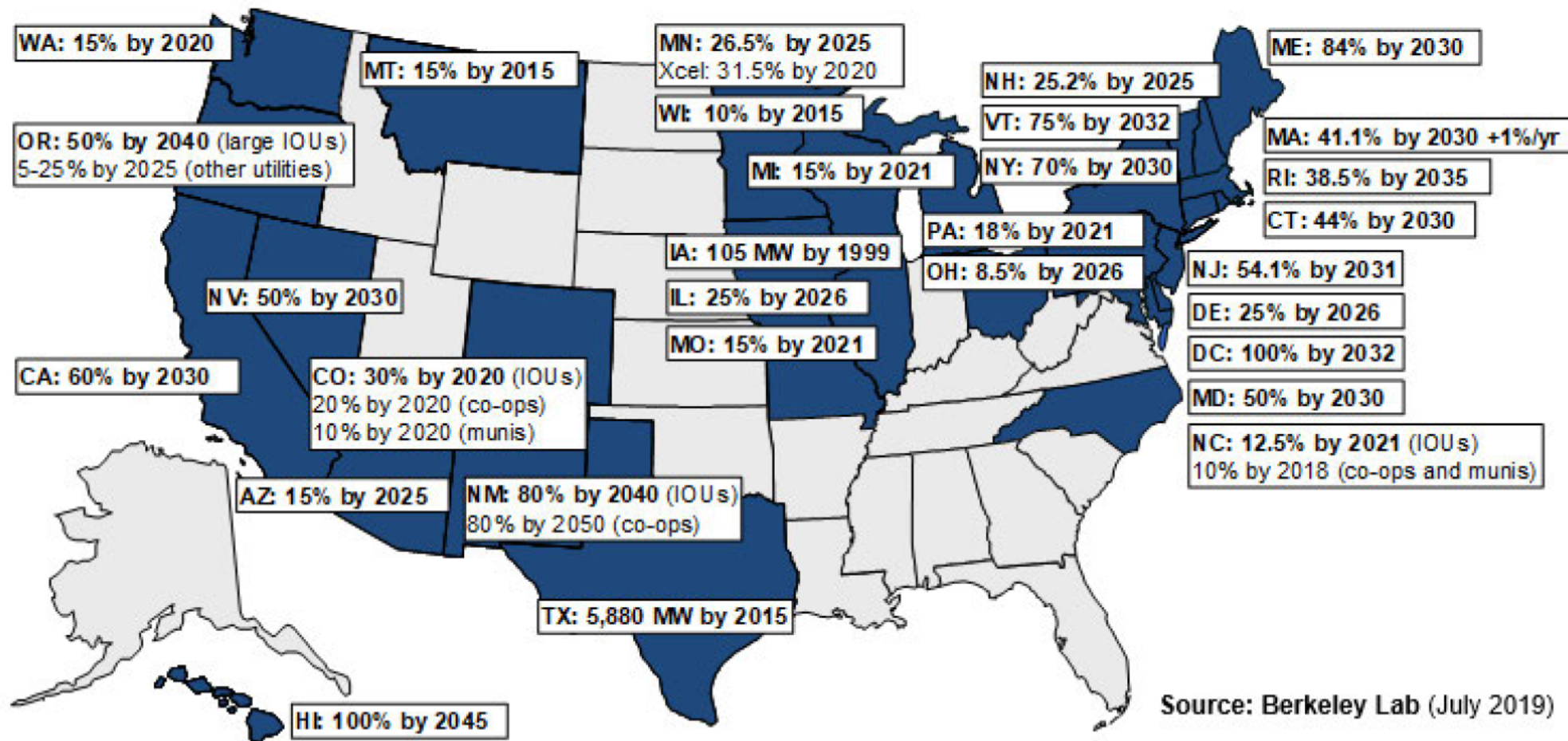
Wind Prices Are at All-Time Lows, Competitive with Cost of Solar and Gas



Wind Cost Decline

Source - Berkeley Lab

State RPS Policies



Source: Berkeley Lab (July 2019)

Mid-Atlantic Region Renewable Energy Policy

Maryland: 2019 legislation increasing standards to 50% renewables by 2030

New Jersey: 2018 legislation increasing standards to 50% renewables by 2030

New York: 2019 legislation increasing standards to 70% renewables by 2030

District of Columbia: 2019 legislation increasing standards to 100% renewables by 2032

Virginia: New law implementing a 30% standard by 2030 and requiring 100% clean energy by 2045 Dominion; 2050 APCO

Delaware: 2021 legislation increasing standard to 40% renewables by 2035



Alternative Energy Portfolio Standard


- Signed into law in November 2004; flattens out on May 31, 2021
- Requires Pennsylvania utilities obtain 18% retail electricity from alternative resources by 2021
 - Tier I - 8% - photovoltaic energy, solar-thermal energy, wind, low-impact hydro, geothermal, biomass, wood pulping (black liquor) and manufacturing byproducts from energy facilities within the state, biologically-derived methane gas, coal-mine methane, and fuel cells
 - 0.5% of the 8% to come from solar photovoltaics (PV)
 - Tier II - 10 % - Large-scale hydropower, waste coal, energy efficiency, municipal solid waste, byproducts of wood processing, etc.

The Market- Based AEPS – Solar SREC Program

- Solar renewable energy credits (SRECs) are the instruments used by utilities and retail suppliers to measure their compliance with the PA AEPS
- Developers and brokers can sell SRECs to utilities and retail suppliers through the state SREC program
- SRECs are equal to 1 MWh of solar energy generated from a qualifying facility
- SRECs must be PA generated to count for compliance
- The fundamental theory is one of supply and demand. If the market is short, then prices will rise; and conversely if the market is long, prices will fall
- SREC prices are capped by an alternative compliance payment
- PA SRECs have a useful life of three years

The Market- Based AEPS – Tier I REC Market

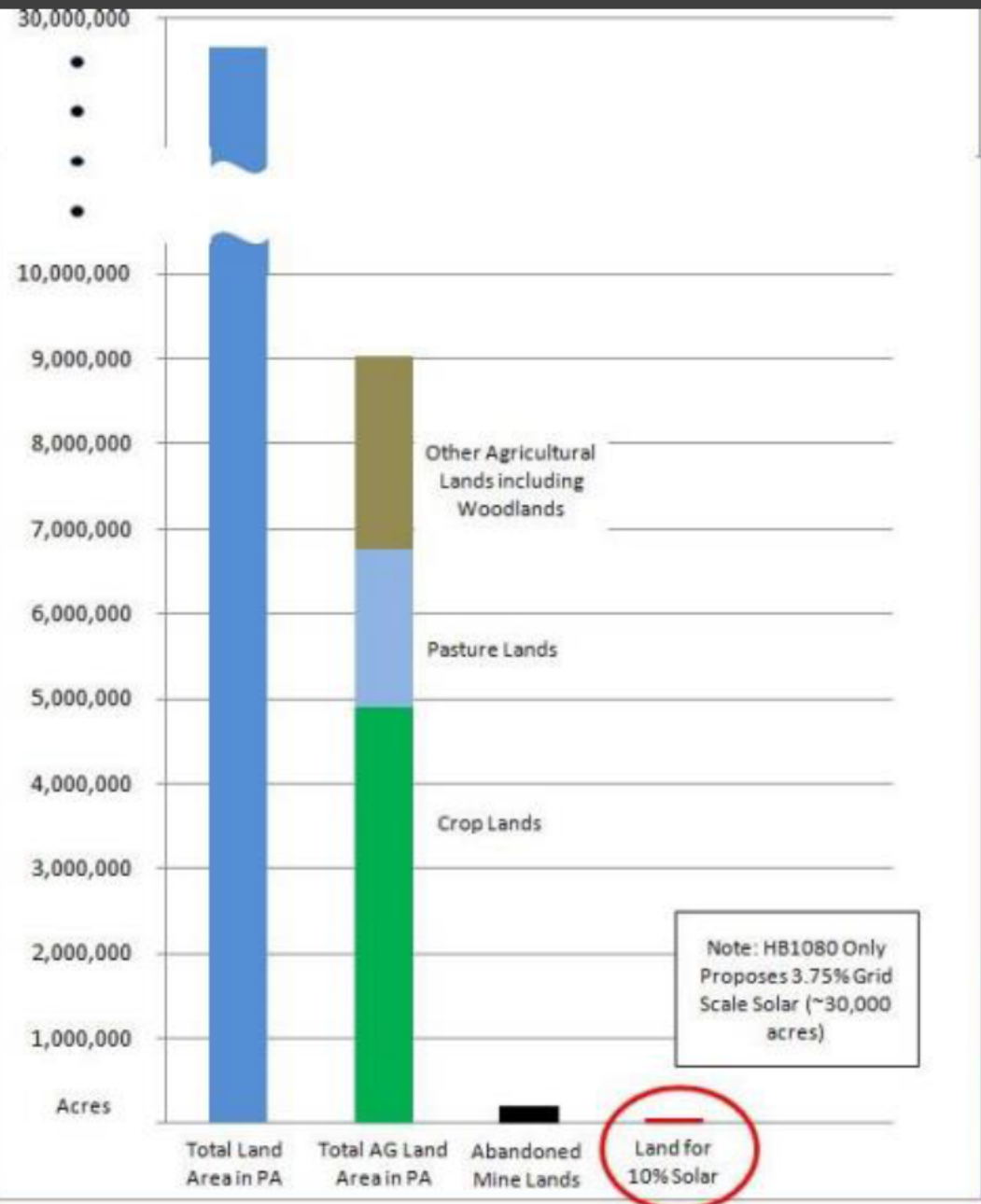
- Renewable energy credits (RECs) are the instruments used by utilities and retail suppliers to measure their compliance with the PA AEPS
- Developers and brokers can sell RECs to utilities and retail suppliers to meet compliance
- RECs are equal to 1 MWh of solar energy generated from a qualifying facility
- RECs can come from qualified facilities within PJM
- PJM tracks REC for states via its GATS program
- REC prices are also capped by an alternative compliance payment



Benefits to Agriculture Communities

- More than 6,000 PA farms closed between 2012 and 2017
 - Some farmers and other landowners are leasing land for renewable energy development. This is an important cash crop that can help keep farms in business
 - This is providing millions of dollars in lease payments to landowners per year
 - A life of a solar or wind farm is 20-30 years and land will be returned to agricultural use – as opposed to the land being permanently lost to commercial or residential development
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Land Needed for 3.75% Grid Scale (Utility-Scale) in Pennsylvania



Renewable Energy in PJM

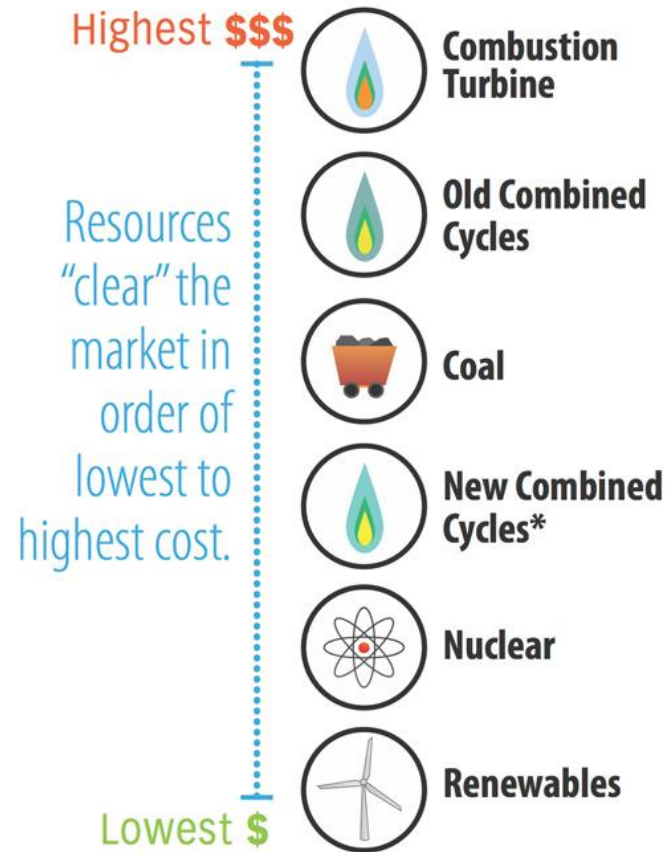
- PJM Interconnection is the regional transmission operator (RTO) that is responsible for reliability of the electric grid and ensuring that there is sufficient electricity generation to meet customer demand at all times
- It oversees the transmission of electricity in 13 states and DC for more than 65 million people.
- It operates a wholesale electricity market and other ancillary markets in its role to ensure reliability, including a capacity market
- PJM has a generation capacity of over 185,000 MW.
- It balances the requirements of all forms of electricity generation, including wind and solar generation
- PJM Interconnection queue is critical to development in PA

PJM Wholesale Markets

1. Wholesale market
 - a. Bilateral contract - an agreement by one party to sell power to another
 - b. Organized wholesale market - where a clearing price is set by auction. Generation prices are offered at a price for a specific number of MWh of power
 - i. Day ahead market – hourly prices are calculated for the next day
 - ii. Real time market – spot market where power is procured for immediate use
 - c. Capacity market – resources procured to meet predicted energy demand three years into the future

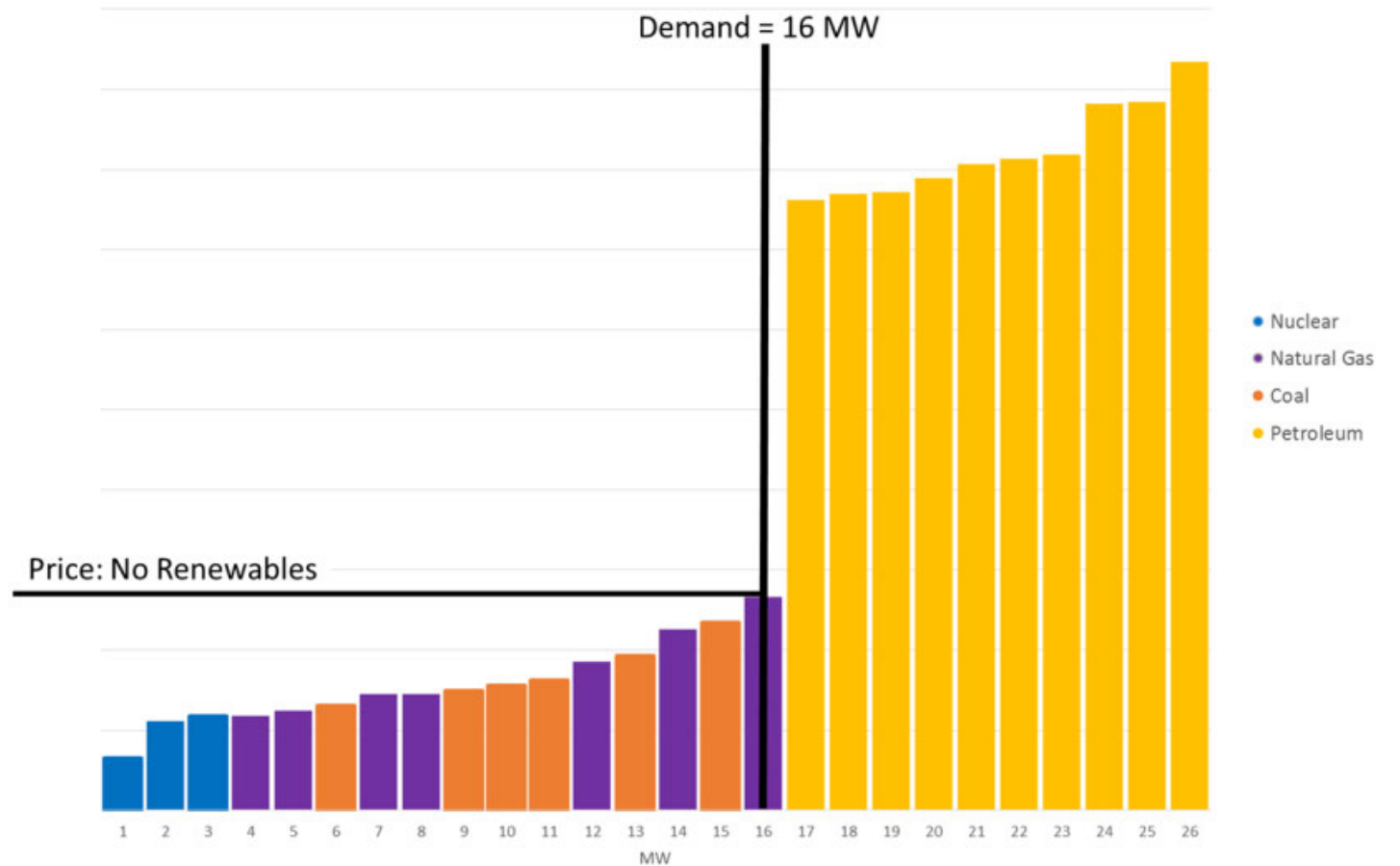
PJM Clearing Price

source: PJM

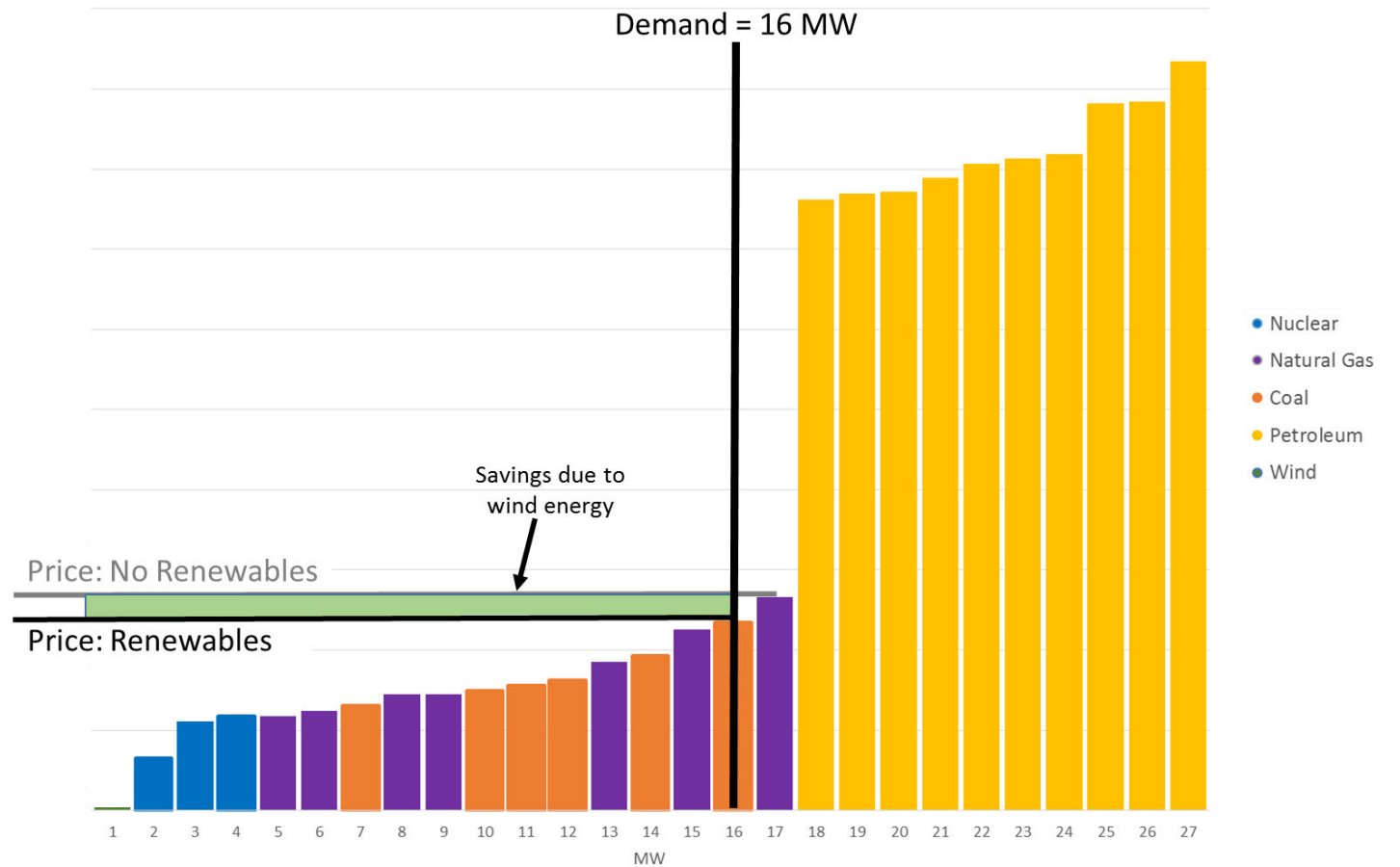


*New combined cycles are more fuel efficient.

Merit order
effect – *no
renewables
in PJM*



Merit order
effect – *with
renewables
in PJM*



Drivers for RE Development in PA

Strong state policy is needed, like reasonable market-based incentive programs like the AEPS or closing borders

Long-term contracts for renewable energy development

Fortune 500 companies, universities and local governments with strong sustainability goals can fuel development

Lower costs for development, such as improvement in technology

Reasonable siting rules



Utility-Scale Development – Concerns Sometimes Raised

- *Use of farmland for wind and solar projects*
 - *Environmental and wildlife concerns*
 - *Impacts on property values near solar and wind farms*
 - *Decommissioning wind and solar projects*
 - *Reliability of solar and wind energy projects*
-

Statewide Jobs, Economic Benefit and Tax Revenue

10%
Solar by
2030



\$10.3 Billion in Private Capital Investment



\$5.5 Billion in Local Economic Benefit



75,682 jobs and **\$3.2B Billion** in Wages



\$2 Billion in Farmer Lease Payments

- Keeps farms in family ownership
- Stabilizes local farm economy



\$514 Million in local tax revenue



~800,000 customers served by solar



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Questions?
