




# The Grid of the Future Starts Now:

Paths toward  
improved transmission,  
local engagement and  
equitable markets in PJM

PIEOUG Presentation to  
the PJM Board | May 18, 2022

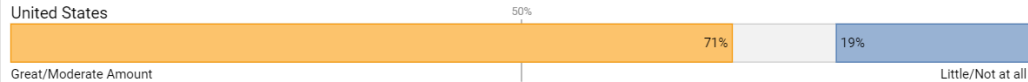
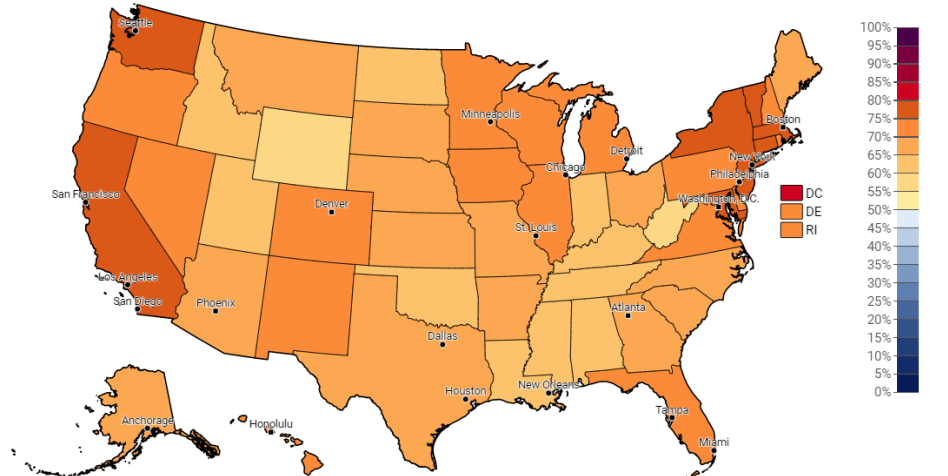


# The State of the Energy Transition in PJM

Tom Rutigliano, Sr. Advocate  
NRDC Sustainable FERC Project

# The energy transition has broad support

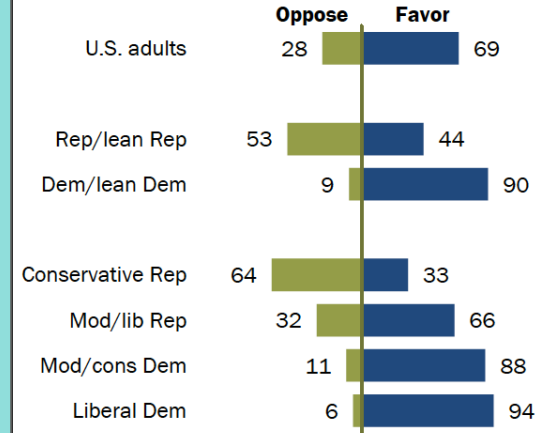
Estimated % of adults who think global warming will harm future generations (nat'l avg. 71%), 2021



UCSB UNIVERSITY OF CALIFORNIA SANTA BARBARA  
 YALE PROGRAM ON Climate Change Communication  
 UtahState University

## Majority favors the U.S. taking steps to become carbon neutral by 2050

% of U.S. adults who say they \_\_\_ the U.S. taking steps to become carbon neutral by 2050



Note: Respondents who did not give an answer are not shown. Republicans and Democrats include independents and others who lean to each of the parties.

Source: Survey conducted Jan. 24-30, 2022.

"Americans Largely Favor U.S. Taking Steps To Become Carbon Neutral by 2050"

PEW RESEARCH CENTER

# Most states in PJM have clean energy mandates



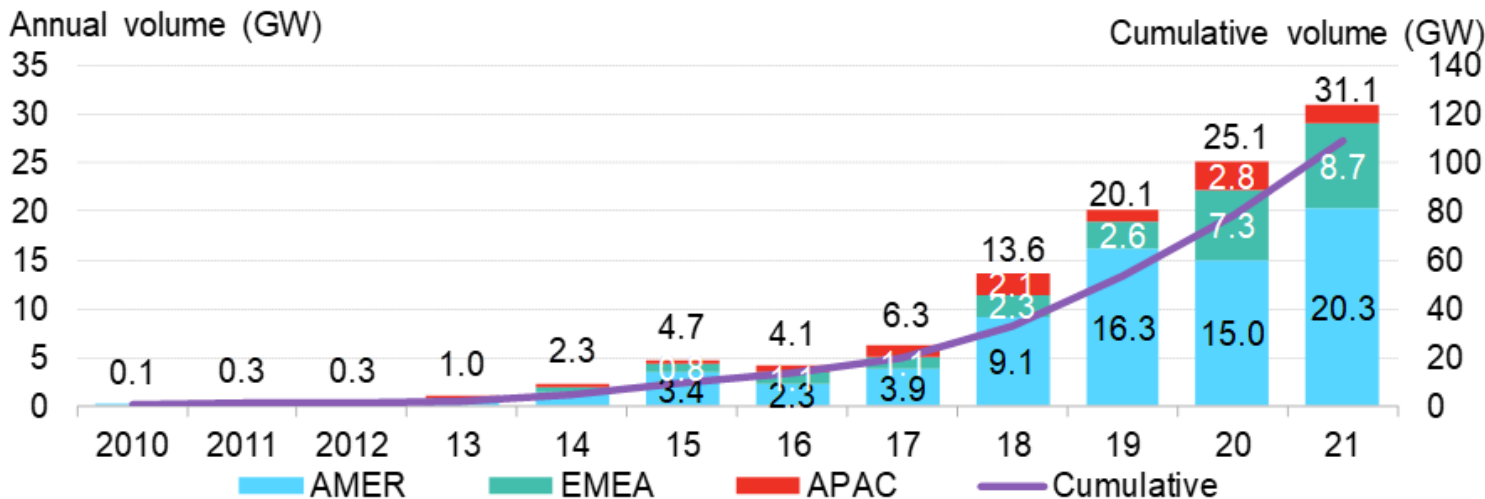
**Key:**

- Green box: Jurisdictions with both GHG and RPS/CEPS Commitments
- Yellow box: Jurisdictions with RPS/CEPS only, or White box with EE Standard only
- For **either** GHG or RPS/CEPS, at least 75% (○) or 100% (□) by 2050 or sooner
- For **both** GHG and RPS/CEPS, at least 75% (○) or 100% (□) by 2050 or sooner

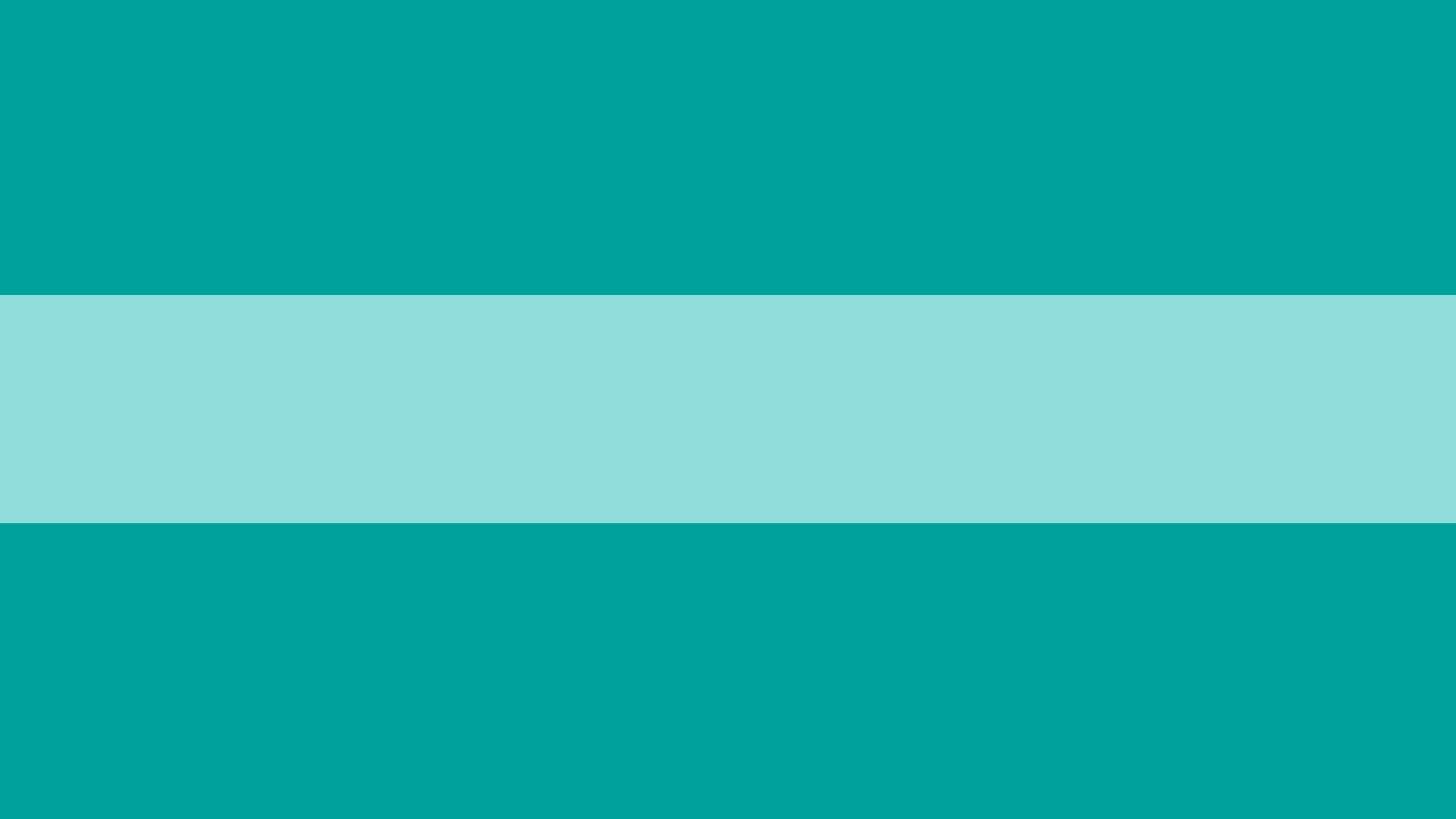
Jurisdiction with RPS	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Delaware	21.00%	22.00%	23.00%	24.00%	25.00%	25.50%	26.00%	26.50%	27.00%	28.00%
Illinois	19.00%	20.50%	22.00%	23.50%	25.00%	28.00%	31.00%	34.00%	37.00%	40.00%
Maryland	33.30%	32.60%	34.40%	36.20%	38.00%	40.50%	44.00%	45.50%	50.00%	52.50%
Michigan	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
New Jersey	23.50%	24.50%	29.50%	37.50%	40.50%	43.50%	46.50%	49.50%	52.50%	52.50%
North Carolina	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
Ohio	6.00%	6.50%	7.00%	7.50%	8.00%	8.50%	0.00%	0.00%	0.00%	0.00%
Pennsylvania	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%
Virginia (Phase I utilities)	6.00%	7.00%	8.00%	10.00%	14.00%	17.00%	20.00%	24.00%	27.00%	30.00%
Virginia (Phase II utilities)	14.00%	17.00%	20.00%	23.00%	26.00%	29.00%	32.00%	35.00%	38.00%	41.00%
Washington, D.C.	26.25%	32.50%	38.75%	45.00%	52.00%	59.00%	66.00%	73.00%	80.00%	87.00%

# Corporate demand for clean energy is soaring

**Figure 1: Global corporate PPA volumes, 2010-2021**



Source: BloombergNEF. Note: Onsite PPAs excluded. APAC volume is an estimate. Pre-reform PPAs in Mexico and sleeved PPAs in Australia are excluded. Capacity is in MW DC.



# Interconnection delays have become a public problem

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SUSTAINABLE BUSINESS

## Grid Operator's Energy-Project Backlog Creates Frustration for Renewables Buyers

Indoor agriculture company AppHarvest is among those planning to procure clean power from projects that are awaiting approval from PJM Interconnection, the largest U.S. grid operator

CANARY MEDIA

## The US has more clean energy projects planned than the grid can handle

Without major policy reforms and grid upgrades, much of the 1.4-terawatt queue of solar, wind and battery projects may never get built, two new reports find.



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## Overwhelmed by solar projects, the nation's largest grid operator seeks a two-year pause on approvals



# Projects are not entering service in PJM

Table 12-25 Percent of all projects (MW energy) to go in service by unit type and year submitted to the queue: March 31, 2022

Unit Type	2018	2019	2020	2021	2022
Battery	0.3%	0.0%	0.0%	0.0%	0.0%
CC	1.2%	0.5%	0.0%	0.0%	0.0%
CT - Natural Gas	4.8%	0.9%	0.4%	0.0%	0.0%
CT - Oil	0.0%	0.0%	0.0%	NA	NA
CT - Other	NA	NA	NA	0.0%	NA
Fuel Cell	NA	0.0%	NA	0.0%	NA
Hydro - Pumped Storage	0.0%	0.0%	NA	0.0%	NA
Hydro - Run of River	100.0%	0.0%	0.0%	0.0%	NA
Nuclear	0.0%	NA	0.0%	NA	NA
RICE - Natural Gas	NA	NA	NA	0.0%	NA
RICE - Oil	NA	NA	NA	NA	NA
RICE - Other	100.0%	NA	NA	NA	NA
Solar	0.5%	0.0%	0.0%	0.0%	0.0%
Solar + Storage	0.0%	0.0%	0.0%	0.0%	0.0%
Solar + Wind	NA	NA	0.0%	0.0%	NA
Steam - Coal	22.4%	0.0%	NA	NA	NA
Steam - Natural Gas	NA	NA	0.0%	NA	NA
Steam - Oil	NA	NA	NA	NA	NA
Steam - Other	NA	NA	NA	0.0%	NA
Wind	0.6%	0.0%	0.0%	0.0%	0.0%
Wind + Storage	NA	NA	NA	NA	NA
All	0.9%	0.1%	0.0%	0.0%	0.0%

Queue totals by status (MW): March 31, 2022

Queue	Active	In Service	Under			Total
			Construction	Suspended	Withdrawn	
AD2 31-Mar-18	5,816.9	432.5	413.8	178.0	13,525.0	20,366.1
AE1 30-Sep-18	14,646.3	81.5	69.3	247.6	18,852.1	33,896.9
AE2 31-Mar-19	21,878.8	50.0	20.9	140.4	11,727.8	33,817.8
AF1 30-Sep-19	21,174.9	16.8	47.0	145.9	7,548.4	28,932.9
AF2 31-Mar-20	20,921.4	8.0	5.1	48.0	7,266.6	28,249.1
AG1 30-Sep-20	32,372.2	0.5	5.0	25.0	5,775.6	38,178.3
AG2 31-Mar-21	55,515.0	0.0	0.0	0.0	1,234.3	56,749.3
AH1 10-Sep-21	45,863.7	0.0	0.0	0.0	4,122.1	49,985.8
AH2 10-Mar-22	26,836.6	0.0	0.0	0.0	6,494.9	33,331.5



**Where is the viable path forward?**



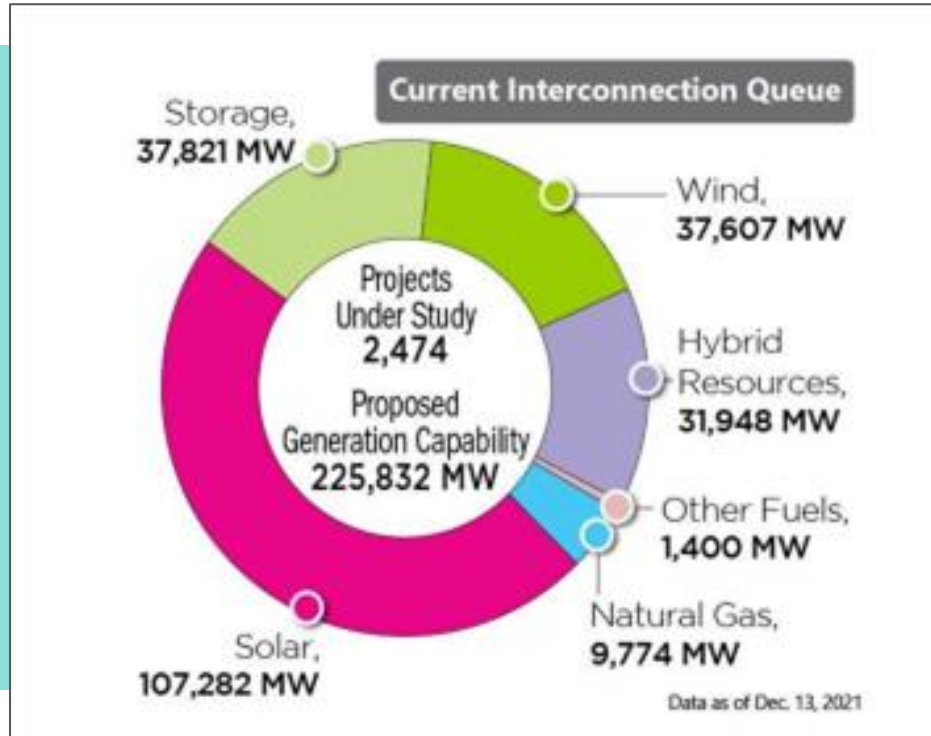
# Improving Transmission Planning in PJM

Cullen Howe, Sr. Advocate  
Natural Resources Defense Council

# **There is an urgent need to improve transmission planning in PJM**



# The resources in the Interconnection Queue are overwhelmingly solar, wind, hybrid and storage



# PJM's 2022 Grid of the Future Report:

**“The grid of the future is not some far-distant idea but is here now...increasing public demand for cleaner sources of electricity, combined with public policy standards and goals, is driving unprecedented growth in renewable sources...PJM generation interconnection queue activity reflects a shift from interconnection requests from natural gas generation to solar, wind, and storage...only through careful scenario analyses will PJM be able to evaluate the holistic impact on the need for grid expansion.”**

# FERC's Notice of Proposed Rulemaking

- The NOPR provides an important **opportunity to implement comprehensive forward-looking** transmission planning.
- PJM should **support a strong final rule** that will ensure a robust transmission-planning process.
- Doing so will help to **resolve some of the interconnection issues** and reduce disagreements among stakeholders.





**“If you love solar and wind power, you have to at least like transmission.”**

- **Joe Rand**, Lawrence Berkeley National Lab



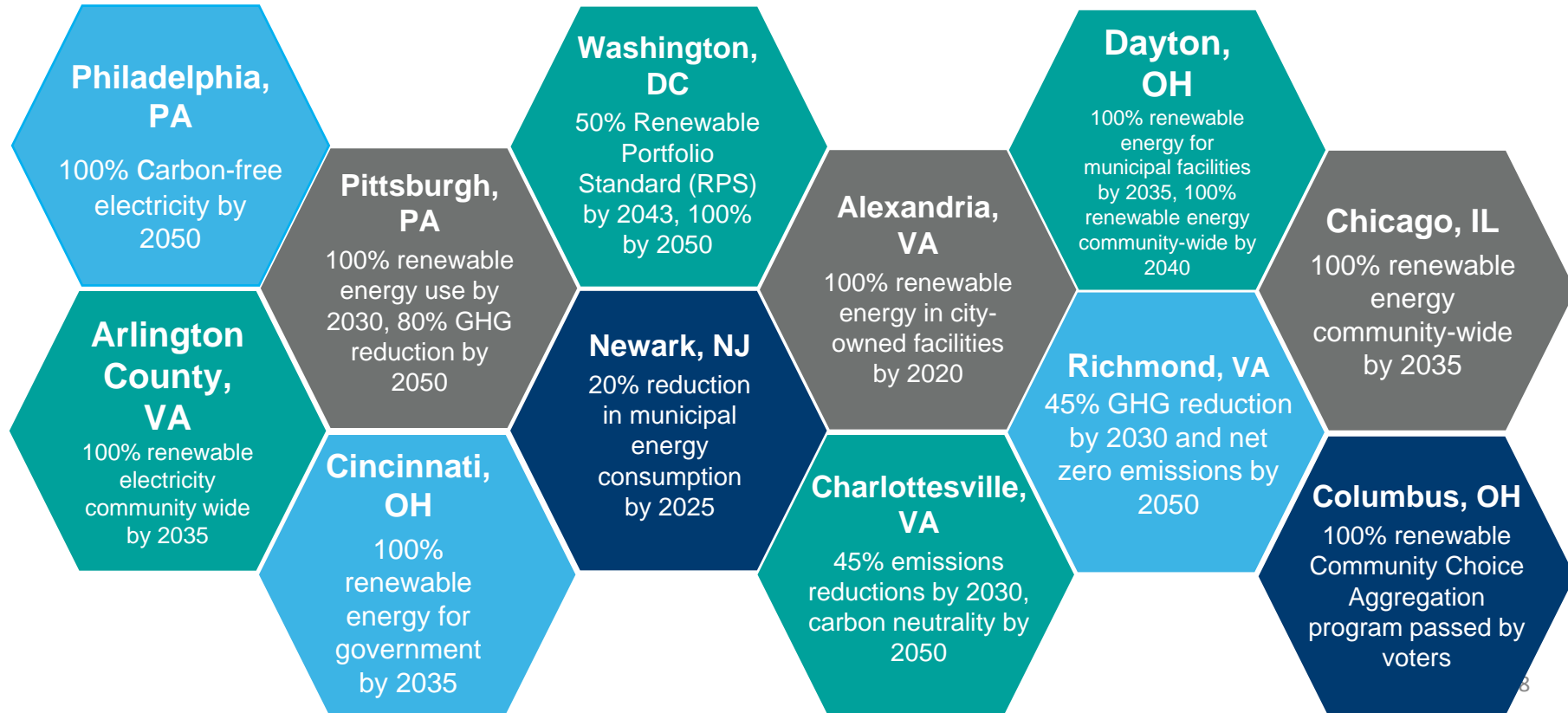
**How are local communities  
and governments engaged?**



# PJM Cities and Communities Coalition

Zach Greene  
Coalition Manager,  
World Resources Institute

# PJMCCC is a growing coalition of local governments representing over 12% of customers in PJM



# PJMCCC has worked toward removing and preventing barriers to decarbonization

2019 - 2021

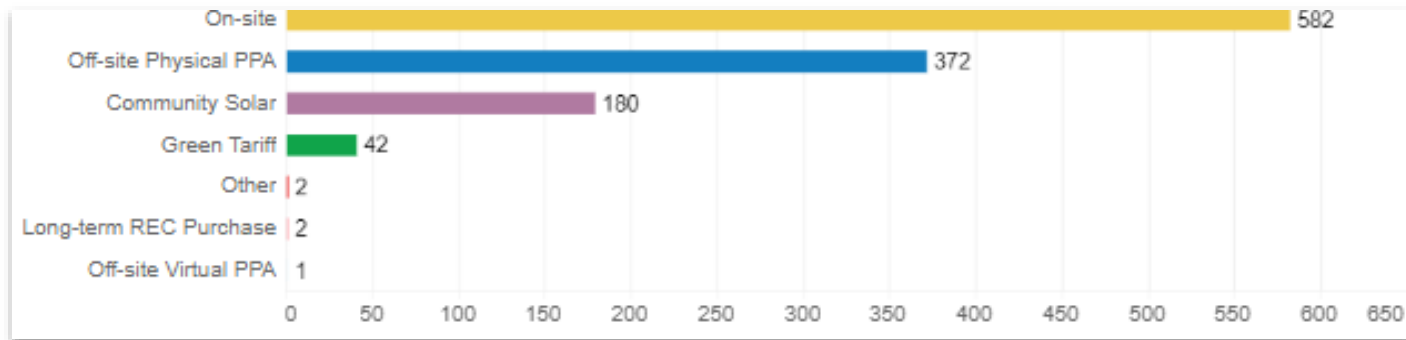
<b>July</b> 2019	<b>February</b> 2020	<b>April</b> 2020	<b>September</b> 2020	<b>October</b> 2020	<b>November</b> 2020	<b>December</b> 2020	<b>February</b> 2021	<b>March</b> 2021	<b>April</b> 2021	<b>September</b> 2021
<a href="#">Letter to PJM Board of Managers</a>	First Annual Summit & <a href="#">Adopted Charter</a>	PJM Senior Leadership Call	PJM Senior Leadership Call	<a href="#">PJMCCC Website &amp; Logo Launch</a>	<a href="#">Storage Policy Statement Released</a> (Cited in FERC Docket)	PJM Staff Call about MOPR	PJMCCC Annual Summit	<a href="#">FERC OPP Listening Session Comment</a> & PJM Senior Leadership Call	<a href="#">FERC OPP Written Comment</a>	<a href="#">MOPR Op-Ed in Utility Dive</a>

Ongoing: Member Education; Steering and Policy Committee Meetings; All-Coalition Calls

# Order 2222 can support operational and community-wide goals for local governments

Considerations for advancing and integrating DERs at the local level include:

- Portfolio approach to meeting energy goals
- Understanding locational aspect of aggregations
- Electrification of fleets and buildings
- Equity considerations



*Number of Local Government Transactions by Type Nationwide (2015-2020)*

# PJMCCC is exploring where equity and wholesale markets intersect

- **Equity and environmental justice are becoming central tenets** to local government priorities, including their energy-related initiatives.
- PJMCCC has uplifted the need to consider **equitable participation and outcomes in wholesale market issues**; energy burden and health outcomes are two key criteria.
- Local governments can be **a conduit to local stakeholders** and support efforts to expand the FERC OPP model in PJM.
- PJMCCC is about to **develop an “equity toolkit”** to help advance discussions with community-based organizations and frontline communities.



# Getting the Quadrennial Review Right:

Capacity Over-procurement

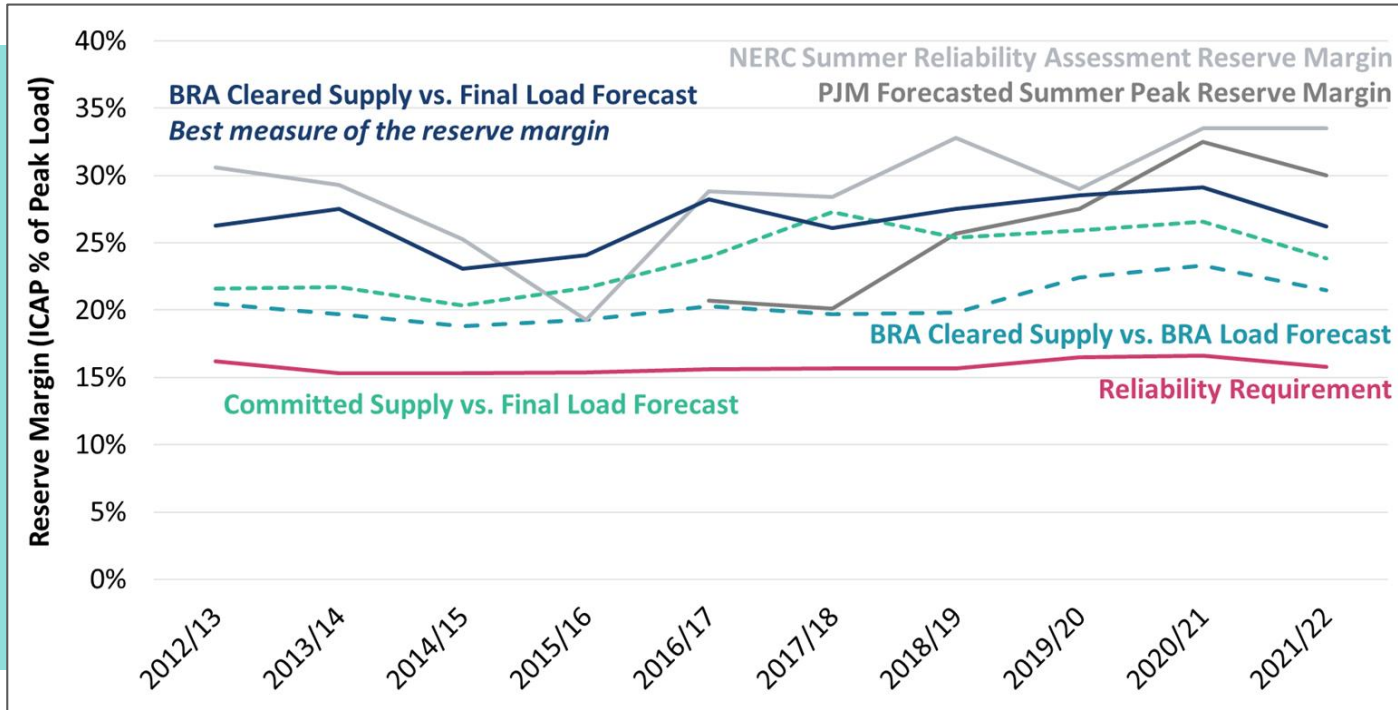
Casey Roberts  
Sr. Attorney  
Sierra Club



# PJM's Over-procurement in a Nutshell

- Target IRM: **15-16%**
- Reserve margin as cleared in the BRA: **19-23%**
- Realized reserve margin in delivery year: **23-29%**

# 2022 VRR Curve Report: PJM Installed Reserve Margin and Procured Amounts (Fig. 2)



# **PJM's proposal will reduce over-procurement, but doesn't go far enough**

- PJM proposes to update the reference resource for the demand curve to a combined cycle plant – long overdue
- Proposes to change to forward energy & ancillary service offset – especially critical with the possibility of sustained high gas prices
- But PJM's proposal would still exceed the reserve margin on average, and make only a small dent in right-sizing the capacity market

# Recommendations for PJM

- In this Quadrennial Review:
  - **Adopt 2x1 Combined Cycle as Reference Resource** - lower costs closer to true Net CONE given modeling limitations
  - **Left-shift the curve** to further reduce over-procurement
- Load forecast bias remains a significant problem:
  - **Requires sustained attention** from the Board to bring about the needed correction
  - **Managing the remaining bias** by stopping procurement of 100% of the Reliability Requirement 3 years ahead.

# Thank You

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