

# Overcoming Challenges in Solar Energy Siting Projects in Maryland

## Greenhouse Gas Mitigation Working Group June 21, 2022

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# Today's Presentation

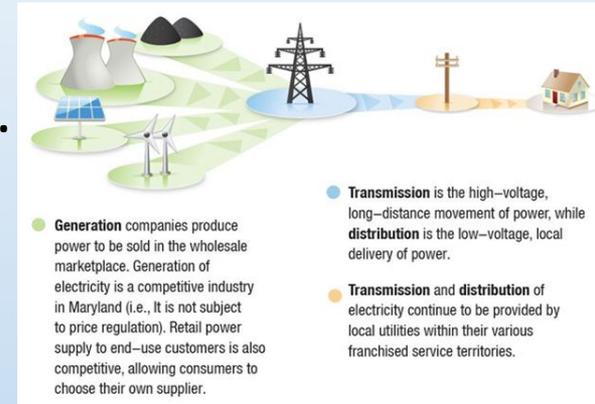


- Maryland's Electricity Facts
- Who is PJM, PSC, and the permitting process
- Overview of the Renewable Portfolio Standards
- Status of Solar Facilities in Maryland
- Status of Maryland Ag lands converted to solar
- Summary of dual-use opportunities
- Governor's Renewable Energy Development and Siting Task Force
- Recommendations from the industry

# Maryland's Electricity Facts



- Annually uses 60,000,000 MWh of electricity
- Import 40% of our electricity from out of state.
- Instate annual electricity production:
  - Calvert Cliffs Nuclear Power Plant accounts for 41%
  - Natural Gas – 38%
  - Coal – 9%
  - Hydroelectric – 5%
  - Renewable Energy (Solar, Wind, small hydro, biomass (wood), solid waste, and landfill gas) -7%
- There are 77,199 solar “facilities” and 105 non-solar generation facilities in Maryland



# Utility-Scale Renewable Energy Permitting in Maryland



- PJM - Interconnection Agreement
- Public Service Commission – Certificate of Public Convenience and Necessity (CPCN)
- County/City Permits
- State and Federal Permits

# PJM



- PJM is a regional transmission organization (RTO) that oversees the flow of electricity in our region
- Coordinates the movement of electricity around the mid-Atlantic (13 states and DC).
- Maryland is entirely with the PJM grid and PJM is the largest grid operator in the US.
- New electricity generators must apply to obtain PJM approval to connect to the grid (two year study process).

- The number of New Service Requests has more than tripled over the past three years.
  - Due to a surge of renewable energy and energy storage projects submitting interconnection requests
  - The Interconnection Agreement is critical in financing the project
  - PJM is modifying its interconnection process due to delays in the interconnection study process
- In PJM over 2,500 solar or wind Projects waiting for approval.
  - Of these, 45 are solar projects in Maryland
  - Equal 451 MWs
- Feb. 2022 – PJM has requested a two-year moratorium for all project reviews.
  - This will allow those projects in the queue to be assessed
  - PJM Reform Task Force has been formed to address the issue
  - What about those projects wanting to connect to the grid?



Update: PJM submitted its interconnection reform filing to FERC on June 14<sup>th</sup> and requested approval by October 3<sup>rd</sup>

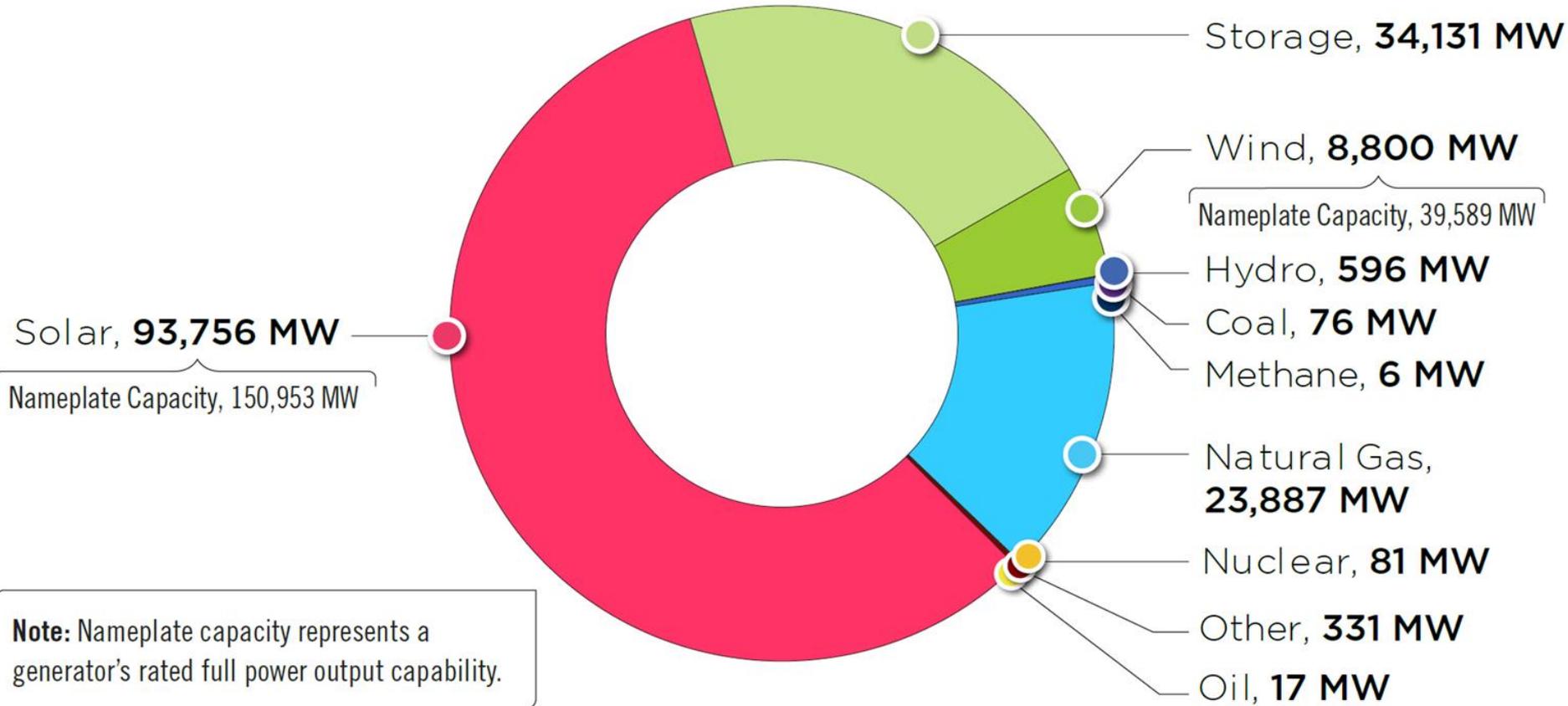
# Significant Project Approval Delays in PJM



Projects that have submitted an interconnection request to PJM and have not received an Interconnection Agreement will follow these timelines:

Interconnection Request Filed	Anticipated Interconnection Agreement Date
Nov 2017 – Mar 2018	Oct 2022
Apr 2018 – Sep 2020	Sep 2024 – April 2025
Oct 2020 – Sep 2021	Jun 2026+
Oct 2021+	

# PJM Requested Capacity Interconnection: April 2022



# Public Service Commission



- Appointed by the Governor with Senate advice and consent, the Commission's five members serve five-year terms
- Generation:
  - Certificate of Public Convenience and Necessity if > 2MWs
  - Developer submits an Application
    - Referred to a PULJ
    - Application reviewed by intervening parties (PPRP, OPC, PSC Staff and others)
    - PPRP coordinated the statewide review of the Project including:
      - the stability and reliability of the electric system;
      - economics;
      - aesthetics;
      - historic sites;
      - aviation safety;



# Public Service Commission and Local Permits



## PSC

- makes CPCN decisions through a formal adjudication process.
- Gives authority to construct with conditions

## County/City

- Encouraged to Intervene in the CPCN Process
- Reviews site plans
- New: the Applicant must meet with County/City representatives a minimum of 60 days before the CPCN application is submitted.

# Maryland's Renewable Portfolio Standard (RPS)



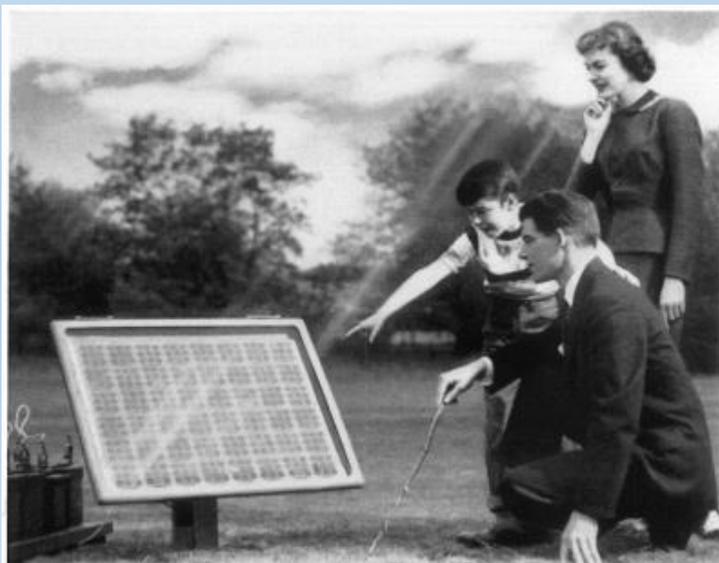
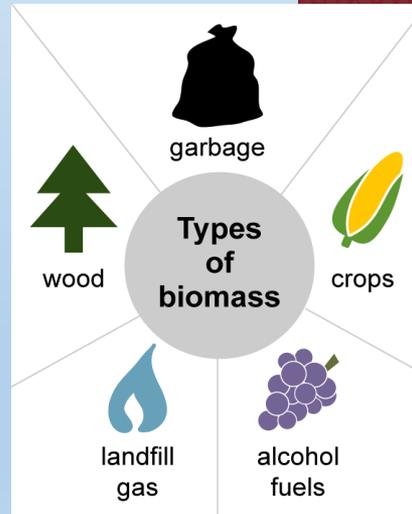
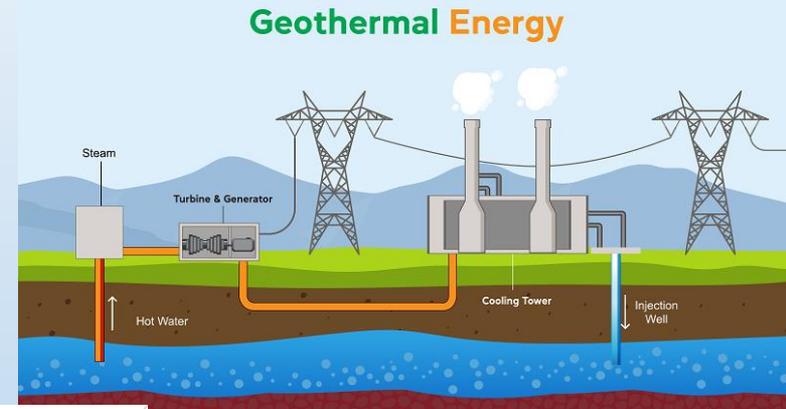
- **1999 - Deregulation** – consumers can choose their electricity supplier
- **Siting mandates for power plants ended.**
- RPS was **legislatively mandated first in 2004** and amended frequently.
  - Mandates utility companies to obtain electricity from renewable energy sources or make alternative compliance payments.
  - Incentivizes renewable energy projects through tax credits, grants, loans, and renewable energy credits (RECs).
  - REC = 1 MWh of electricity
  - In-state power companies can sell their RECs out-of-state.



# Maryland's Renewable Portfolio Standards



Renewable Energy includes



# Benefits of Maryland's Renewable Portfolio Standard



- Increases Maryland's energy diversification
- Lowers the cost of renewable energy to consumers
- Reduces water usage from coal and gas-fired power plants
- Develop clean energy businesses and workforces in Maryland.
- Reduces greenhouse gas emissions

# How a RPS works



**10/13 states and DC have an RPS in PJM**

**States vary their RPS eligible resources and goals through legislation.**

RPS is a state mandate that requires electricity utilities to purchase electricity from renewable energy suppliers.

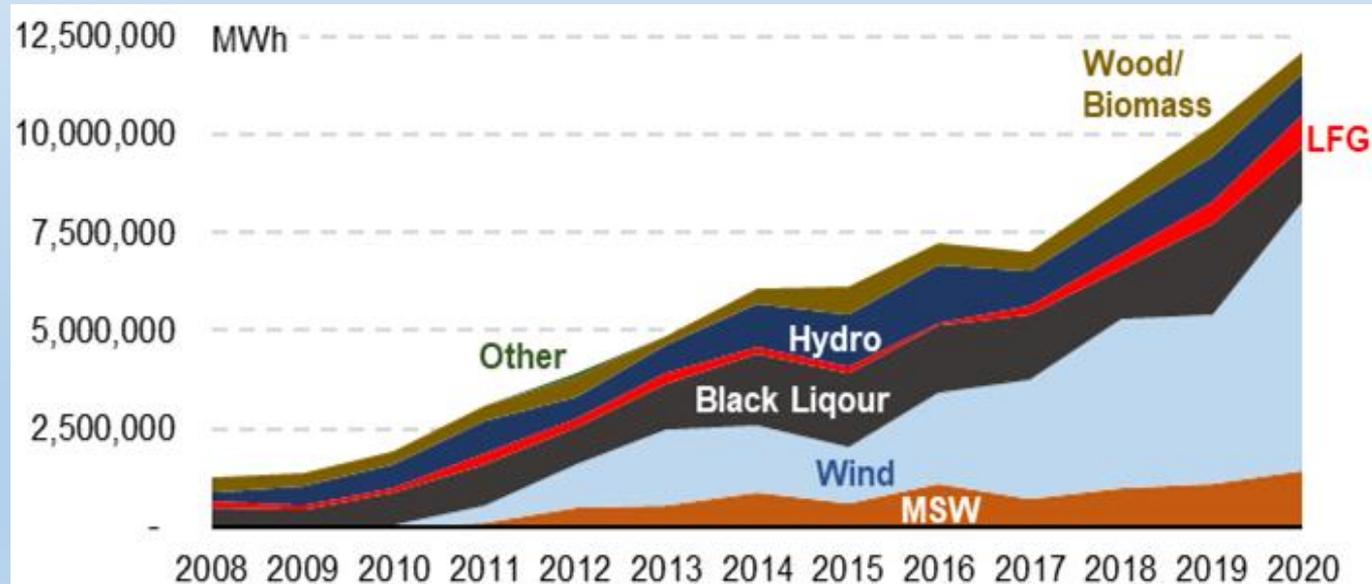
- Each certified renewable energy generator earns renewable energy credits (RECs) for each MWh of electricity produced.
- May make Alternative Compliance Payments (ACPs)
- But there are mandates to purchase from certain renewable energy sources



# Maryland's Two Tiers for Renewables



- Tier I – Includes wind, small hydro, biomass (wood), solid waste, and landfill gas and can be from out of state
- Tier II – In-state Large Hydroelectric (Conowingo)
- Special categories and increased cost of RECs for solar, wind and geothermal, these are called “carve-outs”:
  - Solar – SRECs
  - Wind – ORECs
  - Geothermal - GRECs



**RECs Retired for Tier 1 Non-Carve-out Maryland RPS Compliance, by Fuel Source**

Source: PJM-GATS.

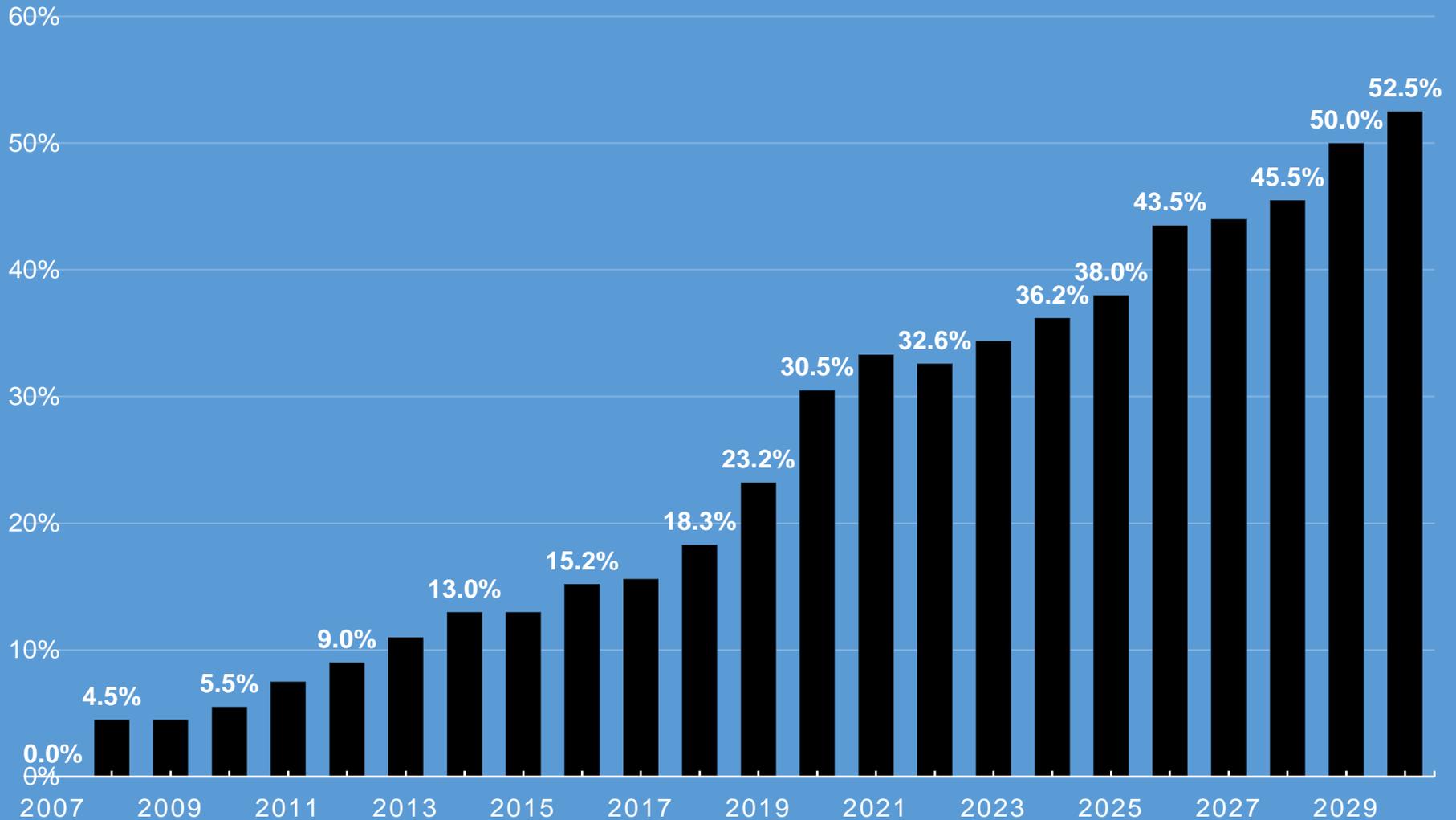
# Maryland's Current RPS Requirements



## Maryland RPS – Percentage of Renewable Energy Required

Year	TIER 1					TIER 1 TOTAL	TIER 2 TOTAL (large Hydro)	TOTAL RPS
	Non- Carve out	Solar	Off-shore Wind	Geo-Thermal				
2022	24.6	5.5	0	0	30.1	2.5	32.6	
2023	25.85	6	0	0.05	31.9	2.5	34.4	
2024	~25.2	6.5	~1.9	0.15	33.7	2.5	36.2	
2025	~26.4	7	~1.9	0.25	35.5	2.5	38	
2026	~17.3	8	~15.2	0.5	41	2.5	43.5	
2027	~16.1	9.5	~15.2	0.75	41.5	2.5	44	
2028	~15.8	11	~15.2	1	43	2.5	45.5	
2029	~18.8	12.5	~15.2	1	47.5	2.5	50	
2030	~19.3	14.5	~15.2	1	50	2.5	52.5	

# Total Renewable Portfolio Standards (RPS) Total by Year



# Three Types of Solar Facilities in Maryland



- Rooftop Solar: A solar energy generating system directly installed on a customer's property.
  - Owned by the customer or a third-party.
  - Compensates owner for electricity delivered onto the grid (net energy metering).
- Community Solar: A solar energy generating system designed to make solar energy accessible to residents and businesses that may be unable or unwilling to install solar on their properties, residences, or buildings.
  - Owned by a subscriber organization.
  - Increased to 5 MWs
- Utility-Scale Solar: A solar energy generating system that sells electricity through power purchase agreements or into the wholesale electricity market.
  - Owned by a generation company.
  - May need a CPCN if over 2 MWs.

# Maryland's Non-CPCN Solar Facilities



System Size (kW)	Number of Projects	Total Capacity (MW)
0 to ≤ 3	2,513	6
> 3 to 6	17,611	83
> 6 to 10	27,609	220
> 10 to 50	26,059	370
> 50 to 100	203	15
> 100	534	731
<b>Total</b>	<b>74,529</b>	<b>1,425</b>

# Utility-Scale Solar Projects in Maryland



- Utility-Scale Solar Projects (> 2 MWs) generally require a CPCN to construct through the Public Service Commission
- PJM Interconnection Agreement
- Typically see these on large tracts of land
- Numerous Areas to examine including:
  - Wetlands,
  - Critical Area
  - Historical Trust
  - DNR for RTE
- Local Permits
  - Site Plan
  - Lighting
  - FCA

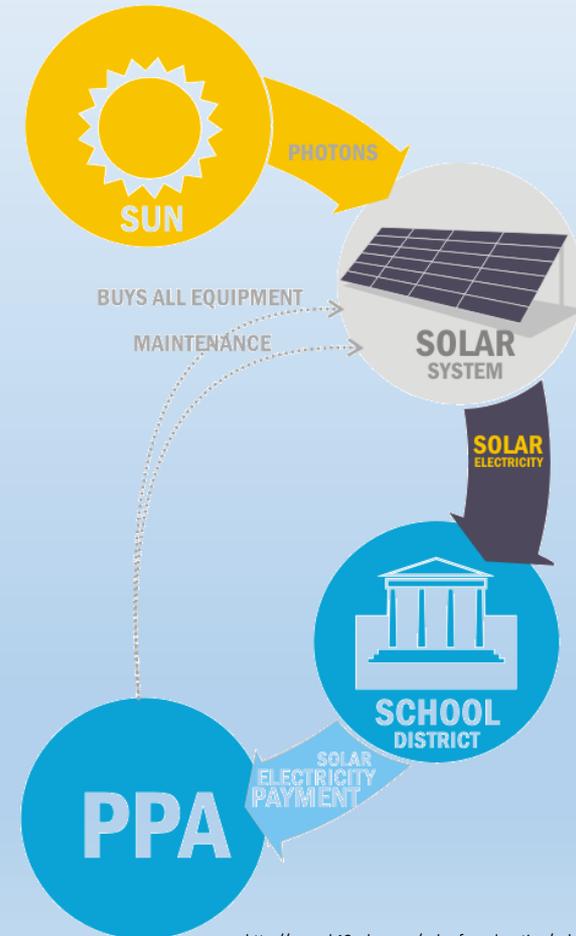


# Status of Utility-Scale Solar Projects (>2MWs) in Maryland since 2011.

- There have been approximately 53 solar CPCN cases filed since 2011.
  - 49 granted a CPCN
  - 1 Denied
  - 3 Pending a PSC decision

**Note only 7 are operational**

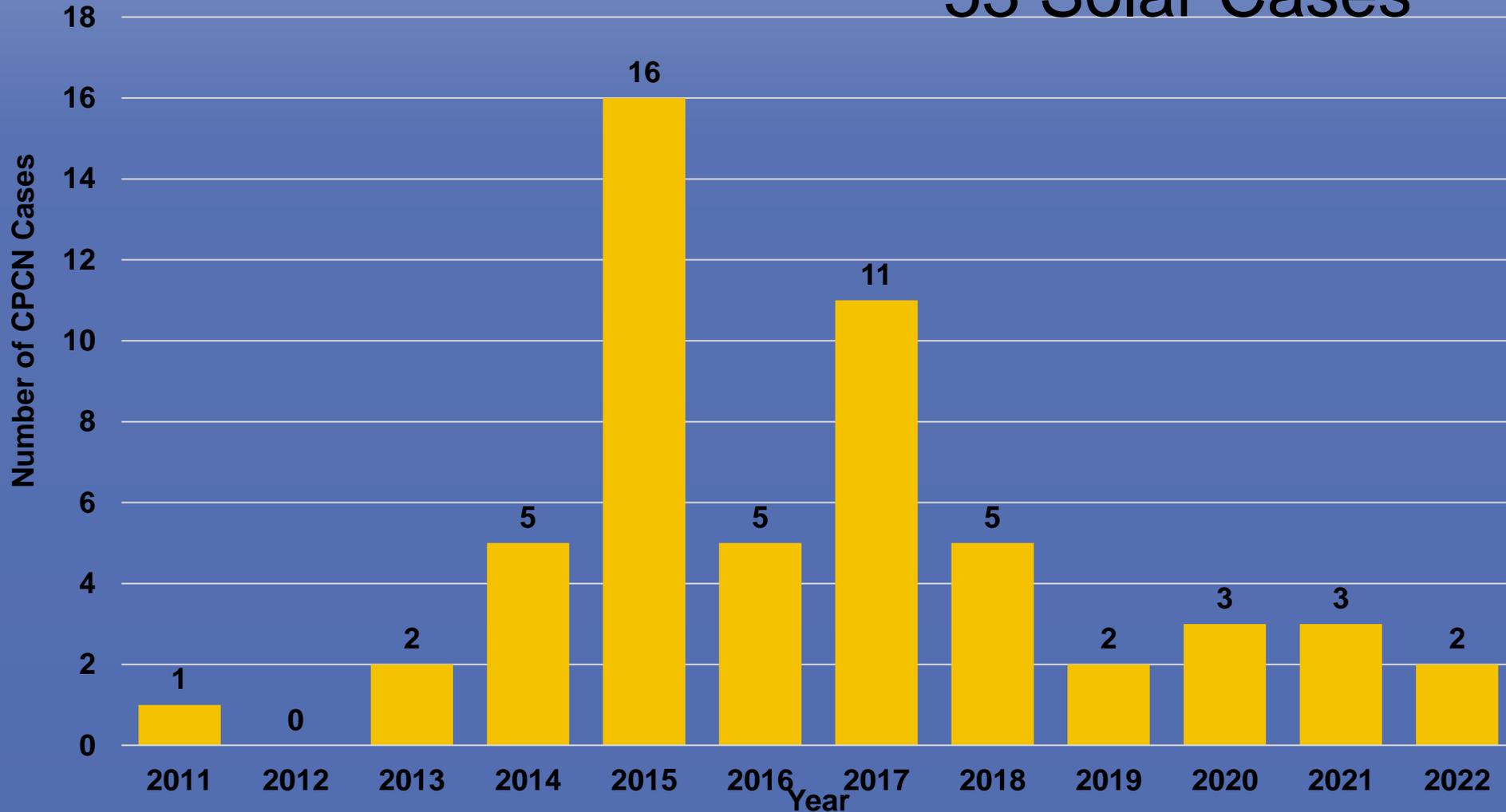
- The largest project to come online is Great Bay Solar at 150 MWs.
- 50% of these facilities are on the Eastern Shore.



# Solar CPCN Cases by Year.



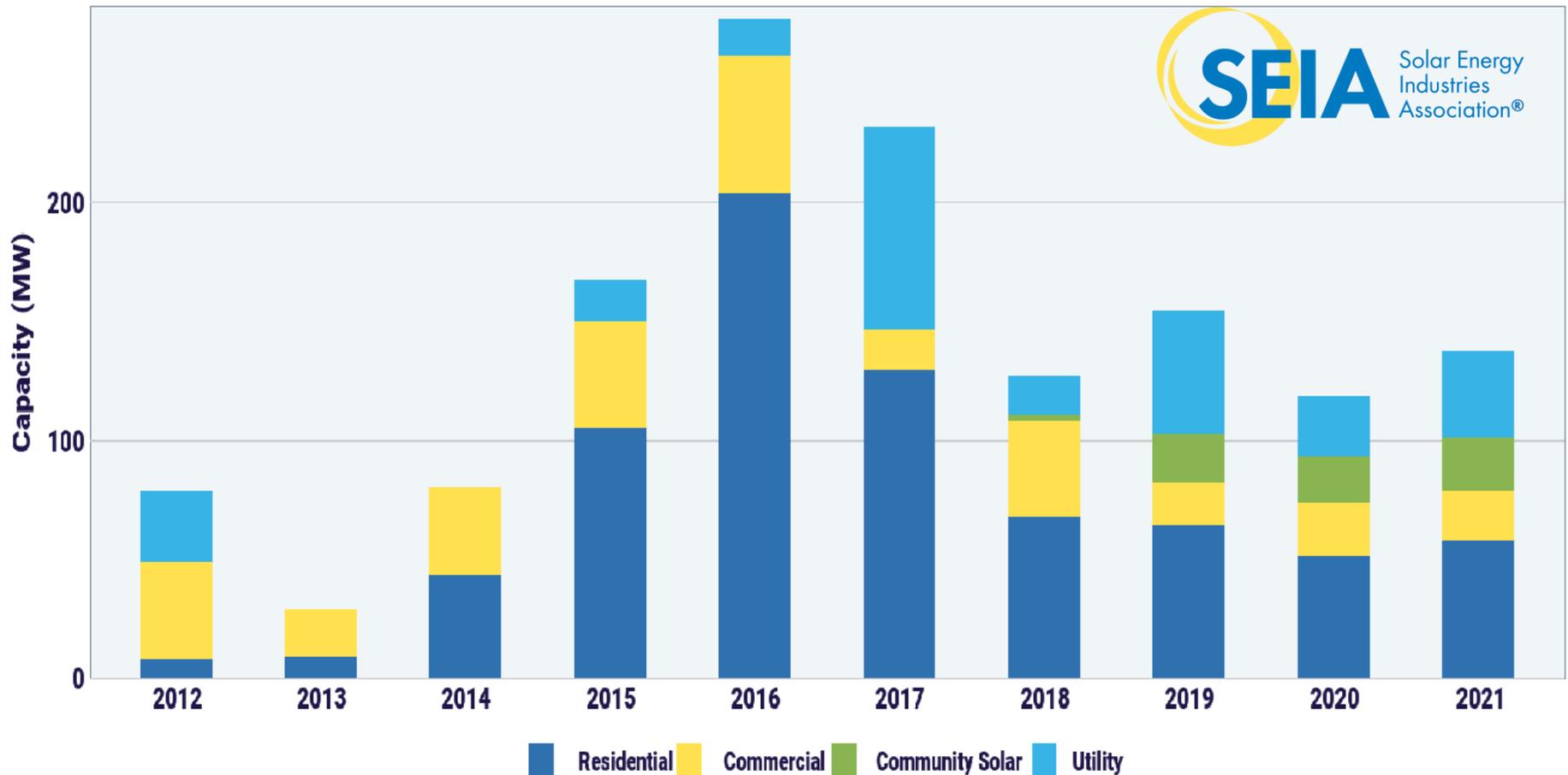
53 Solar Cases



# Solar Generation in Maryland, 2008-2020



## Maryland Annual Solar Installations



# PPRP is Encouraging Dual-Use Utility Scale Solar



- Pollinators
- Crops
- Sheep

Many utility-scale solar developers have incorporated pollinator habitat but none yet have incorporated crops or sheep between panels.



Photo credit: <https://www.farmanddairy.com/news/solar-grazing-could-be-big-opportunity-for-farmers/674017.html>



# Solar Facility Calculation



## 50 MW Solar Facility

- 1 MW = ~8 acres of land
- Solar panels would cover 400 acres
- Output estimate computing panel efficiency and average hours of sunlight equals 122,640 MWh per year
- This facility could annually power over 11,000 homes



# Projected Acres of Utility-Scale Solar Needed to Reach the RPS Goal.



YEAR	Utility Scale Required to Meet RPS (MWs)	Estimated Rooftop Solar (MWs)	Total Solar Capacity (MW)	Estimated Annual UPV Capacity Needed (MW)	Estimated Annual Rooftop Capacity Needed (MW)	Assuming 5 acres/MW	Assuming 8 acres/MW
2022	798	1,234	2,032	254	254	3,990	6,384
2023	868	1,304	2,172	70	70	4,338	6,941
2024	938	1,374	2,312	70	70	4,690	7,504
2025	1,006	1,442	2,448	68	68	5,030	8,048
2026	1,184	1,487	2,671	178	45	5,922	9,475
2027	1,453	1,554	3,007	269	67	7,266	11,625
2028	1,725	1,622	3,347	272	68	8,625	13,800
2029	2,000	1,691	3,691	275	69	10,000	16,000
2030	2,370	1,783	4,153	369	92	11,848	18,956

Based on utility-scale being 50% of the input from 2022-2025 and then 80% thereafter.

Total acres needed to reach the 2030 goal:  $18,956 - 6,384 = 12,572$  but up to 33,000 acres (REDS)

# REDS Report Updated Data Concerning Estimated Farmland Impacted by Solar.



## 2022 PPRP Analysis

- We are currently meeting our Solar Carve-Out within the RPS
- The future solar conditions are unpredictable due to panel, inverter, and transformer supplies, overseas distribution issues, and PJM.
- Distributed (Rooftop) Solar has expanded exponentially.
- Projected energy usage statewide will likely decrease.
- Utility-scale solar installations have slowed significantly.
- Efficiency of panels has also increased and will continue to increase.
- Models are educated guesses based on very dynamic in-state processes include changing RPS goals, PJM interconnection issues, energy efficiency is increasing, changing solar incentives from states and the federal government.

# Maryland's Solar Projections



## Utility Scale Solar:

- Is presently on 3,645 acres in Maryland
- By 2030, 14.5% from Solar
- Results in 12,000 -33,000 more acres to reach the instate solar goal

## Agricultural Lands

- Currently 2,000,000 acres
- UPV would need less than 1% to 1.7% of the available 2 million acres of existing Ag lands in Maryland.



# Agrivoltaics- Dual Use

- Tomatillos are just one of the many types of produce which grows between the rows of solar panels at Jack's Solar Garden in Longmont, Colo. Jack's is a 1.2-MW, five-acre community solar farm and is the largest agrivoltaic research project in the U.S.



# Various Crops under Solar Panels in Colorado.



# Solar on Closed Landfills



Annapolis Solar on a closed Annapolis landfill

18 MW floating panel solar system

Steep slopes

Solar on landfill in AA County....

<https://www.eyeonannapolis.net/2022/03/solar-park-coming-to-former-glen-burnie-landfill/>



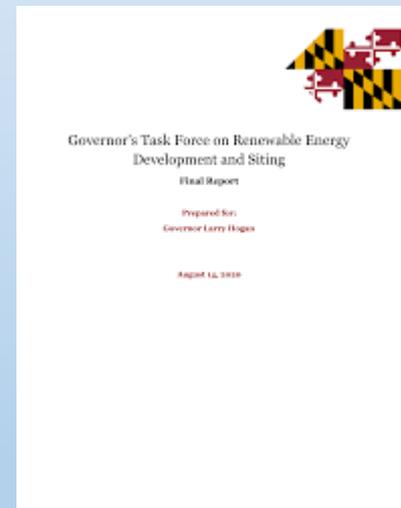
# Governor's Renewable Energy Development and Siting Task Force (REDS)



Report can be found at:

<https://governor.maryland.gov/energy-task-force/#:~:text=Continuing%20his%20commitment%20to%20skilled,energy%20projects%20in%20the%20state.>

Goal: Developed consensus-based recommendations on the siting of new solar and wind energy projects in the state.



# 14 REDS Recommendations

- 1. Develop Additional Incentive Programs**
- 2. Consider Options for Updating and Streamlining the CPCN Process**
- 3. Expand Rooftop Solar and Other Preferred Applications by Increasing the Net Energy Metering Cap**
- 4. Accelerate Residential Rooftop Solar Permitting**
- 5. Evaluate New State and Local Government Facilities and Land for Solar Potential**
- 6. Establish an Offset Requirement for Farmland Development Similar to Maryland's Existing Forest Offset**
- 7. Degraded Lands with Potential for Solar Development**
- 8. SmartDG+ Improvements**
- 9. Examine Transmission and Distribution Constraints**
- 10. Assess Environmental Justice Siting Impacts**
- 11. Develop Streamlined Standard to Review and Approve Energy Storage Projects**
- 12. Expand Efforts to Develop Microgrids in Maryland by Leveraging Solar in the Built Environment**
- 13. Expansion of Maryland Green Registry**
- 14. Promote Complementary Agricultural Practices Like Agrovoltatics and Pollinator Habitat**

# Changes Due to REDS Recommendations



- MEA has significant incentive programs for residential solar and those continue to expand.
- CPCNs now have a legislatively mandated 6-month review period.
- Net Metering Solar cap has been increased to 3,000 MWs.
- PPRP's Smart DG+ has been expanded to include brownfield sites.
- The PSC's RM 72 streamlined the review process for Solar CPCN cases:
  - Requires the Applicant to meet with the county, 60 days before an application is submitted to the PSC, and
  - Instituted a CPCN Application checklist



# Recommendations to The Committee



- Support from the work group for the study prompted by SB 334/HB624. This Bill would require long-term contracts for renewable energy to support a portion of the Standard Offer Service in Maryland.
- Expand agrivoltaic incentive programs for community-solar and utility-scale projects.
- Expand incentive programs for solar on brownfield sites, landfills, parking lots, etc.

# Questions



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