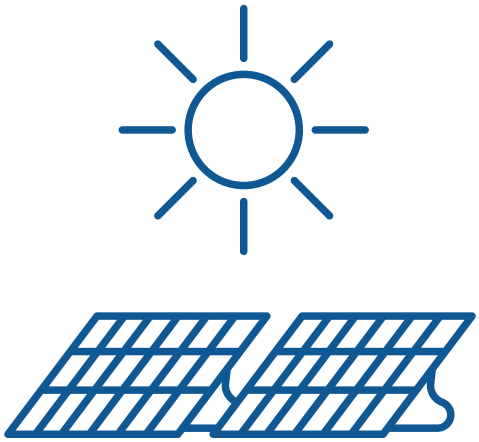
THE TASK FORCE TO STUDY

SOLAR INCENTIVES

FINAL REPORT

APRIL 2024 // PREPARED FOR:
GOVERNOR WES MOORE
SENATE PRESIDENT BILL FERGUSON
HOUSE SPEAKER ADRIENNE JONES



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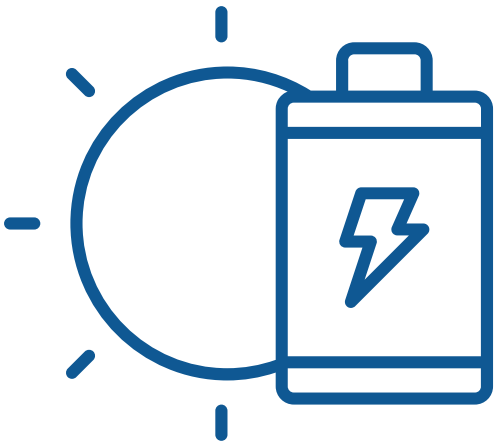

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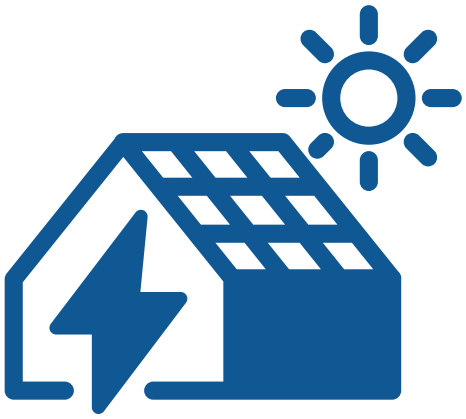


Acronym	Definition
ACP	Alternative Compliance Payment
AHJ	Authorities Having Jurisdiction
AMI	Area Median Income
CBA	Community Benefits Agreement
CBP	Community Benefits Plan
CEJA	Climate and Equitable Jobs Act
CPCN	Certificate of Public Convenience and Necessity
CSEGS	Community Solar Energy Generating System
CWA	Community Workforce Agreement
DER	Distributed Energy Resource
DG	Distributed Generation
DLS	Department of Legislative Services

Acronym	Definition
DNR	Department of Natural Resources
DOE	Department of Energy
EUSP	Electric Universal Service Program
EV	Electric Vehicle
GHG	Greenhouse Gas
GW	Gigawatt
HB	House Bill
HBCU	Historically Black College or University
IREC	Interstate Renewable Energy Council
kW	Kilowatt
LIDC	Low-Income or Disadvantaged Communities
LMI	Low-to-Moderate Income
LMIOU	Low-to-Moderate Income Overburdened Underserved
MBE	Minority Business Enterprise
MCAM	Maryland Cost Allocation Models
MEA	Maryland Energy Administration
MW	Megawatt
MWH-ac	Megawatt-Hours Alternating Current

Acronym	Definition
MWDBE	Minority, Women, Disadvantaged Business Enterprises
NREL	National Renewable Energy Laboratory
PFD	Pollinator Friendly Designation
PHI	Pepco Holdings, Inc.
P.I.L.O.T.	"Payments in Lieu" of Property Tax
PJM Interconnection	Pennsylvania-New Jersey-Maryland Interconnection
PLA	Project Labor Agreement
PPA	Power Purchase Agreement
PPRP	Power Plant Research Program
PSC	Public Service Commission
PV	Photovoltaic
REC	Renewable Energy Credit
RPS	Renewable Portfolio Standard
SACP	Solar Alternative Compliance Payment
SASH	Single-Family Affordable Solar Homes
SB	Senate Bill
SEIA	Solar Energy Industries Association
SEEP	Solar Energy Equity Program
SEIF	Strategic Energy Investment Fund
SREC	Solar Renewable Energy Credit
TPO	Third-Party Ownership

Executive SUMMARY

This report provides context and background for the recommendations put forth by the Task Force to Study Solar Incentives ("Task Force"). These recommendations will be submitted to Governor Moore and the Maryland State Legislature. Maryland established progressive renewable energy and emissions goals, which require significant policy action to achieve. The Task Force was established to assist in answering technical and practical questions and recommend a path forward to increase solar adoption. Per Chapter 545 of the 2023 Laws of Maryland (the "Act"), the Task Force is required to study:

1. The impact of solar grant programs, tax credits and exemptions, classification of solar energy property for assessment purposes, solar renewable energy credits, and other financial incentives on the state's ability to meet the solar energy goals established in the state's renewable energy portfolio standard under § 7–703 of the Public Utilities Article.

2. The impact of federal solar energy incentives and how to maximize the benefit of federal solar energy incentives in Maryland.

3. How the solar alternative compliance fee under § 7–705 of the Public Utilities Article is calculated and its market relationship to the value of solar renewable energy credits.

4. Whether different levels or types of incentives should exist for different types of solar development, including customer–sited residential and nonresidential, aggregated net metered, community, and utility scale, based on cost variance and other factors.

5

And make recommendations regarding measures and incentives needed to ensure:

- That the state meets the solar energy goals established in the state's renewable energy portfolio standard (RPS);
- Minority business enterprise participation in solar development in the state;
- That solar development in the state creates good quality, family–sustaining jobs with training and outreach focused on the communities in which solar development is occurring;
- Equitable access to renewable energy in the state;
- The efficient use of land in the state by maximizing the production of solar energy on previously developed property, including rooftops, parking canopies, and brownfields sites or energy or transportation rights of way.

The Task Force's **priority recommendations** are:

Tax Incentives	• Creation of a personal property tax exemption for non-residential rooftop and parking canopy solar installations. • Permissive grant of authority for local jurisdictions to offer assessment abatements for real property that is host to a solar parking canopy. • Change from the current taxing structure of real property and personal property taxes to a P.I.L.O.T. for ground-mounted solar installations. • The state should extend the sunset provision for the property tax exemption for certain community solar installations.
Permitting	• For residential permitting, require all local permit-granting authorities having jurisdiction (AHJs) to adopt an online standardized permit process including, but not limited to, Solar App+.
Interconnection	• Utilities should eliminate the use of aggregate circuit capacity limits and replace them with a hosting-capacity based screening methodology. • Interconnection fee structure - Support moving from a causer-pays model to a fee model where costs are distributed among those who benefit from the grid upgrades. • Increase net metering cap from 2 MW-AC to 5 MW-AC. • Encourage the Public Service Commission (PSC) to allow meter collar adapters.

	• Interconnection application – remove requirement to include Subscriber Organization info at time of interconnection application. Allow this to be selected/added later.

MBE	• The state should engage in a Disparity Study Analysis of:
	  ◦ the availability of businesses and non-profit organizations owned by minorities and women in the solar industry.
	  ◦ the utilization of these entities as contractors and subcontractors in the Maryland solar marketplace.

Workforce	• The Maryland General Assembly should adopt into Maryland law the federal prevailing wage charges as put forth in the federal Inflation Reduction Act (IRA). • Require Community Benefits Plan for projects over 1 MW (but give flexibility in the terms of the plan; could employ a PLA agreement or a Community Workforce Agreement or establish other mechanisms for delivering local workforce benefits).
Studying RPS/ACP	• Require a Study to inform comprehensive RPS Reform conducted by the Maryland Energy Administration, working along with other applicable stakeholders, with a report to be filed by July 1, 2025.
RPS "Bridge" Policies	• Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize solar while Maryland designs and subsequently implements its long-term RPS reform policy.
Residential Clean Energy Rebate	• Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize residential solar while Maryland designs and subsequently implements its long-term RPS reform policy.

Residential Clean Energy Rebate (Continued)	• The legislature should establish a single-family residential solar grant program using SACP funds to leverage private dollars for the installation of single-family solar systems to include low to moderate income homeowners and overburdened and underserved communities. The program should have two tiers:
	  ◦ Tier 1: For non-LMI households who qualify via geographic eligibility within LMIOU census tracts, up to a household income cap established by the legislature.
	  ◦ Tier 2: Higher level grant for households who are income verified as LMI within LMIOU census tracts.
	
	The program shall be open to all business models and the grant shall be assignable to the system owner if that is different from the homeowner.
	
	Should the legislature deem that income verification beyond self-attestation is necessary, the legislature should establish a streamlined verification process whereby the state issues eligibility status of an applicant within 30 days of application.
	
	The legislature should amend the eligibility for SACP funds to include LMI households that are outside of LMIOU census tracts. The legislature should also explore establishing a grant program without income qualification for homeowners outside of the LMIOU census tracts. SACP funds shall not be used for this purpose.
	
	The legislature should set a reasonable soft cap on this program, with discretion provided to the MEA to exceed this amount based on program success and funds available.

Electric Ready Measures	• Update codes for new construction (both residential and commercial) to require electrical wiring and electrical panels that are solar and EV-ready. • The Maryland Public Service Commission's Energy Storage workgroup is encouraged to study energy storage as part of a virtual power plant solution, when paired with solar including evaluating utility and individual benefits and costs to ratepayers and rate structure options. Storage solutions incentivized by MEA may be in concert with solar and be virtual power plant ready.
Use of ACP Funds	• MEA should make every effort to prioritize ACP funding for solar projects that have multiple co-benefits.

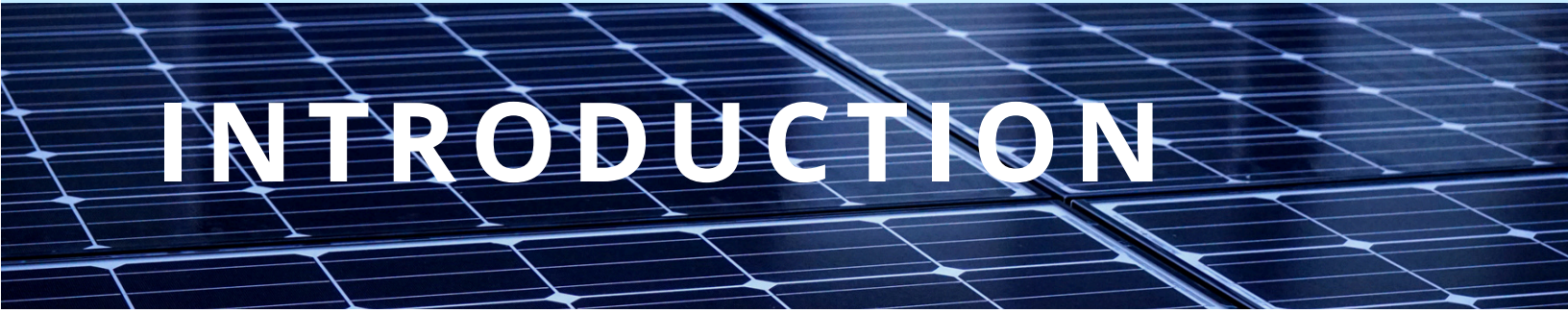
Task Force
MEMBERS

Task Force members were appointed according to the Act.[1] This bill also asked that the Task Force members represent the diversity (racial, gender, ethnic, and geographic) in Maryland as much as possible according to most recent census data. The members of the Task Force are:

Name	Affiliation
Paul Pinsky	Maryland Energy Administration Director (Chair)
Sarah Elfreth	Senate of Maryland Member
Ben Brooks	Senate of Maryland Member
David Fraser-Hidalgo	House of Delegates
Melissa Wells	House of Delegates
Brett Sproul	Public Service Commission Chair Designee
Jake Ouslander	People's Counsel Designee
Jonathan Glaser	State Department of Assessments and Taxation Designee
Justin Fiore	Maryland Municipal League
Andrea Crooms	Maryland Association of Counties -- Urban
Michale Fowler	Maryland Association of Counties -- Suburban

[1] Chapter 545 of The Laws of Maryland (2023), "Task Force to Study Solar Incentives," May 8, 2023, mgaleg.maryland.gov/2023RS/Chapters_noln/CH_545_sb0469e.pdf.

Name	Affiliation
Robert Sandlass	Maryland Association of Counties -- Rural
Donna S. Edwards	American Federation of Labor and Congress of Industrial Organizations
Tom Gaines	Association Builders and Contractors
Mike McHale	AFL-CIO
Bryan Hacker	Solar -- Residential Rooftop
Stephanie Johnson	Solar -- Ground-Mount
Charlie Coggeshall	Solar -- Low to Moderate Income
Elizabeth Cusack	Solar -- Aggregate Net Energy Metering
Kimberly Armstrong	Environmental Advocacy
Imani Black	Environmental Advocacy



INTRODUCTION

Maryland's Renewable Energy Portfolio Standard (RPS) requires electricity suppliers to provide at least 14.5 percent of their electricity from solar sources by 2030, an 8.5 percent increase compared to the 2023 requirement. Additionally, Maryland is the only state to have enacted legislation for a 60 percent greenhouse gas (GHG) reduction by 2031, as established in the Climate Solutions Now Act (CSNA) adopted in April 2022.[2] [3] According to Maryland's Climate Pollution Reduction Plan, published December 2023, the state can meet the CSNA's GHG reduction goals and work towards 100 percent clean energy by 2035, if in-state solar projects increase as much as fivefold by 2031 and account for 33 percent of in-state generation.[4] Governor Moore also recently announced the appointment of the state's first Chief Sustainability Officer who will work to ensure Maryland meets the state's bold climate and environmental goals. To achieve overall decarbonization goals, solar deployment needs to accelerate in the near term. This report identifies the potential to leverage Strategic Energy Investment Fund (SEIF) funds, encourage co-siting, and to increase partnerships for equity, access, and benefits through recommendations from the Task Force to Study Solar Incentives (Task Force).

MARYLAND ENERGY ADMINISTRATION (MEA)

The Maryland Energy Administration (MEA) is deeply involved in the development and implementation of energy legislation for the state. MEA advises the government, businesses, and residents on matters relating to energy policy and administers financial programs to promote clean energy adoption in the state.

MEA's Mission: The mission of the MEA is to promote clean, affordable, reliable energy and energy-related greenhouse gas emission reductions to benefit Marylanders in a just and equitable manner.

MEA's Vision: MEA will advance impactful energy policies and programs to help achieve Maryland's clean energy and greenhouse gas reduction goals.

[2] Maxwell Cooke and Barry F. Rosen, "Maryland's Aggressive Climate Legislation's Impact on Providers," Gordon Feinblatt LLC, March 20, 2023, https://www.gfrlaw.com/what-we-do/insights/marylands-aggressive-climate-legislations-impact-providers.

[3] "Maryland Senate Bill 528: Climate Solutions Now Act of 2022," 2022, https://mgaleg.maryland.gov/2022RS/bills/sb/sb0528E.pdf.

[4] Maryland Department of Environment, "Maryland's Climate Pollution Reduction Plan: Policies to Reduce Statewide Greenhouse Gas Emissions 60% by 2031 and Create a Path to Net-Zero by 2045," December 28, 2023. mde.maryland.gov/programs/air/ClimateChange/Maryland%20Climate%20Reduction%20Plan/Maryland%27s%20Climate%20Pollution%20Reduction%20Plan%20-%20Final%20-%20Dec%2028%202023.pdf.

TASK FORCE TO STUDY SOLAR INCENTIVES

The Solar Incentives Task Force was established to assist in answering technical and practical questions and to recommend a path to increase solar adoption. Chapter 545 of the 2023 Laws of Maryland, effective July 1, 2023, established the Task Force in the State of Maryland.[5] The Task Force is to study:

- The impact of solar grant programs, tax credits and exemptions, classification of solar energy property for assessment purposes, solar renewable energy credits, and other financial incentives on the state's ability to meet the solar energy goals established in the state's renewable energy portfolio standard under § 7–703 of the Public Utilities Article;
- The impact of federal solar energy incentives and how to maximize the benefit of federal solar energy incentives in Maryland;
- How the solar alternative compliance fee under § 7–705 of the Public Utilities Article is calculated and its market relationship to the value of solar renewable energy credits;
- Whether different levels or types of incentives should exist for different types of solar development, including customer–sited residential and nonresidential, aggregated net metered, community, and utility scale, based on cost variance and other factors.

And make recommendations regarding measures and incentives needed to ensure:

- That the state meets the solar energy goals established in the state's renewable energy portfolio standard;
- Minority business enterprise participation in solar development in the state;
- That solar development in the state creates good quality, family–sustaining jobs with training and outreach focused on the communities in which solar development is occurring;
- Equitable access to renewable energy in the state;
- The efficient use of land in the state by maximizing the production of solar energy on previously developed property, including rooftops, parking canopies, and brownfields sites or energy or transportation rights of way.

[5] Ralph W. Kettell , "Fiscal and Policy Note for Maryland Senate Bill 469: Task Force to Study Solar Incentives" (Maryland Department of Legislative Services, May 10, 2023), https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/sb0469?ys=2023RS.

TASK FORCE PROCESS

The first Task Force meeting was held on July 18, 2023, to discuss the current solar landscape and the potential solar policy strategies to achieve the state's solar goals. The Task Force established breakout groups to dig deeper into specific subjects. Each breakout group met virtually on September 6, 2023, October 4, 2023, and November 1, 2023. The breakout groups established were:

- Harder-to-Build Solar
- Utility-Scale Solar
- Rooftop Solar (residential and commercial)

The entire Task Force met a total of eight times, with both virtual and in person attendance options, between July 18, 2023, and January 5, 2024. During the last two meetings, the Task Force voted on proposed recommendations to bring to the governor and General Assembly. Task Force members and stakeholders were provided the opportunity to engage and to submit recommendations through open Task Force meetings, breakout group meetings, and via the Task Force email account.

Public feedback was solicited through open public comment periods on the Recommendations List for Consideration. Additionally, all information presented or discussed at meetings, such as recommendations, public comments, and presentation slides, was made publicly available via the Task Force website, social media, and an email listserv.[6] The website included all details of upcoming and past meetings, including recordings of previous Task Force meetings, meeting agendas, meeting presentation slide decks, recommendations lists, and public comments. The email listserv also provided details on upcoming meetings, solicited public comments, and circulated public comments received.

As part of this process, the Task Force relied on additional support from MEA staff and AECOM to conduct research and develop memorandums providing in depth detail on potential recommendation context. This report contains the final adopted recommendations from the Task Force, as well as the supporting memoranda, which can be found in the Appendices of this Report.

[6] Maryland Energy Administration, "Task force to Study Solar Incentives, energy.maryland.gov, accessed January 29, 2024, energy.maryland.gov/Pages/SolarTaskForce.aspx.

POLICY CONTEXT

Maryland's RPS was first established in 2004 to increase the amount of renewable energy electricity supplied in the state. The RPS has been updated multiple times in the past 20 years, most recently in 2019 requiring 14.5 percent of supplied energy to be from solar sources by 2030. Additionally, the Maryland Department of Environment's (MDE) Climate Pathway Report explores an all-of-society approach that the state can utilize to achieve the CSNA goal of 60 percent GHG reductions by 2031. The report compares current policies with new policies proposed in the Climate Pathway to achieve GHG reduction goals. The report indicates that the electricity and transportation sectors will have the largest impact on GHG emissions reductions. The Climate Pathway approach to decarbonize the electricity sector involves setting a Regional Greenhouse Gas Initiative (RGGI) target of zero GHG emissions by 2040 and a clean electricity standard of 100 percent clean source electricity by 2035. In terms of transitioning the electricity sector to include more renewables, the Climate Pathway recommends ensuring grid stability, leveraging interstate collaboration through RGGI, solar co-siting and co-adoption, and creating partnerships for equity, access, and benefits.

Through the Task Force, Maryland conducted a review of residential rooftop, commercial, utility, and community solar customer segments to develop policy and funding strategies to meet RPS goals and take advantage of solar potential across all customer segments. Table 1 includes a description of these customer segments, existing incentives available within those segments, and the annual generation potential for each segment.

Table 1: Types of Solar[7]

Customer Segment	Ownership	Credits/Incentives Available	MD Annual Solar Energy Generation 2022 (MWh/yr) [8]
Residential rooftop (>0 - ≤.02 MW)	Customer or third party	Net metering, SRECs, federal incentives, MEA's Residential Clean Energy Rebate Program, MEA's Solar Energy Equity Program	649,964
Commercial (>0.02 - ≤0.8 MW)	Customer or third party	Net metering, SRECs, federal incentives, MEA's Commercial Clean Energy Rebate Program, MEA's Resilient Maryland Program, MEA's Solar Canopy and Dual Use Technology Program	197,911
Utility-scale (>2 – ≤1,000 MW)	Utility	SRECs, federal incentives	774,889
Community Solar (>0.8 - ≤2 MW)	Subscriber organization	Net metering, SRECs, federal incentives, MEA's Community Solar Low- and Moderate-Income (LMI) PPA Program, MEA's Community Solar Guaranty Grant Program	147,445

[7] Maryland Public Service Commission, "Solar in Maryland," accessed September 28, 2023, https://www.psc.state.md.us/electricity/wp-content/uploads/sites/2/Solar-in-Maryland-Fact-Sheet-100722.pdf.

[8] Sourced from GATS database.

MARYLAND PERMITTING POLICY

In addition to state policies and goals, solar installations require approvals through local governments (e.g., building permits, electrical permits), local utilities, the Public Service Commission (PSC), and the PJM Interconnection.

Building and Electrical Permit Requirement

For most solar PV system installations in Maryland, an electrical permit, and sometimes a building permit, is required through local government department of permits and inspections.[9] Across the state, solar installations must be completed by a licensed home improvement contractor and licensed electrician registered to the local jurisdiction.[10] However, specific permit requirements vary by county. For example Carroll County and Montgomery County require electrical and building permits for all installations, some, like Anne Arundel County, only require a building permit and not an electrical permit.[11] [12] [13] In Baltimore County, building permits are only required if the system is larger than 10 kW.[14] Residential and commercial applicants must submit construction plans, site plans, and zoning permits depending on the solar installation location; and commercial applicants must also submit data sheets.

Utility Approval

An interconnection agreement application must be submitted to the electric utility serving the location of the solar installation. Each utility has different approval requirements application steps, but the overall steps are similar. To achieve interconnection to the grid in the First Energy Corporation Maryland service territory, a customer must follow the process outlined in Figure 1.

[9] "Local Government Permits & Inspections," Maryland Manual On-Line, June 6, 2022, msa.maryland.gov/msa/mdmanual/01glance/html/permloc.html.

[10] "Understanding Maryland's Licensing Requirements for Green Technology - Home Improvement Commission," Maryland Department of Labor, accessed November 2, 2023. www.dllr.state.md.us/license/mhic/mhicgreen.shtml.

[11] "Carroll County Government," Residential Solar Panels, accessed November 6, 2023, https://www.carrollcountymd.gov/government/directory/public-works/permits-inspections/residential-projects/residential-solar-panels/.

[12] "Residential Solar Permit," Anne Arundel County Government, accessed November 6, 2023, https://www.aacounty.org/inspections-and-permits/permits/residential-permits/solar-permit.

[13] "Residential Solar Permit Process," DPS, accessed November 6, 2023, https://www.montgomerycountymd.gov/DPS/Process/rci/residential-solar.html.

[14] "Solar Building Permit," Baltimore County, accessed November 2, 2023, www.baltimorecountymd.gov/departments/pai/application/solar#:~:text=A%20building%20permit%20is%20required,licensed%2Fregistered%20with%20Baltimore%20County.

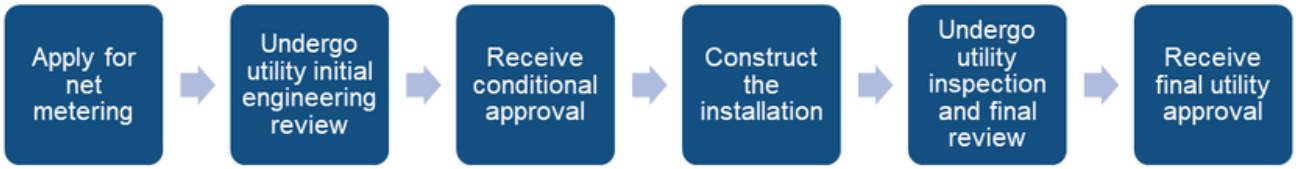


Figure 1: First Energy Corporation Interconnection Timeline

Similarly, Pepco and other Exelon utilities also require multiple approval and inspection steps to receive final approval and gain the authorization to operate. According to Pepco, the interconnection approval process can take up to 77 business days (four months), if not more.[15] [16]

PJM Interconnection Approval

The interconnection approval by PJM is required for all commercial, community solar, and utility-scale projects that are front-of-the-meter systems. The interconnection approval by PJM is required for all commercial, community solar, and utility-scale projects that are front-of-the-meter systems. All jurisdictions must abide by PJM requirements. Behind-the-meter solar systems are not required to go through the PJM interconnection process.[17] Utility-scale systems must receive PJM approval to connect to the grid which entails a two-year study process.

PJM's new process began in July 2023. It prioritizes review of projects that have met readiness requirements instead of submission order. PJM also created a new, publicly accessible Queue Scope tool that allows developers to assess the feasibility and financial impacts of their projects on the grid before entering PJM's interconnection process. The tool indicates grid impacts based on the amount of power injected at a given point of interconnection. This saves money and time for smaller developers and makes the interconnection process more efficient for PJM to process applications.[18]

Due to the quantity of projects in the PJM Queue currently, it is also notable that PJM announced that no new applications will be accepted until 2026.

[15] "Pepco Maryland Application Process Steps," Pepco, December 31, 2015, https://www.pepco.com/SiteCollectionDocuments/Pepco%20Maryland%20Application%20Process%20Steps_2015Dec31.pdf.
[16] Ibid.
[17] "Connecting to the Grid FAQS," PJM Learning Center, accessed November 2, 2023, https://learn.pjm.com/three-priorities/planning-for-the-future/connecting-grid.
[18] "Transition to New Interconnection Process Begins July 10," PJM Inside Lines, July 26, 2023, insidelines.pjm.com/transition-to-new-interconnection-process-begins-july-10/.

Certificate of Public Convenience and Necessity (CPCN)

For projects with a capacity larger than 2 megawatts (MW), a Certificate of Public Convenience and Necessity (CPCN) must be granted by the PSC in addition to interconnection approval by PJM. This includes commercial scale, utility-scale, and community solar projects. Specifically, one may not "begin construction of a generating station, a qualified lead line, an overhead transmission line designed to carry more than 69 kV, or a qualified submerged renewable energy line, or exercise a right of condemnation associated with the construction of a generating station or transmission line without approval of the PSC."[19] There are two exceptions to the full CPCN process both subject to PSC approval:

- Systems with onsite generation capacity between 2-25 MW where 10 percent of electricity is consumed onsite.
- Systems with onsite generation capacity less than 70 MW where at least 80 percent of electricity is consumed on site.[20]

Between 2011 and 2023, sixty-four (64) solar CPCN cases were filed with fifty-six (56) granted; seventeen (17) of those systems are currently operational with a capacity of 391 MWs. In addition, developers have stated that another eighteen (18) utility-scale solar projects will be operational by 2026, equaling 826 MWs. As shown in Figure 2, solar CPCN cases significantly decreased after 2018, aligning with the Community Solar Pilot Program that capped solar projects at 2 MW. With the permanent passage of the program and the Community Solar cap increased to 5 MW, there has been a recent uptick in the number of community solar cases going through the CPCN process, with three (3) community solar array cases in 2023 and twelve (12) community solar cases began pre-application in January 2024.

[19] "CPCN Process," Baltimore: Maryland Public Service Commission, September 12, 2019, www.psc.state.md.us/electricity/wp-content/uploads/sites/2/CPCN-Process-revised-9-12-19.pdf.
[20] Ibid.

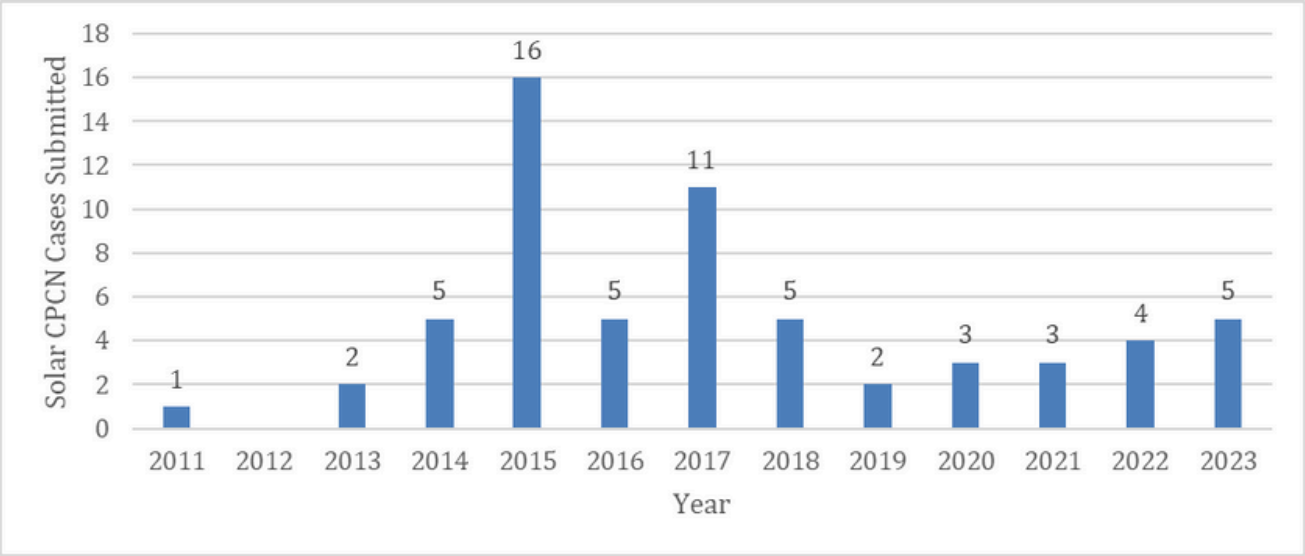


Figure 2: Solar CPCN Cases per Year

Source: MDE

Solar CPCN applicants can be any entity or individual that wants to construct a generating station, but the state's regulated utilities may not own generation. Typically, applicants are utility developers, but they can also be landowners that want to engage in commercial solar.[21] Applying for a CPCN requires a filing fee of $10,000. Before filing the application, the applicant must provide 90-day notice of the filing to the governing bodies of county or municipal corporations where the project will be constructed and also to have a pre-application meeting with PPRP. Forty-five days after the applicant's meeting with PPRP, they can file their application with the PSC. Upon receipt of the application, PPRP and the other interveners, review the application for completeness, the matter is usually delegated to a Public Utility Law Judge (PULJ). A notice of a pre-hearing conference is issued, the application is deemed complete by the PSC, and it is docketed with a case number. At least one public hearing is held to allow for public input followed by an evidentiary hearing held for the parties of record to present testimonies through cross examinations. The PULJ then reviews and prepares a Proposed Order either approving or denying the CPCN. Unless there is an appeal of the Proposed order within 30 days of issuance, it becomes a final order of the PSC. Appeals can extend the timeline by months or years. Once the PSC issues its final order, the developer must obtain all state and local permits before it can begin construction.[22]

[21] Margaret Todd, "Solar Arrays & Maryland's Certificate Of Public Convenience And Necessity (CPCN) Application Process," (University of Maryland Francis King Carey School of Law, n.d.), extension.umd.edu/sites/extension.umd.edu/files/publications/ALEI_CPCNOverview-2.pdf.

[22] Gray, Susan, "The Maryland Certificate of Public Convenience and Necessity (CPCN) Process," Maryland Department of Natural Resources, April 12, 2017, dnr.maryland.gov/pprp/Documents/CPCN-Process-State-Agency-Roles-Responsibilities-Upcoming-Projects.pdf.

ALTERNATIVE COMPLIANCE PAYMENTS (ACP) FUNDING

Under the Maryland RPS, electricity suppliers must submit a required number of renewable energy credits (RECs) annually. Electricity suppliers can acquire RECs by generating their own renewable energy, or purchase RECs that are produced from other generators within the PJM Interconnection. When this obligation cannot be met, electricity suppliers must submit an alternative compliance payment (ACP equivalent to each MWh required) to fulfill RPS requirements. With the specified solar requirement in the RPS, electricity suppliers must specifically provide solar renewable energy credits (SRECs), or they are required to pay solar alternative compliance payments (SACPs).

Funding from SACPs is received in April of each year and may be proposed as part of the Governor's budget. Maryland HB550, the Clean Transportation and Energy Act, passed in April 2023, states that SACP funds can only be used to make programs that increase solar adoption in LMIOU communities.[23] Most MEA solar programming is funded by SACPs that contribute to SEIF funding for solar LMIOU projects. The percentage of SACP funds by industry segment are shown in Table 2.

Table 2: Approximate Percentage of SACP Funds Budgeted/Encumbered by Year by Solar Segment

Fiscal Year	FY25 (Budgeted)
Single-family and Multi-family Residential Programs	46%
Community Solar Programs	31%
Schools, Resiliency Hubs, Parking Lots, Other Commercial or Community Facilities	23%

Since Since SACP funds can only be used on programs in LMIOU communities, there are geographical limitations on where these funds can be spent. The funds can be deployed in approximately 900 of 1,400 census tracts, as shown in Figure 3.

[23] Bill, MD House Bill 550 § (2023), mgaleg.maryland.gov/2023RS/bills/hb/hb0550T.pdf

As defined by HB550, blue areas meet the definition of an underserved community, orange areas meet the definition of an overburdened community, and green areas meet the definition of a low-to-moderate income community.

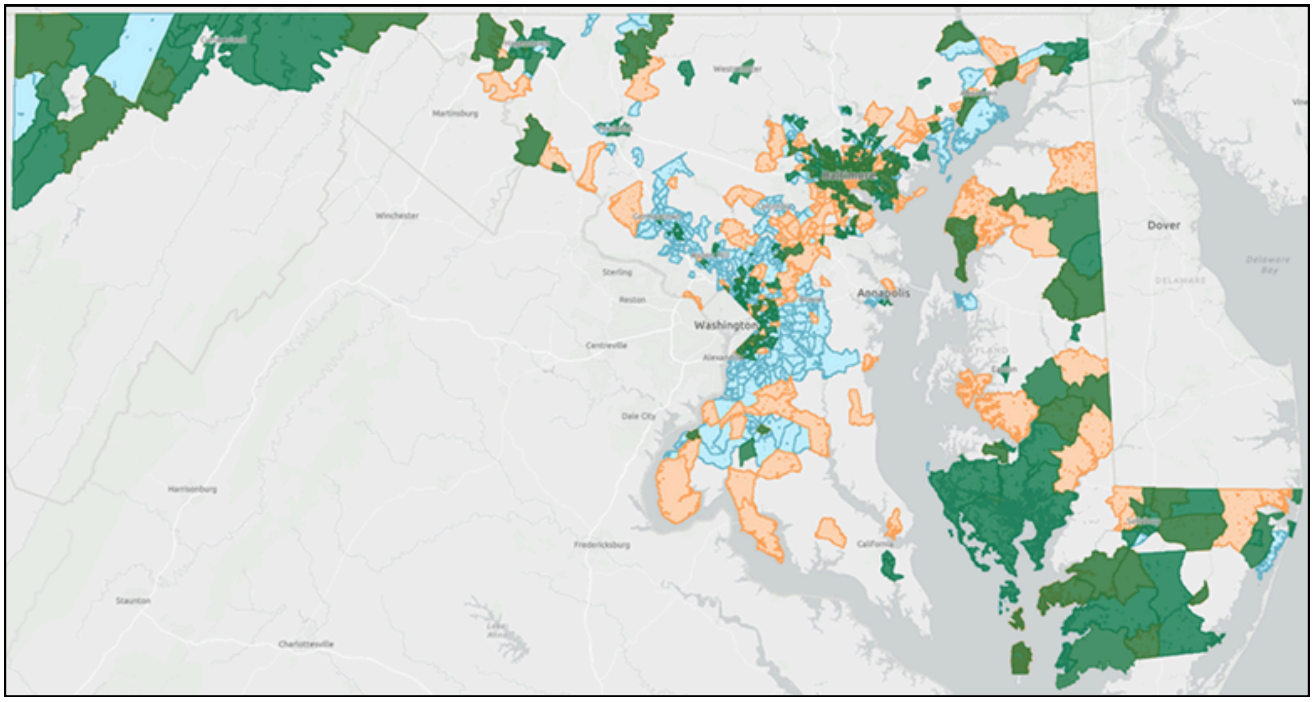


Figure 3: Map of Areas Eligible for SACP Funded Programming

TASK FORCE OBJECTIVES AND RECOMMENDATION MATRIX

The Task Force's list of recommendations aligns with the mandated objectives of the task force, as illustrated in Table 3.

Table 3: Task Force Objectives and Adopted Recommendations Matrix

Recommendation	RPS Goals	MBE Participation	Quality Jobs	Equitable Access	Efficient Land Use
Tax Incentives					
Personal Property Tax Exemption	X				X
Enabling Legislation for Abatements	X				X
Real Property P.I.L.O.T.	X				
Existing Provision Sunset Extension	X			X	X
Permitting					
Standardized Online Permitting Process	X			X	
Interconnection					
Hosting Capacity Based Screening Methodology	X			X	
Interconnection Fee Structure	X				
Increase Net Metering Cap	X				
Meter Collar Adapters				X	

Table 3: Task Force Objectives and Adopted Recommendations Matrix (Continued)

Recommendation	RPS Goals	MBE Participation	Quality Jobs	Equitable Access	Efficient Land Use
Interconnection Application Requirements for Community Solar	X			X	
MBE					
Disparity Study Analysis		X		X	
Workforce					
Prevailing Wage Requirement			X		
Community Benefits Plan Requirement for projects over 1 MW			X		
Studying RPS/ACP					
RPS Reform Study	X				
RPS "Bridge" Policies					
Temporary Bridge Policy	X				
Residential Clean Energy Rebate					
Single-Family Residential Solar Grant Program	X			X	

Table 3: Task Force Objectives and Adopted Recommendations Matrix (Continued)

Recommendation	RPS Goals	MBE Participation	Quality Jobs	Equitable Access	Efficient Land Use
Electric Ready Measures					
Solar and EV-Ready Requirement	X				X
Virtual Power Plant Study	X				X
Use of ACP Funds					
ACP Funding Priorities				X	X

LAND USE

According to forecasting conducted by Task Force staff, approximately 25,000 to 35,000 acres of land is required to meet the RPS requirement that 14.5 percent of electricity sold by 2030 come from solar sources. The total land acreage required for ground-mounted solar includes sites with various existing uses, including farmland, greyfields, brownfields, and parking lots. The Task Force recommended further research to breakdown the projection by existing land uses.

The forecasted range of total land required stems from analysis of two plausible scenarios. According to an analysis conducted by the Task Force, roughly 60 percent of solar generation currently comes from ground-based resources and 40 percent from rooftop resources. Nationally, around 80 percent of solar generation comes from ground-based resources, and experts in the Task Force believe that Maryland may trend toward the national average with additional utility-scale solar projects coming online. The Task Force took both scenarios into consideration, first the scenario where 60 percent of solar capacity is sourced from ground-mounted systems and then the scenario where 80 percent of solar capacity is sourced from ground-mounted systems.

For both scenarios, Task Force staff forecast the total land acreage required to meet the RPS requirement that at least 14.5 percent of electricity sold by 2030 come from solar sources. Since the RPS requirement is a percentage of electricity consumption and electricity consumption is expected to increase, the Task Force built the land use forecast on projected consumption from the Climate Pathway Report rather than historical consumption data. The Climate Pathway projections of increasing electricity consumption are based on current laws and objectives regarding electric vehicles adoption and building decarbonization. The land use forecast is also based on the assumption that every MW of ground-mounted solar capacity will require five acres of land and will generate 1,416 MWH-AC per year. Pre-2022 solar production is accounted for in the projection, so all land use projections are in addition to pre-existing solar acreage pre-2022.

Figure 4 shows the cumulative post-2022 land use requirements projected for scenario one, assuming 60 percent of solar capacity will be ground mounted, and 40 percent will be rooftop mounted. Based on this scenario, 25,000 acres of land statewide is required by 2045. The gray line represents the incremental year-over-year acreage required to meet the state's solar goals as required by the RPS. In 2030, there is a drop in year-over-year acreage requirement due to the RPS solar requirement stabilizing at 14.5 percent. All increases after 2030 are due to increases in electricity consumption, as projected by MDE.

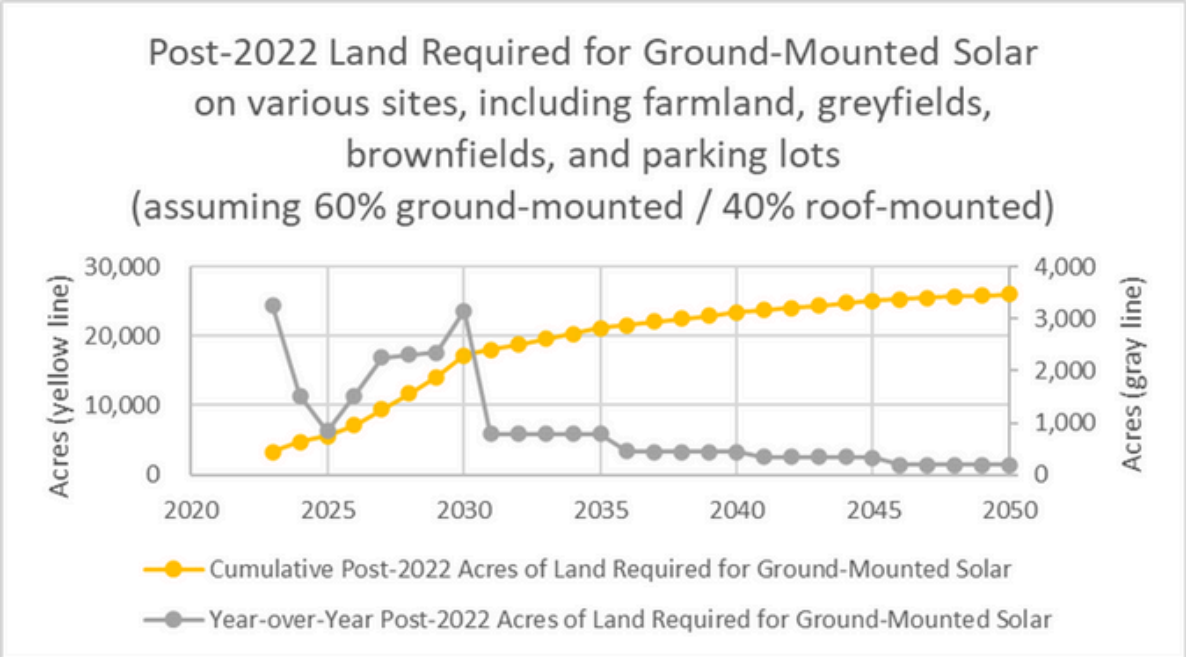


Figure 4: Land Use Requirement Assuming 60 Percent Ground Mounted Solar

Figure 5 shows the cumulative post-2022 land use requirements projected for scenario two, assuming 80 percent of solar capacity will be ground mounted, and 20 percent will be rooftop mounted. Under this scenario, close to 35,000 acres of land is required by 2045. In 2030, there is a drop in year-over-year acreage requirement due to the RPS solar requirement stabilizing at 14.5 percent. All increases after 2030 are due to increases in electricity consumption, as projected by MDE.

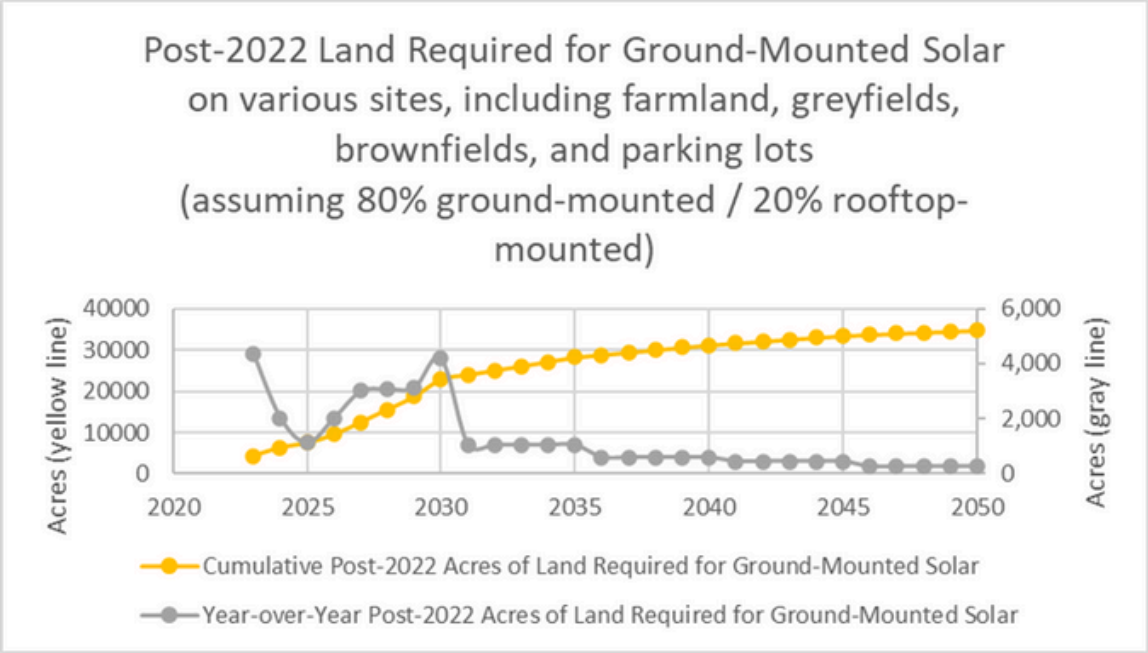


Figure 5: Land Use Requirement Assuming 80 Percent Ground Mounted Solar

RECOMMENDATIONS

The recommendations listed below are those adopted by the Task Force. The recommendations are categorized into the following sections:

- Tax Incentives
- Permitting
- Interconnection
- Minority Business Enterprises (MBE)
- Workforce
- Studying RPS/ACP
- RPS "Bridge" Policies
- Residential Clean Energy Rebate
- Other Residential Rooftop Grants and Rebates
- Use of ACP Funds

Each section begins with a summary, followed by recommendations. Under the recommendation titles, the specific recommendations provided by the Task Force are shown in italics and further supporting detail is provided below each one.

TAX INCENTIVES

Many states have tax-based incentives (either tax credits or tax exemptions) to incentivize both residential and commercial solar installation. Property tax exemptions, where the added value of the solar installation will not affect the property tax, are a common tax incentive. Depending on the state policy, these tax exemptions may be permanent or for a fixed length of time. Certain states only have property tax exemptions for a certain type or size of solar or may require certain payments in lieu of property taxes. Existing federal and state tax incentives that apply to Maryland residents are described below.

Existing Federal Incentives:

- **Investment Tax Credit (ITC):** federal tax credit for non-residential solar systems installed during the tax year.
- **Production Tax Credit (PTC):** federal tax credit given per kWh of electricity generated by non-residential solar systems during the first 10 years of system operation.
- **Residential Solar Energy Credit (commonly referred to as an "ITC"):** federal tax credit for residential solar systems installed during the tax year.

Existing State Incentives:

- **Sales and Use Tax Exemption:** solar panel systems are exempt from the 6 percent state sales tax.[24]
- **Sales and Use Tax Exemption:** sale of electricity generated by solar power purchase agreements (PPA) are exempt from the state sales tax.[25]
- **Real Property Tax Exemption:** residential property taxes are not increased due to an increased valuation from the installation of solar panels.
- **Community Solar Personal Property Tax Exemption:** community solar systems are exempt from personal property tax if it does not exceed 2 MW, provides at least 50 percent of the energy produced to LMI customers for at least 20 percent less than the amount charged by the local electric utility charges, and is used for agrivoltaics or installed on a rooftop, brownfield, parking facility canopy, landfill, or clean fill.[26]

PERSONAL PROPERTY TAX EXEMPTION

Creation of a personal property tax exemption for non-residential rooftop and parking canopy solar installations.

In Maryland, equipment for non-utility electric generator solar farms including solar panels, mounting structures, wiring, transformers, and others are taxed as personal property at 50 percent of its value per Tax-Property Article §7-237(b)(2).[27]

Net metered solar projects supply power to property owners and excess power is sold to local electric companies. Typically, net metered projects are residential solar projects but can also be utilized on commercial sites. Solar energy property is not subject to real property tax when used to generate electricity to be used or to be supplied via net metering.

Non-utility electric generator solar projects are sites that sell generated power to local electric companies. These sites are taxed as real property based on sales or lease values. Improvements to buildings that house this equipment are taxed as real property.

[24] "Maryland Tax – General Code § 11-230 (2022)," Statutes Text. Maryland General Assembly, Accessed January 29, 2024, mgaleg.maryland.gov/mgawebsite/laws/StatuteText?article=gtg&section=11-230&enactments=false.
[25] "Maryland Tax – General Code § 11-207 (2022)," Statutes Text. Maryland General Assembly, Accessed January 29, 2024, mgaleg.maryland.gov/mgawebsite/laws/StatuteText?article=gtg&section=11-207&enactments=false#:~:text=Article%20-%20Tax%20-%20General%20%C2%A711%E2%80%93207.%20%28a%29%20The,schedule%20on%20file%20with%20the%20Public%20Service%20Commission%3B.
[26] "Maryland Tax – Property Code § 7-237 (2022)," Statutes Text. Maryland General Assembly, Accessed January 29, 2024, mgaleg.maryland.gov/mgawebsite/Laws/StatuteText?article=gtp&section=7-237&enactments=false.
[27] Maryland Department of Assessments and Taxation, June 28, 2019, dat.maryland.gov/Pages/ProcedureDetails_Copy(1).aspx?LID=78.

Solar equipment is taxed as personal property at 50 percent of its value. By exempting commercial rooftop solar and parking canopy solar from personal property taxes, the tax exemption will help offset high costs of commercial rooftop installations and solar canopies. Offsetting these high costs may lead to an increase in installed solar.

EXISTING PROVISION SUNSET EXTENSION

The state should extend the sunset provision for the personal property tax exemption for certain community solar installations.

Maryland's Tax Property § 7-237 exempts community solar energy systems adhering to certain requirements from personal property taxes. The Community Solar Energy Generating Systems (CSEGS) – Exemption from Property Taxes law was enacted on June 1, 2022. Applications for the exemption will be accepted by local municipalities to participate through December 31, 2024, unless the sunset provision is extended beyond 2024. To qualify, community solar installations cannot exceed 2 MW, must provide 50 percent of electricity generated to LMI customers at a cost 20 percent below the amount charged by the electric company, and be located on a rooftop, parking facility, or brownfield.[28] The passage of the legislation in 2022 was supported by a myriad of environmental organizations, aiming to incentivize community solar that specifically benefits LMI communities and is built on previously developed land.[29]

ENABLING LEGISLATION FOR ABATEMENTS

Permissive grant of authority for local jurisdictions to offer assessment abatements for real property that is host to a solar parking canopy.

Property tax abatements provide temporary reductions in the amount owed in property taxes. Property tax abatements provide another tax incentive mechanism that makes solar installations more affordable. Unlike property tax exemption, abatements are temporary reductions in the amount owed in taxes. Abatements typically last for a fixed number of years, offering savings during that period.

[28] Sanelli, Michael, "HB76 Fiscal and Policy Note," Department of Legislative Services, 2022, mgaleg.maryland.gov/2022RS/fnotes/bil_0006/hb0076.pdf.

[29] "SUPPORT: HB76 Community Solar Energy Generating Systems - Exemption From Energy and Property Taxes," Sierra Club, January 19, 2022, www.sierraclub.org/sites/www.sierraclub.org/files/sce/maryland-chapter/Legislation/HB76%20-%20FAVORABLE%20-%20Maryland%20LCV%20et%20al.pdf.

As an example, six projects in Indiana received tax abatements.[30] Abatement schedules can vary based on agreements between local authorities having jurisdiction (AHJs) and developers. In these Indiana projects, two received full tax abatements on personal property for ten years, and one for fifteen years. Two other projects had sliding scales from 100 percent at the start to zero at the finish. For all these projects in Indiana, the assessed value of land was not abated.

Florida applies a property tax abatement for 80 percent of the added value for non-residential solar devices. The property tax abatement applies to devices installed on or after January 1, 2018, and expires December 31, 2037.[31] The abatement does not apply to devices installed as part of projects in a fiscally constrained county. Based on an analysis by the University of Michigan, policies that abate property taxes in this manner can benefit both developers and local authorities.[32] Developers benefit from the reduced costs early in a project's lifespan, and local authorities can benefit because the abatement schedule fixes payments of the project's lifecycle.

Most of these property tax abatements apply to personal property tax on the solar equipment. Tax incentives on the real property hosting the solar installations are not as common.[33] Kauai County in Hawaii has a 50 percent property tax exemption on the underlying land hosting alternative energy production.

REAL PROPERTY P.I.L.O.T.

Change from the current taxing structure of real property and personal property taxes to a P.I.L.O.T. (Payments in Lieu of Taxes) for ground-mounted solar installations.

Property tax is imposed on solar projects in one of three ways: value-based tax, generation tax, or nameplate capacity tax.[34]

[30] DeBoer, Larry. Capital comments: Solar energy projects and property taxes, February 22, 2023, extension.purdue.edu/news/2023/02/solar-energy-projects-and-property-taxes.html.
[31] "Property Tax Abatement for Renewable Energy Property," DSIRE, May 25, 2023, programs.dsireusa.org/system/program/detail/5426.
[32] Eli Gold, "Solar Energy Property Taxation," University of Michigan Center for Local, State, and Urban Policy, June 2021, closup.umich.edu/research/solar-energy-property-taxation.
[33] Olivia Hintz, Emma Uebelhor, Eli Gold, "Inventory of State Solar Property Tax Treatments," University of Michigan Center for Local, State, and Urban Policy, June 2021, closup.umich.edu/sites/closup/files/2021-08/closup-wp-54-Hintz-Uebelhor-Gold-Inventory-of-State-Solar-Property-Tax-Treatments.pdf.
[34] Jennifer R. Pusch, "A Primer on State and Local Taxation of Utility-Scale Wind and Solar Projects," American Bar Association, August 30, 2022, www.americanbar.org/groups/taxation/publications/abataxtimes_home/22sum/22sum-salt-pusch-utility-scale-wind-and-solar/.

Some states have a fourth option in the form of a statutory "payment in lieu." In these situations, the taxing authorities and the project managers may reach an agreement on an appropriate fee to help maintain public infrastructure. For example, Ohio has a 100 percent property tax exemption but requires payment in lieu of tax of $7,000 per MW for systems greater than 250 kW in size.[35] Due to the complexity and risk involved in such agreements between local authorities and developers, the American Bar Association recommends that these agreements between developer and local authorities be made under legislative authorization.

PERMITTING

In 2020, the Governor's Task Force on Renewable Energy Development and Siting Interim Report estimated that, between 2020 and 2030, 29,000 acres of land will be used for utility scale solar deployment, of which 90 percent will be farmland. The Solar Task estimated 25,000 to 35,000 acres of land will be used for solar deployment, of which a large portion will be farmland (less than two percent of Maryland farmland). Ground-mounted projects may benefit Marylanders by minimizing costs to develop solar, offering an alternative source of income for farm owners, and reactivating brownfields and greyfield sites. This section includes a recommendation for streamlining residential, commercial, and community solar permitting and siting processes in the state.

STANDARIZED ONLINE PERMITTING PROCESS

For residential permitting, require all local jurisdiction permitting authorities to adopt an online standardized permit process including, but not limited to, SolarApp+.

Jurisdictions across the US utilize various tools to expedite the permit approval process. An example is SolarAPP+, a tool developed by the National Renewable Energy Laboratory (NREL) in 2021.[36] This standardized plan review software processes building permit approvals for residential rooftop solar installations. The tool is free for cities and counties and has been shown to integrate with existing government software and cut down the permitting process by at least five to ten business days.

[35] "Qualified Energy Project Tax Exemption," Ohio Department of Development, accessed November 27, 2023, development.ohio.gov/business/state-incentives/qualified-energy-project-tax-exemption.

[36] "NREL's SolarAPP Streamlines Solar Permitting," NREL, accessed November 2, 2023, www.nrel.gov/news/video/nrels-solarapp-streamlines-solar-permitting-text.html.

Today, SolarAPP+ is available across many cities and counties in California. In Maryland, Montgomery County Department of Permitting Services is already using SolarAPP+ as part of its eSolar offering to expedite the issuance of solar permits for residential rooftop solar systems.[37]

The use of a single residential online permit processing system throughout all Maryland Local Departments of Permits and Inspections will allow residential solar installers to develop uniform permit submittals rather than have to individualize every permit to the unique requirements of the specific permitting authority. MEA received federal funding to help local jurisdictions make the shift to SolarAPP+ specifically.

California's Solar Access Act (SB379) requires that most cities and counties adopt an instantaneous streamlined permitting system for solar and storage.[38] This language allows for certain municipalities to utilize existing technologies or not participate given specific circumstances. By adopting a broader mandate similar to California's, local Maryland jurisdictions will have authority to choose an online solar permitting tool but would only be eligible for financial assistance from MEA if they select Solar APP+.

INTERCONNECTION

Interconnection application, approval, and equipment installation can be a significant barrier to adding distributed energy resources such as solar or battery storage to the grid. These barriers can be due to bureaucratic holdups, customer financial concerns, installation time, or locational uncertainty. Eliminating or reducing these barriers to interconnection and reducing interconnection wait times is critical to helping the state increase solar development and further progress towards renewable energy goals. The following recommendations address different elements of the interconnection process to equitably simplify and decrease the time to connect solar installations to the broader electric grid.

[37] "Community Solar Pilot Program-Frequently Asked Questions," Electricity, October 11, 2023, www.psc.state.md.us/electricity/community-solar-pilot-program/community-solar-pilot-program-frequently-asked-questions/.

[38] Residential Solar Energy Systems: Permitting, CA HB379. September 16, 2022, leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB379

HOSTING CAPACITY MAPS

Utilities should eliminate the use of aggregate circuit capacity limits and replace them with a hosting-capacity based screening methodology.

Hosting capacity is the amount of aggregate generation that can be accommodated on the electric distribution system without adversely impacting power quality or reliability and without requiring power quality reduction mitigation strategies such as specialized inverter settings or infrastructure upgrades. Hosting capacity maps can help developers, customers, and other interested parties assess available capacity in a given location to determine the amount of generation that can be accommodated at that specific point in the distribution system. While a more detailed engineering design study determines the exact amount of generation that can be accommodated, hosting-capacity based screening is a low-cost and effective first step at assessing locational feasibility of solar generation interconnection. Current use of aggregate circuit capacity limits does not provide the more specific location-based analysis of hosting-capacity for solar array siting that hosting-capacity maps can provide. Additionally, aggregate limits may not reflect changes in grid conditions over time, such as upgrades to infrastructure or changes in demand. Maryland does not currently offer a state-wide hosting capacity map, but Pepco and Delmarva Power provide hosting capacity maps across their service territories in Maryland. Maps such as these can be expanded to cover the entire State of Maryland to ease interconnection hosting capacity assessments statewide.

INTERCONNECTION FEE STRUCTURE

Support moving from a causer-pays model to a fee model where costs are distributed among those who benefit from the grid upgrades.

Current interconnection fee structures require interconnection applicants to pay for the necessary distribution system upgrades to accommodate interconnection of their distributed energy resources (DERs) to the grid. The first project to interconnect bears the cost of these upgrades, even though future projects that apply for interconnection will benefit from these upgrades without bearing any of the cost. This fee structure can lead to cancellation of otherwise viable and beneficial DER projects.

The PSC is considering shifting from this causer-pays model to new cost mechanisms, Maryland Cost Allocation Models (MCAMs).[39]

[39] John Borkoski, "Small Generator Facility Interconnection, PC44 Interconnection Workgroup: Phase V Final Report," Maryland Public Service Commission, September 2023, Homepage - Maryland Public Service Commission (state.md.us).

MCAMs reduce upfront interconnection costs for consumers by distributing costs commensurate with benefits among those who have interconnected and receive benefits from interconnection upgrades. These alternative models include a hosting capacity fee that balances interconnection costs between all ratepayers, as well as a cost allocation model that allocates costs of all future interconnecting DERs based on the proportion of available hosting capacity used by the customer. By implementing these alternative fee structures, the impact of excessively high interconnection costs for individual projects can be reduced, delays related to customer aversion to high interconnection fees can be eliminated, and upgrade costs can be appropriately distributed among those who receive the benefits, reducing barriers to DER interconnection.

INCREASE NET METERING CAP

Increase net metering cap from 2 MW-AC to 5 MW-AC.

Maryland is one of 38 states with net metering rules that apply to their utilities. These rules cover system size, interconnection requirements, billing requirements, and DER-specific considerations. Most states are similar to Maryland in that they require a meter for every 2 MW of utility-scale solar installed. For example, Delaware requires one meter per 2 MW for all non-residential customers and Massachusetts public net metering facilities can be up to 10 MW, but each unit within that cannot exceed 2 MW. In Maryland, customer-generators are allowed to net meter up to 2 MW, but the Electricity – Community Solar Energy Generating Systems – Net Energy Metering and Generating Capacity Act signed in May 2022 increased this value to 5 MW for CSEGS.[40]

Increasing the net metering cap from 2 MW-AC to 5 MW-AC would reduce the number of interconnection points for large co-located developments (i.e., multiple large solar arrays at the same site with multiple interconnection points). This can simplify the approval and interconnection process and save on interconnection fees as well as meter and construction costs. The requirements for multiple meters and installations for larger co-located developments over 2 MW can lead to longer construction, interconnection, and approval times, and increase interconnection and overall project costs. These factors could inhibit progress towards Maryland's renewable energy targets.

[40] "Report on the Status of Net Energy Metering In the State of Maryland," Public Service Commission of Maryland, November 1, 2022, http://www.psc.state.md.us/wp-content/uploads/2022-Net-Metering-Report.pdf.

While interconnection of larger solar projects may require electric grid upgrades and corresponding interconnection fees, adopting the alternative fee structures described above can reduce this burden of costly energy upgrades on individual consumers and provide further justification for removal of multimeter co-location requirements.

METER COLLAR ADAPTERS

Encourage the Public Service Commission to allow meter collar adapters.

Meter collar adapters are devices installed between a home's electrical meter and the meter socket to create a single access point for a solar or other DER installations. The collar can be safely installed by an electrician within one hour. Collars add electrical service capacity and eliminates the need to upgrade electrical panels typically required to support additional energy demand of energy resources such as EV chargers, solar panels, heat pumps, and other devices.[41] By removing the need for these upgrades, meter collar adapters ease DER installation in older, underpowered homes by reducing the cost and time necessary for standard installation. The collars are designed to eliminate the need for supply side connections and be easily installed and removed, enhancing safety for DER installation and for emergency personnel access. They meet all applicable safety standards and are approved for use by utilities and public utility commissions across 17 states nationwide, including New Jersey, Pennsylvania, West Virginia, Vermont, Kentucky and Ohio.[42] [43] If allowed by the PSC, meter collar adapters will reduce barriers for solar installation in homes across the state, particularly older homes and homes belonging to LMI homeowners who typically face solar installation roadblocks due to excessive costs for home electrical system upgrades.

INTERCONNECTION APPLICATION ADJUSTMENTS FOR COMMUNITY SOLAR

Interconnection application for Community Solar projects – remove requirement to include Subscriber Organization information at time of interconnection application. Allow this to be selected and added later.

[41] Chris Crowell, "Connect DER's meter collar nets $27M in funding, makes any home 'solar ready'," Solar Builder, May 26, 2023, solarbuildermag.com/news/connectders-meter-collar-nets-27m-in-funding-makes-any-home-solar-ready/.

[42] ConnectDER is the primary producer of meter collar adapters and is the maker of the adapters that meet safety standards and have been approved for use in 17 states.

[43] Michelle Lewis, "This plug-and-play meter collar makes electrical panel upgrades for EVs and solar unnecessary," Electrek, May, 2023, electrek.co/2023/05/23/electrical-panel-upgrades-solar-ev/.

Maryland currently requires all community solar installations to have a corresponding Subscriber Organization registered with the Maryland PSC. Subscriber Organizations offer subscriptions to customers, communicate with the utility company to ensure appropriate billing practices, bill customers for solar energy they buy, provide customer support to subscribers, and maintain the solar facility for its lifespan. As part of solar interconnection applications, applicants currently must provide information on the Subscriber Organization, including Subscriber Organization number, name, and address. This information is not always readily available at time of application submission as subscription contracts may not be finalized. This can lead to application delays and further interconnection delays down the line. Removing the requirement to include all subscriber information at the time of application and allowing later addition of this information can reduce interconnection bottlenecks by allowing customers more time to procure Subscriber Organization information after the application has been submitted but before final interconnection approval.

It should be noted that interconnection of community solar is already under review within the PSC Net Energy Metering (NEM) Workgroup. Currently, the interconnecting electric company is required to verify that a Subscriber Organization authorized by the PSC is being utilized prior to permitting a project to enter into the interconnection queue. This process originated and was important under the pilot program in order to properly allocate limited capacity in each electric company's project category as was required under the pilot.

Under the permanent program the removal of project or capacity categories means projects will now only be limited to the statewide net metering cap. Therefore, it may be possible to permit interconnections for community solar projects on similar terms as there would be for other distributed generation. There are currently pending proposals in the NEM Workgroup to alter the community solar interconnection application and process. Next steps will include distribution of draft regulation language and review and comment by interested parties.

MINORITY BUSINESS ENTERPRISES (MBE)

Minority Business Enterprises (MBEs) are defined as businesses that are at least 51 percent owned by a United States citizen who is Asian-Indian, Asian-Pacific, Black, Hispanic, Native American, a woman, or a disabled person.[44] In Maryland, these businesses can receive state certification from the Office of Minority Business Enterprise. Many states have procurement goals for state agencies in terms of MBE, but Maryland is one of four states with legally mandated MBE requirements on state level projects. It is important to determine a present-day baseline for equity in the solar industry to create a path forward with increased diversity based on Maryland's demographics.

DISPARITY STUDY ANALYSIS

The state should conduct a Disparity Study Analysis of a) the availability of businesses and non-profit organizations owned by minorities and women in the solar industry and b) the utilization of these entities as contractors and subcontractors in the Maryland solar marketplace.

Currently, Maryland is conducting a Disparity Study, otherwise known as the Utilization and Availability Study, to determine if firms are experiencing racial or gender discrimination while doing business in Maryland. The study involves collecting data on the availability of firms owned by minorities and women, utilization of these firms within the state, and the experiences of business owners, trade associations, and stakeholders in doing business with public and private entities in the state.[45]

There is an opportunity to conduct this exercise for racial and gender disparities relating to the solar industry. At present, there are about 200 solar companies in the state including manufacturers, installers/developers, and others.[46] The Interstate Renewable Energy Council (IREC) published a national study that showed that women and African Americans are both underrepresented in the U.S. solar workforce and there is a gap in pay, advancement, and job satisfaction. Additionally, over 88 percent of senior executives in solar companies across the country are white and 80 percent are male.[47]

[44] "Minority Business Enterprise Overview," Maryland Department of Transportation Motor Vehicle Administration, accessed October 20, 2023, mva.maryland.gov/about-mva/Pages/mbe.aspx#:~:text=Who%20is%20considered%20a%20Minority,Woman%20or%20a%20Disabled%20person.
[45] MGT Consulting Group. State of Maryland Disparity Study, accessed November 17, 2023, stateofmddisparitystudy.com/.
[46] "Maryland Solar," SEIA, accessed January 10, 2024, www.seia.org/state-solar-policy/maryland-solar.
[47] "Solar Industry Diversity Study," Interstate Renewable Energy Council (IREC), July 2, 2021, irecusa.org/programs/solar-industry-diversity-study/#:~:text=Women%20and%20African%20Americans%20are,%2C%20advancement%2C%20and%20job%20satisfaction.

To conduct a Disparity Study Analysis for the solar industry, the state may collect utilization and qualitative data from certified small, disadvantaged, and minority businesses in Maryland. These certified solar businesses in Maryland can be identified using the Certified Management System by the Maryland Department of Transportation (MDOT). This tool allows firms to apply and track their certification application and also allows all users to search a complete database for certified MBEs, Disadvantaged Business Enterprises (DBEs), Small Business Enterprises (SBEs), and Airport Concessions Disadvantaged Business Enterprises (ACDBEs).[48] This search tool returned 35 certified businesses that include "solar" in the description; these businesses would be included in the study and compared to other solar businesses in the state. The state should also consider engaging minority firms, not just those certified, in addition to using the firms identified using the Certification Management System. An analysis using data from solar businesses, trade associations, and other stakeholders is needed to determine if solar firms are experiencing discrimination.

WORKFORCE

Maryland aims to be a top state in solar production while also promoting diversity, equity, and inclusion; workforce development; and quality jobs for residents. To this end, the state is committed to establishing goals and incentives that consider both solar development and workforce policies that create good quality, family sustaining jobs with training and outreach focused on the communities in which solar development is occurring.

PREVAILING WAGE REQUIREMENT

The Maryland General Assembly should adopt into Maryland law the federal prevailing wage charges as put forth in the federal Inflation Reduction Act (IRA).

[48] "Maryland Department of Transportation," Maryland DOT - Certification Management System, accessed January 8, 2024, marylandmdbe.mdbecert.com/.

The Prevailing Wage Law in Maryland applies to all construction projects that are valued at $250,000 or greater if the contracting body is a unit of state government and there is any state funding for the project, or the contracting body is a political subdivision, agency, person, or entity with at least 25 percent of funding coming from the state.[49] The law regulates hours of labor, rates of pay, and worker conditions. At present, a 1 MW solar installation typically costs more than the minimum construction project price floor of $250,000; estimates for project costs vary between $860,000 and $1,000,000 for a single MW installed.[50] Therefore, 1 MW construction projects that follow the ownership or funding guidelines mentioned above already require prevailing wage.

The 2023 Community Solar Bill passed in July 2023 requires prevailing wage for community solar projects over 1 MW-AC.[51] HB908 states that workers must be paid more than the minimum wage set by the methodology outlined in the Prevailing Wage Law in Maryland Code SF§17-208 unless there is a project labor agreement (PLA) in place that establishes another rate.

Additionally, the Inflation Reduction Act (IRA) changed existing clean energy tax incentives to provide higher credit levels if prevailing wages are met.[52] In most cases, prevailing wage and apprenticeship requirements must both be met for the increased benefits. The clean energy ITC can provide up to a 30 percent credit if both requirements are met.[53]

In February of 2023, New York amended their prevailing wage requirements to include renewable energy systems with a capacity of one or more MW of alternating currents when it is procured by or for a public entity.[54]

[49] "Overview - Prevailing Wage for State Funded Construction Contracts," Maryland Department of Labor, November 20, 2023, www.dllr.state.md.us/labor/prev/prevoverview.shtml#law.
[50] Coldwell Solar, "How Much Investment Do You Need for a Solar Farm?" Coldwell Solar, accessed November 20, 2023, coldwellsolar.com/commercial-solar-blog/how-much-investment-do-you-need-for-a-solar-farm/#:~:text=The%20typical%20cost%20of%20building,between%20%24890%2C000%20and%20%241.01%20million.
[51] Bill, MD House Bill 908 § (2023), mgaleg.maryland.gov/2023RS/bills/hb/hb0908E.pdf.
[52] "Frequently Asked Questions about the Prevailing Wage and Apprenticeship under the Inflation Reduction Act," Internal Revenue Service, accessed January 8, 2024, www.irs.gov/credits-deductions/frequently-asked-questions-about-the-prevailing-wage-and-apprenticeship-under-the-inflation-reduction-act#prevailing.
[53] "Fact Sheet: How the Inflation Reduction Act's Tax Incentives Are Ensuring All Americans Benefit from the Growth of the Clean Energy Economy," U.S. Department of the Treasury, October 20, 2023, home.treasury.gov/news/press-releases/jy1830#:~:text=The%20Inflation%20Reduction%20Act%20modifies,proportion%20of%20qualified%20apprentices%20from.
[54] Shaun McCready, "Enforcement Guidance - Renewable Energy Prevailing Wage Requirements 224-d," New York Department of Labor, February 7, 2023, dol.ny.gov/system/files/documents/2023/02/enforcement-guidance-renewable-energy-prevailing-wage-requirements-224-d.pdf.

WORKFORCE AGREEMENTS

Require Community Benefits Plan for projects over 1 MW (but give flexibility in the terms of the plan; could employ a PLA agreement or a Community Workforce Agreement or establish other mechanisms for delivering local workforce benefits).

A Community Benefits Plan (CBP) is a non-binding agreement, developed by community organizations to engage local stakeholders and support local needs. CBPs are required for projects receiving Bipartisan Infrastructure Law (BIL) and IRA funding. CBPs must address how the funding recipient and project will:[55]

1. Engage communities and labor.
2. Support quality jobs and workforce continuity
3. Advance diversity, equity, inclusion, and accessibility through recruitment and training
4. Implement Justice 40, which directs 40 percent of the overall benefits of certain Federal investments to flow to disadvantaged communities.

In contrast, Community Benefits Agreements (CBA), Community Workforce Agreements (CWAs), and Project Labor Agreements (PLAs) are legally binding and negotiated between developers and community stakeholders.[56] Agreements can be more powerful because of their legal enforcement, but they may be harder to agree to or navigate than a more flexible CBP.

Requiring a CBP while allowing for a legally binding option provides flexibility that could be needed to move projects forward. It is possible for an outcome of a CBP to be a formal CBA. In either case, community support leads to increased clean energy development as pushback from local communities can otherwise severely delay or halt construction of new projects.[57]

[55] "About Community Benefits Plans," Energy.gov, Accessed January 8, 2024, www.energy.gov/infrastructure/about-community-benefits-plans.
[56] Erifili Draklellis and Jeremy Richardson, "Community Benefits Plans: Driving Equitable Clean Energy Development," RMI, September 25, 2023. rmi.org/community-benefits-plans-driving-equitable-clean-energy-development/#:~:text=CBAs%2C%20on%20the%20other%20hand,community's%20support%20of%20the%20project.
[57] "US Clean Energy Projects Need Public Buy-In. Community Benefits Agreements Can Help," CleanTechnica, September 8, 2023, cleantechnica.com/2023/09/08/us-clean-energy-projects-need-public-buy-in-community-benefits-agreements-can-help/.

CBPs are typically required and recreated on a per project basis depending on the specific contractor and communities involved. However, the state can publish a framework for recipients of incentives to follow or allow for each recipient to create their own CBP.

In either case, CBPs are typically intended to provide carve-outs or specific support for groups such as minority, women, and disadvantaged business enterprises while also supporting development in low-income communities.

Legally binding agreements, like CBAs, CWAs, or PLAs, could also be utilized to engage communities with construction projects. PLAs are negotiated between unions and contractors to establish the employment arrangements on a specific project.[58] PLAs are beneficial for construction employers because they streamline administrative and logistical challenges of working with multiple trade unions or organization groups. They can also eliminate delays due to labor unrest, such as strikes, as the terms of labor have already been agreed upon. PLAs can benefit construction workers with improved worker safety and health through specific provisions requiring training. In addition, PLAs can improve workforce development through an apprenticeship requirement or outreach at hiring halls.

At the beginning of 2023, Delaware launched a CWA pilot.[59] CWAs are a type of PLA that include specific community-based goals or commitments such as social justice, MBE support, or local hires. The pilot applies to up to six public works projects, and requires that all bids, even those awarded to non-union companies, must retain a percentage of work, determined by the state agency putting out the bid for work, from local unions. The percentage flexibility is intentional to make sure the worksites are reflective of the state in terms of union and non-union members.

Though PLAs do have benefits for the unions and contractors, there are concerns that PLA requirements leave out non-union workers. Almost 90 percent of Maryland workers are not in a union and would therefore have to allocate around 19 percent of their take home pay to union pension funds if they were to join a project with a PLA.[60]

[58] "Project Labor Agreement Resource Guide," U.S. Department of Labor, accessed November 20, 2023, www.dol.gov/general/good-jobs/project-labor-agreement-resource-guide.
[59] Katie Tabeling, "Delaware to Start Community Workforce Agreement Pilot," Delaware Business Times, January 27, 2023, delawarebusinesstimes.com/news/delaware-community-workforce-agreement-pilot/.
[60] "Union Members in Maryland - 2022 : Mid–Atlantic Information Office," U.S. Bureau of Labor Statistics, February 6, 2023, www.bls.gov/regions/mid-atlantic/news-release/unionmembership_maryland.htm.

STUDYING RPS/ACP

Solar Renewable Energy Credit (SREC) pricing is determined by solar production, the solar carve-out rate, and the Alternative Compliance Payment (ACP). To satisfy state compliance requirements, electricity suppliers and the utilities must produce or purchase SRECs based on their annual electricity sales multiplied by the solar content requirement from the state's RPS, commonly referred to as the solar carve-out. The electricity supplier can buy the SRECs on the open market or they can pay a penalty at a rate set by state law (the ACP). When the solar supply is below the solar carve-out, the price of the SREC is expected to be close in price to the ACP.[61]

RPS REFORM STUDY

Require a Study to inform comprehensive RPS Reform, conducted by the Maryland Energy Administration, working along with other applicable stakeholders, with a report to be filed by July 1, 2025.

The relationship between the ACP and SREC prices will depend on the electrical energy generation of solar installations relative to the solar carve-out requirement. When the capacity of solar exceeds the solar carve-out, SREC prices are expected to fall below the ACP. When the capacity of solar is below the solar carve-out, SREC prices are expected to be close to the ACP. Figure 6 shows that total solar installation will remain below the solar carve-out requirement. This means that the value of the SREC will remain at the ACP payment.

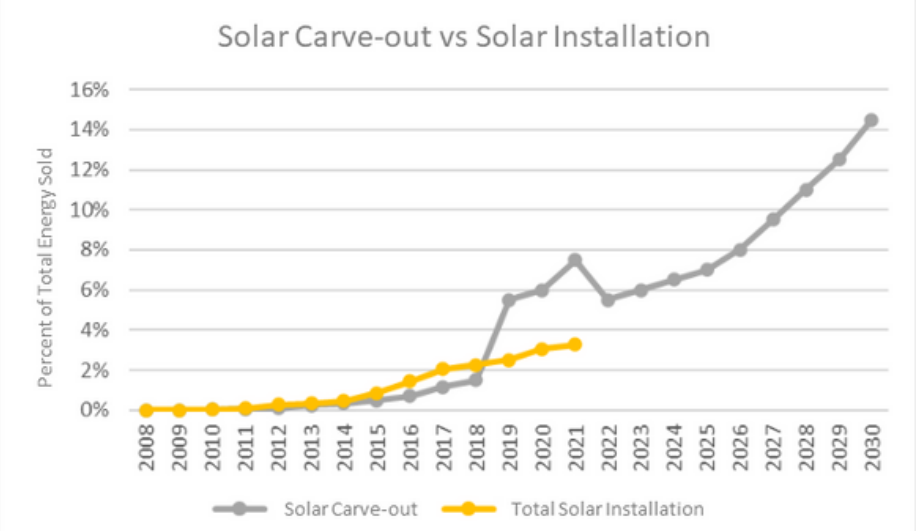


Figure 6: Solar Carve-out vs Solar Installation

[61] Maryland Energy Administration. "Future SREC Prices." October 11, 2022, news.maryland.gov/mea/2022/10/11/future-srec-prices/

Figure 7 shows that from 2016 to 2018, there was an overabundance of SRECs available. Due to this overabundance, the price of SRECs fell below the ACP schedule. This comparison between SREC price and ACP schedule is shown in Figure 7 below. As solar installations are expected to be below the solar carve-out requirement, SREC price is expected to remain close to the ACP payment moving forward.

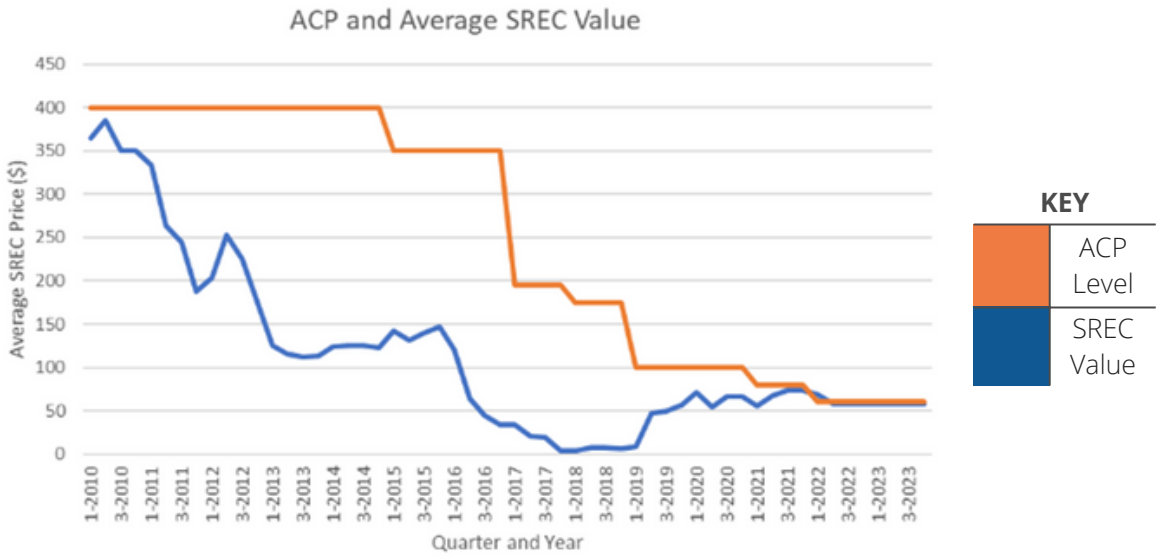


Figure 7: ACP and Average SREC Value

ACP prices and SREC values are expected to decrease in the near future. The current law sets the ACP at $60 through 2024 and then decreases incrementally year-over-year to $22.50 in 2030 as shown in Figure 8.

Figure 8: Maryland ACP Schedule

As ACP decreases, SREC prices are also expected to decline and the drop in SREC values is expected to result in a significant decrease in solar adoption rates. Figure 9 confirms the expectation that higher SREC prices are correlated with higher levels of solar installations. However, this positive correlation shown in the graph does not provide the exact causal relationship between SREC prices and solar installations.[62]

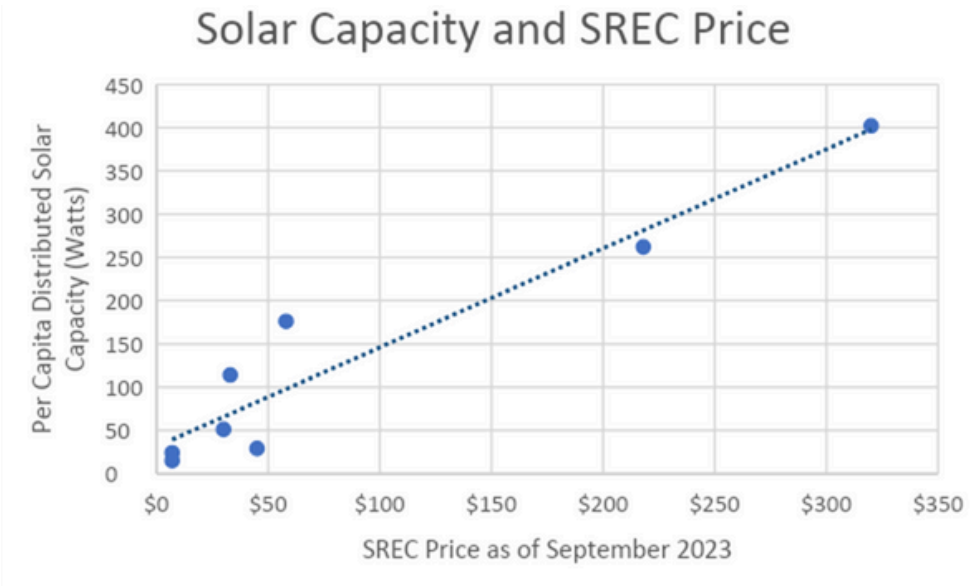


Figure 9: Correlation Between State Solar Capacity and SREC Price

For a more precise causal estimate of the effect of SREC prices on solar installations and controlling for confounding variables such as state characteristics, other existing funding, and other economic factors, we turn to published academic findings on the topic.

In a study published in the American Journal of Agricultural Economics based on the SREC market in seven northeastern states including Maryland, researchers found that for each dollar increase in SREC price, 341-374 kW of total solar capacity is predicted to be installed in-state, 45-48 kW of which is predicted to be residential. This study also found that on average a one dollar increase in SREC price leads to an additional investment of $1.15 million in solar installations in the following year, $152,000 of which is residential.[63]

[62] The slope coefficient for the correlation line in the graph is 1.14. When controls for land and GDP are added to the regression, the coefficient changes to 0.79. Both estimates are statistically significant at the 5 percent level. It is important to emphasize that even including the controls, the regression output can only be interpreted as a correlation. For causal conclusions, the analysis will require historical pricing data as well as events that specifically isolate SREC price changes to solar investments from other covariates. These events could be "natural experiments" or "instrumental variables." The study referenced in this section (See the following footnote) performs a causal analysis of SREC pricing and solar investments using natural experiments for when the state closes its SREC market to out-of-state suppliers. The results from this study as described in the memo can be interpreted as causal.

[63] Cohen, Jed J., Levan Elbakidze, and Randall Jackson. "Interstate Protectionism: The Case of Solar Renewable Energy Credits." American Journal of Agricultural Economics 104, no. 2 (2021): 717–38. doi.org/10.1111/ajae.12248.

The decrease in ACP for Maryland from $60 currently to $22.50 in 2030 represents a significant decrease in solar incentives. Based on the cited study above, this $37.50 decrease in ACP would be equivalent to a $43 million decrease in solar investment with Maryland. Given the significant impact of ACP on solar investment, Maryland may consider performing a more in-depth study on RPS reform and setting an optimal ACP to help accomplish the state's solar goals.

This study may be conducted as an extension of the current mandate of the Solar Task Force. The recommendation is for MEA to continue as the Chair of RPS Reform Study, though the required membership may change, and the estimated timeframe will need to be evaluated.

RPS "BRIDGE" POLICIES

Evaluating additional mechanisms to the SREC market can ensure a robust and cost-effective solar industry as conditions change. A "bridge" solution is a temporary solar incentive policy that should be utilized while broader RPS reform discussions continue. This "bridge" policy can support solar adoption through financial incentives while RPS reform to the ACP and SREC pricing is adjusted to better facilitate solar adoption. The current RPS is affecting ACP and SREC pricing, resulting in decreasing solar adoption in Maryland (Figure 7). Therefore, it is crucial to assess potential "bridge" policies for solutions to increase solar adoption in Maryland.

TEMPORARY BRIDGE POLICY

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize solar while Maryland designs and subsequently implements its long-term RPS reform policy.[64]

Bridge policies may be employed to bridge the gap between the existing RPS framework and the future RPS reform policy. These interim measures help manage the transition and address potential challenges that may arise during the implementation of new policies. Potential "bridge" policies may include, but are not limited to, the following examples.

[64] Voted on general goal. Did not vote on specific bridge policies, i.e., SREC multiplier structures or changes to the ACP Schedule.

RPS Multipliers

Currently, every 1 MWh of solar generation in Maryland accrues one SREC for the project. Other states such as Massachusetts, New Jersey, and Illinois have multipliers in their SREC programs that can increase or decrease the quantity of SRECs that accrue to a given MWh of solar generation.[65] [66] [67] These multipliers may vary based on the project type, location, and size. For example, in Massachusetts, higher multipliers are applied to community solar and low-income solar while a lower factor is applied to utility scale solar on farmland. In New Jersey, higher multipliers are applied to brownfield installations and grid supply rooftop installations while lower multipliers are applied to residential installations and non-residential ground mounts. Similar to SREC programs in New Jersey and Massachusetts, higher multipliers may be attributed to solar projects for LMI communities, projects on previously developed land, and projects meeting prevailing wage requirements. Prevailing wage requirements are discussed in the Workforce section of this report. A SREC multiplier can be implemented for projects that meet prevailing wage requirements to incentivize best labor practices as well as offset some of the costs for meeting the prevailing wage requirements.

SREC buckets group projects based on development type. Similar to SREC multipliers, bucketing is another policy mechanism to differentiate SREC incentives. The Illinois Solar for All Program groups solar projects based on project type, system size, and utility groups and has different SREC prices for each group. For example, the SREC price for a 10 kW single unit residential building installation is $180 while price for a 5,000 kW community solar installation is $78.[68] SREC buckets may be another mechanism that Maryland can develop to differentiate SREC incentives for particular types of solar projects similar to the SREC program in Illinois.

[65] "Solar Renewable Energy Certificate ," Massachusetts Clean Energy Center, accessed November 20, 2023, www.masscec.com/solar-renewable-energy-certificate-srec#:~:text=The%20amount%20of%20energy%20needed,number%20of%20SREC%2DIIs%20generated.
[66] "Solar Transition Frequently Asked Questions," New Jersey's Clean Energy Program, accessed November 22, 2023, njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition-frequently-asked-questions#TREC.
[67] "Renewable Energy Credit Prices for the Illinois Solar for All Program," Illinois Solar for All, August 1, 2022, www.illinoissfa.com/renewable-energy-credit-prices/.
[68] Ibid.

Temporary ACP Schedule Freeze

Based on current laws, SREC prices are expected to decrease in the near future. The current law has the ACP at $60 starting in 2022 and going through 2024 and then incrementally decreasing year-over-year to $22.50 in 2030. In the current environment, ACP prices are directly related to SREC prices, and this decrease will likely result in a significant reduction in solar investment in the state.

While the status of long-term RPS reform is pending, Maryland may consider other incentive policies to maintain the current ACP price. These policies may include putting a pause on ACP decreases or delaying ACP decreases. One specific proposal is to delay the declining schedule by exactly 3 years, effectively "correcting" for the 'lost' COVID years of 2020-2022.

RESIDENTIAL CLEAN ENERGY REBATE

The Residential Clean Energy Rebate (CERP) Program in Maryland is a statewide rebate program that provides an incentive for homeowners to install renewable energy generating systems on their primary residence.[69] The current rebate covers $1,000 for solar generation and $500 for solar water heating, with applications approved on a rolling first-come, first-serve basis. The total budget of the program is $4.6 million for FY2024. The Residential Clean Energy Rebate Program is funded through SEIF, which is supported in part by revenues from Regional Greenhouse Gas Initiative (RGGI) auctions and the state's RPS ACPs. The majority of projects applying for funding are solar projects. Since January 2023, over 90 percent of approved applications are for projects that requested rebates for solar projects.[70]

MEA also has a targeted grant program for low-income single-family homes, funded through ACP. MEA awarded $4.575 million for FY2023 and budgeted $6 million for FY2024 for the Solar Energy Equity Program (SEEP) (formerly Low-Income Solar Grant Program). While $1,000 CERP awards go directly to homeowners after the purchase of a solar system from a large number of solar installers, SEEP grants are awarded to non-profit organizations and local governments who contract with a select group of solar installers to provide solar at no cost (neither upfront nor after installation) to the low-income beneficiaries.

[69] "FY24 Residential Clean Energy Rebate Program," Maryland Energy Administration, accessed November 20, 2023, energy.maryland.gov/residential/Pages/incentives/CleanEnergyGrants.aspx.
[70] Ibid.

SINGLE-FAMILY RESIDENTIAL SOLAR GRANT PROGRAM

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize residential solar while Maryland designs and subsequently implements its long-term RPS reform policy. The legislature should establish a single-family residential solar grant program using Solar Alternative Compliance Payment (SACP) funds, from the fee that electricity suppliers are legally obligated to pay per megawatt hour of solar-generated electricity that they are unable to produce themselves, to leverage private dollars for the installation of single-family solar systems benefiting low to moderate income homeowners and overburdened and underserved communities. The program should have two tiers:

- *Tier 1: For households who qualify via geographic eligibility within LMIOU census tracts, up to a household income cap established by the legislature.*
- *Tier 2: Higher level grant for households who are income verified within LMIOU census tracts.*

The program shall be open to all business models and the grant shall be assignable to the system owner if that is different from the homeowner.

Should the legislature deem that income verification beyond self-attestation is necessary, the legislature should establish a streamlined verification process whereby the state issues eligibility status of an applicant within 30 days of application.

The legislature should amend the eligibility for SACP funds to include LMI households that are outside of LMIOU communities.

The legislature should also explore establishing a grant program for homeowners outside of the LMIOU communities. SACP funds shall not be used for this purpose.

The legislature should set a reasonable soft cap on this program, with discretion provided to the MEA to exceed this amount based on program success and funds available.

A SACP is a fee that electricity suppliers must pay into the SEIF if they are unable to generate the required number of kWh of solar-generated electricity according to the RPS. Maryland HB550, the Clean Transportation and Energy Act, passed in April 2023, states that SACP funds can only be used to make loans and grants to benefit solar projects that support LMIOU communities.[71] This suggested grant program would thus fit into the State SACP fund requirements and specifically support residential solar projects in LMIOU communities, with a recommendation to also explore options for funding homeowners outside of LMIOU communities.

In FY24, $32.6 million in SACP funding is budgeted for a variety of MEA solar programs that serve LMIOU communities, including the Solar Energy Equity Program (formerly the Low-Income Solar Program), the Community Solar LMI-PPA Program, solar on schools through the School Decarbonization Program, and resiliency hubs through Resilient Maryland). The solar task force recommended the legislature set a reasonable soft cap on any new residential rebate program, taking into account competing priorities for solar ACP funding. The solar task force also viewed the rebate program as a temporary "bridge" policy until future RPS reform.

The rebate amount should be established to significantly increase the affordability of a residential solar system in Maryland, even if the quantity of rebates could be fewer in total compared to the Residential Clean Energy Rebate Program. If a typical residential rooftop solar system in Maryland is around 8 kW, it would cost $24,000 in total, assuming a cost of $3.00 per Watt. If a 30 percent federal tax credit is applied, the total remaining cost is about $16,800. For the solar system to cost $10,000 - $15,000, the rebate amount would have to be set at $1,800 - $6,800.

The features of this program would allow flexibility for the homeowner to purchase a solar system or enter into a lease agreement or PPA with a third party, including contracts that require a homeowner to pay $0 upfront. For third party owned systems, the rebate would be assignable to the owner, to streamline payment and reduce barriers for LMI residents to participate. The program would also limit barriers to participation, by selecting a streamlined income verification process, such as self-attestation.

[71] Bill, MD House Bill 550 § (2023), mgaleg.maryland.gov/2023RS/bills/hb/hb0550T.pdf

ELECTRIC READY MEASURES

As local, state, and federal initiatives move to renewable and electrified solutions, it is important to prepare for future changes in energy availability, generation, distribution, and storage. Electric ready means to upgrade electrical wiring and panels to be able to accommodate future installations of electric appliances, electric vehicle chargers, and renewable energy.[72] This section specifically discusses the benefits of updating codes to make new buildings be solar and EV-ready and complete a virtual power plant (VPP) study to evaluate the possibility of a VPP solution.

SOLAR AND EV-READY

Update Codes for new construction (both residential and commercial) to require electrical wiring and electrical panels that are solar and EV-ready.

Solar and EV-ready buildings include the necessary infrastructure to install solar panels or EV charging stations. This recommendation specifically is related to electrical wiring and electrical panels that can handle the electricity required for solar or EV charging systems. Maryland HB830, Residential Construction-Electric Vehicle Charging, requires new residential housing units to include an EV-ready parking space.[73] The bill also includes funding for MEA to conduct analysis on the cost to require EV-ready spaces at multifamily residential buildings.

In addition, the International Energy Conservation Code (IECC), which sets the energy standards for building codes in the U.S., is updated every three years to account for new technologies and energy efficiency best practices. Based on public drafts released of the IECC 2024, the newest version of the codes will require all new residential and commercial construction, and major renovations, to be EV-ready with all required infrastructure for EV charging including the proper electric setup.[74] Maryland has adopted IECC 2021, which is currently the most updated version. When Maryland adopts the next iteration of the Code, buildings that meet new construction and major renovation criteria will be required to meet EV-ready requirements.

[72] "Make Your Home Electric Ready," ENERGY STAR, accessed January 11, 2024, www.energystar.gov/products/energy_star_home_upgrade/make_your_home_electric_ready#:~:text=Electric%20ready%20means%20getting%20the,heating%2C%20cooking%20and%20EV%20chargers.

[73] Thomas S Elder, "Fiscal and Policy Note for Maryland Senate Bill 830: Residential Construction - Electric Vehicle Charging" (Department of Legislative Services, April 27, 2023), mgaleg.maryland.gov/2023RS/fnotes/bil_0000/hb0830.pdf.

[74] Dragana Thibault, "Understanding EV-Ready Requirements in Codes for Homeowners and Builders," Northeast Energy Efficiency Partnerships, July 27, 2023, neep.org/blog/understanding-ev-ready-requirements-codes-homeowners-and-builders.

Many states or local jurisdictions have already implemented some form of solar and/or EV-ready requirements in their building code. California was the first state to include solar ready requirements in their Building Energy Efficiency Standards as mandatory measures.[75] Colorado has published a Model Electric Ready and Solar Ready Code for local jurisdictions to utilize when creating their own local building codes to include electric ready and solar ready policies.[76]

VIRTUAL POWER PLANT STUDY

The Maryland Public Service Commission's Energy Storage workgroup is encouraged to study energy storage as part of a virtual power plant solution, when paired with solar including evaluating utility and individual benefits and costs to ratepayers and rate structure options. Storage solutions incentivized by MEA may be in concert with solar and be virtual power plant ready.

A virtual power plant is a collection of energy generation, energy storage, and energy usage devices that are connected to the grid and can be utilized to conserve energy or add power to the grid when necessary.[77] Energy generation devices include solar arrays and any small-scale renewable energy source that are typically used to provide power to a specific destination, such as a singular house or business, but can be funneled to the grid in times of need. Energy storage devices include batteries or vehicles that can release their charge back to the grid. Finally, energy usage devices include items such as smart thermostats or appliances that can be coordinated with grid operations to conserve energy when it is needed elsewhere on the grid.

Maryland's Climate Pathway includes a focus on preparing the grid for increased demand and increased renewable energy investment. One strategy is to increase both centralized and distributed storage, with a goal to achieve 3GW available capacity by 2033.[78] Therefore, promoting a combination solar and battery program would help the state achieve both the solar adoption goal and storage adoption goal while also providing a cleaner grid in Maryland. Storing clean energy and redistributing it back to the grid eliminates the need for additional electricity from nonrenewable resources.

[75] "Solar PV Systems and Solar Ready," California Energy Commission, accessed January 10, 2024, www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/solar.
[76] "Energy Code Board," Colorado Energy Office, accessed January 10, 2024, energyoffice.colorado.gov/buildings/building-energy-codes/energy-code-board.
[77] Liza Martin and Kevin Brehm, "Clean Energy 101: Virtual Power Plants," RMI, January 10, 2023, rmi.org/clean-energy-101-virtual-power-plants/.
[78] Bill, MD House Bill 910 § (2023), mgaleg.maryland.gov/mgawebsite/Legislation/Details/hb0910?ys=2023RS.

USE OF ACP FUNDS

The use of ACP funds to drive solar adoption plays a crucial role in incentivizing and promoting renewable energy initiatives. ACP serves as a penalty imposed on electricity suppliers who do not meet the required SREC obligations. Maryland HB550, the Clean Transportation and Energy Act, passed in April 2023, states that SACP funds can only be used to make programs that increase solar adoption in LMIOU communities. By redirecting these funds towards supporting solar adoption programs, Maryland can create financial incentives for individuals, communities, and businesses to invest in solar infrastructure and advance equity across Maryland. This proactive approach not only helps meet renewable energy targets but also stimulates the growth of the solar industry. Allocating ACP funds strategically can fund research, development, and subsidy programs, making solar technologies more accessible and attractive.

PRIORITIZING ACP FUNDING

MEA should make every effort to prioritize ACP funding for solar projects that have multiple co-benefits.

Solar energy has the potential for numerous co-benefits that extend beyond its primary role as a clean and renewable power source. The International Climate Initiative notes that co-benefits of solar include local economic value creation, new employment opportunities, cleaner air, access to affordable energy, and rural development.[79] Job creation is a notable co-benefit, as the solar industry fosters employment opportunities in manufacturing, installation, and maintenance. Directing more funding in the form of incentives towards solar initiatives increases clean energy development but also increases potential co-benefits from solar installations such as an increase in employment opportunities, cleaner air, more affordable energy, and an increase in sustainable farming practices.

Solar power can also have the potential to reduce energy costs through decentralized and community-based projects and empower communities to access affordable and reliable energy. In addition, solar project siting and design should include or at least complement agricultural practices. Animal husbandry can be co-located with solar farms and should be promoted where practical. Pollinator-friendly habitats potentially offer co-benefits to adjacent and regional agricultural operations, such as crop pollination and pest control.[80]

[79] Co-benefits of Climate Action. "Our Work." Co-benefits.info. Accessed January 10, 2024, www.cobenefits.info/our-work/project/.
[80] Christina M. Kennedy, Eric Lonsdorf, Maile C. Neel, Neal M. Williams, Taylor H. Ricketts, Rachael Winfree, Riccardo Bommarco, et al, 2013, "A Global Quantitative Synthesis of Local and Landscape Effects on Wild Bee Pollinators in Agroecosystems," Ecology Letters 16 (5): 584–99, doi.org/10.1111/ele.12082.

APPENDIX A

Public Comments to the Recommendations List for Consideration by the Solar Task Force

The following are public comments recorded from the November 22nd, 2023, and the December 5th, 2023, Solar Task Force meetings. The related recommendations, corresponding to the revised Recommendations List from December 5th, 2023 in order of Voting Procedures on December 6th, 2023 are italicized as in the Task Force to Study Solar Incentives Report.

Creation of a personal property tax exemption for non-residential rooftop and parking canopy solar installations.

- Creates fiscal, regulatory, and/or code impacts and requires additional vetting. Appears the intent is to be State mandated and would have a negative impact to County revenue. Without a study, unable to determine the extent of impact. Also, would likely require the State to process exemptions to the taxable assessment. If delegated to the jurisdictions, this would be an increased administrative burden.

Permissive grant of authority for local jurisdictions to offer assessment abatements for real property that is host to a solar parking canopy.

- Creates fiscal, regulatory, and/or code impacts and requires additional vetting. Appears the intent is to be State mandated and would have a negative impact to County revenue. Without a study, unable to determine the extent of impact. Also, would likely require the State to process exemptions to the taxable assessment. If delegated to the jurisdictions, this would be an increased administrative burden.

Change from the current taxing structure of real property and personal property taxes to a P.I.L.O.T. for ground-mounted solar installations.

- Creates fiscal, regulatory, and/or code impacts and requires additional vetting. This isn't clear. PILOT agreements to date are an adjustment to the real property taxes, based on the agreement. Those agreements are in place to incentivize the provision of low-income housing in large projects, to the benefit of those challenged in our community. While a PILOT for this purpose would provide an incentive to build, where is the benefit to the community? This would have a negative impact on County revenue. Without a study unable to determine the extent of impact.

The state should extend the sunset provision for the property tax exemption for certain community solar installations.

- Creates fiscal, regulatory, and/or code impacts and require additional vetting. This does not provide enough information, generally this is understood this would have a negative impact to County revenue. Without a study, unable to determine the extent of impact.

Utilities should eliminate the use of aggregate circuit capacity limits and replace them with a hosting-capacity based screening methodology.

- Supportive of this concept but Note - utilities will need additional software capabilities and time to do this.
- Consider including a "connect and manage" approach as is done in parts of Europe and in ERCOT. In other words, rather than subjugating to a hard aggregate capacity limit, allow prospective distributed generators to interconnect and curtail as needed to maintain reliability. (From a PPRP consultant)

For residential permitting - require all local jurisdiction permitting authorities to adopt an online standardized permit process including, but not limited to, Solar App+.

- This will be so much more effective if everyone adopts the same standard (Solar App+) If a county has already adopted a system, potentially MEA can fund an interface to allow the public facing side be SolarAPP+.

Interconnection fee structure - Support moving from a causer-pays model to a fee model where costs are distributed among those who benefit from the grid upgrades.

- Is there a way to specify "who benefits" in a manner that protects against one project forcing others to cover their costs for no actual benefit?
- Support the shift from a causer-pays fee model for interconnection upgrade fees. Note - a proposal to do this is currently before the Public Service Commission in Rulemaking Docket No. 81
- Supportive of cost sharing generally, and this recommendation. Additionally, support the Secondary MCAM proposal put forward in the Phase 5 PC44 Interconnection Working Group Report. Do not support the Primary MCAM proposal put forward in the Phase 5 PC44 Interconnection Working Group Report. “Primary MCAM” does not resolve grid readiness issues and will create growing and unbalanced developer and ratepayer costs. An effective cost sharing methodology must encourage proactive investment to mitigate congested interconnection queues, price stability for developer financing, and time bounds when hosting capacity will be recovered from subsequent developers or ratepayers. Primary MCAM does not meet these needs. Recommend hosting capacity upgrades as an interim solution; proactive planning combined with straightforward, transparent, and stable cost-allocation will best enable Maryland to meet its clean energy and climate goals.
- Would this incentivize projects in areas that are very expense for interconnection?
- PSC is working on this. It seems to have widespread stakeholder support.

Remove requirement of multiple 2 MW installations for colocated, net-metered developments with an aggregate capacity between 2-14 MW.

- This undermines HB1188 https://mgaleg.maryland.gov/2023RS/bills/hb/hb1188e.pdf
- What is meant by 'remove requirement'?
- As written here this proposal will have no impact on any projects that collocate. If anything, it would further confuse the issue and uncertainty, as we have seen, is an overall negative in the marketplace. The reason collocation is done for projects on the same parcel is to be in compliance with the 2 MW-AC net metering cap. This proposal would not eliminate the reason why projects are collocated and so therefore all projects that fit this model would continue to collocate.

The proposal that would truly help out companies that focus on net metered projects would be to raise the net meter cap from 2 MW-AC to 5 MW-AC. Since this is the community solar cap as well, it would be the most defensible change. Further limiting a project's ability to step up to the 5 MW-AC cap to only those serving government/non-profit users would be acceptable as well, if there is concern about opening the larger NEM projects to anyone. We think this would be consistent with the community solar requirement to sell certain percentages to low-income customers to qualify for the larger eligible project size. This would make no changes to CPCN thresholds. A net metering/aggregated net metering project seeking to build over 2 MW-AC would need to seek approval form the PSC, not the local jurisdiction.

- Do not support this. Any solar array that is greater than 2 MW-ac (5 MW-ac for community solar projects) needs a CPCN. The co-locating option in #6 was provided for solar projects to get them out of doing a CPCN. If they are not willing to agree to these requirements, then they should go through a CPCN process. How is a 10 MW project different than five 2 MW projects that are collocated? The separate metering and the individual shutdowns make them different. I would leave the requirement in and remove #6.

Encourage the Public Service Commission to allow meter collar adapters.

- Supports this proposal as meter collar adapters are likely to reduce the cost of installing rooftop solar or EV chargers. Note - a proposal to do this is currently before the Public Service Commission in Rulemaking Docket No. 81.

Raise existing net metering capacity cap of 3000 MW.

- We probably need to know the ratepayer effect for raising the cap to future increased levels before we approve this.
- Given that substantial amounts of NEM capacity are currently available, a proposal to raise the NEM capacity cap may be premature. Paradoxically, raising the cap at this time could actually reduce the urgency for developers to construct solar facilities expeditiously, which runs counter to the solar task force's objectives. In addition, the cost recovery of NEM credits on non-participating customers has not been fully evaluated at this point. Until that impact can be ascertained and analyzed, concerned about including this proposal in the final report.
- The 3000 MW cap is not even close to being met.

Interconnection application for Community Solar projects - remove requirement to include Subscriber Organization info at time of interconnection application. Allow this to be selected/added later.

- Concur. A project isn't a Community Solar project until the interconnection agreement is initialed, and application is made for Community Solar capacity. The name of the subscriber organization (or even if it is a community solar subscriber organization probably isn't relevant until capacity is requested from the utility company.

The state should engage in a Disparity Study Analysis specific to the solar industry.

- What is the objective?
- Is something required for any other industry? If so, we need to point to the study, so we understand what it is.
- Is this another example of a double standard for solar? Solar development is one area where low- and moderate-income participation is a specific objective – including specification of a 40% LMI carve-out for Community Solar, the legislative designation of incentives and substantial funding (e.g., SACP funds) for low-income solar development.
    - Do we require "Disparity Study Analysis" for the supermarket industry, recognizing that many low-income areas are effectively food deserts?
    - I suggest that we take a step back before creating requirements for solar – a relatively benign and socially positive area of development – that are more onerous than other forms of development that often lack social and environmental benefits.
- If we do this, we should ensure that the study is scientifically acceptable (statistically sound) and does not just stop at disparity but identifies root causes. Without knowing the root causes the State can not effectively address the problem.

The state should require Prevailing Wage for all projects exceeding 1 MW AC.

- This will get us what we need even if/when the federal government removes them from requirement.

Require Project Labor Agreements (PLAs) for New Solar Projects greater than 1 MW.

- More analysis / understanding of a PLA is needed. PLAs are a rather loaded term. Rather than require it, could the State (in consultation with the solar industry & contractors) create a set of standards? Once created, then the decision can be made if it should be enacted. Also, want to ensure fair treatment for union & nonunion labor forces.
- Project Labor Agreements (PLAs) bestow significant benefits to organized labor (unions) in regards to guaranteed work and finances at the expense of merit shop (non-union) contractors. In essence, a PLA guarantees a percentage of every worker's hourly rate be paid to support union apprentice programs, health care, and pension plans. The inclusion of a PLA, or an indistinguishably related community benefit agreement (CBA), in the Task Force to Study Solar Incentives is premature because as a task force we do not know the following:

    - How the additional contributions for a non-union Maryland worker whose firm already provides these benefits help their families.
    - Thus, should the task force be willing to exempt non-union workers from these deductions to ensure they are not double paying?
    - How many Maryland based Union signatory firms have experience working on large scale public solar projects. A list by craft could also prove helpful.
    - Have other states adopted a PLA/CBA approach to their solar projects? If so, what are the standard union hiring hall rules for the crafts required on those projects?
    - We have not learned of any Maryland based union contractors who have worked on solar projects of significant scale with examples of what those projects were.
    - PLAs typically work to the disadvantage of minority business enterprises (MBEs). The task force should know what Maryland-based MBE union signatory firms who have worked on Solar projects of significant scale exist.
    - Furthermore, having knowledge of the rosters by craft of the percentage of women and black skilled Maryland workers who are union members would be very helpful in making this determination.
    - With construction firms and jobs currently in high demand, we should have a sense of what Maryland crafts qualified to work on this project have Maryland workers who are on the bench looking for work. Otherwise, where would workers come from to fill a Union Hall if Marylanders are not on the bench?

- Finally, what guarantees in return for a blanket PLA would Unions provide to ensure Maryland black and women skilled workers (not just laborers) would be provided work opportunities? Should the task force guarantee a percentage threshold on jobs.
- In addition, and in return for a PLA, what percentage of Maryland based workers and firms could the Union guarantee on these projects?

With all these questions still unanswered, I reiterate that the inclusion of a PLA/CBA is premature. Policies that divide and exclude stakeholders should be rejected. Further, proposals that enrich one segment of the construction industry at the expense of others in return for uncodified promises should not be advanced.

Require Community Benefits Plan for projects over 1 MW (but give flexibility in the terms of the plan; could employ a PLA agreement or a Community Workforce Agreement or establish other mechanisms for delivering local workforce benefits).

- Community benefits need to be more defined.
- If this is something other industries do? Would need to understand what this entails so the industry can respond more accurately. Also, this would need more analysis with Labor (union & nonunion) along with job training organizations to understand how to deliver local workforce developments. The recommendation should be to consider this further, but not require it.

Encourage DLS to specifically include in Fiscal Notes the ratepayer impacts (i.e. the changes in cost of utility service for various rate classes) for new or revised energy incentives (e.g. alterations to the alternative compliance payment structure, net energy metering, RPS, etc.).

- This is something they would get from the utilities and not account for the value of solar/DER, etc.?
- There would need to be very strong controls and oversight here- for example, in Maine net metering was unfairly blamed for an increase in costs that was due (in a large part) to inflation / increase in energy supply costs. Without oversight, costs not related to solar will be included and the analysis will be flawed. Need to ensure the analysis is 'accurate' and represents just the cost impact from the specific energy incentive. Also, unclear on how DLS will actually be able to accomplish this both accurately & efficiently.

- This suggestion is only meaningful if the analysis were to be done including cost-benefit determination that includes the value-added of solar in terms of carbon reduction, health benefit from avoidance of other atmospheric pollutants, and value added to the electricity system. The appropriate basis for such calculation will be the output of the PSC's ongoing proceeding to develop a unified cost-benefit analysis for distributed energy resources. We note, however, that there are already partial bases for including the value of solar – including the Biden Administration's interim assignment of the social benefit of carbon reduction at $51.00 per ton and the PSC's own 2018 study of the value added of solar (The "Daymark Study") – noting also that state agencies are still NOT applying any of these value-added inputs in their program and rate approval processes.
- Supports this proposal as it raises awareness of the impact of future proposals as legislation is considered. Note - ratepayer funding is a regressive method of funding public policy initiatives.

Require a Study to inform RPS Reform. The General Assembly should extend the mandate of the Solar Task Force, with MEA as the Chair.

- The Solar Task Force, as it exists, likely includes stakeholders that are not as deeply involved in RPS / ACP and may not need to be involved in specific RPS conversations.
- Option A is the better avenue for the Study - as part of the study & recommendations of the MEA, they can Consider concepts like the one proposed here.
- Agree
- We encourage the inclusion of a market study that provides regulators and policymakers with additional information on consumer behavior in any study of the RPS.
- Recommend that utilities be added as an official member of the task force should the work of the task force be extended.

Require recurring Study to inform comprehensive RPS Reform. The General Assembly should:

- *Delegate to the PSC the responsibility for managing Maryland's solar renewable energy certificate (SREC) market to ensure a robust and cost-effective solar industry.*
    i. *In doing so, the legislature should direct the PSC to address problems in Maryland's existing SREC market structure: currently SREC prices are too low, not properly differentiated by type, and variable from year to year.*

- *Direct the PSC to open an initial evidentiary proceeding with opportunity for public participation to determine how to address this and consider at least two approaches.*
  i. *First, the PSC should be directed to evaluate imposing a "firm fixed price," where the PSC or another entity sets SREC prices on an annual or regular basis, differentiated by type of solar (i.e. the SREC could be higher for solar sited on rooftops, on brownfields, or in underserved communities), which are fixed for the lifespan of a given project.*
  ii. *Alternatively, the PSC should be directed to evaluate maintaining a variable SREC price, but set a floor for SREC prices, raise the ceiling (i.e., the alternative compliance payment), and create an "SREC multiplier" that provides higher incentives for different types of solar.*
  iii. *Direct the PSC to reevaluate and reset values either annually or biannually to allow for real time corrections to structure the market to achieve statutory outcomes in a cost-effective manner.*

- This option is not a study, as it would change how SREC prices are set going forward. It is 2024 RPS reform from a market based SREC price into an administratively determined SREC incentive program. As such, it should be clarified as a separate option under RPS reform.
- This option assumes that SREC rates should be set by some body for some period of time. If this is the case, then the SREC simply becomes an incentive policy of the state using ratepayer funding. It removes the free market from the equation. The use of long-term contracts would remove much of the variability that is causing this proposal without removing the SREC as a market mechanism. I am against having a state agency set SREC rates.
- The PSC should not be made responsible for the financial health of a specific industry.

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize solar while Maryland designs and subsequently implements its long-term RPS reform policy.

- The Task Force did not have enough time to deliberate on the specifics of the multiplier but believe we all agree some bridge is needed. So we recommend proposing the basic structure for the legislature to determine the best format for the multiplier bridge.
- Any changes to or "resets" of the state RPS be tabled for consideration by a potential RPS working group/study as part of a larger RPS overhaul.

- Concerned about the rate impact of the proposals to raise the ACP. Utility rates are a regressive method of funding projects intended to benefit the public generally (such as the development of renewable energy resources). While some level of ratepayer funding will be necessary for Maryland to switch to cleaner energy generation, we would like to see other sources of funding be utilized in achieving these goals.

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize distributed-scale solar while Maryland designs and subsequently implements its long-term RPS reform policy. Specifically, adopt RPS "multipliers" for new solar projects based on system sizes as follows:

a. *Establish RPS credit multiplier amounts as follows:*
    i. *0 - 20 kW projects: 2.0x multiplier*
    ii. *21 - 1,000 kW projects: 2.0x multiplier*
    iii. *1,001 - 2,000 kW: 1.5x multiplier*
b. *Market segmentation blocks would each have a cap on the total MWs worth of eligible projects able to receive multipliers in each year the program is in effect, based on a percentage of the prior year's SREC shortfall, converted to MWs and divided between the multiplier segments. The segmentation block caps are intended to prevent crashing SREC prices by effectively flooding the market with SRECs.*
c. *Eligible projects must receive Authorization to Interconnect between the date the multiplier policy takes effect and three years from that date or implementation of the permanent RPS reform policy, whichever occurs later.*
d. *Projects that receive a multiplier would continue to receive that multiplier for fifteen years from the date of interconnection. This provision ensures the multiplier will phase itself out over time.*

- Many of the 'specifics' outlined should be figured out in the legislative process post recommendation.
- This approach seems to have some potential flaws:
    - The way "multipliers" and "adders" are used in other states like NJ and MA is not based on volume of solar capacity, but instead is used to direct solar projects to preferred sites, like LMI homes or communities, degraded land, parking canopies, etc.

    - The approach includes annual "block" limits on multiplier allocation combined with a 3-year window between allocation of a multiplier for a project and requirement for Interconnection. This would replicate the fundamental flaw of NY's "Megawatt Block" program, which allowed a set total of project capacity to sign up and be allocated part of a total block of potential grants, before the projects were "shovel ready." The result was that a large share of the funding was allocated to projects that were rushed into the queue and were never developed, leaving limited resources to support actual projects, as they were supposed to. The remedy is to make sure that only projects that are "shovel ready" – which probably means already having site control, permits, and interconnection approval – are included as projects slated to receive the multiplier.
- PJM is the SREC issuing authority. Is PJM set up for issuing multiples of SRECs? This separates the match between the number of SRECs and the amount of solar energy being produced.
- Under today's ACP levels, this would allow residential and small commercial projects to have effective SREC levels of $120 / MWH moving down to $45 / MWH in 2030. Larger ground mounted arrays would reduce from a current effective $90 / MWH down to $33.75 / MWH in 2030, whereas industrial scale arrays (and community solar over 2 MW) would remain at the current $60 / MWH, reducing to $22.50 / MWH in 2030. This would help smaller projects in the near term. It would also reduce the amount of funding coming into the SEIF for Solar ACP payments. As the multiplier is only for NEW projects, and the large amount of solar installations required per year to keep up with the RPS goals, it is unlikely that the multipliers would ever put us into a surplus, but if they did, they would crash the price of SRECs.

Establish RPS credit multiplier amounts as follows:

1. *0 - 20 kW projects: 2.0x multiplier*
2. *21 - 1,000 kW projects: 2.0x multiplier*
3. *1,001 - 2,000 kW: 1.5x multiplier*

- Would this be for only new projects or all (retroactive?) Not sure why this is needed.

Market segmentation blocks would each have a cap on the total MWs worth of eligible projects able to receive multipliers in each year the program is in effect, based on a percentage of the prior year's SREC shortfall, converted to MWs and divided between the multiplier segments. The segmentation block caps are intended to prevent crashing SREC prices by effectively flooding the market with SRECs.

- SREC price caps would only occur within the segment that was built faster than the preconceived goal.

Projects that receive a multiplier would continue to receive that multiplier for fifteen years from the date of interconnection. This provision ensures the multiplier will phase itself out over time.

- 5 years not 15 years is better to incentivize new solar projects.

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize distributed-scale solar while Maryland designs and subsequently implements its long-term RPS reform policy. Specifically, adopt RPS "multipliers" for solar projects that meet any of the following criteria:

a. *Residential rooftop projects that benefit households in HB550 LMIOU census tracts*
b. *Projects built on previously developed lands (i.e. parking lots, brownfields, landfills)*
c. *Projects that exceed prevailing wage or employ participants of apprenticeship programs*
d. *Projects that are wholly or partially community-owned*

- Many of the 'specifics' outlined should be figured out in the legislative process post recommendation.

Projects that are wholly or partially community-owned.

- What constitutes community owned? Local government owned? Community solar using PPAs would not qualify as it is not community owned. There are almost no "community owned" community solar arrays in Maryland.

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session to incentivize distributed-scale solar while Maryland designs and subsequently implements its long-term RPS reform policy. Specifically, adopt RPS "multipliers" for solar projects that meet any of the following criteria:

a. *Residential rooftop projects that benefit households in HB550 LMIOU census tracts*
b. *Community Solar Projects built on previously developed lands (i.e. rooftops, parking lots, brownfields, landfills), with preference given to projects located in HB550 LMIOU census tracts*
c. *Community Solar Projects that exceed prevailing wage or employ participants of apprenticeship programs*
d. *Projects that are wholly or partially community-owned*
e. *Community solar projects that reserve at least 50% of offtake for low-income households and offer a minimum 20% discount, with increasing multipliers for increasing percentage of low-income offtake above 50%*

- Support this option.
- Many of the 'specifics' outlined should be figured out in the legislative process post recommendation.

Adopt a temporary (3-year "bridge" with a sunset provision) incentive policy in the 2024 legislative session while Maryland designs and subsequently implements its long-term RPS reform policy. Specifically, adopt a "CEJA reset" strategy. CEJA outlines a phasing down of the SACP price starting at $60 in 2022 and going to $22.50 in 2030 and beyond. The proposal is to push the declining schedule out 3 years, effectively "resetting" the clock to where CEJA intended it to be in 2021 (correcting for the 'lost' COVID years of 2021-2023). The chart for what that looks like is below.

- It's important to consider that, unless other substantial financial incentives are also provided, the residential solar industry has found the present $60.00 SACP level to be insufficient to stimulate an increase in solar uptake.
- As a stopgap measure, I like this. It also has a legitimate reason for doing it. Unfortunately, it doesn't solve the real problem, that Solar ACP rates are too low, but this is a good start.

Residential Clean Energy Rebate Amounts. Adopt a temporary (3-year "bridge") incentive policy in 2024 to incentivize residential solar while Maryland designs and subsequently implements its long-term RPS reform policy. Specifically, increase the Residential Clean Energy Rebate amount from $1000 to $7000k-$7500 for verified low-and-moderate income households, $5000 for households in HB550 (low-income, underserved, or overburdened) census tracts, and $3000-$4000 for households in other census tracts.

- Agree

Residential Clean Energy Rebate Amounts. Eliminate the Residential Clean Energy Rebate Program and reallocate the funds to a targeted LMI Residential Rooftop Solar Program.

- Support this option.
- Eliminating the residential clean energy rebate program would remove existing and proven infrastructure of conveying state funds toward single-family rooftop solar.

Residential Clean Energy Rebate Amounts. Establish a sliding scale (rather than a "cliff") based on household income for the Residential Clean Energy Rebate.

- Would present significant administrative hurdles that should be a considering factor by the task force.

Require that 3rd party owned solar systems are eligible for all Maryland incentives, including the Residential Clean Energy Rebate Program. Require that eligibility is contingent on meeting consumer protection requirements (i.e. cap on escalator rate).

- Support reasonable consumer protection requirements for all ownership types receiving a grant for single-family residential solar projects.

Eliminate the Maryland Energy Storage Income Tax Credit and reallocate the funds to a targeted LMI Residential Rooftop Solar Program.

- Recommends that any changes to existing or the creation of new storage incentives be shifted to the Energy Storage Working Group, which is currently holding meetings.

Require a portion of Electric Universal Service Program (EUSP) funding be utilized to install residential rooftop solar systems on the homes of EUSP-eligible recipients to cover 100% of annual usage and eliminate their ongoing need for EUSP.

- The sentiment is good, but I believe that EUSP funding available for energy assistance to low-income families has been declining; and we know that EUSP energy assistance serves only a minority share of households who would qualify for that assistance. So taking money away from energy assistance is NOT a good idea as a way to promote low-income solar.

Adopt the "ConnectedSolutions" model for solar + battery. Provide an upfront cash rebate to help offset the capital cost of installing the battery storage device and then provides a stream of compensation to the battery for performing valuable grid services on a pay-for-performance basis.

- Recommends that any changes to existing or the creation of new storage incentives be shifted to the Energy Storage Working Group, which is currently holding meetings.
- This would be a good system if Maryland were to authorize a ConnectedSolutions type tariff.

RPS Reform in the 2024 legislative session.

- RPS reform is a highly complex and significant undertaking which could bring instability to the solar industry if done rashly and without proper considerations of suggested proposals. Recommend shelving all changes to the state RPS until proper time and attention can be given to the issue.

ACP Funding Formula proposals:

1. *The ACP Funding formula should require that the state to reserve:*
   a. *60% of ACP funds to provide financial incentives for the development of community solar projects on rooftops and parking lots in and for low-income and disadvantaged communities, including community solar projects on the rooftops of multifamily residential properties; and*
   b. *40% of ACP funds to incentivize the development of single-family rooftop solar for low-income homeowners.*

2. *The state should use multiple financing tools to incentivize priority community solar projects, with a focus on low-cost, long-term debt financing that can be recycled and re-deployed by the state for future programs.*
    a. *60% of the next fiscal year's allotment of ACP community solar funds should be reserved for a loan fund to be used to incentivize community solar development on the built environment, with priority placed on <2 MW projects that are at least 50% low-income and offer a minimum 20% bill discount and/or are located on rooftops and parking lots. Loan terms could be tiered, with interest rates and term length being tied to priority project areas.*
    b. *The remaining 40% should be reserved for grant funding. Grant funding could be used as an additional financial incentive for projects where there is a limited repayment mechanism (battery storage) or to supplement low-cost financing for priority projects where project costs exceed what low-cost financing will allow (parking canopies, <500 kW projects), or for enabling improvements which would prepare a building for the installation of solar panels for community solar projects described in 25(b)(i) above.*

3. *MEA should allocate ACP-funding to programs based on the following priorities. Competitive awards for ACP-Funded programs should also give specific consideration based on the following priorities:*

    a. *Projects with greater LMI participation*
    b. *Projects on previously developed sites (rooftops, parking lots, brownfields, etc.)*
    c. *Projects with higher costs and/or financing challenges, including rooftop and canopy projects that are below 1 MW.*
    d. *Projects that incorporate agrivoltaics*
    e. *Projects that are ecologically compromised and are not targeted for mitigation or restoration.*

- It is not wise to put funding distributions in law or regulation. MEA is the best judge of funding distribution based on opportunity and needed. MEA needs the flexibility.

The ACP Funding formula should require that the state to reserve:

    a. *60% of ACP funds to provide financial incentives for the development of community solar projects on rooftops and parking lots in and for low-income and disadvantaged communities, including community solar projects on the rooftops of multifamily residential properties; and*

b. 40% of ACP funds to incentivize the development of single-family rooftop solar for low-income homeowners.

- By providing only 2 options you close off any additional options. If the funding is limited to LMIOU (as it currently is), MEA will adjust the percentages on a yearly basis based on the number of good applications. In addition, MEA should be allowed to use sound management practices to develop a sustainably funded program that doesn't develop peaks and valleys in funding.

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iv. *Projects that incorporate agrivoltaics.*
v. *Projects that are ecologically compromised and are not targeted for mitigation or restoration.*

- Too narrow to actually be able to use all this money. The specifics should be figured out post recommendation in the legislative process and not totally defined here.
- Support this option. MEA (with the solar industry) could provide a new desired Solar ACP price for the near-term future (10 years).

ACP Acceptable Uses. The state should allow ACP Funds to be utilized for moderate-income households, while reserving at least 60% for low-income, underserved, and overburdened communities.

- Don't support this recommendation, if the definition of low-income is at or below 200% of federal poverty.
- There needs to be a plan for the money to be used in case not all of it is allocated.

For ground mount solar projects:

a. *State agencies set state-wide model permit design standards (setbacks, zoning, soil, etc.) that local jurisdictions must follow, that includes public comment, considers state goals related to solar development, and considers environmental preservation guardrails.*
b. *State agencies set state-wide setbacks as follows:*
   i. *Explicitly require the Commission to establish a reasonable setback in each CPCN order.*
   ii. *Limit setbacks statewide for community solar 1 MW - 2 MW*

- This should not be phrased as an Option A versus Option B thing, as both items can both be recommended. Also, it seems that Option B is setbacks only, so ultimately it is included as part of Option A.

State agencies set state-wide model permit design standards (setbacks, zoning, soil, etc.) that local jurisdictions must follow, that includes public comment, considers state goals related to solar development, and considers environmental preservation guardrails.

- PSC should lead.
- Either option is an infringement on county rights. You need to give the counties a judicial/administrative ability to challenge a decision.

State agencies set state-wide setbacks as follows:

a. *Explicitly require the Commission to establish a reasonable setback in each CPCN order.*
b. *Limit setbacks statewide for community solar 1 MW - 2 MW*

- Either option is an infringement on county rights. You need to give the counties a judicial/administrative ability to challenge a decision.
- First of all, the PSC already does this. Second, "reasonable" is highly subjective. Recommend removing the work "reasonable" and the sentence works just as well.

Limit setbacks statewide for community solar 1 MW - 2 MW.

- State has no experience with setbacks on these small projects.

Streamlining Licensing for Community Solar 2 MW - 5 MW.

a. *Establish a "DG-CPCN" License for community solar projects between 2 MW - 5 MW, that incorporates a "model permit design" and the standardized licensing conditions developed. Increase personnel at PPRP to meet the anticipated workload associated with an increase in applications.*
b. *Update the Public Utilities Article that allows projects between 2 MW - 5 MW to have the option to permit either through the local process or through the PSC CPCN process.*

- Should not be Option A versus Option B, as the two things here can be enacted jointly-can do both options. Option B should be its own recommendation.

Establish a "DG-CPCN" License for community solar projects between 2 MW - 5 MW, that incorporates a "model permit design" and the standardized licensing conditions developed. Increase personnel at PPRP to meet the anticipated workload associated with an increase in applications.

- The CPCN process has never been the reason why these projects are not constructed.
- Each Solar Project has unique impacts that must be addressed.

Update the Public Utilities Article that allows projects between 2 MW - 5 MW to have the option to permit either through the local process or through the PSC CPCN process.

- Only allow an expedited review if there is no County or local opposition and the developer agrees to a Community Benefits Agreement or similar program that benefits the local community/County.

Require MEA in concert with other state agencies to set a percentage of agricultural zoned land in each county that shall be made available for solar development in order to facilitate the state's energy goals.

- This recommendation would be stronger if it was a percentage of all lands rather than just ag land. Some counties do not have much ag land but lots of other solar friendly land. It also has the major ag counties bearing more of the burden than more energy intensive user areas. Finally, some counties may have already passed this threshold with the existing solar development.
- A hard goal for each county would be difficult unless there is some sort of trading program.
- Why MEA? Why not Planning? Or MDA? Or MDE?
- This statement assumes that there SHOULD be an "equitable" sharing of solar on agricultural zoned land. Somehow this would require a county to entice/force farmers (who may not want solar on their land) to put solar on their land. Sounds a bit like "eminent domain". Some counties have better properties for solar (i.e. flat land, less snow, less clouds). It also assumes that there is a transmission or distribution infrastructure available in all counties to carry off all of the electrical power being generated. I understand the concern behind this proposal but believe forcing it upon the counties is not in the public interest.

Counties must adopt plans that allow for energy development with restrictions no more onerous than for new commercial or residential building developments.

- This one needs to be explained more. New commercial projects will be built in accordance with current standards and codes. A county may have every reason to impose additional requirements on a project that was built using aluminum wiring, 208 volts, and switchboards that do not meet current standards of safety. Without an example of a county plan that is egregious, it's hard to understand this proposal.

Require ground-mount solar in excess of 1 MW to meet the following criteria before the receipt of a final building permit:

a. *Ensure topsoil remains onsite, require native vegetative mix and other appropriate protections to maintain soil integrity.*
b. *Consider water run-off, pollution, and unnecessary soil compaction in the design and construction of projects.*
c. *Comply with the Forest Conservation Act.*
d. *Incorporate green infrastructure to manage stormwater runoff.*
e. *Discourage the use of herbicide to control vegetation.*
f. *Protect nearby natural resources and wildlife habitat of special significance.*
g. *Construct arrays with co-benefits for crops, such as pollinator habitats, and animal husbandry whenever practical.*
h. *Non-agrivoltaic projects shall be required to specify a seed mix underneath the solar array of native vegetation and pollinators in coordination with the Maryland Department of the Environment and require the submission of a vegetation management plan.*
i. *Coordinate with all applicable state agencies.*
j. *Provide the results of the United States Fish and Wildlife Service's Information for Planning and Consulting environmental review or a comparable successor tool that is consistent with any applicable United States Fish and Wildlife Service solar wildlife guidelines that have been subject to public review*
k. *Host a Public Meeting and provide notice to the County as well as all parcels within ¼ mile of the project area*
l. *When developing projects in overburdened and underserved communities, as determined by the Maryland Department of the Environment's environmental justice screening tool, additional public outreach and community consultation will be required.*

- If these are not right, we are happy to convene a process by which the industry coordinates with other organizations & interests to come up with something. We can also consider a Land Maintenance Agreement (LMA), which is something IL has, and was the result of this type of coordination.
- Concerned that we are developing a double standard for solar, which – unlike residential and commercial development – does NOT require new roads, sewers, or schools, does not generate new traffic and the associated pollution, DOES provide additional revenue to jurisdictions, and DOES have quantifiable value-added (which will be more specifically quantified by the PSC's ongoing Cost-Benefit Analysis proceeding) to both the climate and the electricity supply. We should therefore review the following list keeping in mind the intent of item 15 – to avoid creating a double standard and more burdensome requirements for solar than for other regulated development.

Consider water run-off, pollution, and unnecessary soil compaction in the design and construction of projects.

- Require instead of consider. Effective run of and pollution reduction is important and should be required not considered.

Incorporate green infrastructure to manage stormwater runoff.

- Needs to reference a document or rules. What is "green infrastructure" as related to stormwater management?

Construct arrays with co-benefits for crops, such as pollinator habitats, and animal husbandry whenever practical.

- This essentially requires all arrays to be constructed for agrivoltaics. What does that say for minimum array height, line spacing, strength of poles, wire runs, etc. I'm not sure this should be a requirement as written. A requirement must have some standard to meet, and this is very vague.

Provide the results of the United States Fish and Wildlife Service's Information for Planning and Consulting environmental review or a comparable successor tool that is consistent with any applicable United States Fish and Wildlife Service solar wildlife guidelines that have been subject to public review.

- I think they are requiring environmental reviews to be made subject to public review, but the sentence needs to be rewritten to make this clear. If not, then who are these reports being "provided to"?

Host a Public Meeting and provide notice to the County as well as all parcels within ¼ mile of the project area.

- Why ¼ of a mile? How was this determined?
- At what point in the process is this required and what is the purpose of the public meeting? Is it just to provide notice or is it also to gain input. The timing of each would be very different.

When developing projects in overburdened and underserved communities, as determined by the Maryland Department of the Environment's environmental justice screening tool, additional public outreach and community consultation will be required.

- What constitutes additional outreach and consultation?

Update Maryland's solar-specific laws and permitting guidelines to incorporate best practices for estimating and managing stormwater runoff.

- Delegated to the County and appears to be working very well.

Create an ombudsman position at MEA or PSC for questions and concerns regarding the implementation of permitting and siting, to serve as a mediator for conflicts between applicants and counties.

- The ombudsman idea is of particular interest. We envision a new Competitive Markets Division at the Public Service Commission that shepherds programs like community solar, deployment of distributed renewable generation, battery storage, etc. This new Division would be a perfect place for this ombudsman to reside.

Respectfully, we believe we should expand education efforts to ensure consumers are provided the information they need to understand what they are purchasing. The Public Service Commission's efforts in this regard should be strengthened and this recommendation is a strong step in the right direction.

- This is not a good use of either MEA or the PSC to mediate at a county level. MEA does not get involved in issues of permitting. It would be a state agency taking over a local AHJ function.

APPENDIX B
State Policy and Incentives Technical Memorandum

INTRODUCTION

Maryland aims to meet Renewable Energy Portfolio Standard (RPS) goals and become a top ten solar generator in the nation.[81] Maryland enacted its RPS in 2004 and its first solar carve-out in 2007. The state amended the RPS standard multiple times, with the most recent Clean Energy Jobs Act in 2019 increasing the RPS target to 25 percent renewable energy by 2020 to 50 percent by 2030 and increased the solar carve-out to 14.5 percent.[82]

In addition to the solar carve-out, the annual requirement is divided into two tiers of generation. Tier 1 includes renewable sources like solar, wind, biomass and geothermal energy. This tier includes the solar carve-out along with a 13.0 percent requirement for offshore wind by 2030 and a 1.0 percent geothermal requirement by 2030, leading to a 22.5 percent requirement from all other sources. Tier 2 serves to allow a small amount of hydroelectric power other than pump storage generation, which is at a 2.5 percent requirement annually through 2030+.[83]

The RPS targets are part of Maryland's broader effort to achieve the most aggressive greenhouse gas (GHG) emissions reduction goals in the nation. Under the Climate Solutions Now Act (CSNA) of 2022, a target has been established to reduce GHG emissions 60 percent (over the 2006 level) by 2031 and net-zero emissions by 2045. Additionally, Governor Moore recently announced the appointment of the state's first Chief Sustainability Officer in history who will work to ensure Maryland meets the state's bold climate and environmental goals.

[81] Center for Robust Decision making on Climate and Energy Policy (RDCEP), "Maryland," Renewable Portfolio Standards, accessed September 28, 2023. http://rpscalc.rdcep.org/state/maryland/.

[82] Maryland Public Service Commission, "Maryland Renewable Portfolio Standard (RPS)," Maryland RPS Fact Sheet. https://www.psc.state.md.us/electricity/wp-content/uploads/sites/2/MD-RPS-Fact-Sheet-2.pdf.

[83] "Renewable Energy Portfolio Standard Report," Baltimore: Public Service Commission of Maryland, November 2022. http://www.psc.state.md.us/wp-content/uploads/CY21-RPS-Annual-Report_Final.pdf.

In support of these efforts, the Task Force to Study Solar Incentives ("Task Force") conducted an analysis of residential rooftop, commercial, utility, and community solar customer segments to develop policy and funding strategies to meet RPS goals and take advantage of solar potential across all customer segments. Table A.1 includes description of these customer segments, as well as incentives available within those segments, and the annual generation potential for each segment.

Table B.1: Types of Solar[84]

Customer Segment	Ownership	Credits/Incentives Available	MD Annual Solar Energy Generation[85] (MWh/yr)
Residential rooftop (0> - ≤0.2 MW)	Customer or third party	Net metering, SRECs, federal incentives, Maryland Residential Clean Energy Rebate Program, Low-Income Solar Grant Program	649,964
Commercial >0.2 - ≤0.8 MW)	Customer or third party	Net metering, SRECs, federal incentives, Maryland Commercial Clean Energy Rebate Program	197,911
Utility-scale (<2 - ≤1,000 MW)	Utility	SRECs, federal incentives	774,889
Community Solar (>0.8 - ≤2 MW)	Subscriber organization	Net metering, SRECs, federal incentives, Community Solar Low- and Moderate-Income (LMI) PPA Program	147,445

[84] Maryland Public Service Commission, "Solar in Maryland," Solar in Maryland Fact Sheet., accessed September 28, 2023, https://www.eversource.com/content/residential/save-money-energy/energy-efficiency-programs/demand-response/battery-storage-demand-response,

[85] Sourced from GATS database.

Given these solar energy generation goals, AECOM is providing support for the Task Force to develop strategies to achieve goals. This first technical memorandum addresses several priority topics as requested by the Task Force including state comparisons for solar generation, funding, finances related to Solar Renewable Energy Credits (SRECs), and policy related questions to payback and third-party ownership models. Specifically, this memorandum includes the following:

- A Comparison of state solar installation based on total current installation and installation normalized for generation potential, land area, and population size.
- A Comparison of state incentives and policies including comparable state grant, tax, and RPS.
- An Analysis of solar renewable energy credit (SREC) pricing by comparing the SREC prices of the states completely within the Pennsylvania-New Jersey-Maryland (PJM) Interconnection (i.e., DE, MD, NJ, OH, PA, VA, and WV) with their respective rooftop and utility annual development & annual rate of growth rates.
- An Analysis of solar project payback periods to evaluate the effect of incentive amounts.
- Research on solar consumer protection in the State of Maryland specifically within the residential sector.
- Key conclusions and next steps.

FINDINGS AND KEY TAKEAWAYS

The key takeaways from this review are:

- In terms of generation potential, population, and total area, the most comparable states are Massachusetts and New Jersey.
- The most similar states to Maryland that are also located fully in the PJM interconnection are Pennsylvania and Virginia.
- Maryland is more transparent with funding availability, offerings, and opportunities for all customer segment participation than most other states. Delaware is the only other state that has almost as much information readily available.
- Performance-based incentives that pay customers based on their solar production may be more effective in low-income communities in comparison to tax credits or exemptions.
- Higher SREC prices may lead to additional solar development. States with higher SREC prices are correlated with higher solar capacities. Published research estimates $1.15 million in additional solar investment when SREC prices increase by $1.
- Based on revised assumptions, a $0.10 to $0.50 per Watt increase in incentives would bring down payback from 13 to 12 years. Across all scenarios, payback periods for residential solar decrease by one to four years when incentives increase from $0.1 to $0.5 per watt.
- To limit predatory sales practices in the residential solar market, Maryland may consider only providing incentives for third party ownership contracts with zero or very gradual escalation rates.

STATE COMPARISON

As part of this analysis, AECOM compared Maryland's existing solar generation capacity in the aforementioned four Customer Segments relative to three groups:

1. The top ten states with the highest overall solar capacity, The top ten states with the highest overall solar capacity,
2. States fully within PJM territory, and
3. Other states with comparatively high solar capacity relative to solar potential, population, and land area.

The PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of electricity to the whole of Delaware, Maryland, New Jersey, Ohio, Pennsylvania, Virginia, and West Virginia, and it delivers electricity to parts of Illinois, Indiana, Kentucky, Michigan, North Carolina, and Tennessee. A map of the utilities within the PJM territory is shown in below Figure B.1.

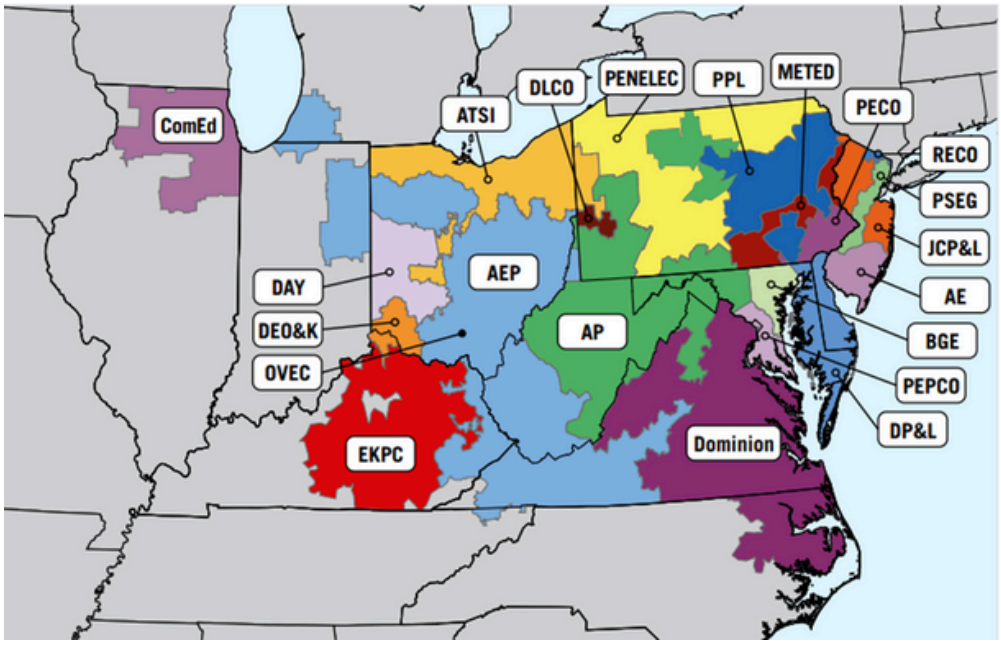

Figure B.1: Map of PJM Territory
Source: https://www.pjm.com/library/~/media/about-pjm/pjm-zones.ashx

AECOM normalized and ranked each continental U.S. state's installed solar (by megawatt, MW) based on their performance controlled for generation potential, which includes sun and land availability, total state size, and total state population. The normalized rankings established a new list of top 10 solar states that shows how much solar states installed controlled for potential advantages. Normalized for solar availability, land area, and state GDP, this ranking describes state solar installation due to incentives and policies. AECOM normalized the data by comparing each individual state to the U.S. average in each category.

The top ten states, normalized, and Maryland are listed below along with their current MW of solar installed and generation potential are in Table B.2.

Table B.2: Top Ten Normalized States

Rank	State	MW of Solar Installed	Generation Potential-Utility Solar (MWh)	Generation Potential-Commercial Solar (MWh)	Generation Potential-Residential Solar (MWh)
1	California	38,145	4,514,440,920	150,200,340	70,314,640
2	North Carolina	8,147	2,953,992,050	23,572,960	17,992,040
3	Massachusetts	4,037	156,681,350	19,188,630	8,176,400
4	Rhode Island	614	34,760,020	3,320,330	1,366,560
5	New Jersey	4,270	259,576,060	20,572,980	12,095,370
6	Nevada	5,040	6,257,146,330	9,471,860	3,542,279
7	Arizona	6,087	8,314,796,850	4,547,710	13,993,690
8	Vermont	413	72,488,050	1,890,240	986,650
9	Virginia	3,885	1,600,467,400	19,622,140	13,457,180
10	Utah	2,761	3,709,227,980	4,360,770	4,248,350
17	Maryland	1,524	448,303,270	17,628,780	8,752,920

To determine which states are most similar to Maryland based on generation potential, population, and total area, AECOM calculated the percent difference between a given state's data for each category and Maryland's corresponding value. The similarity ranking for each comparable state are listed in Table B.2. The values closest to 1 meant the smallest standardized percent difference away from Maryland.

Using this methodology, AECOM identified the states most similar to Maryland in terms of generation potential, population, and total area. Those states are Massachusetts and New Jersey, and the most similar states that are also in the PJM interconnection are Pennsylvania and Virginia.

The preliminary list of states against which to compare incentives and policies include PJM states, the top ten overall and top ten normalized solar capacity. These are found in Table B.3.[86]

Table B.3: Preliminary States for Analysis

State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Total Installed Solar (MW)[87] [88]	Growth Projection Over the Next 5 Years (MW)	Similarity Ranking to Maryland
Arizona	X	X		6,557	9,863	34
California	X	X		41,675	21,002	45
Delaware			X	258	724	36
Florida	X			12,612	12,168	37
Georgia	X			5,200	3,523	26
Maryland			X	1,775	1,566	1
Massachusetts	X	X		4,294	1,684	2
Nevada	X	X		5,926	5,616	38

[86] Note the list will change with further revisions and refinements to our analysis.
[87] Solar Energy Industries Association, "State-by-State Map," SEIA, accessed September 28, 2023, https://www.seia.org/states-map.
[88] SEIA data checked against Forbes data with only minor deviations that do not affect our selection for comparison.

Table B.3: Preliminary States for Analysis (Continued)

State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Total Installed Solar (MW)	Growth Projection Over the Next 5 Years (MW)	Similarity Ranking to Maryland
New Jersey	X	X	X	4,588	2,372	3
New York	X			4,717	8,802	25
North Carolina	X	X		8,459	1,745	17
Ohio			X	1,389	7,782	20
Pennsylvania			X	1,195	2,522	16
Rhode Island		X		721	721	42
Texas	X			18,801	40,579	47
Utah		X		2,931	3,014	32
Vermont		X		425	170	35
Virginia		X	X	4,393	6,722	7
West Virginia			X	33	627	28

POLICY BEST PRACTICES AND COMPARISONS

This section describes various incentive options utilized in select states identified for preliminary review as compared to Maryland in certain instances. It is challenging to quantify the success of incentives alone as other policy impacts, which are not readily available, may also influence solar installation and generation. This section describes incentives from other states and lessons learned, yet this high-level analysis cannot claim with certainty that any one method is quantifiably more effective than another.

LEVERAGING OPPORTUNITIES TO CLOSE FUNDING GAPS

Delaware is similar to Maryland in solar incentive structure. Programs in both states provide rebates of a set amount for solar panel installation for all customers as well as for LMI specific customers. Though the funding operates on different scales, Delaware's program intentions and funding structure are similar enough to Maryland that it is relevant to explore lessons learned from Delaware's program successes.

For FY22, Maryland's Clean Energy Rebate Program[89] had a total budget of around $5 million with approximately 90 percent of program awards going to solar installation, or about 3,900 awards. Each solar award itself was around $1,000, which accounts for only 5-10 percent of the total cost of a solar installation. Therefore, although this program is reported to have led to an overall solar installation of 43,742 kW, a majority of these kW were paid for by the solar owners and not covered by the rebate.

Delaware solar panel owners faced a similar funding gap within its Green Energy Program ('GEP') in which the amount of funding paid covers about 25-35 percent of the total cost of solar installation. The GEP provides funds for residential, commercial, and community solar and promotes leveraging program grants with other investments in clean energy systems. The Delaware Clean Energy Fund annual report demonstrates the program's success of leveraging $5.88 in private investment for every $1 of GEP funds.[90]

[89] For FY22, this program had split funding for residential and commercial segments. It is now two separate programs for these customer segments.

[90] "Green Energy Fund," Delaware Department of Natural Resources and Environmental Control, 2022, https://documents.dnrec.delaware.gov/energy/services/GreenEnergy/Documents/GEF-2022-Annual-Report.pdf.

Delaware resolved the issue of the funding gap and used this opportunity to also propel the state towards its RPS. Participation in the GEP requires individuals to agree to sell their SRECs to the Delaware Sustainable Energy Utility (DESEU), a nonprofit organization that supports the RPS standard and has been selected by Delmarva to operate the SREC Delaware Procurement Program. This process allows residents and commercial entities to sell SREC credits back to DESEU/Delmarva to make additional money to pay off their solar installation and continue earning income in the future. Solar properties may also receive a SREC bonus of 10 percent for using Delaware labor or Delaware manufactured parts, or 20 percent for using both. DESEU's Energize Delaware program also provides residential solar loans to get low-interest loans for affording solar systems. All of these built in Delmarva, DESEU, and Energize Delaware opportunities provide additional funding that can be leveraged to close the gap between available program funding and the true cost of purchasing solar installments.

As a best practice, Maryland could provide support for residents and businesses on how to leverage funds for solar installation between private investment, state funding, and federal funding. Helping residents access additional sources will help close the funding gap and increase solar installation and generation in the state.

For programs specific to low-to-moderate income (LMI) communities, rebates and grants are more typically provided in full. In Maryland, the Low-Income Solar Grant Program provides up to $25,000 per system, which can cover up to 100 percent of many installations. Given the 295 kW of solar installed, the total dollars invested from this program to the number of kW installed is close to $5, which is around the true cost of each kW of solar installed, signaling this program truly does cover close to 100 percent of installation cost. Similarly, Delaware's LMI Solar Pilot Program provides low-income homes with cost free installation up to 4 kW and moderate-income homes with a 70 percent subsidy for installation up to 7 kW. In FY22, Delaware's program provided funding for nine total projects (three low-income and six moderate-income) for $148,000 of total funding.

TAX POLICY COMPARISON

Many states have tax-based incentives (either tax credits or tax exemptions) related to solar installation to incentivize both residential and commercial solar. Six states from the list of comparable states above in Table B.3 (AZ, FL, NJ, NY, NC, RI), as well as Maryland, have a solar sales tax exemption which eliminates sales tax on any eligible solar products. Delaware does not impose a sales tax on any purchase, so cannot provide an exemption for solar. Arizona and Utah both provide tax credits for eligible solar systems.

Tax policies are grouped into three different categories: sales tax exemption, property tax exemption, and income tax credit. Sales tax exemption in general means that equipment cost for solar energy is exempted from state tax. Solar energy equipment may include equipment that uses solar energy to heat or cool a structure, generate electricity to be used in a structure, or provide hot water for use in a structure. Property tax exemption in general means that the added value to the property from the solar installation is exempted from property tax. Income tax credit means that a percentage of the installation cost of solar becomes eligible for a state tax deduction. Tax benefits within comparable states are shown in the table, following.

Table B.4: State Tax Incentives

Program	State	Summary
Sales Tax Exemption	Arizona	For commercial or residential solar, 100 percent of sales tax
	California	Exempts 100 percent of the taxes levied by the state. Local and district sales taxes will still apply. Solar equipment must primarily service farm equipment.
	Florida	Solar energy systems and all components of such systems are exempt from state 6 percent sales tax
	Maryland	Solar energy equipment is exempted from state 6 percent sales tax. Solar energy equipment includes equipment that uses solar energy to heat or cool a structure, generate electricity to be used in a structure, or provide hot water for use in a structure
	New Jersey	Exemption for devices that can provide heating or cooling by harnessing solar energy
	New York	Retail sales and installations of commercial solar energy equipment are exempt from the 4% New York State sales and use tax rate
	Rhode Island	Exemption from state 7 percent sales tax
Solar Property Tax Exemption	California	Tax exemption of 100 percent of system value; 75 percent of system value exemption for dual-use equipment
	Florida	Residential: 100 percent of the added value; Non-Residential: 80 percent of the added value
	Maryland	100 percent property tax increase exemption, Solar Photovoltaic and Solar Hot Water systems installed on structures are exempt from state and local real property taxes
	New York	Some municipalities and school districts have opted out, but applicable in the majority of the state

Table B.4: State Tax Incentives (Continued)

Program	State	Summary
Solar Property Tax Exemption	North Carolina	Residential systems: 100% of the appraised value; All other systems: 80 percent of the appraised value
	Ohio	Projects less than 250 kW are exempt from property tax. Projects above 250 kW are exempt but require $7,000 per MW of payment in lieu of taxes.
	Rhode Island	Residential 100 percent exemption from property taxes
	Virginia	Solar installations of less than 25 kW to be a "separate class of property" not subject to state or local taxes on real or personal property
Income Tax Credit	Arizona	For residential solar, tax credit of 25 percent of installation cost
	New York	System must be installed at personal residence and is limited to $5,000.
	Utah	Credits available to residential and commercial customers based on unit size/price, credit for residential capped at $1,600 and phases out after 2023, credit for commercial capped at $50,000

Although many states and the federal government do provide tax incentives for solar installation, a study from Stanford has revealed that tax rebates for solar are ineffective in low-income communities in the U.S. in comparison to higher income communities.[91] The study posited that this is because lower income families do not pay as much in taxes as high-income families, and thus benefit less from tax breaks. Performance based incentives that pay customers based on their solar production was more effective in low-income communities. A SREC market is an example of a performance-based incentive. Solar owners obtain credits from their solar electricity generation where one (1) SREC is generated per MWh of generation and sell them to utilities or other entities. Purchasers use the credits to help meet their renewable energy generation requirements. The sale of SRECs produces income for the solar panel owner which is an additional incentive for solar generation.

[91] "Tax Rebates for Solar Power Ineffective for Low-Income Americans, but a Different Incentive Works," Stanford News Service, November 16, 2022, https://news.stanford.edu/press-releases/2022/11/16/solar-panels-larealthy-americans/.

SOLAR RENEWABLE ENERGY CREDIT PRICING

Maryland, Delaware, Massachusetts, New Jersey, Ohio, Virginia, and West Virginia all have SREC markets, but with varying price points. SREC pricing specifically is described in the section below.

Table B.5: Comparable State SREC Prices

State	SREC Price
Delaware	$33
Maryland	$58
Massachusetts	$320
New Jersey	$218
Ohio	$7
Pennsylvania	$30
Virginia	$45
West Virginia	$7 [92]

ADDITIONAL POLICY ISSUES

Though funding incentives do support the investment into solar, policy decisions can generate equal if not more installation of solar products.

Renewable Portfolio Standards

Many states that make the list of top ten states with solar installation as well as the normalized top 10 states with solar installation have RPS in place that require a certain amount of energy supplied in a state to come from renewable energy. These RPS requirements can be seen in Table B.6.

[92] Participates in the Ohio Market.

Table B.6: Comparable State RPS Requirements

State	RPS	Requirement	Year Established
Arizona	Required	15 percent by 2025	2006
California	Required	44 percent by 2024, 52 percent by 2027, 60 percent by 2030, 100 percent by 2045	2002
Maryland	Required	30.5 percent in 2020, 50 percent in 2030	2004
Massachusetts	Required	Class I: 35 percent by 2030 and 1 percent each year after, Class II: 6.7 percent by 2020	1997
Nevada	Required	50 percent by 2030, non-binding 100 percent by 2050	1997
New Jersey	Required	50 percent by 2030	1991
North Carolina	Required	12.5 percent by 2021 (IOUs), 10 percent by 2018 (municipal and coops), 70 percent reduction from 2005 by 2030	2007
Pennsylvania	Required	18 percent by 2020-2021	2004
Rhode Island	Required	100 percent by 2033 (19 percent in 2022 raising each year)	2004
Utah	Recommended	20 percent by 2025	2008
Vermont	Required	55 percent by 2017, 75 percent by 2032	2005 (voluntary), 2015 (standard)
Virginia	Required	100 percent renewables by 2045 for Phase II utilities and 2050 for Phase I utilities	2020

Energy Efficiency Standards

Additionally, California has solar system requirements within their Building Energy Efficiency Standards that require buildings to install a solar system or are considered solar ready. For a building, solar-ready means that there is space for a solar system that is not under shade that has interconnection pathways available. Applicable buildings include high-rise multifamily buildings with ten (10) stories or fewer, hotels, motels, and all nonresidential buildings with three stories or fewer. Although there is no readily available information on how this specific solar policy has affected the amount of solar in the state, mandates and policies like this may lead to an increase in the amount of the state's electricity that comes from solar power.

Land Use Considerations

Land use is another consideration when promoting solar installation in the state, specifically utility-scale solar. The Maryland Department of Planning has issued Solar Facility Siting Guidance to provide local governments with resources for determining where to allow for utility-scale solar installations based on existing land use and ecosystem.[93] The U.S. Department of Energy's Solar Energy Technologies Office is engaged in research to provide insight on the interaction of solar installations, wildlife, and ecosystems to best help the U.S. prepare for an influx of solar in the coming years. As a best practice, Maryland should stay up to date with the best practices in pairing solar and agriculture for shared benefit, also known as agrivoltaics, and maximizing coordination between utility-scale solar and existing land use.

Loan Programs

Zero- or low-interest loan programs for solar installation support financing of solar installation that can generally be offered in greater supply than grants or other incentives that will not be repaid. Financing programs can allow Maryland to provide incentives to a broader range of people with fewer requirements to qualify with the expectation that the state will be repaid the money with only some losses that may come with loss of interest depending on how much interest is charged. Examples include the Energy Conservation Assistance Act in California that provides zero-interest rate loans to public schools and 1 percent interest rate loans to other public entities in the state. Dominion Energy in Virginia and Duke Energy in North Carolina both have similar programs that support financing of solar installations.

[93] Maryland Department of Planning, "Solar Facility Siting Guidance," accessed September 28, 2023, planning.maryland.gov/Pages/OurWork/envr-planning/solar-siting/solar-siting-home.aspx.

SREC PRICING ANALYSIS

OVERVIEW ON THE DETERMINANTS OF SREC PRICING[94]

SREC pricing is determined by solar production, the solar carve-out rate, and the alternative compliance payment (ACP) rate set by statute. To satisfy state compliance requirements, electricity suppliers and the utilities may purchase SRECs based on their annual electricity sales multiplied by the solar content requirement from the state's RPS, commonly called the solar carve-out. The electricity supplier can buy the SRECs on the open market or they can pay a penalty at a rate set by state law (the ACP). When the solar supply is below the solar carve-out, the price of the SREC is expected to be close to, or nearly equal to, the ACP.

Figure B.2 shows that the solar installation in Maryland is projected to continue to be below the solar carve-out, this implies that SREC price in Maryland is expected to be close to the ACP.

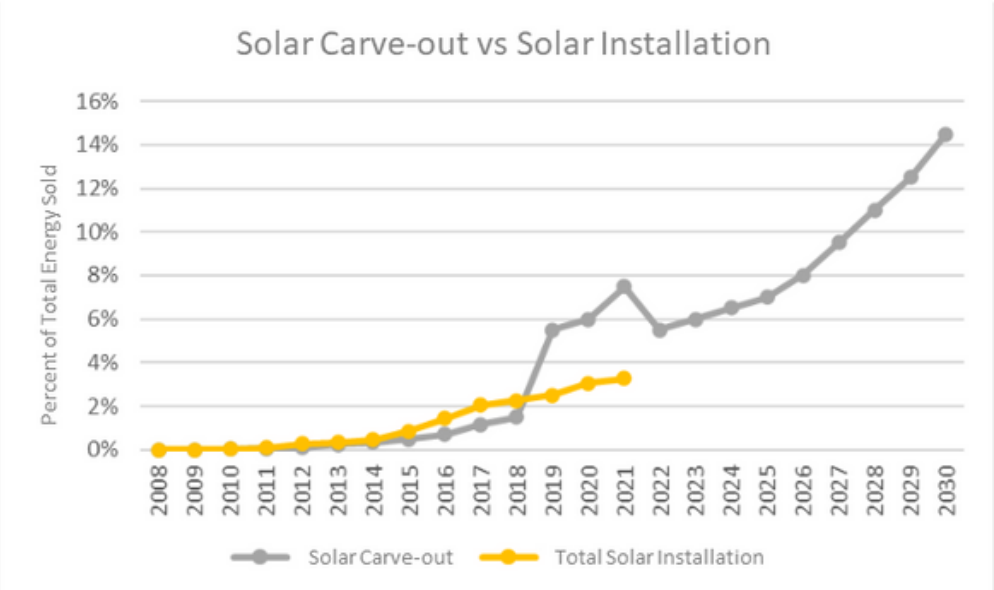

Figure B.2: Solar Carve-out vs. Solar Installation in Maryland

[94] Overview for the determinants of SREC pricing in Maryland along with Figures B.2 and B.3 and taken and summarized from the following MEA source: news.maryland.gov/mea/2022/10/11/future-srec-prices/.

Figure B.3 shows that ACP prices are expected to decrease in the near future, which combined with Figure B.2 implies that SREC price in Maryland is expected to decrease as we approach 2030.

Figure B.3: ACP Prices Per Year

Given the overview and the expected trend of decreasing SREC pricing provided above, an important question to address is how SREC prices influence installations.

As ACP decreases, SREC prices are also expected to decline and the drop in SREC values is expected to result in a significant decrease in solar adoption rates. Figure B. 4 confirms the expectation that higher SREC prices are correlated with higher levels of solar installations. However, this positive correlation shown in the graph does not provide the exact causal relationship between SREC prices and solar installations.[95]

[95] The slope coefficient for the correlation line in the graph is 1.14. When controls for land and GDP are added to the regression, the coefficient changes to 0.79. Both estimates are statistically significant at the 5 percent level. It is important to emphasize that even including the controls, the regression output can only be interpreted as a correlation. For causal conclusions, the analysis will require historical pricing data as well as events that specifically isolate SREC price changes to solar investments from other covariates. These events could be "natural experiments" or "instrumental variables." The study referenced in this section (See the following footnote) performs a causal analysis of SREC pricing and solar investments using natural experiments for when the state closes its SREC market to out-of-state suppliers. The results from this study as described in the memo can be interpreted as causal.

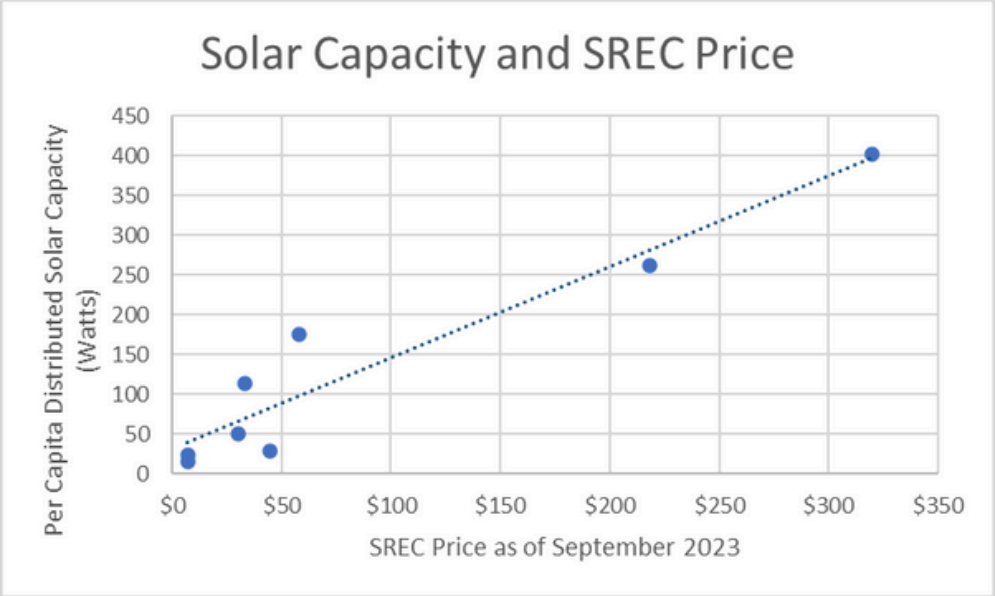

Figure B.4: Preliminary Result for Correlation Between Solar Capacity and SREC Price

For a more precise causal estimate of the effect of SREC prices on solar installations and controlling for confounding variables such as state characteristics, other existing funding, and other economic factors, we turn to published academic findings on the topic.

In a study published in the American Journal of Agricultural Economics based on the SREC market in seven northeastern states including Maryland, researchers found that for each dollar increase in SREC price, 341-374 kW of total solar capacity is installed in-state, 45-48 kW of which is residential. This study also found that on average a one dollar increase in SREC price leads to an additional investment of $1.15 million in in-state solar the following year, $152,000 of which is residential.[96]

[96] Cohen, Jed J., Levan Elbakidze, and Randall Jackson, "Interstate Protectionism: The Case of Solar Renewable Energy Credits," American Journal of Agricultural Economics 104, no. 2 (2021): 717–38, https://doi.org/10.1111/ajae.12248.

The decrease in ACP for Maryland from $60 currently to $22.5 in 2030 represents a significant decrease in solar incentives. Based on the cited study above, this $37.5 decrease in ACP would be equivalent to a $43 million decrease in solar investment with Maryland.

RESIDENTIAL SOLAR PAYBACK ANALYSIS

For this analysis, AECOM assessed the estimated payback period provided by a group of solar contractors. The solar contractors conclude that a $0.50 per Watt incentive would bring down payback periods from ten to eight years. From AECOM's perspective, the modeling assumptions and results provided by the solar contractors are all very reasonable. Given that the modeling assumptions in this analysis are fundamentally estimates for future outcomes, the best approach is to perform a sensitivity analysis to create a range of possible outcomes. This way, we will have a better sense of the range of possibilities instead of relying on one singular point estimate. Our approach is to perform the analysis once again using a separate set of assumptions justified using reliable sources, all of which are slightly more conservative than the assumptions from the solar contractors. This way, our sensitivity analysis results combined with the conclusions of the solar contractors can provide a whole reasonable range of possible outcomes. The assumptions given by the solar contractors and the assumptions from AECOM for sensitivity analysis are as follows:

Table B.7: Solar Contractor Assumptions and AECOM Assumptions

Parameter	Solar Contractor Value	AECOM Value
System Size (kW)	10	10
Estimated Solar Production (kWh)	11,500	11,250
Annual SREC Production (units)[97]	11.5	11.25
System Degradation Rate	50 percent	50 percent
Electricity Rate ($/kWh)	$0.165	$0.157 [98]
Energy Rate Escalation	3 percent	2.1 percent [99]
System Cost $/W	$3.5	$4 [100]

Following revised assumptions, AECOM decreased estimated annual production slightly from 11,500 to 11,250 kWh based on previous solar analysis we completed in the Northeast Region. This annual production estimate is slightly more conservative than the assumption provided by the solar contractors. Using EIA historical data, AECOM also revised electricity rates and energy rate escalation. Finally, AECOM changed the system installation cost from $3.5 to $4.0 based on the latest cost estimates by Lawrence Berkeley National Laboratory. Based on the assumptions from the solar contractors, a $0.10 to $0.50 per Watt increase in incentives would bring down payback from 10 to eight years. Based on AECOM's more conservative assumptions, the payback period is slightly longer than the estimates from the solar contractors. These assumptions conclude that a $0.10 to $0.50 per Watt increase in incentives would bring down payback from 12.75 to 11.01 years. Even though the payback period has increased under AECOM's more conservative assumptions, our results confirm the results from the solar contractors that a $0.10 to $0.50 per Watt increase in incentives would reduce payback by approximately two years.

Additionally, the analysis by the solar contractors only included the initial installation costs but not other ongoing costs such as operation and maintenance (O&M) costs. An analysis that includes these additional costs may result in significant changes. When an annual O&M cost of $15/kW[101] is included, the payback results increase slightly more to 11.93 and 13.82 years. Once again, the results from the solar contractors that a $0.10 to $0.50 per Watt increase in incentives would reduce payback by approximately two years is confirmed. Once again, the results from the solar contractors that a $0.10 to $0.50 per Watt increase in incentives would reduce payback by approximately two years is confirmed. Table B.8 summarizes the results comparing results from different assumptions.

[97] Both Solar Contractors and AECOM assume that ACP cost will remain $22.5 after 2030.

[98] "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis," Form EIA-861M (formerly EIA-826) detailed data, September 27, 2023, https://www.eia.gov/electricity/data/eia861m/. Energy rate escalation is calculated as the average annual escalation rate for the previous 10 years ending July 2023. Electricity rate is taken as the average 12-month electricity rate ending July 2023.

[99] Ibid.

[100] Barbose, Galen, Naim Darghouth, Eric O'Shaughnessy, and Sydney Forrester, "Tracking the Sun: Pricing and Design Trends for Distributed Photovoltaic Systems in the United States," Berkeley: Lawrence Berkeley National Laboratory, September 2023, https://emp.lbl.gov/sites/default/files/5_tracking_the_sun_2023_report.pdf.

[101] O&M costs of $15/kW is based on analyses from previous AECOM solar projects.

Table B.8: Payback Estimates Including Ongoing Costs Assumptions

Payback	Solar Contractor	AECOM	AECOM + O&M
Payback $0.1/W Incentive	10 Years	12.75 Years	13.82 Years
Payback $0.5/W Incentive	8 Years	11.01 Years	11.93 Years

The above payback analysis assumes cash payment for installation and does not account for any cost of capital. For consumers who are financing their solar installation with loans, interest payments become an additional cost. When we include a 5 percent cost of capital and perform a similar analysis as a payback analysis, where all annual savings are used to paydown the principal and interest of the loan, the payback period increases to 22.76 and 18.09 years respectively for $0.10 and $0.50 per Watt incentives. This increase in payback period is due to interest payments being included as an additional cost to the full cost of the solar installation. By increasing the incentives from $0.10 to $0.50 per Watt, the payback period with interest is reduced by more than four years. This is because the added incentive at the beginning of the project further reduces interest costs.

In practice, customers financing solar installations with loans do not pay down principal and interest with total energy savings until all loans are paid back as shown in the above analysis, rather the payments are usually fixed over a set period of time. If we rerun the analysis assuming a 30-year loan at 5 percent interest with fixed payments, monthly cash flows including all savings, loan principal, and interest payments will start negative but turn positive over time as interest rates reduce and savings increase from electricity price escalation. Based on our analysis assuming a 30-year loan at 5 percent interest, annual cash flow turns positive in year 17 when the incentive is $0.10 per Watt and turns positive in year 13 when the incentive is $0.50 per Watt. The increase in incentives from $0.10 to $0.50 per Watt significantly reduces the length of time before the annual cash flows are positive. The reason once again is that the added incentive at the beginning of the project reduces interest costs that will have to be paid in later periods.

To summarize our analysis from this section, we applied more conservative assumptions relative to the assumptions used by solar contractors. By applying more conservative assumptions, we do not mean to imply that the assumptions given by the solar contractors are overly optimistic because we fully agree that their results and assumptions are perfectly reasonable. Rather, our approach of providing more conservative and justifiable assumptions to create a sensitivity analysis for the range of possible outcomes for payback. This way we are not relying on single point estimates for future projections. By applying our more conservative assumptions, we show that the payback period may increase from the solar contractor estimates. However, their result that a $0.10 to $0.50 per Watt increase in incentives would reduce payback by approximately two years is confirmed using our assumptions. However, their result that a $0.10 to $0.50 per Watt increase in incentives would reduce payback by approximately two years is confirmed using our assumptions. Furthermore, when installations are financed via loans, the $0.10 to $0.50 per Watt increase in incentives will have an even more significant effect on financing costs. Payback period with a 5 percent interest when all savings is used to pay down the loan is reduced by more than four years with $0.50 per Watt incentive. For fixed loan payments over 30 years, annual cash flow turns positive from year 17 to year 13 when the incentive increases from $0.10 per Watt to $0.50 per Watt.

RESEARCH ON CONSUMER PROTECTION

Third party ownership models, such as Power Purchase Agreements (“PPAs”) and leasing contracts, allow homeowners and organizations to install solar without having to pay large sums of installation costs upfront. The homeowner is usually contracted to pay a monthly fee over the duration of the contract (normally 20-30 years), and the third-party owner is responsible for installing and maintaining the system. Predatory sales tactics may sometimes be practiced, specifically in the residential sector, where the PPA included a steep escalator rate and the solar contract rate rose faster than regular utility bill rates. The steep escalation results in the homeowner eventually paying more, not less, on a monthly basis for solar energy. Consumer protection mechanisms are thus necessary as a policy safeguard against these predatory sales tactics.

While we were unable to find specific research on the prevalence of such practices specifically in Maryland, we were able to find a study surveying third party owned residential solar systems in California[102] where contracts that included escalator clauses resulted in increased costs for the customer. Further study and consideration of excluding incentives for those third-party ownership models with steep escalation rates may be considered. This way, the beneficial and non-predatory third-party ownership options will remain with incentives in the market while those with unfair and predatory pricing mechanisms are prevented from enjoying state incentives.

Solar installations require large upfront costs, and the financing options generally require a minimum level of credit rating that bars many lower income households from participation. Therefore, third party ownership options may require new types of business models that are adapted to meet low-income household needs. IREC recommends using tools such as credit assistance to help low-income households qualify for loan and leasing options.[103] A study published by NREL identifies 13 financing options for low-income households depending on the type of housing and ownership status.[104] In this study, third-party financing is recommended as a "First Tier" option to install solar for single and multifamily low-income housing.

Furthermore, in Maryland, there are many incentives available for low-income residents to benefit from solar installation that are not directly tied to third party agreements. Community solar, for example, is widely accessible in the state and Senate Bill 613 passed this summer offers community solar subscriptions to every resident of Maryland.[105] This bill is due to the success of the community solar pilot program and will expand the existing pilot to a permanent, less restrictive, and more equitable program. Community solar in Maryland is also subject to consumer protection that requires project owners to submit information to the state to prove legitimacy.

[102] Carolyn Davidson, Daniel Steinberg, and Robert Margolis, "Exploring the Market for Third-Party-Owned Residential Photovoltaic Systems: Insights from Lease and Power-Purchase Agreement Contract Structures and Costs in California," Environmental Research Letters 10, no. 2 (2015): 024006, doi.org/10.1088/1748-9326/10/2/024006.

[103] "Shared Renewable Energy for Low- to Moderate-Income Consumers: Policy Guidelines and Model Provisions," Energy.gov, accessed November 20, 2023, https://www.energy.gov/sites/prod/files/2016/04/f30/IREC-LMI-Guidelines-Model-Provisions_FINAL.pdf.

[104] J. Cook., Bird L. "Unlocking Solar for Low- and Moderate-Income Residents: A Matrix of Financing Options by Resident, Provider, and Housing Type." NREL. January 2018, https://www.nrel.gov/docs/fy18osti/70477.pdf.

[105] Electricity - Community Solar Energy Generating Systems Program and Property Taxes, Bill (2023), https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/SB0613.

CONCLUSION AND NEXT STEPS

The main purpose of this analysis is to assess funding and policy programs in Maryland in comparison to other states. States for comparison include states in PJM as well as states similar to Maryland in generation potential, population, and total area. In terms of generation potential, population, and total area, the most comparable states are Massachusetts and New Jersey. The Most similar states also located fully in the PJM interconnection are Pennsylvania and Virginia. These states specifically should all be investigated further in the future.

However, many states do not have information as readily available as Maryland. Maryland is transparent with funding availability, offerings, opportunities for all customer segment participation. Another state with readily available and accessible data is Delaware, so it will remain a top state for comparison as well. Aside from comparable state research, a study suggests that performance-based incentives that pay customers based on their solar production may be more effective in low-income communities. Additional research into suggested incentives from literature should be explored in the next steps as well.

In terms of funding comparison, States with higher SREC prices positively correlates with higher solar capacity. Based on published academic research, a one dollar increase in SREC price leads to $1.15 million in solar investment in the following year. Maryland alternative compliance payment decreasing from $60 currently to $22.5 in 2030. This may result in a decrease in incentives for solar installation.

Additionally, with assumptions adjusted, payback periods increase but the gap between $1,000 and $5,000 in incentives remains. With AECOM inputs and O&M costs added, payback for $1,000 of funding is 14 years and $5,000 of funding is 12 years. When a 5 percent cost of capital is included, payback for $1,000 of funding is 23 years and $5,000 of funding is 19 years.

Next steps for analysis include further investigating statistically similar states and providing a deeper understanding of the potential costs and benefits of adding incentive programs. AECOM will analyze tax policy and the real property tax pilot to further inform the Solar Taskforce of options regarding financial incentives. Additionally, although consumer protection policies are in existence, the Solar Taskforce could consider setting limits to escalation rates. This way not all third-party ownership models are prevented from accessing incentives.

APPENDIX C

Equity, MBE Requirements, and Quality, Family-Sustaining Jobs Memorandum

INTRODUCTION

Maryland aims to be a top state in terms of diversity, equity, inclusion, workforce development, and providing quality jobs while achieving state goals in solar production. The state seeks to achieve this by prioritizing equity while establishing goals and incentives, developing strong Minority Business Enterprise (MBE) policies, and providing fair and competitive wages.

The solar industry continues to grow with an increased focus on higher incentives and lower cost equipment. Though the industry is growing, diversity has not been increasing within the field and therefore not all workers have benefitted from the industry growth.[106] In 2021, only 23 percent of solar installers tracked their supplier diversity and only 9 percent of companies utilized a supplier diversity program.[107]

Maryland is rated as a top state for Black workers in clean energy according to a report on diversity in the clean energy industry.[108] Though the clean energy industry includes more fields than just solar, this data is used as an approximation for the demographic of the solar workforce in Maryland. The current demographic of the clean energy workforce in Maryland compared to the total across the U.S. is shown in Table C.1.

[106] "Census Demographics and Diversity," Interstate Renewable Energy Council, accessed October 20, 2023, https://irecusa.org/census-demographics-and-diversity/#:~:text=In%20recent%20years%2C%20these%20data,underrepresented%20in%20the%20solar%20workforce.
[107] "EnergySage's Solar Installer Survey 2021 Results," EnergySage, May 2022, https://www.energysage.com/data/#2020-survey.
[108] "Help Wanted: Diversity in Clean Energy," E2, 2021, https://e2.org/wp-content/uploads/2021/09/E2-ASE-AABE-EEFA-BOSS-Diversity-Report-2021.pdf.

Table C.1: Clean Energy Workforce Demographics

Group	Maryland	Total U.S.
Male	74.3%	72.6%
Female	25.7%	27.4%
Hispanic or Latino	14.1%	16.5%
American Indian or Alaskan Native	1.2%	1.4%
Asian	7.5%	8.2%
Black or African American	11.6%	8.4%
Native Hawaiin or Other Pacific Islander	0.9%	1.0%
2+ Races	6.7%	7.9%
People of Color	27.9%	26.9%
Nonwhite Alone	37.6%	39.0%
White (alone)	62.4%	61.0%

This memorandum will address the following topics in detail:

- Equity considerations for solar incentives
- Current and best practice MBE requirements
- Workforce impacts of solar
- Analysis on the current status and potential for quality, family sustaining jobs
- Key conclusions and next steps

FINDINGS AND KEY TAKEAWAYS

To achieve an equitable, inclusive, and successful solar incentive program, this report identifies the following key findings for MEA to consider:

- While many solar incentive programs include direct equity considerations and benefits for low- and moderate-income (LMI) households and disadvantaged communities, high-income households remain about four times more likely to adopt solar PV than low-income households.
- Widespread implementation of LMI-targeted incentives, leasing, and property-assessment based financing alongside falling solar prices could bring solar adoption demographics closer to resembling the broader population.
- California's Supplier Diversity Program provides an example for prioritizing MBEs in the industry by requiring businesses that make $25,000,000 annually to comply with MBE requirements.
- Preliminary findings on the solar workforce in Maryland suggest that the workforce will steadily increase over the next 10 years to accommodate increased demand.
- Based on extrapolation from national data, Maryland clean energy workers make about $28 per hour, indicating the potential for living wage attainment for several (although not all) configurations of families.
- Increasing training programs, collaborating with the private sector, and investing funds in workforce development support both the workforce and employers in creating quality, family sustaining jobs.

Each of these is described in detail in the following sections.

EQUITY CONSIDERATIONS

States nationwide offer solar incentive programs to expand solar adoption across all demographic groups. Some programs provide more generous incentives for LMI households and communities than others. During previous research and analysis efforts, AECOM developed a list of states similar to Maryland in terms of demographics, population, solar generation potential, and total area. These states, alongside states with top 10 solar generation capacity, are listed below. Table C.2 includes 2021 solar adoption demographics using percent of area median income as the unit of comparison.[109]

Table C.2: Top Solar States and Adoption Demographics

State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Total Installed Solar (MW) [110] [111]	Solar Adopters <80%	Solar Adopters >80%, <120% AMI	Solar Adopters >120% AMI
Arizona	X	X		6,557	20%	21%	60%
California	X	X		41,675	21%	21%	59%
Florida	X			12,612	25%	23%	53%
Georgia	X			5,200	23%	21%	56%
Maryland			X	1,775	22%	21%	58%
Massachusetts	X	X		4,294	26%	25%	49%
Nevada	X	X		5,926	20%	20%	61%
New Jersey	X	X	X	4,588	24%	21%	55%
New York	X			4,717	22%	26%	51%
North Carolina	X	X		8,459	19%	22%	59%

[109] Solar Demographics Tool," Lawrence Berkeley National Laboratory, accessed October 20, 2023, https://emp.lbl.gov/solar-demographics-tool.
[110] Solar Energy Industries Association, "State-by-State Map," SEIA, accessed September 28, 2023, https://www.seia.org/states-map.
[111] Emily Glover, "The Best and Worst States for Solar Energy 2023," Forbes, May 11, 2023, https://www.forbes.com/home-improvement/solar/best-worst-states-solar/.

Table C.2: Top Solar States and Adoption Demographics (Continued)

State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Total Installed Solar (MW)	Solar Adopters <80%	Solar Adopters >80%, <120% AMI	Solar Adopters >120% AMI
Ohio			X	1,389	27%	25%	49%
Pennsylvania			X	1,195	40%	25%	34%
Rhode Island		X		721	26%	24%	50%
Texas	X			18,801	29%	21%	50%
Utah		X		2,931	17%	26%	57%
Vermont		X		425	18%	26%	57%
Virginia		X	X	4,393	17%	21%	62%

States with a relatively high proportion of low-moderate income solar adopters include Pennsylvania, Massachusetts, and Rhode Island.

Pennsylvania offers an incentive program that provides grants to solar manufacturers of up to $5,000 for every new job created, loans of up to $40,000 for every new job created, and a guarantee of up to 75 percent of loan deficiency in the event of default. The City of Philadelphia has a solar rebate program providing residents with $0.20 per Watt of residential solar generation.[112] [113] This program and its rebates function the same for all households, but 10 percent of the rebate funds are reserved for LMI households to ensure equitable access to funding. The Philadelphia-specific program is currently on pause due to COVID-19 related budget cuts but will resume if funding is restored.

[112] Pennsylvania Department of Community & Economic Development, "Solar Energy Program (SEP)," accessed October 20, 2023, https://dced.pa.gov/programs/solar-energy-program-sep/.
[113] City of Philadelphia, "Solar Rebate Program," accessed October 20, 2023, https://www.phila.gov/programs/solar-rebate-program/

Massachusetts offers several incentive programs including a tax credit for homeowners worth 15 percent of the cost of their installed solar system, a tax exemption from property taxes for homeowners worth 100 percent of the value of the solar system, and a solar loan program unique to Massachusetts, Mass Solar Loan, that reduces costs of ownership and provides loan support for LMI residents.[114] [115] This program provides support to LMI residents by reducing loan principal by up to 30 percent and interest rates by up to 1.5 percent. Through this program, the state also offers loan loss guarantees to lenders who finance solar systems for residents with poor credit. Mass Solar Loan has helped 17 lenders issue nearly 5,800 loans, of which about 54 percent were for LMI residents.[116]

Rhode Island offers small-scale solar grants, a higher-than-market rate credit for electricity generated from rooftop solar, and elevated tax credits for LMI households.[117] Rhode Island Energy's Renewable Energy Growth program provides homeowners 28.75¢ per kWh of energy produced from rooftop solar, 9.75¢ greater than market rate. Rhode Island's new program, Affordable Solar Access Pathways (ASAP), will utilize Inflation Reduction Act tax credits with Regional Greenhouse Gas Initiative (RGGI) funding to expand renewable energy opportunities for LMI residents.[118]

While many solar incentive programs include direct equity considerations and benefits for LMI households and disadvantaged communities, high-income households remain about four times more likely to adopt solar PV than low-income households, a discrepancy exacerbated by deployment patterns that tend to select relatively affluent areas for solar installation projects.[119] In 2021, less than a quarter of new solar systems were installed on rooftops of households making less than 80 percent of the area median income (AMI), while nearly 60 percent of adopters earned at least 120 percent AMI.[120]

[114] Massachusetts Department of Revenue, 830 CMR 62.6.1: Residential Energy Credit, https://www.mass.gov/regulations/830-CMR-6261-residential-energy-credit.
[115] Forbes, "Massachusetts Solar Incentives: Solar Panel Tax Credits, Rebates & Savings," accessed October 19, 2023, https://www.forbes.com/home-improvement/solar/massachusetts-solar-incentives/.
[116] Massachusetts Clean Energy Center, "Mass Solar Loan", accessed October 19, 2023, https://www.masscec.com/program/mass-solar-loan#toolkit.
[117] This Old House, "Rhode Island Solar Incentives & Rebates: Save Money with Solar Panels," accessed October 19, 2023, https://www.thisoldhouse.com/solar-alternative-energy/reviews/solar-incentives-rhode-island.
[118] Kuffner, Alex, "New Program Will Help Lower Income Homeowners Get Solar Panels. Here's How It Works," The Providence Journal, January 12, 2023, https://www.providencejournal.com/story/news/2023/01/12/new-ri-program-would-use-tax-incentives-to-help-homeowners-install-solar-panels/69795110007/.
[119] O'Shaughnessy, E., G. Barbose, R. Wiser, et al, "The Impact of Policies and Business Models on Income Equity in Rooftop Solar Adoption," Nature Energy 6 (2021): 84-91, https://doi.org/10.1038/s41560-020-00724-2.
[120] Solar Demographics Tool, Lawrence Berkeley National Laboratory, accessed October 19, 2023. https://emp.lbl.gov/solar-demographics-tool https://emp.lbl.gov/solar-demographics-tool.

Compared to the broader population, solar adopters tend to live in higher-value homes, have higher credit scores, be more highly educated, live in majority-white census block groups, be slightly older than the general population, and work in business and finance-related occupations. An effective means of reducing this inequity is through widespread implementation of solar incentive programs targeting LMI communities and households.[121] An effective means of reducing this inequity is through widespread implementation of solar incentive programs targeting LMI communities and households.[122] Tax credits and similar incentives have little effect on the uptake on solar installation in LMI households due to an already lower tax burden.[123] More than 40 percent of US households would not receive any benefit from the solar incentive tax credit due to their low tax burden.[124] As such, interventions like LMI-targeted incentives, leasing, and property-assessment based financing are more effective in increasing adoption equity in existing markets as well as increasing solar PV deployment in new under-served communities; nationwide, solar adopters in low-income communities use all three of these interventions, when available, more frequently than adopters in other areas.[125] As such, interventions like LMI-targeted incentives, leasing, and property-assessment based financing are more effective in increasing adoption equity in existing markets as well as increasing solar PV deployment in new under-served communities; nationwide, solar adopters in low-income communities use all three of these interventions, when available, more frequently than adopters in other areas. Widespread implementation of these solar incentive programs alongside falling solar prices could bring solar adoption demographics closer to resembling the broader population.

[121] Forrester, S., et. Al, "Residential Solar-Adopter Income and Demographic Trends: November 2022 Update", November 2022, https://eta-publications.lbl.gov/sites/default/files/solar-adopter_income_trends_nov_2022.pdf.

[122] Ibid.

[123] Wang, Z., et. Al, "DeepSolar++: Understanding residential solar adoption trajectories with computer vision and technology diffusion models," Joule 6, 11 (2022). DOI: https://doi.org/10.1016/j.joule.2022.09.011.

[124] Tax Policy Center, "Tax Units with Zero or Negative Income Tax Liability - August 2021," Tax Policy Center, accessed October 19, 2023, https://www.taxpolicycenter.org/model-estimates/tax-units-zero-or-negative-income-tax-liability-august-2021/t21-0161-tax-units.

[125] O'Shaughnessy, E., G. Barbose, R. Wiser, et al, "The Impact of Policies and Business Models on Income Equity in Rooftop Solar Adoption," Nature Energy 6 (2021): 84-91, https://doi.org/10.1038/s41560-020-00724-2.

States have implemented solar incentive programs to varying degrees. Most programs include specific equity considerations which target and provide specific benefits for LMI communities, renters, those living in multifamily homes, and other disadvantaged communities. The Massachusetts Solar Renewable Target Program incentivizes the installation of solar panels by paying owners an incentive for each kWh of electricity produced. A small bonus incentive is paid for low-income property owners.[126] Massachusetts also offers direct incentives through its Mass Solar Loan support program described above. Certain states also include equity considerations in their solar workforce development programs. These include targeted training programs offering multilingual classes in LMI communities, requiring local hiring practices, and partnerships with local communities.

California and New York have examples of such programs. The California Solar On Multifamily Affordable Housing program offers free and paid training courses, access to employment resources, and connections to well-paying job opportunities. The program also offers technical assistance services for property owners, tenants, and contractors to ensure they receive accurate, useful, and helpful information; develop a robust understanding of other energy programs and options that can be pursued as a coordinated approach with their solar project; and receive assistance leveraging those programs.[127] The New York Solar Program offers a similar technical assistance program which provides funding to address resource gaps and solve market barriers preventing the development of solar and energy storage installations benefiting LMI households. This program also supports projects to expand solar and storage installation at affordable housing through increased incentives and cost offsets for LMI households or community solar installations which will benefit households unable to afford residential systems.[128] This program also supports projects to expand solar and storage installation at affordable housing through increased incentives and cost offsets for LMI households or community solar installations which will benefit households unable to afford residential systems.[129]

[126] "Masmartsolar," accessed October 19, 2023, https://masmartsolar.com/.

[127] CALSOMAH, accessed October 20, 2023, https://calsomah.org/about.

[128] NYSERDA, "Residential Solar Incentives and Financing", accessed October 20, 2023, https://www.nyserda.ny.gov/All-Programs/NY-Sun/Solar-for-Your-Home/Paying-for-Solar/Incentives-and-Financing.

[129] Ibid.

MINORITY BUSINESS ENTERPRISES (MBE) REQUIREMENTS

MBEs are defined as businesses that are at least 51 percent owned by a United States citizen who is Asian-Indian, Asian-Pacific, Black, Hispanic, Native American, a woman, or a disabled person.[130] These businesses can receive State certification from the Office of Minority Business Enterprise. MBEs are defined as businesses that are at least 51 percent owned by a United States citizen who is Asian-Indian, Asian-Pacific, Black, Hispanic, Native American, a woman, or a disabled person.[131] These businesses can receive state certification from the Office of Minority Business Enterprise. This section will discuss the current state of MBEs in Maryland and in the energy industry, the benefits of increasing diversity and MBE involvement, and best practices from other states that can be applied to Maryland's future MBE growth.

EXISTING MBE REQUIRMENTS IN MARYLAND

Many states have procurement goals for state agencies in terms of MBE, but Maryland is one of four states with legally mandated MBE requirements on state level projects, as shown in Table C.3.

Table C.3: State MBE Mandates for State Agencies

State	MDE Mandate	MBE Program Applications	Year Established
Maryland[132]	29%	State agencies allocate 29% of total procurement funding to MBE firms.	1978
Ohio[133]	15%	State agencies allocate 15% of their annual purchases for goods and services from MBEs.	1980
Rhode Island[134]	10%	Minimum 10% Aggregate Utilization Rate in the state purchase of goods and services and public works projects.	1983
Massachusetts[135]	10%	State agencies allocate 10% of construction contracts each FY to MBEs and 5% of contract value to supplies and equipment to MBEs.	1984

BENEFITS OF MBE REQUIREMENTS

As described in this section, the expansion of MBE policy levers can lead to significant benefits. At present, the only entities required to utilize MBEs in Maryland for any project are state agencies. However, increasing this requirement to include Certificates of Public Convenience and Necessity (CPCN) for generating stations and high-voltage transmission lines would generate additional growth and development of MBE businesses. The Maryland Public Service Commission has the authority to issue a CPCN, which provides authority for a person to construct or modify these facilities. Including an MBE requirement for the CPCN would promote MBE business opportunities and drive local economic development should the MBE be certified in Maryland. Hiring MBE firms would also increase inclusion and equity in the industry. The inclusion of an MBE requirement in the CPCN would help the state and private generators achieve goals in diversity, equity, and inclusion while simultaneously stimulating local economic growth and business development.

So far in 2023, eight projects in Maryland have required CPCN issuance. These projects include a total of 67 MW of solar facilities, two transmission lines, and a circuit reconfiguration.[136] Assuming that the solar projects alone cost approximately $67 million, including an MBE mandate of 29 percent would lead to over $19 million in business opportunity for MBEs to support local economic growth and increased diversity in the industry.[137] [138]

[130] "Minority Business Enterprise Overview," Maryland Department of Transportation Motor Vehicle Administration, accessed October 20, 2023, https://mva.maryland.gov/about-mva/Pages/mbe.aspx#:~:text=Who%20is%20considered%20a%20Minority,Woman%20or%20a%20Disabled%20person.

[131] Ibid.

[132] "Minority Business Enterprise (MBE) Program," Procurement & Business Services, accessed October 17, 2023, https://purchase.umd.edu/vendors/business-diversity/minority-business-enterprise-mbe-program.

[133] "State of Ohio Spends Record Amount with MBEs," OhioMBE, August 20, 2015. https://ohiombe.com/archives/4940.

[134] 220-RICR-80-10-2, https://dedi.ri.gov/divisions-units/minority-business-enterprise-compliance-office/minority-business-enterprise-mbe-0.

[135] Massachusetts Executive Order No. 237, Promoting participation by minority businesses in the economy of the Commonwealth. Michael S. Dukakis, March 19, 1984, https://www.mass.gov/executive-orders/no-237-promoting-participation-by-minority-businesses-in-the-economy-of-the-commonwealth.

[136] "Energy Generation and Transmission Siting (CPCN) Cases," Maryland Public Service Commission, accessed October 18, 2023, https://www.psc.state.md.us/make-a-public-comment/cpcn-cases/.

[137] Mirroring the MBE mandate for state agencies.

[138] Estimation based on approximately $1/Watt for utility scale solar, from: https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost.html.

BEST PRACTICES FOR MBE REQUIREMENTS

At present, Illinois is the only state that mandates suppliers of wind and solar energy to report on diversity in the supply chain.[139] The California Public Utilities Commission (CPUC) requires large wholesale generators, including solar contractors, to adopt a plan for increasing MBE procurement, and encourage smaller generators to participate even though they are not required to report MBE involvement to the CPUC.[140] This is similar to the agreement reached at the Maryland Public Services Commission's Public Conference 52 on Supplier Diversity. During the Conference participating companies agreed to set a goal to award 25 percent of funding to diverse suppliers.[141] Though these programs involve reporting, there are no active MBE threshold requirements for Maryland utility companies.

If statewide or incentive-based MBE requirements are implemented, there are several methods to safeguard small projects from being negatively impacted by these policies. California's Supplier Diversity Program, mentioned above, is only required for utilities and covered entities with a gross annual California revenue exceeding $25 million. Though it is still recommended that smaller utilities record and adopt a plan for increasing MBE involvement, the program does not require it. This protects small businesses that could not feasibly increase MBE participation. This program is similar to Maryland's existing CPCN exemption policy in which the amount of electricity generated, and its end use determines whether a project must adhere to the CPCN requirement. In this way, both the California Supplier Diversity Program and Maryland CPCN requirements are implemented based on size and therefore protect smaller companies. The City of Chicago has special conditions in its MBE mandate that can be enacted for small order bids.[142] This allows the City's Chief Procurement Officer to determine cases of impracticability in which a lesser MBE percentage goal can apply to a project.

[139] "2020 Supplier Diversity: Annual Report," Chicago: Illinois Commerce Commission, February 5, 2021, https://www.ilga.gov/reports/ReportsSubmitted/2557RSGAEmail4581RSGAAttach2020%20Supplier%20Diversity%20Annual%20Report.pdf.
[140] "Supplier Diversity Program," California Public Utilities Commission, accessed October 17, 2023, https://www.cpuc.ca.gov/supplierdiversity/.
[141] "Supplier Diversity," Maryland Public Service Commission, accessed October 20, 2023. https://www.psc.state.md.us/supplier-diversity/#:~:text=The%20Public%20Service%20Commission's%20Public,and%20subcontracts%20with%20public%20utilities.
[142] City of Chicago Department of Procurement Services, Special Conditions for Small Orders MBE & WBE. March 2015, https://www.chicago.gov/content/dam/city/depts/dps/ContractAdministration/StandardFormsAgreements/SmallOrderSpecialConditionsCountyMentorProtege.pdf.

WORKFORCE IMPACTS IN MARYLAND

According to the Interstate Renewable Energy Council (IREC), Maryland had 4,921 solar jobs in 2022 with 49 of those being added during the year, for 1 percent industry growth (Figure B.1),[143] while recent growth nationally has been somewhat higher.[144] Maryland is ranked 15th in total number of solar jobs and solar jobs per capita with a projected growth of 7.2 percent in 2023.

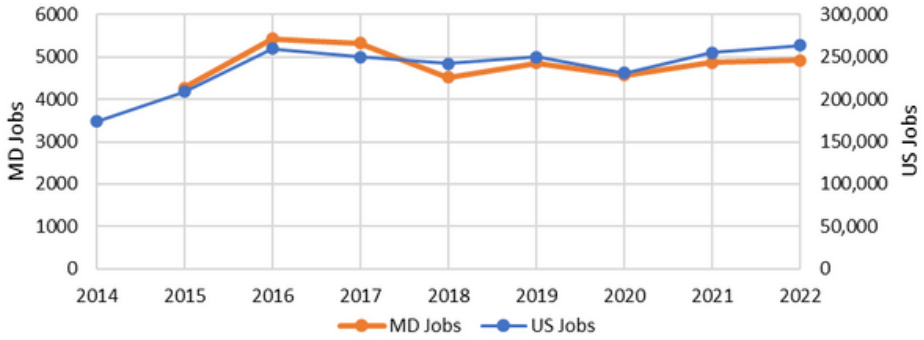

Figure C.1: Solar Jobs in Maryland and Nationally, 2015-2022
Sources: https://irecusa.org/maryland-solar-and-clean-energy-jobs/ and https://irecusa.org/programs/solar-jobs-census/

This job data follows the trend of solar installations, as Maryland installed more solar in 2017 than in the following five years, as shown in Figure C.2.

Figure C.2 also shows Maryland's added solar capacity tracks to the nation-wide industry (as represented by equipment shipments, a useful proxy for deployments)[145] through the expansion through 2016 and contractions of 2017 and 2018.

[143] "Maryland: Solar and Clean Energy Jobs," IREC, accessed October 13, 2023, irecusa.org/maryland-solar-and-clean-energy-jobs/.
[144] "Solar Jobs Census," 2023, Interstate Renewable Energy Council (IREC) (blog), July 2023, irecusa.org/programs/solar-jobs-census/.
[145] "Record Numbers of Solar Panels Were Shipped in the United States during 2021," U.S. Energy Information Administration, September 1, 2022, https://www.eia.gov/todayinenergy/detail.php?id=53679.

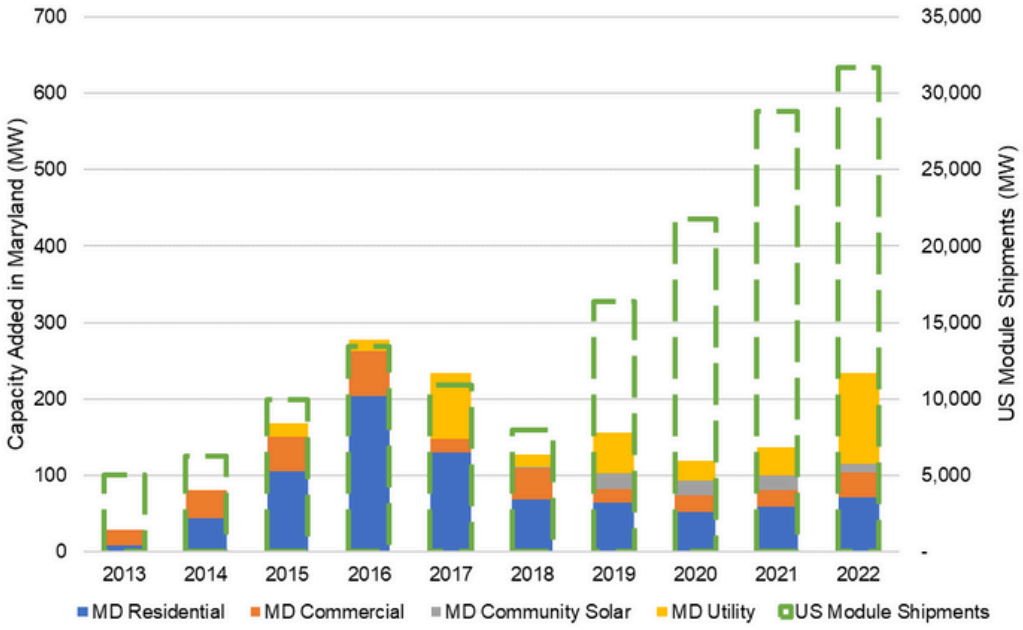

Figure C.2: Maryland Annual Solar Installations Relative to US Module Shipments

Sources: https://www.seia.org/state-solar-policy/maryland-solar and Jamison, Lolita. 2022. "2022 Annual Solar Photovoltaic Module Shipments Report." EIA.

Unlike the national market, however, the state market has not yet recovered to its pre-2016 trajectory (shown in installed and shipped capacity, in Figure C.2). In the past decade, the national solar installation market suffered three discrete event-driven contractions. The drop from 2016 to 2017 was likely caused by developers fast tracking completions in 2016 in advance of the expected sunset of a Federal Income Tax Credit (FITC).[146] Although the FITC was eventually extended, this expectation inflated 2016 numbers and depressed 2017 numbers. The drop from 2017 to 2018 (although continuing the trajectory of the 2017 drop) likely resulted from the Trump Administration's tariff on PV imports.[147] The contraction in the jobs and installation data in 2020 reflects the economy-wide contractions seen due to the COVID-19 pandemic. These contractions reflected similarly in Maryland as they did nationally.

[146] "How Extending the Investment Tax Credit Would Affect U.S. Solar Build," 2015, BloombergNEF (blog), September 15, 2015, https://about.bnef.com/blog/extending-investment-tax-credit-affect-u-s-solar-build/.

[147] Flaaen, Aaron, and Justin Pierce. 2019. "Disentangling the Effects of the 2018-2019 Tariffs on a Globally Connected U.S. Manufacturing Sector," Finance and Economics Discussion Series 2019 (086), https://doi.org/10.17016/FEDS.2019.086.

It's worth noting that nationally, jobs per MW installed have trended lower. While Maryland's recent numbers do not reflect this, their decrease in the last three years may indicate regression towards national averages. This downward movement may reflect the shift towards utility-scale deployments, away from residential, which requires less labor per unit capacity, and/or increasing productivity.[148] This trend also correlates to similarly decreasing costs for installation overall[149] which includes labor costs (Figure C.3).

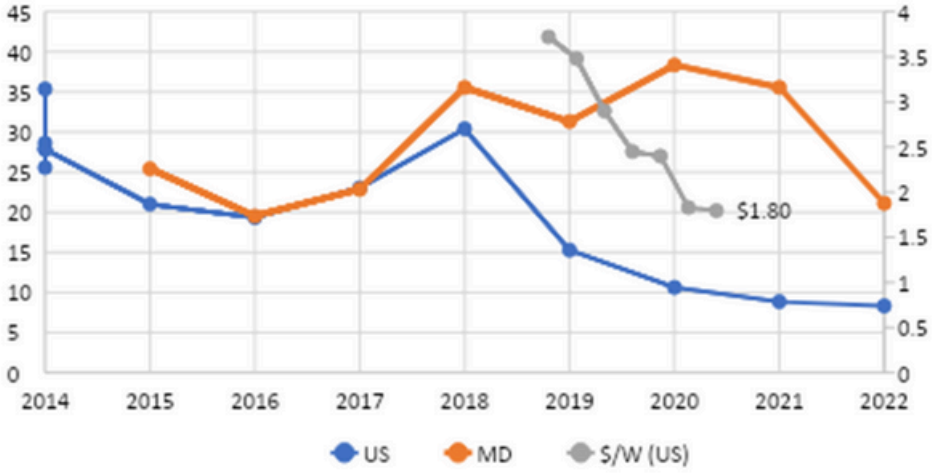

Figure C.3: Jobs Per MW Installed, in Maryland and Nationally, and US Average Normalized Solar Cost

Sources: collated from EIA cost data, IREC jobs data, and EIA capacity data.

According to IREC, 74 percent of the solar workforce in Maryland is made up of installation and project development jobs, as represented in Table C.4.

Table C.4: Maryland Solar Workforce by Sector

Job	Number of Jobs	Percentage of Workforce
Installation & Project Development	3,641	74.0%
Manufacturing	252	5.1%
Wholesale Trade & Distribution	461	9.4%
Operations & Maintenance	309	6.3%
All Others	258	5.2%

EARN Maryland

State programs targeted at workforce development are helpful in continuing to grow the solar workforce and ensure businesses have a skilled workforce and Maryland residents can gain employment in the industry. EARN Maryland is a state-funded, industry-led competitive workforce development grant program.[150] EARN Maryland intends to bridge the skills gap between eligible employees and businesses to drive growth. The program focuses on the needs of specific industries, creates formal pathways to jobs and careers, and provides job readiness training for hard-to-serve jobseekers. Therefore, EARN Maryland addresses both business demands as well as worker needs to create successful workforce development. EARN Maryland has a regional focus and invests in strategic industry partners and economic sectors that are tailored to each region. The partnerships coordinate education, workforce, and economic development to meaningfully train and educate workers for employment. Programs like this benefit the workforce and businesses in specific industries and have the opportunity to heavily impact the solar workforce across the state.

Maryland and Peer State Comparison

To compare the solar workforce growth between Maryland and peer states, AECOM relied on solar job prediction data from NREL and solar MW prediction data from SEIA. AECOM compared Maryland's projected job growth to the estimated number of MW to be installed over the next five years and then related to the peer states identified in the first memo.[151] NREL estimated state-level employment projections in the solar industry for each state between 2020, 2025, and 2030 over a baseline and high modeling scenario. The baseline scenario assumes a mid-case cost reduction of each technology while the high case assumes that the cost to install solar drops quicker than battery energy storage and land-based wind as these are competitors in the renewable energy space. The predicted job counts assume that each state will hold the same proportion of national jobs as it did in 2020. Therefore, the calculations are based on existing incentives and policies and future changes to policies may change the number of jobs a state generates. Comparing these values across each state helps to hypothesize which of the following factors are increasing job growth: MW demand, incentives, policies, or wages. The data for all comparable states is shown in Table C.5.

[148] Karin Kirk, "How Much Do Energy Industry Jobs Pay? A Look at the Data," Yale Climate Connections, September 12, 2021, http://yaleclimateconnections.org/2021/09/how-much-do-energy-industry-jobs-pay-a-look-at-the-data/.

[149] "Average U.S. Construction Costs for Solar Generation Continued to Fall in 2019," U.S. Energy Information Administration, July 16, 2021, https://www.eia.gov/todayinenergy/detail.php?id=48736.

[150] "EARN Maryland - Maryland's New Workforce Training Initiative," Maryland Department of Labor, accessed November 27, 2023, https://www.dllr.state.md.us/earn/earnwhatisearn.shtml.

[151] Arizona, California, Delaware, Florida, Georgia, Maryland, Massachusetts, Nevada, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Texas, Utah, Vermont, Virginia, and West Virginia.

Table C.5: Projected Job Growth in Comparable States

				Baseline Scenario		High Scenario	
State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Job Creation per Year [152]	New Jobs per MW projected [153]	Job Creation per Year	New Jobs per MW Projected
Arizona	X	X		613.6	0.26	1323.4	0.68
California	X	X		7667.8	1.53	16538.3	3.99
Delaware			X	38.3	0.22	82.6	0.58
Florida	X			764.8	0.26	1649.5	0.69
Georgia	X			469.7	0.56	1013.2	1.46
Maryland			X	414.1	1.11	893.3	2.89
Massachusetts	X	X		1024.3	2.55	2209.3	6.65
Nevada	X	X		591.8	0.44	1276.4	1.15
New Jersey	X	X	X	536.5	0.95	1157.2	2.47
New York	X			835.6	0.40	1802.2	1.04
North Carolina	X	X		547.4	1.31	1180.7	3.43
Ohio			X	518.9	0.28	1119.2	0.73
Pennsylvania			X	350.0	0.58	754.8	1.52
Rhode Island		X		94.4	0.55	203.6	1.43

Table C.5: Projected Job Growth in Comparable States (Continued)

				Baseline Scenario		High Scenario	
State	Top 10 Overall Solar Capacity	Top 10 Solar Capacity Normalized by Solar Potential, Population, and Land Area	PJM RTO States	Job Creation per Year	New Jobs per MW projected	Job Creation per Year	New Jobs per MW Projected
Texas	X			799.4	0.08	1724.3	0.22
Utah		X		477.2	0.66	1029.3	1.73
Vermont		X		115.4	2.84	248.9	7.42
Virginia		X	X	301.5	0.19	650.3	0.49
West Virginia			X	29.2	0.19	63.0	0.51

As shown in Table C.5, the states with the greatest number of jobs created per MW projected are California, Massachusetts, and Vermont, with Vermont creating the most at about 2.84 jobs per MW in the baseline scenario. At the moment, there is little publicly available information on the level of incentives awarded for solar in each state and it is challenging to tie policy to direct employment increases. Additional time is needed to go through the workforce data for each state to align with the existing number of solar programs, solar policies and requirements, and wages. Additionally, more information on the wage breakdown between each customer segment and industry sector is needed to produce a deeper dive into the impact of wage on the number of jobs in the solar industry. AECOM can complete a preliminary analysis based on the average wage for solar technicians across each state compared to the number of solar technician jobs, but additional time is necessary to provide the conclusions of this analysis. To better align this data and future predictions with Maryland's existing data and reporting, AECOM would like to better understand the methodology for calculating future MW of solar as part of the electricity sector in the Maryland Climate Pathways Report.

[152] Based on data from 2020-2030.

[153] Number of new jobs over a five-year period divided by the projected MW installed.

QUALITY, FAMILY-SUSTAINING JOBS

It's reported that deployment of renewable energy resources drives economic growth and job creation.[154] [155] [156] Although positive projections may deserve some tempering due to the intrinsic difficulty of representing (negative) induced economic effects with standard modeling methodologies, the extent of that growth is worth consideration, and specifically the potential to create quality, family-sustaining jobs.[157]

The multiple factors that comprise "quality jobs" exist on continuums, complicating judgment of the objective quality of a given position or category. But there is reasonable consensus on the factors involved, which are both quantitative (such as wages) and more subjective (such as worker voice and organizational culture). The U.S. Departments of Commerce and Labor outline principles that include equal opportunity, fair pay and benefits, opportunities for advancement, worker empowerment and participation in organizational culture, and job security and safety.[158] The Aspen Institute constructed a working definition that collects multiple factors into the three categories—Economic Stability, Economic Mobility, and Equity, Respect, and Voice—thereby emphasizing factors beyond financial compensation.[159] The Good Jobs Institute holds the position that a quality job must meet "basic needs" (defined as sufficient pay and benefits, reasonable schedules, career path potential, job security and on-the-job safety) but also provide empowerment and development aspects.[160] These and other groups (including The Urban Institute) have developed sets of metrics against which to evaluate the quality of employment for given sectors and categories of workers, and databases of surveys through which to investigate these metrics (such as Gallup).[161] [162]

[154] Rajat Shrestha, Jillian Neuberger, and Devashree Saha, "Federal Policy Building Blocks to Support a Just and Prosperous New Climate Economy in the United States" (World Resources Institute, September 12, 2022), https://doi.org/10.46830/wrirpt.21.00107.
[155] Jaden Kim and Adil Mohommad, "Jobs Impact of Green Energy," IMF Working Papers, 2022, (101). https://doi.org/10.5089/9798400210631.001.A001.
[156] Manish Ram, Juan Carlos Osorio-Aravena, Arman Aghahosseini, Dmitrii Bogdanov, and Christian Breyer, "Job Creation during a Climate Compliant Global Energy Transition across the Power, Heat, Transport, and Desalination Sectors by 2050," Energy 238 (January): 121690, https://doi.org/10.1016/j.energy.2021.121690.
[157] S. Stavropoulos and M. J. Burger. 2020. "Modelling Strategy and Net Employment Effects of Renewable Energy and Energy Efficiency: A Meta-Regression." Energy Policy 136 (January): 111047, https://doi.org/10.1016/j.enpol.2019.111047.
[158] "The Good Jobs Initiative," DOL, accessed October 20, 2023, http://www.dol.gov/general/good-jobs/principles.
[159] "Statement on Good Jobs," The Aspen Institute, 2023, https://www.aspeninstitute.org/programs/good-jobs-champions-group/.
[160] "What Is the Good Jobs Strategy?" Good Jobs Institute (blog), 2017, https://goodjobsinstitute.org/what-is-the-good-jobs-strategy/.
[161] Batia Katz, William J Congdon, and Jessica Shakesprere, "Measuring Job Quality: Current Measures, Gaps, and New Approaches," The Urban Institute, 2022, www.urban.org/sites/default/files/2022-04/MeasuringJobQuality.pdf.
[162] Jonathan Rothwel and Steven Crabtree, 2019, "New Evidence on the Quality of Work in the United States," Gallup.

Living wages are one quantitative factor supporting the quality of employment opportunities. In Maryland the living wage threshold is between $15 per hour and $67 per hour (based on households of two working adults with no children, and one adult with three children, respectively).[163] These wages represent between approximately three and five times the poverty threshold (which is defined at the national level). Across the set of comparable states, the living wage for two working adults with no children ranges from $13 per hour (Pennsylvania) to $16 per hour (Massachusetts), and for one adult with three children ranges from $58 per hour (Pennsylvania) to $82 per hour (Massachusetts). A breakdown of living wage ranges relative to family size across comparable states is given in Table C.6.

Table C.6: Comparison of Living Wages According to Family Size, Between Maryland and Comparable States

Adults	1				2 (1 Working)				2 (Both Working)			
Children	**0**	**1**	**2**	**3**	**0**	**1**	**2**	**3**	**0**	**1**	**2**	**3**
Maryland	$19.61	$39.23	$50.60	$66.76	$30.06	$36.55	$41.44	$46.33	$15.02	$21.57	$27.32	$33.23
Massachusetts	$21.35	$45.57	$61.58	$82.41	$31.75	$38.84	$43.60	$48.99	$15.87	$24.72	$32.46	$41.09
New Jersey	$18.71	$39.65	$53.03	$71.17	$28.92	$35.34	$40.09	$45.13	$14.46	$21.81	$28.44	$35.56
Pennsylvania	$16.41	$34.45	$44.42	$58.10	$26.40	$32.83	$37.62	$41.63	$13.20	$19.23	$24.44	$29.25
Virginia	$19.04	$38.12	$49.23	$64.98	$28.74	$35.62	$40.59	$45.32	$14.31	$20.94	$26.63	$32.28
Poverty Threshold	$6.53	$8.80	$11.07	$13.34	$8.80	$11.07	$13.34	$15.61	$4.40	$5.54	$6.67	$7.81

Source: livingwage.mit.edu

Across Maryland, the living wage for one adult with no children varies from almost $15 per hour (Allegany County) to just over $22 per hour (Calvert, Charles, Frederick, Montgomery, and Prince George's Counties) (Figure C.4).

[163] "Living Wage Calculator," Massachusetts Institute of Technology, 2023, livingwage.mit.edu/.

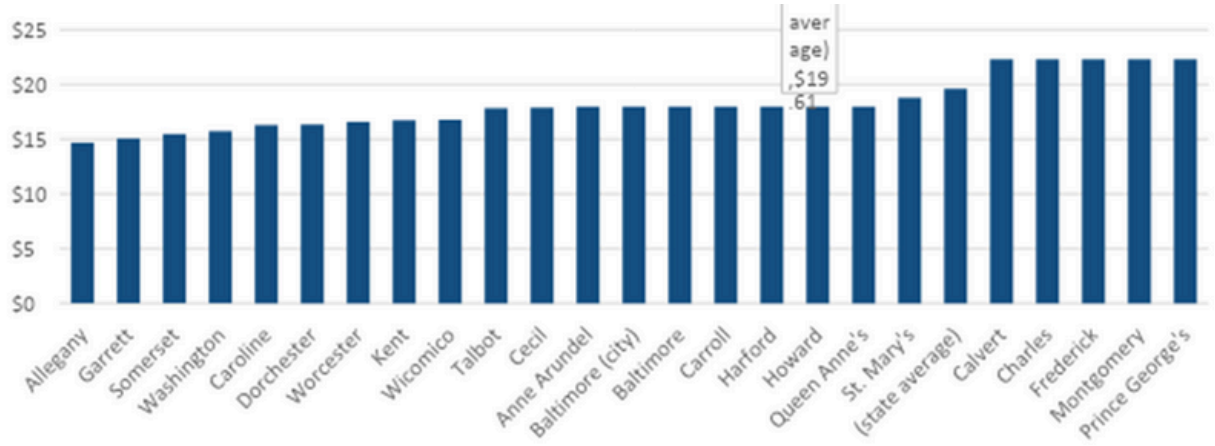

Figure C.4: Differences in living wages (for 1 adult with no children) across counties in Maryland

Source: Living Wage Calculator, MIT, 2023

Nationally, energy sector workers enjoy a higher median hourly wage than those in the overall economy, at approximately $260 per hour versus just over $19 per hour (2021 data).[164] Given that Maryland workers average 8 percent higher income than the national average, the extrapolated Maryland energy sector median wage of nearly $28 per hour indicates the potential for living wages for several (although not all) configurations of families. Supporting this, MEA has found that "clean energy positions earn higher wages compared to statewide averages, particularly in the entry-level positions, where clean energy electricians, plumbers, iron and steel workers, and HVAC mechanics earn upwards of 60 percent more than the average entry-level worker in the same trade."[165]

Comparing the ratio of in-sector wages to living wages across populations provides an indication of how well the sector is compensated, relatively. The ratio of wages in this sector to the average living wage (not normalized by demographics) of approximately $36 in Maryland is 0.74. That ratio is 0.73 in Virginia, and 0.82 in Pennsylvania, indicating that, roughly, work in this sector pays more highly in Pennsylvania. New Jersey is higher still at 0.89, while Massachusetts is similar to Maryland (0.79). This analysis neglects non-wage compensation and other quality jobs criteria and could be made more comprehensive as useful. But if taken at face value, it suggests that, if competing on compensation was deemed strategic, policies that boost it could help to differentiate Maryland within its peer group and close the gap with the highest-paying states.

[164] "United States Energy & Employment Report 2021 Executive Summary," US DOE, July 2021, www.energy.gov/sites/default/files/2021-07/USEER%202021%20Executive%20Summary.pdf.

[165] "Maryland 2021 Clean Energy Industry Report," MEA, June 2022, www.naseo.org/data/sites/1/documents/publications/2021%20MDCEIR%20FINAL[50][57].pdf.

According to the 2022 NREL report on Employment Projections for Clean Energy Technologies,[166] Maryland is strongly positioned to gain jobs in the sector through 2030, with 8,889 projected jobs, or 0.00143 per capita. This projection exceeds that of comparable states (Virginia, Pennsylvania, and New Jersey at 0.00104, 0.00081, and 0.00104 respectively), with Massachusetts slated for a larger increase (0.00296 sector jobs per capita). It should be noted this projection does not include offshore wind, where Maryland expects over 2,000 MW to come online after 2025, and represents a substantial investment.[167]

CHALLENGES

Nationally, employers in clean energy sectors note difficulties in finding and hiring qualified workers. For instance, in electric power generation and transmission, distribution, and storage technology areas, only 13.5 percent and 16.8 percent of employers reported having no difficulty in hiring.[168] Competition, small applicant pools, and lack of experience or technical skills were predominantly cited as the reasons for difficulties. This indicates there is latent demand for workforce, which may be addressable through training and educational programs, delivered through multiple channels, and potentially accelerated through incentivization.

The solar sector mirrors the broader clean energy sector, and the general economy, in under-representation of minorities in the workforce (Figure C.5). That said, the solar workforce outpaces the broader economy in percentage makeup of several demographics and is trending towards greater diversity.[169] [170]

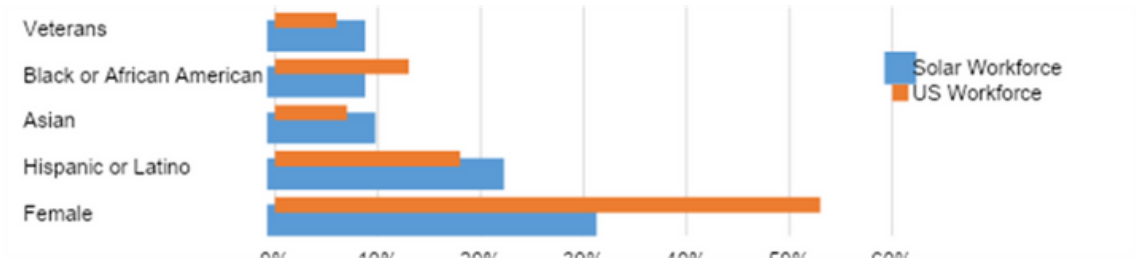

Figure C.5: Solar Demographics Compared to Overall US Workforce
Source: irecusa.org/census-demographics-and-diversity/

[166] Sarah Truitt, James Elsworth, Juliana Williams, David Keyser, Allison Moe, Julia Sullivan, and Kevin Wu, 2022, "State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030," NREL/TP-5500-81486, 1862660, MainId:82259. doi.org/10.2172/1862660.
[167] "Offshore Wind Energy in Maryland," Maryland Energy Administration, accessed October 18, 2023, energy.maryland.gov/Pages/default.aspx.
[168] "United States Energy and Employment Report 2023," US DOE, June 2023, www.energy.gov/media/299601.
[169] "Census Demographics and Diversity," Interstate Renewable Energy Council (IREC) (blog), accessed October 24, 2023, irecusa.org/census-demographics-and-diversity/.
[170] Maryland-specific workforce demographics data are not available at this time, so observations are based on national data.

OPPORTUNITIES

Within the challenges of workforce development lies an opportunity for the rapid deployment of its solutions. The Maryland Clean Energy Center's annual Advanced Energy Market survey identifies addressing workforce availability and capability as a priority.[171] Training programs can be stood up rapidly through existing channels and expanded by replicating successful precedents. For example, Prince George's County Community College runs an ongoing Sustainable Energy and Workforce Development program, which builds skills in EV specialization, Home Improvement Contracting and Weatherization, PV Systems, and Building Energy Analysis and Auditing.[172] Vocational training has been successfully attached to community solar projects and can be efficiently coordinated across neighboring states through collaboration with private partners.[173]

Although not solar specific, a good example of workforce development is the long-term, strategic investment in development of the offshore wind sector currently underway in Maryland, anchored by the Maryland Works for Wind (MWW), a consortium of employers, unions, workforce development organizations, business alliances, training providers, and state agencies including the MEA. MWW is currently operating with an award of nearly $23 million from the US Department of Commerce, funds which are specifically focused on the development of quality jobs and careers.

Maryland's offshore sector strategy parallels efforts in other states on the eastern seaboard, including Virginia, where the largest single offshore wind farm is currently in development, and permanent training programs have been established.[174] In Pennsylvania, exploration is underway for offshore production on the Great Lakes, and participating in the sector, in part, through ship building at the Philadelphia Shipyard.

[171] "Advanced Energy Market Assessment Summary Report," Maryland Clean Energy Center, 2022, www.mdcleanenergy.org/resources/mcec-reports/.
[172] "Sustainable Energy and Workforce Development Program," Prince George's Community College, accessed October 18, 2023, www.pgcc.edu/sewdp/.
[173] "Solar Workforce Development Is Having Its Moment in the Sun!" Maryland Clean Energy Center, accessed October 18, 2023, www.mdcleanenergy.org/solar-workforce-development-is-having-its-moment-in-the-sun/.
[174] Randy Walker, "Why Are People Going to Martinsville for Wind Turbine Training?" Cardinal News, July 7, 2022, http://cardinalnews.org/2022/07/07/wind-tech-training-gets-off-the-ground-in-martinsville/.

There are many platforms addressing equity and inclusion challenges in the solar sector at the national scale, which apply directly to Maryland and peer states. Maryland's state-level incentive for residential rooftop installation is contingent on North American Board of Certified Energy Practitioners® ("NABCEP") accreditation of the installer. In turn, the NABCEP (the nation's sole accreditation provider for the solar sector workforce) has a brace of initiatives intended to broaden access to training and certification,[175] as does the primary industry trade group, SEIA.[176] SEIA has found that, contrary to conventional beliefs, smaller sized companies (which covers much of the solar sector, particularly in installation contractors) are capable and willing to take on equity and inclusion initiatives. According to SEIA reports, "More than 75 percent of the companies participating in the program have fewer than 200 workers and 40 percent have fewer than 50 workers."[177] Maryland itself is seeing success in providing training for under-represented demographics with programs such as the aforementioned tie-ins with community solar projects. The industry as a whole generally views increasing participation from under-represented demographics as a strategic response to the need to expand workforce and capacity, and to mature as an economically sustainable sector.

CASE STUDIES

JOB GROWTH IN RE-PURPOSING STRANDED FOSSIL FUEL INFRASTRUCTURE

A key concern in the shift to clean energy is the repurposing of existing fossil fuel infrastructure. One way this is being addressed in Maryland is through reclaiming abandoned coal mining lands. The company Competitive Power Ventures (CPV), headquartered in Silver Spring, which develops and manages electric power generation assets, has been granted a CPCN for steps taken to establish a 200 MW solar farm on a former coal mining site in Garrett County (the furthest-west county in the state).[178] Over 150 jobs are projected to be created during the farm's 18-month construction (or 1.125 FTE-years/MW), and it will generate up to $2.7 million in local tax revenues annually

[175] NABCEP, "The Solar Industry Needs More Diversity, and NABCEP Has a Plan," Solar Power World, November 5, 2019, www.solarpowerworldonline.com/2019/11/the-solar-industry-needs-more-diversity-and-nabcep-has-a-plan/.
[176] "DEIJ Certification Program Annual Report 2022," 2023, SEIA.
[177] "Solar Industry Seeing Results from Diversity Program," PV Magazine USA, February 23, 2023, pv-magazine-usa.com/2023/02/23/solar-industry-seeing-results-from-diversity-program/.
[178] "CPV Awarded State Approval for 200 MWdc Solar Farm on Former Coal Mine in Garrett County, Maryland - Competitive Power Ventures," January 31, 2022, www.cpv.com/2022/01/31/cpv-awarded-state-approval-for-200-mwdc-solar-farm-on-former-coal-mine-in-garrett-county-maryland/.

($13.5k/MW). The solar farm will deliver emission-free electricity to roughly 30,000 Maryland homes, contributing to Maryland's RPS targets. Such projects are vital as they offer new opportunities to communities facing declining benefits from the fossil fuel economy and enable them to participate—in multiple roles—in the transition to (and continual production of) green energy.

VERTICALLY INTEGRATING CLEANTECH MANUFACTURING WITH DEPLOYMENT CAPACITY IN EV CHARGING

Collaboration with the private sector is crucial for securing high-quality jobs across the clean energy sector. As a current example of success, in a sector adjacent to PV, Blink Charging—a manufacturer, owner, and operator of EV charging network technology—works closely with local governmental bodies, businesses, and organizations to pinpoint ideal spots for establishing charging infrastructure. Their facility in Bowie, MD serves not only for manufacturing, but additionally as a hub for their local recruitment efforts. Here, they collaborate with electricians, contractors, and technicians to accelerate deployment of charging stations and develop maintenance protocols. This cooperative endeavor stimulates economic growth through upskilling and educational training of individuals in the clean energy sector, cultivating a future workforce. Blink aims to increase production capacity at the Bowie plant to 50,000 units/year by 2024.

CONCLUSION AND NEXT STEPS

Equity should always be a factor in decisions for funding solar incentives or establishing solar policies. Of those implementing solar in Maryland, only 22 percent are below 80 percent of the AMI and another 21 percent are between 80-120 percent of AMI. States with a relatively high proportion of LMI solar adopters include Pennsylvania, Massachusetts, and Rhode Island. Each of these states offers strong solar installation incentives. While many solar incentive programs include direct equity considerations and benefits for LMI households and disadvantaged communities, high-income households remain about four times more likely to adopt solar PV than low-income households. Widespread implementation of LMI-targeted incentives, leasing, and property-assessment based financing alongside falling solar prices could bring solar adoption demographics closer to resembling the broader population.

MBE requirements lead to increased equity and local economic development. Maryland has progressive MBE requirements and has the potential for additional growth through requiring MBE requirements as part of the CPCN. California's own CPUC requires MBE reporting and growth plans for large utilities, which aligns with Maryland's existing CPCN requirement for large electricity projects. California's Supplier Diversity Program provides an example for prioritizing MBEs in the industry, while protecting smaller businesses that cannot afford to do so. The City of Chicago also has a similar practice of protecting smaller businesses through their exemptions policy.

Preliminary findings on the solar workforce in Maryland suggest that the workforce will steadily increase over the next 10 years to accommodate increased demand. However, Vermont, California, and Massachusetts' workforces will grow by more workers per MW based on their current solar capacity and trajectory. To better determine solar workforce impacts from MW demand, incentive amounts, policies implemented, or state wages, AECOM recommends conducting an analysis to better distinguish how each item impacts workforce development.[179]

In Maryland the living wage threshold is between $15 per hour and $67 per hour (based on households of two working adults with no children, and one adult with three children, respectively). Based on extrapolation from national data, Maryland clean energy workers make nearly $28 per hour, indicating the potential for living wage attainment for several (although not all) configurations of families. From the workers' perspective, lack of experience or technical skills may lead to underemployment in the clean energy sector. From the employer perspective, competition for workers and small applicant pools are constraining the size of the labor force. Within the challenges of workforce development lies an opportunity for the rapid deployment of its solutions, increasing training programs, collaborating with the private sector, and investing funds in workforce development to support both the workforce and employers in creating quality, family sustaining jobs.

[179] If the state desires the alignment of calculations between solar job predictions with the solar installation reported in Maryland's Climate Pathway Report, AECOM requests a meeting with MEA to better understand the solar energy projections used.

APPENDIX D

Maryland Solar Land Use Regulations and Permitting Technical Memorandum

INTRODUCTION

This memorandum identifies land use and permitting policies and procedures that govern solar installation. It also identifies the timelines that accompany permitting or procedural requirements as well as the overall development timeline of solar installations. The solar development process requires permitting from the utility, the PJM interconnection, and the local jurisdiction where the solar farm is located. Additional requirements may exist should the owner want to participate in net metering.

This following key takeaways are found in this memorandum:

- Maryland has different permitting policies for residential, commercial, community, and utility-scale solar with additional requirements for projects over 2 MW. Based on a comparison of peer states, there are opportunities to improve the efficiency and affordability of the Certificate of Public Convenience and Necessity (CPCN) application process.
- All peer states researched have similar net metering policies as Maryland which require a meter for every 2 MW.
- Multiple permitting pathways and relaxed system size thresholds in other states potentially result in more MW of solar installed. However, Maryland's consolidated, extensive permitting structure treats potential projects equally. Additionally, updating statewide policies in Maryland is simpler than other states as all applicable policies are within a single agency, the Maryland Public Services Commission (PSC).
- Certain siting strategies have minimal inherent impact, such as incorporating solar into previously developed infrastructure (rooftops, parking areas), and adapting compromised areas (landfills, brownfields) for ground-mount arrays. Other siting options (such as the re-purposing of agricultural land for power generation) have greater potential impact and can require more protracted permitting processes.

- Each solar installation project has a different development timeline based on the size of the installation, location, and workforce availability. This makes it challenging to create a "typical" timeline for solar projects.

MARYLAND PERMITTING POLICY

This section explores the various permitting requirements for residential, commercial, community, and utility-scale solar systems in Maryland along with how these processes compare to those in other states. See Table D.1 for a summary of requirements for each solar configuration type in Maryland.

Table D.1: Maryland Permitting Policy Requirements

System Type	Building and Electrical Permit Required	Utility Approval Required	PJM Interconnection Approval Required	Maryland Public Service Commission Approval Required
Residential <10 kW		X		
Residential >10 kW	X	X		
Commercial/Community Solar Behind-the-Meter <2 MW	X	X		
Commercial/Community Solar/Utility-Scale Front-of-the-Meter <2 MW	X	X	X	
Commercial/Community Solar/Utility-Scale Front-of-the-Meter >2 MW	X	X	X	X

BUILDING AND ELECTRICAL PERMIT REQUIREMENTS

For most of solar PV system installations in Maryland, an electrical permit, and sometimes a building permit, is required through local departments of permits and inspections. Most Departments are at the county level with the only exception being Baltimore City.[180] Across the state, solar installations must be done by a licensed home improvement contractor and licensed electrician registered to the local jurisdiction.[181] However, specific permit requirements vary by county. For example, some counties, like Carroll County and Montgomery County, require electrical and building permits for all installations, and some, like Anne Arundel County, only require a building permit and not an electrical permit.[182] [183] [184] In Baltimore County, building permits are only required if the system is larger than 10 kW.[185] Residential and commercial applicants must submit construction plans, site plans, and zoning permits depending on the solar installation location; and commercial applicants must also submit data sheets.

Jurisdictions across the U.S. utilize various tools to expedite the permit approval process. An example is SolarAPP+, a tool developed by the National Renewable Energy Laboratory (NREL) in 2021. This standardized plan review software processes building permit approvals for residential rooftop solar installations. The tool is free for cities and counties and has been shown to cut down the permitting process by at least five to ten business days.[186] Today, SolarAPP+ is available across many cities and counties in California. In Maryland, Montgomery County Department of Permitting Services is already using SolarAPP+ as part of its eSolar offering to expedite the issuance of solar permits for residential rooftop solar systems.[187] Mandating use of SolarAPP+ or similar software options throughout all Maryland County offices could expedite solar permitting application reviews.

[180] "Local Government Permits & Inspections," Maryland Manual On-Line, June 6, 2022, msa.maryland.gov/msa/mdmanual/01glance/html/permloc.html.
[181] "Understanding Maryland's Licensing Requirements for Green Technology - Home Improvement Commission," Maryland Department of Labor, accessed November 2, 2023, www.dllr.state.md.us/license/mhic/mhicgreen.shtml.
[182] "Carroll County Government," Residential Solar Panels, accessed November 6, 2023, www.carrollcountymd.gov/government/directory/public-works/permits-inspections/residential-projects/residential-solar-panels/.
[183] "Residential Solar Permit," Anne Arundel County Government, accessed November 6, 2023, www.aacounty.org/inspections-and-permits/permits/residential-permits/solar-permit.
[184] "Residential Solar Permit Process," DPS, accessed November 6, 2023, www.montgomerycountymd.gov/DPS/Process/rci/residential-solar.html.
[185] "Solar Building Permit," Baltimore County, accessed November 2, 2023, www.baltimorecountymd.gov/departments/pai/application/solar#:~:text=A%20building%20permit%20is%20required,licensed%2Fregistered%20with%20Baltimore%20County.
[186] "NREL's SolarAPP Streamlines Solar Permitting," NREL, accessed November 2, 2023, www.nrel.gov/news/video/nrels-solarapp-streamlines-solar-permitting-text.html.
[187] "Community Solar Pilot Program-Frequently Asked Questions," Electricity, October 11, 2023, www.psc.state.md.us/electricity/community-solar-pilot-program/community-solar-pilot-program-frequently-asked-questions/.

UTILITY APPROVAL

An interconnection agreement must be submitted to the electric utility serving the location of the solar installation. Each utility has different approval requirements application steps, but the overall steps are similar. To achieve interconnection to the grid in the First Energy Corporation Maryland service territory, a customer must follow the process outlined in Figure D.1.

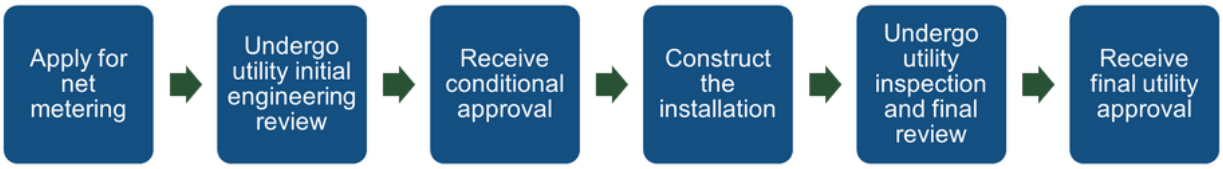

Figure D.1: First Energy Corporation Interconnection Timeline

Similarly, Pepco and other Exelon utilities also require multiple approval and inspection steps to receive final approval and gain the authorization to operate. According to Pepco, the interconnection approval process can take up to 77 business days (or four months) if not more.[188]

PJM INTERCONNECTION APPROVAL

The interconnection approval by PJM is required for all commercial, community solar, and utility-scale projects that are front-of-the-meter solar systems. All jurisdictions must abide by PJM requirements. Behind-the-meter solar systems are not required to go through the PJM interconnection process.[189] Utility-scale systems must receive PJM approval to connect to the grid which entails a two-year study process.

PJM's new process began in July 2023. It prioritizes review of projects that have met readiness requirements instead of submission order. PJM also created a new, publicly accessible Queue Scope tool that allows developers to assess the feasibility and financial impacts of their projects on the grid before entering PJM's interconnection process. The tool indicates grid impacts based on the amount of power injected at a given point of interconnection. This saves money and time for smaller developers and makes the interconnection process more efficient for PJM to process applications.[190] Due to the quantity of projects in the PJM Queue currently, it is also notable that PJM announced that no new applications will be accepted until 2026.

[188] "Pepco Maryland Application Process Steps," Pepco, December 31, 2015, www.pepco.com/SiteCollectionDocuments/Pepco%20Maryland%20Application%20Process%20Steps_2015Dec31.pdf.
[189] "Connecting to the Grid FAQS," PJM Learning Center, accessed November 2, 2023, learn.pjm.com/three-priorities/planning-for-the-future/connecting-grid.

MARYLAND PUBLIC SERVICE COMMISSION APPROVAL – CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

For projects with a capacity larger than 2 MW, a CPCN must be granted by the PSC in addition to interconnection approval by PJM. This includes commercial scale, utility-scale, and community solar projects. Specifically, one may not "begin construction of a generating station, a qualified lead line, an overhead transmission line designed to carry more than 69 kV, or a qualified submerged renewable energy line, or exercise a right of condemnation associated with the construction of a generating station or transmission line without approval of the PSC."[191] There are two exceptions to the full CPCN process both subject to PSC approval:

1. Systems with onsite generation capacity between 2-25 MW where 10 percent of electricity is consumed onsite and;
2. Systems with onsite generation capacity less than 70 MW where at least 80 percent of electricity is consumed on site.[192]

Between 2011 and 2023 sixty-four (64) solar CPCN cases were filed with fifty-six (56) granted; seventeen (17) of those systems are currently operational with a capacity of 391 MWs. In addition, developers have stated that another eighteen (18) utility-scale solar projects will be operational by 2026, equaling 826 MWs. As shown in Figure D.2, solar CPCN cases significantly decreased after 2018, aligning with the Community Solar Pilot Program that capped solar projects at 2 MW. With the permanent passage of the program and the Community Solar cap increased to 5 MW, there has been a recent uptick in the number of community solar cases going through the CPCN process, with three (3) community solar array cases in 2023 and twelve (12) community solar cases began pre-application in January 2024.

[190] "Transition to New Interconnection Process Begins July 10," PJM Inside Lines, July 26, 2023, insidelines.pjm.com/transition-to-new-interconnection-process-begins-july-10/.
[191] "CPCN Process," Baltimore: Maryland Public Service Commission, September 12, 2019, www.psc.state.md.us/electricity/wp-content/uploads/sites/2/CPCN-Process-revised-9-12-19.pdf.
[192] Ibid.

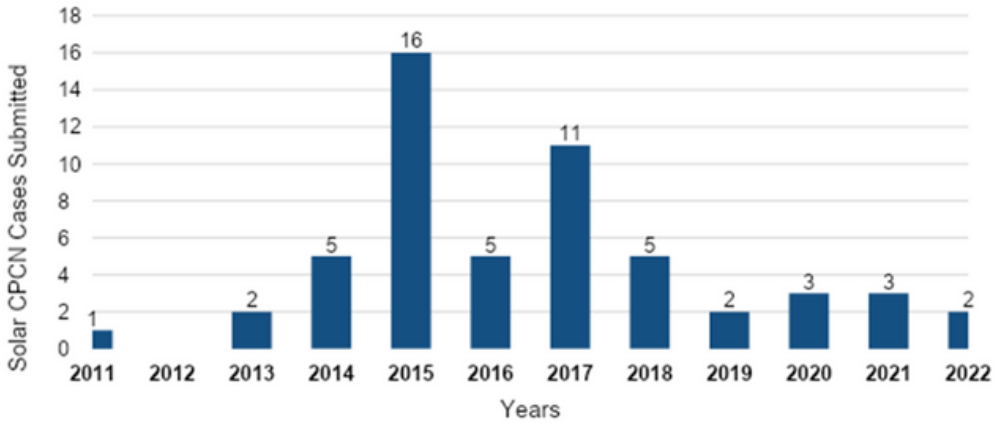

Figure D.2 Solar CPCN Cases per Year

Source:mde.maryland.gov/programs/Air/ClimateChange/MCCC/MWG/Solar%20Siting%20Project%20Problems%20in%20MD.pdf

Applicants can be any entity or individual that wants to construct a generating station but the state's regulated utilities may not own generation. Typically, applicants are utility developers, but they can also be landowners that want to engage in commercial solar.[193] Applying for a CPCN requires a filing fee of $10,000. Before filing the application, the applicant must provide 90-day notice of the filing to the governing bodies of county or municipal corporations where the project will be constructed and also to have a pre-application meeting with PPRP. Forty-five days after the applicant's meeting with PPRP, they can file their application with the PSC. Upon receipt of the application, PPRP and the other interveners, review the application for completeness. and the matter is usually delegated to a Public Utility Law Judge (PULJ) A notice of a pre-hearing conference is issued and the application is deemed complete by the PSC, it is docketed a case number. At least one public hearing is held to allow for public input followed by an evidentiary hearing held for the parties of record to present testimonies through cross examinations. The PULJ then reviews and prepares a Proposed Order either approving or denying the CPCN. Unless there is an appeal of the Proposed order within 30 days of issuance, it becomes a final order of the PSC. Appeals can extend the timeline by months or years. Once the PSC issues its final order, the developer must obtain all state and local permits before it can begin construction.[194]

[193] Margaret Todd, "Solar Arrays & Maryland's Certificate Of Public Convenience And Necessity (CPCN) Application Process" (University of Maryland Francis King Carey School of Law, n.d.), extension.umd.edu/sites/extension.umd.edu/files/publications/ALEI_CPCNOverview-2.pdf.
[194] Gray, Susan, "The Maryland Certificate of Public Convenience and Necessity (CPCN) Process," Maryland Department of Natural Resources, April 12, 2017, dnr.maryland.gov/pprp/Documents/CPCN-Process-State-Agency-Roles-Responsibilities-Upcoming-Projects.pdf.

PEER STATE COMPARISON

The application process for a CPCN for renewable energy projects in many states considers factors beyond the need for additional electricity service.[195] Studies have identified CPCN as a potential impediment for integrated community energy systems.[196] In a recent law review article published by Vanderbilt University, the author argues that CPCN requirements "protect incumbents, raise electricity prices, and obstruct green energy projects" and proposes shifting to market signals such as electricity prices to determine new constructions.[197] This type of exemption could be tailored for community solar projects when there is sufficient demand.

Maryland's CPCN process is a form of discrete resource approval which can also be seen in other states. A discrete resource approval is when a utility seeks approval from the state utility commission for a large capital investment in generation or transmission infrastructure. Currently, nineteen states require discrete resource approvals through the state's PSC.[198] Additionally, many of the peer states listed in previous comparisons do not have this requirement. See Table D.3 for a comparison of the discrete resource approval process in the six peer states where this is required.

[195] See application for Texas: www.puc.texas.gov/industry/electric/forms/ccn/app_exception.pdf. Many other states referenced have separate CPCN applications for renewable energy projects.
[196] Feurer, Duane A., Weaver, Clifford L., Rielley, Kevin J., Gallagher, Kevin C., Harmon, Susan B., Hejna, David T., and Kitch, Edmund W. 1981. "Study of the impacts of regulations affecting the acceptance of integrated community energy systems. Final report". United States. doi.org/10.2172/6703157. www.osti.gov/servlets/purl/6703157.
[197] Joshua C. Macey, Zombie Energy Laws, 73 Vanderbilt Law Review 1077 (2020). scholarship.law.vanderbilt.edu/vlr/vol73/iss4/3.
[198] "Electricity Resource Planning and Procurement," Chapter 7, In EPA Energy and Environment Guide to Action, EPA, 2015, www.epa.gov/sites/default/files/2017-06/documents/gta_chapter_7.1_508.pdf.

Table D.3: Discrete Resource Approval Process: Peer States Comparison Summary

State	Discrete Resource Approvals Requirement	Cost of Application	Timeline
Maryland	Renewable energy generation projects larger than 2 MW	$10,000	• Six months to two years for appeals process
West Virginia[199]	For construction of a Solar EWG[200] facility and transmission lines of 200 kV or greater	$100/MW or $40,000	• Commission will hold a hearing within 90 days of publication • Final order within 150 days of the application filing date
Florida[201]	Steam or solar facilities producing over 75 MW constructed after 1973	$2,500 notice of intent fee, application fee shall not exceed $200,000	• Pre-application (notice of intent, needs determination, etc.) • Certification process (public engagement, hearings, law judge recommendation, etc.)
North Carolina[202]	Renewable energy facilities between 2-80 MW that will not be primarily used for your own use	$250	• File application • 30-day review by government agencies • Commission will schedule public hearing if there is a complaint

[199] "Rules Governing Siting Certificates for Solar Exempt Wholesale Generators" (Charleston: Public Service Commission of West Virginia, August 4, 2020). http://www.psc.state.wv.us/scripts/orders/ViewDocument.cfm?CaseActivityID=550411&Source=Docket.

[200] EWG: exempt wholesale generator, solar EWG facilities are not owned by utilities.

[201] "Power Plant Siting Act," Florida Department of Environmental Protection, accessed October 31, 2023, floridadep.gov/water/siting-coordination-office/content/power-plant-siting-act.

[202] "Builders and Owners of Renewable Energy Facilities," NC Public Staff, accessed October 31, 2023, publicstaff.nc.gov/public-staff-divisions/energy-division/electric-section/builders-and-owners-renewable-energy-facilities#:~:text=Application%20Fees,of%20Commerce%2FUtilities.%22.

Table D.3: Discrete Resource Approval Process: Peer States Comparison Summary (Continued)

State	Discrete Resource Approvals Requirement	Cost of Application	Timeline
Nevada[203]	Renewable energy projects with an output greater than 70 MW, transmission lines greater than 20 kV	$200	• Schedule pre-filing meeting with commission staff • The commission has 150 days from filing to grant/deny application • Application takes longer if federal environmental review required
Georgia[204]	A qualified facility, including solar producers under 80 MW, must abide by the Public Utility Regulatory Policies Act to connect to Georgia Power	$25,000 delivery study	• Bid into a capacity RFP if >30 MW • Provide notice of intent if <30 MW
Vermont[205]	Certificate of Public Good required for electric generation facility over 500 kW	Price varies per kW depending on facility size. Capped at $15,000 if facility is between 50 kW-5 MW, capped at $100,000 if >5 MW	• 45-day notice to file • Procedural steps include site visit, public hearing, evidentiary hearing, and more

[203] "Renewable Energy Projects Approved and/or Permitted by the PUCN," PUCN, July 1, 2023, puc.nv.gov/Renewable_Energy/ApprovedREFacilities/.
[204] "Qualifying Facilities," Georgia Power, accessed November 2, 2023, www.georgiapower.com/business/products-programs/business-solutions/qualifying-facilities.html.
[205] 30 V.S.A. § 248, legislature.vermont.gov/statutes/section/30/005/00248.

NET METERING

Maryland is one of 38 states with net metering rules that apply to their utilities; these rules cover system size, interconnection requirements, billing requirements, and more. Most states are similar to Maryland in that they require a meter for every 2 MW of utility-scale solar installed. For example, Delaware requires one meter per 2 MW for all non-residential customers and Massachusetts public net metering facilities can be up to 10 MW, but each unit within that cannot exceed 2 MW. In Maryland, customer-generators are allowed to net meter up to 2 MW, but CH 581 (2022) increased this value to 5 MW for Community Solar Energy Generating Systems (CSEGS).[206] This section will evaluate the possible effects of increasing the net metering project size or removing the cap altogether.

PRICING

For each interconnection, the customer must pay the utility for wiring and equipment installations in a one-time fee and additional charges per kW that contribute to the utility's payment for their own interconnection, ongoing operation, and maintenance costs.[207] For residential or small-scale installations under 10 kW, interconnection fees can range from $0 to $200 and the solar installation company typically includes the cost of interconnection in the cost of the solar system.[208] This can also be considered as an application fee, as it is for Pepco's Green Power Connection and other Exelon utilities in Maryland. The application fee and corresponding nameplate capacities are shown in Table D.4 following.

[206] "Report on the Status of Net Energy Metering In the State of Maryland," Public Service Commission of Maryland, November 1, 2022, www.psc.state.md.us/wp-content/uploads/2022-Net-Metering-Report.pdf.

[207] "Rate Schedules for Electric Service in Maryland," Potomac Electric Power Company, October 1, 2023, azure-na-assets.contentstack.com/v3/assets/bltbb7c204688a1a6a8/blt8d132a177ec8ead8/MD_Pepco_CURRENT_WINTER_Rate_Schedule_Senate_Bill_143_Flexible_Net_Metering_1000123.pdf.

[208] Thoubboron, Kerry. "Solar Interconnection: What You Need to Know," EnergySage, January 3, 2019, www.energysage.com/solar/solar-interconnection-what-you-need-to-know/.

Table D.4: Utility Interconnection Application Fees[209] [210] [211] [212] [213]

Nameplate Capacity	Exelon Utilities & Potomac Edison	SMECO[214]
Level 1: 10 kW or less and invertor-based	No fee	No fee
Level 2: 2 MW or less, radial distribution circuit or spot network serving one customer	$50 + $1/AC inverter rating KW	$260
Level 3: area networks (50 kW or less), radial distribution circuits (10 MW or less)	$100 + $2/AC inverter rating kW	$260
Level 4: 10 MW or less and not Level 1, 2, or 3	$100 + $2/AC inverter rating kW	$950

For larger installations, interconnection can be more expensive due to distributed solar infrastructure tariffs. Although there are one-time costs to interconnect as listed above, many costs associated with the process come from the total number of MW installed due to the strain on the grid rather than the cost of installing the physical meters. A report by the Lawrence Berkeley National Lab reported that the mean interconnection cost for solar in the PJM Interconnection was $99/kW for solar projects in 2022.[215]

[209] "Net Energy Metering and Small Generator Interconnection Application Checklist," Pepco, February 4, 2015, azure-na-assets.contentstack.com/v3/assets/bltbb7c204688a1a6a8/bltc2819a305ad8863c/GPC_Pepco_MD_ApplicationChecklist_2015_02_04.pdf.

[210] "Net Energy Metering and Small Generator Interconnection Application Checklist," Delmarva, August 6, 2015, www.delmarva.com/SiteCollectionDocuments/GPC_DPL_DE_ApplicationChecklist_2015_08_06.pdf.

[211] "Maryland Level 2 to 4 Interconnection Agreement Application," BGE, November 20, 2018, azure-na-assets.contentstack.com/v3/assets/blt71bfe6e8a1c2d265/blt49ce01b84a7415a8/64e728700bf445000dfced7f/SGI_Levels234ApplicationAndContract_2018.pdf?branch=prod_alias.

[212] "Maryland Level 2 to 4 Interconnection Agreement Application," FirstEnergy, October 2023, www.firstenergycorp.com/content/dam/feconnect/files/retail/md/MD-Level-234-Interconnection-Application.pdf

[213] "Rider GIS Generator Interconnection Standards," SMECO, May 15, 2023, www.smeco.coop/wp-content/uploads/RiderGIS.pdf.

[214] SMECO has an additional $220 pre-application fee if over 20 kW.

[215] Joachim Seel, Joe Rand, Will Gorman, Dev Millstein, Ryan Wiser, Will Cotton, Katherine Fisher, Olivia Kuykendall, Ari Weissfeld, and Kevin Porter, "Interconnection Cost Analysis in the PJM Territory," Lawrence Berkley National Lab, January 2023, eta-publications.lbl.gov/sites/default/files/berkeley_lab_2023.1.12-_pjm_interconnection_costs.pdf.

For projects from 1 – 20 MW, this value was $81/kW. In Washington D.C., also in Pepco utility territory, homeowners were charged a $20,000 fee for grid upgrades that would be required for their rooftop solar.[216] However, a 2018 report for the Maryland PSC found that the integration of solar sources will not require major upgrades, rather modest upgrades to control voltages.[217] This could mean the cost per kW is significantly lower than the estimate for the entirety of the PJM Interconnection; however, the cost consideration for large scale solar installation is more dependent on the total size of the installation rather than the number of individual meters it would take to net meter the project.

In the Maryland PSC's PC44 Interconnection Workgroup Phase V Final Report, the workgroup considered the Maryland Cost Allocation Method (MACM) for socializing interconnection costs for second voltage interconnection customers (less than or equal to 600 volts). The fees to connect residential customers will be a dollar per application hosting capacity fee. For secondary voltage commercial customers, interconnection costs will be shared by customers using a socialized cost sharing methodology. This means that cost allocation for secondary voltage will be moved to a socialized cost sharing among all interconnection customers, and not all ratepayers. For primary voltage interconnections (greater than 600 volts), the MCAM is a "beneficiary pays" cost allocation methodology that sends price signals to primary voltage interconnection customers.

TIMELINE

Each utility has a fairly similar process for interconnection to gain the approval to operate a solar installation and begin the net metering process. The general steps for this process are shown in Figure D.1 in the Utility Approval section. The time from application to authorization to operate is about a year.

After receiving the approval to operate, meter installation may take several weeks depending on meter availability and other work priorities.[218] However, that time can also be shorter. For National Grid, a utility in New York and Massachusetts, the bi-directional net meter is typically available within 10 business days.[219] Customers are allowed to use the solar facility as soon as it is constructed, but the utility is not responsible for credits until the bi-directional meter is installed.

[216] Maxine Joselow, "Fees from Pepco Put Solar Panels out of Reach, D.C. Residents Say," The Washington Post, February 24, 2022, www.washingtonpost.com/dc-md-va/2022/02/23/dc-solar-panels-pepco-fees/.
[217] "Benefits and Costs of Utility Scale and Behind the Meter Solar Resources in Maryland," Worcester: Daymark Energy Advisors, April 10, 2018, www.psc.state.md.us/wp-content/uploads/MD-Costs-and-Benefits-of-Solar-Draft-for-stakeholder-review.pdf
[218] "Maryland Interconnection," FirstEnergy, accessed October 26, 2023, www.firstenergycorp.com/feconnect/maryland.html.
[219] "Net Metering FAQ," National Grid, n.d. www9.nationalgridus.com/non_html/Net%20Metering%20FAQ.pdf.

Solar siting and contracting can be complicated and take several years to complete. A timeline of the overall development process of a utility-scale is shown in Figure C. 4 in the Development Timelines section. However, to evaluate the current interconnection scheme, the only parts of the timeline that may impact installation time would be construction and net meter installation. For example, if the desired total installation is 10 MW, the siting and contracting period should include planning for all 10 MW, even if it is built and metered in varying increments. The time it takes to construct a solar farm depends heavily on the available equipment and workforce. In general, it takes three months per 2 MW of solar to construct a ground-mounted farm used for commercial solar.[220] [221] Therefore, construction of a 10 MW community solar project would take about 15 months. With the current interconnection requirement of one meter per 5 MW, the first interconnection process could begin when the first 5 MW are installed and ready to connect to the grid before the other 5 MW are finished. If the project were to wait to begin interconnection until all 10 MW were built, the extra couple weeks it takes for the utility to finalize interconnection could mean projects wait up to ten months before net metering is available.

At present, in the U.S., 2,000 GW of energy projects are in interconnection queues of around five years waiting to join the grid. These are largely commercial scale projects that require audits or reviews by transmission networks. In July 2023, FERC changed the approval process to allow transmission providers to conduct feasibility studies in clusters rather than one at a time on a first-come-first-served basis.[222]

ZONING AND SITING CONSIDERATIONS

Maryland's solar project zoning and siting requirements impact ecological, social, and economic conditions. Certain siting strategies have minimal inherent impact, such as incorporating generation assets into previously developed infrastructure (rooftops, parking areas), and adapting compromised areas (landfills, brownfields) for ground-mount arrays.[223]

[220] "How Long Does It Take to Construct a Solar Farm?" YSG Solar, March 13, 2020, www.ysgsolar.com/blog/how-long-does-it-take-construct-solar-farm-ysg-solar#:~:text=As%20a%20general%20rule%20of,standard%20ground%2Dmounted%20solar%20farm.

[221] This estimation is common for commercial solar only, not residential or utility-scale.

[222] Robert Zullo, "Federal Regulators Approve New Rules to Ease Power Connection Backlogs," Maryland Matters, July 29, 2023, www.marylandmatters.org/2023/07/29/federal-regulators-approve-new-rules-to-ease-power-connection-backlogs/.

[223] "The Five-Step Process Framework for Project Development," DOE Office of Indian Energy, August 2015, www.energy.gov/sites/default/files/2015/08/f25/5-Step%20Project%20Development%20Overview.pdf.

Other siting options (such as the re-purposing of agricultural land for power generation) have greater potential impact and can require more protracted permitting processes. To the extent possible, pre-determination of the suitability of siting and location options expedites the CPCN process and increases the likelihood of a successful application. Although a fully implemented state-wide land use plan and guidance does not exist, Maryland has some state-wide mechanisms in place for this type of pre-determination and makes several resources available for applicants (though not mandatory).

Although siting for larger (2 MW+) stand-alone solar projects in Maryland is subject to input from multiple parties, the PSC is the sole authority that grants CPCNs (and therefore approves siting). In its process, the PSC considers input from jurisdictions that include the proposed site, the public, and other interested parties. Local zoning ordinances are therefore given consideration during the CPCN process but can be overruled.

In comparison, Virginia offers multiple pathways for permitting, including a non-CPCN ("Permit-by-Rule") pathway through its Department of Environmental Quality, for certain projects up to 150 MW.[224] [225] The CPCN pathway--also available for projects of this size, and required for larger projects--is administered through the State Corporation Commission. The threshold below which generation-specific permitting is not required is significantly less restrictive than Maryland's, at 5 MW (versus 2 MW).

Although Virginia's multiple permitting pathways and relaxed lower MW threshold potentially contribute to more permitting and deployments, it may be that local concerns regarding projects have not been as active, to-date, as they have in Maryland. The more-consolidated permitting structure in Maryland may ensure more potential projects receive equal treatment, both in the direction of greater deployment (fulfilling renewable portfolio standards (RPS)) and accommodating concerns from interested parties. Maryland's consolidation of permitting authority additionally simplifies the adjustment of the permitting process, when such adjustment is deemed useful, as changes made to PSC procedures apply to a higher percentage of potential projects, than would changes to one specific authority in Virginia.

[224] Small Solar Energy Projects Less than or Equal to Five Megawatts or Less than or Equal to 10 Acres or Meeting Certain Categorical Criteria, n.d, Administrative Code of Virginia, Vol. 9VAC, law.lis.virginia.gov/admincode/title9/agency15/chapter60/section130/.
[225] Permit by Rule for Small Renewable Energy Projects. n.d. Code of Virginia. Vol. 10.1, law.lis.virginia.gov/vacode/10.1-1197.6/.

GOVERNANCE OF SOLAR SITING

Authority over siting of solar plants in Maryland ultimately resides solely with the PSC, although other authorities (specifically, counties, and their zoning regulations) have input to the process.[226] Authorities with jurisdiction over and responsibilities in the siting process are discussed in more detail in this section.

Department of Natural Resources Power Plant Research Program

The Maryland Department of Natural Resources' (DNR) Power Plant Research Program (PPRP) develops information on the state solar sector for regulatory bodies, developers, and the broader public. By combining DNR's land use survey information with other geospatial data, the DNR maintains publicly available tools for screening locations for larger-scale (2 MW+) projects, and more generally for understanding siting of utility assets (SmartDG+[227] and PPRP Smart Siting,[228] respectively). PPRP assessments (of environmental, economic, and other impacts) are weighed in the course of PSC's CPCN proceedings by default.

Public Services Commission

In Maryland, the PSC is the only determining authority for siting of power generation assets, including solar power plants (commercial/utility or community). Most counties have zoning regulations intended guide the deployment of such projects, and, as clarified in a recent court case, "Although local zoning laws are preempted and therefore not directly enforceable by the local governments as applied to generating stations such as [solar energy generating systems], they are nevertheless a statutory factor requiring due consideration by the PSC in rendering its ultimate decision."[229]

The PSC includes the PPRP as an automatic party to CPCN proceedings, granting a platform for their information on siting impacts. Other parties, including local jurisdictions, may elect to participate.

[226] "Authorities" here refers to governmental bodies (or agencies within them) with legal jurisdiction.
[227] "SmartDG+," Maryland Department of Natural Resources, accessed October 31, 2023, dnr.maryland.gov/pprp/Pages/smartdg.aspx.
[228] "Smart Siting," Maryland Department of Natural Resources, accessed October 31, 2023, dnr.maryland.gov/pprp/Pages/default.aspx.
[229] Board of County Commissioners of Washington County, Maryland v. Perennial Solar, LL. 2018, Maryland Court of Appeals.

Local Governments (Zoning Ordinances)

Absent a uniform state-wide standard governing where and how to site solar policies, individual municipalities and counties set their own policies through zoning. This results in multiple (and shifting) frameworks against which the PSC (in-part) bases CPCN decisions. Stakeholders have discussed that uniform state-wide standards, implemented through legislation, may be necessary to ensure adequate site options are available to meet stated RPS goals.[230] A state-wide standard, integrating the spatial analysis already conducted by the DNR/PPRP, would have the additional effect of streamlining the permitting process, as fewer one-off assessments would be required for each application.

RELEVANT REGULATIONS

Regulations impacting siting of solar assets in Maryland exist both at state and local levels. State-level requirements are generally environmental in nature (mitigating impact), although community solar-related initiatives have spatial implications as well. Local county zoning ordinances set requirements for appropriate use, setbacks from lot lines, minimum lot sizes, and other factors. As stand-alone solar has only become a significant land use option relatively recently, local ordinances often pre-date its consideration, and reflect pre-existing (or otherwise alternative) use patterns for land.

CRITICAL AREA REGULATIONS

Maryland imposes stricter regulations on development in certain locations based on proximity to sensitive natural assets. For example, additional restrictions are generally placed on development (such as solar) within 1,000 feet of the Chesapeake Bay or its tributaries. Development in these areas is subject to the regulations specified by local authorities. These regulations do not prohibit development of solar generation, but careful study and design can produce solar assets that minimize impact in these areas. In general, siting these assets on previously developed land is preferable.[231] A map of Maryland's critical areas is shown in Figure D.3.

[230] Josh Kurtz, "PSC Chair wants to 'lower the temperature' on siting disputes over renewable energy projects," Maryland Matters, August 30, 2023, www.marylandmatters.org/2023/08/30/psc-chair-wants-to-lower-the-temperature-on-siting-disputes-over-renewable-energy-projects/.
[231] "Principles and Practices for Realizing the Necessity and Promise of Solar Power," 2020, Chesapeake Bay Foundation, cbf.org/issues/land-use/solar-power.html.

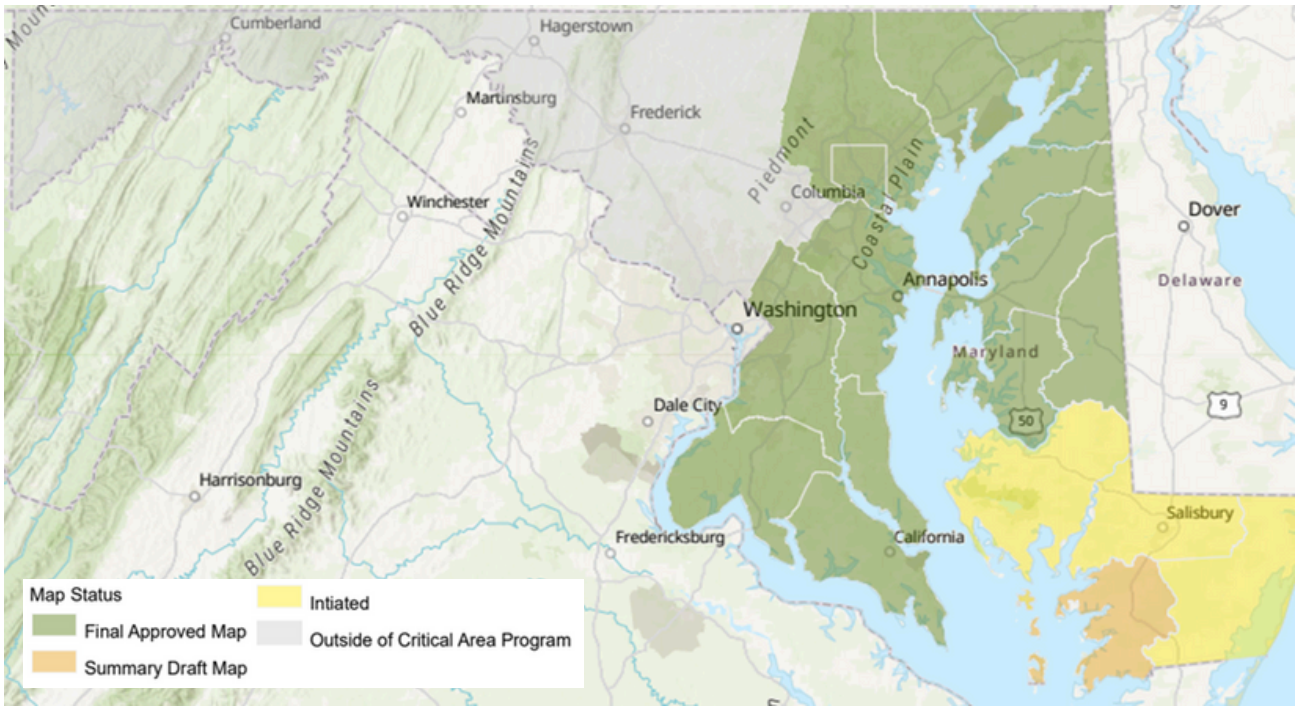

Figure D.3 Critical Area Boundary Map
Source: webmaps.esrgc.org/cbca/

COMMUNITY SOLAR-SPECIFIC REGULATION

CSEGS are incentivized in current regulatory structure under the Maryland Community Solar Pilot Program. The pilot is a seven-year program that offers community solar subscription access to all residents through their utility. Commercial or residential rate payers are eligible for grants that subsidize the power they subscribe to from community solar arrays, with low-to-moderate income (LMI) customers eligible for higher levels of compensation. Regarding land use, the CSEGS must be physically located within the subscriber's electric service area, which incentivizes the distribution of these projects across rural, suburban, and urban areas of Maryland. Additional incentives are available for small systems or systems in brownfields, parking lots, and industrial areas.[232] Table D.5 shows the distribution of community solar pilot capacities in each of the available categories.

[232] "Community Solar Pilot Program," Electricity, 2017, www.psc.state.md.us/electricity/community-solar-pilot-program/.

Table D.5: Community Solar Capacity Limits Across All Participating Utilities

	Small, Brownfield, and Other	Open	LMI
Year One (MW)	23.15	30.77	23.15
Year Two (MW)	23.15	30.77	23.15
Year Three (MW)	11.53	15.44	12.53
Sum % of Total	30%	40%	30%

Source: www.psc.state.md.us/electricity/community-solar-pilot-program/community-solar-pilot-program-frequently-asked-questions/

Solar installations on brownfields or existing infrastructure are specifically categorized in the Pilot program, and, like LMI-accessible projects, a significant fraction of pilot assets are expected to fall into this category (Table D.5), influencing geographical distribution.[233]

ENVIRONMENTAL CONSERVATION

Consideration of environmental impacts in determination of a CPCN is required by Maryland law.[234] Assessments are made on air and water pollution impacts, provisions for disposal of waste, and minimizing the net reduction of forested areas. Requirements associated with specific types of land, such as the Chesapeake Bay Critical Area, are included in this assessment. Additional concerns addressed during the CPCN process, typically brought by interested parties such as counties in which the project is sited, involve setbacks, minimum lot sizes, viewshed protection and visual screening of the solar assets. Mitigation measures are available for some typical sources of environmental harm from these projects, such as establishing the land under solar arrays with ecologically beneficial plant communities, to offset habitat loss and infiltration reduction the array might cause if designed differently.

[233] Program Generation Capacity, Community Solar Energy Generating Systems. n.d. Code of Maryland Regulations. Vol. 20.62.02.02, accessed October 31, 2023. mdrules.elaws.us/comar/20.62.02.02.

[234] "Solar Facility Siting Guidance | Overview of Maryland's Utility-Scale Solar Review and Approval Process," n.d. Planning, accessed November 3, 2023, planning.maryland.gov/Pages/default.aspx.

Stormwater management strategies may be important, especially for projects that require large amounts of land area. Solar farms can contribute to fracturing habitat, but they can also be beneficial for wildlife migration and habitat continuity, if their site plan includes appropriately designed buffer zones and undeveloped or afforested areas. Clearly designated requirements, via a state-wide standard, may reduce the effort required during the permitting process to demonstrate acceptable impact in these and other categories.

Pollinator-Friendly Designation (PFD) is available for ground-mounted solar farms, which incentivizes ground cover that supports pollinator species throughout the growing season.[235] [236] The designation potentially improves the ecological services of the site beyond what is required from state and federal regulations. According to the Environmental and Energy Study Institute, by incentivizing a native plant mix, the designation may help to recharge ground water, reduce erosion, and increase soil carbon sequestration. Benefits may extend to nearby agriculture, through increased pollinator activity, and the effectiveness of the solar project, by reducing local temperatures (which boosts generation efficiency).[237] Maryland was one the first six states to adopt this pathway into legislation.

Required adoption of certain measures such as PFD in solar plant design based on a geospatially resolved state-wide design standard might streamline permit processing, by reducing the baseline number of concerns and discussion topics from interested party groups.

ALTERNATIVE AND PRE-EXISTING USES

Alternative and pre-existing uses for land; especially pre-developed (such as agricultural) sites, are often a source of dispute in the permitting process. Given that the PSC maintains final determination for CPCNs, and state-wide analysis of site quality is already being generated through PPRP efforts, it is conceivable that a legislated state-wide design standard could incorporate district-level requirements for available solar land access.

[235] Pollinator-Friendly Designation of Solar Generation Facilities Authority: Natural Resources Article, §§3-303 and 3-303.1, Code of Maryland, Vol. 08-Department of Natural Resources. 2019-dsd.maryland.gov/Pages/default.aspx.

[236] "Pollinator-Friendly Designation of Solar Generation Facilities," Maryland Register 47, no. 2 (January 17, 2020), dnr.maryland.gov/pprp/Documents/Proposed_PollinatorFriendlyDesignation-01172020.pdf.

[237] Leroy J. Walston, Shruti K. Mishra, Heidi M. Hartmann, Ihor Hlohowskyj, James McCall, and Jordan Macknick, 2018, "Examining the Potential for Agricultural Benefits from Pollinator Habitat at Solar Facilities in the United States," Environmental Science & Technology 52 (13): 7566–76, doi.org/10.1021/acs.est.8b00020.

Although crafting this legislation would require significant participation across many interested party groups, it would shift effort and time into this single discussion, and out of the individual CPCN decision processes, accelerating them on average. Requirements could be determined both for individual parcel scales (such as the percentage of development allowable on parcels) and on broader (county or regional) scales.

Because of the overlap of jurisdictions between the PSC and Counties, where zoning of generation assets is concerned, any conflicts and negotiation between state-wide RPS goals and local interests are often processed at the time of the adjudicated CPCN decision, which can greatly extend the time and effort required for each decision. State-wide agreement on certain factors (such as re-purposing of agricultural land) is not a trivial process. But once undertaken, it would have an accelerating impact on permitting, and the eventual deployment of solar generation. Simultaneously, this agreement would promote the social and spatial distribution of these assets, as well as access to generated power, and co-benefits (such as employment opportunities from the construction and operation of the assets).

DEVELOPMENT TIMELINES

In general, the timeline to develop and install solar is at least a couple of years due to the various policies and steps mentioned in the previous sections. An ideal timeline for a utility-scale solar farm of 250 MW is shown Figure D.4 below.

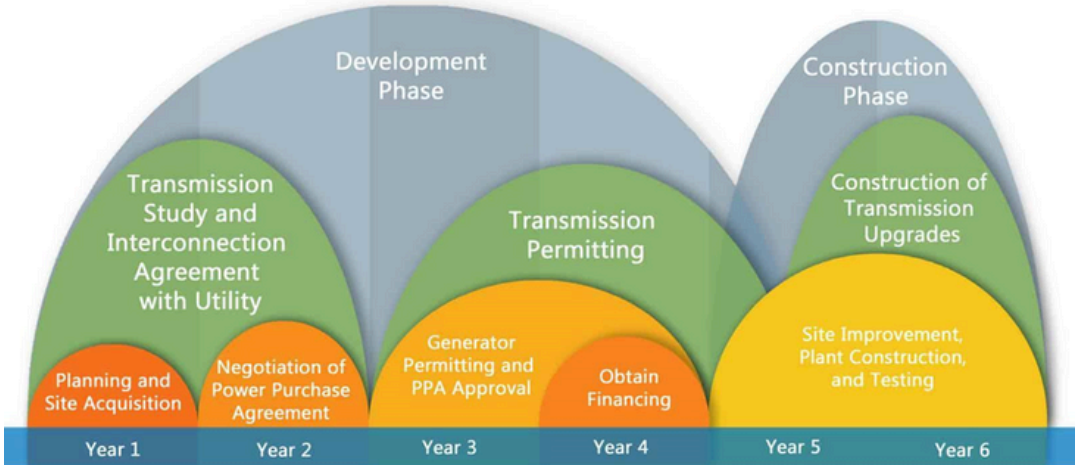

Figure D.4 Example Development Timeline for a Utility-Scale Solar Power Plant (250 MW)

Source: www.seia.org/research-resources/development-timeline-utility-scale-solar-power-plant

Timelines vary based on the location of the build. Site/location selection includes identifying and selecting the land that the plant will be built on, zoning policies, utilities, and construction firms available to complete the installation. Preferred sites for solar installations may be rooftops and brownfields as opposed greenfields, to not negatively impact existing environmental conditions, aesthetic, or interconnection constraints.[238] However, the exact steps to prepare a previously developed commercial property, or a brownfield, for solar depend on the current condition of the area and what potential remediation needs to be completed to prepare the space.

The solar development timeline requires permitting from the utility, the PJM interconnection, and the local jurisdiction that presides over the location of the solar farm (as discussed in the Maryland Permitting Policy and Zoning and Siting Considerations sections of this memorandum). The utility and PJM interconnection are concerned with the amount of electricity added to the grid and the necessary infrastructure improvements, while the local jurisdiction is responsible for considering land-use impacts. Utility-scale solar installation is good for the overall renewable energy and emission reduction goals of the state, farm owners that can increase their revenue, and brownfields that would otherwise be abandoned parcels. However, large-scale solar can lead to loss of farmland and forests, loss of historic properties, viewshed impacts, and glare that could impact pilots and drivers. Additionally, solar farms have a long lifespan, and it is challenging to predict if the installation will remain beneficial or if the land will have other, better uses in the years to come.[239]

BROWNFIELD TIMELINE IMPACTS

There are numerous benefits to building solar arrays on brownfields including the potential to utilize existing infrastructure, incentive opportunities that support financing, and minimal environmental impact. Since brownfields were once in use or are currently underutilized, they are typically surrounded by existing roads or electricity infrastructure that were used for access for the site's previous commercial or industrial use that simplifies the solar siting process and could generate cost-savings.[240]

[238] Greenfields are undeveloped sites while brownfields are sites that have been previously developed for industrial or commercial use that are now abandoned or underutilized.

[239] "Solar Facility Siting Guidance," Maryland Department of Planning, accessed November 1, 2023, planning.maryland.gov/Pages/OurWork/envr-planning/solar-siting/solar-siting-home.aspx.

[240] Sarah Johnson, "Siting a Solar Farm on Brownfields, Landfills, and Former Industrial Sites," Barr Engineering Co., August 22, 2022, www.barr.com/Insights/Insights-Article/ArtMID/1344/ArticleID/393/Siting-a-solar-farm-on-brownfields-landfills-and-former-industrial-sites.

The existing infrastructure could cut time off the construction process that would otherwise be needed to increase capacity of the grid or create roads out to the solar site. They also generally exist on optimal, flat land that supported the previous land use. Building solar systems on brownfield sites can provide access to funding opportunities which could positively impact the planning process and prevent funding barriers to construction. The Inflation Reduction Act created the Energy Community Tax Credit Bonus of up to 10 percent for projects in energy communities which includes brownfield sites.[241] Maryland's Brownfield Revitalization Incentive Program may also provide financial incentives to redevelop brownfields if it is located in a participating jurisdiction and fulfills program requirements.[242] Since brownfield sites were already approved for construction and are now sitting unused, or are underutilized, local communities and jurisdictions are usually in support of repurposing the land to a more beneficial use. They also may already have baseline environmental data collected.

Although there are benefits to working with brownfields, there are still many challenges with this type of construction that depend on the prior use of the site.[243] While some brownfields have no hazardous substances, pollution, or contamination, such as a reclaimed coal mine, some sites may be nearly impossible to reuse in their existing condition, like contaminated industrial sites or former military properties. Working with these sites includes challenges like navigating environmental risk, additional permitting, and remediation and site preparation.[244] Each of these challenges depends on the severity of environmental risk posed by the brownfield and other specific existing conditions including the possibility of environmental controls in place to address contamination. The construction of solar farms on brownfields is a growing possibility, and changes will likely continue coming in the future to ease these challenges. In 2022, the EPA released a best practices guide to constructing solar on landfills, and additional guides like this can lead to an increase in solar adoption on brownfield sites that were once challenges to construct.[245]

[241] "Supporting Brownfields Redevelopment Using Tax Incentives and Credits," United States Environmental Protection Agency, accessed October 30, 2023, www.epa.gov/brownfields/supporting-brownfields-redevelopment-using-tax-incentives-and-credits.
[242] "Maryland's Brownfield Revitalization Incentive Program (BRIP)," Maryland Department of the Environment, accessed October 30, 2023, mde.maryland.gov/programs/land/MarylandBrownfieldVCP/Pages/Brownfields-Revitalization-Incentive-Program.aspx.
[243] "Brownfields Redevelopment," Encore Renewable Energy, accessed October 30, 2023, encorerenewableenergy.com/services/brownfields-redevelopment/.
[244] "Redeveloping Brownfields with Solar: Challenges and Opportunities," American Clean Power Association, August 30, 2022, cleanpower.org/wp-content/uploads/2022/08/ACP_FactSheet_Brownfields_220830.pdf.
[245] "Best Practices for Siting Solar Photovoltaics on Municipal Solid Waste Landfills," US EPA & NREL, May 2022, www.epa.gov/system/files/documents/2022-05/best-practices-siting-solar-photovoltaics-municipal-solid-waste-landfills_051722-pub.pdf.

GREENFIELD TIMELINE IMPACTS

The challenges of working with greenfields are very similar to the benefits of working with brownfields: there are traditional siting barriers that come with constructing solar such as a lack of infrastructure, unfavorable topography, or presence of plant or animal species to protect. If the site is located in a remote field, construction must include roads to the site as well as transmission and distribution lines out to the field to allow for grid interconnection. It may be challenging to find flat, unshaded, suitable land that does not require deforestation or disturbances to the ecosystem. Though greenfield construction does not include potential issues with environmental contamination and remediation, site selection can be lengthy depending on the environment and available space. The site must follow all zoning regulations as previously mentioned that may take longer with a new site rather than a brownfield.

FARMLAND TIMELINE IMPACTS

Agrivoltaics is the co-location of solar energy installation and agriculture around the solar panels to ease the land conflict between the two industries.[246] Solar siting on farms has some shared benefits with brownfield sites as there may be existing infrastructure available to use for panel construction and electricity transmission and distribution. Though agrivoltaics is still a relatively new concept, there are at least five commercial solar-crop sites operating in Colorado, Massachusetts, and Maine, and an additional $15 million in research is being conducted by the U.S. Department of Energy. Massachusetts, New Jersey, and Colorado are beginning to rollout incentives for agrivoltaics intended to ease funding concerns. At present, the capital costs of agrivoltaics are high and the system design is complex, which could lead to lengthier development timelines. In a 2020 report, the NREL modeled the cost of a typical fixed PV system to be $1.53/W while crop systems cost between $1.83/W-$2.33/W depending on the technology used.[247] However, the siting process is easier because of the existing land use. Therefore, in the future, solar development on farms could be an accelerated path to solar.

[246] Michele Boyd, "The Potential of Agrivoltaics for the U.S. Solar Industry, Farmers, and Communities," Energy.gov, April 17, 2023, www.energy.gov/eere/solar/articles/potential-agrivoltaics-us-solar-industry-farmers-and-communities.

[247] Kelsey Horowitz, Vignesh Ramasamy, Jordan Macknick, and Robert Margolis, "Capital Costs for Dual-Use Photovoltaic Installations: 2020 Benchmark for Ground-Mounted PV Systems with Pollinator-Friendly Vegetation, Grazing, and Crops," National Renewable Energy Laboratory, December 2020, www.nrel.gov/docs/fy21osti/77811.pdf.

CONCLUSION AND NEXT STEPS

State policy and procedures regarding solar installation can be barriers to building and interconnecting solar to the grid if the prices are too high, the process is too long, or regulations are too hard to abide by. However, these same policies and procedures are necessary to optimize land use, ensure the grid can handle an influx of solar, and keep track of solar projects in the state. Therefore, it is important to optimize Maryland's permitting processes, net metering laws, and zoning ordinances to maximize the amount of solar installed in an organized manner. Peer states provide a myriad of examples on how best to do this, and a deeper analysis could be conducted on all peer states existing permitting processes for solar installation.

The current net metering process and capacity limits in Maryland are similar to target peer states like Delaware and Massachusetts. The peer state processes, along with feedback from stakeholders in Maryland, could be analyzed to determine if the current state regulations should be altered.

This memorandum does not include a mapped-out development timeline based on the permitting process. That would depend on the scale of the solar installation as well as the location of the installation. This could be constructed at a very base level with the current publicly available information, but additional case studies of solar installations in Maryland would be required to create a more developed timeline.