

PUBLIC SERVICE COMMISSION OF MARYLAND

RENEWABLE ENERGY PORTFOLIO STANDARD REPORT

With Data for Calendar Year 2021

In compliance with Section 7-712 of
the Public Utilities Article,
Annotated Code of Maryland

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November 2022

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I. INTRODUCTION

This document constitutes the annual report of the Public Service Commission of Maryland (“Commission”) regarding the implementation of the Maryland Renewable Energy Portfolio Standard (“RPS”) Program, with data for calendar year 2021. This report is submitted pursuant to § 7-712 of the Public Utilities Article, *Annotated Code of Maryland* (“PUA”), which requires the Commission to report to the General Assembly on the status of the implementation of the RPS Program on or before December 1 of each year.¹ The Maryland RPS Program is designed to support a stable and predictable market for energy generated from renewables, and to lower the cost to consumers of electricity produced from these resources. Implementation of the RPS Program assists in overcoming market barriers seen as impediments to the development of the industry. Moreover, increasing reliance upon renewable energy technologies to satisfy electric power requirements can result in long-term emission reductions, increased fuel diversity, and economic benefits to the State.²

The calendar year 2021 electricity supplier compliance reports, as verified by the Commission, indicate that the State of Maryland RPS obligations were almost entirely fulfilled through the submission of the appropriate level of Tier 1 and Tier 2 Renewable Energy Credits (“RECs”).³ Remaining calendar year 2021 RPS obligations were satisfied by compliance fees, also known as Alternative Compliance Payments (“ACPs”).

A. Objectives of the Program

The objective of PUA § 7-701 *et seq.* (hereinafter, “RPS Statute”) is to recognize and to develop the benefits associated with a diverse portfolio of renewable energy resources to serve Maryland. The State’s RPS Program does this by recognizing the environmental and consumer benefits associated with renewable energy. The RPS Program requires electricity suppliers to supply a prescribed minimum portion of their retail electricity sales with various renewable energy resources, which have been classified within the RPS Statute as Tier 1 and Tier 2 renewable sources. The program is implemented through the creation, sale, and transfer of RECs.

The development of renewable energy resources is further promoted by requiring electricity suppliers to provide an ACP for failing to acquire sufficient RECs to satisfy the RPS as set forth in PUA § 7-703. Compliance fees are deposited into the Maryland Strategic Energy Investment Fund (“SEIF”) as dedicated funds to provide for loans and grants that spur the creation of new Tier 1 renewable energy resources in the State. Responsibility for developing renewable energy resources is vested with the Maryland Energy Administration (“MEA”).

¹ Electricity suppliers must file a RPS compliance report with the Commission for the prior calendar year by April 1st of the subsequent year. Consequently, this report, which is due to the General Assembly in December 2022, highlights data from electricity suppliers’ 2021 compliance reports and other relevant 2021 data. In compliance with PUA § 7-712, topics addressed in this report include the availability of Tier 1, Tier 1 Solar, and Tier 2 renewable energy sources, compliance fees collected to support in-State renewable projects, and other pertinent information.

² See PUA § 7-702, which describes the legislative intent and legislative findings in support of the enactment of the Maryland Renewable Energy Portfolio Standard.

³ See Section I.B.2 for a description of eligible Tier 1 and Tier 2 resources and requirements.

B. Overview of the Maryland RPS Program

Under the RPS Program, Maryland electricity suppliers are required to demonstrate compliance on an annual basis with an escalating renewable energy portfolio standard. This requirement applies to both competitive retail suppliers and electric companies in the State, including those that provide Standard Offer Service.⁴ Electricity suppliers must file annual compliance reports with the Commission verifying that the renewable requirement for each entity has been satisfied.

A REC constitutes the renewable attributes associated with the production of one megawatt-hour (“MWh”) of electricity generated using eligible renewable resources. As such, a REC is a uniquely-identified tradable commodity equal to one MWh of electricity generated or obtained from an eligible renewable energy resource. Generators and electricity suppliers may trade RECs using a Commission-approved system known as the Generation Attributes Tracking System (“GATS”). The GATS system is operated by PJM Environmental Information Services, Inc. (“PJM-EIS”) and is designed to track the ownership and trading of generation attributes.⁵ A REC has a three-year lifespan during which it may be transferred, sold, or redeemed. However, each electricity supplier must document annually the retirement of RECs equal to the percentage specified by the RPS statute⁶ or pay an ACP commensurate with any shortfalls.

1. Registration of Renewable Energy Facilities

Facilities eligible for the Maryland RPS Program must be located in PJM (the wholesale bulk power control area in which Maryland resides)⁷ or in a control area that is adjacent to the PJM region,⁸ so long as the electricity produced is delivered into the PJM region. However, facilities generating electricity from solar energy, geothermal, poultry litter-to-energy, waste-to-energy, or refuse-derived fuel are eligible only if the facility is connected with the electric

⁴ Standard Offer Service (“SOS”) is electricity supply purchased from an electric company by the company’s retail customers who cannot or choose not to transact with a competitive supplier operating in the retail market. *See* PUA §§ 7-501(n) and 7-510(c).

⁵ An attribute is “a characteristic of a generator, such as location, vintage, emissions output, fuel, state RPS Program eligibility, etc.” PJM-EIS, *GATS Operating Rules* (May 2014) at 3.

⁶ Using the Tier 2 RPS requirement as an example, assume a hypothetical electricity supplier operating in the State had 100,000 MWh in retail electricity sales for 2021. In 2021, the Tier 2 requirement was 2.5 percent; therefore, the electricity supplier would have to either verify the purchase of 2,500 Tier 2 RECs or pay an ACP for deficits. Similar requirements apply to Tier 1 and Tier 1 Solar, although the percentage obligation and ACP denomination differs depending on the tier and calendar year, as outlined by the RPS Statute.

⁷ The PJM wholesale market includes all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

⁸ A control area is an “electric system or systems, bounded by interconnection metering and telemetry, capable of controlling generation to maintain its interchange schedule with other control areas and contributing to frequency regulation. For the purposes of this document, a control area is defined in broad terms to include transmission system operations, market, and load-serving functions within a single organization. A control area operator may be a system operator, a transmission grid operator, or a utility.” PJM-EIS, *Generation Attribute Tracking System (GATS) Operating Rules* (April 2018) at 5. For example, the multi-state area controlled by the PJM Regional Transmission Operator is one control area, as is the adjacent Midwest Independent System Operator (“MISO”) multi-state area, and the adjacent New York ISO.

distribution grid serving Maryland. Finally, energy from a thermal biomass system must be used in Maryland to qualify for the RPS program.⁹

Before recommending certification of a Renewable Energy Facility (“REF”), Commission Staff must determine whether the facility meets the standards set forth by the RPS statute and Commission regulations (COMAR 20.61). REF applicants who qualify under Maryland’s RPS Program must complete the appropriate application for REF certification posted on the Commission’s RPS website.¹⁰ In addition to the geographic requirements, applicants must also meet the fuel source requirements associated with Tier 1 or Tier 2 (*see* Table 1, below). Verification of the fuel source is completed with the aid of Energy Information Administration Form 860 (“EIA-860”) to validate each facility’s rated nameplate capacity, fuel source(s), location, and commercial operation in-service date.¹¹ Facilities that co-fire a REC-eligible renewable fuel source with non-eligible fuel sources must also submit a formula or methodology to account for the proportion of total electricity generated by the eligible fuel sources, which then may be credited with RECs. In addition to obtaining Commission certification, all REFs must register with GATS to track and transact business related to RECs. The GATS account must be established with the certification number issued by the Commission upon approval of the REF application.

2. Maryland RPS Annual Percentage Requirements

To comply with the Maryland RPS Program, electricity suppliers must acquire RECs derived from Maryland-certified Tier 1 and Tier 2 renewable sources, as defined in PUA § 7-701. Eligible fuel sources for Tier 1 RECs and Tier 2 RECs are listed in Table 1; solar has its own standard within Tier 1.

⁹ There are currently no thermal biomass facilities in Maryland.

¹⁰ REF applications are maintained by the Commission and are accessible online, available at: <https://www.psc.state.md.us/electricity/description-documents-maryland-renewable-energy-portfolio-standard-program/>.

¹¹ Submitting Form EIA-860 is a requirement under Section 13(b) of the Federal Energy Administration Act of 1974 (Public Law 93-275) for generating plants, regulated and unregulated, which have a nameplate rating of 1 MW or more, are operating or plan to operate within five years, and are connected to the transmission grid.

Table 1 Eligible Tier 1 and Tier 2 Sources

Tier 1 Renewable Sources	Tier 2 Renewable Sources
<ul style="list-style-type: none"> • Solar, including energy from photovoltaic technologies and solar water heating systems • Wind • Qualifying Biomass • Methane from a landfill or wastewater treatment plant • Geothermal • Ocean • Fuel Cell that produces electricity from a Tier 1 source • Hydroelectric power plant less than 30 MW capacity • Poultry litter-to-energy • Waste-to-energy • Refuse-derived fuel • Thermal energy from a thermal biomass system 	<ul style="list-style-type: none"> • Hydroelectric power other than pump storage generation <p><i>(Note: Tier 1 RECs may be used to satisfy Tier 2 obligations)</i></p>

As shown in the table below, there is a different percentage schedule corresponding to each tier and set-aside requirement comprising the Maryland RPS Program.

- The Tier 1 requirements gradually increase until peaking in 2030, after which they are maintained at those levels.
- The Tier 1 Solar set-aside requirement increases from 7.5 percent in 2021 to 14.5 percent by 2030.¹² This ramp-up period for the solar carve-out corresponds in part with the implementation of the pilot program on community solar energy generating facilities, which was established by the passage of Senate Bill 398 and House Bill 1087 and signed into law in May 2015. The three-year pilot program was extended through 2024 by House Bill 683, enacted in May 2019. There is a potential that Solar Renewable Energy Credits (“SRECs”) generated by eligible community solar facilities could serve to help meet the increasing Tier 1 Solar set-aside in the coming years.
- Beginning in 2017, a constant Tier 1 Offshore Wind set-aside of up to 2.5 percent commenced as part of the Tier 1 portfolio.¹³ In Order No. 88192, the Commission

¹² “Tier 1 Solar set-aside” refers to the requirement to obtain RECs for energy derived from qualified solar energy facilities. The Tier 1 Solar set-aside requirement applies to retail electricity sales in the State by electricity suppliers and is a subset of the Tier 1 standard.

¹³ The Maryland Offshore Wind Energy Act of 2013 (2013 Md. Laws, Ch. 003) established an offshore wind set-aside within the Tier 1 requirement. Beginning in 2017, Tier 1 may include a Commission-determined amount of

established specific offshore wind carve-outs from 2021 through 2042 ranging from 0.60 percent to 2.03 percent. Senate Bill 516, enacted in May 2019, increased the RPS requirements to 50 percent by 2030, and established additional offshore wind carve-outs beginning in 2027. The Commission will incorporate these increased carve-outs into the offshore wind RPS obligations as part of its review of Round 2 offshore wind project applications.

- Beginning in 2023, a Tier 1 geothermal set-aside of up to 0.05 percent will commence as part of the Tier 1 portfolio, rising to 1.0 percent in 2028.
- Maryland’s Tier 2 requirement of 2.5 percent was re-established by Senate Bill 65 in 2021.

Table 2 Annual RPS Requirements by Tier

Compliance Year	Tier 1 (Excluding Carve-outs)	Solar	Offshore Wind¹⁴	Post 2022 Geothermal	Tier 2	Total
2021	21.93%	7.50%	1.37%	N/A	2.50%	33.30%
2022	23.24%	5.50%	1.36%	N/A	2.50%	32.60%
2023	23.87%	6.00%	2.03%	0.05%	2.50%	34.45%
2024	27.06%	6.50%	0.14%	0.15%	2.50%	36.35%
2025	26.84%	7.00%	1.66%	0.25%	2.50%	38.25%
2026	27.39%	8.00%	2.61%	0.50%	2.50%	41.00%
2027	18.98%	9.50%	13.02%	0.75%	2.50%	44.75%
2028	18.98%	11.00%	13.02%	1.00%	2.50%	46.50%
2029	23.98%	12.50%	13.02%	1.00%	2.50%	53.00%
2030+	22.48%	14.50%	13.02%	1.00%	2.50%	53.50%

At certain renewable procurement cost thresholds, an electricity supplier can request that the Commission consider a delay in scheduled Tier 1 and Tier 1 Solar RPS percentages.¹⁵ To date, no such request has been made by electricity suppliers operating in the Maryland marketplace.

offshore wind RECs (“ORECs”), not to exceed 2.5 percent. The project must be generating RECs in order for the obligation to begin. In the absence of a Commission-determined OREC obligation, electricity suppliers must satisfy the carve-out using RECs derived from other Tier 1 renewable sources.

¹⁴ This percentage includes only the Commission-approved offshore wind energy carve-out from Order No. 88192 and Order No. 90011.

¹⁵ PUA § 7-705(e)-(f).

3. Maryland RPS Alternative Compliance Payment Requirements

Electricity suppliers who do not meet their RPS obligation through the retirement of eligible RECs must submit an ACP for every unit of shortfall. Table 3 presents the ACP schedule separated by tiers for each compliance year of the RPS Program moving forward.

Table 3 ACP Schedule (\$/MWh)

Compliance Year	Tier 1 (Excluding Carve-outs)	Solar	Post 2022 Geothermal	Tier 2	IPL¹⁶ Tier 1
2021	\$30	\$80	N/A	\$15	\$2
2022	\$30	\$60	N/A	\$15	\$2
2023	\$30	\$60	\$100	\$15	\$2
2024	\$27.50	\$60	\$100	\$15	\$2
2025	\$25	\$55	\$100	\$15	\$2
2026	\$24.75	\$45	\$90	\$15	\$2
2027	\$24.50	\$35	\$80	\$15	\$2
2028	\$22.50	\$32.50	\$65	\$15	\$2
2029	\$22.50	\$25	\$65	\$15	\$2
2030+	\$22.35	\$22.50	\$65	\$15	\$2

ACPs are remitted to the Maryland SEIF. With the passage of Chapter 757 of 2019, Alternative Compliance Payment revenues under the RPS are now required to be used to benefit low-income renewable energy projects.¹⁷

II. ELECTRICITY SUPPLIER COMPLIANCE REPORTS

Calendar year 2021 marked the 16th compliance year for the Maryland RPS. The RPS compliance reports submitted to the Commission by electricity suppliers, along with information obtained from GATS, provide information regarding the retired RECs and the underlying REFs (e.g., type and location of generators) utilized by electricity suppliers to comply with Maryland RPS obligations.¹⁸ RPS compliance reports were filed by 107 electricity suppliers, including: 78

¹⁶ Industrial Process Load (“IPL”) means the consumption of electricity by a manufacturing process at an establishment classified in the manufacturing sector under the North American Industry Classification System. Under PUA § 7-705(b)(2) and COMAR 20.61.01.06.E(5), a supplier sale for IPL is required to meet the entire Tier 1 obligation for electricity sales, including solar. However, the ACP for an IPL Tier 1 non-solar shortfall and a Tier 1 Solar shortfall is the same. For IPL, there is no ACP for Tier 2 shortfalls.

¹⁷ State Government Article, § 9–20B–05(i).

¹⁸ According to PUA § 7-709, a REC can be diminished or extinguished before the expiration of three years by: the electricity supplier that received the credit; a nonaffiliated entity of the electricity supplier that purchased or otherwise received the transferred credit; or demonstrated noncompliance by the generating facility with the requirements of PUA § 7-704(f). In the PJM region, the regional term of art is “retirement,” which describes the process of removing a REC from circulation by the REC owner, *i.e.*, the owner “diminishes or extinguishes the REC.” PJM-EIS, *GATS Operating Rules* (May 2014) at 54-56.

competitive retail suppliers; 18 brokers or competitive electricity suppliers with zero retail electricity sales; and 11 electric companies, of which four are investor-owned utilities.

According to the filed compliance reports, there were approximately 58.7 million MWh of total retail electricity sales in Maryland for 2021 (up from 57.1 million MWh in 2020); 57.5 million MWh of retail electricity sales were subject to RPS compliance, and 1.2 million MWh were exempt.¹⁹ Maryland electricity suppliers retired about 15.2 million RECs in 2021, more than the 14.3 million RECs retired for compliance in 2020. The total cost of RECs retired in 2021 totaled \$332.7 million, up from \$223.2 million in 2020.

Table 4 displays the average cost per REC retired in each tier since 2008. The increase in REC prices likely reflects the increasing RPS requirements. The rise in SREC prices may be attributable to an increase in demand for SRECs due to the effects of the Clean Energy Jobs Act.

Table 4 Average Cost of RECs per Tier (2008 – 2021)

Year	Tier 1 Non-Solar	Tier 1 Solar	Tier 2
2008	\$0.94	\$345.45	\$0.56
2009	\$0.96	\$345.28	\$0.43
2010	\$0.99	\$328.57	\$0.38
2011	\$2.02	\$278.26	\$0.45
2012	\$3.19	\$201.92	\$0.44
2013	\$6.70	\$159.71	\$1.81
2014	\$11.64	\$144.06	\$1.81
2015	\$13.87	\$130.39	\$1.71
2016	\$12.22	\$110.63	\$0.96
2017	\$7.14	\$38.18	\$0.48
2018	\$6.54	\$31.91	\$0.66
2019	\$7.77	\$47.26	\$1.05
2020	\$8.24	\$66.10	\$1.06
2021	\$14.36	\$72.59	\$6.45

As demonstrated by the table below, the aggregated cost of compliance with the Maryland RPS Program displays a general growth rate apart from a reduction in 2017. Despite the downward trends in 2017 continuing into 2018, in 2019 Tier 1 and Solar REC prices increased significantly since 2018. This trend only accelerated beginning in 2019, with REC costs rising 56.9 percent from 2019 to 2020, and an additional 83.6 percent from 2020 to 2021, with the total cost of compliance increasing to \$409.8 million.

¹⁹ According to PUA § 7-703(a)(2), exceptions for the RPS requirement may include: IPL which exceeds 300,000,000 kWh by a single customer in a year; regions where residential customer rates are subject to a freeze or cap (*see* PUA § 7-505); or electric cooperatives under a purchase agreement that existed prior to October 1, 2004, until the expiration of the agreement. COMAR 20.61.01.06(D) exempts any sale of electricity that is marketed or otherwise represented to customers as renewable or having characteristics of a Tier 1 renewable source or Tier 2 renewable source.

Table 5 Total Cost of RECs per Year (2016 – 2021)

	Tier	2016	2017	2018	2019	2020	2021
Total REC Costs	Tier 1	\$88,200,121	\$50,045,621	\$56,406,247	\$79,320,505	\$99,836,127	\$187,346,301
	Solar	\$45,556,987	\$21,275,664	\$27,351,388	\$55,166,116	\$122,943,987	\$144,411,601
	Tier 2	\$1,441,416	\$687,785	\$1,049,293	\$58,899	\$386,590	\$959,225
	ACPs	\$33,933	\$55,032	\$67,796	\$7,730,223	\$52,240	\$77,129,013
	Total	\$135,234,473	\$72,066,120	\$84,876,742	\$142,277,762	\$223,220,964	\$409,848,162
Total RECs Retired	Tier 1	7,216,439	7,006,113	8,627,737	10,210,275	12,117,585	13,045,432
	Solar	411,787	557,224	857,232	1,167,329	1,859,976	1,989,505
	Tier 2	1,501,587	1,448,567	1,599,819	55,879	366,260	148,702
	Total	9,129,813	9,011,904	11,084,788	11,433,483	14,343,821	15,183,639
RPS % Required	Tier 1	12.00%	11.95%	14.30%	15.20%	22.00%	23.30%
	Solar	0.70%	1.15%	1.50%	5.50%	6.00%	7.50%
	Tier 2	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
	Total	15.20%	15.60%	18.30%	23.20%	30.50%	33.30%

Due to a significant shortfall in available SRECs, ACPs accounted for a significant portion (\$77.1 million) of the total \$409.8 million RPS compliance costs in 2021. Prior to 2021, reliance on ACPs had been limited. This shortage of SRECs explains why the average SREC costs rose to \$72.59, just shy of the \$80 ACP for SRECs, after having fallen every year up until 2019.

Table 6 Results of the 2021 RPS Compliance Reports

RPS Compliance Year		Tier 1 Non-Solar	Tier 1 Solar	Tier 1 IPL	Tier 2	Total
2021	RPS Obligation	12,975,526	2,912,479	-	147,946	16,035,951
	Retired RECs	13,045,432	1,989,505	-	148,702	15,183,639
	ACP Required	\$232,930	\$76,884,624	-	\$11,459	\$77,129,013

Note: Some electricity suppliers retired more RECs than required.

RECs are valid to demonstrate RPS compliance for the calendar year in which they were generated and in the following two calendar years.²⁰ Figure 1 aggregates the Maryland RPS tiers on the basis of generation year. For the 2021 compliance year, 45.4 percent of RECs retired were generated in 2021; 40.4 percent were generated in 2020; and the remaining 14.2 percent were generated in 2019. This data conveys that RECs are in high demand as they are most often retired the year of their generation.

²⁰ COMAR 20.61.03.01 C (unless the REC is diminished or extinguished before expiration).

Figure 1 RECs Retired in 2021 by Generation Year

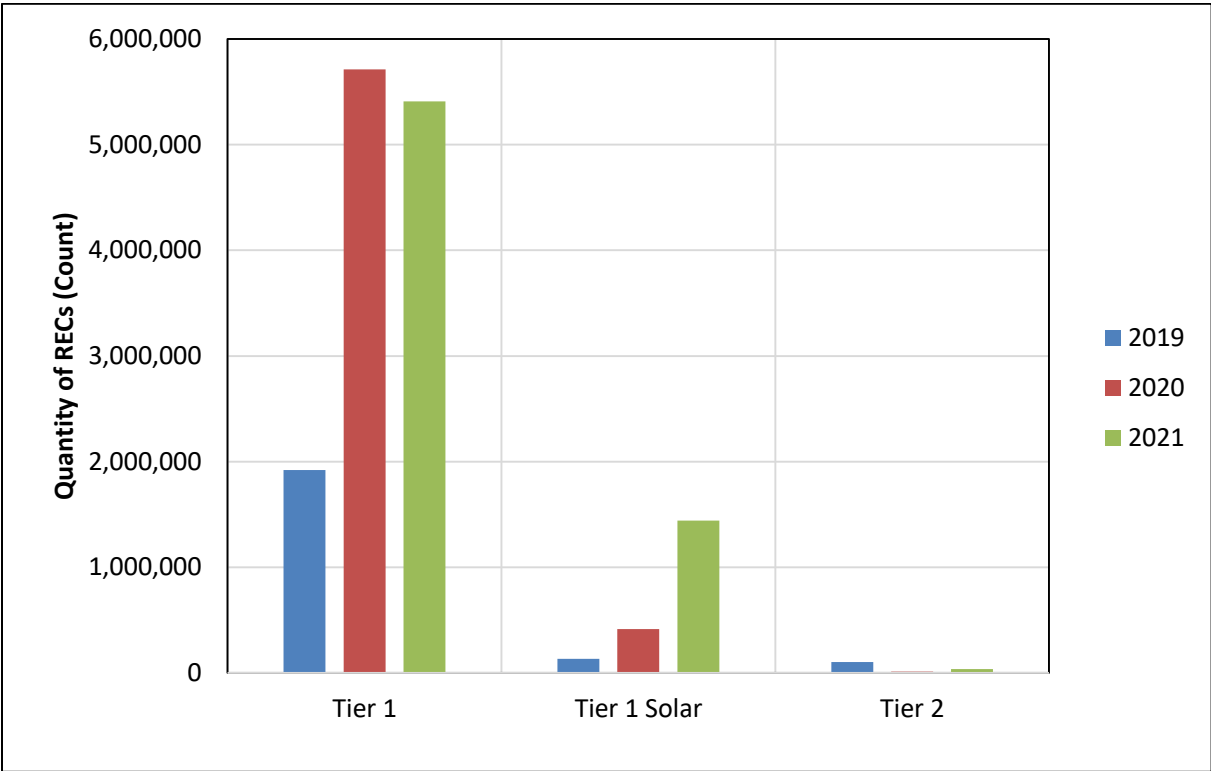
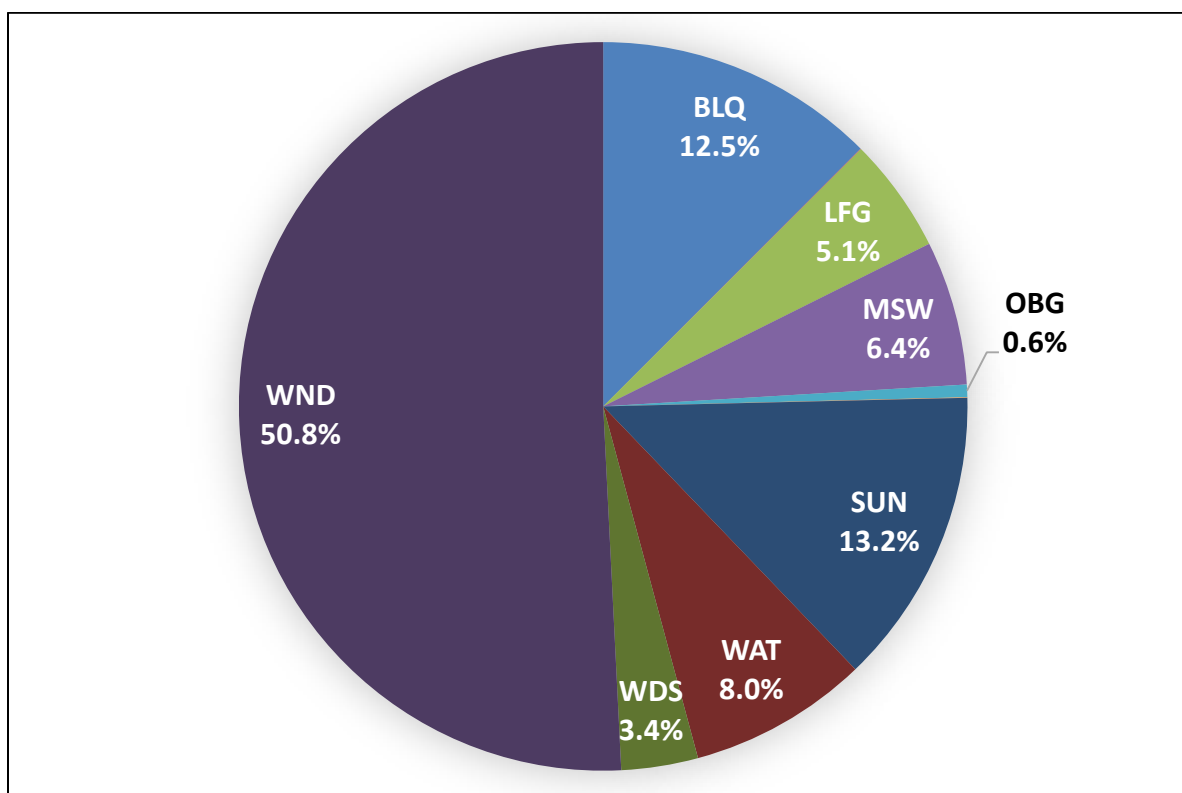


Figure 2 illustrates the fuel sources used to satisfy Tier 1 RPS requirements for the 2021 RPS compliance year. Of the Tier 1 RECs retired for 2021, the resources from which the RECs were sourced consisted primarily of wind, municipal solid waste, and black liquor. Although not pictured, Tier 2 RPS requirements for the 2021 RPS compliance year were satisfied exclusively by RECs derived from hydroelectric power.

Figure 2 2021 Tier 1 Retired RECs by Fuel Source²¹

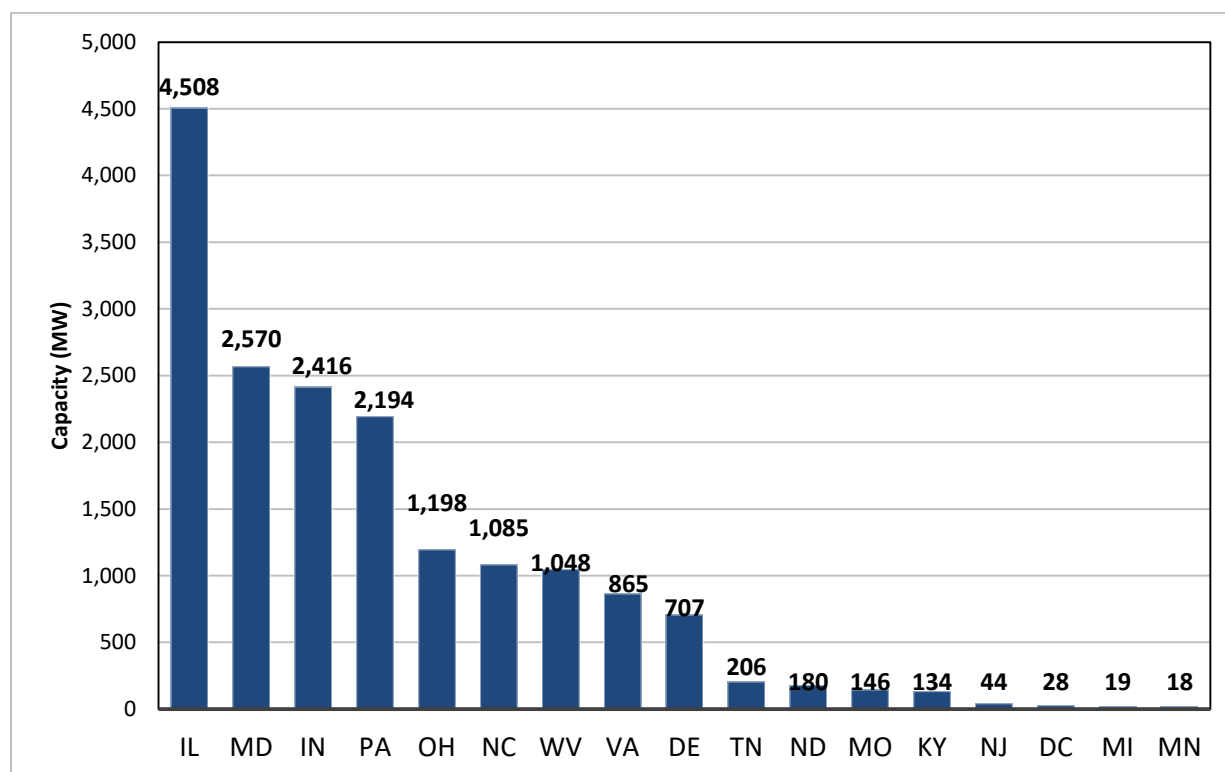


Abbreviations: BLQ, Black Liquor; LFG, Landfill Gas; MSW, Municipal Solid Waste; OBG, Other Biomass Gas; SUN, PV solar; WAT, Hydroelectric; WDS, Wood and Waste Solids; WND, Wind.

Figure 3 presents the geographical location and the total generating capacity (17,365 MW) for all Maryland RPS-certified facilities regardless of Tier. RPS requirements also exist in the surrounding states, which generally support out-of-state and regional market participation. Illinois is the largest single contributor, with over 97 percent of its registered capacity being wind generation.

²¹ WAT includes Tier 1 only. Solar thermal and geothermal contributed too few RECs to be seen on the chart.

Figure 3 Total Rated Capacity by State (MW)²²



For the 2021 compliance year, Figure 4 displays aggregated REC data to convey general relationships among the states that contributed RECs. Illinois supplied the largest number of RECs purchased by retail electricity suppliers (24.1 percent), followed by Maryland (21.0 percent), Virginia (17.1 percent), and Pennsylvania (9.5 percent). The remaining 13 states contributed a total of 28.4 percent of all RECs retired in 2021. The majority of RECs from in-State generators were sourced from Tier 1 non-solar (37.6 percent) and solar photovoltaic (61.8 percent).

²² PJM-EIS, Generation Attribute Tracking System, Database query, (August 1, 2021). The information in this figure does not include Commission-authorized RECs that have not established a REC account with PJM GATS.

Figure 4 Number of RECs Retired by Facility Location (2021)

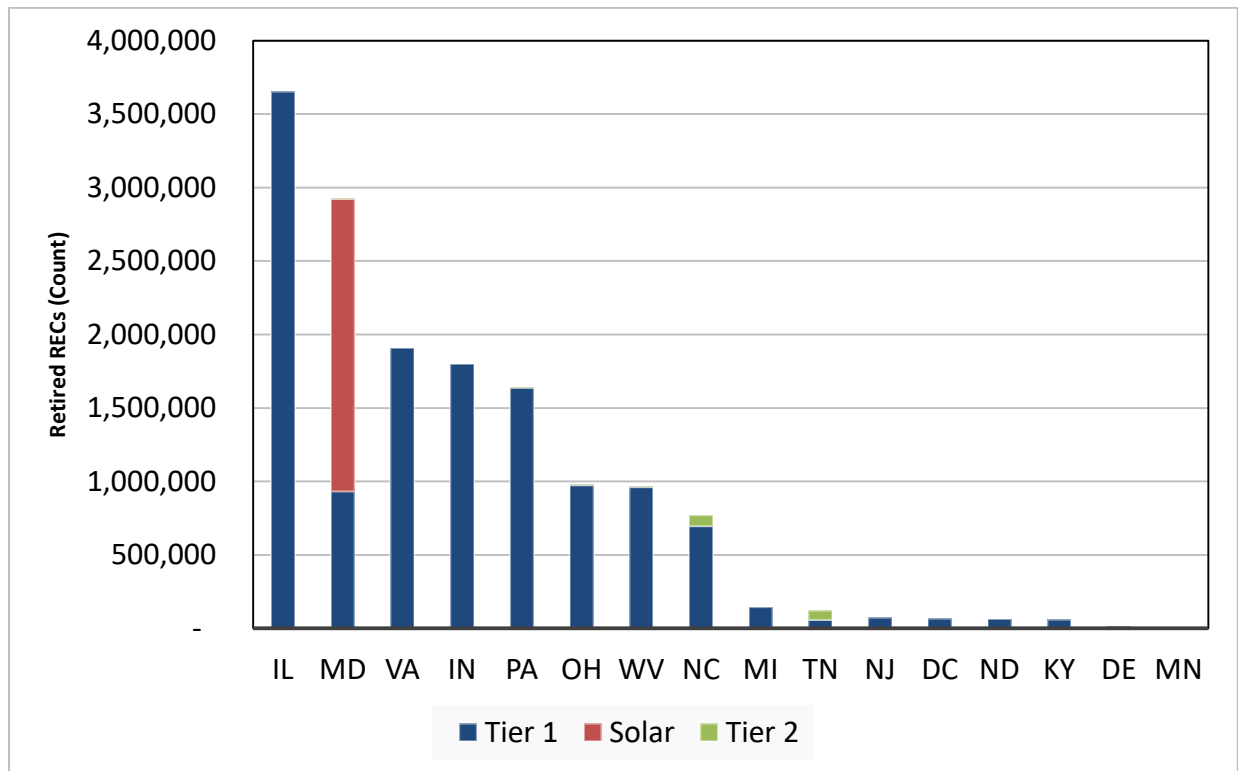


Table 7 and Table 8 provide the quantitative data in support of the previous figure. Table 7 provides the reported levels of RECs retired by Maryland electricity suppliers in 2021 on a tier and aggregate basis, whereas Table 8 provides the information on a percentage basis. As noted above, Illinois-generated RECs, followed by Maryland, Virginia, and Indiana were used in the largest aggregate amounts by Maryland electricity suppliers for 2021 RPS compliance.

Table 7 2021 RECs Retired by State

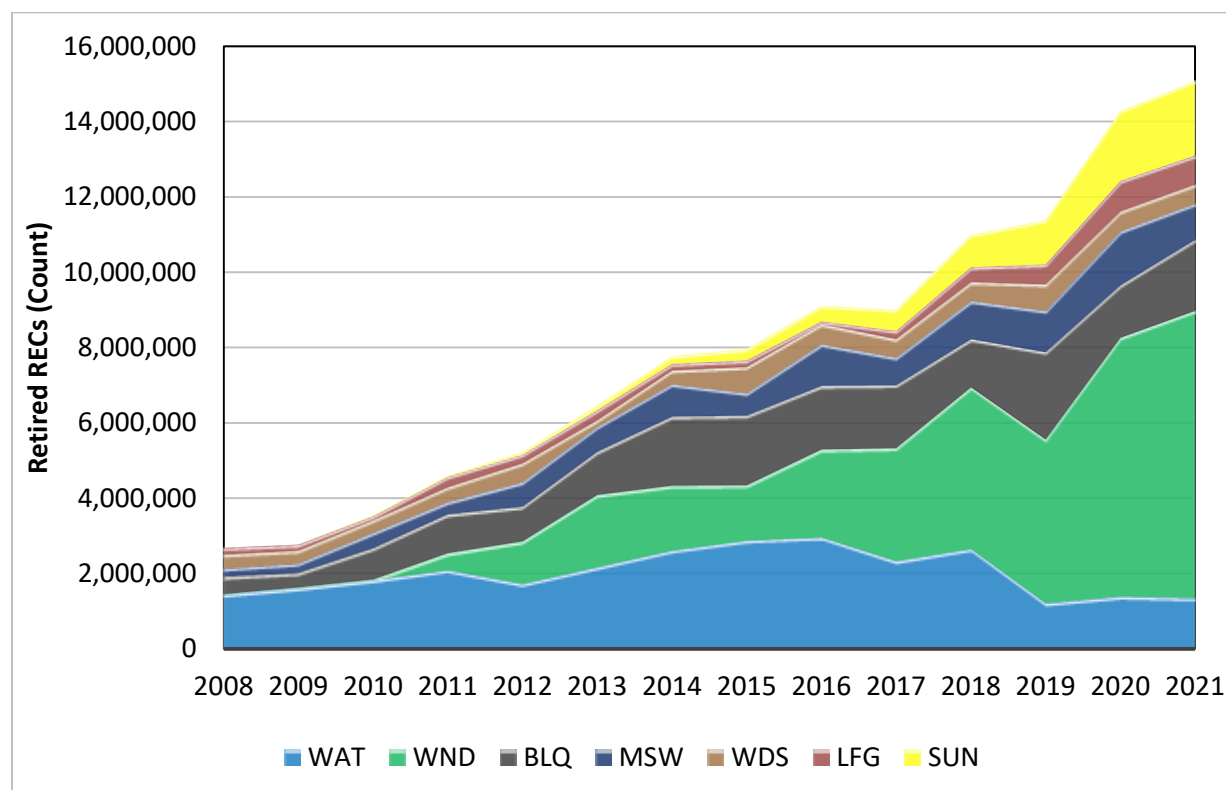
State	Tier 1 Non-Solar	Tier 1 Solar	Tier 2	All Tiers
IL	3,653,465	-	-	3,653,465
MD	933,575	1,989,505	450	2,923,530
VA	1,907,806	-	-	1,907,806
IN	1,798,840	-	-	1,798,840
PA	1,638,795	-	56	1,638,851
OH	975,127	-	3,999	979,126
WV	961,164	-	6,550	967,714
NC	690,283	-	74,369	764,652
MI	144,895	-	-	144,895
TN	57,714	-	63,278	120,992
NJ	71,964	-	-	71,964
DC	66,339	-	-	66,339
ND	64,409	-	-	64,409
KY	59,113	-	-	59,113
DE	16,480	-	-	16,480
MN	613	-	-	613
Total	13,045,432	1,989,505	148,702	15,183,639

Table 8 2021 RECs Retired by State (%)

State	Tier 1 Non-Solar	Tier 1 Solar	Tier 2	All Tiers
IL	28.0%	0.0%	0.0%	24.1%
MD	7.2%	100.0%	0.3%	19.3%
VA	14.6%	0.0%	0.0%	12.6%
IN	13.8%	0.0%	0.0%	11.8%
PA	12.6%	0.0%	0.0%	10.8%
OH	7.5%	0.0%	2.7%	6.4%
WV	7.4%	0.0%	4.4%	6.4%
NC	5.3%	0.0%	50.0%	5.1%
MI	1.1%	0.0%	0.0%	1.0%
TN	0.4%	0.0%	42.6%	0.8%
NJ	0.6%	0.0%	0.0%	0.5%
DC	0.5%	0.0%	0.0%	0.4%
ND	0.5%	0.0%	0.0%	0.4%
KY	0.5%	0.0%	0.0%	0.4%
DE	0.1%	0.0%	0.0%	0.1%
MN	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Figure 5 illustrates the growth in RECs retired in total and by fuel type from the introduction of the solar carve-out of the RPS requirement in 2008. For the third year in a row, wind was the largest contributor of total number of RECs. Total wind RECs retired for compliance have tripled since 2016. In 2020, solar REC retirements grew to be the second largest contributor of RECs. Note that the contributions from qualifying biomass sourced from agricultural crops, geothermal, other biomass liquid and gas, and solar thermal are too small to be seen on this chart.

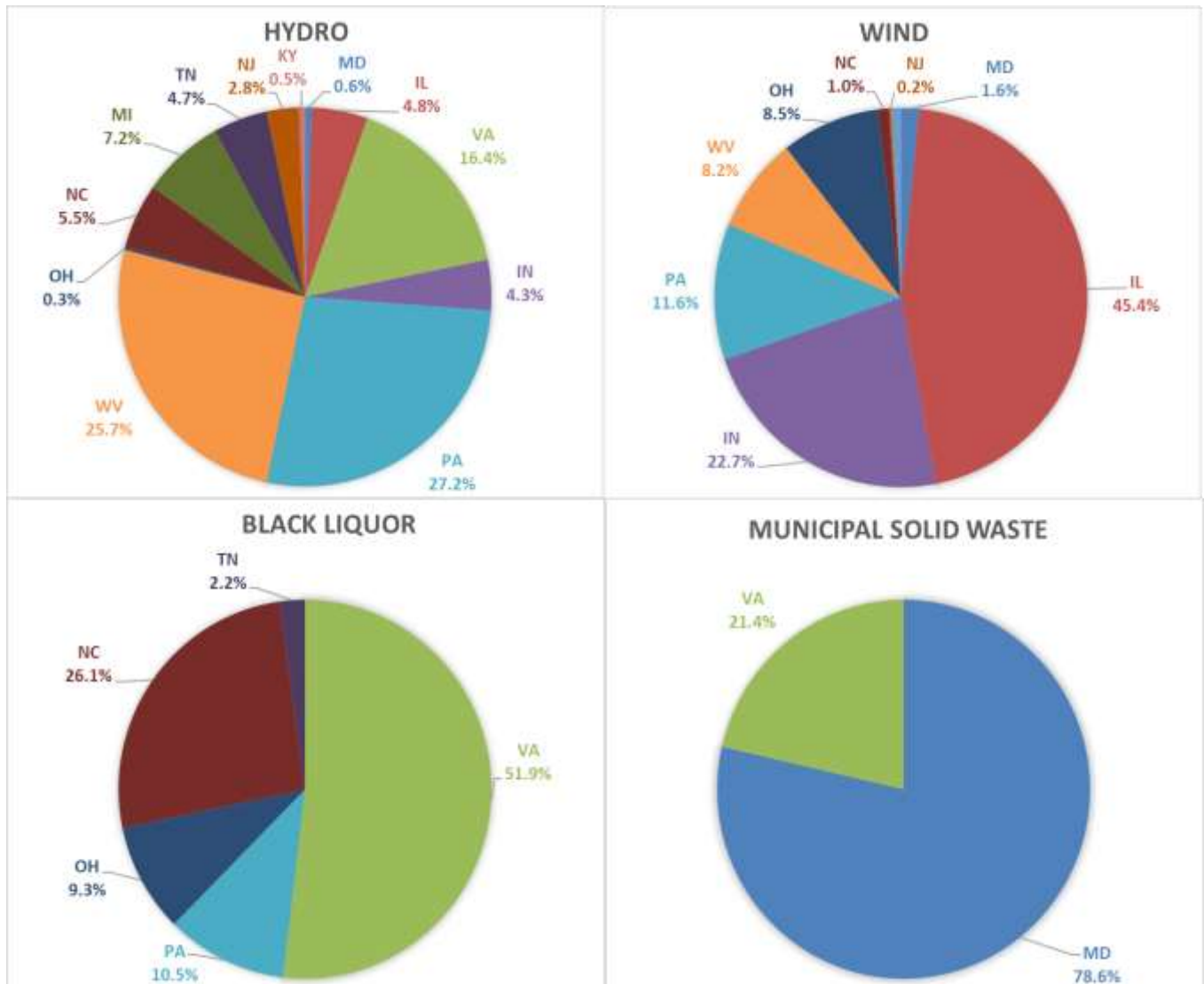
Figure 5 RECs Retired by Fuel Type (2008 – 2021)



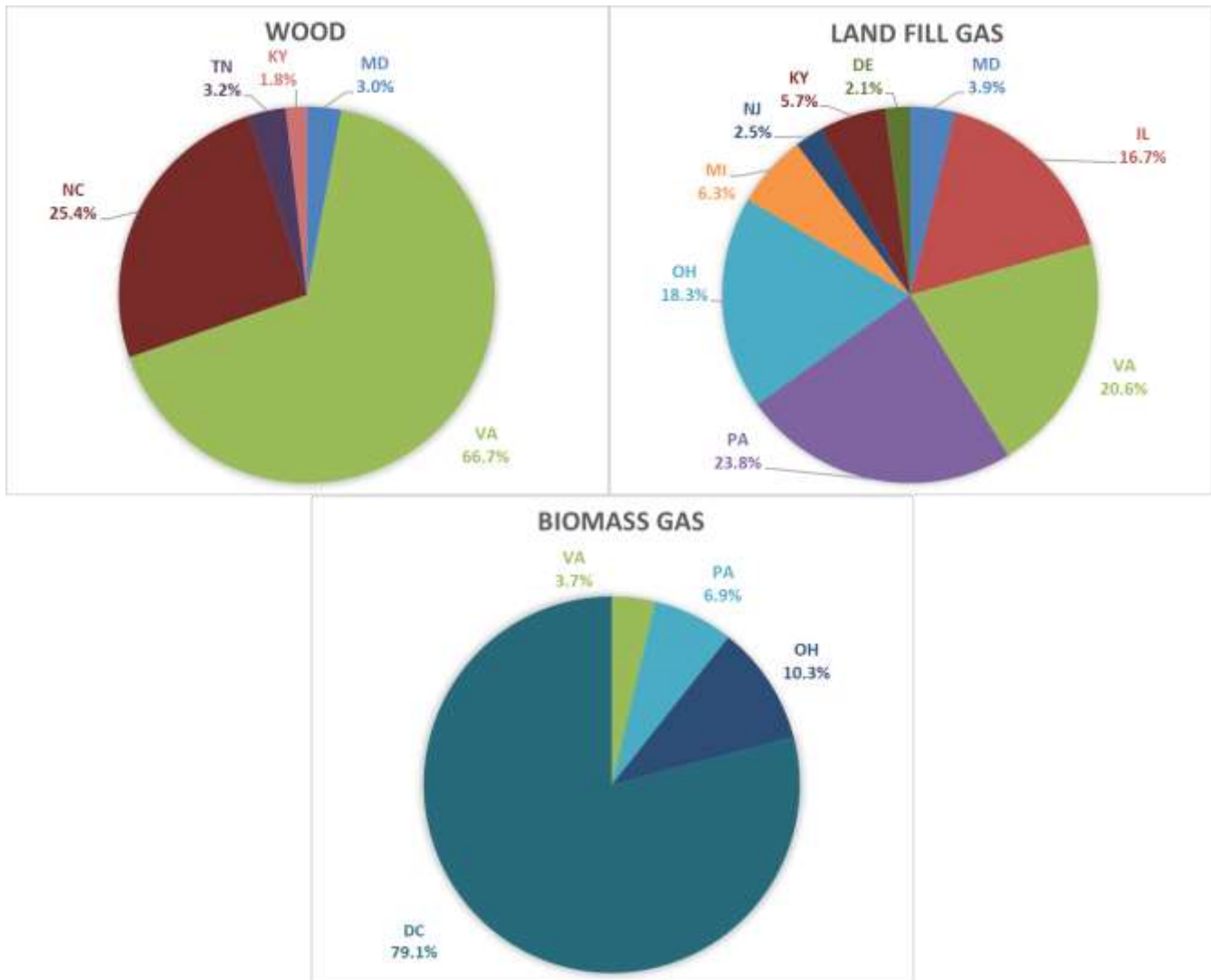
Abbreviations: BLQ, Black Liquor; LFG, Landfill Gas; MSW, Municipal Solid Waste; SUN, Solar Photovoltaic; WAT, Hydroelectric; WDS, Wood and Waste Solids; WND, Wind.

In 2021, all the RECs retired from geothermal and solar sources originated in Maryland. The seven remaining fuels used to comply with Maryland's 2021 RPS requirements corresponded to RECs generated in multiple other states, and Figure 6 shows the percentage contribution from each state for each of these seven fuels. Facilities located in Maryland provided 78.6 percent of municipal solid waste RECs retired for compliance in 2021. Maryland resources provided only 1.6 percent of wind RECs, 0.6 percent of hydroelectric RECs, 3.9 percent of landfill gas RECs, and 3.0 percent of wood and waste solids RECs.

Figure 6 Percentage of RECs Generated in Each State, by Fuel (2021) ²³



²³ Additional information pertaining to the source of renewable energy used to meet Maryland's 2021 RPS compliance requirements is presented in Appendices A and B. Appendix A provides a breakdown of the *number of RECs* used by electricity suppliers according to tier, fuel type, and facility location, while Appendix B presents the *number of facilities* by tier, fuel type, and facility location that provided RECs for compliance.



III. MARYLAND RENEWABLE ENERGY FACILITIES

Implementation of the Maryland RPS Program can provide an incentive for renewable generators to locate in Maryland and generate electricity. The renewable requirement establishes a market for renewable energy, and, to the extent Maryland's geography and natural resources can be utilized to generate renewable electricity, developers may locate projects within the State. This section of the report provides information about the REFs located in Maryland in 2021.²⁴ Renewable energy generated in Maryland can be used both in Maryland and in other states for RPS compliance purposes, and also can be sold in support of competitive retail electricity

²⁴ Specific information pertaining to the State's REFs as described herein was made available by PJM-EIS in the GATS State Agency Report.

supplier product offerings (*i.e.*, green power products).²⁵ Green power products are generally offered to the public with higher concentrations of electricity generated by renewable energy resources (*e.g.*, 50 or 100 percent) than required by Maryland’s RPS.

As shown in Table 9, in 2021, eligible sources located within Maryland generated approximately 1.3 million Tier 1 non-solar RECs, 1.6 million Tier 1 SRECs, and 2.1 million Tier 2 RECs. Additional analyses pertaining to the Maryland-based renewable generators are presented in Appendices B through D. Appendix B shows the disposition of RECs generated in Maryland in 2021. Appendix C provides the number of renewable energy facilities by county that are both located in Maryland and registered with GATS to participate in any one of the PJM states’ RPS programs. Appendix D provides the total capacity of these facilities, broken out by county and tier.

Table 9 2021 Maryland-Generated RECs by Fuel Source

Fuel Type		RECs (Quantity)	RECs (Percent)
Tier 1	Geothermal	2,888	0.1%
	Landfill Gas	42,988	0.9%
	Municipal Solid Waste	745,717	14.8%
	Solar Thermal ²⁶	17	0.0%
	Small Hydro	13,899	0.3%
	Wood Waste	13,842	0.3%
	Wind	517,711	10.3%
Tier 1 Solar	Solar PV	1,588,033	31.6%
	Solar Thermal	2,901	0.1%
Tier 2	Large Hydro	2,097,157	41.7%
Total		5,025,153	100.0%

Table 10 presents additional detail regarding the disposition of Maryland-generated RECs in calendar year 2021. Approximately 28 percent of the RECs generated by renewable facilities located within Maryland during 2021 are available for potential future sale in Maryland or in other states in subsequent compliance years. Just over 42 percent of all RECs generated in Maryland were retired in 2021 to meet the RPS requirements in Maryland and various other PJM states. Labeled as “Other” in Table 10, just over 29 percent of RECs were used for other purposes, which may include pending transfers between parties.

²⁵ Facilities located in Maryland are not necessarily registered by the Commission for the Maryland RPS; rather, certain facilities may seek certification out-of-state in support of a long-term contract for the RECs from an out-of-state counterparty. Counterparties can include an electricity supplier operating in a different state and purchasing the RECs to satisfy the RPS requirement for another state or other entities, such as brokers, that purchase the REC output for resale.

²⁶ Tier 1 Solar RECs may be used to satisfy Tier 1 obligations.

Table 10 Disposition of 2021 Maryland-Generated RECs

REC Tier	Available	RPS Compliance	Other	Total
Tier 1 Non-Solar	583,669	747,277	6,116	1,337,062
Tier 1 Solar	168,720	1,444,107	279	1,613,106
Tier 2	624,623	0	1,472,534	2,097,157
Total	1,377,012	2,191,384	1,478,929	5,047,325
(%)	27.3%	43.4%	29.3%	100.0%

Source: PJM-EIS

Table 11 presents, on a state-by-state basis, the distribution of the RECs both generated in-State and retired for RPS compliance purposes. In 2021, Maryland-generated RECs were retired for compliance purposes in five jurisdictions: the District of Columbia, Delaware, Maryland, New Jersey, and Pennsylvania.

Table 11 2021 Maryland-Generated RECs Retired for RPS Compliance by State

Tier	Fuel Type	DC	DE	MD	NJ	PA	Total
Tier 1 Non-Solar	Geothermal	-	-	2,492	-	-	2,492
	Land Fill Gas	-	-	114	-	2,695	2,809
	Municipal Solid Waste	-	-	517,534	-	-	517,534
	Small Hydro	-	-	7,538	5,420	-	12,958
	Wood Waste	-	-	9,335	-	-	9,335
	Wind	-	95,849	87,590	-	18,710	202,149
	Subtotal	-	95,849	624,603	5,420	21,405	747,277
	Percentage	0.0%	12.8%	83.6%	0.7%	2.9%	100.0%
Tier 1 Solar	Solar PV	2,493	-	1,439,106	-	7	1,441,606
	Solar Thermal	-	-	2,501	-	-	2,501
	Subtotal	2,493	-	1,441,607	-	7	1,444,107
	Percentage	0.2%	0.0%	99.8%	0.0%	0.0%	100.0%
Tier 2	Large Hydro	-	-	-	-	-	-
	Subtotal	-	-	-	-	-	-
	Percentage	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All Tiers	2,493	2,493	95,849	2,066,210	5,420	21,412	2,191,384
	0.1%	0.1%	4.4%	94.3%	0.2%	1.0%	100.0%

Source: PJM-EIS.

IV. CONCLUSION

The electricity supplier compliance reports for 2021, verified by the Commission, indicate that most Maryland RPS obligations were met via the purchase and retirement of RECs; there were \$77.1 million in ACPs. Approximately 19 percent of RECs used for compliance in 2021 came from in-State resources, down from 21 percent in 2020. RECs derived from two fuel types—wind (50.2 percent), and black liquor (12.4 percent)—were the predominant sources of non-solar Tier 1 compliance in 2021. The Tier 1 Solar carve-out was met by the retirement of RECs generated exclusively in Maryland. Companies demonstrated Tier 2 compliance by purchasing RECs derived from large hydroelectric sources. Throughout this next year, the Commission will continue to: review applications from facilities requesting certification as a Maryland REF, oversee the RPS Program, and verify that the electricity suppliers in Maryland procure a sufficient amount of electricity generated by renewable resources.

APPENDICES

Appendix A Location of Facilities that Provided RECs for 2021 RPS Compliance

	DC	DE	IL	IN	KY	MD	MI	MN	NC	ND	NJ	OH	PA	TN	VA	WV	Total
<i>Tier 1 Non-solar</i>																	
Black Liquor	-	-	-	-	-	-	-	-	2	-	-	1	2	1	4	-	10
Geothermal	-	-	-	-	-	78	-	-	-	-	-	-	-	-	-	-	78
Landfill Gas	-	2	11	-	6	5	1	-	-	-	5	7	14	-	13	-	64
Municipal Solid Waste	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	-	3
Other Biomass Gas	1	-	-	-	-	-	-	-	-	-	-	3	1	-	2	-	7
Small Hydro	-	-	3	2	2	1	5	1	-	-	1	-	7	-	17	5	44
Wood Waste	-	-	-	-	1	1	-	-	2	-	-	-	-	1	4	-	9
Wind	-	-	30	13	-	5	-	-	1	1	1	16	20	-	-	5	92
<i>Tier 1 Solar</i>																	
Solar PV	-	-	-	-	-	71,885	-	-	-	-	-	-	-	-	-	-	71,885
Solar Thermal	-	-	-	-	-	790	-	-	-	-	-	-	-	-	-	-	790
<i>Tier 2</i>																	
Large Hydro	-	-	-	-	-	1	-	-	6	-	-	1	2	2	-	3	15
Total	1	2	44	15	9	72,768	6	1	11	1	7	28	46	4	41	13	72,997

Note: In order to prevent double counting, facilities using multiple fuels are only listed under their primary fuel.

Appendix B Disposition of 2021 Vintage RECs Generated in Maryland

Fuel Type and Tier	RECs Retired for RPS Compliance by State						Available	Other	Total RECs Generated
	DC	DE	MD	NJ	PA	Total			
Geothermal	-	-	2,492	-	-	2,492	396	-	2,888
Landfill Gas	-	-	114	-	2,695	2,809	40,179	-	42,988
Municipal Solid Waste	-	-	517,534	-	-	517,534	228,183	-	745,717
Small Hydro	-	-	7,538	5,420	-	12,958	941	-	13,899
Solar Thermal	-	-	-	-	-	-	17	-	17
Wind	-	95,849	87,590	-	18,710	202,149	309,446	6,116	517,711
Wood Waste	-	-	9,335	-	-	9,335	4,507	-	13,842
<i>Tier 1 Non-solar Total</i>	-	95,849	624,603	5,420	21,405	747,277	583,669	6,116	1,337,062
Solar PV	2,493	-	1,439,106	-	7	1,441,606	168,320	279	1,610,205
Solar Thermal	-	-	2,501	-	-	2,501	400	-	2,901
<i>Tier 1 Solar Total</i>	2,493	-	1,441,607	-	7	1,444,107	168,720	279	1,613,106
Large Hydro	-	-	-	-	-	-	624,623	1,472,534	2,097,157
<i>Tier 2 Total</i>	-	-	-	-	-	-	624,623	1,472,534	2,097,157
<i>Grand Total</i>	2,493	95,849	2,066,210	5,420	21,412	2,191,384	1,377,012	1,478,929	5,047,325

Appendix C Number of Renewable Energy Facilities Located in Maryland

Maryland County	Tier 1	Solar	Tier 2	Total
Allegany	1	62	-	63
Anne Arundel	60	9,577	-	9,637
Baltimore	107	8,534	-	8,641
Baltimore City	2	1,263	-	1,265
Calvert	3	950	-	953
Caroline	-	391	-	391
Carroll	16	2,460	-	2,476
Cecil	21	1,746	-	1,767
Charles	3	3,150	-	3,153
Dorchester	1	389	-	390
Frederick	36	3,228	-	3,264
Garrett	6	65	-	71
Harford	90	4,365	1	4,456
Howard	55	4,395	-	4,450
Kent	1	370	-	371
Montgomery	52	13,190	-	13,242
Prince George's	13	21,256	-	21,269
Queen Anne's	6	767	-	773
Somerset	1	323	-	324
St. Mary's	2	1,637	-	1,639
Talbot	5	274	-	279
Washington	30	1,209	-	1,239
Wicomico	3	1,293	-	1,296
Worcester	1	589	-	590
Total	515	81,483	1	81,999

Note: This list includes all renewable generators that are both: 1) located within Maryland, and 2) registered to participate in any one of the PJM states' renewable energy programs as of August 1, 2022.

**Appendix D Capacity of Renewable Energy Facilities Located in Maryland
(MW)**

Maryland County	Tier 1 Non- Solar	Tier 1 Solar	Tier 2	Total
Allegany	65.0	5.6	-	70.6
Anne Arundel	4.8	143.1	-	147.9
Baltimore	72.9	132.9	-	205.9
Baltimore City	0.1	16.5	-	16.7
Calvert	0.1	11.9	-	12.0
Caroline	-	12.9	-	12.9
Carroll	0.5	52.8	-	53.3
Cecil	0.8	40.4	-	41.2
Charles	0.1	50.7	-	50.8
Dorchester	0.0	17.1	-	17.1
Frederick	0.9	94.3	-	95.2
Garrett	210.0	6.9	-	216.9
Harford	3.3	77.6	474.0	554.9
Howard	2.9	69.6	-	72.5
Kent	0.0	21.7	-	21.7
Montgomery	80.2	154.2	-	234.4
Prince George's	13.6	270.4	-	284.1
Queen Anne's	0.2	43.9	-	44.1
Somerset	3.8	153.6	-	157.4
St. Mary's	0.1	18.0	-	18.1
Talbot	70.4	14.0	-	84.4
Washington	0.9	95.6	-	96.5
Wicomico	6.1	47.0	-	53.1
Worcester	0.0	24.2	-	24.2
Total	536.7	1,575.2	474.0	2,585.9

Note: This list includes all renewable generators that are both: 1) located within Maryland, and 2) registered to participate in any one of the PJM states' renewable energy programs as of August 1, 2022.