

# **PUBLIC SERVICE COMMISSION OF MARYLAND**

## **RENEWABLE ENERGY PORTFOLIO STANDARD REPORT**

**With Data for Calendar Year 2020**

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

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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 2020. 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.<sup>1</sup> 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.<sup>2</sup>

The calendar year 2020 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”).<sup>3</sup> Remaining calendar year 2020 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”).

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<sup>1</sup> Electricity suppliers must file an 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 2021, highlights data from electricity suppliers’ 2020 compliance reports and other relevant 2020 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.

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

<sup>3</sup> 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.<sup>4</sup> 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.<sup>5</sup> 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 statute<sup>6</sup> 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)<sup>7</sup> or in a control area that is adjacent to the PJM region,<sup>8</sup> 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

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<sup>4</sup> 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), 7-510(c).

<sup>5</sup> 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.

<sup>6</sup> 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 2020. In 2020, 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.

<sup>7</sup> 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.

<sup>8</sup> 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.<sup>9</sup>

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.<sup>10</sup> 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.<sup>11</sup> 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.

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<sup>9</sup> There are currently no thermal biomass facilities in Maryland.

<sup>10</sup> REF applications are maintained by the Commission and are accessible online, available at: <http://www.psc.state.md.us/electricity/wp-content/uploads/sites/2/Application-for-Certification-as-a-Renewable-Energy-Facility.pdf>.

<sup>11</sup> 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 5 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"> <li>• Solar, including energy from photovoltaic technologies and solar water heating systems</li> <li>• Wind</li> <li>• Qualifying Biomass</li> <li>• Methane from a landfill or wastewater treatment plant</li> <li>• Geothermal</li> <li>• Ocean</li> <li>• Fuel Cell that produces electricity from a Tier 1 source</li> <li>• Hydroelectric power plant less than 30 MW capacity</li> <li>• Poultry litter-to-energy</li> <li>• Waste-to-energy</li> <li>• Refuse-derived fuel</li> <li>• Thermal energy from a thermal biomass system</li> </ul>	<ul style="list-style-type: none"> <li>• Hydroelectric power other than pump storage generation</li> </ul> <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 5.5 percent in 2019 to 14.5 percent by 2030.<sup>12</sup> 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.<sup>13</sup> In Order No. 88192, the Commission

<sup>12</sup> “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 sub-set of the Tier 1 standard.

<sup>13</sup> 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 offshore wind RECs (“ORECs”), not to exceed 2.5 percent. The project must be generating RECs in order for the

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 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**

<b>Compliance Year</b>	<b>Tier 1 (Excluding Carve-outs)</b>	<b>Solar</b>	<b>Post 2022 Geothermal</b>	<b>Offshore Wind<sup>14</sup></b>	<b>Tier 2</b>	<b>Total</b>
2020	22.00%	6.00%	N/A	0.00%	2.50%	30.50%
2021	21.93%	7.50%	N/A	1.37%	2.50%	33.30%
2022	23.24%	5.50%	N/A	1.36%	2.50%	32.60%
2023	23.82%	6.00%	0.05%	2.03%	2.50%	34.40%
2024	25.04%	6.50%	0.15%	2.01%	2.50%	36.20%
2025	26.24%	7.00%	0.25%	2.01%	2.50%	38.00%
2026	27.51%	8.00%	0.50%	1.99%	2.50%	40.50%
2027	29.27%	9.50%	0.75%	1.98%	2.50%	44.00%
2028	29.04%	11.00%	1.00%	1.96%	2.50%	45.50%
2029	32.06%	12.50%	1.00%	1.94%	2.50%	50.00%
2030+	32.56% - 33.9%	14.50%	1.00%	0.60% - 1.94%	2.50%	52.50%

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.<sup>15</sup> To date, no such request has been made by electricity suppliers operating in the Maryland marketplace.

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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.

<sup>14</sup> This percentage includes only the Commission-approved offshore wind energy carve-out from Order No. 88192. This does not include the additional 1,200 MWs of capacity set forth by the General Assembly.

<sup>15</sup> 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)**

<b>Compliance Year</b>	<b>Tier 1 (Excluding Carve-outs)</b>	<b>Solar</b>	<b>Post 2022 Geothermal</b>	<b>Tier 2</b>	<b>IPL<sup>16</sup> Tier 1</b>
2020	\$30	\$100	N/A	\$15	\$2
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.<sup>17</sup>

## II. **ELECTRICITY SUPPLIER COMPLIANCE REPORTS**

Calendar year 2020 marked the 15th compliance year for the Maryland RPS, and the 13th year for electricity suppliers to comply with the Tier 1 Solar set-aside. 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.<sup>18</sup> RPS compliance reports were filed by 103 electricity suppliers, including: 71

<sup>16</sup> 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.

<sup>17</sup> State Government Article, § 9–20B–05(F-3)(i)(2).

<sup>18</sup> 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; 21 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 57.1 million MWh of total retail electricity sales in Maryland for 2020 (down from 60.5 million MWh in 2019); 55.8 million MWh of retail electricity sales were subject to RPS compliance, and 1.2 million MWh were exempt.<sup>19</sup> Maryland electricity suppliers retired about 14.3 million RECs in 2020, more than the 11.4 million RECs retired for compliance in 2019. The total cost of RECs retired in 2020 totaled \$223.2 million, up from \$134.5 million in 2019.

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 – 2020)**

<b>Year</b>	<b>Tier 1 Non-Solar</b>	<b>Tier 1 Solar</b>	<b>Tier 2</b>
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

As demonstrated by the table below, the aggregated cost of compliance with the Maryland RPS Program displays a general growth rate with the exception of a reduction in 2017. Despite the downward trends in 2017 continuing into 2018, in 2019 Tier 1 and Solar REC prices increased almost 19 percent and 48 percent in 2019, respectively, while Tier 2 REC prices increased by approximately 60 percent. This trend only accelerated in 2020, with compliance costs rising by 65.9 percent to \$223 million.

<sup>19</sup> 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 (2014 – 2020)**

	<b>Tier</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Total REC Costs</b>	Tier 1	\$85,054,001	\$88,200,121	\$50,045,621	\$56,406,247	\$79,320,505	\$99,836,127
	Solar	\$39,055,714	\$45,556,987	\$21,275,664	\$27,351,388	\$55,166,116	\$122,943,987
	Tier 2	\$2,617,917	\$1,441,416	\$687,785	\$1,049,293	\$58,899	\$386,590
	<b>Total</b>	<b>\$126,727,632</b>	<b>\$135,198,523</b>	<b>\$72,009,071</b>	<b>\$84,806,928</b>	<b>\$134,545,520</b>	<b>\$223,166,704</b>
<b>Total RECs Retired</b>	Tier 1	6,134,653	7,216,439	7,006,113	8,627,737	10,210,275	12,117,585
	Solar	299,525	411,787	557,224	857,232	1,167,329	1,859,976
	Tier 2	1,531,279	1,501,587	1,448,567	1,599,819	55,879	366,260
	<b>Total</b>	<b>7,965,457</b>	<b>9,129,813</b>	<b>9,011,904</b>	<b>11,084,788</b>	<b>11,433,483</b>	<b>14,343,821</b>
<b>RPS % Required</b>	Tier 1	10.00%	12.00%	11.95%	14.30%	15.20%	22.00%
	Solar	0.50%	0.70%	1.15%	1.50%	5.50%	6.00%
	Tier 2	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
	<b>Total</b>	<b>13.00 %</b>	<b>15.20 %</b>	<b>15.60 %</b>	<b>18.30 %</b>	<b>23.20 %</b>	<b>30.50 %</b>

ACPs accounted for only a small fraction (\$52,240) of the total \$233.2 million RPS compliance costs in 2020. Reliance on ACPs largely decreased in 2020 (compared to \$7,730,223 in 2019). This is due to two companies filing for bankruptcy before being able to retire RECs. Many ACPs paid in 2020 were made in lieu of purchasing Tier 1 RECs to satisfy IPL obligations.<sup>20</sup>

**Table 6 Results of the 2020 RPS Compliance Reports**

<b>RPS Compliance Year</b>		<b>Tier 1 Non-Solar</b>	<b>Tier 1 Solar</b>	<b>Tier 1 IPL</b>	<b>Tier 2</b>	<b>Total</b>
2020	RPS Obligation	12,007,171	1,854,176	-	367,082	14,228,429
	Retired RECs	12,117,585	1,859,976	-	366,260	14,343,821
	ACP Required	\$270	\$29,800	-	\$22,170	\$52,240

*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.<sup>21</sup> Figure 1 aggregates the Maryland RPS tiers on the basis of generation year. For the 2020 compliance year, 45.5 percent of RECs retired were generated in 2020; 37.2 percent were generated in 2019; and the remaining 17.4 percent were generated in 2018.

<sup>20</sup> The ACP for Tier 1 IPL obligations is \$2 per MWh, significantly lower than the average non-solar Tier 1 REC (\$8.24) and solar Tier 1 REC (\$66.10).

<sup>21</sup> COMAR 20.61.03.01C (unless the REC is diminished or extinguished before expiration).

**Figure 1 RECs Retired in 2020 by Generation Year**

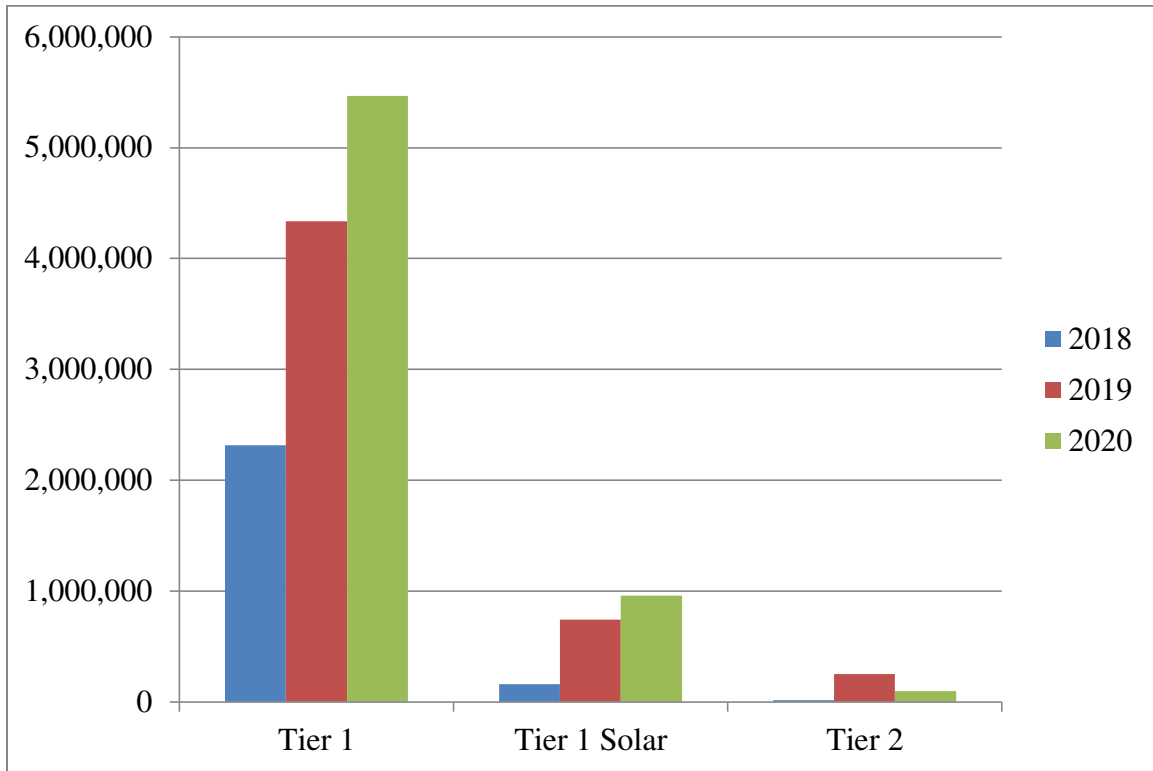
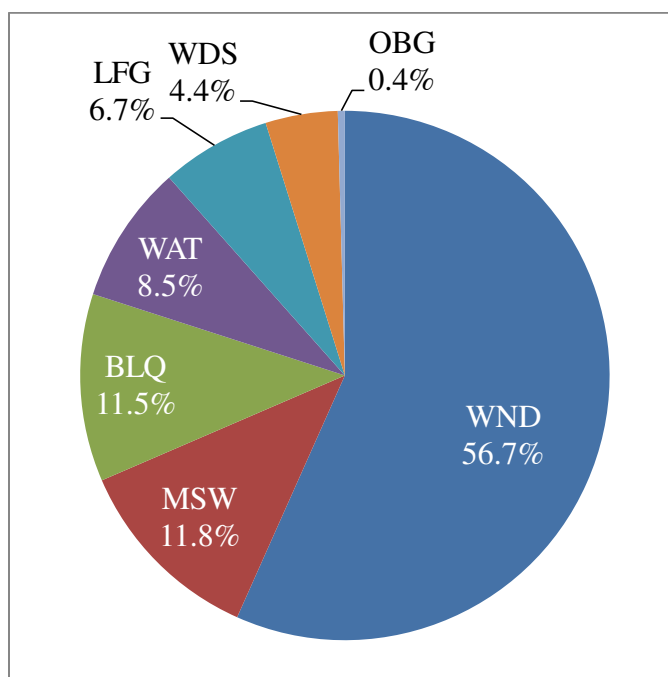


Figure 2 illustrates the fuel sources used to satisfy Tier 1 RPS requirements for the 2020 RPS compliance year. Of the Tier 1 RECs retired for 2020, the resources from which the RECs were sourced consisted primarily of wind, municipal solid waste, and black liquor. Although not pictured, Tier 2 RPS requirements for the 2020 RPS compliance year were satisfied exclusively by RECs derived from hydroelectric power.

**Figure 2 2020 Tier 1 Retired RECs by Fuel Source<sup>22</sup>**

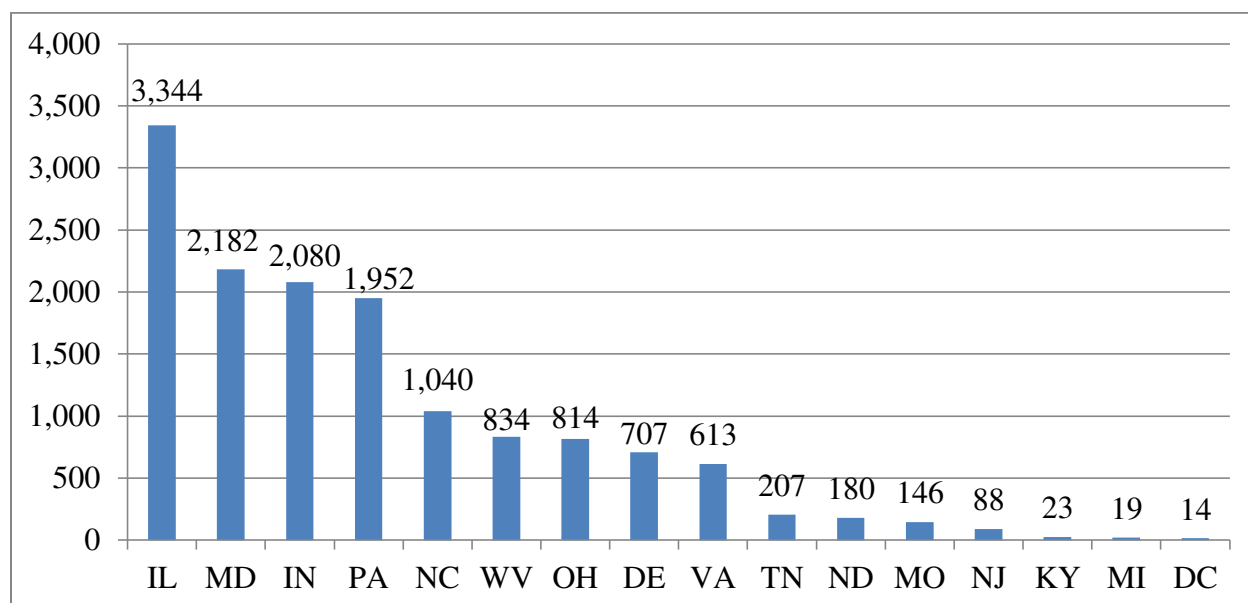


Abbreviations: BLQ, Black Liquor; LFG, Landfill Gas; MSW, Municipal Solid Waste; OBG, Other Biomass Gas; WAT, Small Hydroelectric; WDS, Wood and Waste Solids; WND, Wind.

Figure 3 presents the geographical location and the total generating capacity (14,270 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. Of the renewable facilities that are eligible to participate in the Maryland RPS Program, 44 percent of the corresponding capacity is located in the Mid-Atlantic states. The remaining eligible resource capacity is distributed across nine other states.

<sup>22</sup> WAT includes Tier 1 only. Qualifying biomass sourced from agricultural crops and geothermal contributed too few RECs to be seen on the chart.

**Figure 3 Total Rated Capacity by State (MW)<sup>23</sup>**



For the 2020 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 2020. The majority of RECs from in-State generators were sourced from Tier 1 non-solar (37.6 percent) and solar photovoltaic (61.8 percent).

<sup>23</sup> PJM-EIS, Generation Attribute Tracking System, Database query, (June 1, 2021). The information in this figure does not include Commission-authorized REFs that have not established a REC account with PJM GATS.

**Figure 4 Number of RECs Retired by Facility Location (2020)**

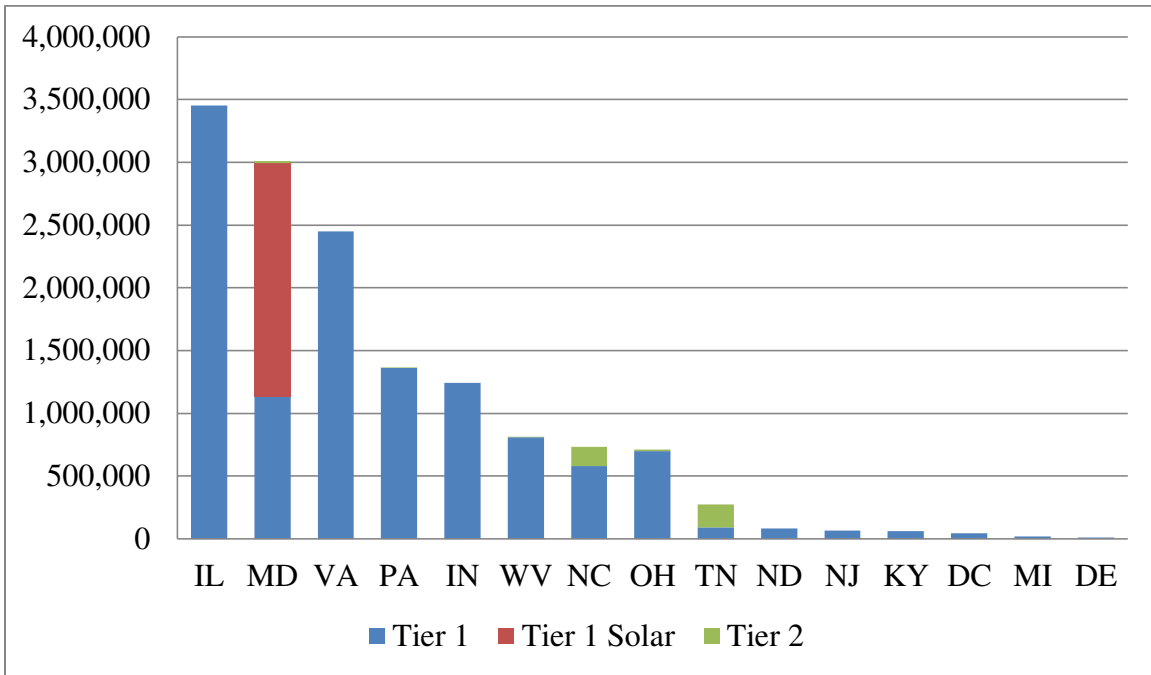


Table 7 and Table 8 provide the quantitative data in support of the previous figure. Table 7 provides the reported levels of RECs retired by Maryland electricity suppliers in 2020 on a tier and aggregate basis, whereas Table 8 provides the information on a percentage basis. As noted above, Illinois-generated RECs, followed by Maryland, Virginia, and Pennsylvania were used in the largest aggregate amounts by Maryland electricity suppliers for 2020 RPS compliance.

**Table 7 2020 REC Retirement by State**

State	Tier 1 Non-Solar	Tier 1 Solar	Tier 2	All Tiers
IL	3,453,917	-	-	3,453,917
MD	1,133,148	1,859,976	16,634	3,009,758
VA	2,449,380	-	-	2,449,380
PA	1,363,382	-	519	1,363,901
IN	1,242,825	-	-	1,242,825
WV	810,963	-	2,426	813,389
NC	581,256	-	152,510	733,766
OH	698,525	-	11,564	710,089
TN	93,934	-	182,607	276,541
ND	83,234	-	-	83,234
NJ	67,848	-	-	67,848
KY	62,817	-	-	62,817

<b>State</b>	<b>Tier 1 Non-Solar</b>	<b>Tier 1 Solar</b>	<b>Tier 2</b>	<b>All Tiers</b>
DC	45,469	-	-	45,469
MI	18,747	-	-	18,747
DE	12,140	-	-	12,140
<b>Total</b>	<b>12,117,585</b>	<b>1,859,976</b>	<b>366,260</b>	<b>14,343,821</b>

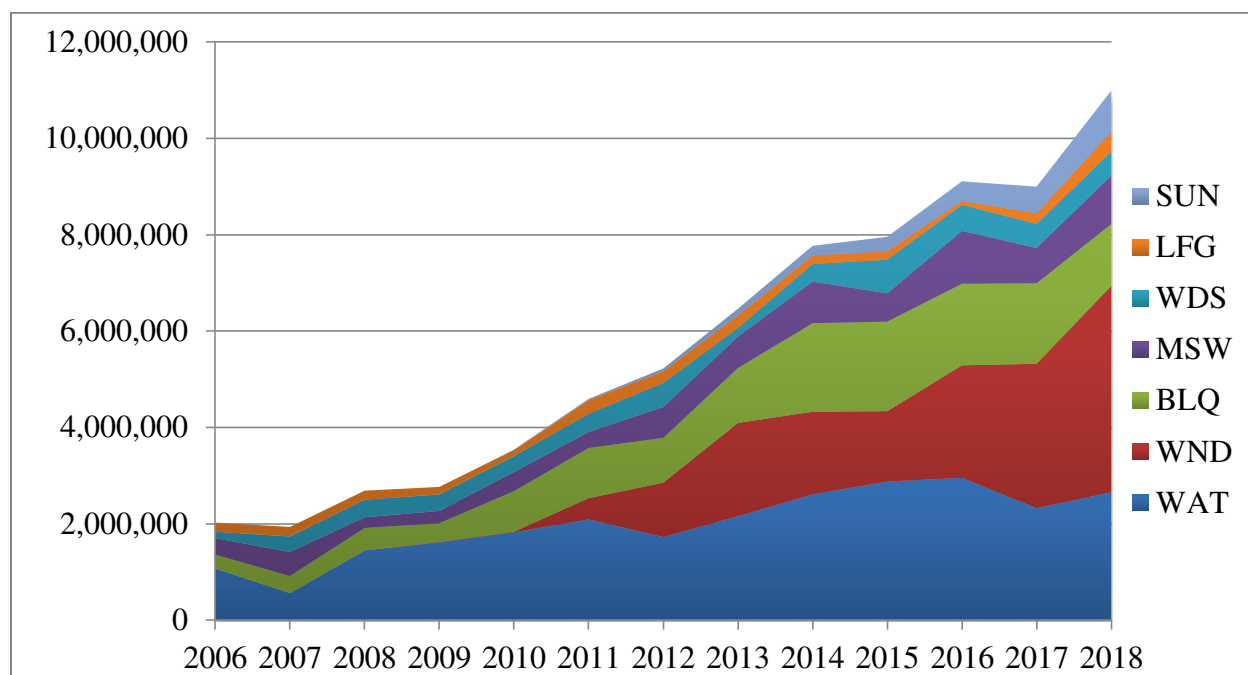
**Table 8 2020 REC Retirement by State (%)**

<b>State</b>	<b>Tier 1 Non-Solar</b>	<b>Tier 1 Solar</b>	<b>Tier 2</b>	<b>All Tiers</b>
IL	28.5%	0.0%	0.0%	24.1%
MD	9.4%	100.0%	4.5%	21.0%
VA	20.2%	0.0%	0.0%	17.1%
PA	11.3%	0.0%	0.1%	9.5%
IN	10.3%	0.0%	0.0%	8.7%
WV	6.7%	0.0%	0.7%	5.7%
NC	4.8%	0.0%	41.6%	5.1%
OH	5.8%	0.0%	3.2%	5.0%
TN	0.8%	0.0%	49.9%	1.9%
ND	0.7%	0.0%	0.0%	0.6%
NJ	0.6%	0.0%	0.0%	0.5%
KY	0.5%	0.0%	0.0%	0.4%
DC	0.4%	0.0%	0.0%	0.3%
MI	0.2%	0.0%	0.0%	0.1%
DE	0.1%	0.0%	0.0%	0.1%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Figure 5 illustrates the growth in RECs retired in total and by fuel type from the beginning of the RPS requirement in 2006. For the third year in a row, wind was the largest contributor of total number of RECs. Total wind RECs retired for compliance have nearly tripled since 2016. In 2020, solar REC retirements grew to be the second largest contributor of RECs, with a 59 percent increase compared to 2019. 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.



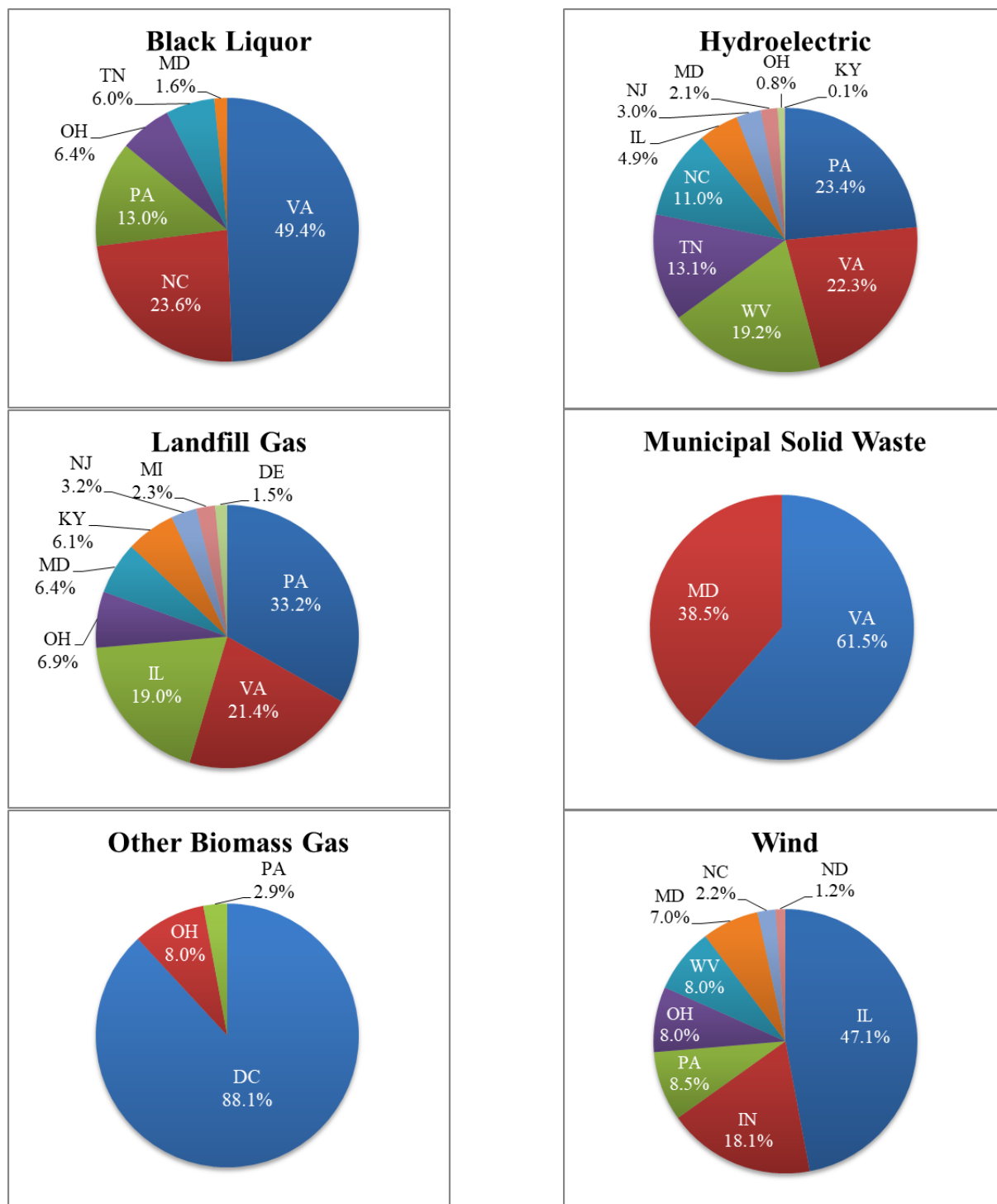
**Figure 5 RECs Retired by Fuel Type (2006 – 2020)**



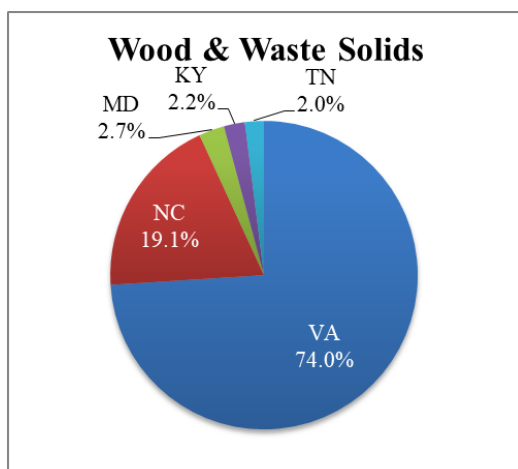
Abbreviations: BLQ, Black Liquor; LFG, Landfill Gas; MSW, Municipal Solid Waste; SUN, Solar Photovoltaic; WAT, Hydroelectric; WDS, Wood and Waste Solids; WND, Wind.

In 2020, all of the RECs retired from geothermal and solar sources originated in Maryland, while all of the qualifying biomass sourced from agricultural crops was located in North Carolina. The seven remaining fuels used to comply with Maryland's 2020 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 38.5 percent of municipal solid waste RECs retired for compliance in 2020. Maryland resources provided only 1.6 percent of black liquor RECs, 2.1 percent of hydroelectric RECs, 6.4 percent of landfill gas RECs, 7.0 percent of wind RECs, and 2.7 percent of wood and waste solids RECs.

**Figure 6 Percentage of RECs Generated in Each State, by Fuel (2020)<sup>24</sup>**



<sup>24</sup> Additional information pertaining to the source of renewable energy used to meet Maryland's 2020 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 2020.<sup>25</sup> 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 supplier product offerings (*i.e.*, green power products).<sup>26</sup> 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 2020, eligible sources located within Maryland generated approximately 1.3 million Tier 1 non-solar RECs, 1.4 million Tier 1 SRECs, and 1.7 million Tier 2 RECs. Additional analyses pertaining to the Maryland-based renewable generators is presented in Appendices C through E. Appendix C shows the disposition of RECs generated in Maryland in 2020. Appendix D 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 E provides the total capacity of these facilities, broken out by county and tier.

<sup>25</sup> Specific information pertaining to the State's REFs as described herein was made available by PJM-EIS in the GATS State Agency Report.

<sup>26</sup> 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.

**Table 9 2020 Maryland-Generated RECs by Fuel Source**

Fuel Type		RECs (Quantity)	RECs (Percent)
<b>Tier 1</b>	Geothermal	2,268	0.1%
	Landfill Gas	64,632	1.5%
	Municipal Solid Waste	634,288	14.6%
	Solar Thermal <sup>27</sup>	15	0.0%
	Small Hydro	14,807	0.3%
	Wood Waste	15,310	0.4%
	Wind	546,287	12.6%
<b>Tier 1 Solar</b>	Solar PV	1,390,132	32.0%
	Solar Thermal	3,206	0.1%
<b>Tier 2</b>	Large Hydro	1,673,219	38.5%
<b>Total</b>		<b>4,344,164</b>	<b>100.0%</b>

Table 10 presents additional detail regarding the disposition of Maryland-generated RECs in calendar year 2020. Approximately 50 percent of the RECs generated by renewable facilities located within Maryland during 2020 are available for potential future sale in Maryland or in other states in subsequent compliance years. Just over 39 percent of all RECs generated in Maryland were retired in 2020 to meet the RPS requirements in Maryland and various other PJM states. Labeled as “Other” in Table 10, just over 11 percent of RECs were used for other purposes, which may include pending transfers between parties.

**Table 10 Disposition of 2020 Maryland-Generated RECs**

REC Tier	Available	RPS Compliance	Other	Total
Tier 1 Non-Solar	508,287	742,278	27,042	1,277,607
Tier 1 Solar	433,207	960,003	128	1,393,338
Tier 2	1,216,991	0	456,228	1,673,219
<b>Total</b>	<b>2,158,485</b>	<b>1,702,281</b>	<b>483,398</b>	<b>4,344,164</b>
(%)	<b>49.7%</b>	<b>39.2%</b>	<b>11.1%</b>	<b>100.0%</b>

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 2020, Maryland-generated RECs were retired for compliance purposes in five jurisdictions: the District of Columbia, Delaware, Maryland, New Jersey, and Pennsylvania.

<sup>27</sup> Tier 1 Solar RECs may be used to satisfy Tier 1 obligations.

**Table 11 2020 Maryland-Generated RECs Retired for RPS Compliance by State**

<b>Tier</b>	<b>Fuel Type</b>	<b>DC</b>	<b>DE</b>	<b>MD</b>	<b>NJ</b>	<b>PA</b>	<b>Total</b>
	Geothermal	-	-	754	-	-	754
	Land Fill Gas	-	-	6,580	7,817	-	14,397
	Municipal Solid Waste	-	-	413,228	-	-	413,228
	Small Hydro	-	-	11,411	-	-	11,411
	Wood Waste	-	-	9,472	-	-	9,472
	Wind	-	53,946	231,930	-	7,140	293,016
	<b>Subtotal</b>	<b>-</b>	<b>53,946</b>	<b>673,375</b>	<b>7,817</b>	<b>7,140</b>	<b>742,278</b>
	<b>Percentage</b>	<b>0.0%</b>	<b>7.3%</b>	<b>90.7%</b>	<b>1.1%</b>	<b>1.0%</b>	<b>100.0%</b>
<b>Tier 1 Solar</b>	Solar PV	2,182	-	955,594	-	-	957,776
	Solar Thermal	-	-	2,227	-	-	2,227
	<b>Subtotal</b>	<b>2,182</b>	<b>-</b>	<b>957,821</b>	<b>-</b>	<b>-</b>	<b>960,003</b>
	<b>Percentage</b>	<b>0.2%</b>	<b>0.0%</b>	<b>99.8%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>
<b>Tier 2</b>	Large Hydro	-	-	-	-	-	-
	<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
	<b>Percentage</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>All Tiers</b>	<b>Grand Total</b>	<b>2,182</b>	<b>53,946</b>	<b>1,631,196</b>	<b>7,817</b>	<b>7,140</b>	<b>1,702,281</b>
	<b>Percentage</b>	<b>0.1%</b>	<b>3.2%</b>	<b>95.8%</b>	<b>0.5%</b>	<b>0.4%</b>	<b>100.0%</b>

Source: PJM-EIS.

#### IV. CONCLUSION

The electricity supplier compliance reports for 2020, verified by the Commission, indicate that nearly all the Maryland RPS obligations were met via the purchase and retirement of RECs, with only \$52,240 in ACPs owed for compliance purposes. Approximately 21 percent of RECs used for compliance in 2020 came from in-State resources, up from 18 percent in 2019. RECs derived from two fuel types—wind (56.7 percent), and municipal solid waste (11.8 percent)—were the predominant sources of non-solar Tier 1 compliance in 2020, with those RECs sourced primarily from Illinois and Virginia, respectively. 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, with 4.5 percent of the Tier 2 RECs sourced from Maryland REFs.

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 2020 Retired RECs by Facility

Tier 1*						Tier 1*					
Facility Name	Fuel	State	Quantity	AB %	Tier 1	Facility Name	Fuel	State	Quantity	GEO %	Tier 1
Kapstone Kraft	AB	NC	21	100.00%	0.00%	Parlegreco, D.	GEO	MD	15	1.64%	0.00%
<b>Total</b>			<b>21</b>	<b>100.00%</b>	<b>0.00%</b>	Patel, K.	GEO	MD	14	1.53%	0.00%
Facility Name	Fuel	State	Quantity	BLQ %	Tier 1	Richardson, J.	GEO	MD	6	0.66%	0.00%
AEP W Kingsport	BLQ	TN	83,242	6.00%	0.69%	Ryan, J.	GEO	MD	7	0.77%	0.00%
Chillicothe	BLQ	OH	89,076	6.42%	0.74%	Sakakihara Broadwater	GEO	MD	7	0.77%	0.00%
Covington	BLQ	VA	145,002	10.44%	1.20%	Santin, D.	GEO	MD	4	0.44%	0.00%
Domtar Paper	BLQ	NC	219,574	15.81%	1.81%	Shriner	GEO	MD	7	0.77%	0.00%
Franklin Mill	BLQ	VA	262,627	18.91%	2.17%	Smith, H.	GEO	MD	21	2.30%	0.00%
Hopewell	BLQ	VA	105,782	7.62%	0.87%	Smith, J.	GEO	MD	9	0.98%	0.00%
Kapstone Kraft	BLQ	NC	108,084	7.78%	0.89%	Sotzen	GEO	MD	15	1.64%	0.00%
Luke Mill	BLQ	MD	22,174	1.60%	0.18%	Spies, J.	GEO	MD	11	1.20%	0.00%
Spring Grove	BLQ	PA	180,204	12.98%	1.49%	Traber, T.	GEO	MD	4	0.44%	0.00%
West Point	BLQ	VA	172,750	12.44%	1.43%	Verde, J.	GEO	MD	6	0.66%	0.00%
<b>Total</b>			<b>1,388,515</b>	<b>100.00%</b>	<b>11.46%</b>	Weiland, J.	GEO	MD	21	2.30%	0.00%
Facility Name	Fuel	State	Quantity	GEO %	Tier 1	Wise, R.	GEO	MD	60	6.56%	0.00%
Baratta	GEO	MD	7	0.77%	0.00%	Wissel, J.	GEO	MD	19	2.08%	0.00%
Benigni, C.	GEO	MD	6	0.66%	0.00%	Yarrington, M.	GEO	MD	54	5.90%	0.00%
Bird, J.	GEO	MD	34	3.72%	0.00%	<b>Total</b>			<b>915</b>	<b>100.00%</b>	<b>0.01%</b>
Bird, W.	GEO	MD	6	0.66%	0.00%	Facility Name	Fuel	State	Quantity	LFG %	Tier 1
Brackett Residence	GEO	MD	15	1.64%	0.00%	ACE Cumberland	LFG	NJ	1	0.00%	0.00%
Brenny, M.	GEO	MD	4	0.44%	0.00%	AEP Cloyds	LFG	VA	6,210	0.76%	0.05%
Brokowski Residence	GEO	MD	46	5.03%	0.00%	AEP Orchard Hills	LFG	MI	18,747	2.30%	0.15%
Brooks Road	GEO	MD	13	1.42%	0.00%	AP Arden	LFG	PA	29,269	3.60%	0.24%
Cipriani, A. 1	GEO	MD	6	0.66%	0.00%	AP Upton DG	LFG	PA	25,192	3.09%	0.21%
Cipriani, A. 2	GEO	MD	5	0.55%	0.00%	Bavarian	LFG	KY	18,788	2.31%	0.16%
Custer, C.	GEO	MD	7	0.77%	0.00%	BC Alpha Ridge	LFG	MD	1,440	0.18%	0.01%
Daly, M.	GEO	MD	8	0.87%	0.00%	BC Millersville	LFG	MD	23,154	2.84%	0.19%
Dickerson, L.	GEO	MD	9	0.98%	0.00%	Biodyne	LFG	IL	18,960	2.33%	0.16%
Dixon, T.	GEO	MD	14	1.53%	0.00%	Blue Ridge	LFG	PA	10,562	1.30%	0.09%
Dorman, K.	GEO	MD	25	2.73%	0.00%	Broad Mountain	LFG	PA	4,930	0.61%	0.04%
Field, J.	GEO	MD	32	3.50%	0.00%	BWWTP CoGen Plant	LFG	MD	7,882	0.97%	0.07%
Florenzo Residence	GEO	MD	36	3.93%	0.00%	CID LFG Turbines	LFG	IL	5,970	0.73%	0.05%
Gilotra, R.	GEO	MD	19	2.08%	0.00%	Countryside	LFG	IL	9,460	1.16%	0.08%
Graziani	GEO	MD	11	1.20%	0.00%	Easton LFG	LFG	MD	1,063	0.13%	0.01%
Gugerty, B.	GEO	MD	23	2.51%	0.00%	Fairless Hills B	LFG	PA	125,268	15.39%	1.03%
Harding, A.	GEO	MD	8	0.87%	0.00%	FE Carbon Alum	LFG	OH	6,171	0.76%	0.05%
Harrison, H.	GEO	MD	4	0.44%	0.00%	FE Erie County	LFG	OH	4,142	0.51%	0.03%
Hendrickson	GEO	MD	11	1.20%	0.00%	FE Geneva	LFG	OH	3,446	0.42%	0.03%
Hucht	GEO	MD	8	0.87%	0.00%	FE Lorain	LFG	OH	35,000	4.30%	0.29%
Jack	GEO	MD	8	0.87%	0.00%	FE Mahoning	LFG	OH	2,502	0.31%	0.02%
Jackson, C.	GEO	MD	15	1.64%	0.00%	Frey Farm	LFG	PA	3,217	0.40%	0.03%
Jarboe	GEO	MD	12	1.31%	0.00%	Green Valley	LFG	KY	7,897	0.97%	0.07%
Jocic, B.	GEO	MD	7	0.77%	0.00%	Greene Valley	LFG	IL	20,540	2.52%	0.17%
Kawalek, J.	GEO	MD	10	1.09%	0.00%	Hardin County	LFG	KY	2,243	0.28%	0.02%
Keeney, A.	GEO	MD	19	2.08%	0.00%	Keystone Landfill	LFG	PA	19,154	2.35%	0.16%
Kennedy, B.	GEO	MD	12	1.31%	0.00%	Lake Gas	LFG	IL	10,597	1.30%	0.09%
Lee, A.	GEO	MD	12	1.31%	0.00%	Lakeview Gas	LFG	PA	13,084	1.61%	0.11%
Lehr, M.	GEO	MD	16	1.75%	0.00%	Laurel Ridge	LFG	KY	12,414	1.53%	0.10%
Leung	GEO	MD	20	2.19%	0.00%	Lorain County	LFG	OH	4,798	0.59%	0.04%
Loudermilk, G.	GEO	MD	40	4.37%	0.00%	Lycoming	LFG	PA	4,077	0.50%	0.03%
MacInnes	GEO	MD	5	0.55%	0.00%	ME Glendon	LFG	PA	4,551	0.56%	0.04%
Martin, D.	GEO	MD	7	0.77%	0.00%	ME Lebanon	LFG	PA	1,100	0.14%	0.01%
McPartland, K.	GEO	MD	21	2.30%	0.00%	Monmouth	LFG	NJ	6,101	0.75%	0.05%
McWilliams	GEO	MD	13	1.42%	0.00%	Newland Park	LFG	MD	6,753	0.83%	0.06%
Menning, J.	GEO	MD	12	1.31%	0.00%	O'Brien Edgeboro	LFG	NJ	4,638	0.57%	0.04%
Mignini, A.	GEO	MD	12	1.31%	0.00%	Orchard	LFG	IL	9,702	1.19%	0.08%
Overstreet	GEO	MD	30	3.28%	0.00%	Pendleton County	LFG	KY	8,070	0.99%	0.07%
Parker	GEO	MD	7	0.77%	0.00%	Pep Oaks	LFG	MD	8,926	1.10%	0.07%
						PEP Ritchie Brown	LFG	MD	3,233	0.40%	0.03%

## Appendix A 2020 Retired RECs by Facility (Cont'd)

Tier 1 (Cont'd)*						Tier 1 (Cont'd)*					
Facility Name	Fuel	State	Quantity	LFG %	Tier 1	Facility Name	Fuel	State	Quantity	WAT %	Tier 1
PL Archbald PEI 6	LFG	PA	23,736	2.92%	0.20%	London	WAT	WV	69,766	6.80%	0.58%
PL Pine Grove	LFG	PA	82	0.01%	0.00%	Marmet	WAT	WV	63,059	6.15%	0.52%
PN Northern Tier	LFG	PA	2,985	0.37%	0.02%	Moomaws Dam	WAT	VA	2,712	0.26%	0.02%
Prairie View	LFG	IL	31,690	3.89%	0.26%	Mother Ann Lee	WAT	KY	1,639	0.16%	0.01%
PS Pennsauken	LFG	NJ	62	0.01%	0.00%	Niagara	WAT	VA	6,010	0.59%	0.05%
Rochelle Energy	LFG	IL	10,243	1.26%	0.08%	Pinnacles	WAT	VA	31,232	3.04%	0.26%
Sayrevil	LFG	NJ	14,976	1.84%	0.12%	Radford	WAT	VA	3,959	0.39%	0.03%
Settlers Hill	LFG	IL	21,325	2.62%	0.18%	Reusens	WAT	VA	36,521	3.56%	0.30%
Southern	LFG	DE	12,140	1.49%	0.10%	Schoolfield	WAT	VA	13,168	1.28%	0.11%
Suffolk Energy	LFG	VA	4,612	0.57%	0.04%	Snowden	WAT	VA	30,626	2.99%	0.25%
Tullytown	LFG	PA	3,206	0.39%	0.03%	Upper Sterling	WAT	IL	9,938	0.97%	0.08%
VP Amelia	LFG	VA	9,457	1.16%	0.08%	VP Emporia	WAT	VA	6,376	0.62%	0.05%
VP Bethel	LFG	VA	22,273	2.74%	0.18%	Winfield	WAT	WV	97,403	9.49%	0.80%
VP Brunswick	LFG	VA	9,251	1.14%	0.08%	York Haven	WAT	PA	55,603	5.42%	0.46%
VP Charles City	LFG	VA	11,929	1.47%	0.10%	Yough	WAT	PA	18,829	1.84%	0.16%
VP Chesterfield	LFG	VA	20,848	2.56%	0.17%	Total			1,025,886	100.00%	8.47%
VP Henrico	LFG	VA	4,670	0.57%	0.04%	Facility Name	Fuel	State	Quantity	WDS %	Tier 1
VP King and Queen	LFG	VA	13,034	1.60%	0.11%	AEP W Kingsport	WDS	TN	10,692	2.00%	0.09%
VP King George	LFG	VA	45,309	5.57%	0.37%	Covington	WDS	VA	98,472	18.41%	0.81%
VP Peninsula	LFG	VA	26,597	3.27%	0.22%	Cox Waste	WDS	KY	11,766	2.20%	0.10%
VP Virginia Beach	LFG	VA	202	0.02%	0.00%	Domtar Paper	WDS	NC	87,761	16.41%	0.72%
Woodland	LFG	IL	16,140	1.98%	0.13%	ECI	WDS	MD	14,409	2.69%	0.12%
Total			814,019	100.00%	6.72%	Hopewell	WDS	VA	38,994	7.29%	0.32%
Facility Name	Fuel	State	Quantity	MSW %	Tier 1	Kapstone Kraft	WDS	NC	14,387	2.69%	0.12%
Covanta Fairfax	MSW	VA	882,086	61.47%	7.28%	VP South Boston	WDS	VA	196,452	36.74%	1.62%
Montgomery Co 2	MSW	MD	295,613	20.60%	2.44%	West Point	WDS	VA	61,829	11.56%	0.51%
Wheelabrator	MSW	MD	257,366	17.93%	2.12%	Total			534,762	100.00%	4.41%
Total			1,435,065	100.00%	11.84%	Facility Name	Fuel	State	Quantity	WND %	Tier 1
Facility Name	Fuel	State	Quantity	OBG %	Tier 1	Adam	WND	IL	2,535	0.04%	0.02%
Allentown	OBG	PA	1,514	2.93%	0.01%	AEP Bitter Ridge	WND	IN	92,272	1.34%	0.76%
Buckeye BioGas	OBG	OH	1,737	3.36%	0.01%	AEP Blue Creek	WND	OH	268,695	3.91%	2.22%
DC Water Bailey 1	OBG	DC	45,469	88.08%	0.38%	AEP Bluff Point	WND	IN	128,677	1.87%	1.06%
Haviland	OBG	OH	2,159	4.18%	0.02%	AEP Fowler R 1A	WND	IN	122,254	1.78%	1.01%
Zanesville	OBG	OH	742	1.44%	0.01%	AEP Fowler Rg 3	WND	IN	44,949	0.65%	0.37%
Total			51,621	100.00%	0.43%	AEP Fowler Rg 4	WND	IN	77,556	1.13%	0.64%
Facility Name	Fuel	State	Quantity	WAT %	Tier 1	AEP Hog Creek	WND	OH	170,329	2.48%	1.41%
AEP Buck	WAT	VA	79,822	7.78%	0.66%	AEP Meadow Lk1	WND	IN	111,688	1.63%	0.92%
AEP Fries	WAT	VA	19,671	1.92%	0.16%	AEP Meadow Lk2	WND	IN	29,594	0.43%	0.24%
AEP Glen Ferris	WAT	WV	11,553	1.13%	0.10%	AEP Meadow Lk3	WND	IN	58,640	0.85%	0.48%
Allegheny	WAT	PA	14,192	1.38%	0.12%	AEP Meadow Lk4	WND	IN	43,454	0.63%	0.36%
Allegheny River 6	WAT	PA	46,566	4.54%	0.38%	AEP Meadow Lk5	WND	IN	158,035	2.30%	1.30%
Allegheny River 8	WAT	PA	74,906	7.30%	0.62%	AEP Meadow Lk6	WND	IN	228,135	3.32%	1.88%
Allegheny River 9	WAT	PA	101,376	9.88%	0.84%	AEP Paulding 3	WND	OH	69,481	1.01%	0.57%
AP Misc	WAT	WV	23,269	2.27%	0.19%	AEP Trishe	WND	OH	20,711	0.30%	0.17%
Big Shoals	WAT	VA	2,892	0.28%	0.02%	AEP Wildcat	WND	IN	133,427	1.94%	1.10%
Brasfield	WAT	VA	13,410	1.31%	0.11%	AMP	WND	OH	152	0.00%	0.00%
Coleman Falls	WAT	VA	12,958	1.26%	0.11%	AP Beech Ridge 1	WND	WV	36,929	0.54%	0.30%
Conemaugh	WAT	PA	14,414	1.41%	0.12%	AP Beech Ridge 2	WND	WV	9,481	0.14%	0.08%
Cushaw	WAT	VA	28,358	2.76%	0.23%	AP Criterion	WND	MD	26,707	0.39%	0.22%
Deep Creek 32	WAT	MD	12,078	1.18%	0.10%	AP Fair Wind	WND	MD	192,974	2.81%	1.59%
Dixon	WAT	IL	18,540	1.81%	0.15%	AP FourMile Rg	WND	MD	230,454	3.36%	1.90%
Great Falls Hydro	WAT	NJ	42,070	4.10%	0.35%	AP Greenland	WND	WV	133,439	1.94%	1.10%
Halifax	WAT	VA	4,181	0.41%	0.03%	AP Laurel Mtn.	WND	WV	81,167	1.18%	0.67%
Holcomb Rock	WAT	VA	18,003	1.75%	0.15%	AP Pinnacle	WND	WV	198,337	2.89%	1.64%
Lakeview Hydro	WAT	VA	1,095	0.11%	0.01%	AP Roth Rock	WND	MD	27,935	0.41%	0.23%
Lockport	WAT	IL	39,691	3.87%	0.33%	AP S Chestnut	WND	PA	21,250	0.31%	0.18%
						AP Twin Ridges	WND	PA	49,067	0.71%	0.40%



## Appendix A 2020 Retired RECs by Facility (Cont'd)

Tier 1 (Cont'd)*						Tier 2					
Facility Name	Fuel	State	Quantity	WND %	Tier 1	Facility Name	Fuel	State	Quantity	WAT %	Tier 2
Big Sky	WND	IL	222,719	3.24%	1.84%	Belleville	WAT	WV	106	0.03%	0.03%
Bishop Hill	WND	IL	501,318	7.30%	4.14%	Conowingo	WAT	MD	16,634	4.54%	4.54%
Camp Grove 2	WND	IL	88,608	1.29%	0.73%	Covanta	WAT	WV	1,268	0.35%	0.35%
Cayuga Ridge	WND	IL	301,960	4.40%	2.49%	Falls	WAT	NC	2,436	0.67%	0.67%
Eco Grove	WND	IL	51,673	0.75%	0.43%	High Rock	WAT	NC	3,306	0.90%	0.90%
Findlay	WND	OH	474	0.01%	0.00%	Lake Lynn	WAT	PA	3	0.00%	0.00%
Fowler Ridge	WND	IN	14,144	0.21%	0.12%	Narrows	WAT	NC	6,608	1.80%	1.80%
Grand Ridge 1	WND	IL	32,171	0.47%	0.27%	Racine	WAT	OH	11,564	3.16%	3.16%
Grand Ridge 2	WND	IL	30,400	0.44%	0.25%	Safe Harbor	WAT	PA	516	0.14%	0.14%
Grand Ridge 3	WND	IL	38,115	0.56%	0.31%	Santeetlah	WAT	NC	4,719	1.29%	1.29%
Grand Ridge 4	WND	IL	4,135	0.06%	0.03%	Summersville	WAT	WV	1,052	0.29%	0.29%
Green River	WND	IL	284	0.00%	0.00%	Tuckertown	WAT	NC	2,186	0.60%	0.60%
Greenville	WND	OH	281	0.00%	0.00%	XIC Calderwood	WAT	TN	182,607	49.86%	49.86%
Harpster	WND	OH	114	0.00%	0.00%	XIC Cheoah	WAT	NC	133,255	36.38%	36.38%
High Trail	WND	IL	122,362	1.78%	1.01%	Total			366,260	100.00%	100.00%
Hilltopper	WND	IL	66,442	0.97%	0.55%	Summary					
Holcim-Paulding	WND	OH	1,828	0.03%	0.02%	<div> <div>Tier 1 REC Total12,117,585</div> <div>SREC Total1,859,976</div> <div>Tier 2 REC Total366,260</div> <div>Grand Total14,343,821</div> </div>					
Kelly Creek	WND	IL	78,698	1.15%	0.65%						
Marion	WND	OH	1,274	0.02%	0.01%						
Mendota Hills	WND	IL	104,432	1.52%	0.86%						
Minonk	WND	IL	247,918	3.61%	2.05%	<div>*Solar facilities are not represented in this table. In 2020, SRECs were retired from 69,991 facilities.</div>					
Old Trail	WND	IL	27,917	0.41%	0.23%						
Ottawa	WND	OH	276	0.00%	0.00%	Resource Definitions					
Otter Creek	WND	IL	37,106	0.54%	0.31%	Agriculture Waste	AB	Municipal Solid Waste	MSW		
Pilot Hill	WND	IL	22,089	0.32%	0.18%	Black Liquor	BLQ	Other Biomass Gas	OBG		
PL Locust Ridge	WND	PA	69,273	1.01%	0.57%	Geothermal	GEO	Wood/Waste Solids	WDS		
PN Allegheny Rg	WND	PA	10,269	0.15%	0.08%	Hydroelectric	WAT	Wind	WND		
PN Armenia Mtn	WND	PA	4,860	0.07%	0.04%	Landfill Gas	LFG				
PN Casselman	WND	PA	34,802	0.51%	0.29%						
PN Highland	WND	PA	372	0.01%	0.00%						
PN Highland North	WND	PA	62,756	0.91%	0.52%						
PN Laurel Hills	WND	PA	3,037	0.04%	0.03%						
PN Lookout	WND	PA	80,273	1.17%	0.66%						
PN Mehoopany 1	WND	PA	96,466	1.40%	0.80%						
PN N. Allegheny	WND	PA	13,725	0.20%	0.11%						
PN Patton	WND	PA	10,483	0.15%	0.09%						
PN Ringer	WND	PA	23,380	0.34%	0.19%						
PN Sandy Ridge	WND	PA	56,027	0.82%	0.46%						
PN Stony Creek	WND	PA	49,325	0.72%	0.41%						
Providence Hgt.	WND	IL	74,722	1.09%	0.62%						
Radfords Run	WND	IL	267,667	3.90%	2.21%						
Talbot County	WND	MD	72	0.00%	0.00%						
Tatanka	WND	ND	83,234	1.21%	0.69%						
Top Crop 1	WND	IL	83,225	1.21%	0.69%						
Top Crop 2	WND	IL	193,906	2.82%	1.60%						
Tullytown	WND	OH	446	0.01%	0.00%						
VP Desert	WND	NC	151,429	2.21%	1.25%						
VP New Creek	WND	WV	86,560	1.26%	0.71%						
Walnut Ridge	WND	IL	593,408	8.64%	4.90%						
Wbrook	WND	IL	35,000	0.51%	0.29%						
Whitney Hill	WND	IL	2,311	0.03%	0.02%						
WTG B	WND	OH	13,378	0.19%	0.11%						
Zephyr	WND	OH	191	0.00%	0.00%						
Zephyr 2.0	WND	OH	1,122	0.02%	0.01%						
Total			6,866,781	100.00%	56.67%						

### Appendix B Location of Facilities that Provided RECs for 2020 RPS Compliance

	DC	DE	IL	IN	KY	MD	MI	NC	ND	NJ	OH	PA	TN	VA	WV	Total
<b><i>Tier 1 Non-solar</i></b>																
Agricultural Byproduct	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	<b>1</b>
Black Liquor	-	-	-	-	-	1	-	2	-	-	1	1	1	4	-	<b>10</b>
Geothermal	-	-	-	-	-	60	-	-	-	-	-	-	-	-	-	<b>60</b>
Landfill Gas	-	1	10	-	5	7	1	-	-	5	6	15	-	12	-	<b>62</b>
Municipal Solid Waste	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	<b>3</b>
Other Biomass Gas	1	-	-	-	-	-	-	-	-	-	3	1	-	-	-	<b>5</b>
Small Hydro	-	-	3	-	1	1	-	-	-	1	-	7	-	17	5	<b>35</b>
Wood Waste	-	-	-	-	1	1	-	2	-	-	-	-	1	4	-	<b>9</b>
Wind	-	-	26	13	-	5	-	1	1	-	15	16	-	-	6	<b>83</b>
<b><i>Tier 1 Solar</i></b>																
Solar PV	-	-	-	-	-	69,112	-	-	-	-	-	-	-	-	-	<b>69,112</b>
Solar Thermal	-	-	-	-	-	799	-	-	-	-	-	-	-	-	-	<b>799</b>
<b><i>Tier 2</i></b>																
Large Hydro	-	-	-	-	-	1	-	6	-	-	1	2	1	-	3	<b>14</b>
<b>Total</b>	<b>1</b>	<b>1</b>	<b>39</b>	<b>13</b>	<b>7</b>	<b>69,989</b>	<b>1</b>	<b>12</b>	<b>1</b>	<b>6</b>	<b>26</b>	<b>42</b>	<b>3</b>	<b>38</b>	<b>14</b>	<b>70,193</b>

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

### Appendix C Disposition of 2020 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	-	-	754	-	-	754	1,514	-	2,268
Landfill Gas	-	-	6,580	7,817	-	14,397	50,235	-	64,632
Municipal Solid Waste	-	-	413,228	-	-	413,228	221,060	-	634,288
Small Hydro	-	-	11,411	-	-	11,411	3,396	-	14,807
Solar Thermal	-	-	-	-	-	-	15	-	15
Wind	-	53,946	231,930	-	7,140	293,016	226,229	27,042	546,287
Wood Waste	-	-	9,472	-	-	9,472	5,838	-	15,310
<b><i>Tier 1 Non-solar Total</i></b>	-	53,946	673,375	7,817	7,140	742,278	508,287	27,042	1,277,607
Solar PV	2,182	-	955,594	-	-	957,776	432,228	128	1,390,132
Solar Thermal	-	-	2,227	-	-	2,227	979	-	3,206
<b><i>Tier 1 Solar Total</i></b>	2,182	-	957,821	-	-	960,003	433,207	128	1,393,338
Large Hydro	-	-	-	-	-	-	1,216,991	456,228	1,673,219
<b><i>Tier 2 Total</i></b>	-	-	-	-	-	-	1,216,991	456,228	1,673,219
<b><i>Grand Total</i></b>	2,182	53,946	1,631,196	7,817	7,140	1,702,281	2,158,485	483,398	4,344,164

## Appendix D Number of Renewable Energy Facilities Located in Maryland

<b>Maryland County</b>	<b>Tier 1</b>	<b>Solar</b>	<b>Tier 2</b>	<b>Total</b>
Allegany	1	58	-	59
Anne Arundel	32	9,174	-	9,206
Baltimore	11	8,104	-	8,115
Baltimore City	1	1,210	-	1,211
Calvert	-	903	-	903
Caroline	-	366	-	366
Carroll	-	2,385	-	2,385
Cecil	-	1,658	-	1,658
Charles	-	3,041	-	3,041
Dorchester	1	369	-	370
Frederick	6	3,024	-	3,030
Garrett	6	62	-	68
Harford	5	4,168	1	4,174
Howard	11	4,119	-	4,130
Kent	-	370	-	370
Montgomery	13	12,405	-	12,418
Prince George's	6	20,008	-	20,014
Queen Anne's	4	725	-	729
Somerset	1	312	-	313
St. Mary's	-	1,559	-	1,559
Talbot	4	259	-	263
Washington	1	1,157	-	1,158
Wicomico	1	1,220	-	1,221
Worcester	-	543	-	543
<b>Total</b>	<b>104</b>	<b>77,199</b>	<b>1</b>	<b>77,304</b>

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, 2021.

## Appendix E Capacity of Renewable Energy Facilities Located in Maryland (MW)

<b>Maryland County</b>	<b>Tier 1 Non-Solar</b>	<b>Tier 1 Solar</b>	<b>Tier 2</b>	<b>Total</b>
Allegany	65.0	2.8	-	67.8
Anne Arundel	3.9	128.3	-	132.2
Baltimore	68.5	126.3	-	194.8
Baltimore City	0.1	16.2	-	16.2
Calvert	-	10.4	-	10.4
Caroline	-	11.6	-	11.6
Carroll	-	37.6	-	37.6
Cecil	-	39.2	-	39.2
Charles	-	49.4	-	49.4
Dorchester	0.0	14.0	-	14.0
Frederick	2.1	91.4	-	93.5
Garrett	210.0	6.8	-	216.8
Harford	0.2	74.8	474.0	549.0
Howard	1.3	60.8	-	62.1
Kent	-	22.1	-	22.1
Montgomery	81.1	144.5	-	225.6
Prince George's	13.5	251.6	-	265.1
Queen Anne's	0.1	43.3	-	43.3
Somerset	3.8	153.5	-	157.3
St. Mary's	-	17.2	-	17.2
Talbot	70.3	13.3	-	83.6
Washington	0.0	95.5	-	95.5
Wicomico	6.0	46.0	-	52.0
Worcester	-	24.0	-	24.0
<b>Total</b>	<b>525.9</b>	<b>1,480.5</b>	<b>474.0</b>	<b>2,480.4</b>

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, 2021.