
Introduction to the Renewable Energy Portfolio Standard

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Introduction to the Renewable Energy Portfolio Standard

Last Revised: October 2023

Overview

In General

The renewable energy portfolio standard (RPS), established under § 7-703 of the Public Utilities Article, requires that a specified portion of retail electricity sold by electricity suppliers in the State come from “renewable” sources, as statutorily defined.¹ Consequently, the RPS incentivizes renewable energy growth and market stability as well as fossil fuel emissions reductions. While the RPS has been subject to legislative changes since its implementation in 2006, the current statewide goal is that 52.5% of the State’s energy be derived from renewable sources by 2030. The RPS is administered by the Public Service Commission (PSC). Subject to specified exemptions, the electricity suppliers required to comply with the RPS include electric companies (investor-owned utilities, electric cooperatives, and municipal utilities²) and aggregators, brokers, and marketers of electricity.³

The eligible renewable energy sources, percentage requirements, and statutory changes are discussed in more detail below.

Eligible Sources

The energy sources that are eligible for compliance with the Maryland RPS are bifurcated into Tier 1 and Tier 2 renewable sources. Tier 1 sources, as of October 2023, include (1) solar energy; (2) wind energy; (3) qualifying biomass; (4) methane from anaerobic digestion in a landfill or wastewater treatment plant; (5) geothermal energy; (6) ocean energy; (7) a fuel cell that produces electricity from qualifying biomass or methane from anaerobic digestion; (8) small hydroelectric power plants; (9) poultry litter-to-energy; (10) waste-to-energy; (11) refuse-derived

¹ § 7-701 of the Public Utilities Article.

² Electric cooperatives and municipal electric utilities are subject to slightly different RPS requirements from other electric companies. For electric cooperatives, the percentage of Tier 1 electricity in the RPS that must be derived from solar is 2.5% in 2020 and later. The RPS requirement that applies to municipal electric utilities for 2022 and later is 20.4% from Tier 1 sources, including 1.95% from solar and 2.5% from offshore wind energy.

³ Under § 7-703 of the Public Utilities Article, the RPS does not apply to electricity sales at retail by any electricity supplier (1) in excess of 300,000,000 kilowatt-hours (or 300,000 megawatt-hours) of industrial process load to a single customer in a year; (2) to residential customers in regions of the State where the residential customer rates are subject to a freeze or cap contained in a specified settlement agreement; or (3) to a customer served by an electric cooperative under an electricity supplier purchase agreement that existed before October 1, 2004 (*i.e.*, Choptank Electric Cooperative). Furthermore, the portion of the RPS that represents offshore wind energy applies only to the distribution sales of electric companies and does not apply to distribution sales by an electric company in excess of 75,000,000 kilowatt-hours of industrial process load to a single customer in a year or 3,000 kilowatt-hours of electricity in a month for certain agricultural customers.

fuel; (12) thermal energy; and (13) raw or treated wastewater used as a heat source or sink for heating or cooling systems.⁴ Hydroelectric power, other than pump storage, is the only Tier 2 source in Maryland. Under statute, Tier 1 sources are eligible for meeting Tier 2 requirements.

Generally, a Tier 1 or Tier 2 source must be located (1) in the PJM region;⁵ (2) outside of but adjacent to the PJM region if the electricity is delivered into the PJM region; or (3) on specified offshore wind lease sites. However, some sources have additional requirements. For example:

- solar, geothermal, poultry litter-to-energy, waste-to-energy, and refuse-derived fuel are eligible only if they are connected with the electric distribution grid that serves Maryland;
- energy from a thermal biomass system must be used in Maryland to qualify for the RPS;
- energy from wastewater used as a heat source or sink is eligible only if it is connected to the electric distribution grid that serves Maryland or processes wastewater from Maryland residents;
- small hydroelectric is only eligible if it is generated at a dam that existed as of January 1, 2004; and
- large hydroelectric is only eligible (for Tier 2) if it is generated at a system or facility that existed or was operational as of January 1, 2004.

Renewable Energy Portfolio Standard Goals and Tier 1 Carve-Outs

Under the RPS, the percentage of electricity required to be supplied from Tier 1 sources increases incrementally each year, while Tier 2 remains steady at 2.5%. In addition to the requirement to supply specific amounts of energy annually through Tier 1 and Tier 2 sources, the RPS contains specific Tier 1 carve-outs for solar, offshore wind, and geothermal energy. While the solar and geothermal carve-outs have specific percentage requirements set in statute each year, the offshore wind energy carve-out is dependent on the annual creation of offshore wind renewable energy credits (OREC), as determined by PSC.⁶ Specific annual percentages for each of the tiers and carve-outs are shown in **Exhibit 1**.

⁴ See the definition of “Tier 1 renewable source” in § 7–701 of the Public Utilities Article for additional details on Tier 1 renewable sources.

⁵ “PJM region” is the wholesale bulk power region administered by PJM Interconnection, LLC, and includes 13 states, including Maryland, and the District of Columbia.

⁶ See § 7-703(b)(12) – (25) of the Public Utilities Article.

Exhibit 1 Annual Renewable Energy Requirements

<u>Year</u>	<u>Solar</u>	<u>Post 2022 Geothermal</u>	<u>Offshore Wind*</u>	<u>Other Tier 1</u>	<u>Tier 1 Total</u>	<u>Tier 2</u>	<u>Combined Total</u>
2023	6.00%	0.05%	2.03%	23.82%	31.90%	2.50%	34.40%
2024	6.50%	0.15%	0.14%	26.91%	33.70%	2.50%	36.20%
2025	7.00%	0.25%	1.66%	26.59%	35.50%	2.50%	38.00%
2026	8.00%	0.50%	2.61%	26.89%	38.00%	2.50%	40.50%
2027	9.50%	0.75%	13.02%	18.23%	41.50%	2.50%	44.00%
2028	11.00%	1.00%	13.02%	17.98%	43.00%	2.50%	45.50%
2029	12.50%	1.00%	13.02%	22.98%	49.50%	2.50%	52.00%
2030+	14.50%	1.00%	13.02%	21.48%	50.00%	2.50%	52.50%

*This percentage includes only the commission-approved offshore wind energy carve-out from Order Nos. 88192 and 90011.

Source: Public Service Commission

Renewable Energy Credits

To demonstrate compliance with RPS requirements, an electricity supplier must acquire renewable energy credits (REC) equal to the RPS percentage specified in statute each year or else pay an alternative compliance payment (ACP) equivalent to the supplier's shortfall. RECs identify the attributes associated with the production of one megawatt-hour (MWh) of electricity generated using eligible Tier 1 and Tier 2 sources.

Each REC has a unique identifier that prevents duplicative sales, ensures proper tracking, and assigns ownership rights. Thus, a REC proves that a supplier has rights to Tier 1 or Tier 2 renewable sources, either from producing the REC or purchasing the REC. Generally, the price of a REC fluctuates based on basic market principles of supply and demand. In 2021, the average cost of a REC was \$14.36 for Tier 1 non-solar, \$72.59 for Tier 1 solar, and \$6.45 for Tier 2.

Under § 7-709 of the Public Utilities Article, a REC has a 3-year life during which it can be transferred, sold, or used for RPS compliance. The purchase, sale, and retirement of RECs is facilitated through the PSC-approved Generation Attributes Tracking System (GATS) operated by PJM. Using system data, GATS creates a REC for every MWh of electricity generated and assigns the REC a unique serial number.

Unlike RECs, § 7-704.1 of the Public Utilities Article requires that the price for ORECs be bundled to include the price of the offshore wind energy, capacity, ancillary services, and

environmental attributes. Furthermore, ORECs are procured by a developer at a fixed price according to a pricing schedule, as opposed to RECs which fluctuate in price based on market demand.⁷

Alternative Compliance Payments

If an electricity supplier does not meet its RPS obligations in a compliance year, the supplier must make an ACP for the shortfall.⁸ The ACP serves as both a penalty for noncompliance with REC requirements and as an alternative to purchasing RECs when specific renewable sources are scarce. The ACP varies for shortfalls from Tier 1 sources (excluding solar and geothermal), solar energy, geothermal systems, and Tier 2.⁹ The ACP is paid into the Strategic Energy Investment Fund (SEIF), administered by the Maryland Energy Administration, and established under Title 9, Subtitle 20B of the State Government Article. The SEIF is used to, among other things, promote renewable and clean energy resources.

Under § 7-712 of the Public Utilities Article, PSC must submit a report on the RPS for each compliance year. The report must cover the implementation of the RPS, the availability of Tier 1 resources, projects supported by the SEIF, and additional pertinent information.

Major Legislative Changes

The State RPS has undergone several rounds of significant change since its creation in 2004 – notably to alter source eligibility, establish carve-outs, increase overall percentage requirements, and adjust ACPs. **Exhibit 2** summarizes the most significant changes by chapter law and year. Additional visualizations of the RPS and changes to its components over time are included in **Appendix 1**.

⁷ RECs may also be purchased at fixed or pre-established prices as determined in a contract between private parties; the general distinction is that OREC prices are established by PSC order.

⁸ See § 7-705 of the Public Utilities Article.

⁹ There is also a separate ACP for industrial process load shortfalls from Tier 1 sources. See § 7-705 of the Public Utilities Article.

Exhibit 2
**History of Major Legislative Changes to the Renewable Energy Portfolio
Standard and Alternative Compliance Payments**
Current Through 2023 Legislative Session

<u>Year</u>	<u>Chapter(s)</u>	<u>Summary</u>
2004	Chapters 487 and 488	<p>RPS established. Percentage requirement set at 3.5% in 2006 (1.0% from Tier 1 and 2.5% from Tier 2), increasing to 7.5% from Tier 1 in 2019 and later (Tier 2 originally terminated after 2018).</p> <p>ACP established and set at \$20 for each Tier 1 MWh of shortfall and \$15 for each Tier 2 MWh of shortfall. Separate ACP established for industrial process load shortfalls from Tier 1, set at \$8/MWh in 2006, decreasing to \$2/MWh in 2017 and later.</p>
2007	Chapters 119 and 120	<p>Established requirement that a percentage of Tier 1 electricity under the RPS be derived from solar energy (solar carve-out); carve-out set at 0.005% in 2008, increasing to 2.0% in 2022 and later.</p> <p>Increased percentage of electricity required to be derived from Tier 1 renewable sources under the RPS to 9.5% in 2022 and later.</p> <p>ACP established for solar carve-out and set at \$450/MWh of shortfall in 2008, decreasing to \$50/MWh of shortfall in 2023 and later.</p>
2008	Chapters 125 and 126	<p>Increased the Tier 1 RPS, beginning with 5% in 2011, increasing to 20% in 2022. These percentages include the 2% solar carve-out.</p> <p>Revised geographic eligibility of facilities eligible to generate RECs.</p> <p>Increased Tier 1 ACP to \$40/MWh.</p>
	Chapters 135 and 136	<p>Defined poultry litter-to-energy as a Tier 1, rather than a Tier 2, renewable source. The poultry litter-to-energy source must be connected with the electric distribution grid serving Maryland to be eligible for meeting the RPS.</p>

2010	Chapter 494	<p>Increased solar carve-out for years 2011-16, beginning with 0.05% in 2011, increasing to 0.5% in 2016.</p> <p>Increased Solar ACP for years 2011-16, beginning with \$400/MWh of shortfall in 2011, decreasing to \$350/MWh of shortfall in 2016.</p>
2011	Chapters 407 and 408	Defined solar water heating systems as Tier 1 sources under the RPS; energy from these systems qualifies for the solar carve-out.
	Chapter 519	Defined waste-to-energy as a Tier 1, rather than Tier 2, renewable source. Also defined refuse-derived fuel as a Tier 1 source. Both sources must be connected with the electric distribution grid serving Maryland to be eligible to meet the RPS.
2012	Chapters 556 and 557	<p>Added geothermal heating and cooling systems as a Tier 1 source.</p> <p>Modified eligibility of geothermal energy to meet the RPS to require that the source be connected with the electric distribution grid serving Maryland.</p>
	Chapters 583 and 584	Accelerated RPS solar carve-out, beginning with 0.25% in 2013 and increasing to 2% in 2020.
	Chapter 635	Added thermal energy from biomass systems that use animal waste, food waste, or qualifying biomass as a Tier 1 source.
2013	Chapter 3	<p>Established requirement that, beginning in 2017, 2.5% of Tier 1 electricity in the RPS be derived from offshore wind energy (offshore wind carve-out).</p> <p>Established ORECs and an ACP for shortfalls from the offshore wind carve-out.</p>
2017	Chapters 1 and 2	<p>Increased percentage of electricity required to be derived from Tier 1 renewable sources and the solar carve-out to 25% and 2.5%, respectively, by 2020.</p> <p>Decreased Tier 1 ACP to \$37.50/MWh of shortfall in 2017.</p> <p>Decreased solar ACP for 2017, 2018, 2020, and 2022 but increased to \$60/MWh of shortfall for 2023.</p>

2019	Chapter 757	<p>Increased the distance off the coast of the State that a Tier 1 or Tier 2 renewable source may be located to qualify for a renewable energy credit.</p> <p>Established a “Round 2” process requiring ORECs from additional offshore wind capacity, beginning with 400 MW in 2026, 800 MW in 2028, and 1,200 MW in 2030 and later.</p> <p>Increased percentage of electricity required to be derived from Tier 1 renewable sources to 50% by 2030, including increasing the solar carve-out to 14.5% and requiring at least 1,200 MW from Round 2 offshore wind projects.</p> <p>Extended Tier 2 RPS requirement of 2.5% to apply in 2019 and 2020.</p> <p>Set solar carve-out of 2.5% in 2020 and later for electric cooperatives’ RPS.</p> <p>Decreased Tier 1 ACP to \$22.35/MWh in 2030 and beyond.</p> <p>Decreased solar ACP to \$22.35/MWh in 2030 and later.</p>
2021	Chapter 164	<p>Established requirement that percentage of Tier 1 electricity under the RPS be derived from post-2022 geothermal systems (geothermal carve-out); carve-out set at 0.05% in 2023, increasing to 1% in 2028 and later. Certain portion of geothermal carve-out must be derived from systems installed at low- and moderate-income housing or institutions that serve low- and moderate-income individuals and families.</p> <p>ACP established for geothermal carve-out set at \$100/MWh in 2023, decreasing to \$65/MWh in 2028 and later.</p>
	Chapters 174 and 175	<p>Limited Tier 1 RPS percentage requirements for municipal electric utilities to 20.4% in 2021 and later, with carve-outs for solar and offshore wind.</p>
	Chapter 673	<p>Decreased percentage of electricity required to be derived from Tier 1 renewable sources and the solar carve-out beginning in 2022 through 2029, but maintained same Tier 1</p>

and solar carve-out goals for 2030 and later.

Permanently extended Tier 2 beginning in 2021.

Increased solar ACP to \$60/MWh in 2023, decreasing to \$22.50/MWh in 2030 and later.

Removed black liquor, or any product derived from black liquor, from Tier 1 beginning with the 2022 compliance year.

	Chapter 691	Added raw or treated wastewater used as a heat source or sink for a heating or cooling system as a Tier 1 source. To be eligible for inclusion in the RPS, the system must be connected with the electric distribution grid serving Maryland or process wastewater from Maryland residents.
2022	Chapter 578	Altered OREC collection mechanism under the RPS such that electric companies, instead of electricity suppliers, must purchase ORECs to meet the requirements of the RPS.

ACP: alternative compliance payment

OREC: offshore wind renewable energy credit

RPS: renewable energy portfolio standard

Source: Department of Legislative Services

Pathway to 100% Clean Energy

In General

Chapter 757 of 2019, also known as the Clean Energy Jobs Act (CEJA), directed the Power Plant Research Program (PPRP) to conduct a study on, among other things, the feasibility, costs, and benefits of increasing the RPS to a goal of 100% renewable energy by 2040. CEJA also directed PPRP to identify industries and communities that could be negatively impacted by a 100% RPS and to evaluate transition arrangements for affected workers and communities. In addition, PPRP studied what a 100% clean energy requirement would look like based on the Clean and Renewable Energy Standard (CARES) legislation that was introduced, but not enacted, in the 2020 and 2021 legislative sessions.¹⁰

¹⁰ See SB265/HB363 of 2020 and HB 1362 of 2021.

As of May 2023, the PPRP had modeled four scenarios for the period from 2020 through 2040 (“forecast period”): (1) a base case/business as usual (BAU) scenario; (2) a 100% RPS without Calvert Cliffs nuclear facility scenario; (3) a 100% RPS with Calvert Cliffs scenario; and (4) a 100% clean energy scenario. PPRP released preliminary results for these scenarios, which are summarized below. Additional scenarios are planned for inclusion in the final study, which must be submitted to the Governor and the General Assembly by January 1, 2024.

Assumptions Made in Conducting the Study

In conducting the study, PPRP made the following assumptions:

- the states modeled in the study included PJM states and the entire state of Illinois;
- the study used 2020 early release data from the Energy Information Administration, with constraints for 2021 and 2022;
- modeling was done at a county-by-county level for Maryland but was statewide for other states modeled in the study;
- except for the 100% RPS with Calvert Cliffs scenario, all other scenarios assumed Calvert Cliffs goes offline after the expiration of the Nuclear Regulatory Commission’s operating license in 2034 (Unit 1) and 2036 (Unit 2);
- EmPOWER Maryland was assumed to expire at the end of 2023;
- all Round 1 and Round 2 offshore wind capacity in Maryland was assumed to come online in 2027;
- the targets of 8,500 megawatts of offshore wind by 2031 and 3,000 megawatts of energy storage by 2033 established under Chapter 95 of 2023 and Chapter 570 of 2023, respectively, were not reflected in the modeling; and
- State greenhouse gas (GHG) emissions reduction goals, including the goals established under the Climate Solutions Now Act of 2022¹¹, were not modeled as binding constraints.

High-level Findings

PPRP identified the following main findings among the scenarios modeled.

- In all scenarios, Maryland becomes a power exporter, substantial amounts of renewables are added, and the levels of most individual air pollutants decline rapidly but increase

¹¹ See Chapter 38 of 2022.

towards the end of the forecast period (though not to the levels present at the beginning of the forecast period).

- There was little difference in capacity and generation in Maryland between the BAU scenario and a 100% RPS without Calvert Cliffs scenario.
- Keeping Calvert Cliffs online would result in slightly less natural gas capacity in Maryland but a more significant reduction of natural gas capacity in PJM.
- The 100% clean energy scenario results in additional advanced nuclear and carbon capture storage capacity and generation.

Overall, PPRP stated that the “results point to a need for “clean firm” capacity, especially in the latter half of the forecast period, to meet Maryland GHG emission reduction goals.” Thus, according to PPRP, the State will likely need to consider utilizing non-weather-dependent, always-available, zero-emissions energy, or “clean firm” energy, to meet the State’s GHG emissions reduction goals.¹²

Scenarios for Achieving 100% RPS

Business as Usual Scenario

Under the BAU scenario, there is a steady increase in wind and solar capacity through 2030, accompanied by the retirement of coal and existing natural gas capacity during that timeframe. New renewable capacity largely stops by 2030, except for rooftop solar. New natural gas installations increase from approximately 2029 through 2038, especially when the operating licenses for the nuclear reactors at Calvert Cliffs expire in 2034 and 2036. Maryland turns from a power importer to a power exporter by 2034. Although the amounts vary by year, RPS compliance under the BAU scenario generally requires slightly more REC purchases than in-state generation of renewable energy. Air emissions in the State generally decrease through 2030 but begin to rise again from 2030 through 2040, with some emissions exceeding 2020 levels.

100% RPS without Calvert Cliffs Scenario

The 100% RPS without Calvert Cliffs scenario gives similar results to the BAU scenario in terms of installed capacity and generation in the State during the forecast period, with Maryland turning from a power importer to a power exporter by 2034. Total coal capacity is reduced to zero by 2030 and there is a corresponding increase in natural gas combined cycle capacity and generation beginning in 2031 with the decrease in coal and the retirement of Calvert Cliffs reactors. Similar to the BAU scenario, RPS compliance under the 100% RPS without Calvert Cliffs scenario has more REC purchases than in-State generation of renewable energy. Similar to the BAU

¹² Examples of “clean firm” energy include geothermal, hydrogen combustion, nuclear, and natural gas with carbon capture and sequestration.

scenario, air emissions generally decrease through 2030 but begin to rise again from 2030 through 2040, with some emissions exceeding 2020 levels.

100% RPS with Calvert Cliffs Scenario

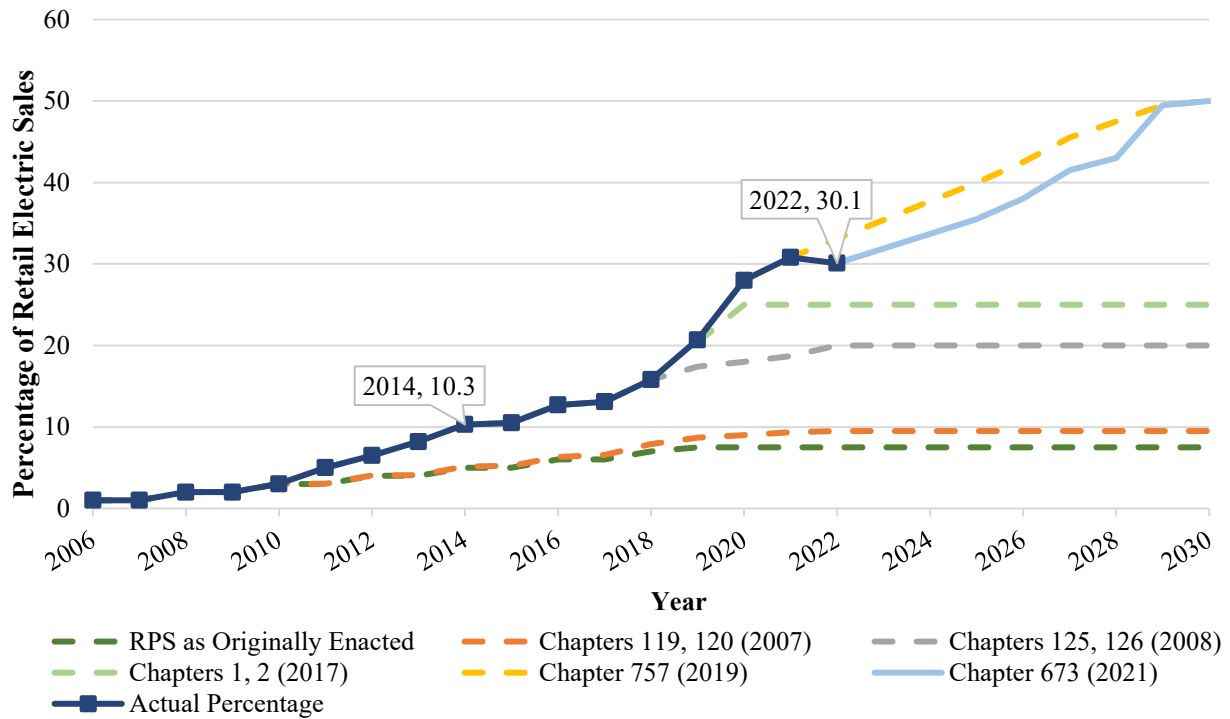
Transitioning to a 100% RPS with the continued operation of Calvert Cliffs would result in similar capacity and generation as the 100% RPS without Calvert Cliffs scenario, although nuclear energy capacity would subsume the growth of natural gas capacity, resulting in less natural gas generation in Maryland than the previous two scenarios. Once again, the State would export more energy than it imports beginning in 2034, although at slightly higher amounts, and would purchase more RECs than in-state generation of renewable energy. The pattern of emissions reductions is likewise similar, with falling levels through 2030 and increasing levels through 2040.

100% Clean Energy Scenario

To implement a 100% clean energy scenario, PPRP assumed the implementation of the 2020 and 2021 CARES legislation that, among other things, would have distinguished renewable energy from clean energy and incentivized net-zero emissions. Under this scenario, the State would realize greater nuclear energy generation and an increase in natural gas capacity with carbon capture technology. A 100% clean energy scenario would allow the State to export most of its carbon captured natural gas to neighboring states within PJM, allowing the State to become a net exporter of energy by 2028, earlier than under any of the other scenarios modeled. As under the other scenarios, the State would have to purchase more REC's than in-state generation of renewable energy, and emissions follow a similar pattern.

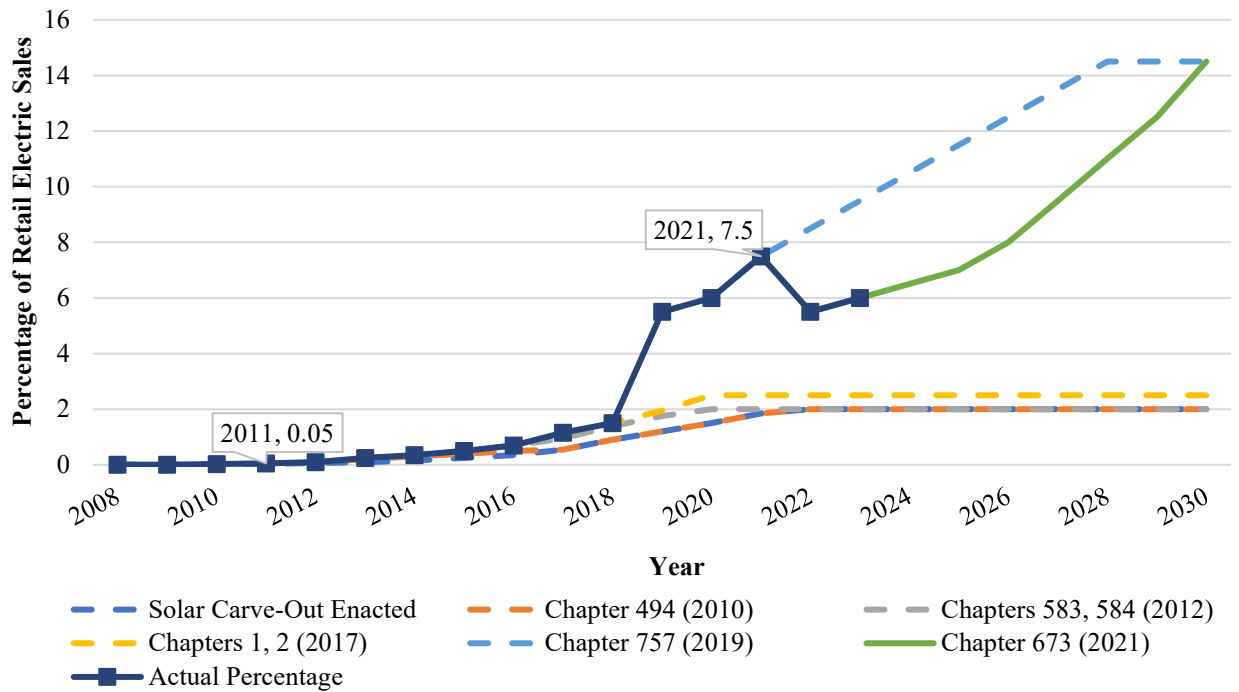
Appendix 1

Exhibit 1.1
Statutory Changes in Tier 1 Source Requirement Under the RPS Compared to Actual Tier 1 Source Requirement by Year



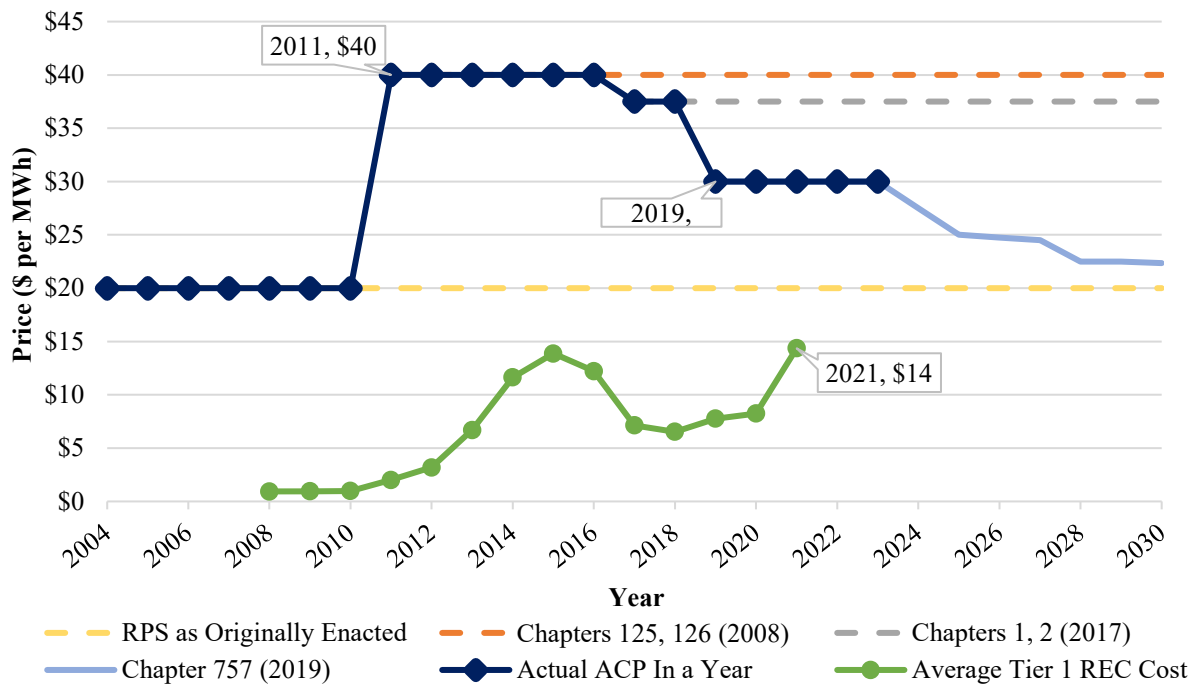
Source: Department of Legislative Services

Exhibit 1.2
Statutory Changes in Solar Carve-out Requirement Under the RPS
Compared to Actual Solar Energy Requirement by Year



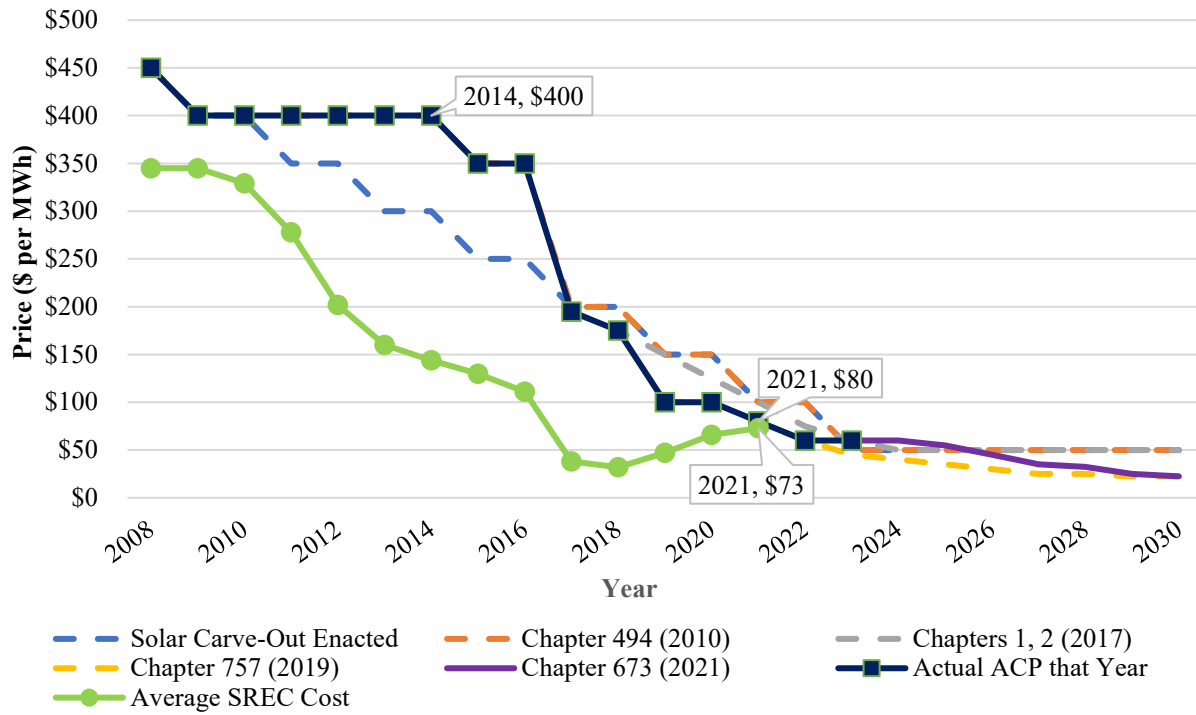
Source: Department of Legislative Services

Exhibit 1.3
Statutory Changes in Tier 1 ACP Price Under the RPS Compared to Actual ACP Price by Year and Average Tier 1 REC Cost by Year



Source: Public Service Commission; Department of Legislative Services

Exhibit 1.4
Statutory Changes in Solar Energy ACP Price Under the RPS Compared to Actual ACP Price by Year and Average SREC Cost by Year



Source: Public Service Commission; Department of Legislative Services