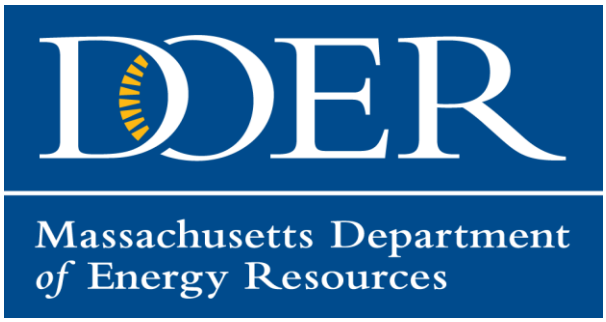

2018 ANNUAL COMPLIANCE REPORT

RENEWABLE ENERGY PORTFOLIO STANDARD (RPS)
ALTERNATIVE ENERGY PORTFOLIO STANDARD (APS)
CLEAN ENERGY STANDARD (CES)

(CES IS ADMINISTERED BY MASSDEP)

June 9, 2021

Renewable and Alternative Energy Division
Department of Energy Resources
Executive Office of Energy and Environmental Affairs
Commonwealth of Massachusetts

TABLES

FIGURES

Executive Summary

The Renewable Energy Portfolio Standard (RPS) Class I is a statutory obligation created by the Electricity Restructuring Act of 1997 and activated by regulations in 2002. The statute was first revised by the Green Communities Act of 2008, which added a second class of RPS (Class II) and the Alternative Energy Portfolio Standard (APS). The RPS and APS statutes were further modified by the Competitively Priced Electricity Act of 2012,[1] the Renewable Thermal Act of 2014,[2] the Energy Diversity Act of 2018,[3] and the Act to Advance Clean Energy of 2018.[4] In 2018, the Clean Energy Standard (CES) was introduced to complement the other standards. It is administered by the Massachusetts Department of Environmental Protection (MassDEP).[5]

The statute requires Massachusetts Retail Electricity Suppliers to obtain each year a certain percentage of their retail customers' electricity supply from resources qualified under each portfolio standard. The RPS, APS and CES requirements do not apply to municipal light plants. There were some notable developments in 2018, including the number of renewable energy certificates (RECs) generated by solar photovoltaic units through the Solar Carve-Out II program increasing by 37% compared to 2017. In addition, the number of RPS Class II RECs increased by 30%, mostly due to the new qualification of hydroelectric plants.

Notably, in a concerning development, six Retail Electricity Suppliers failed to meet their compliance requirements, the greatest number of suppliers to be found non-compliant since the program began in 2003. The obligations of the non-compliant suppliers accounted for approximately 5% of the total obligation of the RPS Class I. In response, the Department of Energy Resources (DOER) has proposed modifications to ensure compliance in the future.

Minimum Standards

The RPS requirements began in 2003 with an obligation of 1% of total retail electricity sales that increased 0.5% annually until it reached 4% in 2009. From 2010 to 2018, the RPS Class I obligation has increased 1% annually. The RPS Class I Minimum Standard was 13% in 2018.

Since 2010, the RPS Class I Minimum Standard has included a Solar Carve-Out (SCO) obligation for in-state solar generation. The minimum standard obligation for the SCO and its 2014 successor program, Solar Carve-Out II, change annually by formulas set in regulation.

The RPS Class II Renewable Energy obligation rises annually per a schedule and formula set in regulation, while the Class II waste-to-energy obligation is fixed at 3.5% annually. The APS obligation, which was 4.25% in 2018, increases by 0.25% per year. The total obligation for the CES was 16% in 2018, though it is inclusive of the RPS Class I minimum standard. Therefore, the additional obligation from the CES is 3% in 2018. The CES increases by 2% per year. The table below shows the 2018 minimum standard for each class, the resultant renewable obligation in MWh, and the total amount of Alternative Compliance Payments (ACP) collected by class:

[1] Chapter 209 of the Acts of 2012
[2] Chapter 251 of the Acts of 2014
[3] Chapter 188 of the Acts of 2017
[4] Chapter 227 of the Acts of 2018
[5] In agreement with the Massachusetts Department of Environmental Protection, DOER's annual report on RPS and APS will also serve as the Annual Clean Energy Resource Report as specified in 310 CMR 7.75(9)(b), Clean Energy Standard.

Summary of Minimum Standards, Certificates Used to Meet Obligation, and Alternative Compliance Payments in 2018

RPS/APS Class	Minimum Standard *	Total Obligation (MWh)	Certificates Used to Meet Obligations (MWh)	ACP Credits Used to Meet Obligations (MWh)	Alternative Compliance Payments ($)
RPS CLASS I	13.0000%	3,463,696	3,286,783	2	$ 138
RPS SCO *	1.7879%	829,784	751,035	20,283	$ 8,640,558
RPS SCO II *	3.7489%	1,739,857	1,582,507	22,636	$ 7,922,600
RPS CLASS II Renewable	2.6155%	1,213,892	961,688	169,016	$ 4,783,153
RPS CLASS II Waste-to-energy	3.5000%	2,088,490	1,503,209	11,755	$ 133,067
APS	4.5000%	1,910,223	1,910,223	43,845	$ 992,651
CES **	3.0000%	855,077	755,676	3,985	$ 759,661
TOTAL* **	**21.0319%**	**12,101,019**	**10,751,121**	**271,522**	**$ 23,231,827**

* Solar carve out requirements are subsets of the overall RPS Class I requirement.
** CES total obligation is 16%. The RPS Class I obligation counts towards meeting the overall obligation making the Incremental Minimum Standard 3%.
*** Total number of certificates and ACP credits does not exactly match total obligation due to 1) rounding of individual obligations, and 2) the non-compliance of six suppliers (See Appendix Two: Compliance Filings, Review, and Verification). Totals of certificates used also includes banked certificates from prior compliance years.

Eligible Resources

Eligible RPS Class I resources include post-1997 renewable generation units located in New England or in adjacent electricity control areas.[6] Eligible resources for RPS Class II Renewable Energy include pre-1998 renewable plants (primarily small hydropower) located in New England or in adjacent electricity control areas. Eligible Class II waste-to-energy generation units must be pre-1998 waste-to-energy plants located in Massachusetts that meet certain MassDEP recycling requirements. Eligible APS resources in 2018 included air and ground source heat pumps, solar thermal, biomass, liquid biofuels, biogas, fuel cells, and waste-to-energy thermal in addition to Combined Heat and Power (CHP).

Renewable Energy Certificates (RECs)

In order to achieve RPS, APS, and CES compliance, each Retail Electricity Supplier must obtain enough renewable generation certificates to satisfy its Minimum Standard obligation or make an Alternative Compliance Payment for enough credits to satisfy the Minimum Standard obligation.

Each RPS Class I and Class II RECs, Solar Carve-Out Renewable Energy Certificate (SRECs), Solar Carve-out II Renewable Energy Certificate (SREC IIs), and Waste Energy Certificate (WECs) represents the renewable generation attributes of one megawatt hour (MWh) of electricity generated during the Compliance Year by a qualified generation unit.[7]

Under the APS program, an Alternative Energy Certificate (AEC) represents the MWh-equivalent of the fuel savings in thermal energy from APS-qualified facilities as determined by the APS regulations for each specific alternative energy technology.

The CES establishes Clean Energy Certificates (CECs), which comparable to other attribute programs, is used to track compliance with the program. RPS Class I RECs are also eligible to be used for compliance with the

[6] These include New York (NYISO), Quebec, New Brunswick, and Northern Maine (NMISA).
[7] The MWh value of some SREC IIs generation is discounted by SREC factors related to project size and type of location, resulting in only a portion of a facility's output generating SREC IIs.

CES. In 2018, no separate qualifying generators were eligible to produce stand-alone CECs. As a result, RPS Class I RECs were used to meet the meet the CES obligation in 2018.

Total Load Obligation

The total retail load obligation in 2018 was 46,409,960 MWhs, which was 1.5% more than the retail load obligation in 2017 of 45,715,742 MWhs.

RPS Class I

Total RPS Class I RECs generated (net of SRECs and SREC IIs) equaled 6,975,162, which represents a 2.4% increase over 2017. Some of these RECs also qualify in other jurisdictions and may have been used for compliance in other New England states (mostly Connecticut, New Hampshire, and Rhode Island). In addition, some were used to meet voluntary green products that exceed RPS requirements.[8]

However, as noted above, RPS Class I RECs were also used to meet the new CES obligation in 2018. There was adequate supply of RECs in the market to meet the RPS and CES obligations. In fact, only two Alternative Compliance Credits were utilized for RPS Class I, which resulted in an Alternative Compliance Payment of $138. Suppliers also banked 586,227 Class I RECs for future use (banking was not allowed in 2018 for CES).

Resources located in Massachusetts supplied 42% (mostly solar) of all RPS Class I RECs (including SRECs and SREC IIs) used for compliance, which is the largest contribution of any state. Maine provided 26% of all RPS Class I RECs (mostly wind), and New York contributed 15% (mostly wind).

Overall, wind accounted for approximately 52% of the total RPS Class I RECs (including SRECs and SREC IIs), slightly less than in 2017. Solar photovoltaic arrays contributed 41%, which was an increase from 2017. Landfill gas supplied 4% of the total RPS Class I REC supply, while hydroelectric contributed 2%, and anaerobic digesters provided 1%.

Solar Carve-Out

The SCO market was tightly balanced in 2018. For compliance, suppliers utilized 20,283 ACP credits, up from 1,167 in 2017. As a result, ACP receipts increased from $0.5 million in 2017 to $8.6 million in 2018.

Solar Carve-Out II (SCO II)

Like the SCO market, the SCO II program was tightly balanced in 2018. ACP credits utilized increased from 13,889 in 2017 to 22,636 in 2018. ACP receipts jumped from $4.9 million in 2017 to $7.9 million in 2018.

In 2018, Massachusetts transitioned to the new Solar Massachusetts Renewable Target (SMART) program, a tariff-based program that incentivizes development of solar in Massachusetts. The program initially targeted 1,600MW of solar capacity, which increased to a total of 3,200MW in 2020.

[8] These Class I RECs retired as "Voluntary Renewable Energy (VRE) purchases," from both the 2017 Filings and NEPOOL GIS Reserved Certificates Report, were reported to the MassDEP, which, in turn, will retire a calculated number of allowances for a future vintage year in the Regional Greenhouse Gas Initiative (RGGI). The retired allowances represent the Greenhouse Gas emissions avoided by 34,913 MWh of renewable energy. That quantity will reduce the number of allowances that can be sold in the RGGI Auction for that future year, which will, in turn, slightly reduce the regional allowance cap for non-renewable thermal power plants for that year. DOER's regulatory basis for this report is the CO_2 Budget Trading Program Auction Regulations, 225 CMR 13.14. More information about RGGI can be found at http://www.rggi.org/.

RPS Class II Renewable and RPS Class II Waste-to-Energy

The RPS Class II Renewable Energy program was more in balance than previous years because of the increase in RPS Class II RECs produced due to the increase in supply from recently approved hydroelectric plants for the program. ACP credits fell from 390,463 in 2017 to 169,016 in 2018. ACP receipts fell from $10.9 million in 2017 to $4.8 million in 2018.

In the RPS Class II Waste-to-Energy Program, suppliers used 11,755 ACP credits, resulting in $133,067 of ACP receipts. Suppliers banked forward 61,217 WECs.

Alternative Portfolio Standard (APS)

The APS market was mostly in balance compared to previous years. Suppliers utilized 43,845 ACP credits for ACP payments of $0.9 million, down from $3.2 million in 2017.

Clean Energy Standard (CES)

The CES was a new standard in 2018 and is overseen by the Massachusetts Department of Environmental Protection (MassDEP). . The Minimum Standard was 16% in 2018. Under the CES, all RPS Class I RECs are eligible CECs to meet the program's obligation. In 2018 no separate qualifying generators were eligible to produce stand-alone CECs. Subsequently, all CECs used to meet the CES obligation were eligible for RPS Class I RECs. The RPS Class I Minimum Standard, 13% in 2018, is included within the CES Minimum Standard. The incremental obligation in the CES was 3% in 2018 and herein is referred to as the "incremental minimum standard."

In its first year, CECs and ACP credits were used to meet the obligation of 759,661 MWh (net of Non-Compliance). ACP credits amounted to 3,985 totaling $179,779 in ACP receipts.

Supplier Compliance

Sixty-seven (67) Retail Electricity Suppliers (including the 3 state-regulated investor-owned utilities) served Massachusetts retail customers in 2018 (see Appendix One: 2018 Massachusetts Retail Electricity Suppliers).9 Sixty-one suppliers fully discharged their obligations through the purchase of the required number of certificates or by making ACPs by the filing deadline. Six suppliers were non-compliant at the deadline (see Appendix Two: Compliance Filings, Review, and Verification for further detail).

[9] NStar and Western Massachusetts Electric Co. are reported as Eversource at the request of the company. Massachusetts Electric Co. and Nantucket Electric Co. are reported as National Grid at the request of the company. Similarly, beginning in 2018, all Constellation accounts are reported as Constellation New Energy at the request of the company. In addition, EDF Energy Services assumed TransCanada's retail accounts in Massachusetts. Even though the transaction did not occur until March 2018, DOER agreed that EDF could report TransCanada's retail sales for the whole year (Compliance Year), so that TransCanada did not have to file.

1. INTRODUCTION TO THE RENEWABLE PORTFOLIO STANDARD, ALTERNATIVE ENERGY PORTFOLIO STANDARD AND CLEAN ENERGY STANDARD

A. Renewable Energy Portfolio Standard (RPS)

The Electricity Restructuring Act of 1997 mandated the Renewable Energy Portfolio Standard (RPS), one of the earliest such requirements in the nation. The original RPS obligated Retail Electricity Suppliers,[10] to obtain for their retail customers a small but growing percentage of electricity (the "Minimum Standard") from qualified renewable generation sources, e.g., solar, wind, landfill methane, and low-emission/advanced technology biomass[11] that had begun operation after 1997.

All Minimum Standards are structured as percentage obligation of a Supplier's retail load, but each Minimum Standard has different eligibility criteria and percentage obligations.

The RPS program began with an obligation of 1% in 2003, that increased annually by 0.5% through 2009, when it reached 4%. Under the Green Communities Act of 2008, the RPS was renamed RPS Class I, and the Minimum Standard would be increased by 1% annually beginning in 2009. The RPS Class I Minimum Standard was 13% in 2018.

The legislature further amended the RPS Class I Minimum Standard through Chapter 227 of the Acts of 2018, by increasing the growth rate from 1% per year to 2% per year for the years 2020 through 2029. After 2029, the RPS Class I Minimum Standard reverts to a 1% annual growth rate.[12]

As a result of the Green Communities Act of 2008, suppliers were required, as of 2009, to comply with three additional energy portfolio standards: (1) RPS Class II Renewable, (2) RPS Class II Waste-to-Energy, and (3) Alternative Energy Portfolio Standard (APS). The RPS Class II Renewable qualified electricity generated from pre-1998 generation units. As a condition of eligibility, the RPS Class II Waste-to-Energy qualified facilities must be approved by the MassDEP and provide a portion of their certificate revenue to MassDEP recycling programs. The APS, when first promulgated, allowed for combined heat and power (CHP), flywheel energy storage, and other efficient technologies to participate.

Additionally, the Green Communities Act of 2008 expanded the list of RPS eligible resources to include hydroelectricity plants of small size and low environmental impact,[13] as well as geothermal and marine and hydro-kinetic facilities. Furthermore, as of 2009, behind-the-meter distributed generation units, which formerly had to be located within Massachusetts, could be located anywhere in the ISO New England (ISO-NE) control area (the New England grid), but all such generation must be reported to the NEPOOL Generation Information System (GIS)[14] by an independent Third Party Meter Reader or Independent Verifier.[15]

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[10] Defined in CMR 14.02 as a person or entity that sells electrical energy to End-use Customers in Massachusetts including but not limited to electric utility distribution companies supplying basic service…A Municipal Lighting Plant…shall be exempt from the obligations of a Retail Electricity Supplier.

[11] Since 2012, the regulations for woody biomass have included detailed fuel sourcing and energy conversion efficiency standards based on forest sustainability and life-cycle carbon dioxide emissions, informed by a DOER-commissioned, 2010 study on the relative environmental impacts of woody biomass as a fuel supply. See the Biomass Sustainability and Carbon Policy Study (a.k.a. Manomet Study) webpage.

[12] The RPS law and regulations do not include final limits or ending dates except for the Solar Carve-Out & Solar Carve-Out II regulations.

[13] Under the 2012 Act, eligible hydroelectricity capacity limits were increased, effective as of November 1, 2012, to 30 MW in Class I and 7.5 MW in Class II. In addition, statutory environmental criteria apply to facilities under both Class I and Class II; these criteria normally are met through certification by the non-profit, Low Impact Hydropower Institute (LIHI). See the details for Class I hydropower in 225 CMR 14.05(1)(a)6 and for Class II hydropower in 225 CMR 15.05(1)(a)6.

[14] See http://www.nepoolgis.com, as well as the Generation Certificates paragraph on page 8.

[15] Third Party Meter Readers provide meter data directly to the GIS Administrator via a secure internet portal.

B. Solar Carve-Out (SCO)

A Solar Carve-Out Minimum Standard was created within Class I as of 2010,[16] and an additional Solar Carve-Out II (SCO II) Minimum Standard (see C. Solar Carve-Out II below) was created within Class I as of 2014, as a successor program to the Solar Carve-Out.

Under the SCO Minimum Standard, each supplier must demonstrate annually that within its Class I percentage obligation it has obtained a specified percentage of its electricity from solar photovoltaic (PV) systems that were installed after 2008 and are connected to the Massachusetts electric grid. The SCO percentage obligation changes annually through a methodology detailed in the Class I Regulations.

Following an interim extension by emergency regulations and then by conventional rulemaking, DOER commenced on April 25, 2014, the SCO II within Class I. The start of the SCO II marked the end of the SCO, which eventually qualified a total of 653.3 MW of new solar resources.[17]

C. Solar Carve-Out II (SCO II)

The SCO II is modeled on the SCO regarding project eligibility, except installation must have commenced after 2012. Within that model, the SCO II has three major differences compared to the SCO: (1) the Clearinghouse Auction Account prices undergo scheduled reductions to reflect declining development costs; (2) some project types and sizes are provided less incentive than others, reflecting public policy priorities; and (3) certain types of large-scale projects are approved under an annual cap within a system of "managed growth" intended to avoid any boom or bust pattern of development.

Approvals of solar PV systems under the SCO II were originally capped at 946.7 MW of installed capacity, which was designed to meet the Commonwealth's new capacity goal of 1,600 MW by 2020, less the 653.3 MW qualified under the original SCO. However, the market reacted robustly to the SCO II program, and DOER received enough applications for the SCO II program to reach the 1,600 MW program capacity cap in February 2016.

In response, DOER filed emergency regulations for Class I on April 8, 2016. That rulemaking, which concluded on June 1, 2018, removed the capacity cap, provided conditional construction deadlines, and extended the program until the start of the next solar program. The extension provided lower SREC Factors for projects that were able to achieve certain milestones by established deadlines.

The SCO II also differs from the SCO in the creation of "Market Sectors" and "SREC Factors" for qualifying projects. Under the SCO II, the highest incentive, namely an SREC Factor of one SREC II per megawatt-hour (MWh) of output, is given to small (25 kW or less) projects, solar canopies, community-shared solar projects providing 100% of its power to low-income housing, and emergency power sites. The SCO II gives a slightly lower SREC Factor to larger building-mounted projects, those that mostly serve an on-site load, and those built on eligible landfills and qualified "brownfields."[18]

D. Solar Massachusetts Renewable Target program

Following the passage of Chapter 75 of the Acts of 2016, DOER promulgated regulations that created the Solar Massachusetts Renewable Target (SMART) Program. The SMART program was designed to create long-

[16] Each year's Class I obligation equals the obligation scheduled in regulation, 225 CMR 14.07(1), minus the Solar Carve-Out and Solar Carve-Out II obligations that are *calculated* per a method specified in regulation, 225 CMR 14.07(2) and (3). Also see the second paragraph of Section Two of this Report.

[17] For more details about the Solar Carve-Out and Solar Carve-Out II, see footnote 29, and/or visit the RPS/APS homepage.

[18] See Current Status of the Solar Carve-Out II Program for more details.

term, sustainable incentives that promote solar development in Massachusetts via a declining block tariff incentive framework. On September 12, 2018, the Commonwealth's investor owned electric distribution companies jointly filed a model tariff with the Massachusetts Department of Public Utilities (DPU) for its review and approval. On September 26, 2018, the DPU approved the model tariff filed by the distribution companies, allowing the final steps of the transition process to begin. The official transition to the SMART program occurred in November2018 and marked the close of new solar projects qualifying for the SCO II Program.

All SMART qualified resources create RPS Class I RECs. However, the SMART program does not represent a carve-out to the RPS Class I Minimum Standard like the SCO and SCO II programs.

In 2018, no SMART RPS Class I RECs were generated.

E. RPS Class II Renewable Energy

RPS Class II is limited to and intended to support the continued operation of two classes of pre-1998 Generation Units. The RPS Class II Renewable Energy Generating Units meet the same technology, resource, and location criteria as Class I, but with a lower MW capacity limit (7.5) for hydropower. A Class II regulatory revision in 2014 established a methodology to calculate the Minimum Standard for RPS Class II Renewable Energy in future years and capped the Minimum Standard at 3.6%.

F. RPS Class II Waste-to-Energy

The RPS Class II waste-to-energy provides incentives for pre-1998 waste-to-energy generation. The RPS Class II eligibility of waste-to-energy Generation Units, also known as municipal solid waste plants, is conditioned on recycling and other regulatory criteria specific to Massachusetts. The Minimum Standard is currently fixed at 3.5%.

G. Alternative Energy Portfolio Standard

As a result of the Green Communities Act of 2008, the APS was limited to, and intended to support, certain "alternative" technologies and resources which would be supported in an incentive structure modeled on the RPS.[19]

Late in 2014, DOER began to develop changes in the APS regulations to incorporate renewable thermal technologies, pursuant to Chapter 251 of the Acts of 2014. The Act mandated these regulations to go into effect on January 1, 2015, but the diverse set of disparate technologies necessitated extensive stakeholder meetings and internal work through 2017. Chapter 188 of the Acts of 2018 further expanded the list of eligible technologies to include fuel cells and waste-to-energy thermal facilities. The final regulations became effective on December 29, 2017.[20]

H. Clean Energy Standard (CES)

The purpose of the CES is to reduce Massachusetts' reliance on fossil fuel-fired electric power plants by increasing the use of clean energy, namely low- and zero-emissions power generation technologies.

The establishment of the CES developed out of (1) the Massachusetts Global Warming Solutions Act (GWSA), (2) the Massachusetts Supreme Judicial Court's May 2016, decision in Kain v. Department of

[19] The APS statute is at http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1~2.

[20] The statute for renewable thermal energy technologies is at https://malegislature.gov/Laws/SessionLaws/Acts/2014/Chapter251. The regulatory process for this change, including public documents, is presented at this webpage.

Environmental Protection, which clarifies the intent and requirements of the GWSA, and (3) Governor Baker's September 2016 Executive Order 569.

In response, the MassDEP promulgated regulations that established obligations on Retail Electricity Suppliers to provide an annually increasing percentage of power from clean energy sources. It also defined clean energy based on a greenhouse gas (GHG) emissions-based performance standard, regardless of the technology used to generate the electricity. It also captured additional low- and zero-emissions generation technologies that are not included in the existing RPS program as implemented by DOER.

I. Renewable Energy Certificates (RECs)

RECs are created, recorded (each one receives a unique serial-number), and tracked by the New England Power Pool Generation Information System (NEPOOL-GIS). The NEPOOL-GIS tracks all electricity generated within the Independent System Operator New England (ISO-NE) control area as well as electricity imported into the ISO-NE control area from adjacent control areas.[21]

For each MWh of electricity generated, the NEPOOL-GIS creates and deposits one electronic renewable generation certificate in the account of the Generation Unit that generated the MWh in ISO-NE or exported the MWh from an adjacent control area.[22]

To meet the RPS, APS and CES requirements, suppliers purchase the appropriately coded renewable generation certificate directly from the generators, or indirectly from brokers. The certificates are electronically transferred from the generator's or broker's NEPOOL-GIS account to the supplier's NEPOOL-GIS account. Each certificate qualified for a Massachusetts portfolio standard can only be used for compliance with the standard for which it is qualified and for the Compliance Year in which it was generated, unless it is banked forward. For example, a 2018 generated RPS Class II REC can only be used for 2018 Class II Renewable Energy compliance. However, since SRECs and SREC IIs are "carve-outs" within RPS Class I and are encoded in the NEPOOL-GIS as a type of Class I REC, they also can be used for RPS Class I compliance. RPS Class I certificates can be used to meet the CES obligation.

APS obligations are met through Alternative Energy Certificates (AECs), generated from eligible Generation units. An AEC may be from a renewable energy system or an efficient system that may be displacing non-renewable resources.

J. Alternative Compliance Payments (ACP)

ACPs are an essential mechanism for RPS, APS, and CES compliance and overall cost controls. If a supplier does not acquire enough certificates to meet a given Minimum Standard, it can comply with the respective program by making a payment at the ACP rate in lieu of purchasing renewable generation certificates. Alternative Compliance Payments for RPS and APS are made to the Massachusetts Clean Energy Center

[21] The ISO-NE "control area", covering most of New England, is a geographic region in which a common control system is used to maintain scheduled interchange of electrical energy within the region and exchanged with adjacent control areas. ISO New England Inc. is the "independent system operator" (ISO) for the ISO-NE control area, operating the New England electric power grid. It also qualifies as the "regional transmission operator" (RTO) under the rules of the Federal Energy Regulatory Commission (FERC).

[22] Each REC is encoded with Attributes that indicate the Generation Unit name, location, and fuel, energy resource or technology, as well as whether or not the Generation Unit and its RECs are qualified for *each* of the several New England state RPSs. A Massachusetts qualified REC that is also qualified for RPS in another New England state can be sold, transferred, and used to meet either state's RPS or other energy portfolio standard obligation. However, by the end of each GIS Certificate trading year (midnight on June 15 of the year following the Compliance Year), each REC can be located in only one state-specific Supplier sub-account at the NEPOOL GIS, which prevents double-counting of RECs. Each state's RPS statute and regulations define the RPS eligibility of generation a bit differently, and those definitions can be changed over time by each state. Thus, not every GIS certificate that is termed a REC is qualified for MA RPS.

(MassCEC) which holds the funds on behalf of DOER for the funding of renewable projects. Alternative Compliance Payments for CES are made directly to MassDEP.

This process is intended to acknowledge that enough certificates for a given Minimum Standard may not always be available in the marketplace. The ACP rate functions as a cost containment mechanism by creating a cap on the value of a certificate for each Minimum Standard.[23]

K. Banking

Banking provides compliance flexibility. Suppliers may acquire more certificates than required by the Minimum Standard and "bank" them for compliance towards that same Minimum Standard[24] in either of the following two Compliance Years. Each program has a different banking limit.[25]

L. Retail Load Obligation

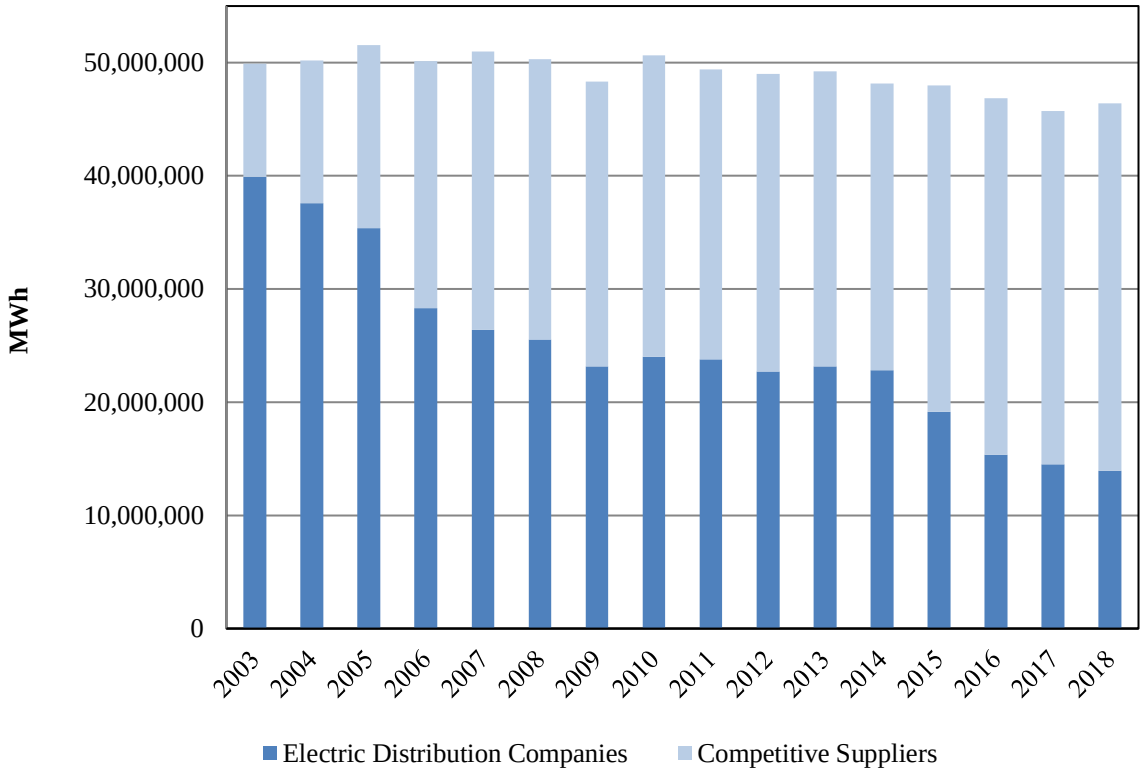
The following figure shows the total Retail Load Obligation of Suppliers since 2003 broken down by load served by the electric distribution companies and competitive suppliers. There were 67 Retail Electricity Suppliers in 2018. Three of the Retail Electricity Suppliers were electric distribution companies and the remaining were competitive suppliers. Competitive suppliers have been increasingly serving a larger proportion of total retail load. As noted above, Municipal Light Plants (MLPs) are currently exempt from the RPS, APS and CES programs. The total Retail Load Obligation in 2018 was 46,409,960 MWh, a slight increase from 45,715,742 MWh in 2017.

[23] See the ACP webpage for additional details, and see the regulations in 225 CMR 14.07, 15.07, and 16.07. In addition, see Section Nine of this report for details about ACP collection and expenditure.

[24] For example, banked Attributes from excess Class I and Class II certificates are not interchangeable, nor are Class II RECs and WECs. However, banked Attributes from excess Class I SRECs can be used towards either SCO or Class I compliance.

[25] See 225CMR 14.08(2), 15.08(2) or 16.07(2)

Figure 1 Retail Load Obligation by Supplier Type, 2003-2018



The RPS and APS requirements are further detailed in the RPS and APS regulations and guidelines found on DOER's website. The information on the website describes how facilities become qualified, lists all qualified facilities, explains how Retail Electricity Suppliers demonstrate annually their compliance with RPS and APS, and provides links to the statutes and regulations and to any ongoing regulatory processes. It also contains all past annual reports of the RPS and APS programs.

DOER received Annual Compliance Filings from 61 Retail Electricity Suppliers that sold electricity to retail end users in Massachusetts during 2018. There was one new Retail Electricity Supplier that began selling electricity in 2018 (see Appendix One: 2018 Massachusetts Retail Electricity Suppliers). Six suppliers were non-compliant at the deadline (see Appendix Two: Compliance Filings, Review, and Verification for further detail).

2. RPS Class I Renewable Compliance in 2018

A. Compliance Details

Table 1 below shows the dispensation of RECs, banked RECs and ACP credits in meeting the RPS Class I Compliance Obligation. In 2018, the Minimum Standard for RPS Class I was 13%. Because the SCO and SCO II are carve-outs within RPS Class I, their average obligations of 1.7879% and 3.7489% respectively were subtracted from 13%. The SCO and SCO II are average obligations because the exempt loads have been removed. It results in an average net RPS Class I Minimum Standard of 7.4632%. Because the Non-Compliance was so significant in 2018, DOER has netted the Non-Compliance obligation from the Aggregate Compliance Obligation to show a more reflective accounting of the disposition of RECs. This practice also is carried forward to RPS Class II, APS and CES.

Table 1 Aggregated Data from the RPS Class I Annual Filings, 2014-2018 (excluding Solar Carve-Outs)[26]

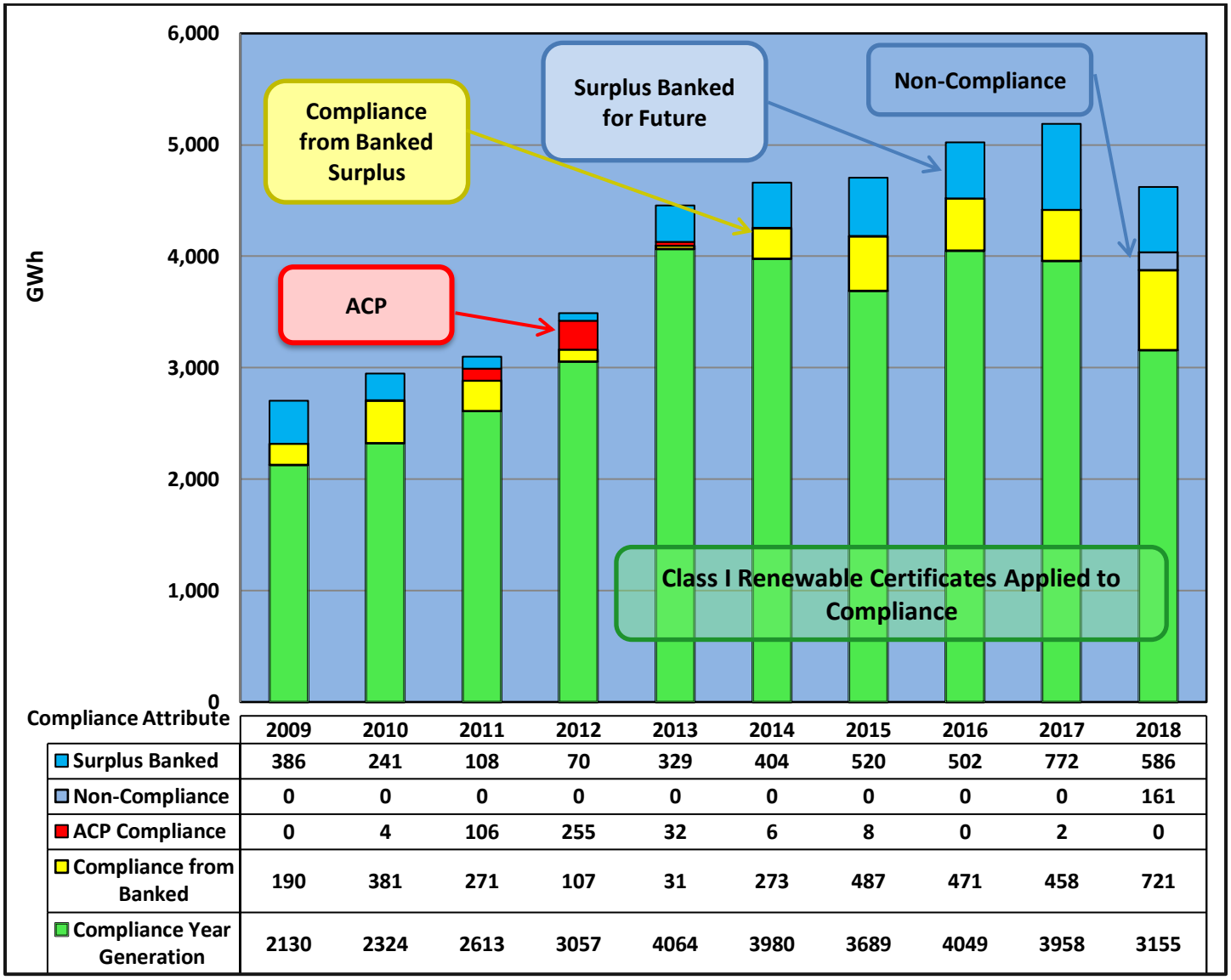
CLASS I RENEW COMPLIANCE ANALYSIS	**2018**	**2017**	**2016**	**2015**	**2014**
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Average Net Minimum Standard	***7.4632%***	*7.9620%*	*8.5829%*	*7.6498%*	*8.0081%*
Aggregated Compliance Obligation	**3,463,696**	3,640,026	4,022,346	3,672,667	3,854,245
Non-Compliance	**(176,911)**	(175)	(3,456)	(9,020)	(41)
Net Compliance Obligation	**3,286,785**	3,639,851	4,018,890	3,663,647	3,854,204
Class I RECs Settled by LSEs	**3,155,357**	3,958,188	4,049,070	3,688,921	3,575,825
minus Surplus Class I RECs	**(590,004)**	(779,311)	(501,754)	(520,378)	(404,133)
Net Class I RECs for Compliance	**2,565,353**	3,178,877	3,547,316	3,168,543	3,171,692
***plus* Banked from Prior Year Surpluses**	**721,430**	457,857	471,256	486,857	272,660
Total Class I RECs used for Compliance	**3,286,783**	3,636,734	4,018,572	3,655,400	3,444,352
***plus* ACP Credits**	**2**	1,676	269	8,247	5,719
Total Credits used for Compliance	**3,286,785**	3,638,410	4,018,841	3,663,647	3,450,071
Surplus Attributes Banked Forward	**586,227**	772,309	501,754	520,378	403,976
ACP Receipts	**$138**	$113,465	$18,020	$553,126	$378,369

The total number of Massachusetts RPS Class I RECs (net of SREC and SREC II) generated in NEPOOL-GIS in 2018 increased by 2% over 2017, to 6,975,162, the lowest increase in five years. RPS Class I certificates also could be used to meet the CES. There were sufficient RPS Class I RECs to meet both the RPS Class I and the CES and 586,227 RECs were banked forward in 2018. Only 2 ACP credits were utilized for compliance in 2018, resulting in $138 of ACP.

[26] CY is the abbreviation for Compliance Year, which is equal to a calendar year. These are aggregated figures, with compliance calculated separately for each Supplier, and with fractions always rounded upwards. Therefore, if one calculated the RPS Obligation using the total "CY Retail Sales," the result usually would be less than the "CY Aggregated Compliance Obligation" listed in this table and elsewhere in the report. This is true for all RPS classes and for APS. For data from earlier years, see DOER's website.

Figure 2 below shows the buildup of compliance over the last 10 years.

Figure 2 RPS Class I Compliance, 2009-2018 (Excluding Solar Carve-outs) GWh



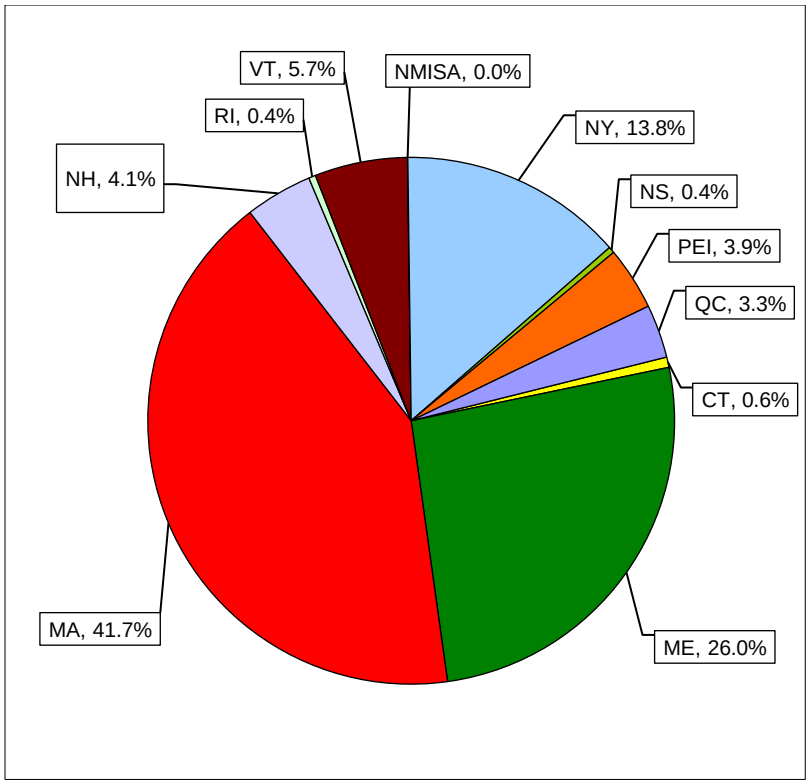
Compliance Attribute	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Surplus Banked	386	241	108	70	329	404	520	502	772	586
Non-Compliance	0	0	0	0	0	0	0	0	0	161
ACP Compliance	0	4	106	255	32	6	8	0	2	0
Compliance from Banked	190	381	271	107	31	273	487	471	458	721
Compliance Year Generation	2130	2324	2613	3057	4064	3980	3689	4049	3958	3155

B. Generation Sources by Location

Figure 3 below shows the percentages of 2018 RPS Class I RECs (including SRECs and SREC IIs) from the New England states, New York, and Canada.27 Figure 4 illustrates the recent trend in the location of REC generation. Table H RPS Class I Compliance by Generation Location, 2011-2018 in Appendix Four: Data Tables for Compliance by Generation Location and Type list the data from which these graphs were generated.

Massachusetts was again the main state of origin for RPS Class I RECs with 41.7%, up from 37.7% in 2017, mostly due to increased solar photovoltaic. Maine again had the second most generation with 26.0% (mostly wind), but down from the 2017 of 28.2%.

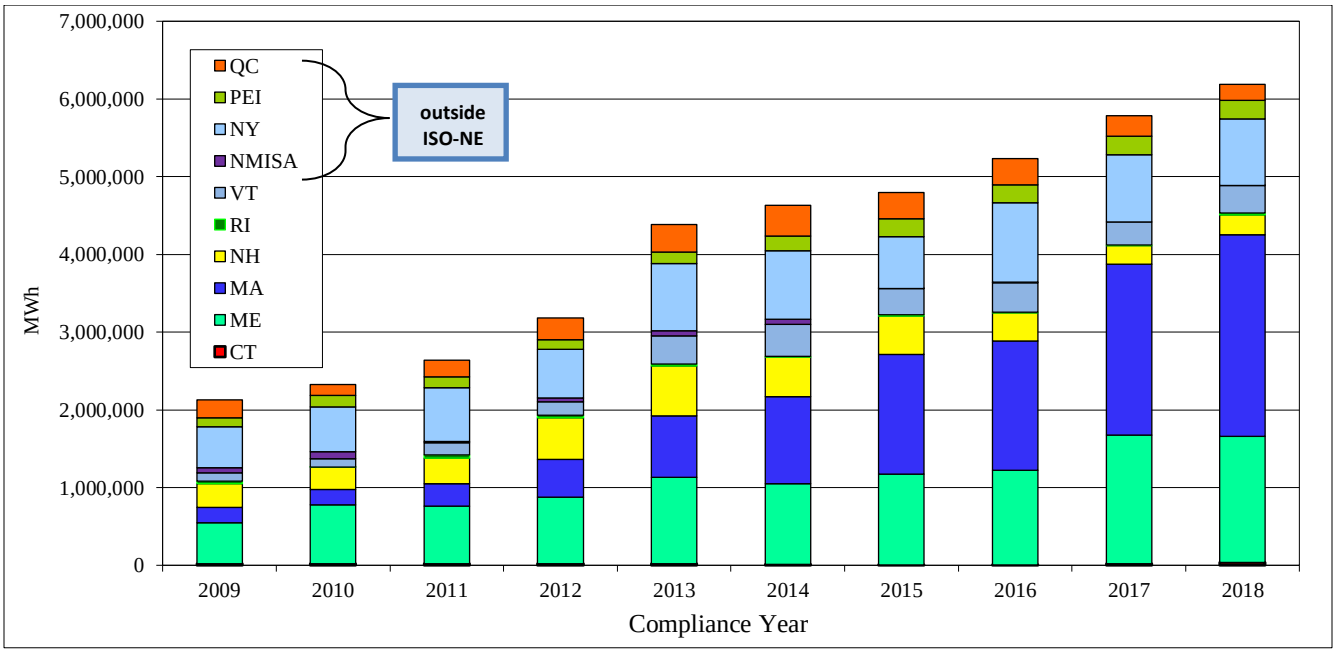
Figure 3 2018 RPS Class I Compliance by Generator Location*



* Includes the Solar Carve-Outs, i.e., all SRECs and SREC IIs.

[27] Note that the transmission grid in two northern Maine counties is outside of the ISO New England control area, is separately managed by the Northern Maine Independent System Administrator ("NMISA"), and connects to the ISO-NE grid via the Maritime Areas grid, which is managed by the New Brunswick System Operator. Therefore, the output of NMISA-located generators must be imported via Canada to ISO-NE in order to earn RECs.

Figure 4 RPS Class I Compliance by Generator Location, 2009-2018*

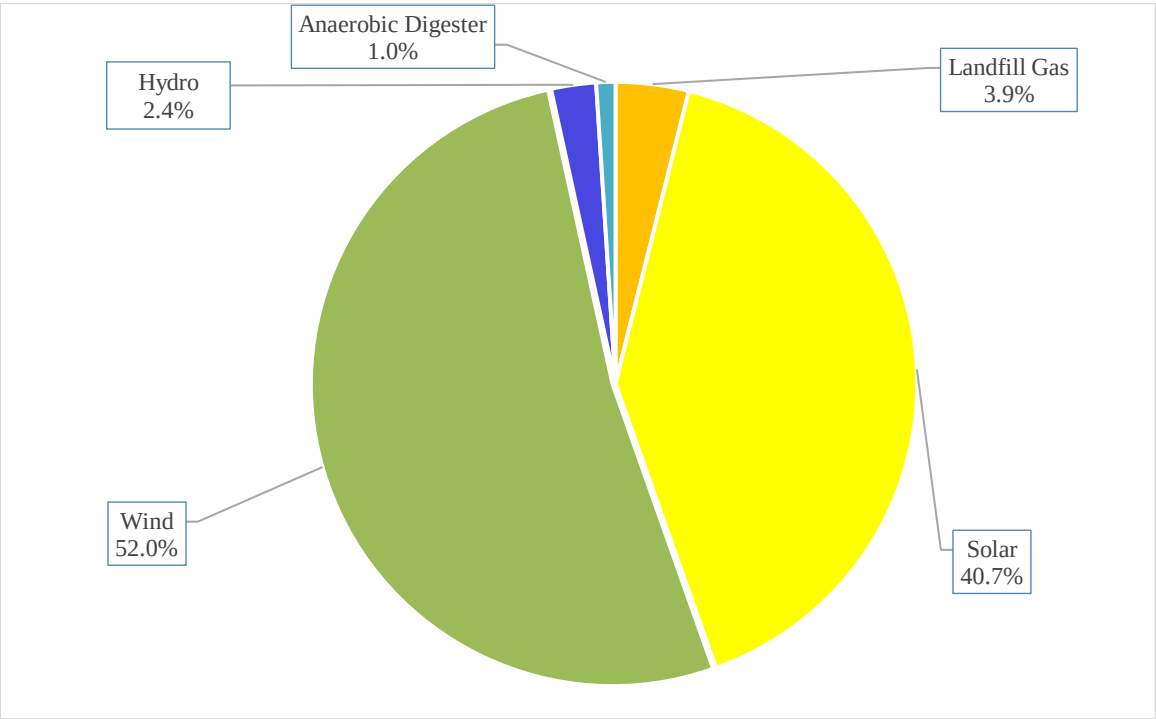


* Includes the Solar Carve-Outs, all SRECs & SREC-IIs.

C. Generation Sources by Type

The tables and figures below show the types of Generation Units that made up RPS Class I RECs, including SRECs and SREC IIs, used for compliance in 2018. Further information on the location of the different types of Generation Units is provided in Table KRPS Class I Compliance Percentage by Generator Type and State, 2018 in Appendix Four: Data Tables for Compliance by Generation Location and Type.

Figure 5 2018 RPS Class I Compliance by Generator Type*



* Includes the Solar Carve-Outs, all SRECs & SREC-IIs

Wind power continued to be the largest source of RECs for the RPS Class I, representing 52.0% of the 2018 supply, down slightly from 2017. Maine accounted for 50% of the total supply of RPS Class I RECs from wind, while New York represented 23%.

Solar photovoltaic arrays were 40.7% of the total RPS Class I RECs in 2018 and had a growth of ~6% compared to 2017, the largest increase of among the technologies. This growth has been propelled by several factors, including declining equipment costs, federal and state tax incentives, and the growth of the RPS Solar Carve-Out II launched in April 2014.[28]

Approximately 96% of the RPS Class I solar RECs (including SRECs and SREC IIs) originated in Massachusetts.

Landfill methane gas represented 3.9% of RPS Class I RECs in 2018. Older qualified landfill methane gas projects have experienced a decline in production. Approximately 62% of the landfill methane gas in RPS Class I originated in New York.

Hydroelectricity had the most supply coming from capacity increases and efficiency upgrades that were performed post-1997 at older plants. To meet eligibility for RPS Class I, facilities must be 30MW or less and meet Low Impact Hydroelectric Impact (LIHI) certification. Hydroelectricity represented 2.4% of RPS Class I RECs in 2018. Maine accounted for 39% of supply while Vermont accounted for 34%. Massachusetts accounted for 23%.

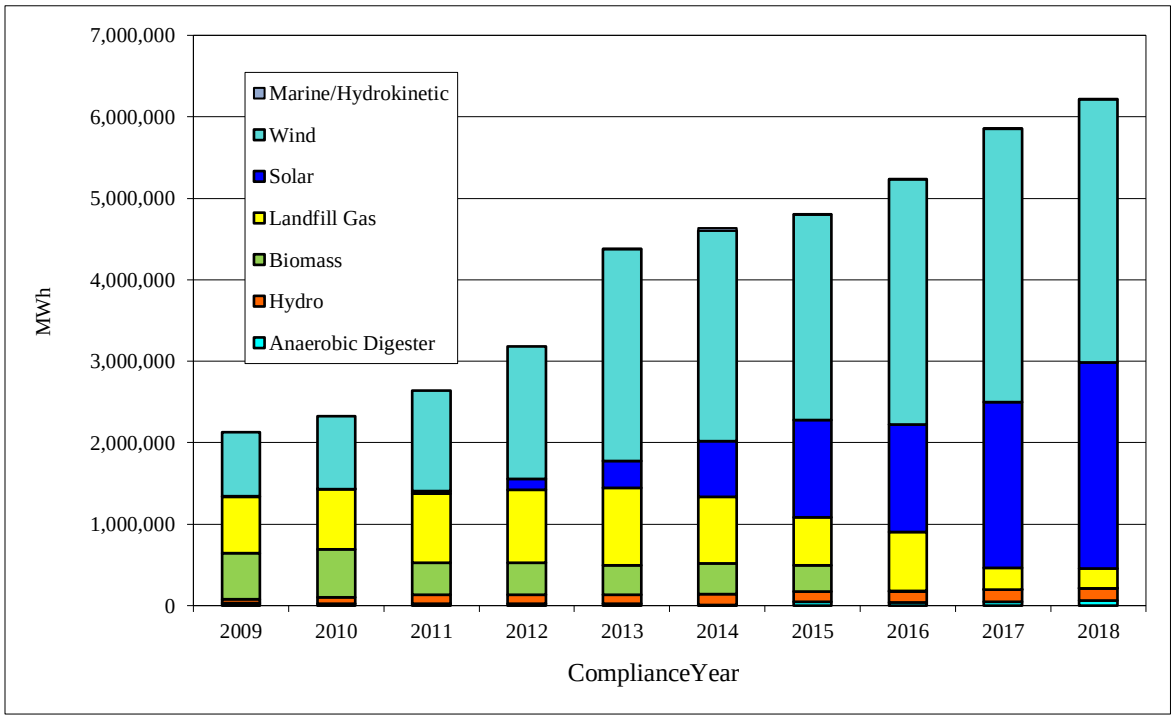
Anaerobic digester supply, which accounted for 1.0% of all RPS Class I RECs in 2018, was mostly generated in Massachusetts (81.2%). Anaerobic digester potential exists at wastewater treatment plants, at

[28] In addition to RPS, MA has other programs helping to drive PV development. See the Solar page at DOER's website.

facilities that generate organic waste and locations where organic waste can be easily transported to the Generation Unit.

Marine and Hydrokinetic only had 43 MWh generated in 2018, and all of them were water supply conduits located in Massachusetts.

Figure 6 RPS Class I Compliance by Generator Type, 2009-2018*



* Includes the Solar Carve-Outs, i.e., all SRECs and SREC IIs.

Table 2 Percentage Change in RPS Class I Generation Type, 2016 – 2018

FUEL TYPE	MWh			% of Total		
	2016	2017	2018	2016	2017	2018
Landfill Gas	722,539	268,910	243,083	13.8%	4.6%	3.9%
Solar PV	1,324,578	2,030,870	2,526,793	25.3%	34.7%	40.7%
Wind	3,009,326	3,353,712	3,228,475	57.5%	57.3%	52.0%
Hydroelectric	133,389	147,168	149,477	2.5%	2.5%	2.4%
Anaerobic Digester Gas	42,099	47,412	63,761	0.8%	0.8%	1.0%
Marine & Hydrokinetic	48	47	43	0.0%	0.0%	0.0%
Biomass	2,501	2,185	1,421	0.0%	0.0%	0.0%
Totals	5,234,480	5,850,304	6,213,053	100.0%	100.0%	100.0%

3. RPS SOLAR CARVE-OUT COMPLIANCE IN 2018

Pursuant to the Green Communities Act of 2008, the SCO program, which commenced in 2010, is a "carve-out" of RPS Class I (i.e., the SCO Minimum Standard is included in each year's overall RPS Class I

Minimum Standard). It was originally intended to provide incentive for 400 MW of PV to be installed within Massachusetts by 2018.[29]

The qualified installations surpassed the original program cap of 400 MW in 2013, four years ahead of the date anticipated by DOER. As the 400 MW cap approached, DOER received a rapid acceleration of applications in the spring of 2013. In order to avoid penalizing a substantial amount of investments made in good faith, DOER issued an emergency revision of the Class I regulations in June 2013, to set rules for raising the cap.[30] In order to maintain the photovoltaic development, DOER subsequently began a rulemaking for a successor SCO II program, described in Section 3 below.

Table 3 below shows the dispensation of SRECs, banked SRECs and ACP credits in meeting the SCO Obligation within the RPS Class I program.

Table 3 Aggregated Data from the Solar Carve-Out (SCO) Compliance Filings, 2014-2018 (MWh)

SCO COMPLIANCE ANALYSIS	**2018**	**2017**	**2016**	**2015**	**2014**
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Average Net Minimum Standard *	**1.7879%**	1.6266%	1.7850%	2.0934%	0.9481%
Aggregated Compliance Obligation	**829,784**	743,619	813,188	1,005,024	456,347
Non-Compliance	**(59,578)**	(419)	(719)	(2,570)	
Net Compliance Obligation	**770,206**	743,200	812,469	1,002,454	456,347
SRECs Settled by LSEs	**719,703**	742,959	839,614	755,018	480,744
minus Total Surplus SRECs	**(9,003)**	(34,476)	(36,981)	(12,231)	(36,222)
Net SRECs for Compliance	**710,700**	708,483	802,633	742,787	444,522
***plus* Banked from Prior Year Surpluses**	**40,335**	34,930	9,767	36,161	8,159
Total SRECs Used for Compliance	**751,035**	743,413	812,400	999,373	452,690
Plus Total ACP Credits	**20,283**	1,167	59	3,084	3,657
Total Credits Used for Compliance	**771,318**	744,580	812,459	1,002,457	456,347
Surplus Attributes Banked Forward	**8,992**	34,280	36,979	12,231	36,222
Reminted Auction SRECs Used	**10,984**	9,127	49,190	220,425	9
SRECs Placed in Auction	**632**	1,520	18,428	1,898	124,831
ACP Receipts	**$8,640,558**	$522,816	$27,848	$1,529,664	$553,512

* Average Net Minimum Standard is less than Minimum Standard due to exempt load.
** Note that the "Total Credits Used for Compliance" exceeds the "Net Compliance Obligation" because some suppliers had excess SRECs over their Banking Limits or Non-Compliant suppliers settled SRECs but did not complete their filing.

In 2018, the Average Net Minimum Standard rose from 1.6266% in 2017 to 1.7879% in 2018, representing an increase of 11.6%.

[29] The eligibility requirements for a PV system to qualify include the following: (a) interconnection with the Massachusetts electricity grid, (b) at least a minimal use of some electricity on-site with the balance of the output connected to the grid, and (c) nameplate, direct current capacity limited to no more than 6 MW on a single parcel of land. In addition, a system is not eligible if it had received funding by certain other government programs. See DOER's Solar Carve-out/SREC-I webpages for additional information on the program.

[30] The revised cap became 653.3 MW. For a detailed list of SCO projects, visit http://www.mass.gov/eea/docs/doer/rps-aps/solar-carve-out-units.xlsx.

There was an increase in ACP credits used to meet obligation due to a decrease in generation caused by weather. This increased ACP receipts from $0.5 million in 2017 to $8.6 million in 2018. Consequently, the number of banked SRECs fell from 34,280 to 8,992.

4. RPS SOLAR CARVE-OUT II COMPLIANCE IN 2018

The SCO II Minimum Standard was established by revised regulations for RPS Class I promulgated on April 25, 2014. The SCO II program set a capacity cap for qualified solar carve-out installations at 1,600 MW in the Commonwealth, inclusive of the SCO capacity (653.3 MW), with a goal of reaching that overall cap by 2020. As noted, the cap was reached in early 2016 and emergency regulations were promulgated on April 8, 2016 that removed the cap and extended the program.

As a result, in 2017, there were three levels of exemptions to the SCO II Minimum Standard:

- The first level of exemption was for contracts executed or extended on or before April 25, 2014. Those contracts had a 0% Minimum Standard.
- The second level of contract exemptions was for the period between April 26, 2014 and May 8, 2016 (30 days after the filing of the emergency regulations). These contracts were subject to a Minimum Standard of 2.6823% in 2018.
- Any contracts executed or extended after May 8, 2016, were subject to the Minimum Standard of 4.0683% in 2018 which was a 42% increase over the 2017 Minimum Standard.

Table 4 below shows the utilization of SREC IIs and ACP credits in meeting the RPS Class I SCO II Compliance Obligation.

Table 4 Aggregated Data from the Solar Carve-Out II Compliance Filings, 2014-2018

SCO II COMPLIANCE ANALYSIS	**2018**	**2017**	**2016**	**2015**	**2014**
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Average Net Minimum Standard *	**3.7489%**	2.4114%	0.8080%	0.3288%	0.0843%
Aggregated SCO II Obligation	**1,739,857**	1,102,398	319,589	123,317	21,076
Non-Compliance	**(135,257)**	(734)	(321)	(395)	(154)
Net Compliance Obligation	**1,604,600**	1,101,664	319,268	122,922	20,922
SREC IIs Settled by LSEs	**1,571,264**	1,107,930	326,308	125,294	15,633
minus Total Surplus SREC IIs	**(18,659)**	(29,175)	-10,059	-3,021	-187
Net SREC IIs for Compliance	**1,552,605**	1,078,755	316,249	122,273	15,446
***plus* Banked from Prior Year Surpluses**	**29,902**	9,167	3,019	20	0
Total SREC IIs Used for Compliance	**1,582,507**	1,087,922	319,268	122,293	15,446
***plus* Total ACP Credits**	**22,636**	13,889	5	629	5,476
Total Credits Used for Compliance	**1,605,143**	1,101,811	319,273	122,922	20,922
Surplus Attributes Banked Forward	**18,625**	29,027	10,059	3,018	21
Reminted Auction SREC IIs Used	**191,185**	109,424	21,773	51	N/A
SREC IIs Placed in Auction	**4,626**	12,071	243,377	67,046	N/A
ACP Receipts	**$7,922,600**	$4,861,150	$1,750	$235,875	$2,115,001

* Average Net Minimum Standard less than marginal Minimum Standard due to exempt load.
** Note that the "Total Credits Used for Compliance" exceeds the "Net Compliance Obligation" because some Suppliers had excess SREC IIs over their Banking Limits or Non-Compliant Suppliers settled SREC IIs but did not complete their filing.

Like the SREC market, the SREC II market had an increase in ACP credits. This increase was partly due to an increase in the Average Net Minimum Standard from 2.4114% to 3.7489%. ACP credits rose to 22,636 in 2018 from 13,889 in 2017, and the ACP receipts increased respectively to $7.9 million in 2018, compared to $4.8 million in 2017.

5. RPS CLASS II RENEWABLE ENERGY COMPLIANCE IN 2018

RPS Class II was established in the Green Communities Act of 2008 with the purpose of providing incentives for the continued operation of pre-1998 renewable energy plants in the region and waste-to-energy plants located in Massachusetts. RPS Class II renewable energy is generated by the same resources and technologies as RPS Class I. However, hydroelectric plants in RPS Class II are limited to 7.5 MW (versus 30 MW in RPS Class I), pursuant to Chapter 25A, section 11F.

The quantity of pre-1998 renewable energy generation that DOER originally had projected to qualify did not materialize as anticipated during the early years of the program. RPS Class II Renewable Energy has typically experienced REC shortfalls, and suppliers have relied heavily on the ACP mechanism to meet their obligations. DOER reacted to this situation with a RPS Class II regulatory revision that reduced the original 3.6% Minimum Standard to 1.5% for 2013, 1.75% for 2014, and 2.0% for 2015. After 2015, the Minimum Standard is set annually by a formula that responds to changing market conditions. For 2018, the RPS Class II Minimum Standard was 2.6155%. It has a maximum cap of 3.6%

Table 5 below shows the dispensation of RPS Class II RECs, banked RPS Class II RECs and ACP credits in meeting the RPS Class II obligation.

Table 5 Aggregated Data from the RPS Class II Renewable Energy Filings, 2014-2018

CLASS II RENEW COMPLIANCE ANALYSIS	**2018**	**2017**	**2016**	**2015**	**2014**
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Minimum Standard	**2.6155%**	2.5909%	2.5319%	2.0000%	1.7500%
Aggregated Compliance Obligation	**1,213,892**	1,184,485	1,186,394	959,531	840,893
Non-Compliance	**(83,188)**	(175)	(1,035)	(2,397)	(4,044)
Net Compliance Obligation	**1,130,704**	1,184,310	1,185,359	957,134	836,849
Class II RECs Settled by LSEs	**1,000,422**	783,698	561,324	539,399	526,415
minus total surplus SCO RECs	**(46,415)**	(7,867)	(18,017)	(18,488)	(62,401)
Net RECs for Compliance	**954,007**	775,831	543,307	520911	464,014
***plus* Banked from Prior Year Surpluses**	**7,681**	18,016	7,317	102,901	104,498
Total RECs used for Compliance	**961,688**	793,847	550,624	623,812	568,512
plus total ACP Credits	**169,016**	390,463	634,720	333,322	268,337
Total Credits Used for Compliance	**1,130,704**	1,184,310	1,185,344	957,134	836,849
Surplus Attributes Banked Forward	**46,314**	7,680	18,017	18,288	42,035
ACP Receipts	**$4,783,153**	$10,850,967	$17,454,800	$9,176,355	$7,288,033

In 2018, DOER began qualifying numerous hydroelectric dams located in New York. This is reflected in the data by the large increase in RPS Class II RECs that were settled by suppliers. The net result was that the ACP Receipts fell by 56% from ~$10.9 million to ~$4.8 million. This is further shown in Figure 7 below, which shows the increase in MWh that were imported from adjacent Control Areas.

Figure 7 2018 RPS Class II Compliance by Generation Source

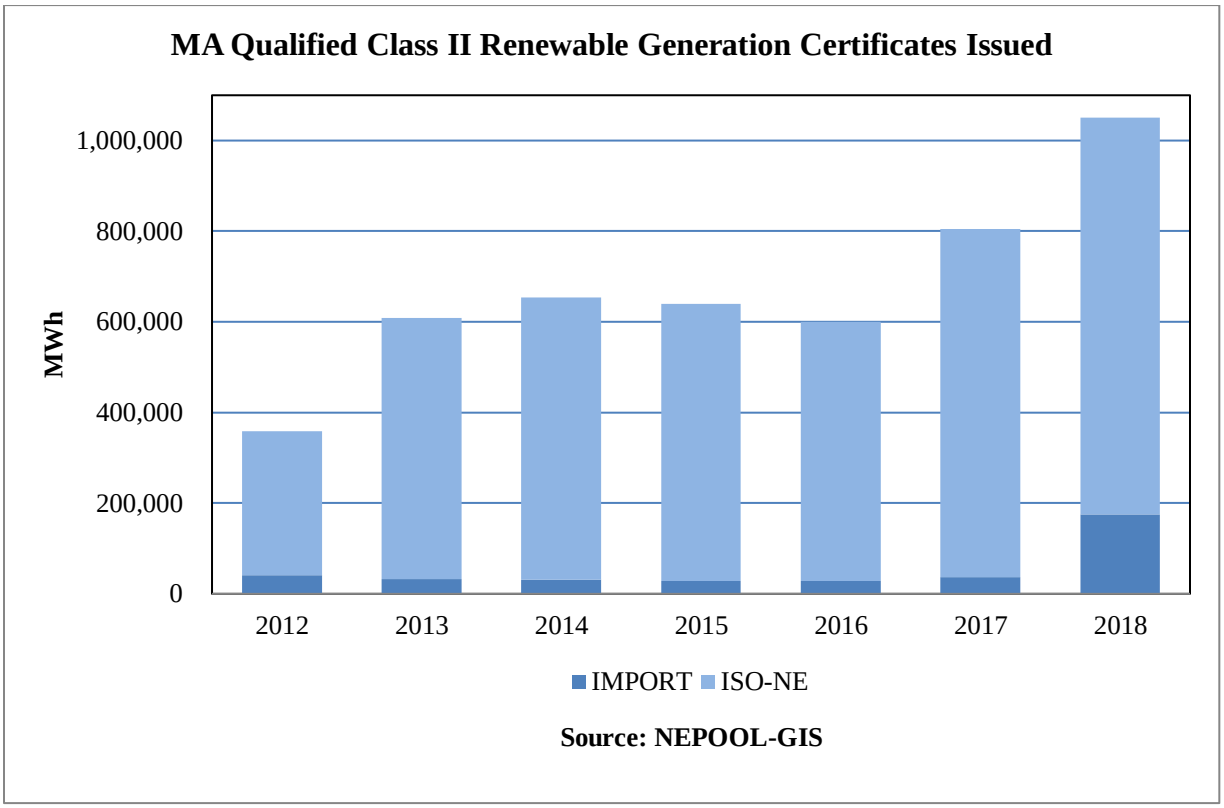


Figure 8 below shows the distribution of generator type for RPS Class II RECs. In 2018, 94.3% of RPS Class II RECs were generated by hydroelectricity, while 5.1% were generated from landfill gas. Figure 9 shows that the location of the Generation Units was fairly well distributed across the region.

Figure 8 2018 RPS Class II Compliance by Generator Type

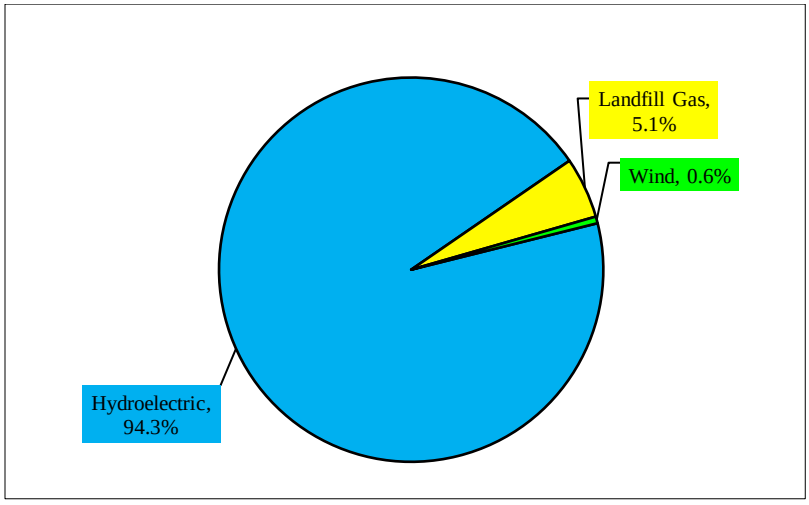
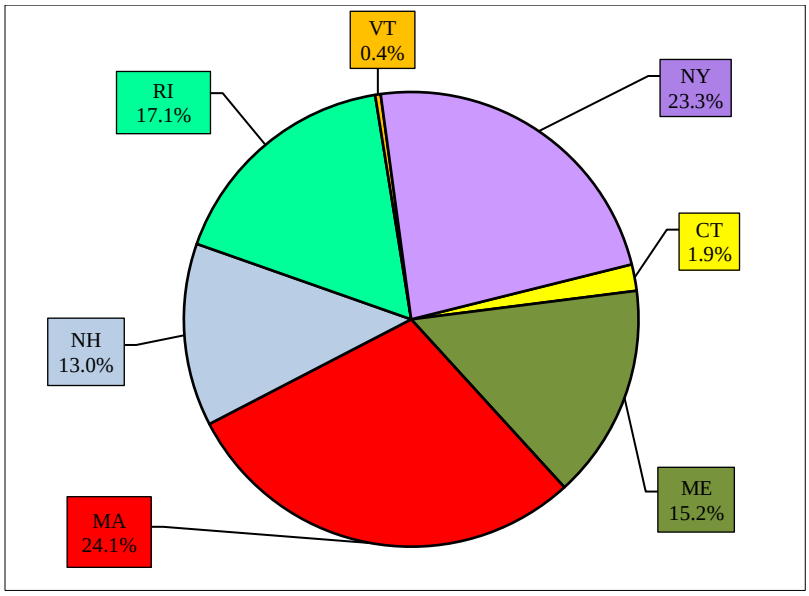


Figure 9 2018 RPS Class II Compliance by Location



6. RPS CLASS II WASTE ENERGY COMPLIANCE IN 2018

RPS Class II Waste Energy is a separate sub-class within RPS Class II. Each Supplier must comply separately with both the Renewable Energy sub-class and the Waste-to-Energy sub-class. Qualification is limited to waste-to-energy plants that meet the Massachusetts Department of Environmental Protection (MassDEP) regulations for such facilities.[31] The MassDEP regulations provide for enhanced sorting and recycling and for the owner of each plant to remit to the MassDEP 50% of the proceeds from its RPS Class II Waste-to-Energy certificates. The MassDEP uses those funds to help support municipal recycling programs.

In order to eliminate large WEC surpluses that Suppliers were carrying forward (banking) from year-to-year, DOER, through its RPS Class II rulemaking in 2014, enacted a banking moratorium for Compliance Years 2014 and 2015. Regulations then lowered the banking limit from 30% to 5% in subsequent years beginning in 2016.

Table 6 below shows the dispensation of WECs, banked WECs and ACP credits in meeting the RPS Class II Waste-to-Energy obligation.

[31] The MassDEP regulations are in 310 CMR 7.08(2) and 310 CMR 19.000.

Table 6 Aggregated Data from RPS Class II Waste Energy Compliance, 2014-2018

CLASS II WASTE COMPLIANCE ANALYSIS	2018	2017	2016	2015	2014
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Minimum Standard	**3.5000%**	3.5000%	3.5000%	3.5000%	3.5000%
Aggregated WEC Obligation	**1,624,385**	1,600,090	1,640,016	1,679,161	1,681,759
Non-Compliance	**(109,421)**	(238)	(1,431)	(4,195)	(1)
Net Compliance Obligation	**1,514,964**	**1,599,852**	**1,638,585**	**1,674,966**	**1,681,758**
WECs Settled by LSEs	**1,545,740**	**1,617,739**	**1,651,769**	**1,620,112**	**1,440,670**
minus total surplus WECs	**(69,694)**	(44,496)	(20,111)	(15,706)	(13,873)
Net WECs for Compliance	**1,476,046**	1,573,243	1,631,658	1,604,406	1,426,797
***plus* Banked from Prior Year Surpluses**	**27,163**	15,644	0	53,440	251,993
Total WECs used for Compliance	**1,503,209**	1,588,887	1,631,658	1,657,846	1,678,790
***plus* total ACP Credits**	**11,755**	10,816	7,362	17,120	2,968
Total Credits Used for Compliance	**1,514,964**	1,599,703	1,639,020	1,674,966	1,681,758
Surplus Attributes Banked Forward	**61,217**	44,496	20,566	0	0
ACP Receipts	**$133,067**	$120,274	$80,982	$188,491	$32,232

7. ALTERNATIVE ENERGY PORTFOLIO STANDARD COMPLIANCE IN 2018

The APS regulations 225 CMR 16.00 were established on January 1, 2009, pursuant to the Green Communities Act of 2008, codified at M.G.L. c. 25A, § 11F½.

In general, the APS offers an opportunity for Massachusetts residents, businesses, and government entities to receive an incentive for using certain types of alternative energy technologies. These alternative energy technologies contribute to the Commonwealth's clean energy goals by increasing energy efficiency and reducing the need for conventional fossil fuel-based power generation or heating systems.

The APS requires a certain percentage of the state's electric load to be met by these eligible technologies. In 2018, the Minimum Standard was 4.50%, and currently increases by 0.25% each year.

When it began, the APS was comprised mostly of CHP systems and Flywheel Storage. Historically, the market did not have enough certificates to meet the annual obligation, resulting in the collection of significant ACPs each year.

Revised APS regulations were promulgated in 2017, which expanded the eligible technologies to include fuel cells, waste-to-energy thermal facilities, and a suite of heat transfer, combustion, and heat pump technologies by which thermal energy is derived from sunlight, biomass, and thermal gradients in air, ground, and water. In 2017, these projects were eligible to receive AECs back to January 1, 2015, which NEPOOL-GIS issued in the fourth quarter of 2017, after promulgation of the revised regulations.

With the expansion of eligible technologies under the APS, a material number of AECs were created. ACP credits, which traditionally had covered 50% of the obligation, declined substantially. Consequently, ACP receipts fell as well. In 2018, this trend continued as qualification of large CHP units occurred and the ongoing increase in the generation of AECs from the newly eligible technologies. The over-supply of AECs in the APS market led to 317,814 AECs being banked forward, and a reduction of ACP receipts from ~$3.2 million in 2017 to about ~$1 million in 2018.

The APS regulations require DOER to complete a review or the APS regulations no later than December 31, 2020. The review will include an examination of the costs and benefits of the program to ratepayers, an examination of the effectiveness of the program in meeting the energy and environmental goals of the Commonwealth, and an evaluation of whether the Minimum Standard or its rate of increase, as established in 225 CMR 16.07(2), should be adjusted.

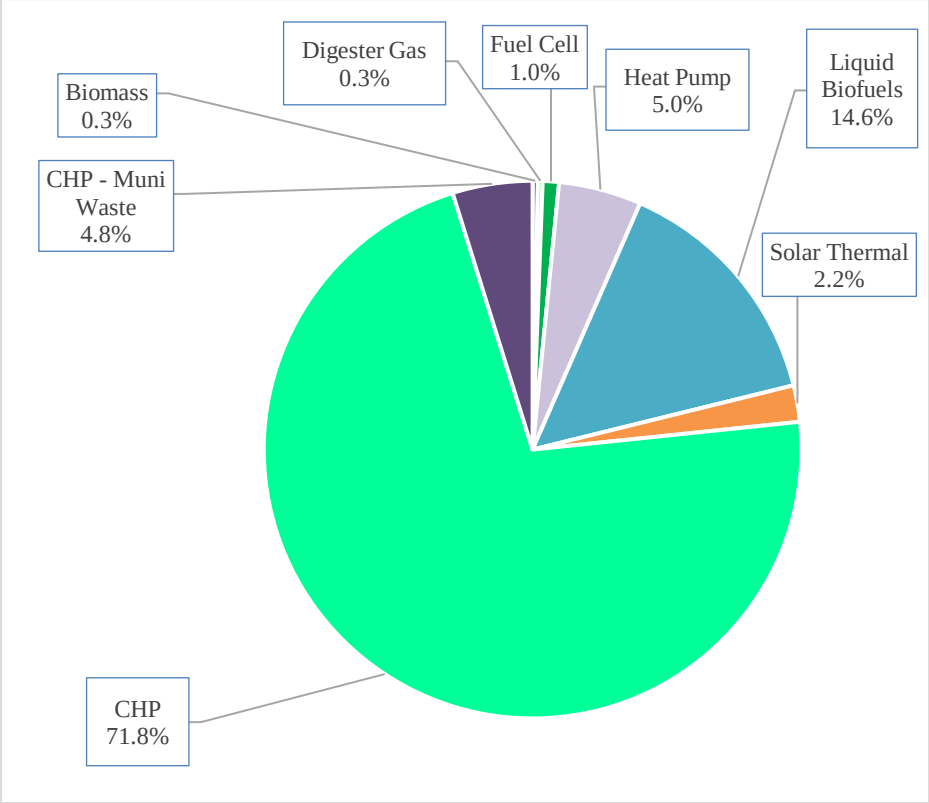
Table 7 below shows the dispensation of AECs, banked AECs and ACP credits in meeting the APS obligation.

Table 7 Aggregated Data from the APS Compliance Filings, 2014-2018 (MWh)

APS COMPLIANCE ANALYSIS	**2018**	**2017**	**2016**	**2015**	**2014**
Retail Sales (Retail Load Obligation)	**46,409,960**	45,715,742	46,864,429	48,009,723	48,129,294
Minimum Standard	**4.5000%**	4.2500%	4.0000%	3.7500%	3.5000%
Aggregated Compliance Obligation	**2,088,490**	1,942,959	1,874,294	1,799,094	1,681,759
Non-Compliance	**(134,422)**	(1,090)	(1,635)	(4,195)	(8,088)
Net Compliance Obligation	**1,954,068**	1,941,869	1,872,659	1,794,899	1,673,671
AECs Settled by LSEs	**2,015,993**	2,017,892	945,003	894,602	831,080
***minus* Surplus AECs**	**(317,987)**	(221,624)	(3,873)	(2,869)	(261)
Net AECs for Compliance	**1,698,006**	1,796,268	941,130	891,733	830,819
***plus* Banked from Prior Year Surpluses**	**212,217**	3,847	2,869	261	7,347
Total AECs used for Compliance	**1,910,223**	1,800,115	943,999	891,994	838,166
***plus* ACP Credits**	**43,845**	141,974	928,636	902,605	835,505
Total Credits Used for Compliance	**1,954,068**	1,942,089	1,872,635	1,794,599	1,673,671
Surplus Attributes Banked Forward	**317,814**	221,624	3,873	2,869	261
ACP Receipts	**$992,651**	$3,156,082	$20,429,992	$19,875,362	$18,147,169

Figure 10 below shows the generator type of the AECs settled for APS compliance.

Figure 10 2018 APS Compliance by Generator Type



8. CLEAN ENERGY STANDARD COMPLIANCE IN 2018

In August 2017, EEA and MassDEP finalized 310 CMR 7.75: *Clean Energy Standard* that require retail sellers of electricity to provide increasing quantities of clean electricity to their customers in Massachusetts. The standard is defined as a percentage of electricity sales and increases from 16% in 2018 to 80% in 2050, increasing by 2% each year. The CES regulation includes specific eligibility requirements, including an emissions-based qualification threshold and a requirement that eligible generators must have commenced commercial operation after 2010.

The CES complements the RPS, in that the RPS obligation is contained within the CES obligation. In 2018, the RPS obligation of 13% was a contained within the 16% CES obligation. The difference between the CES Minimum Standard of 16% and the RPS Class I Minimum Standard 13% is known as the Incremental Minimum Standard, which was 3.00% in 2018.

In addition, any RPS Class I REC are also eligible as a Clean Energy Certificate (CEC) which are used to meet the CES obligation. In 2018, no separate qualifying generators were eligible to produce stand-alone CECs. Subsequently, all CECs used to meet the CES obligation were eligible RPS Class I RECs. Pursuant to CPS regulations, any ACP funds collected shall be expended to support programs and projects to reduce greenhouse gas emissions to mitigate the impacts of climate change.

Table 8 below shows the dispensation of CECs and ACP credits in meeting the CES obligation. The abundance of RPS Class I RECs allowed suppliers to meet the CES obligation. The 39 surplus CECs were over-settled by one competitive supplier. The CES allowed no banking 2018. The ACP receipts were $179,779.

Table 8 Aggregated Data from the CES 2018 Compliance Filing (MWh)

CES COMPLIANCE ANALYSIS	2018
Retail Sales (Retail Load Obligation)	46,409,960
Exempt Load	(17,908,671)
Net Load	64,318,631
Incremental Minimum Standard	3.00%
Aggregated Compliance Obligation	855,077
Non-Compliance	(95,416)
Net Compliance Obligation	759,661
CECs Settled by LSEs	755,715
minus Surplus CECs	(39)
Net CECs for Obligation	755,676
plus Banked from Prior Year Surpluses	0
Total CECs used for Compliance	755,676
plus ACP Credits	3,985
Total Credits Used for Compliance	759,661
Surplus Attributes Banked Forward	0
ACP Receipts	$179,779

9. PROJECTION OF FUTURE RPS AND APS COMPLIANCE OBLIGATIONS AND SUPPLY

DOER projections of future RPS and APS compliance obligations are detailed in the tables below. These projections are based on the ISO-NE "reference case" for load growth in the 2019 CELT Report.[32] This process follows the approach of the RPS/APS Annual Compliance Reports for 2009 through 2017. These forecasts assume normalized weather and normalized economic drivers.

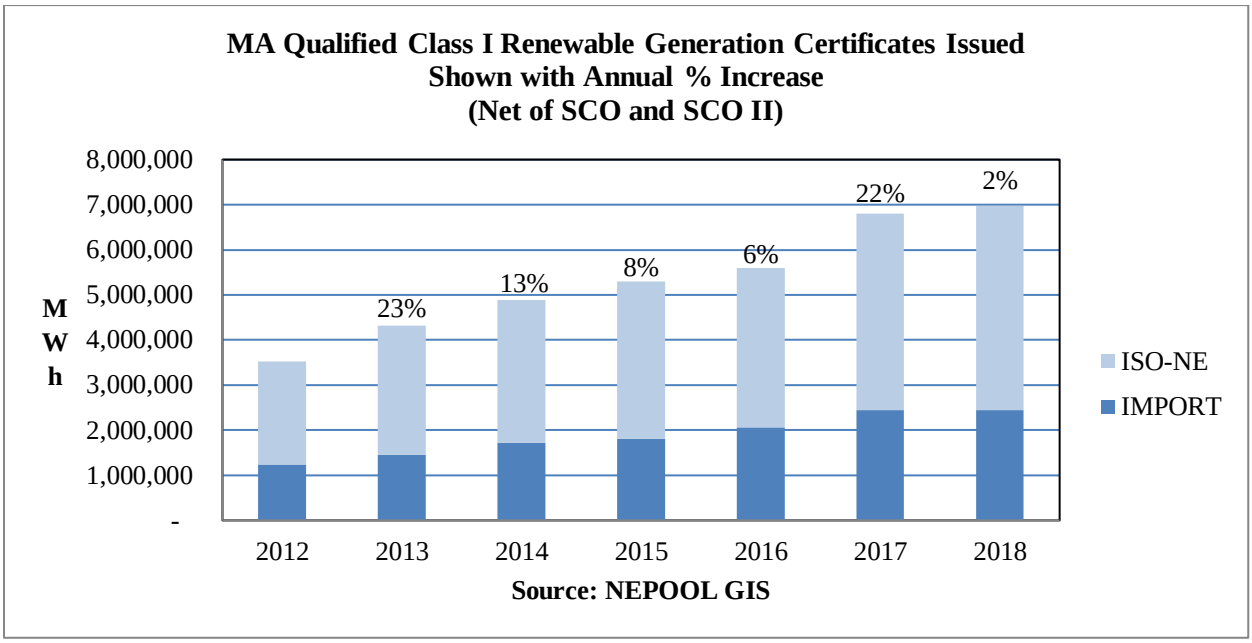
A. Projection of Class I Renewable Generation Supply

Figure 11 shows that steady growth has occurred in the generation of RPS Class I RECs (net of SCO and SCO II) through 2018. However, not all Massachusetts qualified RPS Class I RECs will be settled in Massachusetts. These RECs also may be qualified in other states. If they are settled in other states, they cannot be claimed in Massachusetts. [33]

[32] Based on *2019 CELT Report* dated 4/30/2019, which is listed at http://www.iso-ne.com/system-planning/system-plans-studies/celt. Loads have been adjusted for the exempt municipal load.

[33] Note that not all certificates issued by NEPOOL GIS are settled in MA for compliance as many are settled elsewhere, voluntarily retired, or if SRECs or SREC IIs, deposited into DOER's SREC Clearinghouse Auction Accounts.

Figure 11 MA Class I Renewable Generation Certificates with Annual Percent Increase



Projecting future RPS Class I REC supply is particularly difficult for various reasons. Much of the uncertainty derives from forces external to the program itself, including but not limited to the following:

- Changes in federal policy, including tax incentives.
- Significant renewable projects being developed or considered.
- The evolution of renewable energy procurements pursuant to 83C.
- Transmission development that may allow new generation to be constructed.
- Regional market dynamics that alters the export decisions for REC retirement.
- Solar growth in the Commonwealth; and
- Interaction between the RPS Class I Minimum Standard and the CES regulation.

For these reasons, projections of RPS Class I REC supply is limited to the anticipated obligation based on forecasted retail loads (Table 9 below).

Table 9 MA RPS Class I Actual and Projected Retail Load and Compliance Obligations[34]

Year	Actual/ Projected Retail Load Obligation	RPS Class I (including Solar Carve-Outs)		Solar Carve-Out and Solar Carve-Out II			RPS Class I – net of the SCO & SCO II	
		Minimum Standard	REC Obligation	SREC Obligation	SREC-II Obligation	Total Obligations	Net REC Obligation	Net Minimum Standard
2017	45,175,472	12.00%	5,421,056	734,002	1,043,901	1,777,903	3,643,153	8.06%
2018	46,409,960	13.00%	6,033,295	829,714	1,739,857	2,569,571	3,463,696	7.46%
2019	*44,705,754*	*14.00%*	*6,258,806*	*779,887*	*1,701,170*	*2,481,057*	*3,777,749*	*8.45%*
2020	*43,535,434*	*16.00%*	*6,965,670*	*701,109*	*1,715,675*	*2,416,784*	*4,548,886*	*10.45%*
2021	*42,694,771*	*18.00%*	*7,685,059*	*709,498*	*1,898,275*	*2,607,773*	*5,077,286*	*11.89%*

** Italicized is projected.*

B. Projection of SCO Generation Supply

Accelerated solar PV development began to emerge in the RPS market in 2010 and has been increasing rapidly through 2018. DOER expects further strong growth of solar PV in the years ahead, boosted by the SMART Program[35] (see below). However, it also anticipates that the supply of SRECs and SREC IIs will begin to decline as both programs will have reached their cap by 2018 and systems reach their end life within the programs. Equipment degradation also will likely lead to reduced output on average in the future.

Table 10 shows the historical SCO load obligation and the projected load obligation for the coming years.

Table 10 Solar Carve-Out Actual and Projected Load Obligations*[36]

Year	Actual/ Projected Retail Load Obligation	Load Served Under pre-6/28/13 Retail Contracts	Minimum Standard for pre 6/28/13 Retail Contracts	Pre 6/28/13 SCO Load Obligation	Load Served Under post 6/27/13 Contracts	Minimum Standard for post-6/27/13 Contracts	Post 6/27/13 SCO Load Obligation	SCO Total Load Obligation
2017	*45,175,472*	*356,771*	0.9861%	*3,518*	*45,358,971*	1.6313%	739,941	743,619
2018	*46,409,960*	*175,807*	1.4110%	*2,481*	*46,234,153*	1.7903%	827,730	829,784
2019	*44,705,754*	*90,373*	*1.0978%*	*992*	*44,615,381*	*1.7458%*	*778,895*	*779,887*
2020	*43,535,434*	*81,258*	*0.9867%*	*802*	*43,454,176*	*1.6116%*	*700,307*	*701,109*
2021	*42,694,771*	*73,297*	*1.0181%*	*746*	*42,621,474*	*1.6629%*	*708,752*	*709,498*

* *Italicized is projected.*

[34] Actual Retail Load Obligation through 2018. Actual compliance figures through 2018 are from RPS annual compliance filings. The retail load obligation projections starting in 2019 are based on the ISO-NE load growth projections in its *CELT Report* (see footnotes 32) and excludes municipal light plants which are exempt from the RPS and APS programs. In this table, the SCO and SCOII annual obligations are deducted from the total Class I obligation to show the net Class I REC obligation. The SCO and SCO II obligations take into account actual and projected exempt loads and Minimum Standards that are based on retail contract dates.

[35] See Chapter 75 of the Acts of 2017 and DOER's webpage, Development of the Next Solar Incentive.

[36] The projected SCO obligations do not take account of the proposed changes to the 225 CMR 14.00 and are subject to change. For further information please visit RPS Class I and II Rulemaking.

C. Projection of SCO II Generation Supply

The SCO II program commenced on April 25, 2014, providing the incentive for continued PV development. Similar to the SCO program, an exemption was allowed for contracts that were entered into prior to the start of the program. Table 11 shows the historical SCO II load obligation and the projected load obligation for the coming years.

Table 11 Solar Carve-Out II Actual and Projected Load Obligations*

Year	Retail Sales	Exempt Load Served Under pre-4/26/14 Retail Contracts	Load Served Under pre-5/9/16 Retail Contracts	Minimum Standard for pre-5/9/16 Retail Contracts	Pre-5/9/16 SCO II Load Obligation	Load Served Under post-5/8/16 Retail Contracts	Minimum Standard for post-5/8/16 Retail Contracts	Post-5/8/16 SCO II Load Obligation	Total SCO II Load Obligation
2017	45,175,472	*3,499,290*	*12,735,216*	2.0197%	*257,214*	*28,940,966*	2.8628%	*828,522*	1,085,736
2018	46,409,960	*2,102,988*	*4,526,695*	2.6823%	*121,420*	*39,780,277*	4.0683%	*1,618,382*	1,739,857
2019	*46,409,960*	*1,840,253*	*2,717,683*	*2.3196%*	*63,039*	*41,852,025*	*3.9141%*	*1,638,131*	*1,701,170*
2020	*46,409,960*	*647,640*	*1,490,068*	*2.2040%*	*32,842*	*44,272,252*	*3.8011%*	*1,682,833*	*1,715,675*
2021	*46,409,960*	*428,155*	*914,946*	*2.2672%*	*20,744*	*45,066,859*	*4.1661%*	*1,877,531*	*1,898,275*

* *Italicized is projected*. The Minimum Standard for pre 4/26/14 contracts is zero percent (0%).

D. Projection of the Generation Supply for the SMART Program

The purpose of the SMART program is to establish a tariff incentive program to encourage the continued development of solar across the residential, commercial, government, and industrial sectors in the Commonwealth. The SMART program began accepting applications on November 26, 2018.

The SMART Program initially supported 1,600 MW of new solar generating capacity. SMART facilities must use solar technology and be interconnected with the electric distribution grid in Massachusetts. The maximum capacity of a SMART facility is 5 MW Alternating Current (AC).

All Solar Tariff Generation Units with capacities greater than 25 kW AC will be eligible to receive compensation for 20 years from the Solar Tariff Generation Unit's RPS Effective Date. All Solar Tariff Generation Units with capacities less than or equal to 25 kW AC will be eligible to receive compensation for 10 years from the Solar Tariff Generation Unit's RPS Effective Date.

E. Projection of RPS Class II and APS Supply

RPS Class II renewable market has generally been undersupplied since the beginning of the program in 2009. The pre-1998 installed capacity amount automatically limits the amount of capacity that can qualify. However, beginning in 2018, DOER qualified its first Class II renewable hydroelectric facilities outside of the New England grid (all in New York), which resulted in an increase in supply from new imported certificates.

There are a host of factors which make it difficult to project the future supply of RPS Class II RECs. These factors include, but are not limited to: (a) whether eligible Generation Units, namely hydroelectric plants, will continue to meet the RPS Class II environmental requirements, and (b) whether eligible RPS Class II RECs will be used for compliance in other New England states. Some of the other New England states have higher ACP rates for pre-1998 capacity. Also, recent changes to New York's CES program could keep the production of New York qualified hydroelectric facilities in New York.

For the RPS Class II Waste-to-Energy market, the total number WECs in 2018 closely matched the Minimum Standard Obligation as shown in Table 12. Due to banking limitations in the program, DOER expects that supply will continue to closely match demand in future years.

For the APS, historically there have not been enough AECs in the market for suppliers to meet their obligations and, as a result, the suppliers had to pay ACP. However, in 2018 there have been several new CHP, renewable thermal, fuel cell and waste-to-energy facilities that began participating in the APS program, increasing the number of AECs in the market. This growing supply of AECs is showing signs to eliminate the shortfall in AECs in the future.

Table 12 shows the historical load obligation for RPS Class II and APS program, and the projected load obligations for the coming years.

Table 12 RPS Class II and APS Actual and Projected Compliance Obligations

Year	Actual/ Projected Load Obligation	RPS Class II Renewable Minimum Standard	RPS Class II Renewable Obligation as % of Load Obligation	RPS Class II Waste-to-Energy Obligation @ 3.5% of Load Obligation[37]	APS Minimum Standard	APS Load Obligation
2017	45,175,472	2.5909%	1,184,485	1,600,090	3.75%	1,942,959
2018	*46,409,960*	2.6155%	1,213,892	1,624,385	4.00%	2,088,490
2019	*44,705,754*	*2.6833%*	*1,199,589*	*1,564,701*	*4.25%*	*1,899,995*
2020	*43,535,434*	*3.2056%*	*1,395,572*	*1,523,740*	*4.50%*	*1,959,095*
2021	*42,694,771*	*3.5634%*	*1,521,385*	*1,494,317*	*4.75%*	*2,028,002*

10. USES OF THE ALTERNATIVE COMPLIANCE PAYMENT FUNDS

The proceeds from ACP are held in an account at MassCEC. DOER oversees the expenditure of the ACP funds. The regulations[38] provide that the expenditure of ACP funds from RPS Class I and the Solar Carve-Outs must "further the commercial development of RPS Class I Renewable Generation Units and Solar Carve-Out Renewable Generation Units." The expenditure of ACP funds from APS must "further the commercial development of Alternative Generation." Although the statute and regulations for RPS Class II do not place any restrictions, DOER generally uses RPS Class II ACP funds to support or promote the development of renewable and other clean energy, including, among other things, local and state-level clean energy projects and activities of DOER's Green Communities Division.

Table 13 shows the historic collection of ACP for each of the different portfolio standards. ACP receipts for the CES are collected by the MassDEP. Please see Section 8 for a description of their uses of the ACP.[39]

[37] The projected RPS Class II Waste Energy obligations do not take account of the proposed changes to the 225 CMR 15.00 and are subject to change. For further information please visit RPS Class I and II Rulemaking.
[38] These provisions are found in the Regulations for RPS Class I, RPS Class II, and APS respectively, as follows: 225 CMR 14.08(3)(d), 225 CMR 15.08(3)(b), 225 CMR 15.08(4)(b), and 225 CMR 16.08(3)(b).
[39] See 310 CMR 7.75 5(c)2.

Table 13 ACP Proceeds per Portfolio Standard, 2014-2018 (rounded to the nearest dollar)

RENEWABLE STANDARD	**2018**	2017	2016	2015	2014
RPS CLASS I	**$138**	$113,465	$18,020	$553,126	$378,369
RPS SCO	**$8,640,558**	$522,816	$27,848	$1,529,664	$553,512
RPS SCO II	**$7,922,600**	$4,861,150	$1,750	$235,875	$2,115,001
RPS CLASS II Renewable	**$4,783,153**	$10,850,967	$17,454,800	$9,176,355	$7,288,033
RPS CLASS II Waste-to-Energy	**$133,067**	$120,274	$80,982	$188,491	$32,232
APS	**$992,651**	$3,156,082	$20,429,992	$19,875,362	$18,147,169
TOTAL	**$22,472,166**	$19,624,754	$38,013,392	$31,558,873	$28,514,316

11. ESTIMATED RATEPAYER COSTS OF COMPLIANCE

The costs of RPS and APS compliance are passed on to ratepayers through their energy supply rates by several mechanisms, including 1) a bilateral contract with a competitive retail supplier, 2) participation in a municipal energy aggregation, or 3) their basic service rate if their local distribution company is their supplier. RPS and APS compliance costs are generally not broken out as separate line items on electric bills but are embedded into the cost of energy supply.

Table 14 represents DOER's estimate of the costs of compliance for ratepayers by estimating low and high values for certificates by class, multiplying those values by the number of certificates purchased, and adding the total amount of ACP collected by class. The estimated total cost impact of all the portfolio standards to ratepayers in 2018 likely fell somewhere between $750 million and slightly over $900 million. The actual amounts paid by suppliers for their certificates is not known to DOER.

The solar programs, SCO and SCO II, account for between 80 and 90 percent of the costs depending on the scenario.

Table 14 Estimated RPS Compliance Costs (Low and High Cost Scenarios), 2018

Scenario	RPS/APS Class	ACP Collected ($)	Estimated Certificate Value ($/MWh)	Estimated Total Value of Certificates ($)	Estimated Total Cost Impact ($)	Estimated Average Ratepayer Impact (Cents/kWh)	% of Total
Low Certificate Cost	RPS Class I	$138	$10.00	31,553,570	$31,553,708	0.07	4.2%
	SREC	$8,640,558	$320.00	230,304,960	$238,945,518	0.51	32.0%
	SREC II	$7,922,600	$270.00	424,241,280	$432,163,880	0.93	57.9%
	RPS Class II Renewable	$4,783,153	$10.00	10,004,220	$14,787,373	0.03	2.0%
	RPS Class II Waste	$133,067	$5.00	7,728,700	$7,861,767	0.02	1.1%
	APS	$992,651	$10.00	20,159,930	$21,152,581	0.05	2.8%
	TOTAL	**$22,472,166**	**N/A**	**$723,992,660**	**$746,464,826**	**1.61**	100.0%
High Certificate Cost	RPS Class I	$138	$40.00	126,214,280	$126,214,418	0.27	13.5%
	SREC I	$8,640,558	$360.00	259,093,080	$267,733,638	0.58	28.7%
	SRECII	$7,922,600	$280.00	439,953,920	$447,876,520	0.97	48.1%
	RPS Class II Renewable	$4,783,153	$28.00	28,011,816	$32,794,969	0.07	3.5%
	RPS Class II Waste	$133,067	$10.00	15,457,400	$15,590,467	0.03	1.7%
	APS	$992,651	$20.00	40,319,860	$41,312,511	0.09	4.4%
	TOTAL	**$22,472,166**	**N/A**	**$909,050,356**	**$931,522,522**	**2.01**	100.0%

Table 15 represents DOER's estimate of the range of total costs of compliance for ratepayers during the period from 2014 through 2018 using the same methodology that was used to estimate the 2018 costs above. Costs have increased over time because of increasing Minimum Standards. The analysis indicates that RPS Class I program costs have declined over this period due to the decline in REC prices.

Table 15 Estimated Total RPS/APS Compliance Costs (Low and High Cost Scenarios), 2014 – 2018

Scenario	RPS/APS Class	2018	2017	2016	2015	2014
Low Certificate Cost	RPS Class I	$31,553,708	$54,664,475	$80,999,420	$148,109,966	$143,411,369
	SREC I	$238,945,518	$238,414,976	$268,704,328	$341,287,764	$130,354,392
	SRECII	$432,163,880	$298,600,090	$88,104,910	$32,812,315	$7,430,221
	RPS Class II Renewable	$14,787,373	$29,903,295	$30,926,576	$22,121,931	$19,921,993
	RPS Class II Waste	$7,861,767	$8,064,709	$8,339,827	$8,289,051	$7,235,582
	APS	$21,152,581	$31,957,922	$38,385,049	$36,872,800	$33,937,689
	TOTAL	**$746,464,826**	**$661,605,467**	**$515,460,110**	**$589,493,827**	**$342,291,246**
High Certificate Cost	RPS Class I	$126,214,418	$145,582,825	$161,980,820	$221,888,386	$214,927,869
	SREC I	$267,733,638	$268,151,496	$302,288,888	$363,938,304	$144,776,712
	SRECII	$447,876,520	$309,479,310	$91,367,990	$37,824,075	$7,899,211
	RPS Class II Renewable	$32,794,969	$33,078,683	$32,610,548	$23,740,128	$21,501,238
	RPS Class II Waste	$15,590,467	$16,009,144	$16,598,672	$16,389,611	$14,438,932
	APS	$41,312,511	$39,158,382	$40,275,055	$38,662,004	$35,599,849
	TOTAL	**$931,522,522**	**$811,459,840**	**$645,121,973**	**$702,442,508**	**$439,143,811**

Table 16 represents DOER's estimates of the average cents per kWh cost of compliance for ratepayers during the period of 2014 through 2018. While estimated cents per kWh has increased since 2014, mostly due to increasing Minimum Standards for RPS Class I, the programs now collectively support significantly more renewable and alternative energy generation.

Table 16 Estimated RPS/APS Compliance Costs, (Cents per kWh), 2014 – 2018

Scenario	RPS/APS Class	2018	2017	2016	2015	2014
Low Certificate Cost	RPS Class I	0.07	0.12	0.17	0.31	0.30
	SREC I	0.51	0.52	0.57	0.71	0.27
	SRECII	0.93	0.65	0.19	0.07	0.02
	RPS Class II Renewable	0.03	0.07	0.07	0.05	0.04
	RPS Class II Waste	0.02	0.02	0.02	0.02	0.02
	APS	0.05	0.07	0.08	0.08	0.07
	TOTAL	**1.61**	1.45	1.10	1.23	0.71
High Certificate Cost	RPS Class I	0.27	0.32	0.35	0.46	0.45
	SREC I	0.58	0.59	0.65	0.76	0.30
	SRECII	0.97	0.68	0.20	0.08	0.02
	RPS Class II Renewable	0.07	0.07	0.07	0.05	0.05
	RPS Class II Waste	0.03	0.04	0.04	0.03	0.03
	APS	0.09	0.09	0.09	0.08	0.07
	TOTAL	**2.01**	1.78	1.38	1.46	0.91

APPENDIX ONE: 2018 Massachusetts Retail Electricity Suppliers[40]

Electric Distribution Companies

Fitchburg Gas and Electric Co. d/b/a Unitil	NSTAR Electric Company and Western Massachusetts Electric Company d/b/a Eversource
Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid	

Competitive Retail Suppliers

Agera Energy LLC	Everyday Energy, LLC	Provider Power MASS, LLC
Ambit Northeast, LLC	First Point Power, LLC	Public Power, LLC
Atlantic Energy MA LLC	Green Mountain Energy Company	Reliant Energy Northeast LLC
BBPC d/b/a Great Eastern Energy, LLC)	Hampshire Council of Governments	Residents Energy, LLC
Blue Rock Energy, Inc.	Harborside Energy of Massachusetts, LLC	SFE Energy Massachusetts Inc.
Calpine Energy Solutions, LLC	Harvard Dedicated Energy Limited	SmartEnergy Holdings, LLC
Champion Energy Services, LLC	Hudson Energy Services, LLC	South Jersey Energy Company
Clean Choice Energy, Inc	Inspire Energy Holdings, LLC	Spark Energy, LP
Clearview Electric, Inc.	Interstate Gas Supply, Inc.	Starion Energy, Inc.
Connecticut Municipal Electric Energy Cooperative (CMEEC)	Just Energy Massachusetts Corp.	Summer Energy Northeast, LLC
Constellation New Energy, Inc.	Liberty Power Holdings LLC	Sunwave Gas & Power Massachusetts, Inc.
Devonshire Energy LLC	Major Energy Electric Services, LLC	Texas Retail Energy, LLC.
Direct Energy Business, LLC	Massachusetts Gas & Electric, Inc.	Titan Gas, LLC
Direct Energy Services, LLC	Mega Energy Holdings, LLC	Town Square Energy, LLC
Discount Power, Inc.	Messer Energy Services, Inc. f/k/a Linde	Union Atlantic Electricity, LLC
Dynegy Energy Services (East), LLC	Mint Energy, LLC	Utility Expense Reduction
East Avenue Energy, LLC	National Gas & Electric, LLC	Verde Energy USA Massachusetts, LLC
EDF Energy Services, LLC	NextEra Energy Services Massachusetts, LLC	Viridian Energy, LLC
Eligo Energy MA, LLC	Nordic Energy Services, LLC	**Wattifi, Inc.**
Energy Plus Holdings	Oasis Power, LLC	Xoom Energy Massachusetts, LLC
ENGIE Resources LLC	Palmco Power MA, LLC d/b/a Indra Energy	
ENGIE Retail, LLC, d/b/a Think Energy	Perigee Energy, LLC	

[40] New Suppliers since 2017 are shown in **bold**.

APPENDIX TWO: COMPLIANCE FILINGS, REVIEW, AND VERIFICATION

Six suppliers did not submit enough renewable energy certificates or purchase enough ACP to be in full compliance with the RPS, APS, and CES standards. A summary of the ACP owed by the six suppliers is shown below in Table 17.

Table 17 Total ACP Owed by Six Non-Compliant Suppliers*

Retail Electricity Supplier	RPS and APS	CES
Agera Energy, LLC	$ 41,568,371.80	$ 2,349,898.20
BlueRock Energy, Inc.	$ 6,495,153.14	$ 349,368.60
BBPC, LLC d/b/a/ Great Eastern Energy	$ 37,921,856.69	$ 1,541,152.26
Mint Energy, LLC	$ 3,174,560.00	$ -
Union Atlantic Electricity	$ 1,137,746.58	$ 60,977.88
Utility Expense Reduction, LLC	$ 771,101.44	$ 41,427.72
Total	$ 91,068,789.65	$ 4,342,824.66

Grand Total	$ 95,411,614.31

* Numbers account for any settled certificates, banked certificates or load exemption (CES only) attributable to the supplier.
**CES calculations assume full compliance with RPS

DOER and MassDEP issued Notices of Non-Compliance to all six suppliers.

Agera Energy, LLC filed for Chapter 11 bankruptcy in the US Bankruptcy Court for the Southern District of New York on October 4, 2019. DOER subsequently filed claims against Agera's bankruptcy estate in the amount of $61,692,657.09 as an unsecured claim and $2,699,982.00 as an administrative claim for Alternative Compliance Payments (ACPs) due to DOER for Compliance Years 2018 and 2019. MassDEP filed a claim against Agera in the same court for $3,653,582.66, as an unsecured claim and $220,018.79, as an administrative claim, assuming payments were also made to DOER. In light of the risks, costs and delay of continued litigation in the bankruptcy proceeding, DOER and MassDEP entered into an agreement with Agera to settle the ACP claims owed to the Commonwealth, which the court approved on June 24, 2020.

Following the DOER issuance of the Notice of Non-Compliance for Union Atlantic regarding its 2017 filing, DOER filed a petition with the DPU pursuant to 220 CMR 11.07(4)(c)1., *Licensure Action*, requesting that Union Atlantic's license to sell electricity in Massachusetts be revoked or suspended. The DPU subsequently opened a formal proceeding with Union Atlantic pursuant to Chapter 30A, DPU 19-18.

The remaining four suppliers opted to end their competitive supplier licenses with the DPU. Their ACP amounts remain outstanding.

APPENDIX THREE: 2018 RPS and APS Compliance Summaries (MWh)[41]

Table A RPS Class I Compliance Summary[42]

RPS CLASS I	Load Obligation from Filing	2018 Class I RECs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS Class I Attributes	RPS Class I Net Obligation	Excess Attributes	Banking Limit (30%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	13,113	-	52	-	13,165	12,452	713	3,735	713
National Grid	6,910,894	457,701	-	-	-	603,349	493,535	109,814	148,060	109,814
Eversource	6,865,725	411,073	-	-	-	523,541	490,308	33,233	147,092	33,233
SUBTOTALS	13,950,988	881,887	0	52	0	1,140,055	996,295	143,760	298,887	143,760
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	2,270,090	105,534	357,728	176,913	176,913	2,913,645	2,467,401	446,244	740,193
GRAND TOTAL	46,409,960	3,151,977	105,534	357,780	176,913	1,316,968	3,909,940	2,611,161	745,131	883,953

Table B RPS Solar Carve-Out Renewable Energy Compliance Summary

RPS CLASS I SOLAR CARVE-OUT (SCO)	Load Obligation from Filing	2018 MA SRECs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS SCO Attributes	SCO Net Obligation	Excess Attributes	Banking Limit (10%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	3,114	-	47	-	3,161	3,122	39	312	39
National Grid	6,910,894	115,042	-	8,684	-	123,726	123,726	-	12,372	-
Eversource	6,865,725	123,073	-	4	-	123,077	122,918	159	12,291	159
SUBTOTALS	13,950,988	241,229	0	8,735	0	249,964	249,766	198	24,975	198
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	478,469	4,610	26,990	78,754	588,823	580,018	8,805	57,974	8,794
GRAND TOTAL	46,409,960	719,698	4,610	35,725	78,754	838,787	829,784	9,003	82,949	8,992

Table C RPS Solar Carve-Out II Renewable Energy Compliance Summary

[41] All data for the Competitive Suppliers is aggregated in these four tables in accordance with the provision for confidentiality of product-specific data in the RPS Class I Regulations, 225 CMR 14.09(2)(b). Data for the regulated distribution utility companies are made public in filings at the MA Department of Public Utilities. Names of all Retail Electricity Suppliers are listed in Appendix Two: Compliance Filings, Review, and Verification.

[42] Solar Carve-Out and Solar Carve-Out II are netted out from the Class I table, although included in Tables H, I, J, and K of Appendix Four: Data Tables for Compliance by Generation Location and Type.

RPS CLASS I SOLAR CARVE-OUT II (SCOII)	Load Obligation from Filing	2018 MA SREC IIs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS SCOII Attributes	SCOII Net Obligation	Excess Attributes	Banking Limit (10%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	7,151	-	93	-	7,244	7,094	150	709	150
National Grid	6,910,894	267,396	-	13,760	-	281,156	281,156	-	28,115	-
Eversource	6,865,725	279,467	-	-	-	279,467	279,319	148	27,931	148
SUBTOTALS	13,950,988	554,014	0	13,853	0	567,867	567,569	298	56,755	298
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	1,016,716	892	15,157	157,853	1,190,618	1,172,288	18,330	117,198	18,327
GRAND TOTAL	46,409,960	1,570,730	892	29,010	157,853	1,758,485	1,739,857	18,628	173,953	18,625

Table D RPS Class II Renewable Energy Compliance Summary

RPS CLASS II	Load Obligation from Filing	2018 MA Class II RECs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS Class II RE Attributes	RPS Class II Net Obligation	Excess Attributes	Banking Limit (30%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	4,550	-	74	-	4,624	4,561	63	1,368	63
National Grid	6,910,894	207,561	-	4,011	-	211,572	180,755	30,817	54,226	30,817
Eversource	6,865,725	183,945	-	-	-	183,945	179,574	4,371	53,872	4,371
SUBTOTALS	13,950,988	396,056	0	4,085	0	400,141	364,890	35,251	109,466	35,251
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	604,366	1	3,595	252,204	860,166	849,002	11,164	254,674	11,063
GRAND TOTAL	46,409,960	1,000,422	1	7,680	252,204	1,260,307	1,213,892	46,415	364,140	46,314

Table E RPS Class II Waste-to-Energy Compliance Summary

RPS CLASS II WASTE-TO-ENERGY	Load Obligation from Filing	2018 MA Class II WECs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS Class II WE Attributes	RPS Class II Waste-to-Energy Net Obligation	Excess Attributes	Banking Limit (10%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	6,100	-	97	-	6,197	6,103	94	305	94
National Grid	6,910,894	253,049	-	161	-	253,210	241,882	11,328	12,094	11,328
Eversource	6,865,725	251,557	-	43	-	251,600	240,301	11,299	12,015	11,299
SUBTOTALS	13,950,988	510,706	0	301	0	511,007	488,286	22,721	24,414	22,721
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	1,035,034	4,466	22,396	121,176	1,183,072	1,136,099	46,973	56,773	38,496
GRAND TOTAL	46,409,960	1,545,740	4,466	22,697	121,176	1,694,079	1,624,385	69,694	81,187	61,217

Table F APS Alternative Energy Compliance Summary

APS	Load Obligation from Filing	2018 MA APS AECs	2016 Banked Attributes	2017 Banked Attributes	Alternative Compliance Credits	Total RPS APS Attributes	APS Net Obligation	Excess Attributes	Banking Limit (10%)	Banked Attributes
DISTRIBUTION COMPANIES										
F G & E	174,369	7,782	-	114	-	7,896	7,847	49	2,354	49
National Grid	6,910,894	346,921	-	56,224	-	403,145	310,991	92,154	93,297	92,154
Eversource	6,865,725	264,261	-	51,900	-	316,161	308,958	7,203	92,687	7,203
SUBTOTALS	13,950,988	618,964	0	108,238	0	727,202	627,796	99,406	188,338	99,406
COMPETITIVE SUPPLIERS										
SUBTOTALS	32,458,972	1,390,986	28	103,951	178,267	1,679,275	1,460,694	218,581	438,177	218,408
GRAND TOTAL	46,409,960	2,009,950	28	212,189	178,267	2,406,477	2,088,490	317,987	626,515	317,814

Table G Clean Energy Standard Compliance Summary

CES	Load Obligation from Filing	CECS SETTLED	Alternative Compliance Credits	Total CES Attributes	CES Net Obligation	Excess Attributes	Banking Limit (30%)	Banked Attributes
DISTRIBUTION COMPANIES								
F G & E	174,369	4,219	-	4,219	4,219	-	-	-
National Grid	6,910,894	178,495	-	178,495	178,495	-	-	-
Eversource	6,865,725	163,913	-	163,913	163,913	-	-	-
SUBTOTALS	13,950,988	346,627	0	346,627	346,627	0	0	0
COMPETITIVE SUPPLIERS								
SUBTOTALS	32,458,972	409,088	99,401	508,489	508,450	39	0	0
GRAND TOTAL	46,409,960	755,715	99,401	855,116	855,077	39	0	0

APPENDIX FOUR: Data Tables for Compliance by Generation Location and Type[43]

The first four tables below provide the data from which the RPS Class I graphs in

[43] Note that regularly updated tables listing all RPS and APS qualified Generation Units, including their locations and types, are available for viewing and downloading via DOER's RPS/APS Qualified Generation Units webpage.

Figure **2** through Figure 6 were generated. Those graphs and these tables include SREC and SREC II data for the SCO and SCO II programs, which are within RPS Class I. SREC data beginning in 2012 also includes SRECs that were transferred to the Auction Account at the GIS, becoming reminted auction SRECs, which are available to use for SCO compliance in the two or three years after their generation year.

Table H RPS Class I Compliance by Generation Location, 2011-2018

STATE	2011	2012	2013	2014	2015	2016	2017	2018	
CT	16,414	16,070	16,452	11,397	5,973	6,829	22,481	39,593	0.6%
ME	746,648	864,227	1,114,355	1,039,509	1,170,728	1,219,261	1,651,113	1,618,008	26.0%
MA	**286,115**	**483,925**	**791,088**	**1,118,406**	**1,538,702**	**1,659,136**	**2,204,208**	**2,592,432**	**41.7%**
NH	331,996	531,430	640,808	508,841	495,212	358,956	237,805	256,838	4.1%
RI	41,952	37,131	23,288	11,059	9,496	8,210	5,081	26,532	0.4%
VT	149,505	173,191	364,691	407,497	342,023	382,949	297,852	354,224	5.7%
NMISA	22,742	49,144	64,629	67,369	353	5,166	-	1,037	0.0%
NY	688,039	620,904	870,508	880,859	666,330	1,025,674	864,280	856,288	13.8%
NS	-	-	-	-	-	1,173	64,400	23,700	0.4%
PEI	142,688	125,713	142,478	189,578	227,942	230,705	236,727	241,214	3.9%
QC	213,713	278,794	356,139	397,130	339,366	336,421	266,357	203,187	3.3%
TOTAL	2,639,812	3,141,663	4,384,436	4,631,645	4,796,125	5,234,480	5,850,304	6,213,053	100%

Table I RPS Class I Compliance by Generation Type, 2011-2018

FUEL TYPE	2011	2012	2013	2014	2015	2016	2017	2018	
Anaerobic Digester Gas	25,115	27,373	22,853	9,868	43,837	42,099	47,412	63,761	1.0%
Other Biomass	392,629	394,754	357,575	375,109	320,801	2,501	2,185	1,421	0.0%
Hydroelectric	105,484	105,326	113,936	129,790	129,810	133,389	147,168	149,477	2.4%
Landfill Gas	848,229	891,798	954,656	820,001	587,790	722,539	268,910	243,083	3.9%
Marine & Hydrokinetic	-	-	6,837	28,959	47	48	47	43	0.0%
Solar PV	36,688	138,159	323,164	681,502	1,194,925	1,324,578	2,030,870	2,526,793	40.7%
Wind	1,231,667	1,623,119	2,605,415	2,586,416	2,518,915	3,009,326	3,353,712	3,228,475	52.0%
Totals	5,820,341	3,180,529	4,384,436	4,631,645	4,796,125	5,234,480	5,850,304	6,213,053	100.0%

Table J RPS Class I Compliance by Generation Location and Type, 2018 (MWh)[44]

	Anaerobic Digester Gas	Bioenergy Other Biomass	Hydrokinetic	Hydropower	Landfil Gas	Solar PV	Solar Thermal	Wind	Total
CT	0	0	0	322	2,109	37,162	0	0	39,593
ME	0	13,949	0	43,569	2,171	23,123	4	1,535,192	1,618,008
MA	1,421	48,816	43	28,846	35,641	2,313,128	14	164,523	2,592,432
NH	0	0	0	18,077	20,231	22,489	5	196,036	256,838
NMISA	0	0	0	0	0	0	0	1,037	1,037
NY	0	0	0	20,445	140,961	0	0	694,882	856,288
NS	0	0	0	0	0	0	0	23,700	23,700
PE	0	0	0	0	0	0	0	241,214	241,214
QC	0	0	0	0	25,889	0	0	177,298	203,187
RI	0	0	0	0	0	11,133	5	15,394	26,532
VT	0	996	0	38,218	16,081	119,334	396	179,199	354,224
TOTAL	1,421	63,761	43	149,477	243,083	2,526,369	424	3,228,475	6,213,053

Table K RPS Class I Compliance Percentage by Generator Type and State, 2018

	Anaerobic Digester Gas	Bioenergy Other Biomass	Hydrokinetic	Hydropower	Landfil Gas	Solar PV	Solar Thermal	Wind	Total
CT	0.0%	0.0%	0.0%	0.2%	0.9%	1.5%	0.0%	0.0%	0.6%
ME	0.0%	21.9%	0.0%	29.1%	0.9%	0.9%	0.9%	47.6%	26.0%
MA	100.0%	76.6%	100.0%	19.3%	14.7%	91.6%	3.3%	5.1%	41.7%
NH	0.0%	0.0%	0.0%	12.1%	8.3%	0.9%	1.2%	6.1%	4.1%
NMISA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NY	0.0%	0.0%	0.0%	13.7%	58.0%	0.0%	0.0%	21.5%	13.8%
NS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.4%
PE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.5%	3.9%
QC	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	5.5%	3.3%
RI	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	1.2%	0.5%	0.4%
VT	0.0%	1.6%	0.0%	25.6%	6.6%	4.7%	93.4%	5.6%	5.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table L RPS Class II Renewable Energy Compliance by Generation Location, 2011-2018

STATE	2011	2012	2013	2014	2015	2016	2017	2018	
CT	11,178	2,933	5,848	6,557	4,410	14,461	19,439	18,822	1.9%
ME	42,540	72,014	171,754	110,517	104,395	112,269	130,374	152,452	15.2%
MA	21,200	61,082	97,982	184,538	213,229	180,920	246,270	291,645	29.2%
NH	69,674	55,454	86,931	96,101	94,336	87,538	133,297	130,095	13.0%
RI	3,524	1,448	1,597	2,524	1,709	2,777	35,132	170,819	17.1%
VT	30,610	53,106	145,497	126,143	119,155	151,251	3,478	3,933	0.4%
NY	57856	0	0	0	0	12108	216,021	232,655	23.3%
TOTAL	236,582	246,037	509,609	526,380	537,234	561,324	784,011	1,000,421	100%

[44] Table J (RPS Class I) and Table P (CES) are identical and include all RPS Class I RECs used to comply with RPS and CES.

Table M RPS Class II Renewable Energy Compliance by Generation Type, 2011-2018

FUEL TYPE	2011	2012	2013	2014	2015	2016	2017	2018	
Hydroelectric	172,051	246,037	509,462	526,097	535,799	525,392	724,199	943,142	94.3%
Marine & Hydrokinetic	0	0	147	240	242	244	258	235	0.0%
Landfill Gas	7,285	64,531	0	0	0	26,965	52,689	51,378	5.1%
Wind	0	0	0	7	1,193	8,723	6,865	5,666	0.6%
Totals	181,347	312,580	511,622	528,358	539,249	563,340	786,028	1,000,421	100.0%

Table N RPS Class II Compliance by Generation Location and Type, 2018 (MWh)

STATE / FUEL TYPE	Hydroelectric	Hydrokinetic	Landfill Gas	Wind	TOTAL
CT	11,260	-	7,562	-	18,822
ME	152,452	-	-	-	152,452
MA	291,410	235	-	-	291,645
NH	123,279	-	6,816	-	130,095
RI	134,082	-	36,737	-	170,819
VT	3,933	-	-	-	3,933
NY	226,726	-	263	5,666	232,655
TOTAL	**943,142**	**235**	**51,378**	**5,666**	**1,000,421**

Table O APS Compliance by Generation Type, 2012-2018

Fuel Type	2011	2012	2013	2014	2015	2016	2017	2018	
Biomass	-	-	2,689	2,797	3,138	2,548	5,495	6,525	0.3%
Digester Gas	-	-	-	855	531	893	152	5,578	0.3%
Fuel Cell	-	-	-	-	-	-	-	19,758	1.0%
Flywheel Storage	303	3,186	489	377	98	2,724	-	-	0.0%
Heat Pump - Air	-	-	-	-	-	-	2,087	28,416	1.4%
Heat Pump - Groun	-	-	-	-	-	-	-	71,910	3.6%
Liquid Biofuels	-	-	-	-	-	-	406,673	294,337	14.6%
Solar Thermal	-	-	-	-	-	-	121	44,198	2.2%
CHP - Biomass	-	-	2,689	2,797	3,138	2,548	1,659	1,924	0.1%
CHP - Natural Gas	324,619	347,993	529,462	826,966	890,835	938,838	1,495,505	1,446,495	71.7%
CHP - Muni Waste	-	-	145,497	-	-	-	105,658	96,936	4.8%
CHP - Waste Energy	-	-	-	855	531	893	486	30	0.0%
TOTAL	324,922	351,179	680,826	834,647	898,271	948,444	2,017,836	2,016,107	100.0%

Table P CES Compliance by Generation Location and Type, 2018 (MWh)[45]

	Anaerobic Digester Gas	Bioenergy Other Biomass	Hydrokinetic	Hydropower	Landfil Gas	Solar PV	Solar Thermal	Wind	Total
CT	0	0	0	322	2,109	37,162	0	0	39,593
ME	0	13,949	0	43,569	2,171	23,123	4	1,535,192	1,618,008
MA	1,421	48,816	43	28,846	35,641	2,313,128	14	164,523	2,592,432
NH	0	0	0	18,077	20,231	22,489	5	196,036	256,838
NMISA	0	0	0	0	0	0	0	1,037	1,037
NY	0	0	0	20,445	140,961	0	0	694,882	856,288
NS	0	0	0	0	0	0	0	23,700	23,700
PE	0	0	0	0	0	0	0	241,214	241,214
QC	0	0	0	0	25,889	0	0	177,298	203,187
RI	0	0	0	0	0	11,133	5	15,394	26,532
VT	0	996	0	38,218	16,081	119,334	396	179,199	354,224
TOTAL	1,421	63,761	43	149,477	243,083	2,526,369	424	3,228,475	6,213,053

Table Q Voluntary Renewable Energy Certificates Retired for RGGI by Generation Location and Type, 2018 (MWh)[46]

State	Hydroelectric	Landfill Gas	Solar Photovoltaic	Wind	Total
MA	1,205	1,000	1,848	733	4,786
ME			259	2,202	2,461
NH			68		68
NY				855	855
RI				308	308
VT			264		264
Total	1,205	1,000	2,439	4,098	8,742

[45] See footnote 48

[46] These RPS Class I RECs were documented in the Filings and/or NEPOOL GIS reports and are qualified to be retired by the MassDEP for the Regional Greenhouse Gas Initiative. For additional details, see footnote 8.