

**Massachusetts  
Renewable & Alternative Energy  
Portfolio Standards**

**MASSACHUSETTS RPS & APS  
ANNUAL COMPLIANCE REPORT  
FOR 2015**

**October 10, 2017**

**Department of Energy Resources  
Commonwealth of Massachusetts**

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## EXECUTIVE SUMMARY

2015 was another significant year for the Massachusetts Renewable and Alternative Energy Portfolio Standards (RPS and APS). RPS Class I certificates (RECs and SRECs) sourced from Massachusetts renewable generation rose by almost 38% over 2014, largely due to continued growth in solar installations, and in-state facilities were once again the largest single source of those certificates.

RPS is a statutory obligation created by the Electricity Restructuring Act of 1997 and activated by regulations in 2002. The statute was revised by the Green Communities Act of 2008 to add the APS and a second class of RPS, and it was further modified by the Competitively Priced Electricity Act of 2012 and the Renewable Thermal Act of 2014. The statute requires Massachusetts Retail Electricity Suppliers to obtain from qualified sources certain percentages of the electricity needed to supply their retail customers each year. Sources eligible for RPS Class I are post-1997 renewable units located in New England and on adjacent electricity grids; for the RPS Class II Renewable Energy subclass, pre-1998 renewable plants; for the RPS Class II Waste Energy subclass, pre-1998 Massachusetts waste-to-energy plants; and for APS, Massachusetts plants using certain “alternative energy” technologies, mostly Combined Heat & Power. RPS Class I succeeded the original RPS that had began in 2003 with an obligation of 1% and increased by 0.5% annually until it reached 4% in 2009. After 2009, the Class I obligation has increased by 1% annually and was 10% in 2015. Since 2010, the Class I standard has included a Solar Carve-Out (SCO) obligation for in-state solar photovoltaic generation. The SCO and its 2014 successor Solar Carve-Out II each began at less than 0.1% and rises annually per a formula set in regulation. The Class II Renewable Energy obligation rises annually per a schedule and formula set in regulation, while the 3.5% Class II Waste Energy obligation does not increase annually. The APS obligation increases by a schedule set in regulation.

Sixty Retail Electricity Suppliers had RPS and APS obligations in 2015. Of the 60, 59 met their obligations with a mix of (a) 2015 Certificates purchased from the owners of qualified Generation Units, (b) Attributes banked from 2013 and 2014 surplus Certificates, (c) reminted Solar Auction SRECs, and (d) Alternative Compliance Payments (ACPs) in lieu of Certificates. One Supplier that had filed for bankruptcy in 2014 completed its dissolution in July of 2015 and did not submit a Compliance Filing. Each RPS Class I and Class II Renewable Energy Certificate (REC), Solar Carve-Out Renewable Energy Certificate (SREC), and Waste Energy Certificate (WEC) represents the Generation Attributes of one megawatt hour (MWh)<sup>1</sup> of electricity generated during the Compliance Year by a Generation Unit qualified for the relevant standard. The MWh value of some SREC-IIs are discounted by SREC Factors related to project size and type of location. Alternative Energy Certificates (AECs) represent the APS Attributes of the energy from APS qualified facilities during the Compliance Year, as calculated in a manner prescribed in the APS regulations for each specific alternative energy technology.

The supply of 2015 RPS Class I RECs exceeded demand by 0.4%. The total retail load obligation in 2015 was 48,010 gigawatt hours (GWh),<sup>2</sup> of which the average 7.65% RPS Class I obligation (10% minus the average 2.09% Solar Carve-Out and the average 0.26% Solar Carve-Out II obligations within Class I)<sup>3</sup> was 3,673 GWh. This obligation was met by 3,689 GWh of 2015 Class I RECs purchased by the Suppliers and 487 GWh of banked Attributes from 2013 and 2014 surplus RECs, plus 8 GWh of ACPs (costing about \$553 thousand) paid by Suppliers that fell short of their REC obligations (versus about \$378 thousand for 2014). The net result was 520 GWh surplus 2015 Class I RECs, all of whose Attributes were bankable for 2016 or 2017 compliance.

MA RPS operates within a regional network of incentive programs, and RECs qualified for MA RPS Class I can also be used for other purposes. A number of the RECs documented in the 2015 Filings were used by several MA Suppliers to meet “green product” claims, i.e., to acquire RECs for customers who voluntarily signed up for 50% or 100% renewable electricity. Also, some RECs were transferred into the NEPOOL GIS “Reserve Account” for retirement by various entities in MA as “green” or for other purposes. RECs qualified for MA RPS Class I can also qualify for RPS in other states, and almost 30% of MA-qualified RECs (net of SRECs, which are a sub-set of Class I RECs) were used for RPS compliance in other New England states (mostly Connecticut, New Hampshire, and Rhode Island), while some might have been used to meet voluntary green product claims outside MA. Thus, many more MA-qualified RECs are created than are used for Massachusetts RPS compliance.

<sup>1</sup> One megawatt hour (MWh) = one thousand kilowatt hours (kWh) = one million watt hours of electrical energy.

<sup>2</sup> One gigawatt hour (GWh) = one thousand MWh = one million kWh = one billion (US) watt hours of electrical energy.

<sup>3</sup> See footnote 50 for an explanation of this year’s use of “average” Minimum Standard obligations for Class I RECs and SRECs.

The supply of RECs, SRECs, and SREC-IIs from Class I renewable sources within Massachusetts in 2015 grew by 420 GWh (38%) from 2014, the highest GWh increase among all locations. Geographically, resources in Massachusetts (mostly solar, wind, and landfills) supplied 32% of all RPS Class I RECs settled for compliance. Maine resources (especially wind) supplied more than 24% of all RPS Class I RECs, while New York (wind and landfills) supplied 14%, adjacent Canadian provinces (wind) 12%, and New Hampshire (mostly wind and biomass) more than 10%, with the remaining 7% coming from other New England states. Most RPS Class I RECs came from electricity generated by wind turbines (53%), solar photovoltaic (PV) arrays (25%), landfill methane-fired plants (12%), and biomass (7%). The remainder came from a combination of hydroelectric, anaerobic digester gas, and marine & hydrokinetic facilities. Solar PV continued to be the fastest growing type of renewable generation source, surpassing landfill methane in 2015 as the second largest source behind wind.

For the RPS Solar Carve-Out (SCO) within Class I, continued growth in PV output did not keep pace with the increase in SREC obligation, but the use of SRECs from prior years' Solar Credit Clearinghouse Auctions minimized use of the ACP option for compliance. Despite a shortfall in the market, a few SRECs were deposited into and sold from the Auction. The 757 GWh supply of 2015-generated SRECs was short of the 1,005 GWh required to meet the RPS SCO obligation, which averaged 2.0934% in 2015. Of the 757 GWh, only 2 GWh were deposited into the Auction, and 755 GWh were used for SCO compliance, along with 36 GWh banked from 2014 and 220 GWh of reminted SRECs from prior years' Solar Auctions, while 12 GWh of net surplus were banked forward. Some of the obligation was met with 3 GWh worth of ACPs, totaling \$1.53 million (versus under \$554 thousand for 2014).

For the second year of the Solar Carve-Out II, the supply of SREC-IIs exceeded demand. After netting out the retail load obligation under contracts that predated the April 25, 2014, regulatory change, the net retail load obligation was almost 37,494 GWh, and the 0.3288% SREC-II obligation was about 123 GWh (which is 0.2569% of the *total* retail load obligation). That obligation was met by almost 126 GWh of 2015 SREC-IIs, while more than 3 GWh surplus was banked forward. Less than 1 GWh of shortfall by some Suppliers was met by ACPs, totaling less than \$236 thousand (versus over \$2.11 million for 2014). An additional 67 GWh of surplus 2015 SREC-IIs were deposited into and sold from DOER's Solar Auction.

The supply of Class II RECs in 2015 for the RPS Class II Renewable Energy obligation of 2.0% fell further short of demand in 2015 than in 2014. The 960 GWh obligation was met with 539 GWh of RECs (mostly hydro) and 103 GWh of 2013 & 2014 banked RECs, from which 18 GWh were banked forward. A shortfall of 333 GWh was met by ACPs of over \$9.17 million (versus almost \$7.29 million for 2014).

The supply of WECs for the RPS Class II Waste Energy requirement exceeded demand. However, although almost 1,785 GWh of WECs were generated in 2015, Suppliers obtained only 1,620 GWh of WECs to meet the 3.5% obligation, which totaled 1,679 GWh. In addition, Suppliers used 53 GWh banked from 2014 surplus. More than one-third of the Suppliers also used about 17 GWh of ACPs, totaling over \$188 thousand (versus just over \$32 thousand for 2014).

The supply of almost 895 GWh of AECs for the Alternative Energy Portfolio Standard (APS), plus less than 1 GWh banked from 2014 surplus, was significantly short of the 1,799 GWh needed to meet the 3.75% obligation. Consequently more than 902 GWh (over 50%) of the APS obligation were met by ACPs totaling more than \$19.87 million (versus almost \$18.15 million for 2014), and fewer than 3 GWh of surplus AECs were banked forward. Almost all AECs came from combined heat and power (CHP) plants.

The total Alternative Compliance Payments (ACPs) for all classes of RPS and APS was more than \$3 million higher than for 2014, an increase of 11%. The compliance obligations accumulated by the one bankrupt Supplier before its dissolution totaled \$2,238,972.66 in unrealized Alternative Compliance Payments. (Details are in Appendix One.)

In sum, RPS Class I continued its intended role of incentivizing the accelerated development of new Renewable Generation Units, while RPS Class II continued incentivizing ongoing and improved operation of older renewable and waste energy facilities. The APS incentive has increased the financial viability of new and incremental CHP projects, which generate large savings in net, source-fuel consumption when compared with conventional sources of electricity and thermal energy. Finally, the Solar Carve-Out II in RPS Class I continued to provide incentives for the growth of in-state PV installations. The robust response to this program will result in MA meeting its 2020 goal of 1,600 MW of installed capacity long before 2020.

## SECTION ONE INTRODUCTION TO THE RENEWABLE & ALTERNATIVE ENERGY PORTFOLIO STANDARDS

This section describes the Massachusetts Renewable and Alternative Energy Portfolio Standards (RPS and APS) as structured in 2015 pursuant to the Green Communities Act of 2008 (the “2008 Act”) the Competitively Priced Electricity Act of 2012 (the “2012 Act”), and the 2014 Act Relative to Credit for Thermal Energy Generated with Renewable Fuels (the “2014 Act”).<sup>4</sup> The last two paragraphs briefly summarize changes that took effect during and after 2015.

The Electricity Restructuring Act of 1997 mandated the Renewable Energy Portfolio Standard, RPS, one of the earliest such mandates in the nation. The original RPS obligated Retail Electricity Suppliers (“Suppliers”), both regulated distribution Utilities and licensed Competitive Suppliers, to obtain for their retail customers a small but growing percentage of electricity (the “Minimum Standard”) from sources that qualified as New Renewable Generation Units, namely generators that began operation after 1997 and used eligible renewable resources and technologies – especially solar, wind, landfill methane, and low-emission/advanced technology biomass<sup>5</sup>. The RPS began with an obligation of one percent in 2003 and increased by a half percent annually through 2009, when it reached four percent. Under the 2008 Act, the RPS was renamed RPS Class I and, since 2009, has increased by one percent annually. The obligation was ten percent for 2015 and will be twenty percent in 2025, after which it will continue rising.<sup>6</sup> In addition to RPS Class I, as of 2009 the Suppliers must comply with three new energy portfolio standards mandated by the 2008 Act, and, as of 2010, with a Solar Carve-Out within Class I<sup>7</sup>. As of 2014, an additional Solar Carve-Out II within Class I went into effect. The 2008 statute also mandated a new RPS Class II for electricity from pre-1998 generation units, divided into two subclasses – one for renewable energy and one for waste-to-energy – and a new Alternative Energy Portfolio Standard (APS) for energy from combined heat & power (CHP) and some other technologies. All of the Minimum Standards are structured as percentage obligations for Suppliers, but with each Minimum Standard having different eligibility criteria and percentage obligations.

In 2009, the changes mandated by the 2008 Act were implemented in three Regulations, respectively for RPS Class I, RPS Class II, and the Alternative Energy Portfolio Standard.<sup>8</sup> The new Regulations for RPS Class I continues to limit eligibility to post-1997 Generation Units, but with some grandfathered Vintage Generation Units from RPS still partially qualified, and, as of 2010, with a

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<sup>4</sup> The RPS provisions of the ElectricUtility Industry Restructuring Act of 1997 (<https://malegislature.gov/Laws/SessionLaws/Acts/1997/Chapter164>), later replaced by provisions of the Green Communities Act of 2008 (<http://www.malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter169>) and further amended by the Competitively Priced Electricity Act of 2012 (<https://malegislature.gov/Laws/SessionLaws/Acts/2012/Chapter209>), are incorporated into law in M.G.L., c. 25A, § 11F (<http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F>). APS provisions are in M.G.L., c. 25A, § 11F½ (<https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1~2>), as amended by the 2014 Act, “An Act Relative to Credit for Thermal Energy Generated with Renewable Fuels” (<https://malegislature.gov/Laws/SessionLaws/Acts/2014/Chapter251>). That last amendment is addressed in the penultimate paragraph of this section of the Report.

<sup>5</sup> In the case of woody biomass, the regulations since 2012 has included detailed fuel sourcing and energy conversion efficiency standards based on forest sustainability and life-cycle carbon dioxide (CO<sub>2</sub>) 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](#) and the [RPS Biomass Policy Regulatory Process webpage](#).

<sup>6</sup> The RPS law and regulations do not include final limits or ending dates except for the Solar Carve-Out & Solar Carve-Out II regulations.

<sup>7</sup> Each year’s Class I obligation equals the obligation scheduled in regulation, 225 CMR 14.07(1), minus the Solar Carve-Out obligations that are *calculated* per a method specified in regulation, 225 CMR 14.07(2). Also see the second paragraph of Section Two of this Report.

<sup>8</sup> The [Regulations](#) – 225 CMR 14.00 (RPS Class I), 15.00 (Class II), and 16.00 (APS) – became effective on an “Emergency” basis on January 1, 2009, and the subsequent rulemaking concluded with the promulgation of final revised Regulations effective on June 12, 2009. The RPS Class I regulations were subsequently revised to include a Solar Carve-Out standard on an Emergency basis in January of 2010, launching a process that culminated in December of 2010, and was revised again in 2014 to add a follow-up Solar Carve-Out II standard.

“carve-out” for post-2007 solar photovoltaic projects. The list of RPS eligible resources was expanded to include hydroelectricity plants of small size and low environmental impact<sup>9</sup>, as well as geothermal and “marine and hydro-kinetic” facilities. In addition, 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 now must be reported to the NEPOOL Generation Information System (“GIS”)<sup>10</sup> by independent Third Party Meter Readers (a.k.a., “Independent Verifiers”).<sup>11</sup>

Under the **Solar Carve-Out (“SCO”)** Minimum Standard, each Supplier must demonstrate annually that, *within* its Class I percentage obligation, it has obtained a specified, much smaller percentage of its electricity from solar photovoltaic (“PV”) systems that are Massachusetts electric grid-connected and were installed after 2008. The SCO percentage obligation rises annually through a methodology detailed in the Class I Regulations (225 CMR 14.07(2)). On a dollar per MWh of energy basis, PV is typically costlier to install than the other major Class I renewable technologies. That expense is reflected in higher Alternative Compliance Payment (“ACP”) rates (see below), with the original intent of providing sufficient incentive to bring 400 MW of new PV generating capacity on line in Massachusetts by 2017. That goal was surpassed in 2013, and, following an interim extension by Emergency regulations and then conventional rulemaking, DOER commenced on April 25, 2014, the follow-up Solar Carve-Out II (“SCO II”, a.k.a., SREC-II) within Class I. The start of the SCO II marked the end of the SCO, which eventually qualified a total of 653.3MW.<sup>12</sup>

The **Solar Carve-Out II (“SCO II”)** is modeled on the SCO with regard to project eligibility, except that installation has to have commenced after 2012. Within that model, SCO II has three major differences: (1) the Clearinghouse Auction Account prices undergo scheduled reductions to reflect declining development costs; (2) some types and sizes of projects 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/bust pattern of development. Approvals of PV systems under the SCO II were 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 minus 653.3 MW qualified under the original SCO. However, the market reacted robustly to SCO II, and that goal of qualifying 1,600 MW was within sight by late in 2015. DOER’s response and further new developments for PV incentives are recounted in the last paragraph of the SCO II section of the report.

**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** Minimum Standard is for Units that meet the same technology, resource, and location criteria as Class I, but with a lower per-facility MW

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<sup>9</sup> Hydroelectric plants in Class I initially were limited to post-1997 facilities of no more than 25 MW *or* to incremental output at pre-1998 facilities attributable to added capacity or efficiency improvements amounting to no more than 25 MW, while the Class II per-facility capacity limit was 5 MW. However, under the 2012 Act, the 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.

<sup>10</sup> See <http://www.nepoolgis.com>, as well as the Generation Certificates paragraph on page 7.

<sup>11</sup> Another substantive change in RPS Class I was the addition of a provision that a qualified plant *not* commit its generation capacity to Control Areas other than ISO-NE, with some exceptions. In addition, non-intermittent generators now must participate in the ISO-NE Forward Capacity Market except to the extent that their capacity is previously committed elsewhere. For details, see 225 CMR 14.05(1)(e). In the case of plants outside of ISO-NE, the import rules now also include a “round-tripping” prohibition, for which see 225 CMR 14.05(5)(d).

<sup>12</sup> For more details about the Solar Carve-Out and Solar Carve-Out II, see footnote 47, and visit [this page](#) at the [RPS/APS homepage](#).

capacity limit for hydropower<sup>13</sup>. A 2014 Class II regulatory revision lowered the previously constant Minimum Standard of 3.6% to 1.5% for 2013, 1.75% for 2014, 2.0% for 2015, and it provided a methodology for subsequent annual adjustments. The **RPS Class II Waste Energy** Minimum Standard of 3.5% provides incentives for pre-1998 Waste Energy generation. The Class II eligibility of Waste Energy Generation Units – a.k.a., trash-to-energy or municipal solid waste plants – is conditioned on recycling and other regulatory criteria specific to Massachusetts. The 2014 regulatory revision also changed the WEC banking provisions, as noted in Section Six of this report.

The **Alternative Energy Portfolio Standard (“APS”)** is limited to, and intended to support, certain “alternative,” largely non-renewable, technologies and resources whose development the Legislature deemed worthy of incentives modeled on RPS.<sup>14</sup> Two APS technologies are active to date: Flywheel Storage and Combined Heat and Power (“CHP”, a.k.a., cogeneration).<sup>15</sup> The Alternative Energy Certificates (AECs) earned by a CHP Unit represent the energy saved (in MWh) by operating the Unit as a CHP Unit instead of separately operating an on-site thermal plant while drawing electricity from the grid.<sup>16</sup> The quantity of AECs earned by a Flywheel Storage Unit is equal to 65% of the electricity discharged by the Unit and represents a value placed upon the Unit’s reduction of peak power generation and voltage regulation.

**Generation Certificates** are the means by which Retail Electricity Suppliers meet their annual RPS and APS obligations. Each Supplier must acquire a sufficient quantity of MA RPS Class I and Class II qualified Renewable Energy Certificates (RECs), Solar Carve-Out Renewable Energy Certificates (SRECs), Solar Carve-Out II Renewable Energy Certificates (SREC-IIs), Class II Waste Energy Certificates (WECs), and APS qualified Alternative Energy Certificates (AECs) to meet its six Minimum Standards each year. These certificates are created, recorded, and tracked by the NEPOOL Generation Information System (GIS).<sup>17</sup> The GIS tracks all electricity generated within the ISO-NE control area and/or fed onto the New England grid, as well as electricity exchanged between ISO-NE and adjacent control areas.<sup>18</sup> For each megawatt-hour (MWh) of electricity, whether renewable or not, the GIS creates and deposits one serially-numbered, electronic certificate in the account of the entity that generated the MWh in ISO-NE or imported the MWh from an adjacent control area. Any certificate for energy output that qualifies for one or more of the New England states’ energy portfolio standards is coded as such.<sup>19</sup> A Supplier with a Massachusetts portfolio standard obligation purchases RECs,

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<sup>13</sup> See footnote 9 for details regarding the Hydroelectric MW limits. See footnote 5 for the Class I woody biomass eligibility standards that were extended to Class II woody biomass in a rulemaking during the first half of 2014.

<sup>14</sup> The APS statute is at <http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1-2>.

<sup>15</sup> Other technologies originally qualified under APS included (1) displacement of fossil fuels by certain paper-derived fuel cubes, (2) coal gasification with permanent carbon sequestration, and (3) “efficient steam technology” (undefined in statute). Stringent carbon dioxide emission reductions and other emission and efficiency criteria apply. However, regulations have not been developed for the third of the three technologies listed here, and [Chapter 251 of the Acts of 2014](#) both removed the first two technologies and added “renewable thermal” to APS as of 2015. Regarding renewable thermal, see the penultimate paragraph in Section One and the last paragraph of Section Eight of this Report.

<sup>16</sup> For how an AEC is calculated for CHP Units, see the APS Regulations in 225 CMR 16.05(1)(a)2 and the [APS Guideline for CHP](#).

<sup>17</sup> See [www.nepoolgis.com](http://www.nepoolgis.com).

<sup>18</sup> 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). See <http://www.iso-ne.com/about>.

<sup>19</sup> 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

SRECs, SREC-IIs, WECs, and AECs from qualified generators, either directly or via brokers, and they are electronically transferred from the generators' GIS accounts to the Supplier's GIS account. Each GIS certificate qualified for a Massachusetts portfolio standard can be used for compliance with *only* the standard for which it is qualified; thus, for example, a Class I REC can be used only for Class I compliance, a Class II WEC only for Class II Waste Energy compliance. However, since SRECs and SREC-IIs are for "carve-outs" within Class I and are encoded at the GIS as types of Class I RECs, they can be used for non-SCO, non-SCO II, Class I Renewable Energy compliance.

**Transition provisions** were required when each new Minimum Standard was added to the original RPS. A major but temporary statutory difference between RPS Class I and the newer standards (RPS Class II and APS) was a transition mechanism designed to mitigate for Competitive Suppliers the price impact of adding the newer standards in 2009. Competitive Suppliers, unlike regulated Utilities, were unable to pass the additional compliance costs along to retail customers with whom they already had contracted to deliver electricity at prices that did not include the purchase of the newly-required Class II RECs, WECs, and AECs. A Competitive Supplier, rather than having to comply with RPS Class II or APS for its entire retail load, had to meet those standards only for the portion of its load that is served under contracts that were executed or extended on or after January 1, 2009. Accordingly, each such Supplier was required to report in its Filing to DOER the quantity of electricity delivered under pre-2009 contracts ("Exempt Load") and to subtract that amount from the total load reported for Class I, in order to ascertain the net amount on which to base its RPS Class II and APS obligations. In addition, each Supplier was required to project its Exempt Load for the next five years; these confidential data are reported in the aggregate in Section Eight, Table Eight. This exemption has declined rapidly, and only one Supplier still had a small Exempt Load in 2015, which will end sometime in 2016. Likewise, each of the two Solar Carve-Outs has been provided with multiple contract date-based transition provisions.

**Alternative Compliance Payments ("ACPs")** serve as an essential mechanism for RPS and APS compliance, increasing its flexibility. If a Supplier does not acquire sufficient certificates to meet a given Minimum Standard, then it can comply by making a payment to the Massachusetts Clean Energy Center ("MassCEC") in lieu of certificates and at a per-MWh rate specified for each Minimum Standard. This is intended, not as a penalty, but as an alternative that acknowledges that sufficient certificates for a given Minimum Standard may not always be available in the marketplace. The ACP Rate also functions, in effect, as a cap each year on the value of certificates for each Minimum Standard.<sup>20</sup>

**Banking** provides another important mechanism for RPS and APS compliance flexibility. The RPS or APS Attribute represented by a certificate that is in excess of the quantity that a Supplier needs for compliance with one of the Minimum Standards in a given Compliance Year (the same as a calendar year) can be "banked" for use towards that *same* Minimum Standard<sup>21</sup> in one of the following two Compliance Years. The total amount that a Supplier can bank is limited to no more than 30% of the amount the Supplier needs for compliance in the Compliance Year in which the surplus generation occurs, but only 10% in the case of the Solar Carve-Outs.<sup>22</sup>

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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.

<sup>20</sup> 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.

<sup>21</sup> 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.

<sup>22</sup> However, note that surplus Class II WECs from 2014 and 2015 Compliance Years cannot be banked, after which the banking limit for WECs will be 5%, instead of the former 30%, per a 2014 Class II regulatory change in 225 CMR 15.08(2)(b). Also see page 30.

The RPS and APS requirements are further detailed in the RPS and APS regulations and on DOER's RPS/APS web pages ([www.mass.gov/energy/rps](http://www.mass.gov/energy/rps)), which also explain how facilities become qualified, list all qualified facilities, explain how Suppliers annually demonstrate their compliance with RPS and APS, and provide links to the statutes and regulations and to any ongoing regulatory processes.

Late in 2014, DOER began to develop changes in the APS regulations to incorporate renewable thermal energy, pursuant to [Chapter 251 of the Acts of 2014](#). These changes would include 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. The Act mandated these to go into effect on January 1, 2015, but this diverse set of disparate technologies necessitated extensive stakeholder meetings and internal work in 2014 and 2015. [Chapter 188 of the Acts of 2016](#) further expanded the list of eligible technologies to include fuel cells and waste-to-energy thermal facilities. The rulemaking to incorporate these technologies began in Spring 2016 and is expected to be completed in the late 2017 or early 2018.<sup>23</sup>

After receiving enough applications for the Solar Carve-Out II to reach the 1,600 MW program capacity cap in February 2016, DOER filed emergency regulations for Class I on April 8, 2016. That rulemaking, which concluded on June 1, 2016, 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, outlined in the *SREC Factors Guideline* and the *SREC Extension Guideline*. DOER has since designed and promulgated a regulation establishing the framework for a new program, as required by an Act Relative to Solar Energy, which Governor Baker signed into law on April 11, 2016.<sup>24</sup> The Solar Massachusetts Renewable Target (SMART) Program is designed to create long-term, sustainable, incentives that promote cost-effective solar PV development in Massachusetts, primarily via a declining block tariff incentive framework. The SMART rulemaking commenced on June 5, 2017, with the final regulation being promulgated on August 25, 2017.<sup>25</sup> On September 12, 2017, 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. Following a DPU order approving the model tariff, the SMART Program will be fully implemented and the Solar Carve-out II Program will cease accepting new applications.

## SECTION TWO

### RPS CLASS I COMPLIANCE IN 2015

#### Summary

DOER received Compliance Filings from 59 of the 60 Retail Electricity Suppliers that provided electricity to retail customers (i.e., "served retail load") in Massachusetts during 2015. Appendix Two lists all 60, including bankrupt Glacial Energy, which did not file.<sup>26</sup> The 60 included the four investor-owned, distribution Utility companies that are regulated by the DPU and 56 Competitive Suppliers that

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<sup>23</sup> 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](#).

<sup>24</sup> "An Act Relative to Solar Energy" is at <https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter75>.

<sup>25</sup> Both the 2016 Emergency rulemaking for SCO II and the development of the new solar PV incentive are linked from [this web page](#).

<sup>26</sup> Glacial Energy of New England declared bankruptcy in 2014 and completed both its exit from the Massachusetts retail market and its corporate dissolution in July 2015, abandoning a half year's worth of RPS and APS compliance obligations valued at \$2,238,972.66 in unrealized Alternative Compliance Payments. See Appendix One in both this report and the [2014 Report](#) for details, including Glacial's unfulfilled 2015 certificate and ACP obligations for each class of RPS and APS.

were licensed by the DPU.<sup>27</sup> Ten Suppliers were new to the Massachusetts RPS market in 2015, and the two GDF Suez entities were renamed ENGIE. While six Suppliers listed for 2014 served no load in 2015, two more Suppliers exited the market during the course of 2015. In summary, 2014 began with 56 Suppliers and ended with 50, while 2015 began with 51 and ended with 58. The several types of changes during 2015 are indicated in Appendix Two by typeface, bolding, and/or footnotes.

The total supply of electricity from 2015 RPS Class I Generation (represented by Class I RECs) exceeded demand by 4%. The 2015 RPS Class I obligation for each Supplier was 10% of its retail load obligation at the NEPOOL GIS, from which the average Solar Carve-Out obligation of 2.0934% and the average Solar Carve-Out II obligation of 0.2569% were subtracted, leaving an average net Class I obligation of 7.6498%.<sup>28</sup>

Of the total compliance obligation, 99.5 % was met by Class I Renewable Generation. 86.3% came from 2015 generation, while 13.3% came from Attributes banked from 2013 and 2014 RECs that were in excess of those years' compliance obligations<sup>29</sup>. Only 0.2% was met using the Alternative Compliance Payment ("ACP") mechanism – by making ACPs to the Massachusetts Clean Energy Center ("MassCEC"). 14.2% of the RECs from 2015 generation were qualified to be Attributes banked forward for use towards Class I compliance in 2016 or 2017, as compared to 10.5 % banked forward from 2014.

Although the 2015 REC supply exceeded demand, six Suppliers did not acquire enough RECs and instead used the ACP mechanism. This non-acquisition of sufficient RECs by some Suppliers may be partly due to 47 Suppliers buying and banking surplus *beyond* their 2015 compliance needs, partly due to miscalculations, and partly due to decisions to avoid the effort of procuring very small numbers of RECs. Seven Suppliers bought exactly the quantities that they needed for compliance. Surplus RECs banked forward from 2015 significantly exceeded both the quantity banked and the ACP Credits from every one of the twelve previous years of RPS. Table One displays the compliance figures for the last six years, 2010 through 2015, while additional details are in Appendix Three, Table A.<sup>30</sup>

Note that all figures regarding the quantities and percentages of Class I RECs from different jurisdictions must be understood in the context of a regional market in which many MA-qualified Class I RECs are also qualified and can be used for the RPS compliance of several New England states. Thus, many more RECs are actually created at the NEPOOL GIS than are reflected in the 2015 RPS compliance figures. Almost 6,244,000 MA Class I RECs (including 757,012 SRECs and 192,855 SREC-IIs) were created at the NEPOOL GIS. Of that total, over 73% were submitted in the Compliance Filings; these consisted of 3,688,921 RECs for Class I, 755,018 SRECs for the Solar Carve-Out, and 125,294 SREC-IIs for the Solar Carve-Out II. Another 68,944 surplus SRECs and SREC-IIs (1% of all Class I RECs) were transferred to the Solar Credit Clearinghouse Auction accounts at the NEPOOL GIS.<sup>31</sup> About 1,453,000 RECs, over 23% of the total supply of MA-qualified Class I RECs, were settled into Suppliers' GIS subaccounts for the other New England states (mostly CT, RI, and NH) where they also qualified for RPS, presumably to be used for RPS compliance there. In addition, 41,657 RECs (less

<sup>27</sup> Regulated distribution Utilities provide electricity under "Basic Service" to those customers in their franchise territories that have not chosen to purchase electricity from Competitive Suppliers. Competitive Suppliers compete for and supply electricity to retail customers in any or all of the DPU-regulated distribution Utility territories, and each must be licensed by the DPU, per its regulations [220 CMR 11.05](#). For more information and DPU perspective about the "restructured" electricity market in which RPS and APS operate, see [this web page](#).

<sup>28</sup> The Solar Carve-Out and Solar Carve-Out II average obligations were determined by dividing the aggregated SCO and SCO-II obligations (in MWh) by the 2015 Total Retail Load without first subtracting any exempt or other contract date-based portion of the load. See footnote 35 for this year's use of "average" Minimum Standard obligations for Class I RECs, SRECs, and SREC IIs.

<sup>29</sup> The remaining 0.2% was Glacial Energy's unsubmitted ACP obligation. See footnote 26

<sup>30</sup> Figures for earlier years, beginning with 2003, are found in [earlier Annual Compliance Reports](#).

<sup>31</sup> See additional detail in Section 3, Solar Carve-Out Compliance; for the Auction, visit [this webpage](#).

than 1%) were identified in voluntary “green power product” sales.<sup>32</sup> Finally, just under 42,000 RECs were minted but not transferred at the GIS, presumably not sold by the generators.

**Table One**  
**Aggregated Data from the RPS Class I Annual Compliance Filings, 2010-2015 (MWh)**  
**(without the Solar Carve-Outs)<sup>33</sup>**

	2015	2014	2013	2012	2011	2010
<b>CY Retail Sales (= Retail Load Obligation)<sup>34</sup></b>	<b>48,009,723</b>	48,129,294	49,252,929	48,992,430	49,386,169	50,026,093
<b>CY average net Minimum Standard (% obligation)<sup>35</sup></b>	<b>7.6498%</b>	8.0081%	7.714%	6.837%	5.8373%	4.9321%
<b>CY aggregated compliance obligation<sup>36</sup></b>	<b>3,672,667</b>	3,854,245	3,799,402	3,349,611	2,882,823	2,467,336
<b>Total RECs from CY generation</b>	<b>3,688,921</b>	3,979,958	4,064,043	3,056,894	2,613,122	2,323,609
<b><i>minus</i> CY total surplus RECs</b>	<b>(520,378)</b>	(404,133)	(330,272)	(70,022)	(107,805)	(241,062)
<b>Net CY RECs for CY obligation</b>	<b>3,168,543</b>	3,575,825	3,733,771	2,986,872	2,505,317	2,082,547
<b><i>plus</i> Banked from pre-CY surpluses</b>	<b>486,857</b>	272,660	31,102	107,351	271,303	380,824
<b>Total RECs used for CY obligation</b>	<b>3,655,400</b>	3,848,485	3,764,873	3,094,223	2,776,620	2,463,371
<b><i>plus</i> Total ACP Credits</b>	<b>8,247</b>	5,719	31,642	255,388	106,203	3,965
<b>Total for compliance obligation<sup>37</sup></b>	<b>3,663,647</b>	3,854,204	3,796,515	3,349,611	2,882,823	2,467,336
<b>Surplus Attributes banked forward<sup>38</sup></b>	<b>520,378</b>	403,976	328,984	69,916	107,804	241,061
<b>ACP proceeds (rounded)</b>	<b>\$553,126</b>	<b>\$378,369</b>	<b>\$2,065,273</b>	<b>\$16,350,132</b>	<b>\$6,598,386</b>	<b>\$241,551</b>

<sup>32</sup> These Class I RECs retired as “Voluntary Renewable Energy (VRE) purchases,” from both the 2015 Filings and NEPOOL GIS Reserved Certificates Report, were reported to the Massachusetts Department of Environmental Protection (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 41,657 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<sub>2</sub> Budget Trading Program Auction Regulations, 225 CMR 13.14. More information about RGGI can be found at <http://www.rggi.org/>. The location and types of generation from which VRE was sourced in 2015 are listed in Table M in Appendix Four.

<sup>33</sup> CY is the abbreviation for Compliance Year, coterminous with 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 [earlier Annual Compliance Reports](#).

<sup>34</sup> DOER requires that each supplier use as its “retail electricity sales” the CY’s total of its “90 Day Resettlement figures” provided to the Suppliers by the regulated utilities both directly and via DOER. For additional detail, see the 5/24/12 [Guideline for Retail Electricity Suppliers on the Determination of Sales to End-use Customers for Calculating the Annual RPS Obligation](#). DOER uses the term “retail load obligation” or just “load obligation” to refer to these figures.

<sup>35</sup> The RPS Class I average net Minimum Standard obligation for each of the CYs after 2009 is calculated by subtracting from that CY’s scheduled percentage the average Solar Carve-out and (starting with 2014) the average Solar Carve-out II Minimum Standards. The RPS Class I Minimum Standard is stated as “average” because each Retail Supplier’s may differ due to the complications of the Minimum Standards for the two Solar Carve-Outs within Class I. See Sections Three and Four, as well as footnotes 49 and 62.

<sup>36</sup> Note that the figures in this row usually are a bit higher than what one would obtain by multiplying the total Retail Sales by the Minimum Standard for each year, as explained in footnote 33.

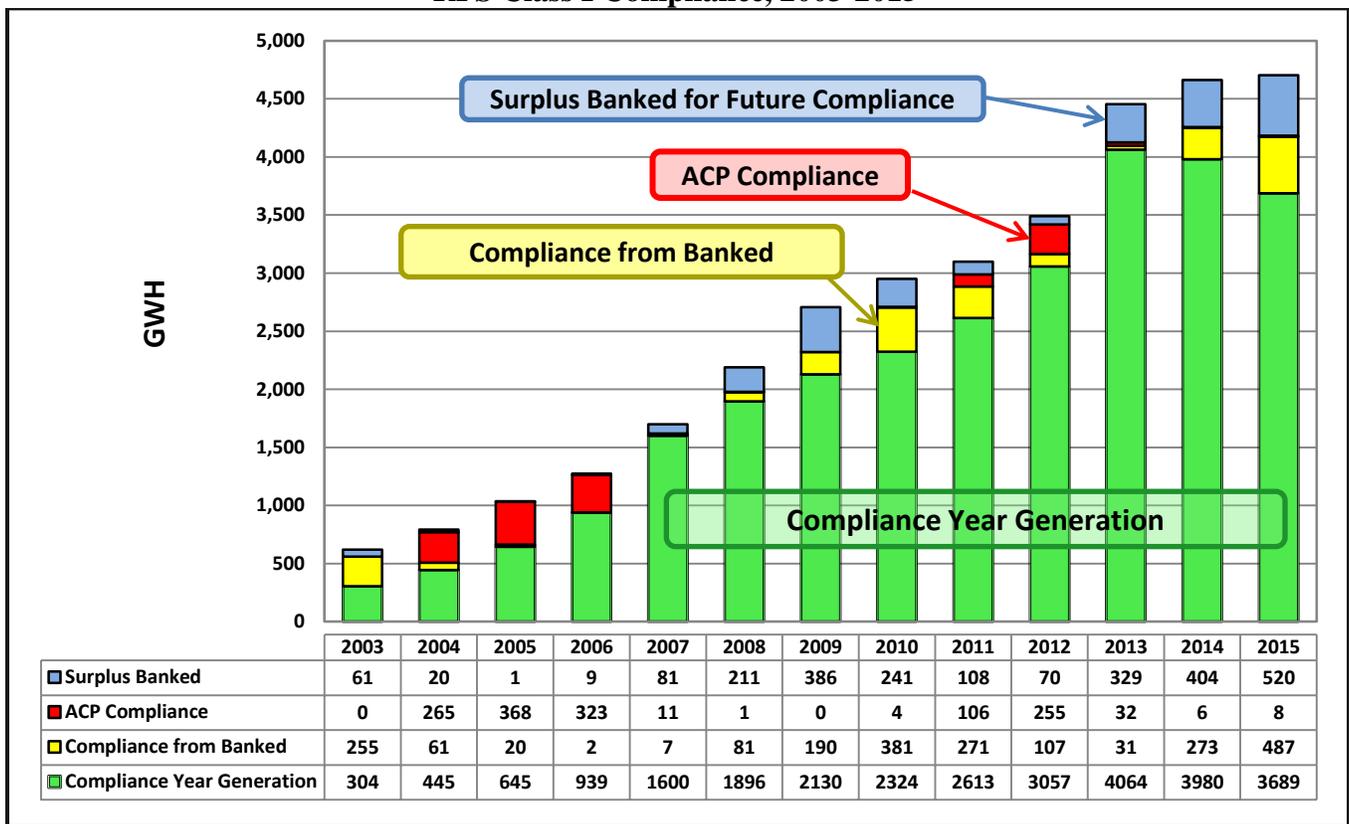
<sup>37</sup> A 920 MWh shortfall in the 2015 total resulted from Glacial Energy’s failure to make its required ACP. See footnote 26.

<sup>38</sup> The annually varying differences between the quantity of surplus Attributes (RECs) and the quantity banked are due to some Suppliers purchasing more RECs than the limit that they are permitted to bank. A Supplier cannot bank a quantity of RECs that is greater than 30% of its total RPS compliance obligation for the year in which those RECs were generated (only 10% for SRECs and SREC IIs). Banked RPS Class I RECs can be applied to compliance only with the RPS Class I obligation, not any other portfolio standard class or subclass and not the Solar Carve-Outs. However, since SRECs and SREC IIs are a type of Class I REC, those that are banked can be used for Class I compliance.

**Compliance Details**

The total retail load obligation in 2015 was 48,009,723 MWh (0.25% fewer than in 2014), for which the aggregated total of all 60 Suppliers’ average 7.6498% % obligation was 3,672,667 MWh. The Class I REC supply totaled 3,688,921 RECs from 2015 generation *plus* 486,857 MWh of Attributes banked from 2013 and 2014 surplus RECs. The combined total yielded an aggregated surplus of 520,378 RECs, which, when subtracted from that total gave a net total of 3,655,400 MWh presented for compliance. Only six Suppliers lacked enough RECs and met some of their compliance through 8,247 MWh of ACPs, totaling \$553,126 at the rate of \$67.07 per MWh.<sup>39, 40</sup> All of the 520,378 MWh surplus was eligible to be banked by 47 Suppliers for compliance use in 2016 and 2017. Except for the unpaid Glacial ACP, the aggregate figures are displayed in Table One, with more detail in Appendix Three, Table A, and Appendix Four, Tables G, H, and I.<sup>41</sup>

**Figure One  
RPS Class I Compliance, 2003-2015**



Changes in the manner of compliance during the first thirteen years of the program, 2003-15, are shown in Figure One. The initial shortage of qualified generation and RECs was mitigated in 2003 by the use of RECs bought in 2002, the so-called “Early Compliance Year”, during which generation became qualified and earned RECs for their output, but when Suppliers did not have to meet compliance obligations. After that jump-start, initial shortages are evident in the high reliance on ACPs for

<sup>39</sup> Regarding the procedures for ACP and the use of ACP funds, see 225 CMR 14.08(3) and Section Nine of this report. See the [Alternative Compliance Payment Rates webpage](#) for additional details.

<sup>40</sup> An additional 9,020 MWh of ACP, totaling \$604,971.40, was not submitted by bankrupt Glacial. See footnote 26.

<sup>41</sup> Note that the Class I tables in Appendix Four *include* all 2015 SRECs and SREC-IIs, including those used for Solar Carve-Out compliance, as well as those transferred to the Auction. However, Table One and Figure One in this subsection, as well as Table A in Appendix Three, do *not* include the Solar Carve-Outs.

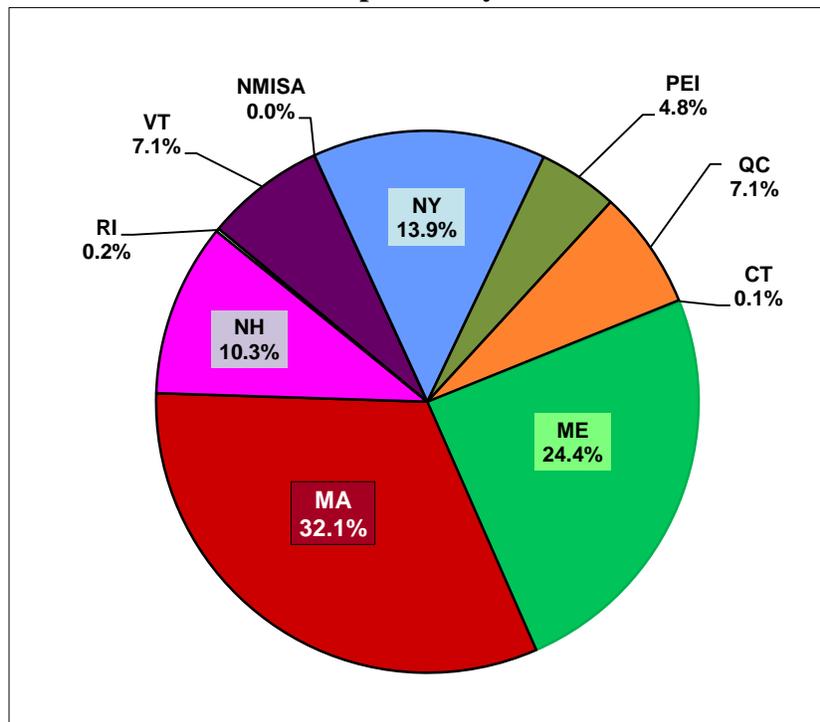
compliance during 2004-06. Next came three years of REC surpluses, 2007-09, with little or no use of ACPs for compliance. Supply was short in 2010, with Suppliers depending more heavily on the use of previously banked Attributes to help met their compliance obligations, and further shortfalls in 2011 and 2012 required a return to ACP reliance. During the subsequent three years, 2013-15, surpluses again have greatly reduced ACP reliance. Thus, the RPS obligation has succeeded in providing incentives for accelerated development of new Renewable Generation Units and the growth of a robust market in RECs in Massachusetts and the region since the original RPS regulations were issued in 2002.

**Generation Sources by Location**

The percentages of 2015 RECs from the New England states, New York, and adjacent Canadian provinces are illustrated in Figure Two.<sup>42</sup> Figure Three illustrates the thirteen year trend in the location of REC generation since 2003. Table F in Appendix Four lists the data from which these graphs were generated.

Massachusetts supplied 32.1% of the 2015 RECs presented for MA RPS Class I compliance, up from 24.1% in 2014, with almost all of the increase attributable to in-state PV projects. Although the 37.6% increase of Class I RECs and SRECs from Massachusetts projects between 2014 and 2015 is less than the 41.4% increase between 2013 and 2014, that 37.6% is still among the highest year-to-year increases since the early years of RPS. Moreover, the 2015 percentage of RECs from Massachusetts was higher than those from any other state for the second year in a row, having reached that position in 2014 for only the first time in the thirteen years of RPS.

**Figure Two**  
**2015 RPS Class I Compliance by Generator Location\***

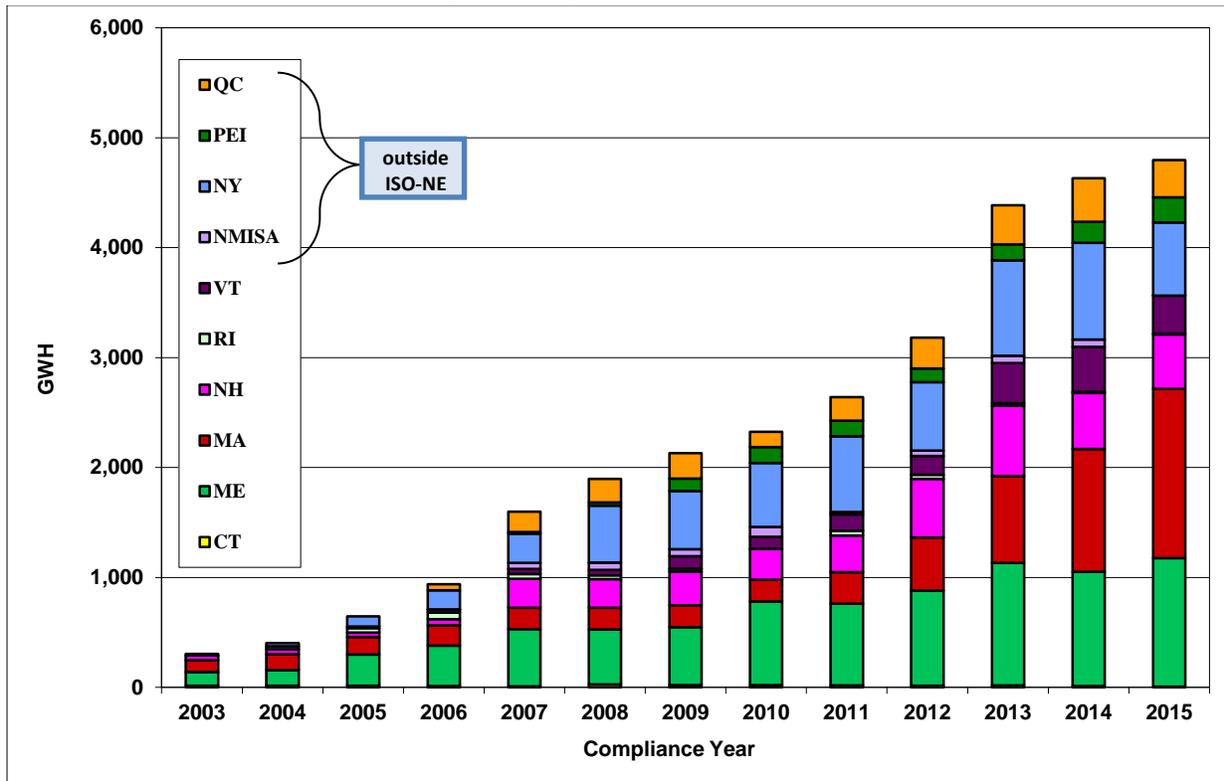


\* Includes the Solar Carve-Outs, all SRECs & SREC-IIs.

<sup>42</sup> 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, as must generation elsewhere in the Maritimes Area, as well as in the New York and Quebec control areas.

The overall quantity of Class I RECs presented for compliance rose by 3.6% from 2014 to 2015. RECs from within the ISO-NE control area rose by 25.2%, while those imported from the adjacent control areas declined by 40.1%. Within ISO-NE, the REC supply from Vermont rose by 63.5%, from Massachusetts 37.6%, and Maine 12.6%, while the supply from the other three states declined. Among imports, only RECs from NMISA rose, while those from New York and Canada all declined.

**Figure Three**  
**RPS Class I Compliance by Generator Location, 2003-2015\***



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

**Generation Sources by Type**

The percentages of 2015 RECs from the qualified types of renewable resources are illustrated in Figure Four, while Figure Five illustrates the thirteen year trend of RECs by resource type. Table G in Appendix Four lists the data from which these graphs were generated.

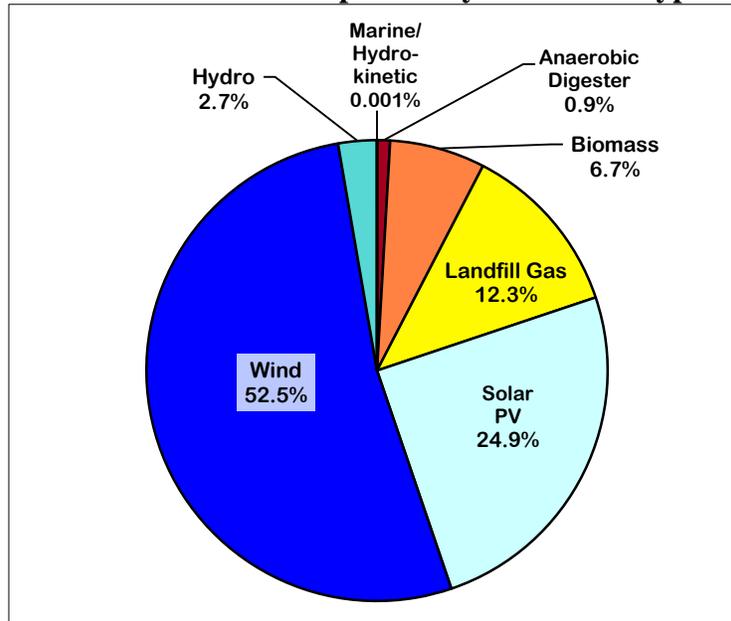
Wind power continues to be the largest source of RECs for RPS, at 52.5% of the 2015 supply. 35% of all wind RECs came from wind farms in Maine, 15% from New York, 13% from New Hampshire, and 11% from Quebec. RECs for non-ISO-NE resources are earned only on electricity actually transmitted into ISO-NE. Given the magnitude of the wind resource in New England and in adjacent control areas – DOER expects wind to continue its leading market share in the RPS.

Solar photovoltaic arrays provide the most rapidly increasing share of RECs, amounting to 24.9% of total Class I RECs in 2015. This accelerating growth has been propelled by a number of factors in the last few years, including declining equipment costs, federal and state tax incentives, federal stimulus dollars, state “net metering” policies, and, most notably, the RPS Solar Carve-Out (SCO) launched in January 2010 and SCO II launched in April 2014.<sup>43</sup> Solar generation qualified for RPS Class I (but not for the SCO or SCO II) rose from 4,120 MWh in 2010, to 10,108 MWh in 2011,

<sup>43</sup> In addition to RPS, MA has other programs helping to drive PV development. See the [Solar page](#) at DOER’s website.

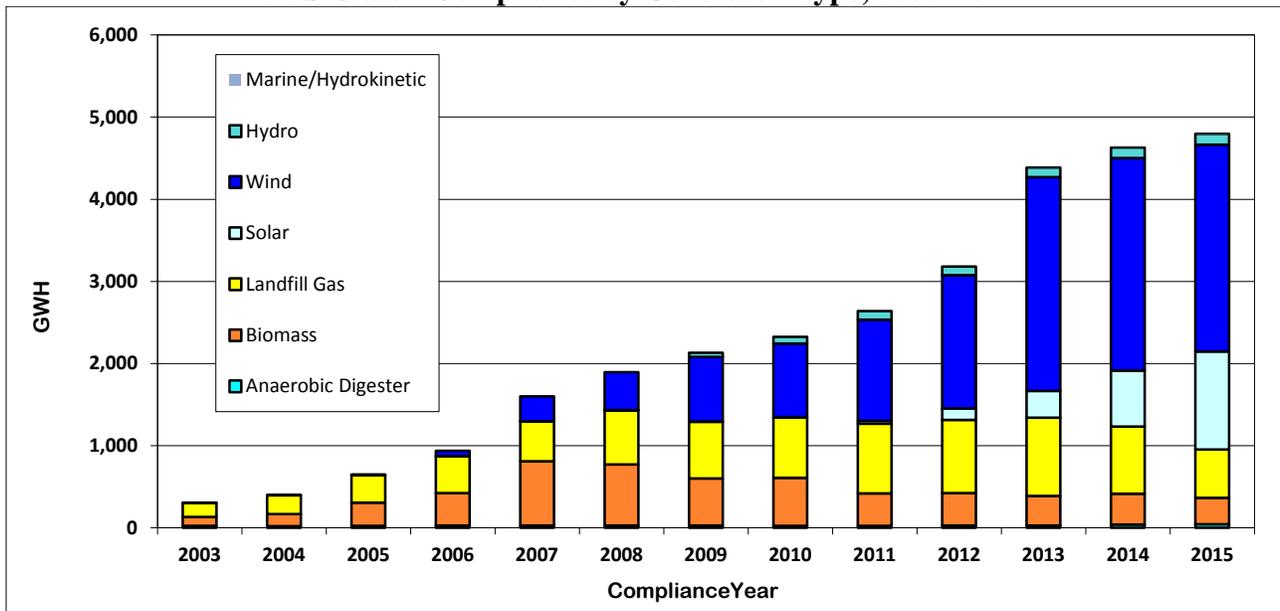
25,387 MWh in 2012, 35,220 MWh in 2013, 59,625 MWh in 2014, and 245,699 MWh in 2015<sup>44</sup>. Although the SCO and SCO II are attracting a large majority of new PV development, about 178 MW of PV have also qualified outside of the SCO for RPS Class I, of which fewer than 24 MW are located in Massachusetts and about 154 MW are located in other New England states (120 MW in Vermont alone).

**Figure Four**  
**2015 RPS Class I Compliance by Generator Type\***



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

**Figure Five**  
**RPS Class I Compliance by Generator Type, 2003-2015\***



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

<sup>44</sup> Of 1,194,925 MWh total 2015 PV RECs settled in 2015 (a 75% increase from 681,502 MWh in 2014), 756,916 MWh were SRECs, and 192,340 MWh were SREC-IIs, for a net of 245,669 MWh of Class I PV RECs. The latter is a 312% increase over the total of 59,625 MWh settled in 2014. See Sections Three and Four for more detail on SRECs and SREC-IIs.

Landfill methane was overtaken in 2015 by Solar PV as a REC source, moving down to third place at 12%. Most landfill methane RECs are from New York (51%), Massachusetts (24%), and 11% from Quebec, with the remainder coming from the other five New England states.

Non-anaerobic digestion-based biomass generation provided less than 7% of Class I RECs in 2015, almost all from Maine (62%) and New Hampshire (38%). The qualification of all of the woody biomass plants in Maine and New Hampshire ceased as of January 1, 2016 because they did not report increased energy conversion efficiencies to meet the 2012 standards for which they heretofore had been grandfathered.

Hydroelectricity was added to the qualified mix for RPS Class I in 2009, mostly from post-1997 increases in output at some older plants from capacity and efficiency upgrades. Hydroelectricity as a source of RECs has risen very slowly, still amounting to less than 3% in 2015, mostly from Maine (36%) and Vermont (32%), although hydroelectricity from Massachusetts (18%) has been increasing, and 13% comes from New Hampshire.

In 2015, 82% of the anaerobic digester<sup>45</sup> output was from Massachusetts (most from the Deer Island Treatment Plant near Boston), and 16% from Maine. Maine was the primary source of *increased* anaerobic digester RECs during the last two years.<sup>46</sup> Anaerobic digester potential exists at wastewater treatment plants and other facilities that generate organic wastes. DOER is collaborating with the Massachusetts Department of Agricultural Resource (MDAR), Massachusetts Department of Environmental Protection (MassDEP), and MassCEC to identify and encourage expanded production of digester gas and its use for electricity generation at wastewater treatment plants, food processing and food service facilities, and dairy farms.

Finally, note the slow trickle of REC supply from Marine and Hydrokinetic projects, which began in 2013 with small turbines within Massachusetts water supply conduits, a technology that has potential for future growth. One qualified tidal project on the far eastern coast of Maine generated RECs during 2012 and 2013, but they were not used for Massachusetts RPS, and the project now has a technology upgrade pending.

### SECTION THREE

#### RPS SOLAR CARVE-OUT COMPLIANCE IN 2015

The Solar Carve-Out (SCO) is a sub-set of RPS Class I that commenced in 2010, pursuant to the Green Communities Act of 2008, and was originally intended to provide incentives for 400 MW of PV to be installed within Massachusetts by 2017.<sup>47</sup> As a “carve-out”, the SCO Minimum Standard is subtracted from each year’s overall Class I Minimum Standard.

The SCO succeeded beyond expectations in attracting solar business development to Massachusetts. In fact, qualified installations surpassed the regulatory cap of 400 MW in 2013, four years ahead of the date anticipated by DOER. This was caused by a rapid acceleration of applications in the spring of 2013 as the 400 MW cap approached. 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

<sup>45</sup> See footnote 137 regarding the relationship between anaerobic digester gas and biomass in the MA RPS regulations.

<sup>46</sup> Please note that the anaerobic digester figures for 2013 and 2014 were erroneous in the original versions of the Annual Reports for those years, due to an externally-entered coding error for the Deer Island Treatment Plant. The figures have been corrected for this report.

<sup>47</sup> 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.

of 2013 to set rules for raising the cap.<sup>48</sup> Finally, in order to maintain the PV development momentum going forward, DOER subsequently began a rulemaking for a successor Solar Carve-Out II, described below in Section Four.

The modest SREC supply surpluses from compliance year generation in 2013 and 2014 have been replaced by a substantial shortfall in 2015. That shortfall occurred even while generation increased substantially due to the rapid pace of new development prior to 2015. During the 14 months from January 2015 through February 2016, the installed capacity of SCO-qualified PV increased from 619.4 MW to 653.3 MW, which became the program’s final capacity cap. The reason for the shortfall in the face of this continued increase of production is that the Solar Credit Clearinghouse Auctions for 2012 and 2013 each required all three rounds to clear, which caused sharper increases in the SCO Minimum Standards for 2015 (and again for 2016), by a mechanism explained on page 28 below. Due to the shortfall, more Banked SRECs from the prior year’s surplus were used, fewer SRECs were banked forward, and fewer were deposited into the 2015 Solar Credit Clearinghouse Auction account.<sup>49</sup>

**Table Two**  
**Aggregated Data from the Solar Carve-Out (SCO) Compliance Filings, 2010-2015 (MWh)**

	2015	2014	2013	2012	2011	2010
<b>CY Retail Sales (=Retail Load Obligation)</b>	<b>48,009,723</b>	48,129,294	49,252,929	48,992,430	49,386,169	50,026,093
<b>Average Minimum Standard<sup>50</sup></b>	<b>2.0934%</b>	0.9481%	0.2860%	0.1630%	0.1627%	0.0679%
<b>CY aggregated SCO obligation<sup>51</sup></b>	<b>1,005,024</b>	456,347	140,855	79,882	80,370	33,988
<b>Total SRECs from CY generation<sup>52</sup></b>	<b>755,018</b>	480,744	143,589	77,491	26,580	2,738
<b>minus CY total surplus SRECs</b>	<b>(12,231)</b>	(36,222)	(8,334)	(963)	(13)	0
<b>Net CY SRECs for CY obligation</b>	<b>742,787</b>	444,522	135,255	76,259	26,567	2,738
<b>plus Reminted Auction SRECs</b>	<b>220,421</b>	9	0	0	0	0
<b>plus Banked from pre-CY surpluses</b>	<b>36,161</b>	8,159	1,294	13	0	0
<b>Total SRECs used for CY obligation</b>	<b>999,369</b>	452,690	136,549	76,272	26,567	2,738
<b>plus total ACP Credits</b>	<b>3,084</b>	3,657	4,206	3,787	53,803	31,250
<b>Total for compliance obligation<sup>53</sup></b>	<b>1,002,453</b>	456,347	140,755	80,059	80,370	33,988
<b>Surplus Attributes banked forward</b>	<b>12,231</b>	36,222	8,066	961	13	0
<b>ACP proceeds (rounded)</b>	<b>\$1,529,664</b>	<b>\$553,512</b>	<b>\$306,518</b>	<b>\$245,360</b>	<b>\$23,887,474</b>	<b>\$11,682,793</b>

<sup>48</sup> The revised cap became 653.3 MW (11,789 projects), of which 647.9 MW (11,787 projects) were installed by the end of 2015. For a detailed list of SCO projects, visit <http://www.mass.gov/eea/docs/doer/rps-aps/solar-carve-out-units.xlsx>.

<sup>49</sup> Visit [this webpage](#) for information about the Solar Credit Clearinghouse Auction.

<sup>50</sup> While the Minimum Standards for 2010 through 2012 applied to all CY Retail Sales, the subsequent Standards represent the *average* resulting from the application of exemptions for certain load served under contracts entered prior to specific dates. For 2013, all load served under contracts entered into prior to June 7, 2013, was subject to a Minimum Standard of 0.2744%, while all load served under contracts entered into on or after June 7, 2013, was subject to a Minimum Standard of 0.3833%. Since such sales varied from Supplier to Supplier, DOER provides in this table the average percentage for 2013, 2.0934%, which is the aggregated SCO obligation of all Suppliers divided by the total Retail Sales. For 2014 there was no exemption. For 2015, the Minimum Standard for load served under contracts entered prior to June 28, 2013, was 1.5359%, while for load under subsequent contracts was 2.1442%. Since such sales varied from Supplier to Supplier, DOER presents here the average percentage for 2015.

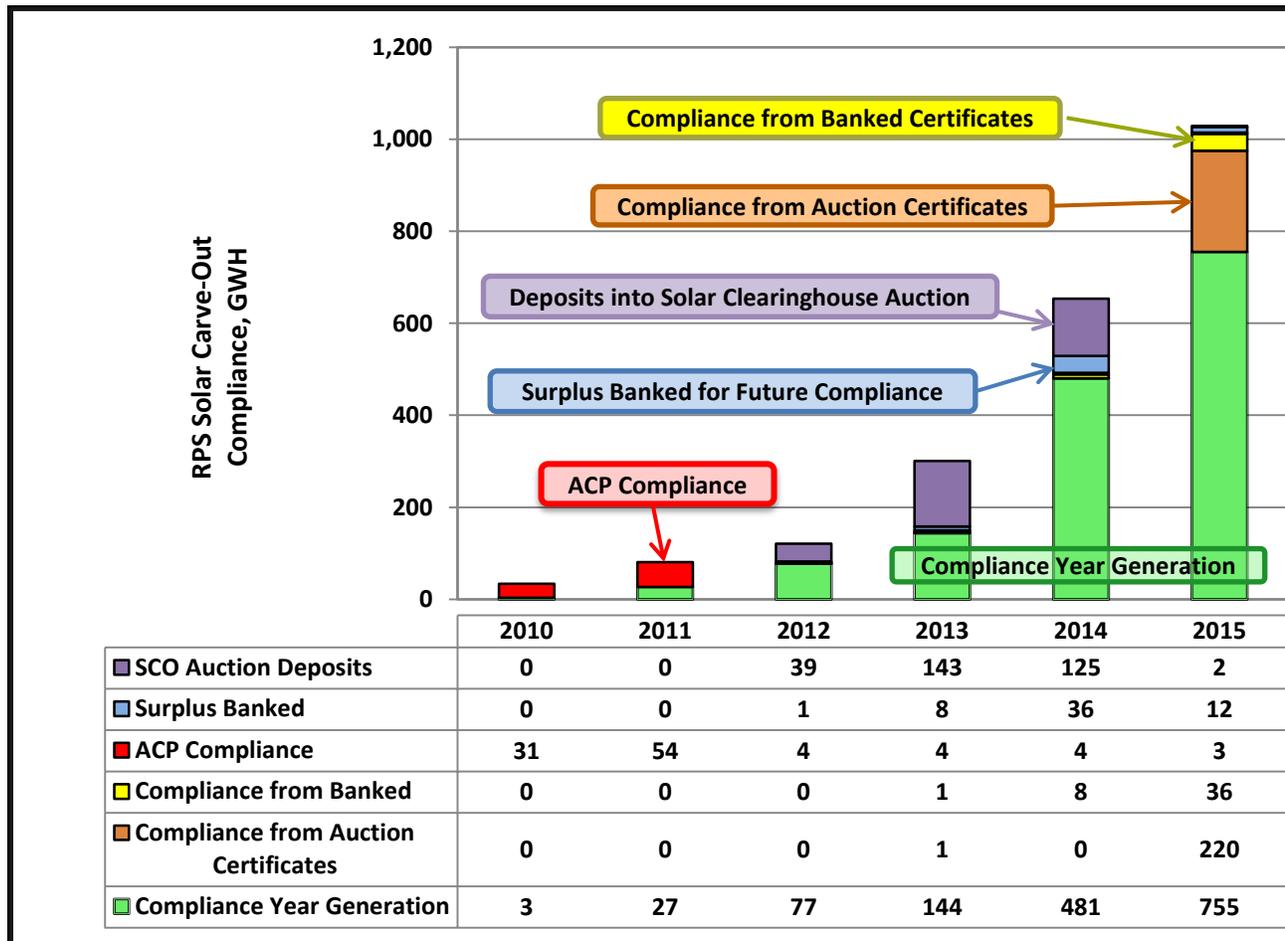
<sup>51</sup> Also, see footnote 33 regarding the difference between totaling individual obligations and calculating overall obligation.

<sup>52</sup> This figure includes only SRECs that were reported in the Filings, not those that were deposited into the SREC Auction Account, nor others that were not reported in the Filings.

<sup>53</sup> A 2,570 MWh shortfall in the 2015 total results from Glacial Energy’s ACP nonpayment. See footnote 26.

The SCO Minimum Standard for 2015 required 1,005,024 MWh of SRECs<sup>54</sup>, while the SCO-qualified PV systems yielded 757,012 MWh of SRECs in 2015. Of that total, 755,018 MWh were reported for SCO compliance, and 1,898 MWh were deposited into DOER’s Solar Credit Clearinghouse Auction account at the NEPOOL GIS. That leaves 96 SRECs unaccounted for, likely not sold by owners. Another 36,161 MWh banked from 2013 and 2014 surplus SRECs, and 220,421 Reminted Auction SRECs from 2012, 2013, and 2014 were also used for 2015 compliance. 13 Suppliers depended on ACPs to meet some or all of their SCO obligations. 12,231 MWh of SCO Attributes were banked forward by 28 Suppliers. The Filing figures are displayed in Table Two, with more detail in Appendix Three, Table B.<sup>55</sup> Changes in the manner of compliance during the first six years of the program are shown in Figure Six.

**Figure Six**  
**RPS Class I Solar Carve-Out Compliance, 2010-2015**



Of the total SCO obligation, none of the shortfall was under pre-2010 contracted load<sup>56</sup>; rather, all of the 3,084 MWh of shortfall was under retail load contracted in 2010 or later, for which the ACP

<sup>54</sup> The 2014 compliance obligation of 1,056,097 MWh, when divided by the 2013 Retail Load Obligation was 2.1442%, was set by the methodology outlined at <http://www.mass.gov/eea/docs/doer/rps/ma-rps-solar-carve-out-determination-of-cv2015-min-std.pdf>, per 225 CMR 14.07(2)(a). However, due to a lower total Retail Load Obligation in 2014 than in 2012 and each Supplier rounding up any fractional MWh of its individual SREC obligation, the aggregated total needed for compliance was ultimately 1,005,024 MWh.

<sup>55</sup> Only bankrupt Glacial’s unpaid ACP is omitted from the table. See footnote 26.

<sup>56</sup> Per regulations, any supply shortfall under pre-2010 contracts incurred an ACP rate equal to the Class I ACP rate in order not to burden Competitive Suppliers that priced such contracts without relevant prior knowledge of the Solar Carve-Out obligations.

totaled \$1,529,664 at the \$496/MWh rate. In addition, however, an ACP of \$1,274,720 for 3,570 MWh was not received from bankrupt Glacial.<sup>57</sup>

DOER administered its fourth Solar Carve-Out Clearinghouse Auction, for SRECs minted in 2015. The Auction required only one round, held on July 29, 2016, in which a total bid volume of 49,886 was received from 41 individual bidders, and all 1,898 deposited SRECs were sold to the bidders by an apportionate method. All SRECs were sold to bidders at the \$300/MWh auction price, and depositors were paid \$285/MWh for each SREC deposited. The 2015 Reminted Auction SRECs can be used for SCO compliance through CY 2017.

## SECTION FOUR RPS SOLAR CARVE-OUT II COMPLIANCE IN 2015

2015 was the second year for compliance under the Solar Carve-Out II Minimum Standard established by revised regulations for RPS Class I promulgated on April 25, 2014, following more than a year of both internal and contracted analysis, stakeholder discussions, and a formal rulemaking. The Solar Carve-Out II Minimum Standard within RPS Class I set a capacity cap for qualified solar carve-out installations at 1,600 MW in the state, inclusive of the prior Solar Carve-Out capacity (653.3 MW), with a goal of reaching that overall cap by 2020. The Solar Carve-Out II differs from the Solar Carve-Out in the creation of “Market Sectors” and “SREC Factors” for qualifying projects. Under the Solar Carve-Out II, the highest incentive, namely an SREC Factor of one SREC-II per MWh of output, is given to small (25 kW or less) projects, solar canopies, community shared solar, projects providing 100% of their power to low income housing, and emergency power sites. The Solar Carve-Out II gives slightly lower SREC Factors to larger building-mounted projects, those that mostly serve an on-site load, and those built on eligible landfills and qualified “brownfields”. “Greenfield” projects that are over 650 kW and export the majority of their power to the grid receive the lowest incentive (0.7 SREC per MWh of output) and must be assigned capacity space in the “annual capacity blocks” in the Managed Growth sector.<sup>58</sup> As a result of these SREC Factors, the total number of SREC-IIs minted at the NEPOOL GIS is lower than the total MWh actually generated by the SCO II PV systems. For additional details, see the [Solar Carve-Out II web pages](#) especially the [About the Solar Carve-Out II Program](#) page.<sup>59</sup>

The new SCO II Minimum Standard applies only to retail load served under contracts on or after its April 25, 2014, date of promulgation, exempting load served under prior contracts. This is consistent with the Exempt Load provision in effect for RPS Class II and APS and is reflected in Section Eight’s Table Ten.

For 2015, the Minimum Standard was calculated<sup>60</sup> to be 0.3288% of each Supplier’s non-exempt Retail Load Obligation. As shown in Table Three, the net load for SCO II compliance in 2015 was 37,493,621, so 123,317 SREC-IIs were required for compliance. Due to rapid growth of installed capacity since its 2014 start-up, the newly-qualified PV systems generated 192,855 SREC-IIs, of which 67,046 were deposited into the Solar Carve-Out Clearinghouse Auction. Of the remainder, 125,294 were presented for compliance, of which a modest 3,021 were surplus, and 515 are unaccounted for. Of the 60 Suppliers, 43 met their full obligations by acquiring sufficient SREC-IIs, with 27 of them banking forward a combined surplus of 3,018 SREC-IIs. The surplus notwithstanding, 16 Suppliers were short

<sup>57</sup> See footnote 26

<sup>58</sup> See [Minimum Standard Adjustments, SREC Factors, and ACP Rates](#), as well as [Current Status of the Solar Carve-Out II Program](#) for more details.

<sup>59</sup> More information on the SCO II stakeholder and rulemaking process is at the linked [Historical Development of the Solar Carve-Out II webpage](#). The regulatory provisions specific to the SREC-II are mostly in 225 CMR 14.05(9) and 14.05(7)(3), here.

<sup>60</sup> See 225 CMR 14.07(3), especially (3)(a) and (3)(c).

by a total of 629 SRECs and met their obligations by the Alternative Compliance mechanism, that is, by making ACPs to the MassCEC at the rate of \$350 per MWh, totaling \$235,875. Glacial’s unrealized ACP was \$148,125 for its 395 MWh obligation.<sup>61</sup> Except for that one unpaid ACP, these figures are displayed in Table Three; more detail is in Appendix Three, Table C.

**Table Three**  
**Aggregated Data from the Solar Carve-Out II (SCO II) Compliance Filings, 2014-2015 (MWh)**

	2015	2014
<b>CY Retail Sales (=Retail Load Obligation)</b>	<b>48,009,723</b>	48,129,294
<b>Exempt Load<sup>62</sup></b>	<b>10,516,104</b>	23,163,408
<b>Net Load</b>	<b>37,493,621</b>	24,965,886
<b>Minimum Standard<sup>63</sup></b>	<b>0.3288%</b>	0.0843%
<b>CY aggregated SCO II obligation<sup>64</sup></b>	<b>123,317</b>	21,076
<b>Total SREC-IIs from CY generation<sup>65</sup></b>	<b>125,294</b>	15,633
<b>minus CY total surplus SREC-IIs</b>	<b>(3,021)</b>	(187)
<b>Net CY SREC-IIs for CY obligation</b>	<b>122,273</b>	15,446
<b>plus Banked from pre-CY surpluses</b>	<b>20</b>	0
<b>Total SREC-IIs used for CY obligation</b>	<b>122,293</b>	15,446
<b>plus total ACP Credits</b>	<b>629</b>	5,476
<b>Total for compliance obligation<sup>66</sup></b>	<b>122,922</b>	20,922
<b>Surplus Attributes banked forward</b>	<b>3,018</b>	21
<b>ACP proceeds (rounded)</b>	<b>\$235,875</b>	\$2,115,001

In February 2016, DOER had received enough applications to reach the 1,600 MW program capacity cap and responded in April by filing [Emergency regulations](#) to extend the program. Subsequent steps are recounted in the last paragraph of Section Two of this report.

## SECTION FIVE

### RPS CLASS II RENEWABLE ENERGY COMPLIANCE IN 2015

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 and Massachusetts waste energy plants. RPS Class II Renewable Energy is generated by the same resources and technologies as Class I, with one exception: hydroelectric plants in Class II are limited to 7.5 MW (vs. 30 MW in Class I), pursuant to the *Competitively Priced Electricity Act of 2012*.<sup>67</sup>

<sup>61</sup> The 395 MWh shortfall in the 2015 total resulted from Glacial Energy’s failure to make its required ACP. See footnote 26.

<sup>62</sup> The SCO-II Minimum Standard does not apply to load served under contracts entered or extended on before April 25, 2014, per 225 CMR 14.07(3)(b). See Table Ten in Section 8 for the projected amount of SCO-II Exempt Load, as aggregated from the 2015 Filings.

<sup>63</sup> The *average* SCO II Minimum Standard of 0.2569%, which is used along with the average SCO Minimum Standard to derive the “average net Minimum Standard” in the Class I Table, is obtained by dividing the aggregated SCO II obligation by the *total* Retail Sales.

<sup>64</sup> Also, see footnote 33 regarding the difference between totaling individual obligations and calculating overall obligation.

<sup>65</sup> This figure includes only SREC-IIs that were reported in the Filings, not those that were deposited into the SREC-II Auction Account at the NEPOOL GIS, nor others that were not reported in the Filings.

<sup>66</sup> This is 395 MWh short of the obligation due to Glacial Energy’s nonpayment of ACP. See footnote 26.

<sup>67</sup> See footnote 9 for more information about hydroelectric eligibility and for a link to the 2012 Act.

Because only pre-1998 plants can qualify for Class II, and because the quantity of pre-1998 renewable energy generation that DOER originally had projected to qualify did not materialize during the early years of the program, Class II Renewable Energy experienced very high REC shortfalls and costly reliance on the ACP mechanism. DOER reacted with a 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, following which the Standard is set annually by a formula that responds to changing market conditions. The expected results of these changes were reflected in 2013 and 2014 by significantly reduced dependence on the ACP mechanism and increased banking, but that was modestly reversed for 2015 as supply growth failed to keep pace with the Minimum Standard increase.

**Table Four**  
**Aggregated Data from the RPS Class II Renewable Energy**  
**Compliance Filings, 2010-2015 (MWh)**

	2015	2014	2013	2012	2011	2010
<b>CY Retail Sales (=Retail Load obligation)</b>	<b>48,009,723</b>	48,129,294	49,252,929	48,992,430	49,386,169	50,026,093
<b>Exempt Load<sup>68</sup></b>	<b>34,578</b>	79,801	973,011	1,584,015	3,799,666	8,233,703
<b>Net Load</b>	<b>47,975,145</b>	48,049,493	48,279,918	47,408,415	45,586,504	41,792,390
<b>Minimum Standard</b>	<b>2.00%</b>	1.75%	1.5%	3.6%	3.6%	3.6%
<b>CY aggregated obligation<sup>69</sup></b>	<b>959,531</b>	840,893	724,222	1,706,727	1,641,134	1,504,544
<b>Total Class II RECs from CY generation</b>	<b>539,399</b>	526,415	509,609	246,665	236,472	103,837
<b>minus CY total surplus Class II RECs</b>	<b>(18,488)</b>	(62,401)	(167,874)	(874)	(1,757)	(63)
<b>Net CY RECs for CY obligation</b>	<b>520,911</b>	464,014	351,735	245,791	234,715	103,774
<b>plus Banked from pre-CY surpluses</b>	<b>102,901</b>	104,498	919	1,739	63	653
<b>Total Class II RECs used for CY obligation</b>	<b>623,812</b>	568,512	342,654	247,530	234,778	104,427
<b>plus total ACP Credits</b>	<b>333,322</b>	268,337	381,007	1,459,197	1,406,356	1,400,117
<b>Total for compliance obligation<sup>70</sup></b>	<b>957,134</b>	836,849	723,661	1,706,727	1,641,134	1,504,544
<b>Surplus Attributes banked forward<sup>71</sup></b>	<b>18,288</b>	42,035	167,874	874	1,749	63
<b>ACP proceeds (rounded)</b>	<b>\$9,176,355</b>	\$7,288,033	\$10,207,169	\$38,347,723	\$35,862,072	\$35,002,925

Except for the unpaid ACP by Glacial Energy, the aggregate figures for 2015 compliance are displayed in Table Four, with more detail in Table D of Appendix Three, and in Tables J and K of Appendix Four. The data for 2015 indicate that, while a large shortage of qualified Class II Renewable Energy generation continued, it had declined substantially in 2013 and 2014 but increased a bit in 2015. Overall, dependence on the ACP mechanism has been much reduced since the first four years of the program, 2009-2012. In addition, the continuing shortfall provides support for at least some additional pre-1998 plants to qualify for Class II benefits, mainly older hydropower plants achieving certification by the Low Impact Hydropower Institute. Another factor in the continuing shortfall is the settlement of 15% of all available MA Class II RECs in other New England states, about 67% of those in Connecticut

<sup>68</sup> See the Transition provisions paragraph on page 8 in Section Three for an explanation of Exempt and Net Load, which pertain to the compliance obligation calculations only of Competitive Suppliers..

<sup>69</sup> See footnote 33 regarding the difference between totaling individual obligations and calculating an overall obligation.

<sup>70</sup> The 2,397 MWh shortfall resulted from bankrupt Glacial Energy's failure to make its required ACP. See footnote 26.

<sup>71</sup> Any surplus RPS Class II Attributes (MWh of qualified surplus RECs) beyond the 30% banking limit can be applied to compliance only with the RPS Class II Renewable Energy obligation, not any other portfolio standard. See footnote 38 regarding the 30% limit and the difference between surplus and banked.REC quantities.

and over 28% in New Hampshire, which reduced the quantity available for MA RPS Class II.<sup>72</sup> In 2015, the net (non-Exempt) load<sup>73</sup> for the Class II Renewable Energy obligation was 47,975,145 MWh, and the total of all 60 Suppliers' 2.0% Class II Renewable Energy obligations was 959,531 MWh. Class II RECs available for Class II compliance, almost all from New England hydroelectric plants, were well short of the demand. Eighteen Suppliers met their full obligations by acquiring RECs, with eleven of them having a combined surplus of 18,488 (of which only 18,288 could be banked forward). The total of 539,399 MWh of 2015 RECs, plus 102,901 RECs banked from 2013 and 2014 banked surplus, minus the 18,488 surplus RECs, yielded 623,812 RECs for 2015 compliance. That net total amounted to 65% of the total Class II Renewable Energy obligation. Of the remaining obligation, 333,322 MWh (34.7%) was met by the Alternative Compliance mechanism, that is, by making ACPs to the MassCEC at the rate of \$27.53 per MWh, totaling \$9,176,354.66. An additional 2,397 MWh of ACP, totaling \$65,989, was not received from bankrupt Glacial Energy.<sup>74</sup>

## SECTION SIX

### RPS CLASS II WASTE ENERGY COMPLIANCE IN 2015

RPS Class II Waste Energy is a separate sub-class within RPS Class II. This means that each Supplier must comply separately with both the Renewable Energy subclass and the Waste Energy subclass. Qualification is limited to plants that meet the MassDEP regulations for such facilities.<sup>75</sup> The MassDEP regulations, in addition to provisions for municipal solid waste handling, emissions, etc., provide for enhanced sorting and recycling and for the owner of each plant to remit to the MassDEP 50% of the proceeds from selling its RPS Class II WECs. The MassDEP uses those funds to help finance municipal recycling programs.

In 2015, the net (non-Exempt) load for the Class II Waste Energy obligation was 47,975,145 MWh, and the total of the 60 Suppliers' 3.5% Class II Waste Energy obligations was 1,679,161 MWh. The Suppliers acquired 1,620,112 WECs, which, combined with the use of 53,440 Attributes banked from 2013 surplus WECs, yielded for some of the Suppliers a surplus of 12,231 WECs and a shortfall of 17,120 WECs. Due to a temporary moratorium on WEC banking for 2014 and 2015, none of the surplus could be banked towards future Class II Waste Energy compliance. Seven Suppliers acquired no WECs, and 16 others failed to purchase enough WECs. 22 of those 23 Suppliers met their total shortfall of 17,120 WECs by making ACPs to the MassCEC at the ACP rate of \$11.01 per MWh, for total payments of \$188,491.20. An additional \$46,186.95 for 4,195 MWh of ACP was not received from bankrupt Glacial Energy<sup>76</sup>. Except for that unpaid ACP, these figures are displayed in Table Five, with more detail in Appendix Three, Table E.

Although these data appear to indicate a shortage of WECs, the actual WECs created at the NEPOOL GIS during 2015 totaled 1,784,550.<sup>77</sup> That means a WEC supply surplus existed, but 164,438 WECs (9% of the available WECs) were not sold to Suppliers by the two generation owners. That is fewer than the 343,090 WECs that had been left unsold for 2014 compliance.

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<sup>72</sup> The percentages of MA Class II RECs settled in other states are based on data in a confidential Regulator's Report at the NEPOOL GIS.

<sup>73</sup> See the discussion of Exempt Load for RPS Class II and APS above, on page 8.

<sup>74</sup> See footnote 26 and Appendix One,

<sup>75</sup> The MassDEP regulations are in 310 CMR 7.08(2) and 310 CMR 19.000.

<sup>76</sup> See footnote 26 and Appendix One.

<sup>77</sup> See the NEPOOL GIS public report, [Number of Certificates by RPS Eligibility, annual ,2015](#)

**Table Five**  
**Aggregated Data from the RPS Class II Waste Energy Compliance Filings, 2010-2015 (MWh)**

	2015	2014	2013	2012	2011	2010
<b>CY Retail Sales (=Retail Load obligation)</b>	<b>48,009,723</b>	48,129,294	49,252,929	48,992,430	49,386,169	50,026,093
<b>Exempt Load<sup>78</sup></b>	<b>34,578</b>	79,801	973,011	1,584,015	3,799,666	8,233,703
<b>Net Load</b>	<b>47,975,145</b>	48,049,493	48,279,918	47,408,415	45,586,504	41,792,390
<b>CY aggregated WEC obligation, at 3.5%<sup>79</sup></b>	<b>1,679,161</b>	1,681,759	1,689,821	1,659,318	1,595,546	1,462,750
<b>Total WECs from CY generation</b>	<b>1,620,112</b>	1,440,670	1,703,780	1,710,117	1,568,127	1,378,219
<b><i>minus</i> CY total surplus WECs</b>	<b>(15,706)</b>	(13,873)	(307,868)	(282,023)	(212,565)	(251,554)
<b>Net CY WECs for CY obligation</b>	<b>1,604,406</b>	1,426,797	1,395,912	1,428,094	1,355,562	1,126,665
<b><i>plus</i> Banked from pre-CY surpluses</b>	<b>53,440</b>	251,993	278,771	207,057	237,620	330,288
<b>Total WECs used for CY obligation</b>	<b>1,657,846</b>	1,678,790	1,674,682	1,635,151	1,593,182	1,456,953
<b><i>plus</i> total ACP Credits</b>	<b>17,120</b>	2,968	13,828	24,167	2,364	5,797
<b>Total for compliance obligation<sup>80</sup></b>	<b>1,674,966</b>	1,681,758	1,688,511	1,659,318	1,595,546	1,462,750
<b>Surplus WE Attributes banked forward<sup>81</sup></b>	<b>0</b>	0	305,433	278,990	207,041	237,667
<b>ACP proceeds (rounded)</b>	<b>\$188,491</b>	<b>\$32,232</b>	<b>\$148,236</b>	<b>\$253,993</b>	<b>\$24,113</b>	<b>\$57,970</b>

Note that, in order to eliminate what DOER had earlier concluded to be a permanent and inherently large WEC surplus that Suppliers, on average, were carrying forward from year to year (see Table Five), DOER enacted through its 2014 RPS Class II rulemaking a banking moratorium for Compliance Years 2014 and 2015, and lowered the subsequent banking limit from 30% to 5% thereafter.

## SECTION SEVEN

### APS ALTERNATIVE ENERGY COMPLIANCE IN 2015<sup>82</sup>

The Alternative Energy Portfolio Standard (APS) is an obligation mandated under the Green Communities Act of 2008. The APS is designed to support certain “alternative” electric power system technologies that largely do not utilize renewable energy resources and that the legislators deemed worthy of support. That support takes the form of financial incentives provided by an energy portfolio standard on the model of RPS. Each Supplier must comply separately with both APS and RPS.

In 2015, the net (non-Exempt) load for the APS obligation was 47,975,145 MWh, for which the 60 Suppliers’ 3.75% APS obligations totaled 1,799,094 MWh. To comply with that obligation, Suppliers purchased 894,602 AECs<sup>83</sup> and used 261 AECs banked from 2014 surplus, for a net total of 894,863 AECs, from which ten Suppliers banked all 2,869 of their surplus AECs. A net shortfall of 902,605 AECs was met by 44 of the Suppliers by making ACPs to the MassCEC at the rate of \$22.02

<sup>78</sup> See footnote 68 regarding Exempt and Net Load, which pertain to the compliance obligation calculations only of Competitive Suppliers.

<sup>79</sup> See footnote 33 regarding the difference between totaling individual obligations and calculating an overall obligation.

<sup>80</sup> A 4,195 MWh shortfall for 2015 resulted from bankrupt Glacial Energy’s failure to make its required ACP. See footnote 26.

<sup>81</sup> Any surplus RPS Class II Waste Energy Attributes (measured as quantities of qualified surplus WECs) can be applied to future compliance only with the RPS Class II Waste Energy obligation, not any other portfolio standard. However, per the 2014 Class II rulemaking, no WECs can be banked from 2014 or 2015 surplus. When banking resumes with the 2016 Compliance Year, the limit will be 5% of each Supplier’s total WE obligation for the year of the surplus, not the former 30%.

<sup>82</sup> See page 7 in Section One and footnote 16 for a description of the APS, an explanation of how AECs are determined for CHP plants, and a reference for further details.

<sup>83</sup> A total of 894,704 AECs were minted at the NEPOOL GIS, so only 102 AECs were left unsold to Suppliers.

per MWh, for a total of \$19,875,362.10. An additional 4,495 MWh of ACP, totaling \$98,979.90, was not paid by bankrupt Glacial<sup>84</sup>. Except for that one unpaid ACP, these figures are displayed in Table Six; more detail is in Appendix Three, Table F, and in Appendix Four, Table L.

**Table Six**  
**Aggregated Data from the APS Compliance Filings, 2010-2015 (MWh)**

	2015	2014	2013	2012	2011	2010
<b>CY Retail Sales (=Retail Load Obligation)</b>	<b>48,009,723</b>	48,129,294	49,252,929	48,992,430	49,386,169	50,026,093
<b>Exempt Load<sup>85</sup></b>	<b>34,578</b>	79,801	973,011	1,584,015	3,799,666	8,233,703
<b>Net Load</b>	<b>47,975,145</b>	48,049,493	48,279,918	47,408,416	45,586,504	41,792,390
<i>Minimum Standard<sup>86</sup></i>	<i>3.75%</i>	<i>3.5%</i>	<i>3.0%</i>	<i>2.5%</i>	<i>2.0%</i>	<i>1.5%</i>
<b>Aggregated APS obligation</b>	<b>1,799,094</b>	1,681,759	1,448,421	1,185,236	911,748	626,902
<b>Total AECs from CY Generation</b>	<b>894,602</b>	831,080	531,781	351,179	324,922	227,134
<i>minus CY total surplus AECs</i>	<i>(2,869)</i>	<i>(261)</i>	<i>(7,347)</i>	<i>(1,239)</i>	<i>(7,636)</i>	<i>(520)</i>
<b>Net CY AECs for CY obligation</b>	<b>891,733</b>	830,819	524,434	349,940	317,286	226,614
<i>plus banked from pre-CY surpluses</i>	<i>261</i>	7,347	1,239	7,635	515	8,818
<b>Total AECs used for CY obligation</b>	<b>891,994</b>	838,166	525,673	357,575	317,801	235,432
<i>plus total ACP credits</i>	<i>902,605</i>	835,505	921,626	827,661	593,947	391,470
<b>Total for compliance obligation<sup>87</sup></b>	<b>1,794,599</b>	1,673,671	1,447,299	1,185,236	911,748	626,902
<b>Surplus APS Attributes banked forward</b>	<b>2,869</b>	261	7,347	1,239	7,636	515
<b>ACP proceeds (rounded)</b>	<b>\$19,875,362</b>	<b>\$18,147,169</b>	<b>\$19,750,452</b>	<b>\$17,397,429</b>	<b>\$12,116,514</b>	<b>\$7,829,400</b>

## SECTION EIGHT

### PROJECTION OF FUTURE RPS AND APS COMPLIANCE OBLIGATIONS AND SUPPLY

DOER provides here one possible scenario for the future RPS and APS compliance obligations through 2021. This scenario is based on the ISO-NE “reference case” for load growth in the *2016 CELT Report*,<sup>88</sup> following the approach of the RPS/APS Annual Compliance Reports for 2009 through 2014. However, the *2015* and *2016 CELT Reports* have differed from earlier *CELT Reports* by their inclusion of ISO-NE’s forecast of PV generation in the wholesale market and of generation imbedded behind the meter. PV is now included, along with Energy Efficiency, in the forecast beyond the Forward Capacity Market of 2019-20.<sup>89</sup> The ISO-NE expects summer peak electricity demand over the 2016-25 period to grow only 0.2% annually, while electricity consumption is expected to remain flat or decline. Note that these forecasts always assume normal weather and economic drivers, so that the actual electricity consumption for any given year may differ to the extent that the weather and the economy deviate from those assumed norms.

In general, any scenario is determined by one’s choice of assumptions, which can be subject to substantial uncertainty. Important variables affecting electricity consumption include (a) weather

<sup>84</sup> See footnote 26 and Appendix One.

<sup>85</sup> See footnote 68 regarding Exempt and Net Load, which pertain to the compliance obligation calculations only of Competitive Suppliers.

<sup>86</sup> See footnote 33 regarding the difference between totaling individual obligations and calculating an overall obligation.

<sup>87</sup> A 4,495 MWh shortfall for 2015 resulted from Glacial Energy’s failure to make its required ACP. See footnote 26.

<sup>88</sup> The ISO-NE figures are from Tab 2, column AM (“GROSS-PV- PDR”) in the *2016 CELT Report* document titled “Forecast Data 2016”, dated 4/29/2016, which is listed at <http://www.iso-ne.com/system-planning/system-plans-studies/celt>.

<sup>89</sup> This ISO forecast is the culmination of efforts by the ISO and stakeholders to develop an “Energy-Efficiency and PV Forecast” that recognizes increasing investment and penetration of these resources.

(especially temperature), (b) regional and national economic conditions, (c) the degree of success in implementing energy efficiency programs, (d) the growth of behind-the-meter generation, and, sometime in the future, (e) the degree of electric vehicle penetration into the market. Presenting a single scenario offers simplicity but misrepresents the degree of uncertainty in these variables. Rather than developing multiple load scenarios, which is outside the scope of this report, DOER chose to base its RPS reference case on the ISO-NE 2016 *CELT Report* forecast. Other analysts can easily replace the CELT forecast with other ISO-NE scenarios or with non-ISO alternative scenarios to see the effect of various assumptions on the RPS and APS obligations.

Table Seven lists both the actual (2010-2015) and projected (2016-2021) total retail sales, as “retail load obligations”<sup>90</sup>, and the resulting actual and projected RPS Class I obligations. The RPS Class I percentage obligations (the Minimum Standard) increase as specified in the statute and regulations. This table provides figures only through 2021, although the annual RPS Class I obligation continues increasing indefinitely. Note that the 2015 projected load obligation in the previous report was 837,571 GWh higher than the 2015 figure in this report, which lowers all post-2015 projections. This serves as a reminder that the projections can have a fairly wide range of reliability.

**Table Seven**  
**MA RPS Class I Annual Retail Load & Compliance Obligations (% & MWh),**  
**Actual (2010-2015) & Projected (2016-2021)**<sup>91</sup>

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
2010	50,026,093	5.0%	2,501,305	33,988	N/A	33,988	2,467,317	4.9321%
2011	49,386,169	6.0%	3,007,569	80,370	N/A	80,370	2,927,199	5.8373%
2012	48,992,430	7.0%	3,429,493	79,882	N/A	79,882	3,349,611	6.8370%
2013	49,252,929	8.0%	3,940,234	140,801	N/A	140,801	3,799,434	7.7141%
2014	48,129,294	9.0%	4,331,636	456,347	21,039	477,353	3,854,245	8.0081%
2015	<b>48,009,723</b>	10.0%	4,800,972	<b>1,005,024</b>	<b>123,317</b>	<b>1,128,341</b>	<b>3,672,631</b>	<b>7.6498%</b>
2016	48,030,025	11.0%	5,283,303	834,586	340,080	1,174,666	4,108,637	8.5543%
2017	47,860,302	12.0%	5,743,236	778,668	917,691	1,696,359	4,046,877	8.4556%
2018	47,670,277	13.0%	6,197,136	TBD	TBD	TBD	TBD	TBD
2019	47,580,137	14.0%	6,661,219	TBD	TBD	TBD	TBD	TBD
2020	47,283,730	15.0%	7,092,560	TBD	TBD	TBD	TBD	TBD
2021	47,046,605	16.0%	7,527,457	TBD	TBD	TBD	TBD	TBD

Figure Seven shows DOER’s projection for the growth in demand for RECs by the “premium” RPS mandates of the five New England states that have similar, albeit not identical, mandates for new renewable energy generation. Those mandates consist of the CT RPS Class I, ME RPS, NH RPS Classes I and II, VT Renewable Energy Standard Tier II (beginning in 2017), and the mandate for new

<sup>90</sup> See explanation and reference in footnote 34 regarding the use of “retail load obligation” for “retail sales.”

<sup>91</sup> The actual figures through 2015 are from RPS annual compliance filings. The retail load obligation projections starting in 2016 are based on the ISO-NE load growth projections in its *CELT Report* (see footnotes 88 and 89), with 14% of the total Massachusetts load attributable to the RPS/APS-exempt municipally owned companies netted out. In this table, the SREC and SREC-II annual obligations are deducted from the total Class I obligations to show the net Class I REC obligations. The SREC and SREC II obligations take into account actual and projected exempt loads and Minimum Standards that are based on retail contract dates; for details on these nuances, see the spreadsheets linked from the [RPS & APS Minimum Standards page](#), as well as Tables Nine and Ten.

facilities in the RI Renewable Energy Standard.<sup>92</sup> The projections for all of the states are based on ISO-NE load growth projections cited above.<sup>93</sup> It should be noted that all of these standards are subject to change by statute or regulation in their respective states. Finally, note that the MA Class I in this graph includes its two solar carve-outs.

**Figure Seven**  
**New England Premium RPS Compliance Obligations by State,**  
**Actual (2010-2015) & Projected (2016-2021)**

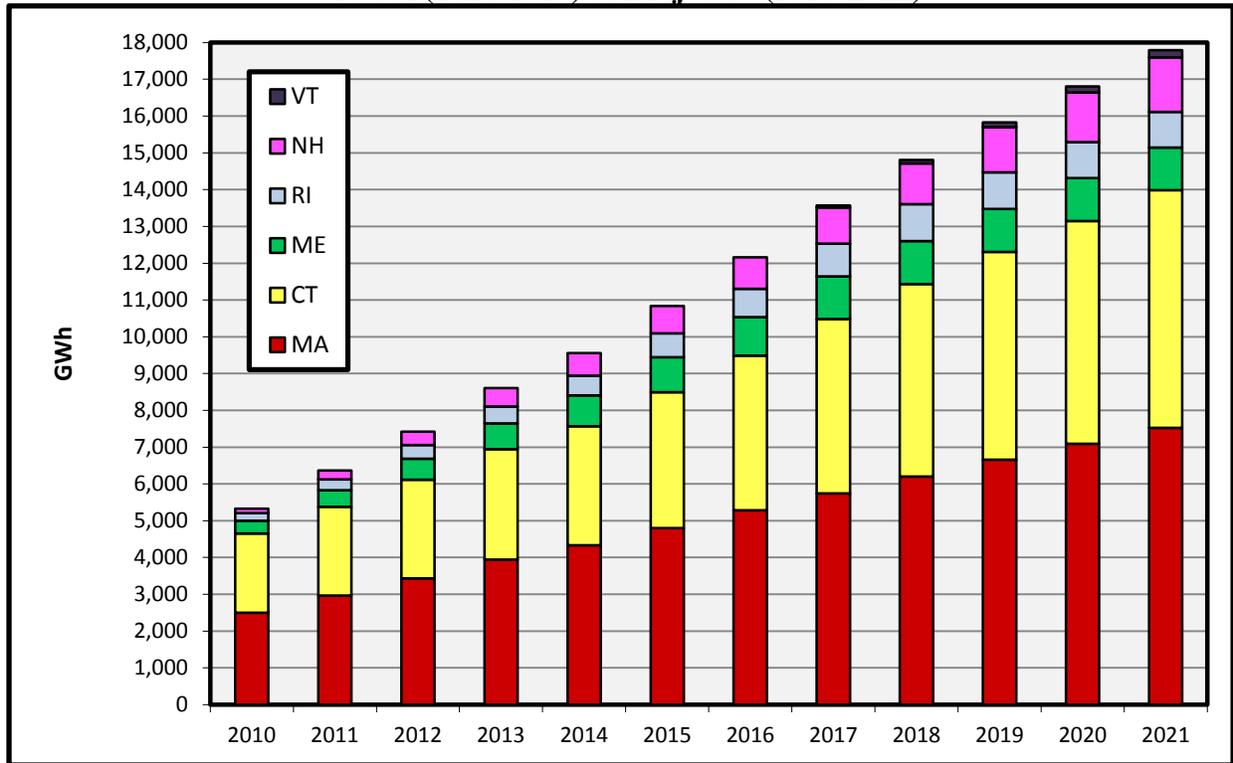


Table Eight lists the 2009-2015 actual retail load obligations for RPS Class II and APS, and retail load obligations projected for 2016 through 2021 (although, like Class I, the standards continue beyond that year). The total load obligation for each year is listed first and is identical to the figures in Table Seven. However, as explained in on page 7, electricity sold under pre-2009 contracts is exempt from the Class II and APS standards. Thus, the projected Exempt Loads provided by Suppliers are then deducted to yield the net load obligations. Note that DOER now expects 2016 to be the last year affected by this Exempt Load, according to data in the 2015 Filings.

Table Eight next multiplies the net load for each year by the mandated percentage standards. The standard does not rise annually for Class II Waste Energy, since that is for a known, fixed number and capacity of qualified pre-1998 plants. The standard does rise annually for APS, and, effective for 2013, the Class II Renewable Energy standard was lowered and subsequently began to rise annually, per a method detailed in the 2014 revised Regulations<sup>94</sup>.

<sup>92</sup> The other programs are summarized at <http://programs.dsireusa.org/system/program1> Apply filters to find the RPS in particular states.  
<sup>93</sup> See footnote 88 for the source of ISO-NE figures.  
<sup>94</sup> See the second paragraph of Section Five for an explanation of this regulatory change.

**Table Eight**  
**MA RPS Class II & APS Annual Retail Load & Compliance Obligations, Net of Exempt Load, Actual (2009-2015) & Projected (2016-2021), in MWh<sup>95</sup>**

Year	Actual/ Projected Load Obligation <sup>96</sup>	Actual/ Projected Exempt Load Obligation	Actual/ Projected Net Load Obligation	RPS Class II REC Minimum Standard	RPS Class II RECs as % of Net Load Obligation	RPS Class II WECs at 3.5% of Net Load Obligation	APS Minimum Standard	APS AECs Obligation
2009	48,301,821	31,918,771	16,383,050	3.6%	589,801	574,368	1.00%	163,844
2010	50,026,093	8,233,703	41,792,391	3.6%	1,504,526	1,462,734	1.50%	626,886
2011	49,386,169	3,799,666	45,586,504	3.6%	1,641,114	1,595,528	2.00%	911,730
2012	48,992,430	1,584,015	47,408,416	3.6%	1,706,727	1,659,318	2.50%	1,185,236
2013	49,252,929	973,011	48,279,918	1.50%	724,222	1,689,821	3.00%	1,448,421
2014	48,129,294	79,801	48,049,493	1.75%	840,866	1,681,732	3.50%	1,681,732
2015	<b>48,009,723</b>	<b>34,578</b>	<b>47,975,145</b>	<b>2.00%</b>	<b>959,503</b>	<b>1,679,130</b>	<b>3.75%</b>	<b>1,799,068</b>
2016	48,030,025	8,566	48,021,459	2.5319%	1,215,855	1,680,751	4.00%	1,920,858
2017	47,860,302	0	47,860,302	2.5909%	1,240,013	1,675,111	4.25%	2,034,063
2018	47,670,277	0	47,670,277	2.6155%	1,246,816	1,668,460	4.50%	2,145,162
2019	47,580,137	0	47,580,137	TBD	TBD	1,665,305	4.75%	2,260,056
2020	47,283,730	0	47,283,730	TBD	TBD	1,654,931	5.00%	2,364,187
2021	47,046,605	0	47,046,605	TBD	TBD	1,646,631	5.25%	2,469,947

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 certainly not limited to the following:

- continued uncertainties in the broader national and global economies;
- renewable energy and climate policies, regulations, and incentives at the federal level;
- changes in the pipeline infrastructure, supply, and price of natural gas, which fuels most conventional electricity generation that competes with generation from renewable resources;
- generation installations resulting from the clean energy RFPs that have been or are expected to be issued by certain New England States, especially solar farms, onshore and offshore wind farms, and hydroelectric plants – both in-region and adjacent regions – which could include large, RPS-*ineligible* hydropower;<sup>97</sup>
- approval and installation of new electricity transmission lines to link large wind farms in northern New England and adjacent Canadian provinces to load centers in southern New England;
- decisions by owners of New York windfarms, whose NYSERDA RPS contracts are scheduled to end over the next ten years and are *not* supported during the next several years under Tier 2 of the new NY Clean Energy Standard (subject to change), with regard to the option of exporting power to ISO New England and earning RECs in the Massachusetts and other state RPS markets;

<sup>95</sup> Each of the REC, WEC, and AEC obligations for each year is the total of all the individual obligations in that year and, due to consistent upward rounding, is greater than the result of multiplying the total load obligation by the Minimum Standard.

<sup>96</sup> The Load Obligation projections here are the same those for RPS Class I in Table Seven. See explanation and reference in footnote 34 regarding the use of “load obligation” for “retail sales.”

<sup>97</sup> The statutory authority for this long term clean energy RFP is Section 83A of the Green Communities Act of 2008 as amended by [Chapter 209 of the Acts of 2012](#), Section 36. See the [Clean Energy RFP website](#) for more information.

- development of anaerobic digester gas projects supplied from agricultural, food processing, food service, and wastewater treatment facilities, for which Massachusetts provides incentives;
- the continued development of in-state solar PV under the SMART Program;<sup>98</sup> and
- interaction between the RPS Class I Minimum Standard and the Clean Energy Standard regulation recently promulgated by the MassDEP.<sup>99</sup>

Accelerated solar PV development began to show up in the RPS market in 2010 and has been increasing rapidly since then. DOER expects further strong growth in the years ahead, boosted by the Solar Carve-Out II that commenced in 2014, the [Solar Loan Program announced by Governor Charlie Baker on December 17, 2015](#),<sup>100</sup> the new SMART Program,<sup>101</sup> and favorable equipment and installation cost trends. The December 2015 extension of the federal Investment Tax Credit will also provide additional incentives for solar PV into the next decade.

The 2012 changes in the RPS Class I eligibility of woody biomass fueled plants introduced challenging, overall efficiency requirements on the development of new biomass projects and should focus development activities on technologies such as CHP. Although the new standards did not apply to already qualified plants until 2016 (except for sustainable fuel sourcing, which was effective as of 2013), several qualified plants in northern New England already had ceased operation or reduced output well before 2013 in reaction to the decline in electricity prices from lower natural gas prices and softening electricity demand. As expected, all except one of the biomass plants that were temporarily grandfathered from the efficiency requirements of the new standards became unqualified at the end of 2015, which will further reduce the quantity of woody biomass-sourced RPS Class I RECs available to the market in 2016 and probably for some time thereafter.

The **Solar Carve-Out** returned to an SREC supply shortfall in 2015 after three years of surplus generation, 2012-2014, which had followed shortfalls in the two ramp-up years of the SCO, 2010-2011. In 2011, 26,598 MWh of SRECs were generated, followed by 118,356 in 2012, 300,816 in 2013, 605,969 in 2014, and 757,012 in 2015. The dramatic increase in generation through 2014 was the result of a rapid increase in installed capacity (12 MW installed in 2010, 39 MW in 2011, 135 MW in 2012, and 230 MW in 2013) reacting to the attractive incentives of the program, but that ramp-up slowed when the capacity cap was reached and then breached in 2013, and only another 215 MW were added in 2014, 27 MW in 2015, and the final 5.9 MW in February of 2016.

Although the output in 2015 was 25% higher than in 2014, the Minimum Standard more than doubled. This was the result of two consecutive years (2012 & 2013) of the Solar Credit Clearinghouse Auction requiring all three rounds before clearing. When that occurred, the volume of certificates deposited into the auction were added to the following year's compliance obligation twice. This mechanism was designed to (a) ensure that there is adequate demand for the auction to clear and (b) encourage retail Suppliers to place bids in earlier rounds of the auction to avoid a large demand increase that exceeds available supply.

The price of SRECs and the cost of the Solar Carve-Out had been affected in the past by, among other things, the relative amounts of the retail load that are under pre-2010 contracts and contracts entered or revised on or after January 1, 2010, for SREC shortfalls under which different ACP rates applied. However, that factor ended in 2015, when only one Supplier served a small remaining load of

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<sup>98</sup> See footnote 101.

<sup>99</sup> See the [MassDEP Clean Energy Standard webpage](#).

<sup>100</sup> For information on the Solar Loan Program, visit these two pages: [here](#) and [www.masssolarloan.com](http://www.masssolarloan.com).

<sup>101</sup> See [Chapter 75 of the Acts of 2016](#) and DOER's webpage, [Development of the Next Solar Incentive](#).

34,577 MWh under pre-2010 contracts; that Supplier had no SREC shortfall and did not need to use the ACP. Therefore, DOER is no longer presenting this data in a table and is no longer tracking this data.<sup>102</sup>

As of 2015, in addition to the supply/demand balance, the price of SRECs and the cost of the SCO are affected, instead, by the relative amounts of the retail load that are under contracts prior to June 28, 2013, and contracts entered or revised on or after that date (see Table Nine), for SREC shortfalls under which different Minimum Standard percentages apply. For 2015, those percentages were, respectively 1.5359% & 2.1142%. Those percentages declined for 2016 to 0.9801% & 1.7568%, 0.9861% & 1.6313% for 2017, and will be 1.1411% & 1.7903% for 2018.<sup>103</sup>

**Table Nine**  
**MA Solar Carve-Out Loads Served under Pre-June 28, 2013 & More Recent Retail Contracts, Actual (2015) & Projected (2016-2021), in MWh<sup>104</sup>**

<b>Year</b>	<b>Actual/Projected Total Load Obligation</b>	<b>Load Served under pre-6/28/13 Retail Contracts, Actual/Projected</b>	<b>Load Served under later Retail Contracts, Actual/Projected</b>
<b>2015</b>	<b>48,009,723</b>	<b>4,019,550</b>	<b>43,990,173</b>
<b>2016</b>	<i>48,030,025</i>	<i>1,405,437</i>	<i>46,624,588</i>
<b>2017</b>	<i>47,860,302</i>	<i>456,458</i>	<i>47,403,843</i>
<b>2018</b>	<i>47,670,277</i>	<i>109,134</i>	<i>47,561,143</i>
<b>2019</b>	<i>47,580,137</i>	<i>26,585</i>	<i>47,553,552</i>
<b>2020</b>	<i>47,283,730</i>	<i>23,155</i>	<i>47,260,575</i>
<b>2021</b>	<i>48,030,025</i>	<i>TBD</i>	<i>TBD</i>

The **Solar Carve-Out II** commenced on April 25, 2014, providing the incentive for continued PV development, and projects are getting qualified and implemented at a rapid pace. In 2014 and most of 2015, the speed has been driven, in part, by the impending end of the federal Investment Tax Credit. In 2014, 94.9 MW of qualified capacity came on line, while more than 286.9 MW came on line in 2015, 456.5 in 2016, and 257.6 in the first eight months of 2017, continuing the SCO’s PV development pace of 2013-14. Further rapid supply growth is expected, especially with the late 2015 extension of the federal investment tax credit and further extensions to the program. While only 15,908 SREC-IIs were generated in 2014, the rapid installation rate in 2014 and 2015 led to the generation of 192,855 SREC-IIs in 2015, which resulted in a significant market oversupply in 2015. Continued expansion of the program led to another significant market oversupply in 2016.

Demand for SREC-IIs is affected over the next few years by the “exempt load” provisions in the regulations, meant to avoid any undue penalty for Suppliers’ retail contracts already in force when this Minimum Standard became effective. Since the program officially started on April 25, 2014, partway into the Compliance Year, the regulations provided that all retail load under contracts on or before that date would be exempt from Solar Carve-Out II compliance. Supplier-projected exempt load estimates are shown in Table Ten.

<sup>102</sup> See Table Ten in the [RPS & APS Annual Compliance Report for 2014](#) for the pre-2015 data.

<sup>103</sup> See SCO Minimum Standard calculations here: <http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out/current-status-of-the-rps-solar-carve-out-program.html>.

<sup>104</sup> Also see footnote 50 regarding ways in which the Minimum Standard may differ in relation to the amounts of retail load served under different contract dates.

**Table Ten**  
**MA Solar Carve-Out II Loads Served under Pre-April 25, 2014 and More Recent**  
**Retail Contracts, Actual (2014-2015) & Projected (2016-2021), in MWh<sup>105</sup>**

Year	Total Retail Load Obligation	Load served under pre-4/25/14 Retail Contracts	Net Retail Load Obligation
2014	48,129,294	23,171,635	24,957,659
2015	<b>48,847,294</b>	<b>10,516,104</b>	<b>37,493,619</b>
2016	48,030,025	4,804,203	43,225,821
2017	47,860,302	2,563,914	45,296,387
2018	47,670,277	1,352,100	46,318,177
2019	47,580,137	972,225	46,607,912
2020	47,283,730	213,852	47,069,878
2021	47,046,605	TBD	TBD

Emergency regulations on April 8, 2016, expanded the total size of the program. It also provided, effective with Compliance Year 2017, for three Minimum Standards: one for load served under contracts dated for contracts entered after April 25, 2014, and on or before May 8, 2016, and a higher one for load served under contracts entered after May 8, 2016.<sup>106</sup>

**Class II RECs** have been in short supply since the beginning of this Minimum Standard in 2009. The absolutely limiting fact is that the total pre-1998 installed capacity cannot rise, but some additional *portion* of that capacity is expected to qualify for Class II over time. The unknown factors for future supply are (a) how *much* of that capacity, mostly from hydroelectric plants, will succeed in the future to meet the MA RPS Class II environmental criteria, and (b) how much of the MA Class II REC qualified or qualifiable supply will be used for compliance with classes of RPS in *other* New England states for which they are also qualified and some of which have higher ACP rates for pre-1998 capacity. The percentage of such loss to other states, mostly Connecticut and New Hampshire, for 2010 through 2015 has been 19%, 24%, 28%, 16%, 19%, and 15% respectively.<sup>107</sup>

**Class II WECs** are likely to remain in surplus for another year or two, while the net load obligation rises toward rough parity with the annual supply. The desired approach to parity has been undermined heretofore by the effects of considerable banking forward of WECs prior to expiration of the Exempt Load. By means of the Class II rulemaking that concluded on June 20, 2014, DOER instituted a two year hiatus in banking (2014-2015), during which the quantity of already-banked WEC attributes has become zero (by compliance use or expiration). When banking resumes as of 2016, it will be limited to 5% of a Supplier’s WEC obligation, not the original 30%. Although DOER expects the Exempt Load to reach zero by 2017 or earlier, the projected slow decline in total retail load after 2016 may result in a slowly growing surplus of potentially available WECs. While the two owners of the Waste Energy facilities could limit the actual availability of WECs in the market, the new 5% banking limit would prevent the total quantity of WECs available for each year’s compliance from rising to more than a small fraction of its former amount.

**APS AECs** are supplied almost entirely by CHP systems. In 2015, the output of AECs was less than 8% more than in 2014. However, the APS CHP program continues to experience a substantial

<sup>105</sup> Also see footnote 50 regarding ways in which the Minimum Standard may differ in relation to the amounts of retail load served under different contract dates.

<sup>106</sup> See the Minimum Standards links from this [web page](#).

<sup>107</sup> The percentages of MA Class II RECs settled in other states are based on data in a confidential Regulator’s Report at the NEPOOL GIS..

growth in the number of large CHP projects that either were completed in late 2015 and began generating AECs in 2016 *or* are now under construction and will be generating AECs some time in 2017. The growing supply of AECs will have to chase a load obligation that is also growing, the latter due to the end of the Exempt Load in 2017 and the continuing annual increase in the Minimum Standard, even though the latter has been rising by only 0.25% per year since 2014 instead of the former 0.5%.

Two developments will impact the future the AEC supply. One is that the actually used thermal output of municipal solid waste fueled plants electricity and the used thermal energy generated by fuel cells were recognized as eligible for APS qualification by Chapter 188 of the Acts of 2016. The other is that Chapter 251 of the Acts of 2014 mandated DOER to add a suite of renewable thermal technologies to the APS<sup>108</sup>. DOER began in November of 2014 to develop what proved to be a technically challenging new standard and expects to complete the process in late 2017 or early 2018.<sup>109</sup> Thereafter, DOER anticipates the generation of AECs from projects of a wide range of sizes utilizing solar thermal systems, woody biomass thermal equipment, heat pumps, liquid biofuels, and other qualifying technologies to provide heating or cooling energy to buildings, water, and industrial processes. AECs from renewable thermal, waste-to-energy thermal, and fuel cell projects are expected to provide increasing shares of the AEC supply demanded for the rising APS Minimum Standard during the years ahead, even while CHP development continues.

## SECTION NINE USES OF THE ALTERNATIVE COMPLIANCE PAYMENT FUNDS

The Alternative Compliance mechanism for meeting RPS and APS obligations in CY 2015 resulted in total ACP proceeds of more than \$31 million, as detailed in Table Eleven. This total is about \$3 million more than in 2014. Below are observations on this increase and on general ACP trends.

- **RPS Class I:** After two years of undersupply and higher ACPs in 2011 and 2012, the supply rebounded robustly in 2013 (especially from wind projects), and PV generation continued accelerating, which reduced the use of ACPs during 2013 through 2015. DOER expects the use of ACP to continue to remain fairly low as the two Solar Carve-Outs continue to cut into the overall Class I compliance obligation, additional projects selected under the multi-state clean Energy RFP begin to come online, and as overall electricity sales by the Suppliers is reduced by both (a) aggressive development of PV and other distributed generation and (b) continued adoption of energy efficiency measures in Massachusetts and other New England states.<sup>110</sup>
- **RPS Class I Solar-Carve Out:** The high ACP total in 2010 and 2011 were due to the commencement of this obligation in 2010 and the delay of supply emerging from the PV development pipeline. However, rapidly accelerating development of PV arrays was more than enough to eliminate the shortfall and resulted in a market oversupply and minimal use of ACP for 2012, a trend that continued through 2014, meeting DOER's expectations. However, for reasons noted on page 28, a small shortage developed in 2015, which is not expected to continue in 2016 and beyond as supply and demand should remain relatively balanced going forward.
- **RPS Class I Solar-Carve Out II:** While a significant ACP total was expected for the 2014 start-up year of this obligation, the much reduced ACPs for 2015 resulted from a rapid acceleration of project applications, qualifications, and installations. It is expected that the market will continue to be significantly oversupplied in 2016 and there should be little reliance on ACP in the near future.

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<sup>108</sup> This statute is at (<https://malegislature.gov/Laws/SessionLaws/Acts/2014/Chapter251>).

<sup>109</sup> The process for revising the APS Regulations, 225 CMR 16.00, is detailed at [this web page](#).

<sup>110</sup> See footnote 97 for information about the Clean Energy RFP.

- **RPS Class II Renewable Energy:** The shortage and concomitant use of ACPs are due to continued technical and financial issues for hydropower plants, especially a preference for settling certificates in the RPS programs of other New England states on the part of some owners of generation units that are qualified or could qualify for MA RPS Class II. That preference is due to differences between the programs with regard to eligibility standards and REC prices.<sup>111</sup> The use of ACPs declined substantially for 2013 and for 2014, due to DOER’s sharp downward revision in the Minimum Standard through a 2014 rulemaking that was applicable for CY 2013, as well as a doubling of qualified hydropower output in 2013. However, the annual supply increase has been slow since 2013 while the Minimum Standard has been rising, and the ACP level consequently rebounded for 2015.
- **RPS Class II Waste Energy:** There should be little or no need for the ACP mechanism, due to the continued oversupply of WECs until the Exempt Load disappears in 2017. However, after two years of ACP decline for 2013-14, the use of ACP rebounded for 2015, when 164,438 WECs of 2015 vintage were not sold by owners of the seven Generation Units. Thus, although there really is no need for ACP, the actual behavior of individual market participants may perpetuate at least some use of the ACP mechanism and may prevent WEC prices from falling very low.
- **APS:** The annually increasing ACP totals through 2015 have been due to an increased non-Exempt retail load subject to the obligation (noted above for Class II), combined with annual increases in the Minimum Standard AEC obligation and a slow movement of projects through the development pipeline. However, the large supply shortfall and dependence on ACPs should likely decline over the coming years, assisted by generally flat or declining electricity demand, by a smaller annual Minimum Standard increase that began in 2015 – 0.25% per year instead of 0.5% – and by entry into the market of AECs from renewable thermal, waste-to-energy thermal, and fuel cell projects, which will become eligible in 2017. Continued increases in the adoption rate of CHP should also contribute to this turnaround.

**Table Eleven**  
**ACP Proceeds per Portfolio Standard, 2010-2015**  
**(rounded to the nearest dollar)**

<b>Program/Class</b>	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>2010</b>
RPS Class I	\$ 553,126	\$ 378,369	\$ 2,065,273	\$ 16,350,132	\$ 6,598,386	\$ 241,551
RPS Class I Solar Carve-Out	\$ 1,529,664	\$ 553,512	\$ 306,518	\$ 245,360	\$ 23,887,474	\$ 11,682,793
RPS Class I Solar Carve-Out II	\$ 235,875	\$ 2,115,001	N/A	N/A	N/A	N/A
RPS Class II Renewable Energy	\$ 9,176,355	\$ 7,288,033	\$ 10,207,169	\$ 38,347,727	\$ 35,862,072	\$ 35,002,925
RPS Class II Waste Energy	\$ 188,491	\$ 32,232	\$ 148,236	\$ 253,993	\$ 24,113	\$ 57,970
APS (Alternative Energy)	\$ 19,875,362	\$ 18,147,169	\$ 19,750,452	\$ 17,397,429	\$ 12,116,514	\$ 7,829,400
<b>Total<sup>112</sup></b>	<b>\$ 31,558,873</b>	<b>\$ 28,514,316</b>	<b>\$ 32,477,648</b>	<b>\$ 72,594,641</b>	<b>\$ 78,488,558</b>	<b>\$ 54,814,638</b>

The proceeds from Alternative Compliance Payments are held and spent in accordance with the RPS and APS statutes and regulations, as follows. The funds are held in an account at the Massachusetts Clean Energy Center ([MassCEC](#)) that is separate from other funds of the MassCEC. Expenditure of the ACP funds by the MassCEC is overseen by DOER under the terms of agreements between the two entities and under any limitations specified in the regulations.<sup>113</sup> The regulations provide that the expenditure of ACP funds from RPS Class I and the Solar Carve-Out must “further the

<sup>111</sup> For more extensive discussion, see DOER’s 12/31/12 report to the Legislature: [Evaluation of the Massachusetts RPS Class II Program](#).

<sup>112</sup> Each of the totals, as rounded, is correct.

<sup>113</sup> 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).

commercial development of RPS Class I Renewable Generation Units and Solar Carve-Out Renewable Generation Units,” while 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 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.

*ACP Spending Plans* for prior years dating back to 2010 have been made available at the [Annual Compliance Reports page](#), accessible via DOER’s [RPS & APS homepage](#). Any future *Plans* also will be posted there when they are ready.

## APPENDIX ONE

### RPS and APS 2015 Compliance Filings, Review, and Verification

All Suppliers that sold retail electricity to end-use customers in the territories of the four Massachusetts regulated utilities during 2015 were required to submit their Annual Compliance Filings for 2015 by Friday, July 1, 2016. DOER had issued forms and instructions for the Filings on May 31, 2016, just over two weeks before the June 15th end of the NEPOOL GIS trading period for the fourth quarter of 2015. By the evening of July 1<sup>st</sup> DOER had received emailed Filings from all four regulated utilities and from 55 of the 56 Competitive Suppliers. DOER did not receive a Filing from Glacial Energy of New England, a complicated and serious matter that is discussed in the last paragraph, below.

The review encompassed both printed and electronic copies of Filers' compliance tables and GIS spreadsheet reports. The electronic files enabled DOER to aggregate, analyze, and summarize the information in the Filings, while the printed versions of GIS reports were available to verify the electronic versions of those reports. DOER contacted a bit over than half of the Suppliers for corrected or additional information, documentation, explanations, and clarifications. The most common error was failure to complete Tables 1B and 1C, and some did not complete some Tables in tabs 2 and 3; all of these relate to the two Solar Carve-outs. Several Filers sent incorrectly formatted GIS reports, as usual, but immediately replaced them upon notification. There was almost no confusion regarding what to do with surplus SRECs and SREC-IIs; Suppliers now realize the value of transferring them to the SCC Auction Account at the GIS, from which they were all sold in the first round as Reminted Auction SRECs with a two year shelf life. However, the value difference notwithstanding, one Supplier did use 56 SREC-IIs for non-SCO Class I compliance. The revised method for ascertaining annual compliance, introduced for 2011 and depending on good cooperation from the regulated utilities, continues proving its value in simplifying the task of Suppliers in calculating their obligations. Finally, the worksheet that calculates ACP obligations, introduced for 2014, continues to prove its worth by preventing both miscalculations and improper rounding.

One Supplier, Glacial Energy of New England, Inc., had declared bankruptcy in the spring of 2014 and finally ceased to exist and to serve load on July 13, 2015. Glacial's load had been sold to Agera Energy, LLC, via Platinum Partners in June of 2014. Agera applied for competitive supplier licenses in some states where Glacial operated, with the stated intention of assuming Glacial's retail contracts. Its license application for Massachusetts was submitted September 24, 2014, and approved April 3, 2015. Review of the legal documents led DOER to concur with Agera that the new owner could not be held responsible for the regulatory obligations of the Glacial retail load until the date that the load itself was transferred to Agera, which did not occur until July 13, 2015. No longer in existence after that date, Glacial neither submitted a Filing and nor remitted the required ACPs to cover its RPS and APS compliance obligations for 2015. DOER found that Glacial's retail load obligations (as obtained from the regulated utilities) held about steady through July but then declined sharply in August. DOER determined that Agera was responsible for Glacial's load as of July 13. To avoid getting into the minutiae of daily and hourly load data, DOER calculated 19/31 of Glacial's July load and assigned it to Agera along with the August load in a letter on May 17, with the option (not taken) for Agera to dispute the assignment. Agera incorporated that portion of the Glacial load into its own, and fulfilled the resultant RPS and APS obligations that otherwise would not have been met at all, since Glacial no longer existed. The following recounts Glacial's unmet Certificate and unpaid ACP obligations, which totaled \$2,238,972.66:

• RPS Class I RECs	9,020 MWh	\$ 604,971.40
• Solar Carve-Out SRECs	2,570 MWh	\$1,274,720.00
• Solar Carve-Out II SREC-IIs	395 MWh	\$ 148,125.00
• RPS Class II Renewable Energy RECs	2,397 MWh	\$ 65,989.41
• RPS Class II Waste-to-Energy WECs	4,195 MWh	\$ 46,186.95
• APS AECs	4,495 MWh	\$ 98,979.90

## APPENDIX TWO

### 2015 Massachusetts Retail Electricity Suppliers<sup>114</sup>

#### Distribution Utilities

Fitchburg Gas & Electric Co. (Unitil)	Massachusetts & Nantucket Electric Companies, d/b/a National Grid	NSTAR Electric Co. Western Massachusetts Electric Co.
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#### Competitive Suppliers

Abest Power & Gas, LLC	First Point Power, LLC	Palmco Power MA, LLC
<i>Agera Energy LLC</i> <sup>115</sup>	<b>Glacial Energy of New England, Inc.</b> <sup>116</sup>	Perigee Energy, LLC
<i>Ambit Northeast, LLC</i> <sup>117</sup>	Great Eastern Energy (BBPC, LLC)	Provider Power MASS, LLC
<i>Champion Energy Services, LLC</i> <sup>118</sup>	<i>Green Mountain Energy Company</i> <sup>119</sup>	Public Power, LLC
Clearview Electric, Inc..	<b>Gulf Oil LP</b> <sup>120</sup>	Reliant Energy Northeast LLC <sup>121</sup>
Consolidated Edison Solutions, Inc.	Hampshire Council of Governments <sup>122</sup>	REP Energy, LLC
Constellation Energy Power Choice, Inc.	Harvard Dedicated Energy Limited	<b>SFE Energy Massachusetts Inc.</b> <sup>123</sup>
Constellation Energy Services, Inc.	Hudson Energy Services, LLC	<b>SmartEnergy Holdings, LLC</b> <sup>124</sup>
Constellation NewEnergy, Inc.	<b>Interstate Gas Supply, Inc., dba IGS Energy</b> <sup>125</sup>	South Jersey Energy Company
Devonshire Energy LLC	<b>Inspire Energy Holdings, LLC</b> <sup>126</sup>	Spark Energy, LP
Direct Energy Business, LLC	Just Energy Massachusetts Corp.	Starion Energy, Inc.
Direct Energy Business Marketing, LLC	Liberty Power Holdings LLC	Sunwave Gas & Power Massachusetts, Inc.
Direct Energy Services, LLC	Major Energy Electric Service, LLC	Texas Retail Energy, LLC.
<b>Discount Power, Inc.</b> <sup>127</sup>	Massachusetts Gas & Electric Co.	Town Square Energy, LLC <sup>128T</sup>
East Avenue Energy,	Mega Energy Holdings, LLC	TransCanada Power Marketing Ltd
Energy Plus Holdings,	Mint Energy, LLC	Verde Energy USA Massachusetts, LLC
<b>ENGIE Resources LLC</b> <sup>129</sup>	NextEra Energy Services Massachusetts, LLC	Viridian Energy, LLC
<b>ENGIE Retail, LLC, dba Think Energy</b> <sup>130</sup>	Noble Americas Energy Solutions, LLC	Xoom Energy Massachusetts, LLC
<b>Ethical Electric, Inc.</b> <sup>131</sup>	Oasis Power, LLC	

<sup>114</sup> All changes from the 2014 list are indicated by **bold** typeface. Entities that were new or renamed in 2015 are also *italicized*, while those that exited during the course of 2015 are in **Arial** font. Bankrupt Glacial Energy is in **Arial with shadow**.

<sup>115</sup> Agera began to serve Massachusetts retail load in June 2015 and assumed full responsibility for Glacial Energy's load on July 13.

<sup>116</sup> Glacial Energy declared bankruptcy in 2014, but continued serving retail load into July 2015. See Appendix One for further details.

<sup>117</sup> Ambit began to serve Massachusetts retail load in April of 2015.

<sup>118</sup> Champion began to serve Massachusetts retail load in March of 2015.

<sup>119</sup> Green Mountain began to serve Massachusetts retail load in April of 2015.

<sup>120</sup> Some of Gulf Oil's retail load (namely service to Boston's Fenway Park) was transferred in the NEPOOL GIS to TransCanada, which met the RPS and APS compliance obligation for the Fenway Park load as part of its own obligation. Gulf left the Massachusetts retail market by October 2015.

<sup>121</sup> Reliant Energy acquired the retail business of Dominion Retail during the second quarter of 2014.

<sup>122</sup> Hampshire COG was also responsible for the RPS and APS compliance obligations in Massachusetts of Connecticut Municipal Electric Energy Cooperative and of Hampshire Power Berkshire.

<sup>123</sup> SFE Energy Mass began to serve Massachusetts retail load in June of 2015.

<sup>124</sup> SmartEnergy began to serve Massachusetts retail load in November of 2015.

<sup>125</sup> IGS Energy began to serve Massachusetts retail load in December of 2015.

<sup>126</sup> Inspire Energy Holdings began to serve Massachusetts retail load in May of 2015

<sup>127</sup> Discount Power began to serve Massachusetts retail load in January of 2015.

<sup>128</sup> Town Square Energy is registered at the NEPOOL GIS as Twin Cities Power, LLC.

<sup>129</sup> F.k.a. GDF Suez Energy Resources NA, Inc.

<sup>130</sup> F.k.a. GDF Suez Retail Energy Solutions LLC, d/b/a Think Energy

<sup>131</sup> Ethical Energy began to serve Massachusetts retail load in September of 2015.

## APPENDIX THREE 2015 RPS and APS Compliance Summaries<sup>132</sup>

### Table A RPS Class I Compliance Summary, 2015 (MWh)<sup>133</sup>

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES	CLASS I RENEWABLE GENERATION ATTRIBUTES					7.6498% RPS CLASS I NET OBLIGATION	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	2015 Class I RECs	2013 Banked Attributes	2014 Banked Attributes	Alternative Compliance Credits	Total RPS Class I Attributes		Excess Attributes	Banking Limit (30%)	Banked Attributes
<b>DISTRIBUTION COMPANIES</b>										
Fitchburg Gas & Electric	203,151	14,433	-	189	670	15,292	15,292	-	4,588	-
National Grid	9,337,197	727,898	-	16,019	-	743,917	702,810	41,107	210,843	41,107
NSTAR	8,081,828	597,296	-	61,743	-	659,039	608,318	50,721	182,496	50,721
W Mass Electric	1,518,348	114,287	-	-	-	114,287	114,285	2	34,286	2
<b>SUBTOTALS</b>	<b>19,140,524</b>	<b>1,453,914</b>	<b>-</b>	<b>77,951</b>	<b>670</b>	<b>1,532,535</b>	<b>1,440,705</b>	<b>91,830</b>	<b>432,213</b>	<b>91,830</b>
<b>COMPETITIVE SUPPLIERS</b>										
<b>SUBTOTALS</b>	<b>28,869,199</b>	<b>2,235,007</b>	<b>95,035</b>	<b>313,871</b>	<b>7,577</b>	<b>2,651,490</b>	<b>2,231,962</b>	<b>428,548</b>	<b>669,611</b>	<b>428,548</b>
<b>TOTALS</b>	<b>48,009,723</b>	<b>3,688,921</b>	<b>95,035</b>	<b>391,822</b>	<b>8,247</b>	<b>4,184,025</b>	<b>3,672,667</b>	<b>520,378</b>	<b>1,101,824</b>	<b>520,378</b>

### Table B RPS Solar Carve-Out Renewable Energy Compliance Summary, 2015 (MWh)

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES	SOLAR CARVE-OUT RENEWABLE GENERATION ATTRIBUTES					2.0934% average RPS SCO Obligation	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	2015 SRECs	2013 Banked Attributes	2014 Banked Attributes	Alternative Compliance Credits	Total RPS SCO Attributes		Excess Attributes	Banking Limit (10%)	Banked Attributes
<b>DISTRIBUTION COMPANIES</b>										
Fitchburg Gas & Electric	203,151	4,215	-	141	-	4,356	4,356	-	436	-
National Grid	9,337,197	189,420	-	10,789	-	200,209	200,209	-	20,021	-
NSTAR	8,081,828	164,867	-	8,820	-	173,687	173,292	395	17,330	395
W Mass Electric	1,518,348	32,557	3	3	-	32,563	32,557	6	3,256	6
<b>SUBTOTALS</b>	<b>19,140,524</b>	<b>391,059</b>	<b>3</b>	<b>19,753</b>	<b>-</b>	<b>410,815</b>	<b>410,414</b>	<b>401</b>	<b>41,043</b>	<b>401</b>
<b>COMPETITIVE SUPPLIERS</b>										
<b>SUBTOTALS</b>	<b>28,869,199</b>	<b>584,380</b>	<b>15</b>	<b>16,390</b>	<b>3,084</b>	<b>603,869</b>	<b>594,610</b>	<b>11,830</b>	<b>59,487</b>	<b>11,830</b>
<b>TOTALS</b>	<b>48,009,723</b>	<b>975,439</b>	<b>18</b>	<b>36,143</b>	<b>3,084</b>	<b>1,014,684</b>	<b>1,005,024</b>	<b>12,231</b>	<b>100,530</b>	<b>12,231</b>

<sup>132</sup> 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.

<sup>133</sup> Solar Carve-Out & Solar Carve-Out II are netted out from the Class I table, although included in Tables G, H, and I of Appendix Four.

**Table C**  
**RPS Solar Carve-Out II Renewable Energy Compliance Summary, 2015 (MWh)**

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES			SOLAR CARVE-OUT II RENEWABLE GENERATION ATTRIBUTES						0.3288% RPS SCO II Obligation	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	Exempt Retail Load (under pre-4/25/14 contracts)	Net Retail Load	2015 SREC-IIs	2013 Banked	2014 Banked	Alternative Compliance Credits	Total RPS SCO II Attributes	Excess Attributes		Banking Limit (10%)	Banked Attributes	
<b>DISTRIBUTION COMPANIES</b>													
Fitchburg Gas & Electric	203,151	-	203,151	730	-	-	-	730	668	62	67	62	
National Grid	9,337,197	-	9,337,197	30,701	-	-	-	30,701	30,701	-	3,071	-	
NSTAR	8,081,828	-	8,081,828	28,358	-	-	-	28,358	26,574	1,78	2,658	1,784	
W. Mass Electric	1,518,348	-	1,518,348	4,993	-	-	-	4,993	4,993	-	500	-	
<b>SUB-TOTALS</b>	<b>19,140,524</b>	<b>-</b>	<b>19,140,524</b>	<b>64,782</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>64,782</b>	<b>62,936</b>	<b>1,846</b>	<b>6,296</b>	<b>1,846</b>	
<b>COMPETITIVE SUPPLIERS</b>													
<b>SUB-TOTALS</b>	<b>28,869,199</b>	<b>10,516,104</b>	<b>18,353,097</b>	<b>60,512</b>	<b>-</b>	<b>20</b>	<b>629</b>	<b>61,161</b>	<b>60,381</b>	<b>1,175</b>	<b>6,064</b>	<b>1,172</b>	
<b>TOTALS</b>	<b>48,009,723</b>	<b>10,516,104</b>	<b>37,493,621</b>	<b>125,294</b>	<b>-</b>	<b>20</b>	<b>629</b>	<b>125,943</b>	<b>123,317</b>	<b>3,021</b>	<b>12,360</b>	<b>3,018</b>	

**Table D**  
**RPS Class II Renewable Energy Compliance Summary, 2015 (MWh)**

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES			CLASS II RENEWABLE ENERGY ATTRIBUTES						2.00% RPS Class II RE Obligation	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	Exempt Retail Load	Net Retail Load	2015 Class II RECs	2013 Banked	2014 Banked Attributes	Alternative Compliance Credits	Total RPS Class II RE Attributes	Excess Attributes		Banking Limit (30%)	Banked Attributes	
<b>DISTRIBUTION COMPANIES</b>													
Fitchburg Gas & Electric	203,151	0	203,151	3,217	0	729	118	4,064	4,064	0	1,220	0	
National Grid	9,337,197	0	9,337,197	185,710	0	0	1,034	186,744	186,744	0	56,024	0	
NSTAR	8,081,828	0	8,081,828	37,456	0	0	124,181	161,637	161,637	0	48,492	0	
W. Mass Electric	1,518,348	0	1,518,348	22,824	0	0	7,543	30,367	30,367	0	9,111	0	
<b>SUB-TOTALS</b>	<b>19,140,524</b>	<b>0</b>	<b>19,140,524</b>	<b>249,207</b>	<b>0</b>	<b>729</b>	<b>132,876</b>	<b>382,812</b>	<b>382,812</b>	<b>0</b>	<b>114,847</b>	<b>0</b>	
<b>COMPETITIVE SUPPLIERS</b>													
<b>SUB-TOTALS</b>	<b>28,869,199</b>	<b>34,578</b>	<b>28,834,621</b>	<b>290,192</b>	<b>62,616</b>	<b>39,556</b>	<b>200,446</b>	<b>592,810</b>	<b>576,719</b>	<b>18,488</b>	<b>173,042</b>	<b>18,288</b>	
<b>TOTALS</b>	<b>48,009,723</b>	<b>34,578</b>	<b>47,975,145</b>	<b>539,399</b>	<b>62,616</b>	<b>40,285</b>	<b>333,322</b>	<b>975,622</b>	<b>959,531</b>	<b>18,488</b>	<b>287,889</b>	<b>18,288</b>	

**Table E**  
**RPS Class II Waste Energy Compliance Summary, 2015 (MWh)**

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES			CLASS II WASTE ENERGY ATTRIBUTES					3.5% RPS Class II WE Obligation	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	Exempt Retail Load	Net Retail Load	2015 Class II WECs	2013 Banked Attributes	2014 Banked Attributes	Alternative Compliance Credits	Total RPS Class II WE Attributes		Excess Attributes	NO Banking in 2014 or 2015	Banked Attributes
<b>DISTRIBUTION COMPANIES</b>												
Fitchburg Gas & Electric	203,151	0	203,151	7,111	0	0	0	7,111	7,111	0	0	0
National Grid	9,337,197	0	9,337,197	326,802	0	0	0	326,802	326,802	0	0	0
NSTAR	8,081,828	0	8,081,828	282,868	0	0	0	282,868	282,864	4	0	0
W. Mass Electric	1,518,348	0	1,518,348	53,143	0	0	0	53,143	53,143	0	0	0
<b>SUB-TOTALS</b>	<b>19,140,524</b>	<b>0</b>	<b>19,140,524</b>	<b>669,924</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>669,924</b>	<b>669,920</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>COMPETITIVE SUPPLIERS</b>												
<b>SUB-TOTALS</b>	<b>28,869,199</b>	<b>34,578</b>	<b>28,834,621</b>	<b>950,188</b>	<b>53,440</b>	<b>0</b>	<b>17,120</b>	<b>1,020,748</b>	<b>1,009,241</b>	<b>15,702</b>	<b>0</b>	<b>0</b>
<b>TOTALS</b>	<b>48,009,723</b>	<b>34,578</b>	<b>47,975,145</b>	<b>1,620,112</b>	<b>53,440</b>	<b>0</b>	<b>17,120</b>	<b>1,690,672</b>	<b>1,679,161</b>	<b>15,706</b>	<b>0</b>	<b>0</b>

**Table F**  
**APS Alternative Energy Compliance Summary, 2015 (MWh)**

RETAIL ELECTRICITY SUPPLIERS	RETAIL SALES			APS ALTERNATIVE ENERGY ATTRIBUTES					3.75% APS Obligation	BANKING FOR FUTURE COMPLIANCE		
	Load Obligation from Filing	Exempt Retail Load	Net Retail Load	2015 APS AECs	2013 Banked Attributes	2014 Banked Attributes	Alternative Compliance Credits	Total APS Attributes		Excess Attributes	Banking Limit (30%)	Banked Attributes
<b>DISTRIBUTION COMPANIES</b>												
Fitchburg Gas & Electric	203,151	0	203,151	0	0	0	7,619	7,619	7,619	0	2,286	0
National Grid	9,337,197	0	9,337,197	220,675	0	0	129,470	350,145	350,145	0	105,044	0
NSTAR	8,081,828	0	8,081,828	260,054	0	0	43,015	303,069	303,069	0	90,921	0
W. Mass Electric	1,518,348	0	1,518,348	18,388	0	0	38,551	56,939	56,939	0	17,082	0
<b>SUB-TOTALS</b>	<b>19,140,524</b>	<b>0</b>	<b>19,140,524</b>	<b>499,117</b>	<b>0</b>	<b>0</b>	<b>218,655</b>	<b>717,772</b>	<b>717,772</b>	<b>0</b>	<b>215,333</b>	<b>0</b>
<b>COMPETITIVE SUPPLIERS</b>												
<b>SUB-TOTALS</b>	<b>28,869,199</b>	<b>34,578</b>	<b>28,834,621</b>	<b>395,485</b>	<b>0</b>	<b>261</b>	<b>683,950</b>	<b>1,079,696</b>	<b>1,081,322</b>	<b>2,869</b>	<b>324,423</b>	<b>2,869</b>
<b>TOTALS</b>	<b>48,009,723</b>	<b>34,578</b>	<b>47,975,145</b>	<b>894,602</b>	<b>0</b>	<b>261</b>	<b>902,605</b>	<b>1,797,468</b>	<b>1,799,094</b>	<b>2,869</b>	<b>539,756</b>	<b>2,869</b>

## APPENDIX FOUR

### Data Tables for RPS and APS Compliance by Generation Location and Type<sup>134</sup>

The first three tables below provide the data from which the Class I graphs in Figures Two through Five were generated. Those graphs and these tables include SREC data for the Solar Carve-Out (SCO), which is within 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. Note the 2013 arrival of Marine & Hydrokinetic.

**Table G**  
**RPS Class I Compliance by Generation Location, 2006-2015**

	2006 MWh	2007 MWh	2008 MWh	2009 MWh	2010 MWh	2011 MWh	2012 MWh	2013 MWh	2014 MWh	2015 MWh   %	
CT	13,204	10,180	25,333	21,371	20,146	16,414	16,070	16,452	11,397	5,973	0.1
Maine	367,298	520,821	500,479	526,906	760,476	746,648	864,227	1,114,355	1,039,509	1,170,728	24.4
MASS	<b>184,777</b>	<b>192,200</b>	<b>197,949</b>	<b>197,530</b>	<b>197,748</b>	<b>286,115</b>	<b>483,925</b>	<b>791,088</b>	1,118,406	1,538,702	32.1
NH	53,556	265,062	261,468	307,909	282,308	331,996	531,430	640,808	508,841	495,212	10.3
RI	62,230	42,562	34,848	26,061	1,182	41,952	37,131	23,288	11,059	9,496	0.2
VT	26,595	46,915	49,207	112,670	108,849	149,505	173,191	364,691	407,497	342,023	7.1
NMISA <sup>135</sup>	455	54,079	66,418	66,071	89,405	22,742	49,144	64,629	67,369	353	0.0
NY	175,961	265,299	517,427	527,751	580,683	688,039	620,904	870,508	880,859	666,330	13.9
PEI	0	16,922	28,111	113,282	144,549	142,688	125,713	142,478	189,578	227,942	4.8
QC	54,696	85,493	215,835	230,367	138,263	213,713	278,794	356,139	397,130	339,366	7.1
<b>Total</b>	<b>938,772</b>	<b>1,599,533</b>	<b>1,896,811</b>	<b>2,129,918</b>	<b>2,323,609</b>	<b>2,639,812</b>	<b>3,180,529</b>	<b>4,384,436</b>	<b>4,631,645</b>	<b>4,796,125</b>	<b>100</b>

**Table H**  
**RPS Class I Compliance by Generation Type, 2006-2015<sup>136</sup>**

Type <sup>137</sup>	2006 MWh	2007 MWh	2008 MWh	2009 MWh	2010 MWh	2011 MWh	2012 MWh	2013 MWh	2014 MWh	2015 MWh   %	
Anaerobic Digester Gas	27,115	27,511	26,328	28,204	24,292	25,115	27,373	29,662	38,782	<b>43,837</b>	<b>0.9</b>
Other Biomass	395,856	782,315	743,882	571,757	584,505	392,629	394,754	357,575	375,109	<b>320,801</b>	<b>6.7</b>
Hydroelectric	N/A	N/A	N/A	47,490	80,823	105,484	105,326	113,936	129,790	<b>129,810</b>	<b>2.7</b>
Landfill Gas	449,633	486,558	660,937	690,851	736,298	848,229	891,798	954,656	820,001	<b>587,790</b>	<b>12.3</b>
Marine & Hydrokinetic	N/A	N/A	N/A	0	0	0	0	28	45	<b>47</b>	<b>0.0</b>
Solar PV	216	803	1,799	2,420	4,116	36,688	138,159	323,164	681,502	<b>1,194,925</b>	<b>24.9</b>
Wind	65,952	302,346	463,865	789,196	893,575	1,231,667	1,623,119	2,605,415	2,586,416	<b>2,518,915</b>	<b>52.5</b>
<b>Totals</b>	<b>938,772</b>	<b>1,599,533</b>	<b>1,896,811</b>	<b>2,129,918</b>	<b>2,323,609</b>	<b>2,639,812</b>	<b>3,180,529</b>	<b>4,384,436</b>	<b>4,631,645</b>	<b>4,796,125</b>	<b>100</b>

<sup>134</sup> 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](#).

<sup>135</sup> NMISA is the Northern Maine Independent System Administrator, regarding which see footnote 42.

<sup>136</sup> The 2013 and 2014 figures for Anaerobic Digester Gas and Marine & Hydrokinetic have been corrected since the 2014 Report.

<sup>137</sup> Note that the Massachusetts RPS statute and regulations include "biogas" (including anaerobic digestion gas) within the list of Eligible Biomass Fuels. However, DOER tracks anaerobic digester generation separately. Landfill gas, which is included within "biomass" in some state RPS programs, is listed separately from Biomass in the Massachusetts RPS statute and regulations. Note that, as of 2012, the Solar PV figures include SRECs that were transferred to the Auction and became Reminted Auction SRECs. The latter were not included in this table of the original 2012 Report, but the 2012 data are updated here and in a corrected 2012 Report.

**Table I**  
**RPS Class I Compliance by Generation Location and Type, 2015 (MWh)**

Type	Anaerobic Digester Gas	Other Biomass	Hydro- electric	Landfill Methane Gas	Marine & Hydro- kinetic	Solar Photo- voltaic	Wind	Total
Connecticut	0	0	182	4,881	0	910	0	5,973
Maine	6,983	197,901	47,222	24,990	0	2,032	891,600	1,170,728
MASSACHUSETTS	35,899	1,659	24,010	142,662	47	1,119,046	215,379	1,538,702
New Hampshire	0	121,241	16,654	21,561	0	1,541	334,215	495,212
Rhode Island	0	0	0	218	0	1,574	7,704	9,496
Vermont	955	0	41,742	38,486	0	69,822	191,018	342,023
Northern Maine ISA (NMISA)	0	0	0	0	0	0	353	353
New York	0	0	0	297,968	0	0	368,362	666,330
Prince Edward Island	0	0	0	0	0	0	227,942	227,942
Quebec	0	0	0	57,024	0	0	282,342	339,366
<b>TOTAL</b>	<b>43,837</b>	<b>320,801</b>	<b>129,810</b>	<b>587,790</b>	<b>47</b>	<b>1,194,925</b>	<b>2,518,915</b>	<b>4,796,125</b>

**Table J**  
**RPS Class II Renewable Energy Compliance by Generation Location, 2009-2015**

Year	2009 MWh	2010 MWh	2011 MWh	2012 MWh	2013 MWh	2014 MWh	2015	
Location	MWh	MWh	MWh	MWh	MWh	MWh	MWh	%
Connecticut	805	2,378	11,178	2,933	5,848	6,557	4,410	0.8
Maine	0	18,605	42,540	72,014	171,754	110,517	104,395	19.4
MASSACHUSETTS	483	14,711	21,200	61,082	97,982	184,538	213,229	39.7
New Hampshire	33,514	29,369	69,674	55,454	86,931	96,101	94,336	17.6
Rhode Island	741	3,040	3,524	1,448	1,597	2,524	1,709	0.3
Vermont	0	28,837	30,610	53,106	145,497	126,143	119,155	22.2
New York	0	6,897	57,856	0	0	0	0	0.0
<b>Totals</b>	<b>35,543</b>	<b>103,837</b>	<b>236,582</b>	<b>246,037</b>	<b>509,609</b>	<b>526,380</b>	<b>537,234</b>	<b>100.0</b>

**Table K**  
**RPS Class II Renewable Energy Compliance by Generation Type, 2009-2015**

Year	2009 MWh	2010 MWh	2011 MWh	2012 MWh	2013 MWh	2014 MWh	2015	
Type	MWh	MWh	MWh	MWh	MWh	MWh	MWh	%
Hydropower	35,543	96,552	172,051	246,037	509,462	526,097	535,799	99.73
Landfill Methane	0	7,285	64,531	0	0	0	0	0.0
Marine/Hydrokinetic	0	0	0	0	147	240	242	0.05
Solar PV	0	0	0	0	0	36	0	0.0
Wind	0	0	0	0	0	7	1,193	0.22
<b>Totals</b>	<b>35,543</b>	<b>103,837</b>	<b>236,582</b>	<b>246,037</b>	<b>509,609</b>	<b>526,380</b>	<b>537,234</b>	<b>100.0</b>

No table is provided for RPS Class II Waste Energy because all of the seven qualified units are of the same type, and all are located in Massachusetts.

**Table L**  
**APS Compliance by Generation Type, 2009-2015**  
**(all located in Massachusetts)**

Type <sup>138</sup>	Year	2009	2010	2011	2012	2013	2014	2015	
		MWh	%						
CHP – Biomass		0	0	0	0	2,689	2,797	3,138	0.35
CHP – Natural Gas		128,922	225,104	324,619	347,993	529,462	826,966	890,835	99.58
CHP – Waste to Energy		0	0	0	0	0	855	531	0.06
Flywheel Storage		1,003	2,030	303	3,186	489	377	98	0.01
<b>Totals</b>		<b>129,925</b>	<b>227,134</b>	<b>324,922</b>	<b>351,179</b>	<b>532,640</b>	<b>830,995</b>	<b>894,602</b>	<b>100.0</b>

**Table M**  
**Voluntary Renewable Energy Certificates Retired for RGGI**  
**by Generation Location & Type, 2015 (MWh)<sup>139</sup>**

Type	Anaerobic Digester Gas	Other Biomass	Hydro- electric	Landfill Methane Gas	Marine & Hydro- kinetic	Solar Photo- voltaic	Wind	Total
Connecticut	0	0	0	0	0	0	0	0
Maine	0	0	0	0	0	0	15,086	15,086
MASSACHUSETTS	1,937	0	1,000	0	0	2,323	16,423	21,683
New Hampshire	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0
No. Maine ISA (NMISA)	0	0	0	0	0	0	0	0
New York	0	0	0	0	0	0	4,888	4,888
Prince Edward Island	0	0	0	0	0	0	0	0
Quebec	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>1,937</b>	<b>0</b>	<b>1,000</b>	<b>0</b>	<b>0</b>	<b>2,323</b>	<b>36,397</b>	<b>41,657</b>

<sup>138</sup> CHP = Combined Heat and Power.

<sup>139</sup> 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 32.