ESAI

Assessing the Renewable Energy Challenge in New England & Massachusetts

A Study of the Renewable Energy Supply and Demand Outlook Through 2020

ASSESSING THE RENEWABLE

ENERGY CHALLENGE

IN NEW ENGLAND & MASSACHUSETTS

:

A Study of the Renewable Energy

Supply and Demand Outlook Through 2020

A Report Prepared By:

Energy Security Analysis, Inc.

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Energy Security Analysis, Inc. (ESAI)

Company Overview

Energy Security Analysis, Inc. (ESAI) is an energy research and consulting firm currently working with a large number of power marketers, financial institutions, generators, regulators, developers, and end-users. ESAI's analysis covers all aspects of the Northeast electricity markets including energy pricing, transmission, capacity, renewables, emissions and demand response. ESAI also covers fundamental supply and demand issues in the North American natural gas markets. ESAI provides ongoing research materials to almost 50 clients with specific interests in the Northeast markets.

The economic assumptions, forecasts and insights from ongoing market research activity are applied to specific project work such as asset valuations, transmission congestion analysis, and other relevant market studies. Since 2000, ESAI has performed a wide range of studies for over 100 clients. While the vast majority of this work is proprietary, some of ESAI's work has been featured in the public realm. One example is a study commissioned by PJM to study the benefits inherent with the 2002 to 2005 expansion of the PJM RTO[1].

ESAI delivers its market research in the form of quarterly, monthly and weekly reports. The quarterly reports – *CapacityWatch, EnergyWatch* and *TransmissionWatch* – provide 10 year outlooks on pricing as well as regulatory and market rule issues. Monthly reports focus on six month outlooks of hub and zonal energy prices, generation and transmission outages, and transmission congestion.

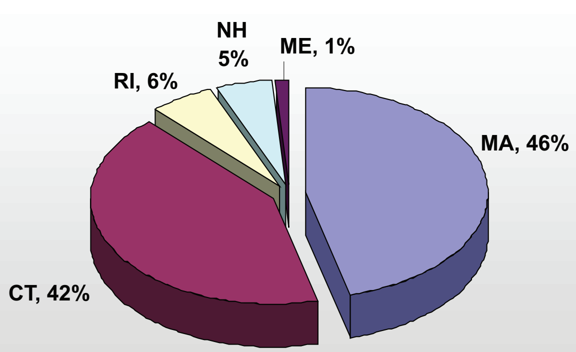
As part of its ongoing research, ESAI tracks individual generation projects (including renewable energy projects) in New England, PJM and New York at all stages of development and construction. This detailed information forms one significant component of ESAI's assessment of the Northeast capacity markets and is a major input to ESAI's energy and capacity price models. ESAI provides its clients with ongoing updates to its forecasts of energy and capacity prices and more importantly, ESAI provides its clients with insights into the fundamental market drivers that impact these markets.

[1] "Impacts of the PJM RTO Market Expansion", Energy Security Analsyis, Inc., Edward N. Krapels and Paul Flemming, November 2005, http://www.pjm.com/documents/documents-archive.html

Executive Summary

Five of the six New England states have legislated Renewable Portfolio Standards that mandate minimum requirements for renewable energy supply. Massachusetts has the largest requirement for renewable energy credits (RECs) and is expected to purchase almost half (46 percent) of the renewable energy available in New England during 2009. Connecticut closely follows Massachusetts with 42 percent of the REC demand in New England. Rhode Island and New Hampshire account for combined 12 percent of the demand, while Maine adds an additional percent.

Figure 1 - Breakdown of New England REC Requirements



This report summarizes the outlook for renewable energy supply and demand in New England and specifically, the outlook for Massachusetts given its position in a competitive New England marketplace. Massachusetts is developing a leadership position in the area of green power and environmental sustainability. The passage of five new energy and environmental initiatives in the last legislative session is unprecedented in the country. Aggressive goals for energy efficiency, the creation of green jobs, and increased use of renewable energy resources have become the cornerstone of the current administration.

ESAI's demand and supply projections include the following critical assumptions:

- Renewable Portfolio Standards (RPS) impose requirements on load serving entities to supply a percentage of their energy from renewable resources based on their total load. ESAI developed three load growth cases upon which future RPS percentages could be based. The Base Case is load growth of 0.8 percent per year based on ISO-NE projections from the 2008 Capacity Energy Loads and Transmission (CELT) report. Flat growth and declining load growth (1.0 percent per year) scenarios were also analyzed.
- Not all new renewable projects that enter the queue will get built. Both ESAI's experience and historical data from the Northeast pools show that there is only a 20 percent probability that new projects will move to completion. Projects that have cleared the 2010/11 Forward Capacity Market (FCM) auction are assigned a 100 percent probability of completion. Projects that have qualified for the 2011/12 FCM auction are assigned 40-50 percent probabilities.

- ESAI estimates that 1,500 MW of nameplate wind resources (or equivalent) will enter the New England queue each year – a somewhat aggressive assumption. Of this total entering the queue, approximately 300 MW of new 'wind-equivalent'[1] capacity will move to completion and come on-line in New England each year starting in 2012.

Conclusions of ESAI's analysis are:

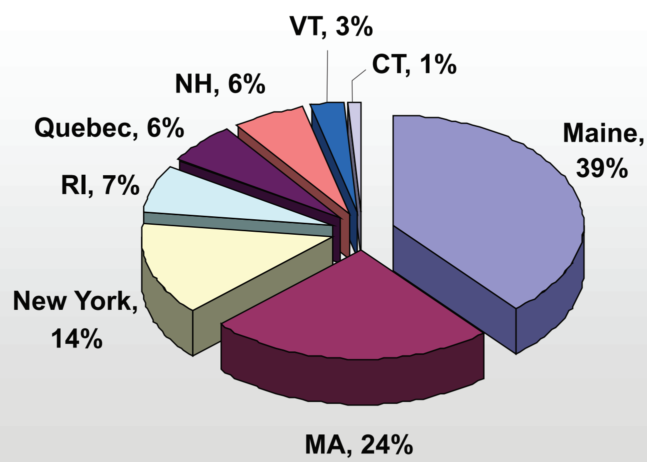
- New England can meet renewable requirements through 2012, but it is unlikely to meet REC requirements for the region beyond 2012 unless an additional 700 MW of wind equivalent resources are added each year.
  - Renewable energy supplies in New England will grow significantly, but the pace of development and construction will lag the pace of increasing renewable energy requirements. New England is likely to fall short of renewable requirements from 2013 through 2020.
  - The supply/demand gap will widen between 2013 and 2020.
- Massachusetts renewable energy supply will lag demand in a similar pattern to New England and is therefore likely to fall short of requirements beyond 2012.
  - Massachusetts demand for renewable resources needs to be evaluated in the context of overall New England supply and demand dynamics.
  - Massachusetts will compete on an equal footing with the other four New England states (CT, RI, NH, & VT) for renewable resources.
  - The competitive equalizer is the Alternative Compliance Payment (ACP). The ACP is comparable between the five states and ensures that, over time, competition will allocate regional RECs proportionally between the states.
- Massachusetts could meet requirements if all New England resources that can be reasonably developed were committed to Massachusetts only.
  - If Massachusetts were to take all of the renewable energy credits in the region, it could meet its requirements but other New England states would be left severely short of requirements.
- <u>To meet renewables targets, Massachusetts energy providers must contract with over 3,200 MW of new wind equivalent resources (~7.0 million MWhs) by 2020 over and above current commitment levels.</u>
  - ESAI's outlook assumes that Massachusetts will contract for about 150 MW of the 300 MW of total new additions each year in New England.
  - Massachusetts will need to contract with 250 – 300 MW of renewable resources each year to meet incremental REC demand.
  - An annual gap of 100 – 150 MW in wind equivalent resource contracts (~220,000 to 330,000 MWhs) is likely to develop in Massachusetts starting in 2013.

[1] Wind resources in New England are assumed to have a 25 percent operating factor. Other resources such as wood chip biomass facilities will have much higher operating factors. A 50 MW biomass plant with an 85 percent operating factor would have the same annual energy output (372,300 MWhs) as 170 MW of wind. The 50 MW biomass plant is the 'wind-equivalent' of 170 MW of wind capacity. Because the majority of new renewable energy must come from wind farms, ESAI uses a wind-equivalent to simplify projections for new capacity.

- Total Alternative Compliance Payments in Massachusetts under the base case expected growth scenario will approach $900 million by 2020. Under the declining growth scenario, Alternative Compliance Payments will reach $340 million by 2020. Annual payments to the Renewable Energy Trust by 2020 will be between $65 and $200 million per year.
- Even if load growth in Massachusetts declines by 1.0 percent per year, a significant REC supply shortfall is still projected against the lower demand. The annual increases in renewables requirements would not be significantly offset by declining load.
- Even if renewable energy generation additions were doubled from ESAI's projections of 300 MW per year of wind equivalent resources to 600 MW per year, New England would still fall short of Renewable Energy Credits in 2020 by over 2.5 million MWh.

  – Under this scenario, Massachusetts would come close to meeting its REC requirements. (CT ACP prices do not escalate and become less competitive over time, shifting more resources towards Massachusetts over time.)
- In 2006, 76 percent of the energy needed to meet the Massachusetts RPS requirement came from outside of the state. Of that, more than 20 percent came from outside the ISO New England control area (some wind projects in Maine are in New England but not within the ISO-NE control area). Projects in New York alone provided 14 percent of the RECs to the Massachusetts program. Maine was the largest New England state to contribute, providing Massachusetts 39 percent of its RECs. If this trend were to continue, the transmission system would require upgrades to handle the significant increases in flows from Maine, Canada and New York. There have already been occasions in New York where wind generation from units providing RECs to the Massachusetts program have been curtailed due to insufficient transmission capacity.

Figure 2 - 2006 Renewable Generation Source States



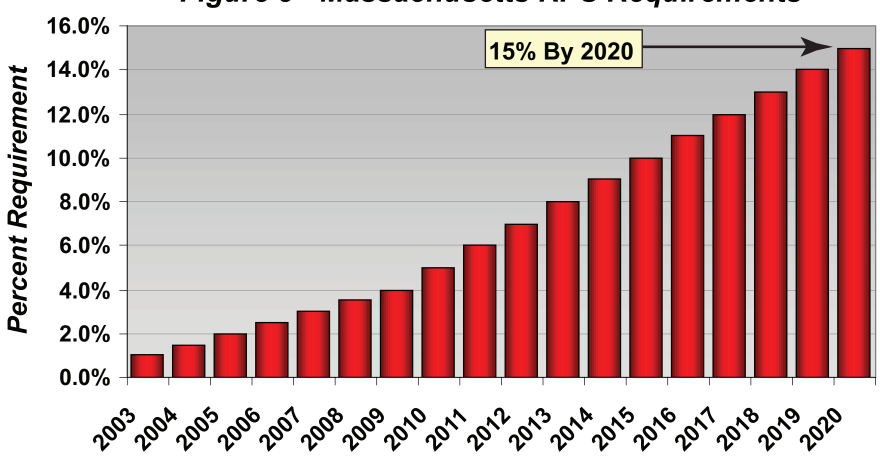
Background

Twenty eight states have legislated Renewable Portfolio Standards (RPS) and another five states have set renewable energy goals. In New England, Massachusetts has joined four other states (CT, RI, NH and ME) in legislating Renewable Portfolio Standards – Vermont has set a state goal, but not mandated an RPS.

The underlying principle for the Renewable Portfolio Standard is that a stated percentage of a state's energy consumption must be supplied by a qualified renewable energy generating resource in a given year. Buyers can contract directly for renewable energy, or may purchase Renewable Energy Certificates (RECs); each REC representing one megawatt-hour of renewable energy.

The Massachusetts RPS commenced in 2003 with a 1.0 percent requirement and has increased by 0.5 percent each year to the current 2008 requirement of 3.5 percent. After increasing to 4.0 percent in 2009, the annual requirement will now increase by 1.0 percent each year when it reaches 15.0 percent in 2020 (see Figure 3).[2]

Figure 3 - Massachusetts RPS Requirements



Note: 1% increases to continue beyond 2020 indefinitely.

The Massachusetts RPS includes a compliance provision that applies a penalty to energy providers and wholesale consumers that do not self-supply or directly contract for renewable energy supplies. This Alternative Compliance Payment (ACP) is currently $57.92/MWh and is applied to a customer's renewable energy shortfall. This payment changes each year with an inflation adjustor linked to the Consumer Price Index and is projected to be above $80.00/MWh by 2020. ACP payments are channeled to the Massachusetts Technology Collaborative's Renewable Energy Trust, a group that invests the proceeds into developing qualified renewable energy projects. The other four New England RPS states also have comparable compliance penalties.

[2] The Massachusetts RPS has been updated by recent legislation known as the Green Communities Act of 2008, S.B. 2768; Chapter 169, Section 11, "An Act Relative To Green Communities". http://www.mass.gov/legis/laws/seslaw08/sl080169.htm

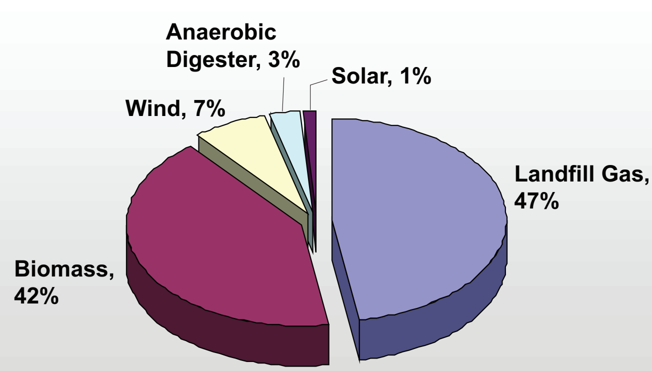
The renewable energy targets for New England are quite robust and will require significant efforts by the industry to promote and develop the resources that will be needed to meet the stated goals – 15 percent of energy consumption in Massachusetts by 2020. To meet this target, Massachusetts energy providers must contract with over 3,000 MW of new incremental wind equivalent resources by 2020 in order to secure slightly more than 7.0 million MWhs of renewable energy. The overall New England renewable energy requirement is almost exactly double the Massachusetts requirement; by 2020 New England would require commitments equal to over 6,000 MW of wind equivalent resources or over 14.0 million MWhs of renewable energy.

Table 1 - Existing Wind Farms & Wind Farms Under Construction (Oct 2008)

	Existing Nameplate Capacity, MW	Under Construction, MW	Rank
TX	6,297	2,470	1
CA	2,493	275	2
IA	1,394	1,480	3
NY	707	589	9
ME	42	57	26
VT	6	0	31
MA	5	3	32
NH	1	24	34
RI	1	0	35
CT	0	0	45

Currently, New England has 55.5 MW of existing wind capacity that is part of a total renewable portfolio of just over 1,200 MW[3] of wind equivalent capacity. The current portfolio is dominated by biomass (460 MW) and landfill gas (44 MW). In Massachusetts, 89% of its renewable energy came from biomass and landfill gas in 2006. We note that 42 MW of the current 55 MW of wind capacity is located in Aroostock County, Maine and is not directly tied to the New England grid (Mars Hill).

Figure 4 - 2006 Renewable Generation By Source Type



[3] Based on 2008 projected supply at a 25 percent operating factor to determine wind-equivalent portfolio capacity.

Massachusetts Renewable Energy - Demand

The Massachusetts demand for Renewable Energy Credits (RECs) is a function of its annual electricity demand and the stated annual RPS percentage supply requirement. In 2008, Massachusetts will consume an estimated 54.5 million MWh of total applicable electricity sales. With a 3.5 percent renewable energy requirement, Massachusetts will need 1.9 million MWh of renewable energy to meet its target. In 2007, the Massachusetts renewable requirement was 1.6 million MWh. To assess future demand, ESAI projects growth in annual energy consumption under three different scenarios through 2020 as indicated below:

Base Case Outlook

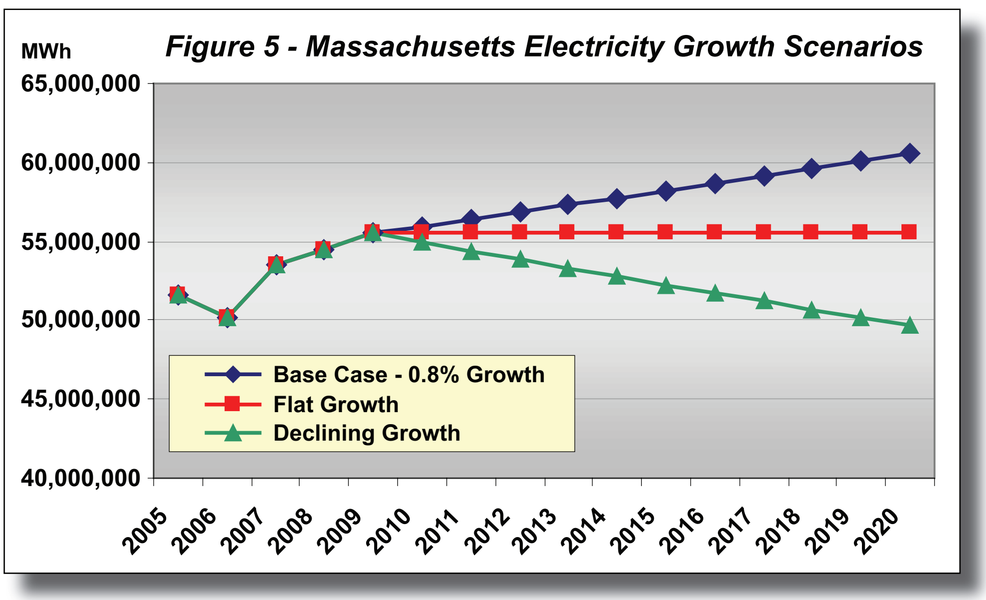
Utilizes the ISO-NE load growth outlook of 0.8% from the most recent CELT report[4].

Flat Growth Outlook

The flat growth scenario assumes no load growth due to low economic growth and a moderate amount of energy efficiency improvements.

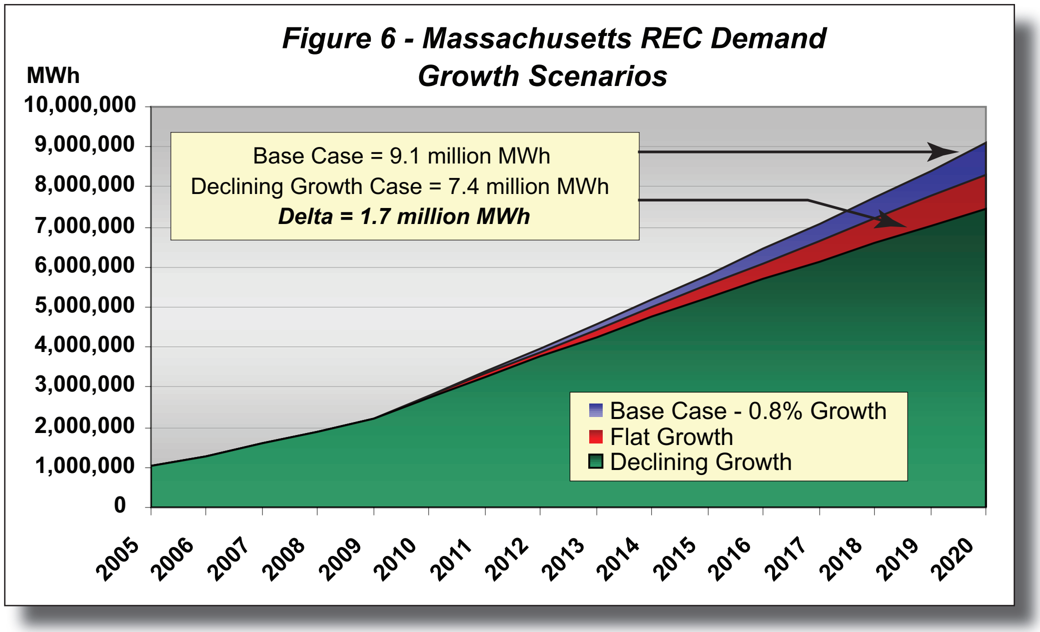
Declining Growth Case Outlook

The declining growth case assumes energy consumption in Massachusetts decreases at a rate of 1 percent per year starting in 2010, achieving a total 10 percent reduction by 2020 due to a stalled economy and/or a highly successful implementation of energy efficiency initiatives.



The Flat Growth scenarios result in a significantly lower demand for the associated renewable energy requirements. As shown in Figure 5, a Declining Growth Case low load growth scenario could result in a reduction in the renewable energy requirements of 1.5 million MWh by 2020, lowering the need for renewable capacity by 685 MW of wind equivalent capacity.

[4] Capacity, Energy, Loads and Transmission Report; http://www.iso-ne.com/trans/celt/index.html.



Annual Load Growth vs. RPS Requirement Increases

Annual load growth in the Base Case at 0.8 percent equates to roughly 450,000 MWh per year in Massachusetts. At a 10 percent renewable energy requirement, the annual increase due to load growth is 45,000 MWh. In comparison, the demand increase due to the annual 1.0 percent increase starting from 2009 is over 550,000 MWh. Thus, while load growth is an important factor in determining the renewable energy requirements, it is roughly an order of magnitude lower in importance relative to the annual percentage increase in the RPS requirement.

Massachusetts represents almost one half of the renewable energy requirements in New England – 46 percent of total 2009 demand. Connecticut accounts for most of the balance of the New England demand at 42 percent. Given the very low energy demands in New Hampshire and Maine, the renewable energy requirements are much lower.

Massachusetts Renewable Energy Requirements –

How Much Can New England Supply?

ESAI has developed a 2008 base year supply portfolio for New England that is based upon the ISO-NE listings of currently qualified renewable resources. Additional resource information such as imported renewable energy is obtained from the participating states' compliance reports.

To determine future supply resources, ESAI makes use of the publicly available ISO-NE generation interconnection queue as the basis for new supply additions as far out as 2013[5]. All renewable generation in the queue has been included in the supply outlook. The resources that are included in the forecast are assigned completion dates as provided by ISO-NE with some adjustments made by ESAI based on its experience.

The other major differentiator in ESAI's assessment of the queue is the application of a probability of completion parameter. This parameter is applied in three ways in this analysis;

1) Under Construction – Projects under construction are assigned a 100 percent probability of completion.
2) Projects that have cleared the first FCM auction for 2010/2011 are assigned a 100 percent probability of completion.
3) FCM Qualified –Projects that have qualified for the second Forward Capacity Auction are assigned a 40 to 50 percent probability of completion. Even though a project qualifies for the auction, there is no guarantee that it will clear in the auction.
4) Under Development – Generally, projects in various stages of development are assigned a 20 percent probability of completion (more discussion on queue probabilities can be found in the next section). ESAI has assigned some projects that don't meet the first two criteria a higher probability of completion based on their location within Massachusetts and the higher probability of Massachusetts projects winning RFPs with long term PPAs per the Green Communities Act for in-state renewable commitments. Cape Wind, for example, is assigned a 40 percent probability due to these factors, as well as size and staying power in a long permitting process.

Assessing the Generation Queue

Developing the Forecast Probability of Completion Number

All new generation projects or expansions in ISO-NE must go through the generation interconnection process. Projects are entered into the "queue" on a first come – first served basis and each project must go through a series of studies that assess the technical feasibility of

[5] ESAI's Project Evaluation Program – tracks ongoing generation projects by pool. Each project is assigned a probability of completion percentage based upon a number of factors including development progress, permitting, financial status of developer, local opposition and other factors. ESAI has monitored all Northeast projects since 2001 and publishes quarterly updates in its *Capacity Watch* publication.
ESAI normally utilizes its own assessment of projects under development and construction in New England. However, for the purposes of this report, ESAI is using the publicly available ISO-NE data for the generation interconnection queue.

connecting to the grid and the associated costs.[6] There is now a meaningful history of project development that can be derived from the New England, New York and PJM interconnection queues. Using the available data in the queue, the overall performance of projects in the queue moving to completion can be calculated[7]. ESAI designates this performance as the "probability of completion". Projects fail to move to completion for a large number of reasons. The obstacles include failure to obtain necessary permits, local opposition, poor economics, merchant risks, and lack of financing amongst others.

In New England, the overall probability of completion performance based upon this metric is slightly below 20 percent. In its 2008 Regional System Plan[8], ISO-NE provided a summary of the interconnection queue performance from its inception in 1997 through March 2008. Based upon the number of projects actually completed, not total MWs, the probability of completion is 17.7 percent (47 projects against 265 interconnection applications).

The New England Probability of Completion Assumptions

For the forward queue analysis in New England, ESAI applies a probability of completion assumption of 20 percent to all projects in the queue that have not yet commenced construction and are under active development. This percentage is higher than the PJM and New York performance. The PJM queue history reflects a probability of completion of 16 percent or lower; New York's queue has a 10 percent probability of completion (see footnote 7).

As a further refinement, projects that have cleared in the first FCM auction (for 2010/11) are given a 100 percent probability of completion due to their commitments to be on-line by June 2010. Projects that have qualified for the second FCM auction, for the 2011/12 capacity year, are given a 40-50 percent probability of completion. These projects may not clear in the auction, but have cleared many of the major permitting and interconnection hurdles. As mentioned earlier, Cape Wind has not qualified for the second FCM auction, but is given a 40 percent chance of

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[6] ISO-NE is undergoing queue reform and some change is expected to the rules, including higher costs for interconnection studies.

[7] A straightforward way to assess the overall probability of completion is to compare the total MWs of projects completed to the total MWs of projects withdrawn from the queue over a long period of time. A simple formula to calculate this probability of completion is shown below:

$$\text{POC \%} = \frac{OP + UC}{TA} \times 100 \ ,$$

Where,
OP = Operating, MW
UC = Under Construction, MW
TA = Total of Generator Interconnection Applications, MW
In PJM, the interconnection queue has been split into periods of six months, where applications in each six month period are assigned a queue letter. For example, Queue F represents project applications submitted from end-January 2000 to end-July. For Queues A through N, representing all projects from before 1999 and through 2005, the project probability of completion was 13 percent. The total MWs of projects withdrawn from the queue during that period represents 84 percent of the total. This leaves a very small percentage projects from these queues that might still considered active, but at this point are unlikely to proceed. When taking all the PJM queues into account (A through U), the probability of completion drops to 10 percent. Using the A through N queues provides a more accurate picture because most projects are either completed or withdrawn and are no longer active.
ESAI's assessment of the New York queue requires an assessment of 'inactive' projects – projects that have not withdrawn but are most certainly not under any active development are likely to withdraw. Based on the metric above, the New York probability of completion is 10.0 percent.

[8] ISO New England, "2008 Regional System Plan", October 16, 2008, p. 50
http://www.iso-ne.com/trans/rsp/2008/rsp08_final_101608_public_version.pdf

completion due to its position in the permitting process and other factors, such as its location in Massachusetts that should give it some development advantages due to considerations under the Green Communities Act.

Renewable projects, particularly wind projects, face the same obstacles noted above for traditional generators. In addition, there are additional challenges to wind projects in the siting and permitting process, including "NIMBYism". The number of sites is somewhat limited by the minimum wind speed requirements and these sites are often located on environmentally sensitive mountain ridges and other sensitive areas. The local opposition to the Cape Wind construction in Nantucket Sound is an interesting example of the challenges faced by wind developers. Wind developers also face the challenges of obtaining turbines on a timely and cost-effective basis as well as the constantly shifting long term outlook for energy prices that directly impact wind farm economics. Given the additional challenges faced by wind developers, the application of a 20 percent probability of completion for wind projects under development appears prudent.

A Look At the Current New England Queues

Table 2 provides an overview of the current New England queues for renewable resources. The queue capacity is broken out by the expected year of project completion. Each project in the queue is assigned a probability of completion consistent with the status of each project as outlined above. The first column expresses the total renewable capacity in the queue for the expected year of completion. The second column provides the total expected capacity that will eventually be constructed based on the sum of the total net capacity after the individual project probabilities of completion are applied.

In its forward assessment of supply, ESAI uses the net capacity after probability shown in the yellow column in Table 2 to determine new renewable energy supplies in each year.

Table 2 - ISO-NE Renewable Queue Capacity Vs. Expected Capacity

Online Year	Nameplate Queue Capacity, MW	Net Expected Capacity After Probability, MW
2008	479	183
2009	482	187
2010	967	267
2011	939	197
2012	1,636	419
2013	578	116
TOTAL	***5,080***	***1,368***
Average/Year	***847***	***228***

Forward Supply Analysis

Table 2 on the previous page shows that the average total renewable queue capacity in each year has been about 850 MW and that the average expected completion is 230 MW per year. Given several factors outlined below, ESAI makes an assumption that 1,500 MW per year of wind-equivalent renewables will enter the queue and that 300 MW or 20 percent of these will be completed each year. Defining factors are:

1) Increasing trend of renewable capacity development already evident
2) Higher Alternative Compliance Payments will drive additional development
3) Other state RPS initiatives will drive investment and development

Visibility in the Queue Through 2011

There is adequate transparency in the queues through 2011. This is primarily due to the requirement that resources that wish to offer into the 2011/12 FCM capacity auction have already been pre-qualified (auction takes place in December 2008). Those resources that have qualified for the auction were given the higher 40-50 percent completion probabilities and other non-qualified resources were given the 20 percent 'in-development' probability. For 2008 to 2011, the expected "net capacity after probability" numbers shown in Table 2 are used in the supply forecast – 267 MW for 2010 and 197 MW for 2011.

There are 767 MW of wind equivalent resources in the queue that have qualified for the second FCM auction (including biomass and landfill gas projects). At ESAI's 40 percent completion assessment we would expect 306 MW to clear in the auction, some of which will have completed construction in 2009 and 2010.

New Resource Additions 2012 to 2020

Beyond 2011, we expect a significant increase in project completions on an annual basis to 300 MW per year of wind equivalent resources. This is roughly equivalent to the pace of renewable resources expected to clear in the 2011 FCM auction with one major difference; the resources clearing in the FCM auction will be completed over a four year period, not a one year period.

It is likely that the 2012 and 2013 queues will expand, however we expect that some of the resources expected in earlier years will shift to 2012 and that some of the 2012 resources will be delayed.

Three hundred megawatts (300 MW) of wind-equivalent resources will produce 657,000 MWh of renewable energy per year with each MWh representing one Renewable Energy Credit. This is roughly equivalent to the annual increase in Massachusetts renewable energy requirements and roughly half of the required increase for New England as a whole.

The New England Supply/Demand Balance

Massachusetts Competes In a Renewable Marketplace

Massachusetts is one of five New England states with renewable energy requirements. Each of the other states have similar non-compliance penalties or ACPs. The ACPs in Massachusetts, Rhode Island, Maine and New Hampshire are equivalent at $57.12/MWh (basis 2007) and escalate equally with the consumer price index, CPI. The Connecticut ACP is $55.00/MWh but at present does not escalate with the CPI.

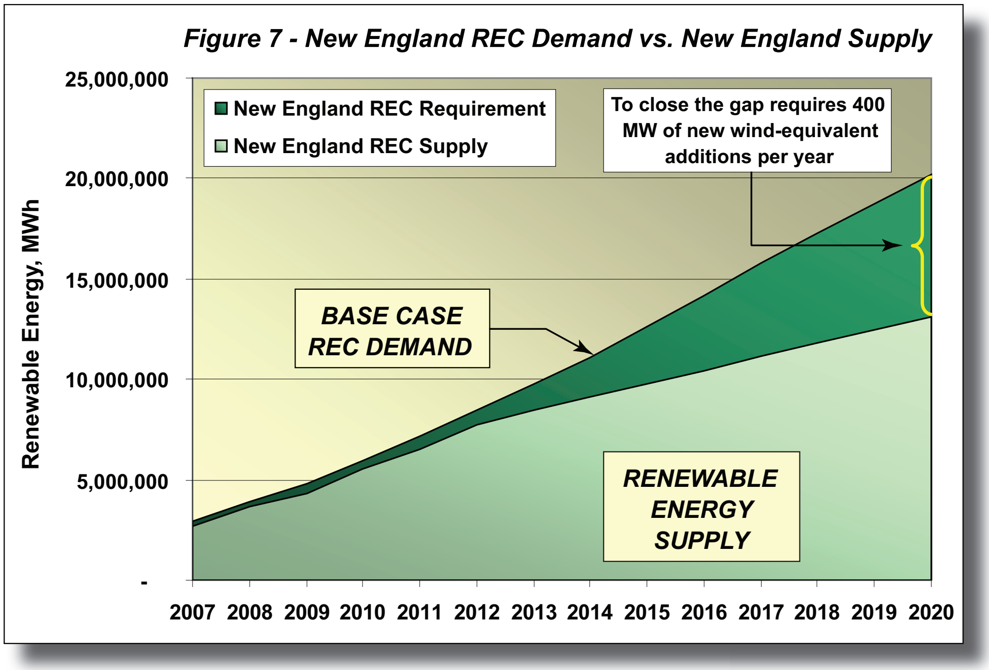
Because longer term RECs are typically traded at a significant discount to ACP, it is clear that all of these states will compete equally for available RECs. (Buyers will not want to commit to the non-compliance penalty on a long term basis. Current long term REC values are in the $30-40/MWh range.)

Because Massachusetts co-exists in a competitive New England marketplace with other states who can compete equally, ESAI assigns available supply on a pro-rated basis across the states. As noted in an earlier chart with a breakdown of the NE REC requirements, the 2009 Massachusetts requirement represents 46 percent of the total pool requirement with Connecticut close behind at 42 percent. While it is possible that Massachusetts can provide local incentives for in-state renewable energy production, this will likely only be a moderate percentage of the total Massachusetts requirement. Additional requirements at the margin will compete with other states and we believe that the pro-rata assumption is valid even with state provided incentives.

The New England Balance

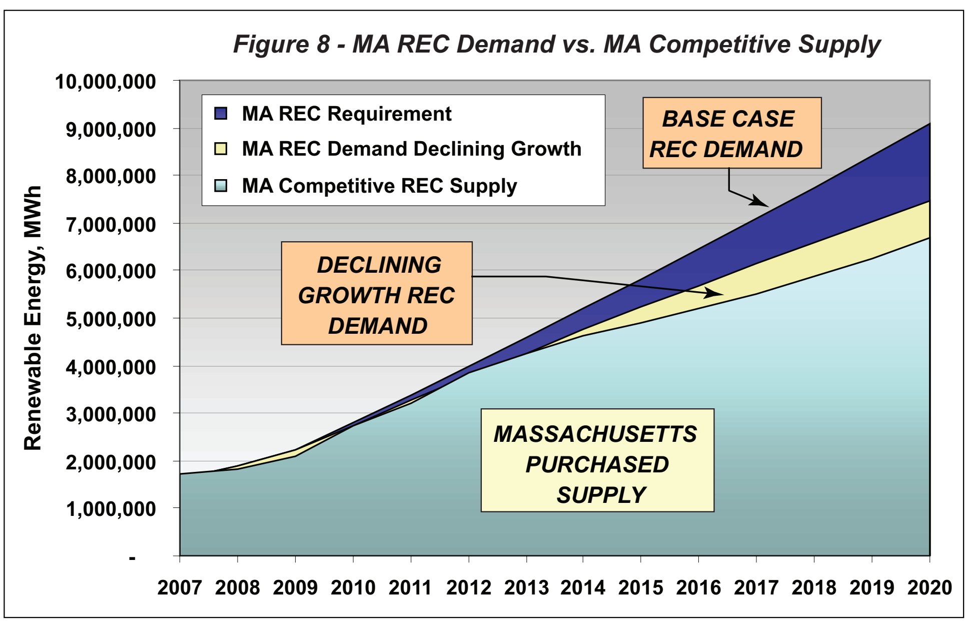
In 2007, the New England REC supply and demand is likely to be balanced. From 2008 to 2012, new capacity additions should come close to keeping up with increases in REC demand, both in New England and in Massachusetts. Beyond 2012, a supply gap will develop that will widen slowly as new REC supply additions are outpaced by the accelerating demand. The supply – demand gap starts to widen after 2012 and continues to widen into 2020. By 2020, the New England REC shortfall would be close to 7.1 million MWh under the Base Case growth scenario (0.8 percent load growth).

Figure 7 shows the widening gap between supply and demand beyond 2012. This gap is defined by the Base Case demand growth scenario and new wind equivalent resources of 300 MW per year. In order to meet the New England RPS goals, 700 MW of new wind-equivalent resources or 1,533,000 MWhs would need to be added each year. This is an additional 400 MW above the 300 MW that ESAI assumes would get built under the expected pace of development. Without the 400 MW of additional wind equivalent resources, the gap would remain. Even with 600 MW per year of total new additions, the REC market supply in New England would fall short by over 1.8 million MWh. ESAI believes that it would be difficult to implement such an aggressive renewables program to add another 400 MW (total 700 MW/year) of wind equivalent resources in New England without new infrastructure to enable its development in areas where wind resources are most abundant.



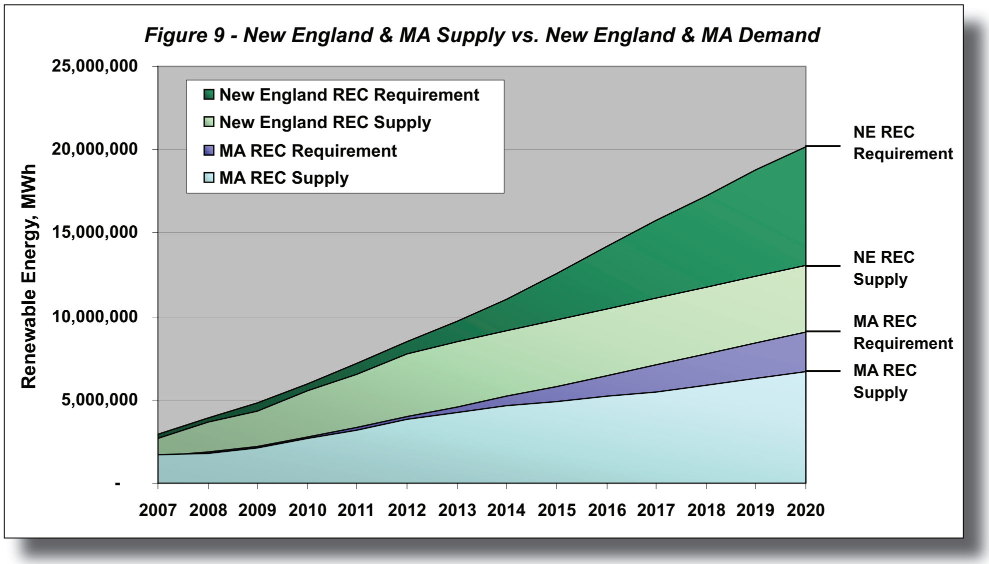
The Massachusetts Balance

As mentioned above, Massachusetts must compete with other New England states to purchase RECs from renewable energy suppliers. Under the Base Case growth scenario, Massachusetts's REC balance is balanced to only slightly short from 2008 to 2012 (see Figure 8) Beyond 2012, a widening shortfall begins to develop. This shortfall is expected to widen significantly to about 2.5 million MWh per year by 2020.



The Overall Picture

Figure 9 provides the Massachusetts demand and supply outlook in the context of the greater New England supply and demand outlook. The total New England supply could easily meet the Massachusetts requirements, however, other states would then fall very short of requirements. The Massachusetts supply represents approximately half of the total New England supply.



Connecticut is the second largest demand sink for New England RECs. Because the Connecticut Alternative Compliance Payment price does not increase with the Consumer Price Index as is the case with the other New England states, Connecticut becomes less competitive and yields more RECs to the other higher priced states.

Massachusetts would be the biggest beneficiary of RECs being diverted from Connecticut to higher priced states. In 2020, Massachusetts would represent 45 percent of the New England demand, but would attract 51 percent of the New England supply. This competitive dynamic has been included in ESAI's supply assessments.

Facilitators to Completion

Renewable energy projects rely largely on developing and emerging technologies that can be expensive relative to traditional forms of electricity generation. To overcome the economics associated with higher costs and the intermittent nature of wind and solar resources, a number of specific policies have been put in place that provide incentives to renewable developers. Other policies such as those aimed at emissions reductions will also provide economic benefits to renewable developers. These facilitators to project development are outlined below.

1) ***High ACP Prices*** - ACPs are high in New England and are likely to stay high over the next ten years. This provides a backdrop for developers to gain higher prices for long term REC contracts and is supportive of new development.

2) ***ACP Redeployment*** - Funds received as Alternative Compliance Payments will go to the Mass Technology Collaborative and the Renewable Energy Trust where funds will be redirected back into renewable project development. This will help to get many new projects off the ground.

3) ***Massachusetts Green Communities Act*** – In-state promotion of renewables and other state government support represent significant initiatives in the Green Communities Act. Massachusetts utilities will be required to provide long term contracts for renewable energy supplies. Long term contracts will be a vital component of any package that developers present to lenders for financing. Merchant projects will be much more difficult to finance for the foreseeable future.

4) ***Production Tax Credit*** – As part of the recent federal bailout package, production tax credits were extended by 8 years for the solar industry and 1 year for the wind industry. This provides a continued stimulus for the wind and solar renewable sectors.

5) ***Carbon Mitigation & Emissions*** – The introduction of carbon cap and trade under RGGI (the Regional Greenhouse Gas Initiative) will add a carbon cost component to the cost of conventional power production. As this cost increases, the marginal cost of electricity in the wholesale markets will increase. Renewable power sources will have little or no carbon costs and will directly benefit from any increases in carbon costs that result in higher electricity costs. This added revenue could become very significant under a federal carbon program that imposes strict carbon emission standards. Although the Clean Air Interstate Rule was recently vacated, a replacement rule for tighter NOx and SOx standards is expected under a cap and trade program. Higher costs for NOx, SOx and mercury mitigation for traditional generators will also result in higher electricity costs and provide economic benefits to renewable energy resources that do not have these emissions costs.

6) ***Wind Development Areas*** – In April 2008, the state of Maine enacted legislation to expedite wind farm development under "An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development". Specifically, the Act sets out a goal of 3,000 MW of new wind capacity to be built in Maine by 2020. Under the Act, the permitting process will be streamlined for projects developed in designated expedited development areas. These areas are quite extensive and cover major portions of the State of Maine.

7) ***Import Qualifications*** – The Massachusetts requirement for FCM qualified imports has been dropped as a result of the reviews and comments as part of the rulemaking process.

Imports are not required to clear the Forward Capacity Markets in order to meet Massachusetts RPS eligibility. This clears a potential hurdle for renewable energy imported from outside of New England.

8) ***Net Metering –*** Promotes smaller on-site or distributed renewable energy production by allowing net sales to the grid. Wind towers up to 60 kW and solar up to 2 MW will qualify for net metering.

Impediments to Renewable Energy Growth In New England

The development of a generation project is a lengthy and tedious process that requires an organization with access to significant expertise in many areas including siting, environmental permitting, technology, transmission, plant economics, and financing. Renewable energy projects such as wind farms encounter these same issues and can face additional difficulties that do not necessarily plague traditional generation developers. The following issues are particularly relevant to wind project developers and provide potential hindrances to the progress of developing projects.

1) ***Energy Price Uncertainty*** - A high fuel price environment has a directly positive impact on the economics of most renewable energy projects, especially wind. Under a high fuel price environment, developers are able to make long term contracts for their energy at high fixed prices. For wind developers, the fuel – wind – is free and any increases to their energy sales price go straight to the bottom line. As fuel prices come down, wind project economics are less attractive.

   High natural gas prices provided a very positive outlook for renewable development during the Spring of 2008. From April to July, natural gas prices were at $12.00/MMBtu or higher, providing a strong underpinning for the high energy prices needed to support renewables.

   The current outlook is for $6-8 gas for the next several years. This is due to a number of factors including lower demand, abundant shale gas production, global LNG production hitting stride in the 2010-12 time frame and increased access to natural gas from the Rockies region due to new west to east pipeline capacity. Lower natural gas prices will result in lower electricity prices and will tend to make wind projects less profitable and more difficult to finance than under a high gas price scenario.

2) ***New England Capacity Prices*** - New England conducted its first Forward Capacity Market (FCM) auction in early 2008. Prices cleared at the floor of $4.50/kw-mo, well below the requirements for new traditional gas-based capacity (combined cycle). The first auction cleared a surplus of approximately 2,000 MW; this surplus will add to pricing pressure in future auctions. Given the qualified resources for FCM 2, we expect further additions to the surplus as over 5,000 MW of price taker capacity qualified in FCM 2. ESAI expects depressed capacity pricing conditions through 2015. Capacity factors play a relatively small role in wind farm revenue streams, but are more significant for higher capacity factor biomass or landfill gas projects.

3) ***NIMBY Issues*** - Although typically associated with traditional power plants, NIMBY issues are also arising with wind projects. Most projects must overcome concerns and objections over visibility issues, noise and the traffic associated with the construction and maintenance of the wind towers and turbines.

4) ***Limited Transmission Take-away Capacity*** - The base New England infrastructure is not currently capable of handling high volumes of power generated from renewable sources in all areas. Significant limitations would be experienced in Maine under existing conditions. The Maine limitations will be addressed to some extent if the Maine Power Reliability Project is approved and constructed.

5) ***Deliverability Issues*** - Due to limited transmission, it is possible that renewable energy production could be curtailed to preserve the integrity of grid operations. One example is curtailment at the Maple Ridge wind farm in upstate New York – a Massachusetts eligible resource. This facility has experienced curtailments and significant price discounts due to congestion on transmission lines that are inadequately sized to handle all of the power that can be potentially delivered from that area.[9]

6) ***Access to Transmission – Long Generator Leads*** - Wind farms are often located significant distances from existing transmission lines. Some developers may be able to afford long generator leads as part of their overall project costs, others may not.

7) ***Siting – Best Sites Taken Early*** - As projects get built, new sites are harder to find and possibly more difficult to permit. The choice spots go first, the more difficult sites are left for later development.

8) ***Financing*** - The current credit environment makes debt financing much more difficult, particularly for merchant projects. Some project developers are now being forced to shut down or scale back projects under late stage development or even construction. One major developer, Noble Environmental Power, is curtailing construction or development of about half of its projects as a result of the Lehman Brothers failure.

   Long term power purchase agreements will be needed to finance most projects. Many projects will require energy prices that are above market and high REC prices. Some entities may be willing to pay higher prices to support development, others may not. Most buyers will be hoping to buy long term RECs at substantial discounts to the annual ACP levels.

   Offshore costs are much higher and would require significantly above market energy, capacity and REC prices in some combination to meet higher cash flow needs.

9) ***Tax Credit Values Are Volatile*** - Renewable projects often generate tax credits that are more valuable to other entities. Developers have been able to take advantage of this by 'selling' their tax credits to enhance the economics of the project. Due to the recent financial crisis, the market's appetite for tax credits has also contracted significantly and reduces the opportunity for this economic enhancement.

10) ***Intermittent Resources & System Integration*** – The power system can accommodate a fairly high level of intermittent resources. However, the full amount of intermittent resources that can be managed effectively on the system is unknown. As more wind resources enter the system over time, it may become more difficult or more costly to interconnect incremental wind resources to the system.

11) ***Biomass Fuel Availability*** - There is significant potential for biomass capacity additions in New England, however, there is a limit to the amount of wood based biomass fuel that will be available for new projects. Recent studies for a proposed biomass plant in Coos County, New Hampshire[10] indicate that it is questionable whether enough biomass is available locally without longer haul imports to the facility. Each incremental biomass

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[9] Matthew Wald, "Wind Energy Bumps Into Power Grid's Limits", New York Times, August 27, 2008.

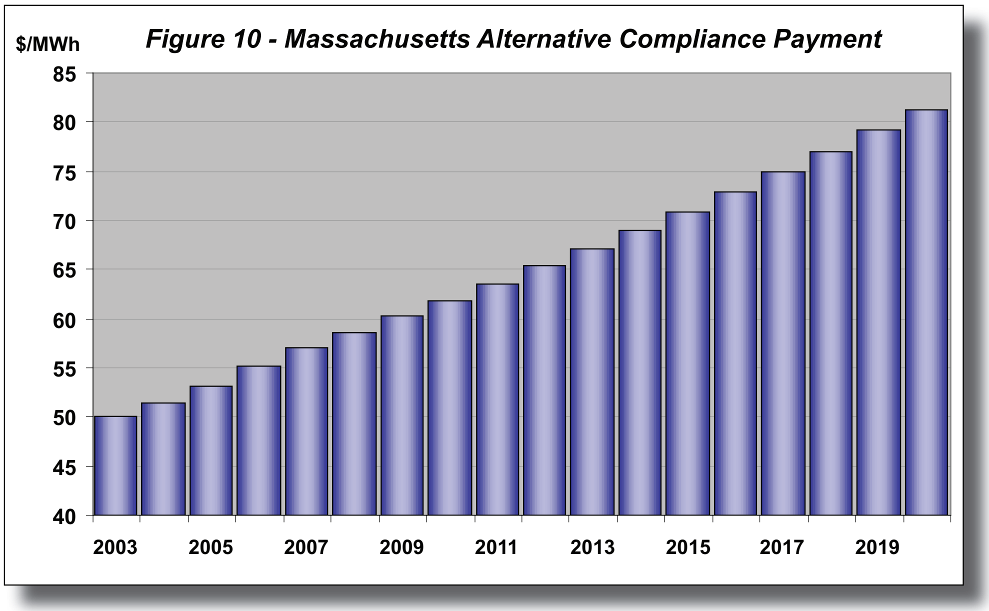
[10] Relevant studies can be found at http://www.puc.state.nh.us/TransmissionCommission.htm . "Clean Power Development – Biomass Fuel Availability"; "Innovative Natural Resources Solutions, Inc. – Presentation on Biomass Fuel Availability In Berlin, NH"; "Landvest Inc. Presentation on Wood Supply Study For Coos County".

facility that gets built will add strain to the regional market for wood based biomass, eventually driving competition and higher prices.

12) ***Regulatory Uncertainty*** – The uncertainty associated with the production tax credits for wind energy production is another difficulty in the development of new wind facilities. The production tax credit is a key component of the revenues streams that make many wind projects economically feasible. Without this tax credit, many projects would not move forward. There are many other regulatory risks that developers must face including the possibility of changes in the renewable portfolio standards themselves or changes in the ISO market rules that could adversely impact project economics.

Massachusetts Alternative Compliance Payments

Massachusetts energy buyers will pay the Alternative Compliance Payment (ACP) for any shortfall in REC supply against the state mandated requirements. This is a deficiency penalty that is paid into a fund managed by the Massachusetts Technology Collaborative through the Renewable Energy Trust. The ACP was set in 2003 at $50.00/MWh and increases annually with the Consumer Price Index. From 2009 forward, a ESAI applied a 2.75 percent CPI growth rate to this analysis. By 2020, the ACP will climb above $80.00/MWh (see Figure 10).



The total annual ACP payment expectations can be calculated by multiplying the expected REC shortfall by the ACP penalty in each year. In 2009, we anticipate the total ACP payments in Massachusetts to reach over $36 million. By 2020, the annual ACP payment could reach $244 million per year. Figure 11 shows the annual and cumulative ACP payments from the start of the RPS program in 2003 through 2020. Cumulative payments through 2020 could reach $900 million under the Base Case growth scenario. Figure 12 shows that cumulative payments under the Declining growth scenario would reach $340 million by 2020.

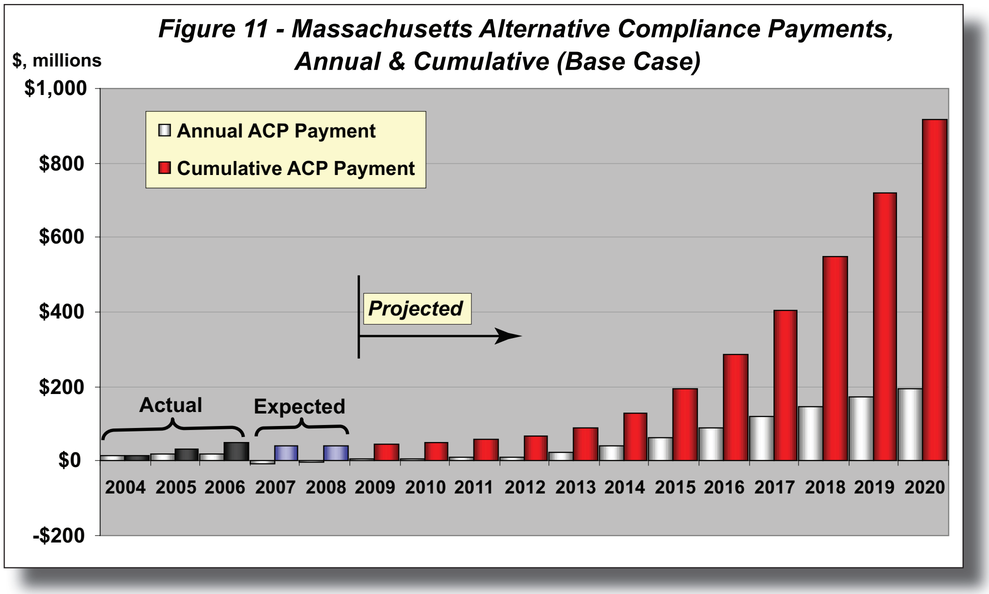


Figure 11 - Massachusetts Alternative Compliance Payments,
Annual & Cumulative (Base Case)
$, millions
$1,000
$800
$600
$400
$200
$0
-$200
Annual ACP Payment
Cumulative ACP Payment
Projected
Actual
Expected
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

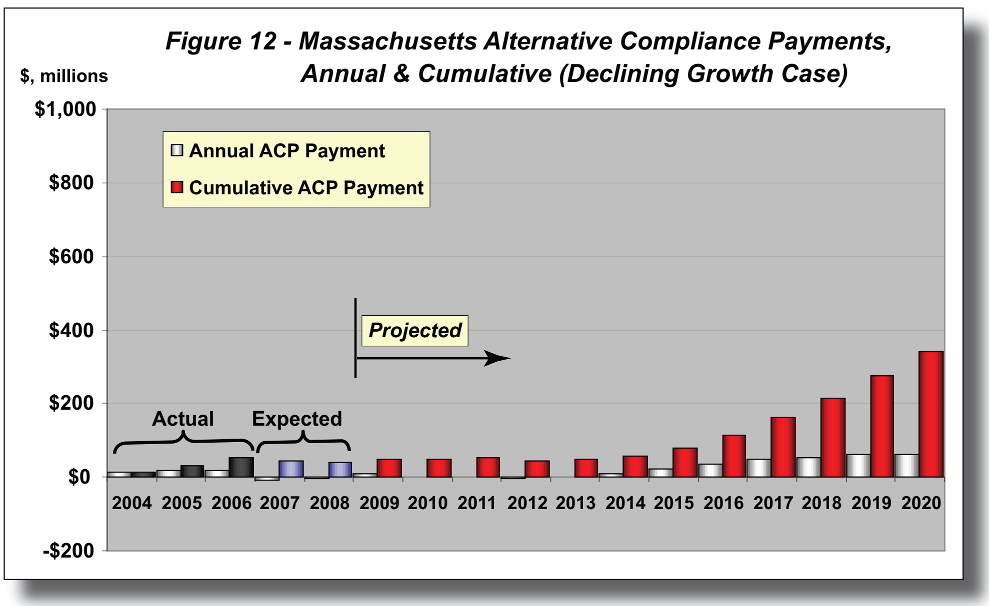


Figure 12 - Massachusetts Alternative Compliance Payments,
Annual & Cumulative (Declining Growth Case)
$, millions
$1,000
$800
$600
$400
$200
$0
-$200
Annual ACP Payment
Cumulative ACP Payment
Projected
Actual
Expected
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

APPENDIX

Table A1 - ISO-NE 2008 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2008 Capacity**
Stetson Mountain Wind	100%	60	60	60
Stetson Mountain Wind	100%	39	39	39
Lempster Wind Energy Project	100%	24	24	24
Grandpa's Knob Wind	50%	75	38	
Hoosac Wind Project	40%	30	12	
Biomass Project	20%	17	3	
Landfill Gas	20%	6	1	
Landfill Gas	20%	5	1	
Phillips Brook Wind	3%	146	4	
Rollins Mountain Wind Farm	1%	78	1	
TOTAL		**479**	**183**	**123**

Table A2- ISO-NE 2009 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2009 Capacity**
Kibby Wind Farm	100%	65	65	65
Granite Reliable Power Windpark	50%	100	50	50
Fraser Paper	40%	61	24	24
Wind Project	20%	87	17	
Wind	20%	27	5	
Wind	20%	24	5	
Wind Capacity Increase- see # 245	20%	30	6	
Wind Project	20%	34	7	
Wind Project	20%	13	3	
Landfill Gas	20%	2	0.3	
Sheffield Wind	10%	40	4	
TOTAL		**482**	**187**	**139**

Table A3 - ISO-NE 2010 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2010 Capacity**
Kibby Wind Farm	100%	66	66	66
Watertown Renewable Power	40%	26	11	
Rhode Island Landfill Gas Project	40%	36	14	
Rhode Island Landfill Gas Project	40%	46	18	
Wind Project	20%	75	15	
Wind	20%	148	30	
Wind	20%	20	4	
Wind	20%	50	10	
Wind Project	20%	30	6	
Wind Project-Phase 1(MPS Queue # 6)	20%	300	60	
Plainfield Renewable Energy Project	20%	38	8	
Biomass Project	20%	45	9	
Biomass Project (also queue position #223)	20%	41	8	
Increase to biomass project in queue 218	20%	21	4	
Steam Turbine	20%	17	3	
Biomass Project	20%	10	2	
TOTAL		**967**	**267**	**66**

Table A4 - ISO-NE 2011 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2011 Capacity**
Wind - Orleans	20%	34	7	
Wind (upgrade to 266) - Orleans	20%	9	2	
Wind - Aroostock	20%	150	30	
Wind - Aroostock	20%	150	30	
Wind - Aroostock	20%	150	30	
Brodie Mountain (Berkshire Wind)	80%	15	12	
Wind Project-Phase 3 (MPS Queue # 4)	20%	250	50	
Russell Biomass	20%	55	11	
Biomass Project	20%	41	8	
Biomass Project	20%	50	10	
East Springfield Biomass	20%	35	7	
TOTAL		**939**	**197**	**0**

Table A5 - ISO-NE 2012 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2012 Capacity**
Cape Wind	40%	462	185	
Deepwater Wind	20%	347	69	
Wind - Aroostoock	20%	64	13	
Wind - Aroostoock	20%	95	19	
Fitchburg Wind	20%	12	2	
Wind Project-Phase 2(MPS Queue # 2&3)	20%	250	50	
Wind Project-Phase 4(MPS Queue # 8)	20%	250	50	
Wind Project-Phase 5(MPS Queue # 9)	20%	150	30	
East Haven Wind Farm	5%	6	0	
TOTAL		**1,636**	**419**	**0**

Table A6 - ISO-NE 2013 Projects				
Facility Name / Project Type	**Probability**	**Capacity**	**Net Capacity**	**2013 Capacity**
Wind	20%	450	90	
Wind	20%	128	26	
TOTAL		**578**	**116**	**0**

APPENDIX 2

Massachusetts RPS Requirements Under Original and New RPS			
Year	**Original RPS (1997 Statute)**	**New RPS, Class 1 (S.B. 2768 Green Communities Act)**	**Alternative Compliance Payment ($/MWh)**
2003	1.0%	1.0%	$50.00
2004	1.5%	1.5%	$51.41
2005	2.0%	2.0%	$53.19
2006	2.5%	2.5%	$55.13
2007	3.0%	3.0%	$57.12
2008	3.5%	3.5%	$58.58
2009	4.0%	4.0%	$60.20
2010	5.0%	5.0%	$61.87
2011	6.0%	6.0%	$63.59
2012	7.0%	7.0%	$65.35
2013	8.0%	8.0%	$67.16
2014	9.0%	9.0%	$69.02
2015	*9.0%*	10.0%	$70.93
2016	*9.0%*	11.0%	$72.89
2017	*9.0%*	12.0%	$74.91
2018	*9.0%*	13.0%	$76.99
2019	*9.0%*	14.0%	$79.12
2020	*9.0%*	15.0%	$81.31

New England Alternative Compliance Payments		
	MA, RI, ME, NH	**CT**
2007	$57.12	$55.00
2008	$58.69	$55.00
2009	$60.30	$55.00
2010	$61.96	$55.00
2011	$63.67	$55.00
2012	$65.42	$55.00
2013	$67.22	$55.00
2014	$69.07	$55.00
2015	$70.96	$55.00
2016	$72.92	$55.00
2017	$74.92	$55.00
2018	$76.98	$55.00
2019	$79.10	$55.00
2020	$81.27	$55.00

Eligible Resources Under Original RPS Versus New RPS		
Resource	**Original RPS (1997 Statute)[1]**	**New RPS (S.B. 2768 Green Communities Act)[2]**
Solar Photovoltaic	X	X
Solar Thermal Electric Energy	X	X
Wind Energy	X	X
Ocean Thermal, Wave or Tidal Energy	X	X
Fuel Cells Using Renewable Fuels	X	X
Landfill Gas	X	X
Hydro[3]		X
Biomass	X	X
Marine or Hydokinetic Energy		X
Geothermal Energy		X

[1] Includes resources that began operation after December 31, 1997.

[2] Includes resources that began operation after December 31, 1997.

[3] Applies only to new units with a capacity up to 25 MW, or to units that have been uprated to 25 MW. No unit shall involve pumped storage or construction of any new dam or water diversion structure constructed later than 1/1/98 (S.B. 2768).

Sources for MA RPS Certificates in 2006 by Fuel/Technology, State, and Date					
Name (city or town)	**State**	**Fuel / Technology**	**Capacity MW**	**Commercial Start Date**	**Historic Generation Rate, MWh**
Deer Island Treatment Plant – STG (Winthrop)	MA	AD	18	7/98	
Deblois -Worcester Energy	ME	BM	25.85	6/89, restart spring 2005	3,126
Indeck West Enfield	ME	BM	27	11/87 restart 6/01	20,888
Indeck Jonesboro (Washington)	ME	BM	27	11/87, restart 5/04	7,884
Schiller Station Unit 5 (Portsmouth)	NH	BM	50	12/06	
CRRA Hartford Energy LLC	CT	LFG	2.8	8/98	
Attleboro Landfill – QF	MA	LFG	1.5	1/98	
Randolph/BFG Electric Facility	MA	LFG	3	3/00	
[Sykes Rd] -GRS -Fall River	MA	LFG	5.7	8/00	
Granby Sanitary Landfill & Granby LFG Off Grid	MA	LFG	2.8	10/01	
Greater New Bedford LFG Utilization& CNBE Off Grid	MA	LFG	3.3	10/05	
Plainville Generating Co., LLC	MA	LFG	5.6	3/03	
Chicopee Units 1, 2, & 3	MA	LFG	5.7	2/04	
Westfield #1	MA	LFG	0.48	12/04	
Turnkey Load Reducer (Rochester)	NH	LFG	3.2	3/92	8,329
Rochester Landfill	NH	LFG	6.4	1/98	1,665,859
Colonie LF/Innovative Energy (Cohoes)	NY	LFG	4.8	1/06	
Ontario LFG/Seneca Energy II (Stanley)	NY	LFG	5.6	3/03, import 4/05	
Model City Energy Facility (Lewiston)	NY	LFG	5.6	6/01, import 3/04	
Modern LFG (Youngstown)	NY	LFG	6.4	1/06	
Seneca Falls Landfill Gas (Waterloo)	NY	LFG	11.2	3/96, import 1/04	48,130
Johnston Landfill	RI	LFG	12	12/89	86,901
Johnston RGGI Expansion Phase 1	RI	LFG	2.4	3/04	
Johnston RGGI Expansion Phase 260	RI	LFG	6	8/05	
Coventry LF Gas to Energy	VT	LFG	4.8	5/05	
Brockton Brightfield	MA	PV	0.425	9/06	
MA PV Cluster [aggregation]	MA	PV	0.268	6/03	
One Oak Hill Road PV (Fitchburg)	MA	PV	0.147	8/05	
Solar New England [aggregation]	MA	PV	0.078	12/98	
Hull Wind 2	MA	Wind	1.8	5/06	
Massachusetts Maritime Academy WTG (Buzzards Bay)	MA	Wind	0.66	6/06	
Mars Hill (in NMISA, not ISO-NE)61	ME	Wind	42	10/06	
Fenner Windpower Project (Cazenovia)	NY	Wind	30	12/01, import 1/03	
Mount Miller Wind Energy (Murdochville)	QC	Wind	54	6/05, import 10/06	
Mount Copper Wind Energy (Murdochville)	QC	Wind	54	6/04, import 10/06	
In-State Resources			**49**	**11%**	
Out-Of-State Resources			**381**	**89%**	
Total Resources			**431**	**100%**	
Source: MA RPS Annual Compliance Report for 2006					

Other MA Qualified New Renewable Generation Units					
Name (city or town)	**State**	**Fuel / Technology**	**Capacity MW**	**Commercial Start Date**	**Historic Generation Rate, MWh**
Berkshire Cow Power (Richford)	VT	AD	0.6	12/06	
Green Mt Dairy Farm (Sheldon)	VT	AD	0.33	2/07	
Montagne Farm (St. Albans)	VT	AD	0.38	10/07	
Blue Spruce Farm (Bridport)	VT	AD	0.27	1/05	
Iggy's Biodiesel CHP (Cambridge)	MA	BM	0.045	spring 2008	
Seaman Paper (Baldwinville)	MA	BM	0.3	6/06, qualified for 10/07	
Ware Cogen	MA	BM	8.6	mid/late 2008	
Boralex Livermore Falls	ME	BM	40	11/91, restart TBD	0
Greenville Steam Company	ME	BM	20	12/86, qualified 1/07	0
Laidlaw Energy & Environmental (Ellicottville)	NY	BM	5.5	early 2009	
Manchester Methane (E. Windsor)	CT	LFG	3.2	5/07	
Ameresco Northampton	MA	LFG	0.8	early 2008	
Covanta Haverhill – LF Gas	MA	LFG	1.6	12/07	
Fitchburg Landfill	MA	LFG	3.2	9/07	
Pine Tree Landfill	ME	LFG	3.17	2/08	
Dunbarton Road Landfill (Manchester)	NH	LFG	1.3	8/88	4,248
MM Albany	NY	LFG	6.6	late 2008	
Nanticoke Landfill Gas (Binghamton)	NY	LFG	2.1	3/04, import spring 2008	
Development Authority of the North Country/Innovative Energy (Rodman)	NY	LFG	4.8	summer 2008	
Seneca Falls LFG Expansion66	NY	LFG	4.8	6/07	
WM Chaffee	NY	LFG	4.8	7/07	
WM Mill Seat (Bergen)	NY	LFG	4.8	7/07	
MM Cuyahoga Energy (Solon)	OH	LFG	3.8	2/99	
Pontiac Energy (Cranston)	RI	LFG	0.5	3/96	1,611
Coventry LF Gas to Energy [additional engine, new GIS acc't]	VT	LFG	1.8	1/07	
GSA Waltham, Solar Array	MA	PV	0.325	3/07	
Mass. Energy Aggregate PV	MA	PV	0.036	4/03	
Mass. Energy Aggregate PV (Cape & Is)	MA	PV	0.09	10/03	
Mass. Maritime Academy Dorm PV (Buzzards Bay)	MA	PV	0.08	11/07	
Shad Hall Photovoltaic (Harvard University, Boston)	MA	PV	0.036	9/03; 4/07 into NEPOOL GIS	
Hull Wind Turbine U5	MA	Wind	0.66	12/01	
Princeton Wind Farm [replacing old 0.32 MW with new 3.0 MW]	MA	Wind	3	9/84, restart spring 2009	208
Jiminy Peak Wind QF (Hancock)	MA	Wind	1.5	8/07	
Mass. Energy Aggregate Small Wind	MA	Wind	0.01	9/04	
Madison Windpower	NY	Wind	11.5	10/00, import 7/07	
Maple Ridge II Wind Farm (Lowville)	NY	Wind	90.75	12/06, import 1/07	
Munnsville Wind Farm (Bouckville)	NY	Wind	34.5	7/07	
Steel Winds Energy Project (Lackawanna)	NY	Wind	20	4/07	
West Hill Windpower (Sturbridge)	NY	Wind	39	fall 2008	
West Cape Wind Farm (O'Leary) [in two phases, 20 MW and 79 MW]	PEI	Wind	99	5/07 & fall 2008-2009	
In-State Resources			**20**	**5%**	
Out-Of-State Resources			**404**	**95%**	
Total Resources			**424**	**100%**	

Source: MA RPS Annual Compliance Report for 2006

Note: Table includes MA RPS qualified New Renewable Generation Units that did not provide RECs for 2006 compliance.