

New York State Energy Research and Development Authority

NYSERDA

Renewable Portfolio Standard Main Tier 2013 Program Review

Summary

Final Report
September 5, 2013



NYSERDA's Promise to New Yorkers:

NYSERDA provides resources, expertise and objective information so New Yorkers can make confident, informed energy decisions.

Our Mission: Advance innovative energy solutions in ways that improve New York's economy and environment.

Our Vision: Serve as a catalyst—advancing energy innovation and technology, transforming New York's economy, empowering people to choose clean and efficient energy as part of their everyday lives.

Our Core Values: Objectivity, integrity, public service, partnership and innovation.

Our Portfolios

NYSERDA programs are organized into five portfolios, each representing a complementary group of offerings with common areas of energy-related focus and objectives.

Energy Efficiency and Renewable Energy Deployment

Helping New York to achieve its aggressive energy efficiency and renewable energy goals – including programs to motivate increased efficiency in energy consumption by consumers (residential, commercial, municipal, institutional, industrial, and transportation), to increase production by renewable power suppliers, to support market transformation and to provide financing.

Energy Technology Innovation and Business Development

Helping to stimulate a vibrant innovation ecosystem and a clean-energy economy in New York – including programs to support product research, development, and demonstrations; clean-energy business development; and the knowledge-based community at the Saratoga Technology + Energy Park®.

Energy Education and Workforce Development

Helping to build a generation of New Yorkers ready to lead and work in a clean energy economy – including consumer behavior, youth education, workforce development and training programs for existing and emerging technologies.

Energy and the Environment

Helping to assess and mitigate the environmental impacts of energy production and use – including environmental research and development, regional initiatives to improve environmental sustainability and West Valley Site Management.

Energy Data, Planning and Policy

Helping to ensure that policy-makers and consumers have objective and reliable information to make informed energy decisions – including State Energy Planning; policy analysis to support the Regional Greenhouse Gas Initiative, and other energy initiatives; emergency preparedness; and a range of energy data reporting, including *Patterns and Trends*.

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Prepared by:

New York State Energy Research and Development Authority

Albany, NY

Summary

Introduction

The Renewable Portfolio Standard (RPS), established by the New York State Public Service Commission (Commission) and administered by the New York State Energy Research and Development Authority (NYSERDA), has been New York's primary policy initiative to promote the development of new renewable energy resources since it was established in 2004.¹ In accordance with Commission directives with respect to a 2013 review and in cooperation with staff of the Department of Public Service, NYSEDA has developed a series of reports to assist the Commission in assessing the RPS program in its entirety.²

This summary presents findings associated with the RPS Main Tier³, including an evaluation of the benefits and costs associated with the portfolio of currently contracted resources as of December 31, 2012 (the Current Portfolio).⁴ It also presents an assessment of the prospects for meeting Main Tier targets (established in 2009/2010) using available uncommitted funds. The program review is comprised of three volumes of work:

- **Volume 1: Program Review Introduction.** This volume provides an overview of the RPS Policy and Orders, a summary of the Program Review approach, a Main Tier status update on what has been accomplished as of December 31, 2012, and a review of the methods that were used to perform the analysis presented in subsequent volumes.
- **Volume 2: Current Portfolio Analysis.** This volume presents an evaluation of all RPS Main Tier projects in the Current Portfolio.⁵ The evaluation includes an analysis of the associated direct investment made in New York State, the electricity system impacts of the new renewable generation, a summary of environmental benefits, a detailed benefit-cost analysis, and an assessment of the macroeconomic impacts including net-job creation.
- **Volume 3: Projected Impact from Using Available Uncommitted Funds.** This volume presents an analysis of new renewable resources that could be procured under future Main Tier solicitations by expending the remaining authorized but uncommitted funds. Because the cost, quantities procured, resource mix and timing are highly dependent on the underlying assumptions, Volume 3 presents a base case and various sensitivity analyses.

¹ *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard*, "Order Regarding Retail Renewable Portfolio Standard;" issued and effective September 24, 2004.

² *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard*, "Order Establishing New RPS Goal and Resolving Main Tier Issues;" issued and effective January 8, 2010.

³ The Commission established two tiers of resource types under the RPS. The Main Tier consists primarily of medium to large-scale electric generation facilities that deliver their electrical output into the wholesale power market administered by the NYISO. The Commission also established a separate tier called the Customer-Sited Tier (CST), which is smaller, "behind-the-meter" resources, such as photovoltaic systems, fuels cells, wind facilities, anaerobic digester gas, and similar technologies that for the most part produce electricity for use on site.

⁴ A separate report has been prepared for the RPS Customer-Sited Tier.

⁵ "Current Portfolio" refers to projects with Main Tier RPS contracts as of December 31, 2012 and also includes four projects with Main Tier contracts which expired prior to December 31, 2012.

Approach

In fulfillment of the terms of the January 2010 Order, NYSERDA is filing this report with the Commission for public review. This report is intended to assist the Commission in assessing the Main Tier's progress toward meeting its goals and objectives, provide information to assist in the assessment of the various impacts of the program, and assist the Commission in the development of the State's continuing policy and investment strategies in the clean energy sector.

Many areas of the program were extensively considered in the 2009 Program Evaluation Report⁶ and addressed through subsequent Commission Orders. As noted in Section 2 of this Summary, these activities have subsequently impacted the scope and emphasis of the evaluation review for 2013. Therefore, the Main Tier 2013 Program Review Report focuses on:

- Main Tier status.
- Main Tier direct economic impacts.
- Main Tier benefit/cost analyses.
- Main Tier macroeconomic effects.
- Future Main Tier resource availability and costs.

The filing of this report as well as potential future reports will comply with the given directives to help the Commission assess the Main Tier's contributions, and to shed light on how best to continue the State's public investment in the achievement of the RPS Program goals. This report was prepared by NYSERDA and a competitively procured team of contractors in cooperation with Department of Public Service staff. This report presents key findings provided by NYSERDA and contractors Sustainable Energy Advantage, LLC and its subcontractors, La Capra Associates and Economic Development Research Group, as well as ICF International.

⁶ NYSERDA, New York State Renewable Portfolio Standard Evaluation Report: 2009 Review (Evaluation Report). The Evaluation Report relied on the reports of two NYSERDA contractors: KEMA, New York Main Tier RPS: Impact and Process Evaluation (March 2009) and Summit Blue Consulting, New York State Renewable Portfolio Standard: Market Conditions Assessment—Final Report (February 19, 2009).

Main Tier Program Status (Volume 1)

Program Performance

The original modeling work to establish the 2015 Main Tier target was conducted in 2009. In its April 2, 2010 Order, the Commission established NYSERDA Main Tier and Customer-Sited Tier program targets for supporting the production of approximately 10.4 million MWh of renewable energy annually by 2015.⁷ Including recent changes in the allocations of these targets based on the 2012 Customer-Sited Tier Program Operating Plan⁸, this consists of approximately 9.5 million MWh from the Main Tier and 0.9 million MWh from the Customer-Sited Tier.

As of December 31, 2012, Main Tier contracted projects are expected to produce 4.49 million RPS Attributes⁹ in 2015, representing about 47% of the Main Tier target.¹⁰ Approximately \$876.6 million, or roughly 38% of the total approved RPS Main Tier funding has been expended or committed to achieving the 2015 Main Tier target.

Therefore, the RPS Main Tier results to date have been achieved more cost-effectively than originally projected.

NYSERDA has conducted seven competitive Main Tier solicitations and is in the process of completing an eighth Main Tier solicitation in pursuit of the Main Tier target. As of December 31, 2012, the seven completed solicitations have resulted in active contracts to procure RPS Attributes from 54 large-scale electricity generation projects, facility upgrades or facility repowerings. Contracts with four generators expired under their terms prior to the end of 2012.¹¹ These solicitations resulted in facilities under contract from a variety of renewable generation types including wind, biomass, biogas, and hydroelectric. Wind comprises the majority of contracted projects, representing approximately 79% of generation. When all of the currently contracted projects reach commercial operation, approximately 1,834 MW of new renewable capacity¹² will be added.

⁷ *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard*, “Order Authorizing Customer-Sited Tier Program Through 2015 and Resolving Geographic Balance and Other Issues Pertaining to the RPS,” issued and effective April 2, 2010.

⁸ *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard*, Renewable Portfolio Standard Customer-Sited Tier Program Operating Plan (2012-2015), filed June 29, 2012.
<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={A6A2772B-310C-47A2-B5F9-25FFBCAC6660}>

⁹ One RPS Attribute is generated by the production of one megawatt-hour (MWh) of energy production from an eligible renewable generator. RPS Main Tier contracts only allow RPS Attribute payments to be made upon their generation and delivery to New York State. Therefore, funding associated with underperforming projects can be reallocated to procure new renewable resource Attributes that contribute to achievement of the Main Tier target.

¹⁰ NYSERDA counts toward the MWh program targets only the portion of a project’s output or potential output that is under contract. Under the RPS rules, the maximum amount eligible for bid is 95% of output; some facilities have bid and are under contract for less than 95%.

¹¹ RFP 916 permitted contract delivery terms of less than 10 years.

¹² “New Renewable Capacity” generally refers to the Nameplate Capacity of facilities under contract in the RPS that did not exist prior to the start of the RPS program, including any portion not under contract with NYSERDA.

Current Portfolio Impact Analysis (Volume 2)

This analysis accounts for the associated cost of Main Tier procurements to ratepayers, assesses the associated direct investments made in New York State, and models the impact of Main Tier renewable energy generation resources on the State's wholesale electric system. This analysis also includes an assessment of the environmental benefits resulting from the displacement of conventional generation, including avoided fossil fuel use and reduced emissions. Together, this information provides an assessment of the direct benefits and costs of the Main Tier program. However, changes in costs and spending as a result of the program will impact New York State's economy beyond these direct effects. Therefore, this evaluation of the Main Tier also includes an analysis of the statewide macroeconomic impacts on New York, including changes in employment.

The analysis of the Current Portfolio of NYSERDA Main Tier contracts consists of the following analytical components:

- **Direct Cost:** Actual Main Tier expenditures to date associated with the Current Portfolio and two Maintenance Resource projects, and an extrapolation of expected expenditures through the end of those contract's durations.
- **Direct Investment:** The reported and verified direct expenditures in New York by renewable electricity generators under contract to NYSERDA, the projection of these expenditures for the full output and expected life of each project, and the extrapolation of expenditures to the remaining projects with Main Tier contracts.
- **Electric System Impacts and Environmental Impacts:** Past electric system impacts attributable to the supported renewable electricity generators as modeled relative to a base case with no RPS policy investment, and projected impacts resulting from continued operation of these generators.
- **Benefits and Costs:** The various costs and benefits estimated in the components above are compiled into a summation of direct costs and direct benefits, leading to the calculation of a benefit-cost ratio.
- **Macroeconomic Analysis:** Impacts and changes to jobs in New York – positive and negative – resulting from the costs and benefits as estimated using a macroeconomic model representation of the New York economy.

Analytic Findings

The overall benefit-cost analysis with respect to the Current Portfolio yielded the following key findings:

- Approximately \$2.7 billion dollars of direct investments in New York State are expected over the projected life of the renewable energy facilities.
- Fossil fuel usage is expected to be reduced by 1% or approximately 130 trillion Btus.
- CO₂ emissions are expected to be reduced by more than 50 million tons. 15 million tons each of NO_x and SO₂ emissions reductions are also expected.

Summary

- Program costs are expected to comprise less than 0.2% of total retail electricity expenditures.
- Taking into account wholesale electricity price reductions resulting from the program, the program's cumulative net rate impact is projected to be essentially zero.
- Net electricity imports are expected to decline by approximately estimated 4.7%, or an average of 1.17 million MWh per year.
- Under base CO₂ value assumption, the statewide benefit-cost analysis shows a net benefit of approximately \$1.6 billion, with a benefit to cost ratio of approximately 5 to 1.¹³
- Under high CO₂ value assumption, with approximately \$3.5 billion in net benefits, benefit to cost ratio is approximately 9 to 1.¹⁴
- There is expected to be a per year net gain of approximately 670 jobs in the New York economy.
- The cumulative net growth in gross state product, taking into account all stimulative and depressive factors, is expected to be approximately \$2 billion.

The analysis of quantifiable benefits and costs demonstrates that public investment through the RPS Main Tier has a positive impact on the State economy and the environment. The positive economic impact is in part attributed to the fact that every \$1 of State RPS funding invested captures on average almost \$3 in direct investments in New York.

The renewable energy generation that is supported by the public investment displaces electricity imported from out-of-state (estimated to decrease by almost 5% over the study period) and natural gas generation that is supplied with largely out-of-state fuel. Therefore, in-state renewable energy investments help keep New Yorkers' money in the State, fueling economic growth and the creation of approximately 670 jobs, even after accounting for any jobs lost due to the depressive effect of building fewer conventional plants. The cumulative gross state product (GSP) gain is expected to be approximately \$2 billion, with a net present value (NPV) of \$921 million.

It is critical to note that generation displaced by the operation of new renewable energy facilities is the most expensive generation, which sets the prices for the entire market. By displacing this generation, the wholesale electricity price paid by in-state ratepayers is reduced, which has two effects: (1) increasing consumer purchases of in-state goods and services creating in-state jobs, and (2) reducing profits to existing generators whose owners largely reside out-of-state. From 2002 to 2037, electricity system modeling results show that New York generators produce approximately 37.5 million more megawatt-hours of electricity in-state in the current generation profile. This generation results in a cumulative GSP gain of approximately \$1.1 billion, with an NPV of \$414 million.

¹³ A base value of \$15/ton CO₂ (in 2010 dollars) was used.

¹⁴ An upper bound of \$85/ton CO₂ (in 2000 dollars) was used to place an upper bound on the value of carbon.

Positive environmental impacts are attributed to the fact that the portfolio of renewable generation is dominated by wind energy, a zero-emission resource that displaces a significant amount of fossil fuel combustion, avoiding the emissions of greenhouse gases and criteria air pollutants. Between 2014 and 2025, the peak years of renewable energy generation from the Current Portfolio, it is estimated that 2.6 million tons of CO₂ per year will be avoided (equivalent to removing 510,000 cars off the road), as well as displacing about 15 million tons each of NO_x and SO₂ from 2006 through 2037.

Projected Yield from Commitment of Remaining Main Tier Funds (Volume 3)

NYSERDA conducted an analysis of new renewable resources that could be procured under future Main Tier solicitations by expending the remaining \$1.316 billion of authorized but uncommitted funds. Depending on the underlying assumptions, there may be different results for cost, quantities procured, resource mix and timing. The analysis therefore included a number of sensitivity analyses to show the impact of critical assumptions.

The cost study work uses a model of the New York renewable electricity generation supply curve, electric energy and capacity price forecasts derived in the State Energy Plan (Plan), and the projected Main Tier RPS procurement budget for a given scenario to estimate the least-cost mix of renewable resources procured and corresponding renewable premiums for each year in the study period. The supply curve model has been used in previous analyses of RPS program compliance costs, and key assumptions have been updated for this effort.

Analytic Findings

Of the various input assumptions, two factors predominantly impact the amount of renewable generation that can be expected from spending the remaining approved Main Tier budget of \$1.316 billion¹⁵: the future availability of the Federal Production Tax Credit (PTC), and the future trajectory of the cost and performance of on shore wind power. Therefore two cases were explored, yielding the following outcomes:

- The first case assumes that the PTC is extended in its current form, and incorporates on shore wind technology improvements to date, but assumes that further technological (and associated cost and performance) improvements do not occur throughout the period 2013 through 2015. In this case the available funding is projected to procure an additional 3,700 GWh per year of renewable energy. Combined with the Current Portfolio, total program progress would approach 8,200 GWh per year, representing 86% of the Main Tier target.

¹⁵ This available budget anticipates a re-allocation of \$108 million from Main Tier budgets to support the NY-Sun Initiative in 2014 and 2015.

- The second case assumes that the PTC is phased out by 2019, and on shore wind technological (and associated cost and performance) improvements continue throughout the period 2013 through 2015.¹⁶ In this case the available funding is projected to procure a reduced total of 3,000 GWh of additional renewable generation per year resulting in total program progress of 7,500 GWh per year, representing 79% of the Main Tier target. Although the PTC phase-out has a material impact on the Main Tier's buying power, this impact could be partially offset by an expected decline in the overall cost of capital, as more expensive tax equity required to monetize tax credits would be replaced by lower cost sources of capital such as traditional equity and slightly increased use of debt.¹⁷

Factors Influencing Program Progress

As a result of a variety of market conditions, the outlook for meeting RPS Main Tier program goals in 2015 appears more challenging than a few years ago. Market conditions in 2013 continue to evolve from those present in 2004 when the RPS Program was designed and in 2009 during the mid-course review. Total authorized funding for Main Tier program procurements was established by the Commission based on expectations of future market conditions. Market conditions, most critically the expected future prices of natural gas, have changed substantially from what was expected back in 2009. Although the results to date for the Main Tier program have been achieved more cost-effectively than originally projected, current market conditions and future projections suggest that the remaining authorized Main Tier funding doesn't appear sufficient to achieve the 2015 program targets that were established in 2009/2010.

Various factors influence the premium required to support renewable energy project development, thus the ultimate achievements of the program. Factors that limit the program's ability to achieve its prescribed target within the given budget include:

- Continued low natural gas prices result in reduced wholesale revenues for projects, exacerbate financing and hedging difficulties, and ultimately drive up ratepayer premiums to develop renewable energy.
- The continuing uncertainties and stop/start nature of federal renewable energy tax credits and grants have disrupted the renewable energy market nationwide.
- Challenges persist in siting and permitting projects in New York State, which result in higher project costs and reduce the pace of development of market-ready projects.

¹⁶ The PTC Phase-out case includes an examination of potential future technology improvements beyond recent improvements as the PTC Phase-out would most likely be justified based on future technology improvements. The impact of the PTC Phase-out is therefore partially offset by these improvements.

¹⁷ This expected decline is anticipated due to the fact that currently there are limited suppliers of the tax equity required to utilize the PTC. This limited supply and high demand for tax equity increases the cost of capital. Without the PTC more traditional financing mechanism become available at more reasonable costs, and this lower cost financing partially offsets the impacts of losing federal tax incentives.

In part because of these factors, many projects in New York State are only in the early stages of development and are likely not in a position to respond effectively to any near-term RPS solicitation, which requires considerable financial security for commercial operation milestones that they will have difficulty satisfying.

Factors that enable program success include onshore wind turbine cost and technology advancements, which are expected to result in reduced cost per MWh and a greater number of MWh produced per installed MW. These enabling factors are potentially significant but are not expected to be large enough to off-set the limiting factors described above.

Considerations for Future Program Implementation

Not all influences are outside the control of the program such as the chosen pace of procurements, contract tenor and other design features. New York State may benefit from a renewed consideration of these features in addition to alternative financing strategies, such as those that may emerge through the State's Green Bank initiative and expanded renewable energy policy objectives.

New York State should consider proceeding carefully so that it can capture cost-reducing innovations in the renewable industry over time, avoid less-than-optimal program outcomes by only supporting technologies and projects that are market-ready, benefit from remaining federal subsidies¹⁸ and enjoy the benefits of new financing options¹⁹ that may emerge in response to reducing federal subsidies.

¹⁸ If federal incentives are extended, re-accelerating project development would take some time initially, and the structure of any federal commitment (particularly any phase-out schedule) would hopefully account for this lag; if not, projects in New York State might be at a disadvantage as time to re-engage and move through permitting processes in New York could result in New York projects foregoing higher levels of federal incentives available in the early years of any phase-out schedule.

¹⁹ Master limited partnerships (MLPs) and real estate investment trusts (REITs) are examples of financing innovations being developed or considered that could potentially reduce the cost of financing capital-intensive renewable energy projects. Legislative changes may be required to enable such financing vehicles.

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels. NYSERDA professionals work to protect our environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York since 1975.

Visit nyserdera.ny.gov to learn more about NYSERDA programs and funding opportunities.

**New York State
Energy Research and
Development Authority**

17 Columbia Circle
Albany, New York 12203-6399

toll free: 1 (866) NYSERDA
local: (518) 862-1090
fax: (518) 862-1091

info@nyserdera.ny.gov
nyserdera.ny.gov



State of New York
Andrew M. Cuomo, Governor

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New York State Energy Research and Development Authority
Richard L. Kauffman, Chairman | Francis J. Murray, Jr., President and CEO