The Renewable Portfolio Standard: Mid Course Report

prepared by the

New York State Department of Public Service Staff

October 26, 2009

PREFACE

The Renewable Portfolio Standard (RPS) has been New York's primary policy initiative to promote the development of new renewable energy resources since it was established in 2004. This is the Mid Course Report required by the Commission. It summarizes the results of the program and evaluates whether it should continue and, if so, whether and how it should be modified.

The Report also takes into account the State's evolving energy policy. In his January, 2009 State of the State address, Governor Patterson set a goal that "by 2015 New York will meet 45% of its electricity needs through improved energy efficiency and clean renewable energy." A new State Energy Plan is being prepared. The August 2009 draft, which "provides the framework within which the state will reliably meet its future energy needs in a cost-effective and sustainable manner . . .",[1] recommends that the State implement programs to reduce electricity use 15% below 2015 forecasts and augment programs to increase the proportion of renewable generation to 30 % of electricity consumption by 2015.[2] The draft Plan also commits the State to actively promoting the development of a "clean energy economy" by, among other things, creating and maintaining in-State demand for renewable technologies and services. [3] In addition, in Executive Order No. 24, issued August 6, 2009, the Governor established a State goal to reduce greenhouse gas emissions from all in-State sources 80% below 1990 levels by 2050. The Executive Order also established a Climate Action Council and tasked it with the responsibility to prepare a Climate Action Plan which among other things would set out and evaluate strategies to meet that goal. These policies provide part of the context for the Commission's reconsideration of the RPS program.

[1] 2009 State Energy Plan, (draft, August, 2009) p. xi.

[2] Id., p. xiii.

[3] Id., p. xiv

EXECUTIVE SUMMARY

Electricity from renewable resources has been a cornerstone of New York State's energy supply portfolio for over a century. Without further investment, the relative contribution of those energy sources to the State's portfolio will continue to decline as it has since the early 1960s. The question this poses is whether it is in the public interest to make a multi-billion commitment over a 15-year period to reverse that trend. This is a major undertaking with attendant risks. It is not, however, the first time issues of similar import have presented themselves in New York. The developers of Powerhouse #1 and its predecessors in the late 1800s made the decision to expand the hydroelectric capabilities of Niagara Falls despite significant geographic limitations imposed by the direct current distribution system. That decision soon proved visionary with Nickola Tesla's breakthrough work on alternating current transmission; and the facilities at Niagara Falls continue to represent the State's single largest source of renewable generation. Similarly, the Commission's foresight in pursuing an aggressive pro-competition policy in the telecommunications industry in the 1970's (long before federal initiatives) now seems to have been prescient. The State is poised for a similar major transition of the electric utility industry through an expansion of clean energy options, energy efficiency and the still to be unlocked potential of smart grid technology.

While this Report explains why renewable investments can be made in a way that benefits the public and has minimal impact on utility bills, it is also important to recognize the potential for more difficult to quantify future benefits resulting from anticipated advances in renewable technology. This Report explains why it is in the public interest to expand renewable energy investments in New York; however, an equally important question is raised concerning the adverse environmental implications of not supporting expansion of these valuable resources.

The purpose of establishing the Renewable Portfolio Standard was to help attain a statewide objective of having 25% of the megawatt-hours (MWhs) of electricity consumed in the state produced from renewable resources by the year 2013. This initiative, which is administered by NYSERDA, employs two programs as the principal means of obtaining additional renewable resources. The bulk of the MWhs needed to reach this goal are obtained

from competitive procurements of renewable resources (the Main Tier or "MT"). A complementary program has been established for "behind the meter" applications of renewable generation, allowing customers to directly participate in the promotion of innovative technologies (the Customer-Sited Tier or "CST").[4]

When establishing the RPS, the Commission set an initial schedule of collections of $741.5 million[5] to fund most of the program's estimated costs through 2013. By the end of 2009, RPS funding should be committed to specific contracts which are expected to provide about 2.7 million MWhs per year of renewable resources from the Main Tier and 98,808 MWhs from the CST through 2013 and beyond. While the CST results are on track with interim targets established by the Commission, the MT results are about 62% of what was initially expected for 2009. The most recent supply curve analysis and a market potential study prepared for NYSERDA indicates that there is ample potential for in-State renewable resources to attain the 25% objective or more through a combination of the Main Tier and the CST.[6]

This Report also examines a number of important related initiatives that may affect RPS. Among them are regional and now federal efforts to internalize the cost of carbon and reduce carbon dioxide emissions, the expansion of net metering, and Federal and State tax policies. The most important external consideration, however, is the Commission's ongoing Energy Efficiency Portfolio Standard proceeding (EEPS), which commenced in 2008, in combination with a variety of other nonjurisdictional efficiency initiatives that are also underway. In the EEPS proceeding, the Commission recognized New York's policy to reduce electricity usage in the State 15% by 2015 and established a MWh electricity target for 2015 that represents an appropriate level of savings from the State's electric utilities. If the State's overall target is achieved by 2015 as a result of EEPS and other ongoing efficiency efforts, the amount of renewable resources required to attain the 2013 RPS 25% goal is greatly reduced.

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[4] While funding has also been provided for small wind turbines and fuel cells in the Customer-Sited Tier, the bulk of the funds requested and expended have been for solar photovoltaic (PV) and anaerobic digester generation.

[5] This amount did not include administrative costs.

[6] A list of relevant NYSERDA documents is in Attachment A.

In light of EEPS, the relatively slow start of the Main Tier, the amount of potential resources available in both the Main Tier and CST, and recent expressions of state energy policy, a hard look at the existing RPS goal is necessary. The Report considers several alternative scenarios and supports a scenario that revises the original RPS goal to 30% renewable power and extends the term of the program to 2015.

The estimated incremental cost through 2024 of implementing this new proposed goal (30% by 2015) is about $2.5 billion overall (on average $167 million per year) and $1.0 billion on a present value basis. These amounts are substantial. However, when these costs are spread across all ratepayers over a 15-year period, and offset by expected price suppression, the effect on New York ratepayers is not large. More specifically, the cost of implementing RPS with a 30% renewable resource target is an expected overall annual increase in the amount the public must pay for electricity that is less than 1% in total by 2015 for all customers. A cost and collection schedule consistent with the 30% recommendation is contained in the Appendix.

The decision to support this higher renewable goal and the associated costs is based on a number of different considerations, including quantitative analyses, qualitative considerations, State and Federal energy policies and the impact of RPS on a variety of State interests including the environment and job creation. The analysis recognizes that RPS programs will not in most instances be economic from the perspective of the "total resource cost test" adjusted for environmental factors and the "ratepayer impact test", which are the two tests the Commission has relied on when evaluating projects proposed in the EEPS proceeding. This raises the threshold question of why ratepayer money should flow to RPS projects when it might be more cost-effective to fund the EEPS program or even investments in conventional generation that produces electricity with a lower environmental impact than what is displaced.

The Report concludes that the Main Tier provides significant environmental benefits, does not result in large rate increases,[7] improves generation resource diversity, provides a number of difficult to quantify benefits, and has potential to act as a hedge against wholesale

[7] Indeed, the Main Tier's environmental benefits (if monetized) in combination with its price suppression effects more than offset its cost.

electricity price swings. The Main Tier RPS program is, therefore, in the public interest and should be continued.

The Report concludes that the CST strengthens New York's emerging clean energy economy, provides opportunities for job creation at all levels of the renewables supply chain, marginally increases the likelihood that technological advances will lower future costs and facilitates locating distributed generation where it can do the most good. However, because it is difficult to assess the CST with traditional quantitative benefit cost metrics, the determination of whether the CST is in the public interest is more complicated. From a quantitative perspective, the CST will account for a substantial portion (about 20%) of RPS annual costs while, in its mature 2015 steady state, produce at most about 7% of the total RPS MWh savings. These results suggest that the price suppression produced by the MT on a per dollar invested basis is far greater than what occurs as a result of the CST, and also indicate that investments in the CST are generally not as attractive as the investments in the MT. Nevertheless, even with these results, the effect of the CST on utility rates is minimal. And the Commission has recognized, from the inception of the program, that other public policy considerations – from economic development to direct citizen participation –provides ample justification for the CST.

Recognizing that the overall costs associated with RPS are large and that price suppression does not fully offset these costs, it is important to control the costs and minimize the bill impacts of RPS. The use of hedges, variable or capped bids and/or legislated securitization to fund RPS (or perhaps an even broader clean energy charge) are all possibilities that this Report recommends be analyzed by Staff and NYSERDA in the near future.

The proposed 30% goal equates to 10.4 million MWhs in 2015, an amount that is only slightly higher than the original goal established by the Commission for RPS in 2013 but substantially higher than the 2013 MWh target implied by more recent load forecasts. To reach this new goal the Report considers various potential modifications to the solicitation mechanics, the central procurement model, delivery requirements, vintage requirements, and the treatment of maintenance resources. Recommendations are made in a limited number of areas. There are also several recommendations concerning a formal schedule for MT

procurements and the treatment of unencumbered funds to enable the RPS process to operate more effectively. Other areas, such as the appropriate level of PV funding, are left open for further analysis and comment.

The Report also addresses the recommendations and concerns raised by the parties, including those related to the geographic distribution of renewable resources. The addition of a separate utility-sited tier is also considered and rejected.

New York State has a clear policy favoring clean energy investments, and the Commission is directly involved in three related initiatives: System Benefit Charge (SBC)-funded NYSERDA programs, EEPS programs, and RPS. In addition, the revenues generated from auctioning CO2 emission allowances in the Regional Greenhouse Gas Initiative (RGGI) will go towards funding clean energy. Nevertheless, the Commission's experience with all of these programs is limited, there may well be serious, unexpected "bumps in the road" over time, and actual results may be more or less favorable than anticipated. The progress of all of these initiatives should be carefully evaluated, measured and verified so that the Commission will have sufficient information in the future to revisit the initiatives it controls and determine if there is a more effective allocation of resources among them. The Report, therefore, recommends that the Commission review the status of all these initiatives simultaneously in 2013. In any event, the Commission should, prior to 2013, consider combining the charges for all of its clean energy initiatives into one clean energy charge on customer bills and evaluate the extent to which this charge should also encourage investments in cleaner more efficient conventional sources of power. The balance of the Report is organized as follows: The **Results** section summarizes the money spent on and the MWhs of renewable resources obtained from the first four years of the RPS program. **The RPS Program In General** explains several topics that are important to an evaluation of the RPS program, and **The Main Tier** and **The Customer-Sited Tier** sections discuss those aspects of the program and present and propose resolutions of various issues (assuming the program is to continue). **The Efficacy of the RPS Program** then considers the costs and benefits of the program and recommends that the Commission increase program funding to provide that 30% (up from the current 25%) of the State's energy be provided by renewable resources.

1. BACKGROUND

The 2002 State Energy Plan warned of the possible consequences of New York's fossil fuel dependency, noting that the State's primary sources of energy have significant long-term environmental effects and ultimately face depletion.[8] In instituting the renewable portfolio standard (RPS) proceeding, the Commission recognized these concerns, among others:

> We are increasingly concerned with the effects on our climate of fossil-fired generation and the security implications of importing [from out of state] much of the fuel needed to supply our electricity needs. Further, inasmuch as there is a finite supply of natural gas and other fossil fuels, over-dependence on such will leave the State vulnerable to price spikes and possible supply disruptions.[9]

The Commission noted that the State's reliance on electricity generated by renewable sources was declining over time, from over 30% in the early 1960's to less than 20% by 2003. This decline was attributable in large part to a massive but relatively constant contribution of the State's hydroelectric facilities at Niagara Falls and Massena as the State's consumption continued to grow. Absent State action, this trend was expected to continue.

The Commission saw the possibility for significant benefits at a modest cost:

> Bill impacts for the RPS are expected to be modest. For residential customers, for the life of the program, cumulative bill impacts are forecast to range from a reduction of 0.9 percent to an increase of 1.68 percent; for commercial customers, the range is a 0.78 percent reduction to a 1.79 percent increase; and for industrial consumers, the range is a 1.54 percent reduction to a 2.20 percent increase.
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> Implementation of the RPS is also expected to create greater regional benefits in New York State through economic development. Manufacturing of renewable energy equipment, procurement of fuels such as biomass, and construction and operation of generating facilities will create direct and indirect jobs, purchases of local products, which add revenues to local economies, and additional tax payments. This RPS will result in

[8] State Energy Plan (June 2002) p. 1-1.

[9] Case 03-E-0188, Renewable Portfolio Standard, Order Instituting Proceeding (issued February 19, 2003) p. 1.

> substantial changes in New York's fuel use for electric generation. These anticipated changes will have the effect of reducing air emissions statewide of NO_x (6.8 percent); SO_2 (5.9 percent); and CO_2 (7.7 percent), with greater emission reductions in New York City and Long Island.[10]

Ultimately, the Commission decided to increase the proportion of electricity produced by renewable sources from 19.3% to 25% by 2013.[11] The Commission's strategy was to provide financial incentives for the development of renewable generation resources and it authorized the utilities to collect funds from their customers for that purpose.[12]

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[10] Case 03-E-0188, supra, Order Regarding Retail Renewable Portfolio Standard (issued September 24, 2004) pp. 14, 15.

[11] Id., p. 4.

[12] The Commission established these objectives for the program:

> Accordingly, . . . we adopt the following objectives:
> a. Renewable Resources: institute an RPS to increase New York State's supply of renewable resources with the ultimate aim of establishing a viable, self-sustaining competitive renewable generation market.
> b. Generation Diversity for Security and Independence: diversify the generation resource mix of energy retailed in New York State to improve energy security and independence, while ensuring protection of system reliability;
> c. Economic Benefits: develop renewable resources and advance renewable resource technologies in, and attract renewable resource generators, manufacturers, and installers to New York State;
> d. New York's Environment: improve New York's environment by reducing air emissions, including greenhouse gas emissions, and other adverse environmental impacts on New York State, including upon underserved communities, of electricity generation;
> e. Equity and Economic Efficiency: develop an economically efficient RPS requirement that minimizes adverse impact on energy costs, allocates costs equitably among ratepayers, and affords opportunities for recovery of utility investment; and
> f. Administrative Fairness and Efficiency: develop an RPS that is administratively transparent, efficient, and verifiable.
> g. Competitive Neutrality: develop an RPS compatible with competition in energy markets in New York State.

The Commission established these rules for resource eligibility:

> For purposes of participation in the RPS program, we envision the establishment of two tiers of eligible resources. The first or "Main Tier" shall consist primarily of medium to large scale electric generation facilities that we expect to compete against each other on a kWh price premium basis for RPS funding. The second or "Customer-Sited Tier" shall consist of "behind-the-meter" facilities that is not generally economically competitive with the Main Tier technologies.
>
> As to vintage of eligible facilities, the general rule shall be that to be considered eligible, a facility must have first commenced commercial operation on or after January 1, 2003. Customer-sited resources have to be installed on or after January 1, 2003. A limited vintage exception shall be provided for certain hydroelectric, wind and biomass resources ("maintenance resources") that demonstrate the need to receive RPS financial support to continue operations.
>
> Eligible resources in the Main Tier shall include biogas, biomass, liquid biofuel, fuel cells, hydroelectric, photovoltaics, ocean or tidal power, and wind.
>
> . . . Eligibility in the Customer-Sited Tier shall include fuel cells, photovoltaics, and wind resources.[13]

To implement this initiative, the Commission also decided to employ a "central procurement model," relying on NYSERDA as the program administrator. Use of the central procurement model was considered to be an efficient way to ensure individual load serving entities' compliance with RPS targets and therefore preferable to the individual procurement models advocated by some parties. It determined that central procurement would expedite program startup and provide more immediate feedback and control of the initial procurements. Finally, in its September 2004 Order, the Commission recognized the need for a review of RPS progress. The Commission specifically called for a comprehensive mid-course review of the RPS

[13] Id., p. 11. (Anerobic digesters were lated added to this list)

program in 2009 and established the parameters of that review in its April 2005 Order.[14]

In anticipation of the Commission's mid-course program review, earlier this year NYSERDA submitted to the Commission its "New York Renewable Portfolio Standard Evaluation Report: 2009 Review" ("Evaluation Report").[15] On April 27, 2009, we requested comments on the Evaluation Report by May 29, 2009. Some of the comments are used to frame the discussion below; all of them have been considered.

This Report constitutes the Department's RPS mid-course review. The Report also provides a limited number of recommendations based on our analyses of the Evaluation Report and cost studies, observations on program implementation to date, comments from parties and stakeholders, and consultation with NYSERDA.

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[14] The Commission identified the following specific topics to be addressed in the mid-course review.

1. an overview of program status;
2. an assessment of the program's success;
3. NY progress compared with other states;
4. an assessment of the impact of achievements in the voluntary green market;
5. effect of DSM and energy efficiency initiatives;
6. impact of reduced load on renewable goals and funding;
7. an assessment of program costs and benefits;
8. macroeconomic and economic development benefits;
9. the interaction of RPS with RGGI;
10. possible modifications to the list of eligible resources;
11. possible modifications to the delivery requirement;
12. steps for transitioning to a market-based system;
13. options for a regionally compatible certificate tracking and trading system;
14. input from stakeholders; and
15. additional recommendations for improving the RPS Program.

Case 03-E-0188, supra, Order Approving Implementation Plan, Adopting Clarifications, and Modifying Environmental Disclosure Program (issued April 14, 2005) (Implementation Order).

[15] The Evaluation Report relied in turn 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 Renewable Portfolio Standard: Market Conditions Assessment – Final Report (February 19, 2009). The Evaluation Report's assessment of the costs and benefits of the RPS program are discussed below.

2. RESULTS

The RPS Program is currently in its fourth year about mid-way to its planned eight-year time horizon.[16] In 2004, the Commission established MWh targets for both the Main Tier and the Customer-sited Tier through 2013 of about 4.8 million MWhs and 101,000 MWhs, respectively. It is estimated that projects supported under the Main Tier will produce 2.947 million MWhs from renewable resources in 2009, 62 % of the initial 2009 target. The estimated 99,000 MWhs that will likely be produced by installations supported under the Customer-Sited Tier in 2009 is only slightly less than the 101,000 MWh target for 2009.

The Commission initially established ratepayer funding for RPS of $741.5 million. Of this amount NYSERDA has entered into arrangements which account for about $646 million. This includes: $475 million for contracts entered into following three Main Tier solicitations; $103.3 million for the Customer-Sited Tier (through 2009); $33.9 million for Maintenance Resource[17] contracts; $25.6 million for NYSERDA administration of the program; and $9 million

for state fees. About $95 million will be used for a fourth Main Tier Solicitation that was issued in September 2009, with contracts expected to be executed in early 2010.

2.1 The Main Tier

NYSERDA's three competitive Main Tier solicitations have resulted in contracts with 28 renewable projects that are expected to contribute up to 2,947 million MWh per year to the RPS Main Tier target.[18] Of this total, 2,625,237 MWh is wind, 104,782 MWh is hydro, and 218,025 MWh is biomass. These facilities add 1,164 MW of renewable capacity to the New

[16] Twenty-two RPS-related Commission orders have been issued which have clarified or revised program design and implementation rules, expanded program eligibility, authorized Main Tier competitive solicitations, and approved Customer-Sited Tier programs and funding.

[17] "Maintenance Resource," a subset of the Main Tier, refers to payments refers to payments to extant renewable resource facilities to help them remain viable. The category is designed to avoid losing a baseline renewable resource due to financial difficulty.

[18] Because only a portion of a generator's production is actually purchased by NYSERDA in the Main Tier, the anticipated total generation from these projects would be higher.

York power grid; they are listed in the Appendix. As noted earlier, these production and capacity figures fall short of the 2009 target set in 2004. Some of the major reasons for this shortfall are

- Three wind projects awarded contracts that would have provided 360,000 MWhs in 2009 were cancelled.
- The expected output of several projects was reduced based on actual performance.
- Authorized funding was also exhausted more rapidly than initially anticipated because overall average costs/MWh from the first three solicitations were higher than original estimates, and administrative costs and maintenance resource costs were not included in calculating the authorized collections.
- The unanticipated downturn in the economy also materially frustrated progress toward the RPS targets (although this impact was offset to some degree by the reduction in annual electric demand also resulting from the downturn).

The experience gained thus far should inform future decisions, and this Report proposes modifications to the Main Tier that should enhance its operation.

2.2 Maintenance Resources

NYSERDA has entered into contracts with two projects eligible as maintenance resources, the Lyonsdale Biomass Plant located in Lyons Falls and the Boralex Biomass Plant located in Chateauguay. In combination, these contracts support the operation of approximately 39 MWs of biomass capacity and produce approximately 259,000 MWhs annually. The contracted funding committed to these facilities is $34 million annually.

2.3 The Customer-Sited Tier

The Customer-Sited Tier consists of smaller, behind-the-meter resources that produce electricity primarily for use on site. On application to NYSERDA, participating customers receive a one-time incentive payment or a combination of a one-time payment and performance-based incentives. The Commission envisioned that funds allocated to the Customer-Sited Tier would support behind the meter installations capable of generating 201,130 MWh per year by 2013,

or 2% of the overall RPS target.[19] While the Commission initially established annual funding for this tier of $16.3 million, NYSERDA indicated in its operating plan that that amount would not be enough to meet the 2% objective. As a result of this and high demand for solar photovoltaic (PV) and anaerobic digester generation (ADG) installations the Commission has increased CST funding twice. The current authorized funding for the CST for the 2006-2009 period, which reflects the availability of significant incentives earlier this year for solar PV, is $103 million, of which $75 million is for solar PV, $20 million for ADG, $6 million for fuel cells, and $2 million for small wind. NYSERDA has provided a discussion of the benefits of the Customer-Sited Tier that is attached as Attachment D.

3. THE RPS PROGRAM IN GENERAL

3.1 The Supply Curve

Estimates of what projects and output may be available to satisfy the RPS annual targets are based on a "supply curve" developed for New York by a NYSERDA contractor. The supply curve is the fundamental guidance for the Main Tier.

The first RPS supply curve was produced in 2003 and developed estimated costs (i.e., incentive levels) of the Main Tier for the analysis that led to adoption of the RPS program in September 2004. The cost study methodologies and findings were supported in hearings leading to the adoption of the RPS. However, many critical assumptions in the 2003 cost study differed from the program features that were, in fact, subsequently implemented. Thus, for purposes of this mid-course evaluation, all cost study assumptions for the current Supply Curve have been reviewed and, as appropriate, modified to conform to actual program requirements and changes in project economics. Key changes to assumptions include: awarding attribute contracts to projects based on a set price instead of an index price (often called contracts for differences); setting the standard contract term at a maximum of 10 years rather than longer terms of 15 to 20 years; reflecting a change in the delivery requirement, which in turn reduced the expected level of low cost imports; reducing wind capacity factor assumptions based on

[19] Case 03-E-0188, supra, Order Regarding Retail Renewable Portfolio Standard (issued September 24, 2004).

actual performance; factoring in changes to financing assumptions in light of the changes in the debt and equity markets related to the economic downturn; and updating energy price forecasts.

Table 1 shows the expected annual MW and MWh contributions of resources reached on the supply curve for the years indicated:

Table 1

Expected Annual Contribution to RPS Goal By Resource[20]

	2011		2012		2013	
	MW	***MWh***	***MW***	***MWh***	***MW***	***MWh***
Wind	417.61	1,079,868	209.72	555,648	191.26	511,506
Biomass	18.06	121,339	56.06	411,729	62.08	455,870
Hydr	20.94	88,245	67.42	322,076	67.42	322,076
Landfill Gas	18.95	147,609	18.95	147,609	18.95	147,609
Totals	475.56	1,437,061	352.15	1,437,061	339.71	1,437,061

	2014		2015		Total	
	MW	***MWh***	***MW***	***MWh***	***MW***	***MWh***
Wind	171.84	464,036	85.93	232,018	1,076.36	2,843,075
Biomass	68.17	503,341	98.74	741,392	303.11	2,233,671
Hydr	67.42	322,076	65.99	316,042	289.19	1,370,514
Landfill Gas	18.95	147,609	18.95	147,609	94.75	738,045
Totals	326.38	1,437,061	269.61	1,437,061	1763.41	7,185,305

Thus, the 2011-2015 RPS incremental attribute goal (based on 30% post-EEPS scenario, described in the following section) is expected to be met with: 2,718,286 MWh of wind (1076 MW); 2,135,630 MWh of biomass (303 MW); 1,310,359 MWh of hydro (289 MW); and 705,650 MWh of landfill gas (95 MW). The supply curve information also provides a forecast of the general geographic area in which new Main Tier renewable generation development could be expected. It is expected that new wind turbines will be sited in NYISO load zones A-F, which serve customers in the Albany area and to the north and west of Albany. New biomass and hydro projects, while a much smaller proportion of the total additional Main Tier renewable

[20] source: http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/25f0de7d747422a1852574da0050c31b/$FILE/Express_Terms_03-E-0188SA19.pdf

generation capacity, are also expected to be sited in these zones, with additional hydro expected to be provided from Canada. Landfill gas generation is forecast to be provided within all load zones, but predominantly within the upstate zones.

These expected capacity additions are well within the development potential for at least wind and hydro. The development potential for wind is estimated at 8,527 MW by 2015.[21] The hydroelectric potential is estimated at 2,527 MW by 2022.[22] While there is reasonable confidence that biomass resources are adequate as well, a NYSERDA-commissioned Renewable Fuels Roadmap and Sustainable Biomass Feedstock Study for New York ("Biofuels Roadmap") is expected to be completed by the end of 2009, and will be used to more accurately estimate New York's indigenous biomass potential.

3.2 Related Initiatives

There are many initiatives underway intended to reduce reliance on fossil fuels, reduce air emissions, and improve the State's and the nation's overall energy security. This section considers a number of those initiatives and their potential impacts on RPS.

3.2.1 Energy Efficiency Portfolio Standard (EEPS)

The level of load reductions actually achieved through EEPS - and other energy efficiency initiatives - affects the amount of renewable generation needed to achieve the RPS

[21] La Capra Associates and Sustainable Energy Advantage, LLC, *New York Renewable Portfolio Standard Cost Study Update: Main Tier Target and Resources*, 2008

[22] Optimal Energy, Inc., *Energy Efficiency and Renewable Energy Resource Development Potential in New York State*, 2003. Study excludes pumped storage as a renewable resource.

goal.[23] The projected 15 percent load reductions produced by energy efficiency initiatives would, if achieved, reduce the amount of renewable energy required to meet the 25 percent RPS goal and would, in effect, enable the RPS program to meet the 25 percent goal by 2011. However, the amount of renewable MWhs necessary to meet a consumption forecast reduced by 15% is obviously substantially less than initially envisioned by the Commission in 2004. A cost benefit analysis presented later in this Report contains four future scenarios: three that assume 100% of the EEPS goal is achieved and one that does not.[24] The four reference scenarios are:

25% With Efficiency Scenario

This scenario assumes that the 15x15 energy efficiency goal is fully met such that the electricity consumption in 2015 is reduced by 15% from what it would have been without EEPS. The load forecast for 2013 is conformed to that assumption. The model then uses 25% of that load forecast to set the RPS goal. It yields an incremental amount of renewable resources that totals about 1.8 million MWh above the amount expected to be obtained by the already completed RPS procurements (first 3 Main Tier procurements, plus the Customer-Sited Tier). (It does not, however, forecast or account for the anticipated MWHs associated with the fourth Main Tier solicitation in the last quarter of 2009. The first three procurements resulted in about 2.9 million MWhs; this new solicitation is not expected to provide the remaining 1.8 million MWhs required to meet the target.)

25% Without Efficiency Scenario

This scenario reflects the original RPS program parameters (25% of electricity

[23] The State has established the policy of a 15% reduction in electricity usage by 2015. The Commission as part of the EEPS proceeding established jurisdictional MWh targets for the electric utilities it regulates and NYSERDA by first estimating the likely contribution of non-jurisdictional efficiency initiatives to the State's overall 15% goal. NYSERDA and the jurisdictional electric utilities were then assigned responsibility for the residual amount of the State's overall objective that would not be meet from non-jurisdictional sources. For simplicity, the Report sometimes uses the term EEPS to represent the overall energy efficiency efforts occurring in the state and not just the efforts by New York's electric utilities and NYSERDA.

consumption from renewable resources in the year 2013) and actual results from completed years of the RPS program. It is based on a load forecast made in 2008. The RPS goal was set to equal 25% of forecasted consumption in 2013 without the reductions associated with EEPS. This scenario yields an incremental amount of renewable resources that totals about 5.5 million MWh above the amount expected to be obtained by the already completed RPS procurements.

30% With Efficiency and $24 million solar PV Scenario

This scenario assumes that the 15x15 energy efficiency goal is met. The load forecast for 2015 is conformed to that assumption. The model then uses 30% of that forecast to set the RPS goal. It yields an incremental amount of renewable resources that totals about 7.4 million MWhs above the amount expected to be obtained by the already completed RPS procurements. Overall the total target under this scenario from the entire RPS program is about 10.3 million MWh.

30% With Efficiency and $24 million solar PV Scenario

This scenario is the same as the one immediately above, except that it contains a significantly larger budget for solar PV, offset by a smaller budget for Main Tier. It provides a slightly lower amount of renewable resources.

3.2.2 Internalizing the Cost of Carbon

The Regional Greenhouse Gas Initiative (RGGI) is an agreement among 10 Northeast and Mid-Atlantic States to cap greenhouse gas emissions. Under the RGGI program, the participating states will stabilize power sector CO_2 emissions at the capped level through 2014. The cap is then reduced by 2.5 percent per year from 2015 to 2018, for a total reduction of 10 percent. The states sell emission allowances through auctions and invest proceeds in consumer benefits or programs to improve energy efficiency and reduce emissions of greenhouse gases.

Five RGGI auctions have been held, the most recent in September of this year. The market price of RGGI allowances has been in the $2 - $4/ton range.

NYSERDA's Evaluation Report[25] notes that there is increasing likelihood that national carbon legislation, establishing a national cap and trade program, will take effect within the next few years. In order to account for this likelihood, a carbon price of $15/ton is used in the analysis that follows.

3.2.3 Net Metering and the Customer-Sited Tier

New York's net-metering law[26] allows consumers to install small, grid-connected renewable energy systems, such as solar PV, wind and ADG,[27] to reduce their electric bills in a manner that does not disrupt the electric grid. Under net metering rules, excess electricity produced by the renewable energy system, but not used by the customer, can flow into the utility grid and is registered as a credit through the meter against the customer's usage in the next month. Net metering is available on a first-come, first-served basis to customers of the state's major investor-owned utilities, subject to technology, system size and aggregate capacity limitations. Publicly-owned utilities are not obligated to offer net metering; however, LIPA offers net metering on terms similar to those specified in the PSL. In August 2008 New York enacted a series of bills amending the state's net metering laws, most notably expanding net metering eligibility to non-residential solar PV and wind systems. In 2009, the Commission issued several orders revising and approving utility tariffs associated with the changes. Table 2 lists eligible renewable energy systems and applicable size limitations.

[25] NYSERDA, New York Renewable Portfolio Standard Evaluation Report: 2009 Review (the "Evaluation Report").

[26] N. Y. Pub. Serv. Law. §§ 66(j), (l).

[27] In 2009, net metering was extended to fuel cells and micro-combined Heat and Power (CHP) units with nameplate capacities of up to 10kW. These additional technologies have not yet been reflected in utility tariffs or the Commission's regulations, including the Standard Interconnection Requirements (SIR).

Table 2
New York Net-Metering Rules as of July 2009

Eligible Renewable/Other Technologies:	Solar (PSL 66-j)		Farm-Based Biogas (PSL 66-j)	Wind (PSL 66-l)	
Applicable Sectors:	Residential / Non-Demand Commercial	Demand Commercial	Farm-Based Residential / Non-Residential Farms	Residential / Non-Demand Commercial	Farm-Based / Demand Commercial
Limit on System Size:	25 kW Residential 5-12 kW Commercial*	Up to 2,000 kW	500 kW	25 kW Residential 7-12 kW Commercial	125 kW Farm-Based Up to 2,000 kW Commercial
Limit on Overall Enrollment	1.0% of 2005 Demand per IOU			0.3% of 2005 Demand per IOU	

* The non-demand limitation varies among utilities based on demand rate qualifications.

In addition, the Commission determined that the net metering statute required setting the maximum system size for small non-residential customers that are not on demand meters at the utility's threshold for requiring a demand meter. This threshold falls between 5 kW and 12 kW depending on the utility.

Net metering records kWh imported or exported over a billing period (aka billing month) and provides that data to the utility. If a system produces less power during a billing month than a customer uses during that period, the customer only pays for the net amount of power that was drawn from the grid. The power that is generated and used on site is worth "full retail value." For example, if a non-demand-metered renewable energy generator produces 700 kWh over a billing month, but a customer uses 1,000 kWh, there will be a net import (use) of 300 kWh over the billing period and the customer will only have to pay energy charges on the net 300 kWh.

If a non-demand-metered solar PV, farm waste or wind energy generator produces more power than is used by the customer during the billing month, the excess power is credited to that customer's account and carried over to the next month. For example, if a customer uses 1,000 kWh over a month, but the generator produces 1,300 kWh, it will export a net 300 kWh to the grid. This 300 kWh credit will roll over to the customer's next month's bill to credit to next month's usage. At the end of the year, residential and farm customers are cashed out at the utility's avoided cost; non-residential customers continue to carry over their net balance for future use to offset utility charges.

A demand-metered solar, farm waste or wind energy generator that produces more power than a customer uses during the billing month will have the excess power converted to a cash value and applied as a direct credit to the customer's outstanding energy, customer, demand and other charges. For example, if a customer uses 1,000 kWh over a billing month, but the renewable energy generator produces 1,300 kWh, the customer will export a net 300 kWh to the grid. This 300 kWh will be converted to a dollar amount by adding the delivery per kWh charge and energy per kWh charge times the excess kWh (example: Delivery + Commodity = Credit x kWh).

Delivery	$.05000
Commodity	$.05000
Total Credit	$.10000 x 300 = $30.00 Credit

This amount will be used to credit the customer's outstanding customer, demand and other charges for that month. Any excess will be converted back to its equivalent kWh and carried over to the next month. Farm and residential customers are cashed out at the utility's avoided cost at the end of the year. Regardless of a net import or export of power during a billing

period, the customer charge and demand charges are still applied and must be paid if not covered by the credits described above.[28]

3.2.4 Tax Policy

Tax incentives significantly improve the economics of both large and small scale renewable projects. In the case of large scale projects, which are bid into Main Tier solicitations, the impact of these incentives should be reflected in the bid prices. In the case of small scale renewable projects, eligible for Customer-sited Tier incentives, NYSERDA accounts for federal (and state) tax incentives when determining the amount of the CST incentive. In general, there is a 30% federal tax credit applicable to the cost of installing all of the technologies eligible for Customer-Sited Tier incentives. There are alternative tax subsidies available for large wind projects in the near term. A summary of various tax incentives appears as Attachment B to this Report.

3.3 The Central Procurement Model

Most RPS programs in other states require each load-serving entity (LSE) to procure sufficient renewable attributes for its own load. New York uses a unique "central procurement" model administered by NYSERDA for both the Main Tier and Customer-Sited Tier. This feature of the New York RPS differentiates it from most other state programs[29].

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[28] Legislation and subsequent Commission orders also establish rules relating to customer responsibility for interconnection costs (e.g., new meters, transformers, or other equipment) and limitations on such costs, which vary by customer type and system size. The Commission also developed uniform interconnection rules for net-metered systems. The 2008 amendments added identical language providing for the development of interconnection standards for non-residential systems.

[29] In its September 2004 order the Commission stated

> The RPS procurement structure will be administered by NYSERDA. Because of our adoption of a central procurement model, it is not necessary to create an alternative compliance mechanism to ensure individual load serving entities' compliance with RPS targets. The Commission views central procurement as preferable to the individual procurement models used elsewhere and discussed by the parties. Central procurement will expedite the start of the program and provide more immediate feedback and

The Hudson Renewable Energy Institute asserts that the central procurement model undermines the voluntary market. It says it is difficult to imagine a voluntary competitive market taking market share from a well-funded monopoly capitalized in large part by the same voluntary jurisdictional customers that support the Main Tier. By contrast, NYSEG asserted that central procurement has been, and continues to be, better than requiring load-serving entities to procure resources separately and independently. The Commission has already addressed such a concern by limiting NYSERDA's purchases to assure a portion of the output of each renewable generation facility is reserved for the voluntary market.

New York's experience with central procurement has been successful. Economies of scale have been achieved by pooling resources into one buyer and by enabling procurements in large quantities. Administrative and oversight efficiencies have been achieved by having only one administrator instead of six. Central procurement has also made it possible to easily develop Customer-Sited Tier offerings in a uniform manner statewide, which is a great assistance to installers working in multiple utility service territories. The program is transparent and information about it is publicly available.

Where each load-serving entity must individually comply with RPS standards, each load-serving entity must compete for the available pool of renewable attributes. This likely increases the cost per attribute as bidders compete with each other. In New York, NYSERDA acts as a single primary purchaser of attributes which eliminates the competition for attributes among buyers, avoids utility specific penalties for not meeting targets, and creates a market in which

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> control of the initial procurements. These early procurements should provide valuable market information about the extent of supply-side competition as this market develops. As we note elsewhere in this Order, NYSERDA should, as part of the 2009 Review, file a plan, for our review and consideration, to transition from the RPS program to a more market-based system. This should include consideration of partial or full transition to a procurement approach that relies upon competitive energy providers, such as ESCOs, and any related enforcement mechanisms.

September 24th order, pp. 15, 16.

sellers compete to supply the attributes. Further, the central procurement model eliminates the need for tradable attributes or certificates to facilitate exchanges between load-serving entities wanting to balance their portfolios, since no balancing is necessary.[30] The use of a single buyer does not require trading among players. In addition, a load-serving entity model might require energy service companies to alter their business models to comply.

Another cost savings achieved by the central procurement model is that funding for New York's RPS program is determined by a pre-defined budget. With an individual load-serving entity model, the load serving entity must meet its target regardless of the price or face penalties. The central procurement model seeks to meet annual goals and allocates funds to achieve that end, but doesn't require that an annually set target be achieved at any cost. There is no penalty for rejecting bids and waiting for better opportunities. Program funds are never expended on compliance penalties. Existing alternative penalties vary. In Pennsylvania the penalty is set at $45/MWh; in Massachusetts $58.58/MWh; and in New Jersey $50/MWh in general and $300/MWh for its solar alternative compliance penalty. Other states have likely not considered central procurement because they simply do not have a NYSERDA-like entity available. Transitioning now to a load-serving entity model would increase the cost of the RPS program and require additional features, such as trading and penalty mechanisms, further increasing the complexity and costs of the program and adding administrative delays.

The end result is that in New York more attributes are available at a lower cost than would occur in other states. Central procurement has proven to be an efficient means to meet the Commission's objective. It should not be changed.

3.4 Experience of Other States

A Report by Summit Blue – a consultant retained by NYSERDA to evaluate the RPS program -- provides some comparative information of RPS policies in other key states that share similarities with New York in terms of their energy market structure, geographic location and/or focus on clean energy strategies. It notes, and staff concurs, that it is hard to compare

[30] It is expected, however, that the voluntary market would benefit from such a trading system.

New York's program to those in other states because each state's RPS goals, rules and renewable energy market characteristics differ substantially.[31]

The Summit Blue Report provides a rough indicator of where New York's RPS compliance costs stand relative to other states in the region on a per-unit ($/MWh) basis. In New York, the weighted average price of RPS-eligible attributes in the three solicitations declined from $22.14 to $15.92. This trend has been led by wind, with a weighted average price decline from $22.60/MWh in the first solicitation to $15.54/MWh in the third. However, the weighted average prices for repowered hydro projects increased from $3.52/MWh in the first solicitation to $17.18 in the third; and for biomass the weighted average prices went from $11.99 in the second solicitation to $19.25 in the third. These prices compare favorably with those paid in other states.

The Summit Blue Report notes that all states have fallen short on meeting targets and goals due to a variety of reasons, including: inadequate incentive levels, difficulty in siting new facilities, transmission capacity constraints and uncertainty about long-term demand for renewable resources. California, like New York, has identified federal and state incentive uncertainty as a key barrier. Transmission capacity was identified among the top barriers in California and Massachusetts and facility permitting and local opposition are barriers in all states reviewed. These are all issues that New York faces in its RPS Program.

In general, the data indicate that New York has done as well or better than most other states. Our costs have been similar and the incentive is properly directed to inducing new

[31] As discussed, New York's program uses a central procurement approach whereas most other states that use a design in which load-serving entities are responsible for complying with the RPS. Program eligibility in NY requires new projects or project upgrades, while other states allow pre-existing projects. The Commission set a vintage date of January 1, 2003 such that renewable generation in operation prior to that date was not eligible for the program. This is not the case in many other states. Eligible RPS eligible resources vary widely across states. In contrast to New York's definition of eligible Main Tier resources, waste-to-energy resources are eligible in some form in all the other states reviewed. Moreover, the neighboring states of Massachusetts, New Jersey, and Pennsylvania are part of multi-state power control areas in the northeast, and these states have the flexibility to draw on renewable resources from anywhere in their power control area. Thus, the mix of technologies and fuel sources used for RPS compliance in each state differs due to a combination of eligibility requirements, delivery restrictions, and resource availability.

generation to be built, while maintaining the base renewable resources that existed prior to the RPS program. That said, the knowledge that other states with different models are facing the same difficulties and challenges that New York faces confirms that the underlying issues related to increasing renewable generation are not necessarily related to the model used by each jurisdiction.

3.5 Renewable Attributes and Tradable Renewable Energy Credits

The State should continue its current efforts to develop a more automated and certificate-based tracking system, which might accommodate some certificate trading. New York has not needed to create a Renewable Energy Credit (REC) trading system to facilitate RPS procurements because New York's unique central procurement model does not require such a trading system. The delivery requirement of the RPS program makes a regional trading system difficult because the energy and attributes must remain linked in some manner. None of the neighboring electric systems, even those that have established REC trading, allow trading of credits across systems without some sort of energy delivery requirement. The Department is currently pursuing options with NYSERDA and NYISO to better automate New York's tracking system, speed the tracking settlement process, and ensure that New York's automated tracking system will be compatible with neighboring systems.

Many parties suggested that New York move immediately to tradable RECs (TRECs) that are fully compatible with those of neighboring states. Moreover, Summit Blue opined that the lack of such a system was a barrier to further development of the renewable energy market. While these comments fail to address certain issues related to deliverability requirements, adoption of a certificate trading system may, at the very least, lead to new forms of certificate trading within New York that would be beneficial to load-serving entities and marketers seeking to offer green power to their retail customers, and generators seeking a source of revenue to support their renewable resource investments.

3.6 A Utility Sited Tier

Central Hudson recommends the Commission consider the establishment of a new "utility-sited tier" to provide utilities the opportunity to construct, own, and operate small utility-scale solar PV projects to complement Main Tier and Customer-Sited Tier resources, in order to more fully develop a diverse renewable supply portfolio. Supporters of a utility sited tier believe that utilities have unique knowledge about and access to their about distribution systems that might create the potential for high value, relatively low cost solar PV facilities. Unlike the CST, the energy, capacity, and avoided distribution cost benefits of utility-sited facilities would flow to the benefit of all ratepayers of the utility, rather than just to the participant customer.

We have performed a study to test the concept of a Utility-Sited Tier to promote small, utility-sited solar PV facilities that integrate renewable energy generation into the distribution system at strategic locations, the details of which appear in Attachment E. The comparison shows that the Utility-Sited Tier approach would be much more expensive than the Customer-Sited Tier approach. The Utility-Sited Tier costs are inherently higher due to the need to pay the participant cost of $8/watt instead of an incentive cost of $3/watt or less, and a utility profit or "return" on the investment that includes income taxes. Given the Commission's policies on utility ownership of generation and the substantially higher unit cost of a Utility-Sited Tier, this option is not recommended.

3.7 The Voluntary Market

The Commission has noted the importance of the RPS Program in stimulating and complementing the voluntary/competitive renewable energy sales and purchases (or "green markets") so that these competitive markets, not government mandates, sustain renewable activity after the RPS program ends.[32]

New York's RPS goal calls for 1% of the State's electricity supply to come from renewable energy sold through the State's voluntary market, and the RPS Program includes components meant to support that market. New York's voluntary "green markets" encourage

[32] See 2004 PSC Order at p. 4

customers to purchase renewable energy from ESCOS or utility company programs. The potential is created that, over time, this voluntary market will grow as consumers increasingly select renewable energy to supply their needs. Environmental disclosure of the pollutants associated with each load serving entity has been required to enable consumers to judge the relative "green-ness" of each supplier and, hopefully, choose the greenest.

Enrollment in various green market offerings in New York has steadily grown since 2004, but only a small percentage of customers are willing to voluntarily pay an additional charge to support renewable energy resource. The actual number of customers purchasing renewable energy in the voluntary market is much less than 1%. This is not an anomaly in New York; no states have voluntary markets beyond a few percent. Increased cost, especially in today's economic climate, is a significant deterrent to consumer purchases of renewable energy.

To help foster the voluntary market, RPS Main Tier solicitations have been designed so that the percentage of a facility's generation that is bid into the RPS Program can be as low as 30% and as high as 95% of the expected annual production of the facility. This range allows developers to sell the retained portion of their generation to other markets, such as the voluntary market. Three wind projects with New York RPS contracts are retaining 60% of eligible production for sale to other markets, which may include the New York voluntary green power market. In addition, the program allows a contractor to suspend an RPS contract to sell the renewable energy attributes into New York's voluntary market, a situation which has already occurred. Although these design features are helpful, the voluntary market is currently insufficient in scale and financing structure (no long-term contracts) to function as a significant driver for large scale renewable development in the State. Another factor that may be impeding the development of a robust voluntary market is New York's failure to date to implement a more automated REC tracking system and an easier and more recognizable trading system. Such a system would better facilitate trading and provide verification of voluntary marketing claims.

It is unreasonable to expect this market to replace the mandatory RPS market as a major driver of renewable energy development in the near-term. However, over the longer term, changes in market conditions could occur that would make renewable energy more cost-

competitive with conventional energy sources, thereby making voluntary purchases of renewable energy a more substantive driver for project development as discussed in more detail in the next section.

3.8 The Transition to a Market Based System

An assessment of the elements that would be necessary to build a successful market-based system was provided in the Summit Blue Report. That Report explains that the current system is already market-based to the extent that it provides a place for buyers (represented by NYSERDA and green power marketers or ESCOs) and sellers to exchange goods (i.e., renewable attributes). A more market-based system would be one with less government participation as the buyer of these attributes. A self-sustaining market would be one that did not require state mandates or incentives for renewable energy. Based on interviews with stakeholders in the New York marketplace, as well as secondary research, the Summit Blue Report contends that the most fundamental elements necessary for achieving a more market-based system to support renewable energy development and to ultimately foster a self-sustaining market for renewable energy in New York include:

1. Long-term market certainty;
2. Open, liquid markets, wherein there is a diversity of buyers and sellers, frequent occasions for transactions, and market participants have the flexibility to negotiate contract terms that suit the characteristics of each deal;
3. Limited barriers to participation;
4. The existence of market drivers (supply and demand) sufficient to achieve the target level of market activity; and
5. Transparency of market data, such as winning bid prices.

The Summit Blue Report identifies these as key characteristics found in successful market-based systems and for growing New York's renewable energy marketplace as well. It is also appropriately noted in the assessment that there can be tension between the interests of

developers and ratepayers. For instance, increased transparency of market data can benefit developers or ratepayers, depending on its effect on clearing prices for renewable attributes.

The Summit Blue Report indicates that New York has made progress toward achieving self-sustaining renewable energy markets. Some indicators of the State's progress to date include the fact that a substantial amount of renewable energy projects are being constructed in New York in response to the RPS demand. Summit Blue also notes that the CST is achieving strong results despite being substantially limited by budget constraints.

Interview results from the full range of stakeholders indicate that it is far too early for New York's renewable energy markets to sustain themselves in the absence of state level incentives. By contrast, Constellation Energy states that the RPS program has been successful, but the transition to a market-based model should start now and it recommends that the Commission establish a clear timeline for transitioning to a near-term market-based model.

Renewable generation resource will be able to compete without financial subsidies when technological innovations and economies of scale drive its costs down to a point were their price converges with that of conventional generation sources and when systems are in place to better support tracking and trading. The RPS Main Tier pays the developer of a renewable energy project a financial premium for ten years. After that time, the project is assumed to be in a position to compete in the market, a realistic assumption since most renewable energy projects have high development and construction costs, but relatively low operating costs. One question concerns whether the projects will remain viable as they begin to reach the end of their useful equipment life, projected to be 20 years for wind turbines, the most abundant technology in the Main Tier. If regional or national carbon policies are put into effect and major technology breakthroughs occur, providing major declines in equipment costs, a voluntary market may develop. In the absence of these events it may not be possible to replace the wind turbines without another round of state subsidies.

Whether the current round of renewable projects being put in place will become competitive with fossil fuel technologies within their lifespan depends on the development of public policies and the development of technologies that will make the performance of the two equal. The likelihood that a cap-and-trade program will be put in place in the near future is

great and the price of fossil fuel generation will therefore likely increase substantially. The potential for technological breakthroughs in various renewable technologies is great; however, the time frame is unknown.

4. THE MAIN TIER

This section considers several issues related to the operation of the Main Tier.

4.1 The Delivery Requirement

In order to qualify for the RPS program, electric energy from a renewable resource must be consumed in New York. For electric energy to be counted in the Main Tier, it must be contractually delivered to and consumed in the State of New York. If it is not, it is not part of New York's electricity resource base and it does nothing to satisfy the goal.[33]

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[33] The Commission explained the need for a delivery requirement in its Instituting order:

> As long as the cost of new electric generation from renewable resources continues to be higher than the cost of generation from other resources, our adoption of the RPS will necessarily increase the direct cost of electricity supplied to New York consumers. Since we are likely mandating an increase in costs, it is important that we structure the RPS in a manner that maximizes the benefits that can accrue to New York from an RPS, consistent with all applicable laws and treaties. The structure of the delivery requirement affects the contractual flow of electricity, the location of pollution reduction and economic development activities, and the levels of wholesale energy and capacity prices, resource diversity and energy security.
>
> We adopt the recommendation to impose a delivery requirement with a monthly matching component. As stated in the RD and as argued by many of the parties, imposition of such a requirement is consistent with and in furtherance of our stated goals of increasing the amount of renewable energy retailed in the State, improving energy security, diversifying the State's electricity generation mix, reducing local air emissions and protecting against oil and natural gas price spikes or possible supply disruptions. Moreover, as noted by several parties, the requirement will also help ensure that New York State ratepayers enjoy the benefits from the costs they will incur to support the RPS program and its objectives. The costs to

Since electrons on a power grid cannot be physically tracked, RPS policy focuses on the flow of dollars, not electrons. The electricity generated to serve customers is the electricity they purchase. If the electricity is purchased from a "farm" of wind turbines, wind is harnessed to cleanly generate the power. The flow of money – the so-called "contract path" – is what drives energy choices and RPS policy. The delivery requirement is what insures the public obtains something valuable for its money – more renewable power serving New York customers. Since at every point the attributes are associated with electrons, New York is satisfied that the funds disbursed supported generation whose output was consumed by New York customers.

The delivery requirement also insures that the price-suppression effects of adding new energy and capacity made possible by RPS support will accrue to the benefit of the New Yorkers who paid the RPS premiums. Every unit of RPS power that is added to the New York electric grid supplants otherrelatively expensive conventionally generated power. Without a delivery requirement, it is unlikely that conventional in-state fossil fuel resources would be displaced by out of state resources supported by the program. The result would be the same level of emissions that would have existed without New Yorkers paying a premium to out-of-state resources.

When the RPS program was originally adopted, one of the primary reasons given for the willingness to spend "extra" to get renewable resources was the goal of reducing the volatility of the electric bills of consumers by obtaining a generation mix that had better fuel diversity. The benefit of reduced bill volatility is achieved only to the extent that the renewable power is actually bought by New York customers. If it is sold outside of New York, it can not reduce bill

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> New York State ratepayers will be minimized by the adoption of a delivery requirement. As shown by the cost studies, foregoing a delivery requirement would significantly raise the expected cost of an RPS for ratepayers because of the reduction in the offsetting impacts on wholesale electric prices. In light of all of the foregoing, we will adopt a delivery requirement.

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volatility in New York. It is recommended that the Commission continue the delivery requirement.

The RPS program originally had a monthly "matching requirement" meaning that the energy imported into New York from the out-of-state spot market pool had to occur during the same month in which the renewable energy was sold into the out-of-state spot market pool. Any tracking or environmental disclosure system governing the out-of-state spot market pool had to recognize the monthly transactions as an export of renewable energy from the generator. In 2006, the Commission modified the details of its delivery requirement. It required that intermittent renewable generators meet a more stringent hourly matching delivery requirement and that non-intermittent generators continue to deliver their energy into the New York Control Area. The Commission also required that no out-of-state generator may have its energy and/or attributes recognized in two jurisdictions simultaneously. Finally, the Commission indicated that it would not dictate contract methods for energy deliveries as long as the out-of-state generator can demonstrate to the satisfaction of the Commission or its designee that the electrical output was sold to end-use consumers in New York State in a retail sale.[34]

The hourly matching requirement was adopted in an effort to place in-state and out-of-state renewable generators on a more equal footing in regard to the cost of delivering energy into the New York Control Area. Without it, many parties had argued that out-of-state generators could unfairly avoid the costs of transmission congestion and losses whereas the hourly requirement mimics the real time experience that in-state generators have to manage.

The hourly matching requirement likely increases the cost that would be paid by New York ratepayers for out-of-state renewable resources. It also increases the administrative costs of tracking performance of the contracts. Since the requirement was added, the RPS solicitations have not attracted any out-of-state wind project bids. Without out-of-state bid

[34] Case 03-E-0188, supra, Order on Delivery Requirements for Imports from Intermittent Generators (issued June 28, 2006) and Order Authorizing Solicitation Methods and Consideration of Bid Evaluation Criteria and Denying Request for Clarification (issued October 19, 2006).

prices to compare to in-state bid prices, it is difficult to make any specific determination about the effects of the revised 2006 hourly matching requirement.

4.2 Project Vintage Date

A question before the Commission is whether to change the "vintage date" for Main Tier solicitations. The underlying issue is whether, in the course of reaching the RPS goal, the Commission should favor a least cost approach or an approach which encourages development of new projects.

In its Order establishing the RPS program, the Commission determined that renewable generation facilities which commenced commercial operation prior to January 1, 2003 would not be eligible for RPS incentives.[35] In response to requests to extend eligibility to projects that started operation before that date the Commission stated:

> Except as otherwise indicated in this Order, we will not modify [the start date proposed by Staff and also suggested in the Recommended Decision], and we hereby impose the condition that renewable generation facilities that commenced commercial operation prior to January 1, 2003 are not eligible for RPS incentives. Adherence to this requirement is consistent with and in furtherance of our stated objective that the RPS should "increase New York State's supply of renewable resources with the ultimate aim of establishing a viable, self-sustaining renewable generation market." Accordingly, those entities that have demonstrated the ability to compete in the market prior to January 1, 2003, except as otherwise indicated in this Order, are not eligible for RPS incentives.[36]

The first three Main Tier procurements used this January 1, 2003 vintage date as an eligibility requirement for projects to be certified. The fourth Main Tier solicitation used a revised vintage date of August 21, 2009, the date of the order authorizing that solicitation, to maximize

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[35] Case 03-E-0188, supra, Order Regarding Retail Renewable Portfolio Standard (issued September 24, 2004).

[36] Id., pp. 31-32. The exceptions noted relate to the concept of maintenance resources.

the leverage of federal stimulus money that would only be available to projects of more immediate vintage.[37] That reason for modifying the vintage date has since become moot.

The major reason for updating the vintage date would be to provide maximum ratepayer support for the development of new major renewable projects. Such support would reflect a heavy weighting in favor of the employment and other economic development benefits associated with any major new construction activity. In that regard, the Commission has already taken a step toward recognizing the importance of economic impacts in evaluating Main Tier bids. In 2006, the Commission determined that economic development impacts should be considered in the bid evaluation process, and authorized NYSERDA to incorporate economic benefits, as well as bid price, into its evaluation process. The Commission determined that the economic benefits bid component should be weighted at no more than 30% of the total score in the evaluation and selection process. [38]

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[37] In that regard, the Commission stated:

> We are interested in using these available funds to leverage as much time-sensitive Federal ARRA money as practicable. In that regard, we will set the vintage date for this particular procurement in a manner that we believe will encourage and maximize such leverage. … The change in the vintage date is necessary to address the unique facts and circumstances now before us. It should not be viewed as an indication that we have made a long-term change in policy. Issues related to the RPS program of the future, including vintage, will be under consideration shortly as part of the 2009 review. We note that large-scale investment in a renewable energy project is a matter that requires financial sophistication and such investors should understand that RPS incentives are not an entitlement and are subject to changing policies as we further refine our objectives in response to changing circumstances.

[38] The economic development weighting criterion recognizes the beneficial economic impact of RPS renewable generation development in local communities as an offset to the RPS program costs to New York State ratepayers. The Commission noted that this approach to recognizing economic development benefits should be re-evaluated during the 2009 Review of the RPS program. Since economic development benefits were added to the bid evaluation criteria, the RPS solicitations have not attracted any out-of-state wind project bids. Without out-of-state bid prices to compare to in-state bid prices, it is difficult to quantify how much RPS contract costs have increased, if at all, as a result of the change to the bid evaluation criteria. Case 03-E-0188, supra, Order Authorizing Solicitation Method and Consideration of Bid Evaluation Criteria and Denying Request for Clarification, (issued October 19, 2006).

There are three major reasons for not modifying the vintage date (i.e., January 1, 2003). First and most important, a change in the vintage date could reduce the number of bidders and the total megawatts bid, compromising the likelihood of reaching our renewable goal, and would likely preclude the opportunity to acquire otherwise available low cost renewable attributes. Second, updating the vintage date would harm those generators with existing plants that might have otherwise bid already existing capacity. Rules in place for the first three Main Tier solicitations allowed renewable generators to bid a portion of their attributes in response to a given procurement and reserve attributes for bidding in subsequent procurements in the event they were unable to find buyers in the voluntary market for what remained. Some large wind developers relied on these rules and have withheld bidding all of their attributes.[39] Finally, as major developers and others have noted, any substantial rule change may create a perception of increased investment risk in New York. The perceptions of major developers, as well as debt and equity investors, with respect to New York's regulatory environment are relevant: New York is competing with other states and regions to attract the development resources and capital for large renewable energy projects. At the very least, a substantial rule change should be considered only in light of compelling circumstances.

On balance, the reasons supporting retention of the existing vintage date (January 1, 2003) outweigh the reasons for changing it. However, as part of that balancing, we also propose that the Commission direct NYSERDA to clarify its economic development bid evaluation criterion to explicitly require for purposes of scoring a showing of incremental

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[39] Existing generators as a group have another concern: they would be denied an additional revenue source by updating the vintage date. While true, it is not clear that existing facilities that have already obtained financing need these added revenues to continue operating profitably, and investment in these projects should not have depended on speculation that they would obtain an RPS contract in a future solicitation. Indeed, the 2009 RPS program review has been contemplated since the inception of the RPS program, so it can be argued that there should be no surprise that the Commission might make such a change at this juncture. Thus, the general claim of detrimental reliance is weak. As noted above, however, those generators who in fact relied on the eligibility criterion in making business decisions regarding what level of attributes they would bid have a stronger reliance argument.

economic benefits associated with a given bid – in that way making clear that the Commission remains favorably disposed toward new projects.

4.3 Administrative Issues

4.3.1 Scheduling Procurements

The Evaluation Report noted that:

> The lack of regularly scheduled and known RPS competitive solicitations, and that the Program does not disclose the funding available for each procurement, send an uncertain market signal that impedes the development of new renewable capacity.[40]

Solicitations for renewable energy attributes in the Main Tier have required Commission approval prior to each solicitation. While there are certain advantages to this approach, such as a higher degree of Commission oversight and public participation for each solicitation, the process for seeking Commission approval is lengthy. The unknown timing of subsequent solicitations leads to uncertainty among potential bidders – with the possible result that development capital may be invested elsewhere.

NYSERDA should be given flexibility, in consultation with Staff, to schedule Main Tier solicitations on a more regular basis. Regularly scheduled RPS solicitations should lead to greater developer and generator certainty, which can in turn lead to better planning and lower overall costs. Additionally, eliminating the requirement of prior Commission approval would give NYSERDA the ability to respond to changing circumstances in a timely manner.

4.3.2 The Release of Unencumbered Funds

Under current program rules, NYSERDA must seek Commission approval to reuse funds that have been unencumbered by previous Main Tier procurement winners whose projects have either not performed to expectations, have dropped out, or have not been completed. (The availability of such funds provided part of the impetus for the pending fourth Main Tier

[40] Evaluation Report, p. 8.

solicitation.) Since such funds have already been approved for Main Tier use, it is reasonable that NYSERDA should be able to reuse them as it sees fit for additional Main Tier procurements without the need for a second Commission approval.

4.4 Contract Issues

4.4.1 Standard Offers for Small Scale Hydro and Biogas

Experience with bids in the Main Tier solicitations demonstrates that the small scale resources that generally have significantly lower unit costs than the large-scale wind resources have been increasing their bid prices over time in an attempt to approach the bid prices of the large scale wind resources. While it is generally advantageous to have many types of resources bidding against each other for RPS contracts, there is such a difference in cost between the relatively lower-cost small-scale facilities and the relatively higher-cost large scale wind facilities that the only robust competition that is being created by the solicitation structure is among the large wind developers. The costs of the small-scale projects are not near the margin (meaning their bids are not likely to be rejected) and their developers are able to extract significantly higher profits in proportion to those that can be obtained by the large wind developers that face real competition. The result is that ratepayers are likely overpaying for small-scale resources.

Currently, there is a single upset price above which contracts will not be awarded for an entire solicitation, but such upset price is generally set in relation to the expected price of the large-scale wind projects, so it does little if anything to regulate the bid prices of the relatively lower-cost small-scale resources. Potential solutions to the problem would be to impose technology specific upset prices above which contracts would not be awarded, or to segment the Main Tier solicitations by technology. While these options would provide some benefits, they would not allay concerns regarding insufficient bidders to produce competitive results.

We instead recommend devising reference prices for such small-scale resources upon which all comers would be given Standard Offer Contracts on an ongoing basis without the need or ability to compete against others on price terms. The resources are small enough and scarce enough that an ongoing invitation for such contracts, even if popular, would not

overwhelm the Main Tier procurement budget. By subjecting some technologies to a standard offer process, greater technology diversity can be promoted and anti-competitive results where bidders are few or scarce can be prevented. Allowing for a standard offer for technologies with lower costs than wind power can reduce the overall average price per MWh paid for attributes and maximize the use of Main Tier funds.

4.4.2 Contract Terms

The Commission has indicated a preference for 10-year contracts to assure that renewable energy attributes acquired in a solicitation are available to meet the ultimate program goal. Keeping contracts at the current 10 year length provides continuing certainly to market participants and encourages new generation because developers can rely on the long term repayment of their investments.

Contracts with terms less than 10 years would likely provide insufficient support to assure investors there will be sufficient revenue to be able to secure financing at reasonable rates and terms. This is truer now than in 2004: lenders are now more risk averse. Most renewable energy generation technologies have high up-front capital costs and are difficult to finance without a reliable source of revenue from which to recoup the initial investment. Moreover, even if contract terms of less than 10 years were financeable, shorter contract terms would force bidders to significantly increase their offered prices because they would need to recoup their high initial costs over a shorter period of time.[41]

Facilities that have to procure fuel (e.g., biomass facilities), however, have had difficulties securing long-term fuel supply contracts, thereby making it difficult for them to commit to fixed-price long-term contracts with NYSERDA. The RPS program should continue to provide an opportunity for such resources to bid in response to Main Tier solicitations. Indeed, from now through 2015, biomass facilities are expected to contribute a substantial portion of

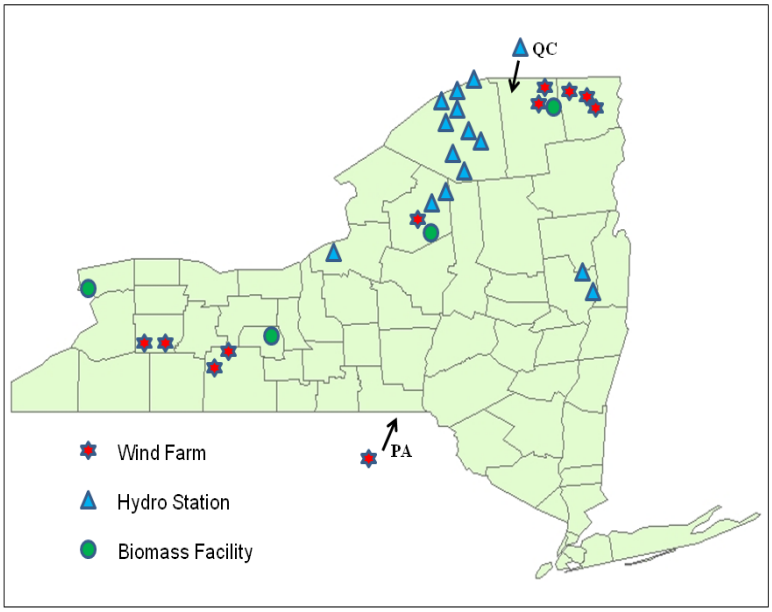
[41] These 10-year contracts terminate in a staggered fashion: since the contract lengths are uniform, the spreading out of procurement solicitations over time naturally results in staggering of contract expiration dates over time. This staggering avoids the risk of flooding the market in the future and maximizes the ability of the voluntary market to absorb additional resources as they become available.

the energy to reach our RPS goal. While all generators should be required to commit to 10-year contracts to further the policies discussed above, the fuel-based renewable energy generators should be allowed to enter into 10-year contracts that have an escape clause every two and one-half years so that the generator may drop out of the program if it is unable to secure a continuous fuel supply at a price that supports its fixed- price long-term contract. This approach was approved by the Commission for use in the Fourth Solicitation. It may also promote a beneficial reduction in volatility in the price of the fuel to be supplied and will provide greater certainty to fuel-based renewable energy generators than the potential for multiple shorter-term contracts.

The Commission should also allow parties some flexibility consistent with the goals of the RPS program. Parties should have the opportunity to make bids that act as hedges to offset future increases in wholesale commodity prices. (This could be accomplished in a variety of ways ranging from a contract for differences to a solicitation bid that establishes a maximum commodity price.) In order to realize the benefits produced by these mechanisms, it will be necessary to develop an RPS cost recovery mechanism that varies by month. The solicitation process should also be modified to permit bids for a period of time exceeding 10 years. Doing so might provide lower upfront costs, thereby reducing the short term bill impact.

4.5 Geographic Equity

The Main Tier has successfully promoted the development of small to large-scale facilities that are sited primarily based on the location of favorable natural resource conditions (windy sites and waterfalls). As a result, these facilities – including the vast majority of wind farms -- are being sited largely in upstate New York. The following map taken from NYSERDA's March 2009 RPS Evaluation Report shows the current distribution:



The produced electricity is delivered into the upstate market zones and displaces other electricity generation in those upstate market zones except when favorable transmission conditions allow that electricity to flow to the higher-priced and congested downstate New York market zones.

The centralized RPS procurement process does not base its procurement decisions on geographic location, beyond incorporating a value for New York State economic development in the Main Tier bid evaluation process. Some have suggested that upstate/downstate equity could be achieved by adding additional requirements that would more closely match spending to funding. The concept of replacing RPS central procurement with a system based on LSE procurement has been examined and such a scheme does not insure any greater matching between funds and geographic location of renewable generation because the generation must be built where the resources are available. A new artificial geographic location requirement would undermine the efficiency benefits of the central procurement model and would increase the overall costs of the RPS program. The geographic distribution tends to follow the locations that are most cost-effective. Accordingly, by allowing central procurement of resources without consideration of arbitrary utility service territory boundaries, the overall cost of the

program is minimized. As a result, no geographic requirement should be imposed on the Main Tier.

4.6 Maintenance Resources

The Main Tier procurement process includes provisions for Maintenance Resources, designed to avoid losing valuable baseline renewable resources because they may be financially unable to continue operations. Most renewable energy generation technologies have high up-front capital costs and low operating costs so once the initial capital investment is financed, continued operation is generally profitable. One exception to the general rule is biomass facilities that, unlike wind and hydropower resources, have continuing feedstock fuel costs that may fluctuate and make them uneconomic to continue to operate. Another possible exception is aging small hydropower facilities that are in need of major capital-intensive overhauls. .

Eligible resources include baseline (i) hydroelectric facilities of five megawatts or smaller; (ii) existing direct combustion biomass facilities; and (iii) existing wind facilities. A rigorous case-by-case review process was established intended to ensure that the amount of support provided is sufficiently tailored to meet the needs of each project, while reserving the largest possible portion of RPS program funds to encourage the development of additional renewable resources. Eligibility criteria includes consideration of operating costs, financial records, effect of market rules, potential for capital improvements, and relationship with a parent company.

The provisions for Maintenance Resources should be modified to limit the maximum contract term to three years, and require that any price offered to such resources be no higher than that offered to similar new projects. After three years, a further showing of need to receive RPS program support will need to be filed, reviewed and acted on by the Commission. This will assure that renewable energy projects facing short term financial hardship are adequately supported and will afford those facing longer term hardships the opportunity to make their case for support.

4.7 Relationship of RPS Generation to Other Renewable Resources

The current RPS bid evaluation and contract process does not address concerns that have been raised by the Commission about proposed renewable generation displacing existing renewable generation, or forcing a steam host to employ auxiliary steam production (with loss of the efficiency benefits of combined-cycle operation). The RPS program is intended to use customer funding to increase the overall renewable generation as a percentage of the total consumption of New York customers. It should not subsidize new generation if that output displaces the power supplied by either other RPS funded projects or existing renewable generation.

The Commission recently approved a methodology to be used by developers of renewable generation projects applying for certificates of public convenience and necessity under PSL §68 to address these concerns. However, this methodology would not be applicable to projects (80 MW or below) that fall outside the Commission's §68 jurisdiction.[42] In light of this recent Commission action, it is recommended that the Commission direct Staff and NYSERDA jointly develop an approach -- in consultation with stakeholders, as appropriate - to be used in Main Tier bid evaluation and/or contract negotiation to respond to these comments.

4.8 Biomass Projects Lead Time

As part of a Main Tier contract award, the developer is given a set lead time within which the project must be placed in service. This in-service requirement assures that monies collected from ratepayers will be put to use quickly and that projects that will not come to fruition can be identified in a timely manner so that the funds can be unencumbered and redirected for a useful purpose. The current lead time allowed appears to be sufficient for the successful development of large wind projects. Biomass proponents argue that their technology needs a longer lead time to be successful and that they are therefore hindered from participation in the Main Tier solicitations due to the structure of the in-service requirement.

[42] Case 09-E-0497, Generator-Specific Energy Deliverability Study Methodology, Order Prescribing Study Methodology (issued October 20, 2009)

We agree. The lead time for biomass projects should be lengthened to allow for the longer development schedules inherent in biomass projects. More potential biomass developers will be encouraged to participate, opening up competition and lowering overall costs. NYSERDA should have the ability to establish longer lead times for biomass.

5. THE CUSTOMER-SITED TIER

5.1 Summary

The Customer-Sited Tier is designed to encourage customers to install their own behind-the-meter renewable energy production systems. This gives customers an opportunity to directly affect the generation source of the electricity they consume, and promotes distributed generation. It also provides an avenue of funding for primarily high-cost technologies that cannot economically compete for funding in the Main Tier, but that hold promise to be important sustainable, low or non-polluting electricity generation resources in the future. Such support helps sustain the infrastructure of distributors, installers and others whose businesses bring technologies to customers.

Since the inception of the RPS, the CST program has been used to encourage the development of alternative technologies, notwithstanding a general recognition that eligible CST technologies would not pass the traditional total resource cost test. The Commission initially established a goal for the CST of 2% of the overall RPS goal, and a total funding level of $130.4 million through 2013, or $16.3 million per year.[43] That annual funding level reflected in

[43] The Commission also required that

> . . . Staff and NYSERDA should develop, for our approval, an implementation and allocation plan to utilize the Customer-Sited Tier funding . . . This funding plan. . . should include a recommendation regarding an initial, base level of funding to be allocated to each eligible technology. We anticipate that these initial, base funding commitments would demonstrate a limited, but definite, commitment to the development of each technology, thereby encouraging investment from the appropriate manufacturing and deployment sectors.

. . . Each of the criteria below would be considered and assigned a relative weight:

- cost effectiveness relative to the retail price of electric power;
- market risk as indicated through consumer awareness, the potential market size, and the availability of deployment services to meet consumer demand;
- the net environmental impact relative to clean fossil technology;
- technical risk as indicated through the stage of product manufacturing, proven field experience and the ability of the technology to meet reasonable performance standards for the expected life of the technology, which should at least extend beyond 2013;
- the likelihood that manufacturing and/or deploying the technology will maintain or increase employment in New York State;
- benefits to the New York State electric system through reduction in the peak load or the cost of power;
- fuel diversity impact through a reduction in the use of fossil fuels; and
- the potential for residential and small business sector participation.

These criteria could be used as a guide in determining the initial, base funding allocation to each category of eligible technology. Base funding and additional allocations could be adjusted each year based on factors such as interest in the program in previous years and changes in market factors that affect the criteria above.

Case 03-E-0188, supra, Order Approving Implementation Plan, Adopting Clarifications, and Modifying Environmental Disclosure Program (issued April 14, 2005).

our recommended scenario is now $50 million per year and accounts for a significantly higher share of RPS funding than the Commission had initially budgeted. Indeed, based upon the projections in the recommended reference scenario, incremental 2015 CST funding will account for about 20% of total cost of the RPS. A more aggressive alternative scenario with $75 million of CST funding is also presented as an option for the Commission to consider. (Because CST subsidies are front loaded when the asset is installed, CST expenditures end in 2015 while Main Tier contract obligations will continue through 2024.) The effect of the CST program on utility rates is not significantly mitigated by price suppression, unlike the Main Tier program. In light of this information it is necessary to carefully consider each CST technology and the benefits it provides.

We observe that:

- The major benefits of CST – customer participation, technological innovation and commercialization, economic development, fuel diversity, environmental mitigation and strategic load reduction -- continue to be important to the State, yet these benefits are not easily incorporated into a benefit cost test[44].

- There is a marked difference in cost per MWh among the eligible CST technologies (PV, ADG, fuel cells and small wind), even after accounting for PV's unique production pattern and potential locational value.[45] PV projects are generally the most expensive. The Market Potential analysis found that PV was at least twice as expensive as other components of the CST:

[44] A more extended discussion of the benefits of CST technologies provided by NYSERDA is appended in Attachment D.

[45] ADG and fuel cells installation could offer the same locational and T&D avoided cost benefits as solar PV.

Table 3

Estimated Program Cost per MWh	
Resource Category	**Estimated $/MWh Cost (Over Life of Project)**
Solar Photovoltaics	$67
Fuel Cells	$32
Anaerobic Digestion Systems	$28
Customer-Sited Wind	$33
Weighted Average Cost	$58

- Certain of these technologies utilize byproduct methane as a fuel source (or enable users to avoid methane generation), thus eliminating the impact of methane releases on climate change. Methane has roughly 20 times the adverse impact of carbon dioxide on climate change.

- Within certain of these technologies (e.g., solar PV), there are economies of scale, such that large installations produce energy at a lower cost/MWh.

The balance of this section summarizes the history of the CST, describes, for each eligible CST resource, the nature of the current program, possible specific improvements and issues of likely interest to the Commission, proposes adding solar thermal as an eligible technology, and estimates, for an assumed level of funding, the generation likely to be produced by the various technologies and related unit costs. Assumed funding levels, broken down by technology, are discussed later.

We recommend that the Commission consider these principles in deciding the appropriate funding for this program:

1. The goal should be identified clearly. The amount of energy from the Customer-Sited Tier amounts to only a small percentage of the RPS goal, so any decision to spend money on the program should be based on other Commission objectives, such as state

2. and local economic development impacts, or a determination that New York should do its fair share to achieve a sustainable energy future.

3. The Commission should consider cost effectiveness, as least as a subordinate criterion. It could, for example, foster the siting of solar PV where they are most cost-effective or earmark money to more cost-effective CST technologies that have significant environmental benefits (such as ADG).

4. The Commission should affirmatively address the rate and bill impacts of CST by noting that expenditures over time are substantial but the annual rate impact when expressed in terms of annual bills for customers is affordable.

5. The Commission should recognize that one factor distinguishing solar technologies from all of the other renewable energy generation technologies is the nearly unlimited number of acceptable sites on which they can be placed. By contrast there are many fewer potential locations for wind turbines on a tall tower, an anaerobic digester, or a fuel cell running on methane from a renewable source. This means that, at least in the near-term, the number of PV or solar thermal systems that can be installed in New York State can be easily ramped up or ramped down solely by changing the size of the RPS program's incentive payment. If the allocations of funds for other technologies are not successfully absorbed by the market for those technologies, there will be an almost automatic tendency to reallocate those funds to markets than can absorb them. This use of RPS funds needs to be seriously considered in defining the rules governing reallocations of CST funds.

5.2 History

The Commission has noted the importance of accelerating development of emerging technologies, such as PV, fuel cells, small wind facilities, and similar technologies.[46] In its

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> [T]he Customer-Sited Tier . . . [is] a mechanism to ensure the continued and accelerated development in New York State of emerging technologies. . . . Incentive programs, payment structures, and payment levels are to be designed to accomplish the following: reduce cost barriers to customers interested in installing renewable energy systems; encourage reliable operation of installed systems; ensure that the incentive design structure is fair and reasonable; encourage properly-sized systems; provide equitable incentive levels between similar products; and progress toward a marketplace sustainable without incentives."

September 2004 Order, the Commission set aside two percent of the total RPS incremental megawatt-hour requirement for these projects to be subsidized through the CST. Funding was to be allocated based on a comprehensive review of the relative costs and benefits. Benefits included the potential for specific projects to create or sustain jobs in New York, support load pockets throughout the State by reducing demand on the grid during peak demand periods, support greater fuel diversity, and environmental benefits.[47]

In its April 2005 Implementation Order, the Commission asked Staff to recommend an initial base level of CST funding to be allocated to each eligible technology. The Commission stated that these base funding levels should demonstrate a limited, but definite, commitment to the development of each technology, thereby encouraging investment from the appropriate manufacturing and deployment sectors. NYSERDA was requested to develop metrics and weighting factors to determine how funds would be allocated among projects and technologies, taking into account the technical and market risks resulting from implementation of each technology. The Commission added that base funding and additional allocations could be adjusted each year depending on factors such as interest in the program in previous years and changes in the market.

Subsequently, in a June 2006 Order, the Commission established funding allocations among CST eligible technologies.[48] The Commission allowed unused funds for the eligible technologies to be reallocated at the end of each year to the "discretionary" category, which NYSERDA, in consultation with Staff, would be permitted to distribute the following year to eligible resources on an as needed basis. The Commission also directed NYSERDA, in consultation with Staff, to evaluate the effectiveness of the individual CST programs and modify them as necessary to meet changing market needs with the proviso that any proposed changes in the overall funding would require Commission approval. Lastly, the Commission ordered NYSERDA to develop a CST Operating Plan that defined the specific programs to be

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[48] Overall funding target for Customer-Sited Tier technologies (exclusive of administrative fees) was set at $45 million through 2009 with 30.7% for solar photovoltaic generation; 10% for small wind; 24.9% for fuel cells; 24.4% for anaerobic digestion systems; and 10% (plus funds remaining from prior years) for discretionary purposes.

implemented through at least 2009, the expected funding levels within each program, the methods of payments to be made, and when solicitations would begin. On February 12, 2007 NYSERDA released its Operating Plan and solicitations for CST resources began shortly thereafter.

Since the inception of the program there has been high demand for solar PV and anaerobic digester installations. The demand for PV systems peaked in early 2009 when federal tax incentives for those systems were significantly increased and NYSERDA announced that New York's incentives would drop by 25%, effective February 1, 2009. This notice of an impending program revision had the effect of encouraging a flurry of market activity aimed at locking-in the higher state incentive and resulted in the near-exhaustion of PV and discretionary funds.

While the Commission felt that the CST was an important part of the RPS program for the reasons cited, the modest level of funding provided and the 2% goal of the CST indicate that it was expected neither to consume a large proportion of the RPS funding nor furnish the bulk of the new renewable generation for New York.

The CST was enhanced and the budget increased in 2008 and 2009 to accommodate the high demand for PV and anaerobic digester installations. It is expected that the total amount (excluding administrative and evaluation costs) committed to the CST since its implementation in 2007 through the end of 2009 will be about $103 million. Of this amount, $75 million has been budgeted for PV, $20 million for anaerobic digesters, $6 million for fuel cells and $2 million for small wind.[49] In addition, there is no longer a stated discretionary fund, but at the end of each calendar year, funds not already committed to projects in a particular category can still be designated “discretionary” and reallocated from undersubscribed to ones with greater demand. Such reallocation should be based upon an analysis of the most effective use of the available funds, recognizing the concerns about solar PV expressed earlier in this section.

[49] As noted above, this amount reflects an unusually high level of activity for PV in the beginning of 2009 due to a short window of significant incentives. In addition, new net-metering laws that expanded the size of eligible non-residential PV systems to 2 MW coinciding with a reduction in installed solar PV prices, added to the significant incentives that were offered solar PV customers.

The historic production and expenditures for the CST are shown in the table.

Table 4

CST Production and Expenditures

	2008	2009	Total
MWs			
Solar Photovoltaic	5.99	13.86	19.85
Anaerobic Digesters	6.69	4.43	11.12
Fuel Cells	0.52	0.00	0.52
Small Wind	0.17	0.19	0.36
Solar Thermal	0.00	0.00	0.00
Total	13.37	18.48	31.85
MWhs			
Solar Photovoltaic	7,770	17,963	25,733
Anaerobic Digesters	46,912	30,996	77,908
Fuel Cells	4,045	0	4,045
Small Wind	207	403	610
Solar Thermal	0	0	0
Total	58,934	49,362	108,296
Expenditures			
Solar Photovoltaic	$22,251,730	$58,776,113	$81,027,843
Anaerobic Digesters	$14,812,926	$4,461,824	$19,274,750
Fuel Cells	$2,032,210	$0	$2,032,210
Small Wind	$518,283	$446,914	$965,197
Solar Thermal	$0	$0	$0
Total	$39,615,149	$63,684,851	$103,300,000

On the basis of the authorized budget and the current rate of demand for PV as well as other technologies in the CST, the funding through December 2009 will result in about 28 MW of installed capacity that will produce about 99,000 MWh. This represents approximately 48% of the original 2013 Customer-Sited Tier target of 201,130 MWh established by the Commission in its 2004 Order and is slightly below the original 100,855 MWh targeted for 2009.

To assist the Commission in its deliberations on the future of the Customer-Sited Tier, NYSERDA submitted a report that considers the market potential and associated costs of each CST technology and a basis for establishing program targets and funding budgets for the years

2010 through 2015.[50] It has also provided a summary of CST issues opportunities which is provided in Attachment D.

5.3 Eligible Technologies

5.3.1 Solar Photovoltaic

A PV device converts solar energy - light and ultraviolet radiation from the sun - directly into electrical energy. PV facilities have high up-front capital costs in relation to other renewable resources, but they also have characteristics that make them particularly attractive. Specifically, potential installation sites are virtually unlimited, they produce no air emissions during operation, they can often be installed in a manner that is not visually intrusive and, most importantly, the electricity they provide follows a curve that nearly matches the summer peak load curve when generation capacity is most critical and expensive. Moreover, they can be readily sited in downstate load pockets, thus adding to the value of their output.

Under the current CST program, NYSERDA provides a one-time incentive payment for PV installations as follows: Residential – $3.00 per watt up to the first 4 kW and $2.00 per watt after the first 4 kW up to a maximum of 8 kW per site/meter; Commercial – $3.00 per watt up to the first 40 kW and $2.00 per watt after the first 40 kW up to a maximum of 80 kW per site/meter; and Not-for-Profit - $5.00 per watt up to the first 25 kW up to a maximum of 25 kW per site/meter[51].

Through July 2009, CST incentives have supported over 1,600 applications for the installation of primarily residential PV systems. Customers who install PV systems also take advantage of favorable net-metering, which allows a customer to receive a credit, at full retail rate, for excess electricity generated by the system but not used by the customer. This

[50] New York State Renewable Portfolio Standard Customer-Sited Tier Program Market Potential, Program Expectations and Funding Considerations (2010-2015), June 22, 2009 (Market Potential Report). This report is referenced often in the discussion that follows.

[51] On October 13, 2009, NYSERDA generally reduced the RPS CST incentives per kW installed by 50¢ per installed watt of PV. The RPS CST incentive for non-profit installers was decreased by $1.00 for the first 25 kW and 50¢ for additional kW. All were subjected to a new cap of 50% of total installed cost.

arrangement, coupled with federal, state and local incentives, has contributed to the steady and significant growth in PV demand since the start of the program.

Solar PV installations produce electricity at a cost of between 30 cents and 44 cents/KWh. This compares to an average wholesale electricity market price of 7 cents/KWh in Albany (for 2006-2008). However, that stark comparison does not account for solar PV's favorable output pattern and potential locational value. We performed an analysis that estimated the average annual market value for a MWh of solar PV produced in New York City versus the average annual market value of a MWh from a conventional base load plant in upstate New York. This analysis which specifically reflects differences in output pattern, geography, and avoided distribution costs found that while a MWh of solar power produced in New York City was much more valuable than a MWh of power produced by a base load plant in Albany, the MWh of solar power, with its high cost, was still substantially less economic than alternatives such as conventional generation, upstate wind and energy efficiency. The analysis used actual market prices of energy and capacity over the years 2006 to 2008.

In terms of location, the market value of MWh produced in New York City, stated on an 8760 hour average basis, was $88/MWh compared to $73/MWh for Albany, a difference that implies a 34% premium value for Solar PV installed in New York City. In terms of output pattern, solar PV has an additional advantage due to the characteristic of its generation output pattern: solar PV's output peaks during the day and ebbs at night, tracking the rise and fall of the hourly market prices of electricity. This makes an average MWh of solar power more valuable than an average MWh of power from a 24 hour per day base load plant. For New York City, this increases the value of solar power from the $88 round the clock all year long amount to $118. This equates to an additional 34% premium value for solar PV. When the effect of output pattern and New York City location are combined, the comparison is a market value for solar power in New York City of $118 versus a market value for base load generation in Albany of $73. This equates to a premium value for the solar PV of 62% from the combination of the two effects. Solar PV also needs to be credited with avoided distribution costs because it is behind the meter. For New York City, this increases the value of a MWh by $39. The combined effect of all three factors – New York City location, output pattern, and avoided distribution

costs bring the value of solar photovoltaic to $157/MWh, a 115% premium over the value of a megawatt hour from an upstate baseload generator. These values are tabulated in the Table 5.

Table 5

Premium Value of Solar Photovoltaic

	Base Load Hourly Pattern	Solar PV Hourly Pattern	Solar PV Hourly Pattern Plus Avoided Distribution Costs
Upstate Location (Alb)	$73/MWh	$88/MWh	$101/MWh
Downstate Location (NYC)	$88/MWh	$118/MWh	$157/MWh

Solar PV remains more expensive than other CST options even after reflecting these characteristics. For purposes of our later analyses of program funding levels, two options are provided. The preferred approach reflects PVG funding of $24 million per year; a more aggressive approach sets that funding level at $50 million per year. These options highlight the question of whether the public interest is better served by doubling solar PV spending or whether existing solar PV support should be maximized by being more deliberate with respect to, among other things, size, locational requirements and incentive levels.

5.3.2 Anaerobic Digesters Generation (ADG)

Anaerobic digestion is a series of processes in which microorganisms break down biodegradable material in the absence of oxygen. Such digestion processes are particularly appropriate for wet organic material such as that found in manure and sewage effluent. They produce methane and carbon dioxide rich biogas suitable for energy production (in contrast, in the presence of oxygen - "aerobic digestion" - carbon dioxide is produced without the methane). In addition to producing electricity, ADG systems serve directly to reduce greenhouse gas emissions, while mitigating solid waste burdens. For these reasons, it is reasonable to consider a target of aggressively encouraging installation of ADG systems until

virtually all the significant New York sources of manure and sewage effluent have been tapped for their energy potential.

The current program for ADG systems provides up to $1 million in incentives for each installation in the form of buying down capacity costs and performance-based payments. A typical all-in system costs about $4,000 - $6,000 per KW. The ADG program has been highly subscribed. As of July 31, 2009, NYSERDA received 28 applications, primarily from large farms. In total, these systems are projected to produce about 70,000 MWh/yr and provide about 10 MW of installed capacity.

The current budget through 2009 is $20,100,000 of which 97% has been encumbered. Many of the farm-based ADG projects also benefit from net-metering, which allows systems up to 500 kW to connect to the grid, so long as manure as a percentage of total fuel weight is at least 50%. Some farms are also selling the carbon credits associated with the methane destruction. According to NYSERDA, however, all of these revenue streams taken together are typically not sufficient to provide the required payback for a customer to proceed with an ADG system. In addition, historically high milk prices provided farmers with the ability to borrow the required capital to install a system. Now that milk prices have fallen significantly, borrowing has become more difficult. Also, high interconnection costs can be a barrier to installing these systems and significantly increase the payback period for these projects.

NYSERDA's Market Potential Report projects that an additional 24.3 MWs are achievable representing an additional 170,000 MWh/year. These assumptions are based on capturing the methane at the majority of the largest dairy farms throughout the state, as well as tapping into 37 wastewater treatment plants. These projections are based on incentives averaging about $28/MWh over the 15-year life span of a typical project and assuming an 80% capacity factor for each system. ADG systems are one of the lowest cost CST technologies on a $/MWh basis. For purposes of this analysis, a total budget of $71 million for incentives through 2015, as recommended by NSYERDA in its market potential report, could help achieve this goal. We believe these projections to be reasonable and, because ADG systems are one of the lowest cost CST technologies, these projects should be aggressively pursued. (NYSERDA notes that

institutional barriers could well frustrate this objective. This observation suggests that efforts outside the RPS program should address those barriers.)

5.3.3 Fuel Cells

A fuel cell produces electricity in an electrochemical conversion process. A "feedstock" fuel is fed into the device where it chemically reacts in the presence of an electrolyte (an electrically conductive medium), creating electricity as one of the products of the chemical reaction. Fuel cells can utilize pipeline gas or gas produced by renewable resources as a feedstock. In New York, sources of renewable biogas (methane) include landfills and wastewater treatment plants. Much of this biogas is currently vented directly into the atmosphere, contributing to pollution and climate change, or "flared" (openly burned) to reduce its harmful effects since it is many times more potent as a "greenhouse gas" than carbon dioxide. Such biogas could serve as an excellent feedstock for fuel cells and its consumption through an electrochemical process would eliminate the unwanted emissions. Further, such facilities would be expected to operate at a high capacity factor. It would therefore be reasonable to consider a CST policy to realize to the fullest extent practicable the energy potential of such sources.

The current CST fuel cell program provides incentives in the form of capacity buy-down and performance-based payments. Incentive payments are differentiated by the scale and type of application, with a $1 million per unit cap for large systems (over 25 kW) and a $50,000 cap for small systems (equal to or less than 25 kW). A “fuel cell system” may consist of one or more large fuel cell module(s) and/or one or smaller fuel cell module(s) installed at a project site. If the site’s fuel cell system includes only small fuel cell modules the cap is a maximum of $50,000, otherwise the cap is a maximum of $1 million. As currently designed, the program has been undersubscribed. NSYERDA’s market potential report indicates that a very limited number of equipment manufactures have affected the program – most notably by eliminating the production of smaller more “mature fuel” cells in favor of larger “experimental” ones and decreasing “single fuel cell” installations in favor of larger “clustered fuel cells”. Also, customer

interest for smaller fuel cells has not materialized as expected. NYSERDA's estimates of future market potential for fuel cells reflect this experience to date.

Fuel cells offer advantages that make them a desirable renewable energy option: they can be installed quickly in load pocket areas; run base-loaded and reduce demand at all times; can be sized to appeal to large and small customers; and they can provide process heat to the host site. The Market Potential Report indicates that fuel cell manufacturing and market practices shows signs of improvement in technology, and costs are starting to decline. In addition, in August 2009, new net-metering legislation was put into affect allowing for residential combined heat and power (CHP) and fuel cell systems of 10 kW or less to receive the avoided cost rate (as opposed to full retail rate) for generation in excess of usage during a billing period.

For small fuel cells, NYSERDA estimates 5 projects per year, rated at 0.01 MW per project operating at an average capacity factor of 25% and recommends funding at $100,000/year. For large fuel cells, it estimates 3 projects per year rated at 0.4 MW per project, plus one project per year rated at 1.2 MW, all operating at a capacity factor of 90%. For purposed of this analysis, NYSERDA estimates total funding for this category to be $6.1 million/year for a total of $ 36,600,000 from 2010-2015. NYSERDA's market potential report also recommends increasing the cap from $1 million to $3 million per unit for larger fuel cell installations.

Increasing the cap would make additional projects economically viable but would also consume the funding on fewer, larger installations. It may be more prudent to leave the current cap of $1 million per installation, for half of the budget (after subtracting out an annual $100,000 very small fuel cell set-aside) to maintain approximately the current rate of subscription for smaller projects into the future. The remainder of the budget should be used to support a $3 million cap on larger installations, provided that these installations use biogas from landfills, wastewater treatment plants, and similar renewable sources as a feedstock which would help capture the methane at these facilities.

5.3.4 Small Wind

Since 2003, NYSERDA has been operating a small wind incentive program, initially with SBC funding and, since 2007, using RPS funds through the CST Program. To date, with the combined funding of the SBC program and RPS programs, NYSERDA approved incentives for about 65 small wind systems in New York State. The majority of the installations (80%) have been 10kW machines and sizes have ranged from 1 kW to 22.5 kW and the majority of customers are residences and small farms. This program has consistently been undersubscribed, which may be due in part to local siting difficulties.

The horizontal axis wind turbines currently eligible under the small wind program are difficult to site in residential areas because they require large, visually intrusive towers. If the program continues as currently designed, it is likely that only the owners of large properties in terms of land area will be able to participate. NYSERDA has yet to identify a "rooftop" model, either horizontal or vertical axis, that it is willing to certify as sufficiently efficient to warrant public investment. In keeping with the concept that the Customer-Sited Tier is designed to encourage customers to install their own "behind-the-meter" renewable energy production systems sized in relation to the amount of the electricity they consume, funding per installation is limited. Current funding limits, which vary depending on the size and height of the turbine and the customer class, have primarily accommodated machines that could serve single family homes and farms, but may be too restrictive to accommodate commercial customers, schools, and other institutional customers. Consideration should be given to increasing the funding per installation and to allow for larger turbines to up to 600 kW in capacity. This size is comparable to the larger customer-sited wind facilities being installed in neighboring states. NSYERDA projects a gradual growth for market demand for the wind program, to 15 MW by 2015, with an expectation that larger systems would be installed in the later years of the program. A total funding level of $18.5 million through 2015 is used for this analysis.

5.3.5 Solar Thermal (proposed)

“Solar thermal" refers to the use of collector devices to absorb the heat content of sunlight to provide hot water or space heating. Inclusion of solar thermal systems in the RPS program would not increase the percentage of consumed electricity generated from a

renewable resource; in that regard solar thermal projects are more like energy efficiency measures that reduce the overall level of electricity consumption.

Solar thermal is not now an eligible technology under the CST. Of the 33 states (including the District of Columbia) with renewable energy programs, 13 states have included solar thermal as an eligible technology. Such inclusion has likely occurred because of the favorable characteristics of the technology. Solar thermal systems are more efficient than solar PV systems in that they extract comparably more of the useful energy content of sunlight. Solar thermal energy displaces customer energy use at lower cost than solar PV. Such systems emit no pollutants and generally replace and reduce the use of fossil fuels in providing hot water or space heating.

Earlier this year the Commission considered a multifamily solar thermal hot water heating programs for inclusion in the Energy Efficiency Portfolio Standard program, but found that the particular program proposed could not pass the Total Resource Cost (TRC) test. The Commission also found that the technology has been successfully installed in particular for single family residential and small commercial customer applications, and that such systems have proven reliable when installed properly by competent installers, and service lives are expected to exceed 20 years with reasonably small maintenance costs.

For estimated energy savings, it was assumed that on average, the typical family of four uses approximately 64 gallons of hot water per day. Using a conventional 50 gallon electric resistance heater, the system would consume approximately 4,800 KWh's per year in the Albany region. A typical 2 collector, flat plate solar thermal system, using an 80 gallon solar tank with an energy factor of .44, would produce the equivalent of approximately 2,100 kWh's per year of electric resistance water heating. This leaves the balance of 2,700 kWh's to be supplied by the utility (4,800 – 2,100.) The energy factor is the percentage of the residence's total hot water load met by the solar thermal system, taking into consideration standby and other losses. In this scenario, with an energy factor of .44, the load (and savings) met by the solar thermal system is approximately 2,100 equivalent kWh's per year (4,800 x .44.)

On average, the solar thermal system described above would result in lifetime (approximately 20 years), production of approximately 40,000 equivalent kWh's. The

approximate cost of the typical solar thermal system described above would be $10,000 (in the Albany region.) It was also assumed proposed funding for a solar thermal program within the customer-sited tier at $4,300,000 per year. Using the scenario above, this would provide for the installation of about 430 residential solar thermal systems. The total lifetime production of these systems would be the equivalent of approximately 17,200,000 KWh's at an average cost of $.25 per KWh.

For these resons, the Commission should be receptive to petitions to have solar thermal installations qualify for CST funding.

5.4 Funding Levels and Expected Production

The following table provides a summary of the funding levels as well as the MW and MWh targets that are recommended, based on a scenario reflecting a 30% renewables target and a forecast the reflects energy efficiency initiatives intended to reduce MWh usage by 15%. It is important to note that the Customer-Sited Tier procurement programs focus substantially on MW capacity because the equipment to be purchased is sold in that manner. Conversion of MW to MWh is useful in counting the achievements of the Customer-Sited Tier towards the RPS goal and targets.

Table 6

Proposed CST Production and Budget

	2010	2011	2012	2013	2014	2015	Total
MWs							
Solar Photovoltaic	8.00	8.28	8.57	8.89	9.23	9.60	52.57
Anaerobic Digesters	4.40	4.90	4.40	3.60	3.45	3.45	24.20
Fuel	2.45	2.45	2.45	2.45	2.45	2.45	14.70
Small Wind	0.72	1.77	1.77	1.84	2.23	2.30	10.63
Solar Thermal	7.92	7.92	7.92	7.92	7.92	7.92	47.52
Total	23.49	25.32	25.11	24.70	25.28	25.72	149.61
MWhs							
Solar Photovoltaic	9,120	9,434	9,771	10,133	10,523	10,944	59,926
Anaerobic Digesters	30,625	33,883	31,290	25,544	24,633	24,633	170,607
Fuel	19,030	19,030	19,030	19,030	19,030	19,030	114,180
Small Wind	1,264	3,045	3,108	3,178	3,944	4,028	18,567
Solar Thermal	9,030	9,030	9,030	9,030	9,030	9,030	54,180
Total	69,069	74,423	72,230	66,915	67,159	67,664	417,460
Budget (Millions)							
Solar Photovoltaic	$24.0	$24.0	$24.0	$24.0	$24.0	$24.0	$144.0
Anaerobic Digesters	13.7	13.3	12.0	11.6	10.2	10.2	71.0
Fuel	6.1	6.1	6.1	6.1	6.1	6.1	36.6
Small Wind	1.9	2.8	2.9	3.1	3.8	4.0	18.5
Solar Thermal	4.3	4.3	4.3	4.3	4.3	4.3	25.8
Total	$50.0	$50.5	$49.3	$49.1	$48.4	$48.6	$295.9

6. THE EFFICACY OF THE RPS PROGRAM

This section provides our analysis of the benefits and costs of the RPS program, as well as a separate analysis of program benefits and costs prepared by KEMA, a consultant engaged by NYSERDA.

6.1 Staff's Analysis

6.1.1 Framework

Staff's analysis addresses two questions:

- What have been the benefits and costs of the RPS initiative to date?
- Going forward, what benefits and costs can be expected from the program?

To address these questions in a way that provides the Commission with a basis for decision-making, we: stress the importance of identifying the range of perspectives from which alternative answers can be developed; qualify our reliance on conventional benefit-cost analyses to acknowledge very important non-quantifiable (or difficult-to-quantify) benefits associated with the RPS; disaggregate the Main Tier and CST given their very different objectives, costs and results; and consider alternative going forward scenarios to illustrate results of different assumed RPS targets and funding levels.

Any decision about the future of the RPS program must be guided by a discussion of its likely benefits and costs measured on a going-forward basis. A major consideration in attempting to weigh the benefits and costs of a renewable generation policy is recognition that many of the benefits are difficult to quantify. These include the reduced reliance on fuel from outside the State; positioning the State for future economic growth related to the development, manufacturing, and servicing of renewable technology; and helping to drive down the costs of renewable technology by adding to the demand for it. Therefore, while many of the benefits and costs are quantifiable and presented in this analysis, strict numerical results do not, by themselves, capture all the relevant considerations for making decisions with respect to renewable generation. This Report highlights both the quantifiable benefits and costs, illuminated with numbers, and the unquantifiable benefits and costs, illuminated by qualitative discussion.

Any quantifiable evaluation of benefits and costs should clearly identify to whom the benefits and costs accrue. Many entities are affected by RPS and there will be some for which the RPS program is a winning proposition and some for which it is a losing proposition. For example, the participating renewable generation owners will benefit because they receive payments for attributes while existing generation owners will lose because they experience lower wholesale prices. The environment will benefit because air emissions are reduced. Electric customers may be either winners or losers depending on how some factors interact to affect electricity prices.

The diversity of RPS effects on various parties has led to the situation where there is no clear agreement in the industry about how to represent all perspectives in a single benefit-cost calculation or even whether it is possible or appropriate to do so. Indeed, some of the very goals of the RPS program produce negative impacts on some entities, such as the effect of reducing fossil fuel use on the producers, marketers, and transporters of those fuels. As a result, in what follows we identify how RPS affects key entities and then determine the benefit-cost ratios for each entity.

Ultimately, the Commission must decide the appropriate weight for any given quantitative or qualitative consideration. In making its decision, the Commission will be cognizant of its statutory obligations to ensure that consumers are provided with safe and reliable service at just and reasonable rates with due regard to mitigating environmental impacts. The weights the Commission gives to various perspectives will be guided by these statutory responsibilities. Recognizing that the Commission may, in carrying out its statutory mandate, place greater emphasis on some perspectives than others, the Report also presents benefit-cost ratios that reflect several combined perspectives including a combined perspective that has been advanced by KEMA, the firm employed by NYSERDA to assess the benefits and costs of the RPS program.

By way of background on the Commission's use of perspectives, it is helpful to consider the EEPS proceeding. In its decisions about energy efficiency, the Commission has used two overriding perspectives to assess benefits and costs. One of the two perspectives used by the Commission is that of society as a whole. This is measured using a total resource cost test (an

analysis that compares the incremental costs of a program to the incremental savings produced) adjusted to reflect the added value of environmental externalities (represented by a $/ton value for CO_2). When the benefit of reduced environmental externalities is added to a total resource cost test it is renamed a societal cost test. Because environmental benefits are an important reason for pursuing renewable generation, the societal cost test is more appropriate than the total resource cost test when evaluating RPS.[52]

The second perspective used by the Commission in energy efficiency evaluations is a determination about how a particular program affects the costs to utility customers. This impact may be reflected as the effect of an action on both utility rates and bills. This ratepayer perspective accounts for wholesale price suppression but does not account for reductions in generator revenues.

These two perspectives are used in our RPS analysis. We also use other perspectives, which are summarized in an Attachment and in notes to Table 7 below. Further, as noted above, we present results of combined perspectives in a way that may more closely correspond to the Commission's sense of which perspectives it wishes to consider in meeting its statutory responsibilities.

6.1.2 Benefits and costs to date

This section presents an analysis of the benefits and costs of the RPS program actions that have already been taken in what we call the Sunk Scenario. We conclude later in this Report that RPS has delivered the benefits to New Yorkers in both quantitative and qualitative terms that are consistent with the Commission's expectations when initiating RPS in 2004. Moreover, nothing in this analysis of RPS results suggest that the program should be scaled down or terminated.

[52] Significantly, the "societal cost test" in effect cancels out the effects of so-called "transfer payments." Here, as an example, the reduction in wholesale prices that is a result of the RPS (i.e. a "benefit" to ratepayers) is wholly cancelled by the equivalent "cost" in the form of reduced revenues to existing generators. There is simply a transfer of money from one stakeholder to another, and no net benefit to society as a whole.

A first step in evaluating quantitative RPS results to date is an identification of the flow of costs and benefits associated with each of the steps in the RPS process:

1. Customers pay into the RPS fund.

2. RPS auctions are held and the RPS fund is used to commit, via 10-year contracts, to pay the owners/developers of new renewable generators for their renewable attributes. (For the CST, NYSERDA rations the availability of incentives for eligible behind-the-meter installations.)

3. New renewable generation owners construct renewable generation facilities, or install them on their rooftops, using some in-state resources and some out-of-state resources.

4. New renewable generation facilities start up operations. Generation from renewable resources is sold into the wholesale market, displacing sales that otherwise would have been made by existing generation owners.

5. As generation from existing generation owners gets backed down, emissions from existing generation fall. Purchases of fuel to run existing generation fall, and other variable costs, if any, from existing generation are shed. Existing generators also lose the revenue associated with the lost sales.

6. The added supply of renewable generation on the market creates more slack in the supply/demand relationship, causing wholesale market prices to fall. This drop in wholesale prices yields benefits for ratepayers while reducing revenue for all generation owners.

7. The New York economy and non-New York economies are impacted in numerous ways by the added expenditures of the new generation owners, the hiring by homeowners of installers of solar PV panels, and the reduced expenditures by existing generators.

Based upon the flows of benefits costs, it was possible to develop five individual perspectives, each of which displays a different way of quantifying program results. Table 7 presents those results.

TABLE 7

Benefit-Cost Results
Individual Perspectives
Sunk Scenario[53]
(All Values are Present Value in 2006 $)
($ in millions)

Perspective	B-C Ratio	Net Benefits[54]
Societal[55]	0.96	-$74
Ratepayer[56]	1.00	$ 1
Environmental[57]	NA	$194
NY Economy[58]	1.42	$157
Existing Generators[59]	NA	-$376

From Table 7, we observe that from the ratepayer and NY economy perspectives RPS results to date show a net benefit and from a societal perspective come close to breaking even.

As will become more important later, it is significant that in the Sunk Scenario, the Main Tier program costs exceeds the CST program cost by more than a factor of 3 (77% vs. 23%). Given the relatively better economics of Main Tier investments over the CST, it is not surprising

[53] The "Sunk Scenario" reflects the RPS program decisions that have already been made by the Commission.

[54] The amounts in this table are on a present value basis and reflect effects through 2015. The annual effects of these amounts on any particular perspective are far smaller.

[55] The Societal Perspective includes all impacts on all entities, including the estimated dollar value of CO_2 emissions reductions.

[56] The Ratepayer Perspective reflects factors that raise or lower electric rates.

[57] The Environmental Perspective measures the dollar value of CO_2 emissions reductions, priced out at $15 per ton.

[58] NY Economy Perspective – represents the direct economic benefits and costs to the NY State Economy in terms of jobs created, etc., based on the estimates developed by KEMA.

[59] The Existing Generators perspective represents the impact of the RPS program on the profits of the owners of existing generators.

that the higher the Main Tier proportion of total program costs to CST costs, the higher will be the program's benefit/cost ratio.

Benefit/cost ratios for several specific perspectives are presented in Table 7. Combining some of these perspectives offers a way of weighting the various impacts of RPS on the various entities. At the start, it is important to recognize that the Societal Perspective is in fact a combination of many individual perspectives, including the impacts on buyers and sellers, participants and non-participants, in-state entities and out-of-state entities, and the environment. It does not attempt to place any higher or lower weights on any of the perspectives of its constituents.

It is possible to construct benefit cost ratios that more accurately measure the intended consequences of RPS by changing the weighting of the individual perspectives affected by RPS.[60] One unequally weighted approach is the KEMA Report's combined benefit cost ratio. It places higher weights on the benefits and costs to the three primary perspectives that policymakers intended to address with the RPS program – the New York economy, the environment, and ratepayers. In doing so, it ignores (places zero weight on) other effects of the program, such as the effect on existing generators and the effect on out-of-state economies.

A third combined approach starts with the ratepayer perspective, and adds the environmental benefit to it. This approach assumes that ratepayers place a value on the benefit to the environment, and are willing to pay higher rates to achieve environmental benefits. A benefit-cost ratio of greater than one on this combined perspective suggests that ratepayers are getting a reasonable result from the RPS program. While reductions in CO_2 yield environmental benefits that are spread world-wide in terms of reduced global warming, the B/C ratio in essence assumes that New York ratepayers are willing to pay extra to produce these environmental improvements for the benefit of the world. Like the KEMA combined B/C ratio, this combined ratio places zero weight on other factors. These two additional combined perspectives are presented with the Societal Test in Table 8. They both show significantly higher benefit/cost ratios than the various individual perspectives on Table 7.

[60] Measuring only intended consequences often means ignoring unintended consequences.

TABLE 8

Benefit-Cost Results
Combined Perspectives
Sunk Scenario[61]
(All Values are Present Value in 2006 $)
($ in millions)

Perspective	B-C Ratio	Net Benefits
Societal	0.96	-$74
Ratepayer Plus Environment	1.52	$194
KEMA combined[62]	2.94	$726

The results shown on Tables 7 and 8, in effect, bracket the quantifiable results of the overall RPS program to date. The results show that in many ways RPS has been beneficial for the State because it has affirmatively addressed the quantitative issues most important to New York.

It is also important to recognize that non-quantifiable benefits identified by the Commission when it initiated the RPS proceeding, have also been realized. For example:

- As a meaningful step toward increasing resource diversity, New York now has over 1,000 MW of wind capacity in place and a proven method for securing more large scale renewable generation projects.

[61] The "Sunk Scenario" reflects the RPS program decisions that have already been made by the Commission.

[62] We include the combined B-C ratio as defined by KEMA. However, the estimates for the combined DEMA B-C ratio use our estimates for the individual components that make up the KEMA combined ratio.

- RPS has generated significant indirect economic development benefits from Main Tier projects beyond those quantified.

- RPS has stimulated the demand for behind-the-meter renewable installations which, in turn, has created new supporting businesses, employment opportunities, and related entrepreneurial opportunities.

These benefits, among others, also merit decisional weight.

6.2.3 Expected benefits and costs going forward

In order to provide the Commission with a quantitative basis for considering various future RPS alternatives, two further refinements were made to the quantitative benefit cost analysis:

- The RPS program was broken down between its Main Tier and Customer Sited Tier components in order to perform forward looking benefit-cost analyses for each; and

- Four alternative scenarios regarding the future RPS program goals and funding levels were considered.

The first refinement (breaking out the Main Tier and CST) is necessary to account for the Commission's very different expectations for the Main Tier and the CST at the time it initiated RPS. More specifically, the MT was expected to contribute the overwhelming bulk of the MWhs needed to reach the RPS target; the attribute cost/MWh of all CST technologies was expected to be substantially higher than the attribute cost/MWh of Main Tier technologies; the current CST funding is for a variety of reasons much higher than the level assumed at the start of the program, with attendant consequences on the overall program; and difficult-to-quantify or non-quantifiable benefits figured far more prominently in establishing the CST than in establishing the Main Tier. The second refinement makes it possible to test various levels of CST funding that are likely to be of interest to the Commission.

Four forward looking scenarios were developed, with varying amounts of total renewable resources and varying mixes of MT and Solar PV resources. They are (1) 25% with Efficiency $24 Million Solar PV Scenario; (2) Original Scenario (25% Without Efficiency Small Solar PV); (3) 30% With Efficiency $24 million Solar PV Scenario; and (4) 30% With Efficiency $49

million PV Scenario. The final two scenarios each achieve a 30% level of renewable generation, the difference between the two being the mix between Main Tier resources and Solar PV resources. While this Report concludes that a scenario achieving 30% renewable resources best meets the public interest, the Commission is also given opportunity to consider a CST with $24 million PV funding or a CST identical in all respects except for $49 million PV funding level. We prefer the less aggressive PV option. Estimates of the relevant benefit-cost ratios for each of the five perspectives, along with estimates of their net benefits, are displayed in Table 9 for each of the four future scenarios.

Table 9

Benefit-Cost Results
Individual Perspectives
Future Scenarios[63]
(All Values are Present Value in 2006 $)
($ in millions)

Perspective	25% With Efficiency $24 Million Solar PV Scenario		Original Scenario		30% With Efficiency $24 Million Solar PV Scenario		30% With Efficiency $49 Million Solar PV Scenario	
	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits
Societal	0.91	-$ 80	0.90	-$288	0.86	-$477	0.85	-$552
Ratepayer	0.76	-$ 47	0.74	-$174	0.64	-$344	0.59	-$425
Environmental	NA	$ 72	NA	$241	NA	$289	NA	$289
NY Economy	1.29	$ 58	1.07	$46	0.98	-$ 23	0.93	-$ 77
Existing Generators	NA	-$150	NA	-$498	NA	-$606	NA	-$606

[63] Each future scenario includes only the incremental costs and renewable MWHs that are added relative to the "sunk scenario."

The B-C ratios for the societal perspective are all less than one.[64] This means that the extra costs of new renewable generation, over and above the cost of existing generation, exceeds the value to society of the environmental benefits obtained, priced out at $15 per ton of CO_2. At higher assumed prices for CO_2, the Societal B-C ratio would rise to one or more.

For the ratepayer perspective, the benefit-cost ratios of the future scenarios are all less than one. This means that rates with the RPS program will be higher than they will be without the program. We have estimated the size of those rate increases before and after the effect of price suppression of wholesale prices for each of New York's six major utilities, for each of the four scenarios. The increases vary from utility to utility for several reasons. One reason is that the effect of the RPS program on NYISO wholesale prices varies from location to location. A second reason is the amount of long-term power purchase contracts vary by utility and that utilities with more long-term contracts will get less benefit from a reduction in NYISO wholesale prices.

The rate impacts created by RPS reach their peak in 2015 for the two 30% scenarios.[65] We estimated the overall change in rates attributable to RPS for the year 2015 by utility for each of the future scenarios in the Appendix. Delivery rates rise for all utilities, but are offset by a decrease in commodity rates for all utilities. The net effect on the overall rate, therefore, is the relevant value upon which to focus and it is relatively minor. Overall, the impacts are not significant. The net percentage change in rates for customers varies from small rate decreases in the 25% With Efficiency with $24 million PV Scenario to increases in the .5% to 1.15% range

[64] The value of the output of solar photovoltaic (PV) power includes the premium value it provides by its favorable output pattern (e.g., it produces more during the day then at night), its ability to be located in constrained urban load pockets, and its ability to avoid distribution costs. The premium value of solar PV, in comparison to base load plants or upstate wind turbines is discussed in more detail in the Customer-Sited-Tier section of this Report.

[65] The change in rates for the 25% With Efficiency Scenarios will peak in 2013 because the relatively small amount of renewable MWhs produced under this scenario makes it possible to eliminate the CST in 2013. Thus the rate impact measures for this scenario in 2015 are not directly comparable to the others.

for the 30% With Efficiency with $49 million PV Scenario. Increases in our preferred scenario (30% Efficiency with $24 million PV) range from .47% to .97%.

There is a pattern in the results for the societal perspective and the ratepayer perspective that tracks the size of the customer-sited tier: the larger the scenario's expenditure on the customer-sited tier, the poorer the results.[66] The following table shows the split between the Main Tier expenditure and the Customer-Sited Tier expenditure for each of the four scenarios.

Table 10
Size of Customer-Sited Tier vs. Main Tier
Future Scenarios[67]
(Percentage of Total RPS Program Costs)
(Present Value 2006 $)

	25% WIth Efficiency $24 Million Solar PV Scenario [68]	Original Scenario	30% With Efficiency $24 Million Solar PV Scenario	30% With Efficiency $49 Million Solar PV Scenario
Main Tier	31%	97%	82%	74%
Customer-Sited Tier	69%	3%	18%	26%

The Original Scenario has the smallest amount of expenditures on the customer-sited tier (3%), and its B-C ratio is better than those of the other three scenarios. The 30% With Efficiency $49 Million Solar PV scenario, reflects a $75 million funding level for the CST, an

[66] The reason why the net change in 2015 prices in the 25% With Efficiency Scenarios is sometimes a rate decrease is due to the fact that because the MWh requirements of these scenarios are low and CST funding is discontinued in 2013. However, there would be a minor degree of upward pressure on rates in the 2010-2013 period in this scenario.

[67] Each future scenario contains only the incremental program costs that are added relative to the sunk scenario.

[68] The low amount of MWhs required by this scenario means that Main Tier expenditures are much lower than the other scenarios. By contrast the CST funding level is fixed at $24 million through 2013.

amount that is approximately a doubling in PV funding over the level currently implied by recent burn rates of CST components. Because the benefit cost results of the CST programs are not as good as the Main Tier, there tends to be more upward pressure on rates from scenarios that place a greater emphasis on the CST. The table below shows the benefit-cost results for the scenario we prefer broken down between the Main Tier and the CST, and for solar PV which is the largest component of the CST.

Table 11

Benefit-Cost Results
Main Tier Versus Customer-Sited Tier
For 30% With Efficiency $24 Million Solar PV Scenario
(All Values are Present Values in 2006$)
($ in millions)

Renewable Technology	Perspective					
	Societal		Ratepayer		Ratepayer Plus Environment	
	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits
Main Tier Total	0.89	-$336	0.74	-$202	1.09	$ 70
Customer-sited Tier Total	0.66	-$137	0.21	-$139	0.31	-$121
Solar PV	0.44	-$ 72	0.06	-$ 76	0.09	- $ 73

The benefit-cost results in the above table follow directly from the fact that the cost of the renewable resources in the customer-sited tier, especially solar PV, is much higher per megawatt hour than the cost of the main tier's primarily wind renewable resources. This high-cost disadvantage of solar PV exists even after acknowledging the higher value of solar PV that derives from its favorable output pattern, its possible New York City load pocket location and its ability to avoid distribution costs. (The added value of the three factors is reflected in the analysis and in the numbers shown in the table.) Therefore, while the Commission should continue to encourage a wide range of types of renewable generation, and while Solar PV has great potential, the level at which solar power gets funded clearly has an important effect on

the cost-effectiveness of the overall RPS program.[69]

The three combined benefit-cost tests used earlier are applied to the four future scenarios in Table 12.

Table 12

Benefit-Cost Results
Combined Perspectives
Future Scenarios[70]
(All Values are Present Value in 2006 $)
($ in millions)

Perspective	25% With Efficiency $24 Million Solar PV Scenario		Original Scenario		30% With Efficiency $24 Million Solar PV Scenario		30% With Efficiency $49 Million Solar PV Scenario	
	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits
Societal	0.91	-$ 80	0.90	-$288	0.86	-$477	0.85	-$552
Ratepayer Plus Environment	1.13	$ 25	1.10	$ 67	0.94	-$ 55	0.87	-$136
KEMA combined	2.42	$280	2.17	$785	1.92	$872	1.79	$819

[69] The benefit to the environment is significant. The pattern of the results follows the simple rule that the more renewable generation, the more the reduction in air emissions. The benefit to the New York economy varies from one scenario to the next. The pattern of the results, generally being better for the scenarios with the smaller amounts of customer-sited tier resources, holds, similar to the results discussed above. This result makes sense because the high subsidy needed by solar PV means that, compared to wind generation; more money is taken out of ratepayers' hands, to the detriment of the New York economy, for each megawatt-hour of solar PV that is produced. The results shown for the New York economy should be given little weight, however, since the KEMA Report, which was relied on for economic development estimates, did not contain a study of the effect, per dollar spent, of solar PV on the New York economy. Absent such a study we made the simplifying assumption that the beneficial effect of solar PV on the New York economy mirrors the effect, per dollar spent, that the KEMA Report found for the Main Tier's wind generators. Other benefits to the New York economy, ones that aren't included in this attempt at quantification are included in Attachments C and D. Turning to the final perspective, existing generators, the losses incurred by existing generators increases in proportion to the number of added MWh of renewable generation because of the effect that added supply has on NYISO wholesale prices.

[70] Each future scenario includes only the incremental costs and renewable MWHs that are added relative to the sunk scenario.

The societal test is the same one as was shown for the individual perspectives. In comparison to the result for the Sunk Scenario, its score is lower across the board. This primarily reflects the higher projected cost of future wind projects compared to the already built wind projects. The Ratepayer Plus Environment result approaches a break even score for each of the 30% scenarios. The KEMA combined ratio, with its inclusion of the direct benefits to the New York economy and exclusion of other factors, is well above 1.0. In total, the results for the purely quantifiable factors are generally below 1.0, but include some perspectives that are above 1.0. These quantifiable factors need to be weighed by the Commission alongside the hard-to-quantify factors in reaching a decision.

6.2 KEMA's Benefit-Cost Analysis

6.2.1 Benefit-Cost Issues Addressed by the KEMA Report

The KEMA Report contained an extensive analysis of the impacts of the RPS program on the New York economy. Numerous alternative estimates of economic impacts were presented, with labels such as "direct economic benefits", "direct economic impacts", and "total economic impacts". The Report also performed a benefit-cost analysis of the RPS program in which one of the components was economic benefits to the New York State economy.

KEMA analysts have informed us that the measure of New York economy benefits that KEMA used in its benefit-cost analysis was the "direct economic benefits" measure, which KEMA also labels "Gross State Product (GSP)". Examples of direct economic benefits are wages paid to in-state employees, land-use payments, local property tax revenues and in-state purchases of items like gravel, steel, concrete, and mechanical equipment.[71] The KEMA Report's other measures of economic benefits produce different and higher numbers, some of which reflect economic multipliers. The KEMA Report does not explain why these other measures were not used in their benefit-cost analysis. As for the economic multipliers, we believe that the reason they were not used in the benefit-cost analysis most likely lies in the problem of having to apply economic multipliers to all of the components of the KEMA Report's

[71] KEMA Report, pages 5-6 to 5-7.

benefit-cost formulation, including the components on the cost side of the calculation, if such multipliers were applied to any one of the components. Accordingly, all of the components in the benefit-cost analysis that the KEMA Report performed, each of which is explained below, were in the form of either a direct benefit or a direct cost, and none contained economic multipliers.

The KEMA Report developed an estimate of direct economic benefits for only one scenario: the three Main Tier procurements that have already been completed. KEMA did not attempt to quantify the economic benefits of the Customer-Sited Tier, nor did it include the costs of the CST in its analysis**.** KEMA analysts have informed us that the best set of numbers for use in a benefit-cost analysis is contained in Table 16 of the KEMA Report. Table 16 shows that the present value in 2006 dollars of the direct benefits to the New York economy of the three Main Tier procurements is $804 million.

As was noted above, the KEMA Report presents values for other definitions of economic impacts on the New York economy, even though they were not used in its benefit-cost analysis. For example, for the three Main Tier procurements, the Report estimates direct economic impacts to be $2.1 billion and total economic impacts to be $4.2 billion. For the 30% With Efficiency Scenario, the KEMA Report estimates "direct and total economic impacts" to be $12.5 billion. No estimates of direct economic benefits analogous to those used in KEMA's benefit-cost analysis of the three Main Tier procurements (Table 16) were estimated by the KEMA Report for the 30% With Efficiency Scenarios or for any other Scenario.[72]

As noted above, the KEMA Report also examined benefits and costs for factors other than the New York economy. Using these other factors, along with its estimate of the direct benefits to the New York economy, the KEMA Report conducted a present value analysis based upon 2006 dollars of the costs and benefits of the first three Main Tier procurements. KEMA specifically determined that the present value of the benefits was about $2.8 billion, consisting of $804 million of direct economic benefits for the New York State economy, $2.0 billion of

[72] Later in this Report, however, the KEMA Report's benefit-cost formula is used by Staff, and is calculated using Staff's inputs for the formula's various components. Staff has performed these calculations for all of the scenarios that Staff analyzes.

benefits to consumers through electricity price suppression at the wholesale level, and $0.1 million of environmental benefits in the form of specific avoided air pollution emissions. Comparing this amount to the $442 million estimated present value of programs costs produced a 6 to 1 benefit-cost ratio.

6.2.2 Analysis of the KEMA Report

KEMA's analysis uses a benefit-cost formula that is different from any of the analyses typically developed or reviewed by the Department when evaluating utility decisions such as construction decisions and energy efficiency investments. For these purposes, the Department takes care to construct categories of benefits and costs that represent a single, consistent perspective for each ratio calculated. As noted above, the two perspectives commonly used by the Department for Energy Efficiency decisions are the Total Resource Cost Test (which becomes the Societal Cost Test when environmental benefits are added) and the Ratepayer Cost Test. By contrast, the KEMA benefit-cost approach reflects a mixture of different benefit and cost perspectives.

The results of benefit-cost analyses are typically expressed as ratios (fractions). Simply put, a ratio whose value exceeds 1.0 denotes a result in which the benefits exceed the costs. Our analysis focuses on what numbers go into the numerator (benefits) and what numbers go into the denominator (costs).

The costs included by KEMA clearly represent one perspective – that of the ratepayer. Ratepayer costs are comprised of NYSERDA administration expenses and the cost of the RPS program's payments to renewable generators, both of which are collected from ratepayers in the RPS surcharge. On the other hand, each of the three categories of benefits included in KEMA's benefit-cost ratio represents a different perspective.

KEMA's first category of benefits is the stimulation of the New York economy associated with expenditures on renewables. KEMA includes as direct benefits to the New York economy, short-term and long-term jobs created to directly construct, maintain and run the plants, property tax payments, lease payments, and other direct costs. These represent benefits to certain local economies and governments, although they also are costs to the developer.

KEMA's second category of benefits, the largest of the three, is electric price suppression. Price suppression is the reduction in the NYISO's wholesale prices that occurs when new renewable generators are built and compete for sales with existing generation. Price suppression is a benefit to electricity consumers, although it is also an equal dollar-for-dollar loss to the existing electric generators. Thus, from a ratepayer perspective price suppression would be a benefit, but from a societal perspective it would not be considered a benefit but a simple transfer payment from existing generators to ratepayers. KEMA's approach includes only the benefit to consumers and in doing so disregards the cost to existing generators.

KEMA's third category of benefits is its estimated dollar value of the emissions (NO_X, SO_X, and CO_2) avoided when new renewable generation substitutes for fossil-based electricity. This is a benefit to society as a whole; in fact, the world society as a whole.

These three benefit perspectives are combined in the numerator of KEMA's B-C ratio, while the denominator simply represents costs to NY State ratepayers. KEMA's combined B-C ratio was driven by an emphasis on the objectives of the RPS program, since it includes the intended effects of the program while excluding other effects of the program. To better understand KEMA's combined B-C ratio and the overall perspective it takes, it is informative to note one effect of the RPS program that KEMA's combined B-C- ratio disregards. The KEMA combined B-C ratio disregards the negative effect of the RPS program on existing generators. Existing generators experience losses when added renewable resources lead to lowered wholesale electricity prices. By disregarding the perspective of existing generators, while retaining other perspectives, the KEMA combined B-C ratio is, in effect, placing a large weight on some perspectives/entities and little or no weight on others. Specifically, the KEMA combined B-C ratio puts a large weight on ratepayers, the environment, and the New York economy and no weight on existing generators.[73] While the Commission must place a large

[73] The KEMA combined B-C ratio also disregards the negative effects on out-of-state economies. One portion of this effect is tied to the reduced purchases of out-of-state natural gas made by existing generators.

weight on ratepayer impacts, it is also important to acknowledge that an RPS policy has unavoidable, if unintended, side effects, such as the impact on existing generators.

KEMA's estimated value of price suppression of $2 billion (in $2006 net present value) for the first three main tier procurements appears to be high. This estimate was based on a regression analysis of NYISO prices performed by Summit Blue Consulting. The Summit Blue estimate of the effect of added renewable generation on NYISO prices is almost twice the size, on a per MWh of renewable generation basis, as the estimate recently contained in the State Energy Plan (SEP). The State Energy Plan's estimate was based on a different methodology – one in which a production simulation model is used to simulate the electric system, with and without the added renewable generation, and the effect on NYISO market prices is extracted from the difference between the two simulations. The SEP's analysis used the Integrated Planning Model (IPM).[74] We performed our own analysis, analysis, analogous to the one done in the draft SEP, except that we used the model with which we are most familiar – the GE-MAPS model.[75] Our estimate of the effect of added renewable generation on NYISO prices is lower still than the draft SEP's. Further, if one assumes that the lower wholesale prices lead to at least some changes on the supply side (e.g., expedited retirements or reductions in capital additions) prior to the next new generation "need year", price suppression is even less. We did not adjust for this, but we acknowledge that were it to be done, our estimate of price

[74] See Pages 58-59 of 2009 State Energy Plan, Technical Assessments, Electricity Assessment: Modeling New York State Energy Plan 2009," August, 2009 Draft. The ICF Integrated Planning Model (IPM) model is an integrated planning model which simulates the production and transmission operations of bulk power systems using detailed system information on transmission interfaces (e.g., transmission lines are not represented) along with forecasts of electricity demand, fuel prices and generator availability to develop projections of how the system will be operated economically including what resources would need to be added to maintain installed reserve margins at acceptable levels to maintain reliability.

[75] The General Electric Multi-Area Production Simulation (GE-MAPS) model is a production costing model which simulates the production and transmission operations of bulk power systems using detailed system information on transmission lines and transmission interfaces, along with forecasts of electricity demand, fuel prices and generator availability to develop projections of how the system will be operated to provide electricity economically and reliably, subject to security and transmission constraints.

suppression would be lowered. Moreover, only a portion of purchases are made from the NYISO spot markets, while the rest are tied to power purchase contracts, some of which are long-term contracts. Accordingly, any estimates of price suppression that are based on NYISO's spot prices, as are KEMA's, the draft SEP's and ours, must be adjusted downward to acknowledge the long-term contracts, whose prices do not change. We did make this adjustment.

KEMA's estimate of environmental benefits appears to be much too low. In Table 16, KEMA includes a net present value estimate of only $128,620. This appears to us be on the order of 1,000 times too small. For example, for the year 2009, KEMA shows an estimate of just $9,235, whereas our estimate for 2009, at $15/ton of CO_2 is $22 million.[76]

The KEMA Report's estimate of direct benefits to the State economy is incomplete. **T**he KEMA Report is a "gross" analysis of the direct benefits to the New York economy, and not a "net" analysis. We believe that a net analysis that considers the reduction in economic activity in New York associated with the reduction in the construction of and operation of non-renewable generators that occurs as added renewable generation is substituted for non-renewable generation is preferable since it provides a more complete estimate of the effect of the RPS policy on the New York economy. In the early years of the forecast period, when the displaced non-renewable generation primarily takes the form of reduced fuel that is burned in already-built generators, the negative impact on the New York economy is likely to be negligible. In the later years of the forecast period, however, the effect takes the form of new generators that would have been built, but, because of the RPS program, are not. The negative economic impact of these future generators that don't get built should have been accounted for as an offset to the economic benefit of the renewable generators that are built.

[76] The expected production from the three main tier procurements of renewable generators in 2009 is 2,947 GWhs, or 2,947,000 MWhs. For every MWh on the margin that is backed down, staff estimates approximately one-half ton of CO_2 is avoided. At a price of $3.95/ton (the price used by KEMA), this would yield a total value of 2,947,000 x 0.5 x $3.95 = $5,820,325 for CO_2 alone in 2009; at $15 per ton (the sensitivity price for CO_2 suggested by the NYPSC in the EEPS case), the Staff figure is closer to $22 million.

In sum, KEMA's estimate of the direct benefit to the economy is too high, the price suppression benefit estimate is too high, and the environmental benefit estimate is too low. More significantly, the ratio calculated by KEMA represents a particular weighting of perspectives that may not match the views of the Commission. As was done above, we prefer to, first, present the many individual perspectives in an unbundled manner, and second, to present several alternative weightings or combinations of perspectives. In this way, one can assure that the weightings implied by any given combined benefit-cost ratio are fully identified and understood.

We included the combined B-C ratio as defined by KEMA, along with two other combined B-C ratios in the previous section of the Report in which tables of benefits and costs were displayed. The estimates for the combined KEMA B-C ratio used our estimates for the individual components that make up the KEMA combined ratio.

6.3 Conclusions and Recommendations

A threshold question is whether the Commission should continue funding the RPS or alternative, should it adopt the 25% With Efficiency Scenario that produces a relatively small amount of new renewable resources in the future. While such approaches may produce small cost savings, the also produce little or none of the qualitative, quantitative and environmental benefits described in this report. A closely related inquiry concerns the appropriate mix of resources between the Main Tier and the Customer Sited Tier. Because the Main Tier is expected to provide well over 90% of the MWhs from the RPS program, the initial inquiry concerns whether additional investments are appropriate for the Main Tier.

6.3.1 The Main Tier

Based upon contracts currently in place, the Main Tier will provide about 97% of all the MWhs produced under RPS. Moreover, the supply curve and its supporting cost studies indicate that there are ample Main Tier resources available for future resources. We have performed an analysis that compares the effect of investing no more money in incremental RPS projects via Main Tier solicitations versus continuing the Main Tier and using it as the primary

vehicle for achieving an objective of 30% renewable resources by 2015. Three economic tests are used to evaluate these scenarios and then a variety of qualitative considerations are superimposed on the decisional process. These qualitative considerations are discussed in Attachment C. In general it is concluded the Main Tier investments committed thus far to RPS (Sunk Scenario) will produce quantitative and qualitative benefits to the public while incremental Main Tier investments (30% Scenario) require closer examination.

A summary of economic tests for both the Sunk and 30% Scenarios appear as follows:

Table 13

Sunk Scenario
($2006 Millions)
Perspective

	Societal		Ratepayer		Ratepayer plus Environment	
	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits
Main Tier Total	1.01	$18	1.35	$95	2.05	$282
Customer-sited Tier Total	0.61	-$66	0.16	-$68	0.24	-$62
Solar PV	0.39	-$54	0.05	-$58	0.08	-$56

Table 14

30% with Efficiency, $24 Million Solar PV Scenario
Perspective

	Societal		Ratepayer		Ratepayer plus Environment	
	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits	B-C Ratio	Net Benefits
Main Tier Total	0.89	-$336	0.74	-$202	1.09	$70
Customer-sited Tier Total	0.66	-$137	0.21	-$139	0.31	-$121
Solar PV	0.44	-$72	0.06	-$76	0.09	-$73

Both scenarios are analyzed using the Societal Test, the Ratepayer Test and the Enhanced Ratepayer Test. The Sunk Main Tier investments are expected to produce significant benefits to the public and pass all three tests. By contrast the Main Tier under the 30% Scenario does not pass the Societal Test or the Ratepayer Test but does pass the Enhanced Ratepayer Test. These results indicate that while the effects of price suppression and quantifiable environmental benefits are substantial for the 30% Scenario, the investments made in this scenario do not pass traditional benefit cost tests and may place upward pressure on utility rates. However, the enhanced ratepayer test when combined with KEMA's combined benefit cost results which were described earlier in this report support the conclusion that the Main Tier has accomplished many of the important objectives noted by the Commission when it initiated RPS.

This information supports continuing the Main Tier, however, questions concerning rate and bill impacts continue to cast doubt on whether it is in the public interest to make such a large monetary commitment over an extended time period. Thus in order to fully support going forward with new Main Tier investments it is necessary to determine the significance of the price effects, determine if there are ways of mitigating those impacts and then consider the extent to which the quantitative and qualitative value of the benefits that are lost by discontinuing the Main Tier would further offset concerns about future price increases..

The following table provides the estimated average bill impact in 2015 (the year that RPS rate recoveries would peak) for residential and non-residential ratepayers by utility of the entire RPS program.[77]

[77] The Main Tier represents about 87% of all RPS costs on a nominal basis over the life of the 2006-2024 program life.

Table 15

RPS Program Bill Impacts

	Cents Per kWh			Percentage Impact			Monthly Bill Impact			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.32	(0.17)	0.15	3.81%	-1.54%	0.76%	$2.17	($1.16)	$1.01	$3,023,984
Non-Residential:	0.32	(0.17)	0.15	7.54%	-1.55%	0.97%	$19.82	($10.61)	$9.21	$5,053,454
Con Edison:										
Residential:	0.23	(0.08)	0.15	2.32%	-0.38%	0.48%	$1.15	($0.40)	$0.75	$24,532,908
Non-Residential:	0.23	(0.08)	0.15	2.80%	-0.44%	0.56%	$12.65	($4.41)	$8.25	$46,970,155
NYSEG:										
Residential:	0.31	(0.21)	0.10	3.02%	-1.86%	0.47%	$1.90	($1.29)	$0.61	$5,545,589
Non-Residential:	0.31	(0.21)	0.10	4.76%	-1.67%	0.52%	$17.90	($12.11)	$5.78	$8,030,002
National Grid:										
Residential:	0.36	(0.21)	0.15	3.08%	-1.76%	0.62%	$2.11	($1.24)	$0.86	$14,889,936
Non-Residential:	0.36	(0.21)	0.15	4.63%	-1.45%	0.66%	$30.25	($17.87)	$12.38	$24,383,870
Orange & Rockland:										
Residential:	0.32	(0.19)	0.12	3.04%	-1.47%	0.53%	$2.21	($1.34)	$0.87	$1,989,992
Non-Residential:	0.32	(0.19)	0.12	5.54%	-1.53%	0.69%	$21.62	($13.08)	$8.55	$3,093,815
RG&E:										
Residential:	0.30	(0.20)	0.10	2.90%	-2.14%	0.52%	$1.80	($1.19)	$0.61	$2,331,743
Non-Residential:	0.30	(0.20)	0.10	3.71%	-1.94%	0.55%	$27.84	($18.41)	$9.43	$4,535,075
									Total:	$144,380,525

In all circumstances the overall percentage increase in bills due to RPS will be less than 1.0% with most increases in the .45-.75% range. This equates to a total 2015 statewide quantifiable cost for RPS net of price suppression of $144 million. While this projected increase is relatively small, it is nevertheless an increase that would be added to other factors causing utility rates to increase (inflation, property taxes, infrastructure investments, EEPS and other clean energy initiatives). For the Main Tier to go forward, it is necessary to determine that the other quantitative and qualitative benefits it provides are of greater value to the public than these costs and/or that there are additional options available to mitigate the projected price impacts.

The quantitative benefits of the Main Tier have been fully addressed in the discussion the various cost tests that combine perspectives that are important to New York State and the Commission. The qualitative benefits of the Main Tier are documented in Attachment C. We believe that the quantitative and qualitative benefits provided by the Main Tier fully justify its continuation despite the relatively small rate impacts. However, it is also recognized that the Commission could assign a different value to these benefits and determine that they do not

offset the projected ratepayer costs. As a result, it is also important to provide the Commission consider ways of mitigating Main Tier rate impacts in the event it does not believe that the benefits provided by the Main Tier offset its cost.

The Commission should direct Staff and NYSERDA to explore several possible modifications to the solicitation process that could provide greater value for ratepayers and potentially mitigate future bill increases. First, they should explore whether the solicitation process could be modified to continue to require all parties to submit the standard 10 year fixed price bid while also providing parties the opportunity to make bids that act as hedges to offset future increases in wholesale commodity prices. This could be accomplished in a variety of ways ranging from a contract for differences to a solicitation bid that establishes a maximum commodity price. The option value of such mechanisms, which is created by the potential for wide swings in commodity prices, could at some point in the future easily exceed the projected bill impacts. In order to realize the benefits produced by these mechanisms, it is probably necessary to develop an RPS cost recovery mechanism that varies by month.

Second, Staff and NYSERDA should consider whether the solicitation process could also be modified to permit bids for a period of time exceeding 10 years. Doing so might provide lower upfront costs, thereby reducing the short term bill impact.

Third, to the extent that it could be employed to better match the timing of cost recovery to realization of benefits, Staff and NYSERDA should explore the use of securitization to fund the payments under future RPS solicitations. Rather than making the front-loaded payments produced by the solicitation process, ratepayers would be responsible for the securitized debt service which could be sculpted over an extended time period in a way to mitigate short term rate impacts while more reasonably matching benefits with costs.

These mitigation options in combination with the quantitative and qualitative benefits provided by the Main Tier lead to the conclusion that the Main Tier is in the public interest and provide the Commission a clear path to continuing the program by authorizing additional funding based upon the 30% With Efficiency Scenario.

6.3.2 The Customer-Sited Tier

The Commission established the Customer Sited Tier in order to encourage customers to install their own "behind-the-meter" renewable energy production systems. This gives customers an opportunity to directly affect the generation source of the electricity they consume, and promotes distributed generation. It also provides an avenue of funding for primarily high-cost technologies that cannot economically compete for funding in the Main Tier, but that hold promise to be important sustainable, low or non-polluting electricity generation resources in the future. Such support helps sustain the infrastructure of distributors, installers and others whose businesses bring technologies to customers.

The major benefits of CST – customer participation, technology innovation/ commercialization, economic development, fuel diversity, environmental mitigation and strategic load reduction -- continue to be important to the State, yet these benefits are not easily incorporated into a benefit cost test. Indeed, the Commission's decision to proceed with a limited CST recognized the need to begin to develop technologies that might not initially pass traditional benefit cost tests.

Currently the CST produces MWhs that are very close to the interim targets established for the program. The projected $50 million cost for the CST Base Case reflects the recommended funding levels for Anaerobic Digesters, Fuel Cells, Small Wind, and Solar Thermal technologies described more fully in the CST section of this Report. The Base Case CST Scenario also reflects an average monthly Solar PV burn rate of $2 million for an annual cost of $24 million. The $50 million Base Case CST funding level produced by these items equates to less than a .25% overall rate increase in utility rates statewide (prior to reflecting price suppression). Moreover the incremental effect of the recommendations in this Report for the CST are very small because the funding required for the CST in 2010 under the Base Case is less than $2.0 million higher than the 2009 CST funding level. As a result, while benefit cost results for the CST are not favorable, it is recommended that the Commission continue to support the CST because it produces MWh savings that meet expectations, the cost to ratepayers remains relatively insignificant, and it continues to achieve the broader public policy goals identified by the Commission when RPS and the CST were initially established.

Two CST scenarios are presented to reflect the challenging decision the Commission has regarding the appropriate level of funding for Solar PV technologies. The CST section of this report provides information indicating that Solar PV is about twice as expensive as any other CST technology. Despite this fact, it has also attracted great interest from contractors and the public. As a result, Solar PV is most heavily funded of all the CST technologies. Thus, there appears to be some level of public interest in allowing Solar PV to go forward at higher funding levels than in the past. However, it is necessary that the Commission understand the consequences of doing so. In order to accomplish this, two scenarios are presented for the CST. Both scenarios reflect the recommended funding levels in the CST section of this paper with one exception. The Base Case Scenario reflects Solar PV funding at the current $24 million per year burn rate while the alternative scenario reflects a greater emphasis on Solar PV and increases the annual funding by $25 million to $49 million per year.

This Report supports the lower funding option because it has less potential to create ratepayer harm and frees up money for more economic Main Tier investments. Staff recommends that the Commission consider whether the current spending level should be preserved or whether solar PV spending be increased by $25 million per year in order to obtain a limited amount of additional MWhs. Based upon 2008 revenue levels, the added $25 million of spending in this alternative scenario represents an average statewide rate increase before price suppression of less than .13%. However as the tables presented earlier in this section and in the CST indicate Solar PV is very expensive relative to other alternatives and has very low benefit cost ratios. It is also important to recognize that the trade off between the two scenarios is the higher cost of additional Solar PV investments versus the use of the less costly Main Tier to fill the MWh gap. Finally, given the unique nature of CST investments and the fact that CST costs are fully front-loaded in one year at the start of a project's life, this cost stream is a strong potential candidate for securitized financing.

6.3.3. RPS Targets and Funding

The final question relates to the level at which the Main Tier and CST will continue in the future. The RPS program was originally established to achieve its goals by 2013. The

Commission took notice of the interplay between the RPS program and the effect energy efficiency efforts would have on the load forecasts underlying the RPS targets, and the potential need to make adjustments because of that effect when it established the program. Since that time, the Energy Efficiency Portfolio Standard (EEPS) program has established a specific MWh savings goal in 2015. Because of this, it makes sense from a planning perspective to put both programs on the same footing so that the targets and achievements may be simultaneously analyzed at future decision points and appropriate judgments made based on an integrated analysis.

The EEPS program developed a high quality load forecast through the year 2015, and that forecast provides a sound basis on which to anchor the two programs. Simply extending the RPS program time an additional two years without increasing the RPS goals would, based on the lower load forecast, lower the slope of the RPS targets and as such would represent a scaling back of the program. That is not appropriate given the desire for an increasingly sustainable energy future. The RPS goal for 2015 should result in a slope of the targets that is at least as aggressive as that for the current targets.

By contrast, expanding the goal to 30% in 2015 without reflecting planned energy efficiency would result in RPS targets that are likely unachievable and a program that would be costly since more expensive resources would have to be tapped to meet the goal. However, expanding the goal to 30% in 2015 while accounting for energy efficiency produces RPS targets that are not only modestly higher than the current targets but also not significantly more expensive than the current program. By lowering the forecasted consumption to reflect the anticipated effects of EEPS, the 30% goal would require about 2,000,000 MWhs of additional generation from renewable resources in 2015 than the current RPS program would require by 2013.[78] While that enhanced goal will be a challenge, it appears to be achievable.

In recommending that the RPS goal reflect planned energy efficiency, it is also important to recognize that both the RPS and EEPS initiatives may produce results more or less favorable than expected. Should the energy efficiency achievements not occur as planned or, alternatively, the RPS targets not be met, modifications to either program should only occur

[78] This is based upon updated load forecasts after the Commission's 2004 RPS Order.

after a fully integrated analysis of both programs. To achieve this new goal, new production targets were developed for the Main and Customer Sited Tiers:

Table

RPS Energy Targets

(MWh)

	25% by 2013 (Original targets)		30% by 2015 (using EEPS load forecast)	
	Main Tier Targets	**CST Targets**	**Main Tier Targets**	**CST Targets**
2006	1,121,247	25,259	*582,082*	- - -
2007	2,324,764	50,457	*582,812*	- - -
2008	3,544,973	75,596	*822,819*	- - -
2009	4,759,855	100,678	*2,947,044*	*108,296*
2010	5,995,752	125,636	2,878,340	177,365
2011	7,271,067	151,515	4,315,401	251,787
2012	8,518,464	175,319	5,723,963	324,016
2013	9,802,369	200,048	6,997,977	390,931
2014	- - -	- - -	8,435,039	458,090
2015	- - -	- - -	9,872,100	525,754

2006 through 2009 targets for 30% by 2015 Post-EEPS are the actual contractual commitments in each

Increasing the goal to 30% is projected to cause incremental costs of $2.45 billion in nominal terms or about $163 million per year on average from 2010 to 2024. Of this amount $296 million (12.1% of total) represents the incremental costs related to the Base Case CST scenario. Expenses for the Main Tier rise from $50 million in 2009 to about $243 million in 2015 before beginning to trend downward to a final 2024 expense of $42 million. These amounts do not reflect the offsetting effects of price suppression, the use of securitized financing to smooth the rate increases or the use of hedges and related approaches to bring unlock the potential option value of RPS resources.

The updated cost studies recently developed for the RPS Program and to support the 30% by 2015 goal have taken into account the use of 10-year, long-term contracts and the projected costs of the RPS program were it to extend to 2024, when contracts executed in 2015 (last year of the program term) would be due to expire. It is recommended that customer collections be set and fixed through 2024 to meet program goals with a stable source of funding while providing customers with a stable and predictable schedule of collections while also meeting NYSERDA's payment requirements in a timely manner. Given the recommendations regarding various rate mitigation options noted in this section, these costs should be viewed as an upper bounds regarding the RPS program cost. A proposed schedule of collections – using the recommended 30% adjusted to reflect the EEPS forecast – is shown in Appendix.

7. CONCLUSION

The Renewable Portfolio Standard continues New York's long standing reliance on renewable energy resources and provides an effective means of attaining Governor Paterson's goals for the State. The existing program should be augmented and extended with the goal of having 30% of the megawatt-hours of electricity consumed in the State come from renewable resources by 2015.

The Main Tier is in the public interest because it provides quantitative and qualitative benefits that outweigh its costs. It should continue with the minor administrative modifications discussed in the Report. The Customer-Sited Tier (which amounts to 3% of the megawatt-hours produced by the program) should also continue, although it is far less cost-effective, because it achieves the qualitative goals – such as economic development – established by the Commission. It too should continue, with the modifications discussed in the Report to make it more cost-effective.

ATTACHMENTS

Attachment A List of References

1. NYSERDA New York Renewable Portfolio Standard Program Evaluation Report: 2009 Review (March 31, 2009). This report presents mid-term evaluation results for the New York Renewable Portfolio Standard (RPS) Program in compliance with the Public Service Commission's April 14, 2005 using research performed by third-party evaluation contractors.

2. New York Portfolio Standard Market Conditions Assessment prepared for NYSERDA by Summit Blue Consulting, LLC. (February 19, 2009) This report addressed how the RPS program has influenced or been influenced by market conditions since its inception.

3. New York Main Tier RPS Impact and Process Evaluation prepared for NYSERDA by KEMA, Inc. (March 2009). This report analyzed program progress, economic benefits, and policy and administrative efficacy.

4. NYSERDA, New York State Renewable Portfolio Standard – Customer-Sited Tier Program: Market Potential, Program Expectations and Funding Considerations (2010-2015) (June 22, 2009). This report provides a basis for funding and expected program outcomes for CST technologies through 2015.

5. 2009 RPS Cost Study (July 7, 2009) – This report provides updated analyses on the future cost of the RPS Program.

6. New York State Renewable Portfolio Standard Performance Report: Program Period ending March 2009. This report summarizes activities conducted by NYSERDA and DPS staff in implementing the RPS.

Attachment B Summary of Tax Benefits for Renewable Generation

Federal Incentives

The federal renewable electricity production tax credit (PTC) is a per-kilowatt-hour credit for electricity generated by qualified energy resources and sold by the taxpayer to an unrelated person during the tax year. The PTC was originally enacted as part of the Energy Policy Act of 1992 and has been extended and modified several times since.

The American Recovery and Reinvestment Act of 2008 (ARRA) extended the in-service deadlines for qualifying renewable technologies and also allowed the taxpayer eligible for the PTC to take the federal business energy investment tax credit (ITC) or receive a grant from the U.S. Treasury Department.

ARRA allows project developers to apply for a grant from the Treasury Department in lieu of the Investment Tax Credit. The grant will be equal to 30% of costs of property that is part of a qualified facility, qualified fuel cell property, solar property, or qualified small wind property, and 10% of all other property. Grants are available to eligible property placed in service in 2009 or 2010, or placed in service by the specified credit termination date, if construction began in 2009 or 2010. Grant applications must be submitted by October 1, 2011. The ITC is currently 30% of eligible investment.

Wind and closed-loop biomass are currently eligible for a 2.1¢/kWh PTC. Wind facilities must be in-service on or before December 31, 2012 to be eligible while closed-loop biomass has a December 31, 2013 in-service deadline. All of the other eligible technologies have a December 31, 2013 in-service deadline and are eligible for a PTC of 1.1¢/kWh. Solar energy facilities may be eligible for the ITC or Treasury Department grant if placed in-service on or before December 31, 2016.

New York Incentives

Income Tax Credit

A personal income tax credit applies to expenditures on solar-electric (PV) equipment used on residential and multi-family residential property. The credit, equal to 25% percent of the cost of equipment and installation, includes solar-thermal equipment.

The credit is capped at $3,750 for solar-energy systems placed in service before September 1, 2006, and capped at $5,000 for solar-energy systems placed in service on or after September 1, 2006. Any amount of credit that exceeds a taxpayer's liability in a given tax year may be carried forward for the five following taxable years. Any amount of the system cost provided by a grant from any source is not eligible for this credit.

Fuel cells installed at a principal residence are eligible for a 20% tax credit, with a maximum credit of $1,500. To qualify, fuel cells must provide a maximum rated baseload capacity of 25 kW and must utilize proton exchange membrane (PEM) technology.

Sales Tax Exemption

New York exempts the sale and installation of residential solar-energy systems from the state's sales and compensating use taxes. The exemption applies to solar-energy systems that utilize solar radiation to produce energy designed to provide heating, cooling, hot water and/or electricity. The exemption does not apply to solar pool heating or other recreational applications.

The law also permits local governments (municipalities and counties) to grant an exemption from local sales taxes. If a city with a population of 1 million or more chooses to grant the local exemption, it must enact a specific resolution that appears in the state law.

Property Tax Exemption

Section 487 of the New York State Real Property Tax Law provides a 15-year real property tax exemption for solar, wind and farm-waste energy systems constructed in New York State. As currently effective, the law is a *local option* exemption, meaning that local governments are permitted decide whether or not to allow it.

The law intends to encourage the installation of solar, wind and farm-waste energy equipment systems and to ensure property owners that their real property taxes will not increase as a result of the installation of these systems. The amount of the exemption is equal to the increase in assessed value attributable to the solar, wind or farm-waste energy system.

The exemption applies only to general municipal and school district taxes; it cannot be applied to special assessments or special ad valorem levies.

Property Tax Assessment

In August 2008 the State of New York enacted legislation allowing a property tax abatement for photovoltaic (PV) system expenditures made on buildings located in cities with a population of 1 million or more people. This essentially limits the abatement to systems installed within New York City. Eligible buildings include all real property except utility real property.

The abatement allows building owners to deduct from their total real property taxes a portion of the expenditures associated with installing a PV system on an eligible building. Systems placed in service between August 5, 2008 (the effective date) and December 31, 2010 are eligible for an abatement of 8.75% of eligible expenditures annually for four years. Systems placed in service between January 1, 2011 and December 31, 2012 are eligible for an abatement of 5.0% of eligible expenditures annually for four years. Thus the total property tax benefit can amount to either 35% or 20% of the installed system cost depending on when it is built. The maximum abatement during a year is $62,500 or the amount of real property taxes owed during the year. Unused balances *may not* be carried forward to subsequent years.

Attachment C Cost Benefit Analysis Perspectives And Qualitative Considerations

Societal Cost Perspective

This perspective is the broadest of all, and represents the sum total of all the perspectives of all the entities in play, including the environment. RPS does not add any new MWhs to the system, but instead substitutes production from new renewable generators for production from existing generators. Therefore, the costs to society are the costs of constructing and operating renewable generation, and the benefits obtained by society are the avoided costs, including avoided emissions, associated with the reduced production from existing generators. To estimate the non-environmental avoided costs, the market price of electricity, both capacity and energy, is used. The environmental benefits are estimated for CO_2 only, and are assumed to equal ½ ton of reduced CO_2 per MWh of existing generation reduced, priced out at $15 per ton. The cost of the new renewable generation should approximately equal the revenues of renewable generators. Because of this 95% of these revenues are used to estimate the cost of new renewable generation in order to recognize that some renewable generators are likely to cost less than the value of the winning bids they submit into the RPS auctions. The costs of administering the RPS program also must be included among the costs.

Ratepayer Cost Perspective

This perspective considers the impact of the RPS program on electric bills. The cost to customers is the sum of all RPS fees that they pay and the benefits are the reduced wholesale prices that occur when the new RPS-induced renewable generators compete for sales in the market and create an increased amount of excess supply. The lowered wholesale prices occur only up until the date at which new generation is needed for reliability purposes, after which the added RPS supply simply displaces the new construction of added conventional supply, with no effect on the overall supply/demand relationship, and therefore no effect on wholesale prices. Also, because a substantial amount of ratepayer purchases are done via existing long-term contracts, the benefits of wholesale spot price reductions accrue only to ratepayer purchases that are made by means other than long-term contracts.

Environmental Perspective

Renewable generation is cleaner than the existing generation that it displaces. Currently, the primary environmental cost that is not substantially internalized into the economics of electric generation (that is, already reflected in the market price) is the cost of CO_2 emissions. New York generators must buy CO_2 emissions allowances that are issued by the Regional Greenhouse Gas Initiative (RGGI). However, the market price of the allowances, at about $2 to $4 per ton, is widely acknowledged to be well below the likely environmental damage to society of an added ton of CO_2, and also below the likely long-run marginal costs of mitigation of CO_2 from electric generators under a Federal U.S. cap and trade program. The Commission, in its energy efficiency analysis, used $15 per ton as a placeholder for quantifying the value of a reduced ton of CO_2. The same amount is used in this Report. Higher values may be equally reasonable. For the environmental perspective, no cost side of a benefit/cost ratio is calculated. Therefore, one simply has a measure of the benefits to the environment.

New York State Economic Development Perspective

A program that prompts the construction and operation of new renewable generators stimulates the New York State economy in terms of jobs created, taxes paid to State and local governments, and additional benefits that flow from these two sources. The benefits to the New York State economy are the monetary value of the jobs, taxes, etc. associated with the new renewable generators spurred by the RPS program, net of any reduced jobs, taxes, etc. associated with the reduced production from--or, perhaps, reduced capital investment by--the existing generators, or any potential new non-renewable generators. The cost to the New York State economy is the payment by ratepayers to fund the RPS payments made to the renewable generators. The Department has not developed our own estimates of the relevant economic development parameters. Estimates of the benefits to the New York economy have, however, been made by KEMA, and they are used to help develop the estimates in this Report.[79]

[79] The KEMA Report developed estimates that can be used in a benefit-cost study only for the Main Tier renewable resources. Staff used information from the Main Tier results and applied it to the Customer-Sited Tier in a manner that reflected the higher per megawatt-hour cost of the Customer-Sited Tier.

Participating Renewable Generators' Perspective

The participating renewable generators that win awards in the RPS auctions clearly receive net benefits from the RPS program. Because their participation is voluntary, they can be assumed to at least expect to break even. This equates to a benefit-cost ratio that is equal to or greater than one. Since the benefit-cost ratio for participating renewable resources is always expected to be greater than 1.0, the Report does not include the participating renewable generators' perspective.

Existing Generators' Perspective

Existing generators are affected by the RPS program. The cost to existing generators has two components. First, existing generators lose sales of generation when their production of electricity is displaced by electricity from new renewable generators. Because the lost generation comes from resources that are on the margin in the system dispatch, the existing generators' profit loss is small because the value of the lost revenues is nearly matched by the value of the shed fuel costs. While there is some cost, it is very small. Thus, this factor is assumed to be zero for purposes of this calculation. Second, existing generators lose revenues because of the reduction in wholesale market prices caused by the added renewable generation, an effect referred to as price suppression. The cost to existing generators of wholesale market price suppression represents a transfer payment since it is the mirror image of the benefit to ratepayers of reduced purchase power costs discussed in the ratepayer cost perspective. While the amount that existing generators lose is estimated, the benefit cost ratio is effectively 0 because generators obtain no benefits from the RPS program.

Qualitative Considerations

The six perspectives discussed above contain benefits and costs that are quantifiable to some degree. Other aspects of a renewable resources program are not so readily quantifiable but nevertheless merit consideration.

One hard-to-quantify benefit of increased renewable generation is the increase in fuel diversity that renewable resources provide to the New York electric system. While the State's

fuel mix is quite diverse compared to many other states, it has become increasingly dependent on natural gas over the last 15-20 years. The system is therefore becoming more vulnerable to potential problems that might disrupt the flow of gas to New York and or significantly drive up its cost. In an extreme case, a disruption could cause New York to have an insufficient amount of generation to meet demand, resulting in brownouts or blackouts. Renewable generation fueled by in-state resources (e.g., wind and sun), reduce this vulnerability.

Furthermore, since gas-fired generators are on the margin the majority of the time in New York, their bids set the wholesale market clearing price for a large percentage of the hours of the year. This means that the wholesale market price of electricity in New York is heavily tied to the volatile wholesale price of gas. To the extent the addition of renewable resources can move gas off the margin, the link between gas prices and NY's electric prices could be weakened. However, given the large amount of gas-fired generation capacity on or near the margin today, it does not appear likely that the addition of renewable resources in the expected amounts will significantly improve this situation in the immediate future.

A related possible benefit of renewable generation flows from its fixed cost characteristic, i.e., once wind and solar generators are built and installed, their running costs are near zero. This characteristic makes them good candidates to be part of transactions that hedge against the market's volatile prices. Whether this role as a facilitator of hedge contracts is a large benefit has not been resolved and this Report recommends further analysis by Staff and NYSERDA. A related question is whether the Commission should, as a matter of policy, require a maximum overall payment for renewable power produced by generating technologies that have near zero running costs.

RPS also drives market demand and positions the State for future economic growth related to the development, manufacturing, and servicing of renewable technology. While this is difficult to quantify, the Department of Labor's recent report on New York State's Clean Energy Industry shows hundreds of firms currently active in the renewable energy marketplace in NYS. Many of these firms have developed as a result of the RPS. New York's chance of successfully growing this component of its economy is greatly enhanced by the State's strong

academic and research facilities as well as high-tech labor pool programs designed to create local market demand for renewable technology.[80]

Another benefit is tied to the desirability of technological advances in renewable generation on a worldwide basis. The rate at which renewable generation technologies improve, and their costs come down, is tied to the size of the near-term worldwide market demand for renewable generation, among other things. While New York is a small market when placed alongside the entire world market, it is not an insignificant market by itself. Moreover, the existence of a large worldwide market depends on the combined actions of the many smaller markets. A New York-centric approach of minimizing New York's costs by avoiding expenditures on renewable generation while other parts of the world drive the market might succeed in keeping New York's costs down, but, if all states and countries took that approach, all, including New York, may be deprived of a strong technological advance with associated economic development opportunities. Therefore, one benefit of the RPS program is that it can be seen as New York taking some responsibility to contribute to the worldwide demand for renewable generation and, in doing so, helping to spur technological progress in this critically important energy sector.

Not all environmental impacts are accounted for in this Report's quantitative analysis. NO_x emissions and SO_x emissions are included because the tradable allowance markets are deemed fully internalize their costs into the price of electricity. Moreover, CO_2 emissions are specifically valued at $15 per ton. However, emissions of particulate matter for non-renewable generation, reduced emissions of methane gas that results when anaerobic digesters are sited, and the visual impacts of wind turbines are not quantified.

Renewable resources and in particular wind, do create reliability concerns associated with the intermittent nature of their output. This topic has been studied intensely. While this cost does not appear large and may be offset by resource additions such as spinning reserves there is nevertheless a cost impact.

The effect of renewable generators on other renewable generators and the transmission

[80] New York Academy of Sciences, NYSTAR, NYSERDA, Innovation & Clean Technology in New York State, June 2009.

system is another potential cost. Benefits from new renewable energy must be adjusted downward if the new resource displaces existing renewable resources in the NYISO system dispatch.. Similarly, to the extent that modifications to the transmission system are needed to eliminate such a displacement or to connect the resource to the grid, it is important to reflect the cost of the transmission facilities when valuing the renewable benefit.

Attachment D NYSERDA's Discussion of the Customer-Sited Tier

In the establishment of the Customer-Sited Tier(CST), the Commission wanted to: ensure that photovoltaics, small wind systems, fuel cells, and any similar technologies that may become eligible for RPS support in the future (note that anaerobic digestion technology was added later) play a role in diversifying the state's energy mix and stimulating economic development opportunities in the State. Funding in this category is to be allocated to projects based on a comprehensive review of the relative costs and benefits, including the potential for specific projects to create or sustain jobs in New York State, the ability of the resources to support load pockets throughout the state by reducing demand from the grid during peak demand periods, support for greater fuel diversity, opportunity for residential and small business customers to participate, and environmental benefits.[81]

CST Solar Photovoltaic (PV) Program

Benefits

Location in specific load pockets: Despite an initially small base of installed PV, New York City's PV market has accelerated rapidly during the past several years. The PV market grew by 56% in 2005, and the average market growth rate during 2002-2005 was 31%. If the City's PV market continues to grow at its current pace, it is estimated that up to 52 MW of PV could be installed within the city by 2015.[82]

The downstate region, Consolidated Edison and Central Hudson franchise areas, represents 48% of the incentive expenditures throughout the combined SBC and RPS PV program. National Grid and New York State Electric & Gas represent 26% and 19% respectively with Orange and Rockland 5% and Rochester Gas & Electric 3%.

Peak kW demand reductions: The ability of solar energy to assist in reducing peak power demand is greatest in areas where peak load is driven by air conditioning demand. One of the

[81] CASE 03-E-0188 – Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard. Order Regarding Retail Renewable Portfolio Standard; Issued and Effective: September 24, 2004

[82] The Center for Sustainable Energy at Bronx Community College; New York City's Solar Energy Future Part I: *The Market for Photovoltaic Systems in New York City*; January 2006

attributes of PV generation is its high effective load carrying capacity (ELCC) when loads are driven by air conditioning demand. For most utilities servicing metropolitan areas in the northeast, the ELCC of stationary PV installations is of the order of 65% (the installation of 100 MW of PV generation is equivalent to installing 65 MW of peaking resource), and remains higher than 50% for grid penetrations of up to 15%.[83]

Economic development: As mentioned below, there are over 90 PV installation companies involved with the PV program. Based on communication with some of these firms, an installation company will spend between $3 million and $4 million in the local community for every 1 MW installed in the program. This amount does not include the purchase of PV modules and, based on the previous incentive levels, illustrates that for every $1.00 spent in incentives, the installation company spends more than $1.00 in salaries, rent, insurance, etc.

Throughout the U.S, many clean-tech companies are increasingly moving manufacturing to be near the end market for their products. This is driven, in part, because of financial incentives, carbon constraints, shipping cost, and other factors. As this trend continues, regional market demand and government support will play strong roles in the creation of clean-tech manufacturing jobs.[84] NYSERDA is taking advantage of the interest in locating near markets by investing in the establishment of two new PV manufacturing companies that will be locating or expanding in New York State:

- SpectraWatt: 131 manufacturing jobs and 30 R&D jobs by 2012; $283 million in annual revenues by 2012; $29 million annual net profit by 2012; $75 million in additional investment 2009-2010.
- Prism: 262 factory jobs and 56 administrative and support jobs by 2012; $202 million in revenue by 2012; $89 million in annual net profit by 2012; $15 million in investment by 2009.

[83] Perez, Richard, M. Kmiecik, T. Hoff, J. Williams, et. al. Availability of Dispersed Photovoltaic Resource During the August 14th 2003 Northeast Power Outage, USDOE Contract No. AAD-2-31904-0, paper presented at the ASES2004 Conference in Portland, Oregon, July 11–14, 2004.

[84] Pernick, Ron, Clint Wilder, Dexter Gauntlett, Trevor Winnie; Clean Tech Job Trends 2009; Clean Edge, Inc. October, 2009

As articulated in a letter Empire State Development (ESD) to the Commission on November 14, 2008[85]: "Empire State Development believes that the continuation of the RPS … will build on the economic development benefits of the program, including growth of the marketplace for new business investment, substantial new job creation in the clean tech sector, addition of new renewable energy sources to put downward pressure on energy prices over the long term, generation of new revenues for localities, and improvement of our communities and environment through increased generation of clean, renewable energy,"

Along those lines, ESD is actively pursuing the following companies (code names used due to confidentiality agreements) that are considering New York for manufacturing. In each of these cases, New York is competing with other states:

- Project Helios**:** 400 employees/ $500 million investment. This is European based company with US hedge funding seeking a site near Buffalo. Company is seeking debt funding to cover costs of project. Also considering a site in PA.
- Project David: 200 employees / $125 million. A Texas based company with a pilot line in Texas is seeking U.S. Department of Energy funding and State level support for a full scale manufacturing line. ESD will make an offer in mid October followed by expected site visits.
- Project Nano: 90 employees / $35 million investment. Project Nano is a thin film solar company from CA that has visited New York sites and is seeking incentives for a pilot line.
- Project Asia: 300-500 Employees / $10 Million investment. One of Asia's largest solar companies is seeking sites on the west coast and NY on the east coast for a solar module assembly and distribution center.

Market Transformation

Business Development: The PV incentive program in New York is the cornerstone of an integrated program to build a sustainable solar industry. Other components of the program,

[85] Largo, Marisa, Letter to Jaclyn Brilling Re: SAPA Notice No. 03-E-0188SA18 and SAPA Notice No. 03-E-0188A19; November 14, 2008

supported through statutory and SBC funding, include the establishment of accredited training programs for PV system design and installation at institutions across the state, the implementation of a national certification program for installers, the development of a series of outreach tools and materials to educate consumers on PV, and a competitive business acceleration program to support the growth of PV businesses and manufacturing. There has been a consistent year-to-year growth rate in the demand for incentives of over 60% since 2003. Between 2007 and 2008, the increase was over 77%.

Reduction in Installed System Cost: Over the last two decades, the cost of manufacturing and installing a photovoltaic solar-power system has decreased by about 20 percent with every doubling of installed capacity. The cost of generating electricity from conventional sources, by contrast, has been rising along with the price of natural gas, which heavily influences electricity prices in regions that have large numbers of gas-fired power plants. The cost of the PV modules is between 50 to 60% of the total system cost. While the scale of the New York program is too small to produce any economies-of-scale influence on equipment cost, due in part to the commitment to workforce development in New York, the labor component of installed cost has decreased by 30%, from $2.30/Watt in 2003 to $1.66 /Watt as of early 2009. Based on an analysis of the labor cost data for the New York program, labor prices decline 10% for every doubling in installed capacity. Installers have been continuing to add to their workforce over the tenure of the program. In one case, a company started in 2006 with three employees and now has 50 individuals working in New York State.

Participation by the residential and small business sectors: In the combined SBC and RPS PV program, as of early 2009, there have been over 2000 applications received from residential customers. Approximately 48% of the installed capacity in the program is for the residential market, 11% for government and 41% for the commercial/institutional sector.

Workforce Development: The cornerstone of a sustainable market is the establishment of a qualified workforce that can meet market demand. Over 90 companies, with a combined 174 installers, operate in the PV program. In addition, New York State is the national leader in the development and implementation of accredited training programs for PV installers. There are currently six active training programs in the State, with another 23 programs under

development. Four of the programs have been accredited and the rest are in the process of completing the necessary requirements. As of late 2008, over 800 PV installation practitioners have been trained at NYSERDA-sponsored programs.[86] In addition, NYSERDA continues to support the North American Board of Certified Energy Practitioners in their program to provide certification to PV installers.

CST Wind Program

Benefits

Customer-sited wind power is starting to show results in satisfying various long-term policy objectives as articulated by the Commission during the design of the Customer-Sited Tier Program. With the implementation of programs to support larger customer-sited systems, the benefits of the initiative will grow. Some of the benefits of customer-sited wind program include:

- Economic development: There are currently 21 active installers in the program representing 17 different installation businesses across New York State with installers that are eligible to participate in the NYSERDA program.
- Fuel diversity and reduction in harmful emissions: Wind systems reduce the amount of grid power used to meet the load at the site.
- Participation by the residential and small business sectors: The majority of customers in the current customer-sited wind program are either residences or farms.
- Projects are located in 26 counties with 60% (29) of applications are west of Syracuse and 9 applications from Oswego County. There have been no application requests from the Orange and Rockland or Consolidated Edison franchise area.

Market Transformation

The market for customer-sited wind technology applications in New York State is still at a very early stage of development. As the number of installations increase and more installers and communities have experience with siting the systems, local institutional barriers will

[86] New York State Department of Labor; New York's Clean Energy Industry: Labor Market and Workforce Intelligence, May 2009

decrease. This will likely result in a reduced installation cost and open the market to additional customers. There has not been a consistent pattern in the annual number of installations of wind systems under the NYSERDA program. This may be due, in part, to local siting complexities and the relatively small number of installation companies operating in the state. According to the American Wind Energy Association,[87] the U.S. small wind market (systems less than 100kW) grew by 14% in 2007. While the year-to-year number of applications in New York has not shown a consistent trend, overall, with funding from both the SBC and RPS, the number of applications increased from 2 in 2003 to 29 so far in 2009. NYSERDA believes a modest annual growth rate of 10% for small systems (10kW) in New York is attainable.

Relative to workforce development and training, as with the PV program, New York is building a leadership role in the development of accredited training programs for small wind installers. There are currently 18 training programs under development at institutions include community colleges, universities, BOCES, and trade groups.

CST Anaerobic Digester-Gas-to-Electric Program

Benefits

The Anaerobic Digester Gas (ADG)-to-Electricity Program of the Customer Sited-Tier can significantly advance New York State toward the goal of the proposed State Energy Plan as well as provide significant on-site benefits to those farms, municipalities, and industries who install these systems. These potential benefits were recognized in the November 2, 2005 Order approving the New York Farm Bureau's request to include ADG-to-electricity projects as eligible technologies. The Order recognized the soundness of the Farm Bureau's argument supporting inclusion "to help achieve our renewable energy generation growth and our environmental goals, as well as support the economic interests of an important state industry."

Anaerobic digestion provides for the treatment of dairy manure, wastewater treatment plant sludge, and industrial organic feed stocks in a way that stabilizes the material, reduces the quantity of solids to be managed, and generates biogas that can be used for generation of power and thermal energy. For farmers this technology can reduce odors and give them more

[87] American Wind Energy Association, AWEA Small Wind Turbine Global Market Study; 2008.

options for timing and the location of land application of the treated material so that the nutrients can be better used by growing crops and are less susceptible to runoff from the land. Power and thermal energy produced can also be used by the farms and wastewater treatment facilities for municipal and industrial organic wastes.

With the proposed support of the ADG-to-Electricity Program for the 2010 through 2015 period, it is projected that development of an additional 24 MW is achievable. With the relatively continuous production of biogas from digesters, this modest generating capacity is projected to have a high capacity factor and contribute an additional 170,000 MWh/year of electricity generation.

Greenhouse gas benefits from fossil fuel displacement from these 170,000 MWh can be projected to reach some 75,000 tons of CO2 equivalent per year based on 0.5 tons CO2e/MWh. If valued at $15 per ton, this amounts to $1,125,000 per year and $17,000,000 over a 15 year life of the ADG projects.

Significantly greater benefits may be realized due to the reduction in methane that would otherwise be emitted at many of the farms from their manure storage facilities if digesters do not get installed to treat the manure and avoid these emissions. Different projections of methane avoidance rates are made for these baseline greenhouse gas emissions depending on the farm practices and location. Projections from 1 to 5 tons of CO2 equivalent per cow have been made.

The projected farm digester installations for the 2010 through 2015 used to project the CST cost of $56,000,000 were projected to treat manure from a cow population of 93,000. If a moderate methane avoidance of 3 tons of CO2 equivalent per cow is used and applied to the cow population of 82,000 on the larger of the farms served, an annual benefit from methane avoidance could reach 246,000 tons of CO2 equivalent.

Although the near term value of CO2 credits or offsets cannot be counted on to be more than a few dollars per ton, if a national cap and trade program is enacted, the value could be significantly higher. Using a $15 per ton value, 246,000 tons of CO2 equivalent would amount to $3,700,000 per year and $55,000,000 over a 15 year life of the projected new ADG projects. Coupled with the greenhouse gas benefit of replacing fossil fuel power generation amounting

to $17,000,000, the total potential greenhouse gas benefits might reach $72,000,000, exceeding the projected cost of the CST incentives for all types of ADG.

Market Transformation

While significant progress has been made with the initial incentives from the CST program, significant barriers remain for the addressed to reach the full potential of the ADG to electricity program.

Digester Capital Costs: The actual costs of ADG installations associated with Program applications received to date have typically ranged from $4,000 to $6,000 per kW for projects installing both a new digester and engine generator. For earlier on-farm applications received by the Program in 2007 and 2008, the ability to borrow the required capital to install an ADG system may have been facilitated by historically-high milk prices. Now that milk prices have fallen drastically below the cost of production, borrowing has become more difficult. Strained and sometimes reduced municipal budgets are also making it difficult to obtain funding for Waste Water Treatment Plant (WWTP) ADG systems.

Much Higher than Anticipated Interconnection Costs: In some rural areas the lack of three-phase power and the limited capacity of the distribution grid lines and equipment can result in significant costs for interconnecting farm ADG-to-electricity projects. Grid upgrade costs being projected for the farms to pay have reached up to $500,000. The potential for such unanticipated costs has been slowing the implementation of projects, even those already contracted under the initial funding of the CST Program. Uncertainty about interconnection costs will continue to limit the ability of farms to obtain financing and to even adequately evaluate project feasibility.

Municipal Decision-making Process: Whereas an on-farm decision to install an ADG-to-electricity system often involves a single family or small partnership, for municipal wastewater facilities this decision, and the process of procuring, permitting and constructing the system, is typically much more complex. This can result in higher costs for ADG systems on municipal facilities.

Limited Eligibility of Customers That Do Not Pay RPS Charges: Generally, only customers who pay RPS charges through their utility bills are eligible to receive incentives through the RPS

Program. This excludes WWTPs and farms that receive municipal power, or power from the New York Power Authority (NYPA) or the Long Island Power Authority (LIPA), from RPS incentive programs. Some of the excluded WWTPs are very large and have the potential to produce significant amounts of renewable power in a load-constrained area of the State. Though not paying RPS charges directly, these WWTP's do provide essential services to a large number of residents who do pay RPS charges through their utility bills.

Separate Metering of Multiple Loads: Farms often expand in stages; as new buildings are added, new utility meters are installed. In New York State, net metering only applies to the load on the meter that interconnects the generator to the utility (it can be costly to connect multiple meter loads to this meter). Therefore, the cash benefit of the project is reduced; although more power can be sold to the utility at the wholesale rate, less power can be displaced at the retail rate. Vermont and Pennsylvania have made provisions for "virtual net metering," where excess power is used to offset retail costs from multiple meters, not just the meter interconnecting the generator to the utility.

As was noted in the Order making ADG eligible under the CST, "maximum, cost effective systems can only be installed in a market that has broad-based acceptance and adoption of the renewable energy technology. Infrequent installations will not attract developmental expertise or lead to declining costs."

To this point the ADG CST program has shown some limited success in attracting market participants to New York State. Having these incentives available has brought one of the country's major digester system providers to work in NYS. Still more system providers are needed for more competition. However, only two companies developed seventy-five percent of the on-farm project applications submitted for the initial ADG CST funding.

The availability of the RPS program and the digester progress shown to date were major factors in the selection of NYS as the state for the first Digester Summit to be convened by the Innovation Center for U.S. Dairy, which is supported by the major companies in the national dairy industry. At this Summit, scheduled to be held on the 29th and 30th of October, 2009, those with a stake in digester systems and their impacts will work to develop action plans and strategies for accelerating the application of anaerobic digestion systems, by building upon the

strengths of NY's farm and agricultural sector community, utilities, the financial sector, digester service businesses, academic institutions, government organizations, and incentive programs. Preparation for this Summit has already led to greater understanding of stakeholder perspectives and consideration of opportunities for tapping these strengths these stakeholders has already begun.

NYSERDA's workforce development program has also focused on the development of skills in the evaluation and operation of anaerobic digester systems. A NYSERDA contract for this work will soon be in place to tap the expertise of those at Cornell University who have been working to further digester technology for several years. As part of that project Cornell will be partnering with SUNY Morrisville, which has installed an ADG-to-electricity system for its small farm with funding support from NYSERDA and the NYS Department of Agriculture and Markets. With the availability of that digester for training, SUNY Morrisville was able to secure funding from the US Department of Labor for green workforce development.

CST Fuel Cell Program

Benefits

The technological challenges to the wide-scale deployment of fuel cells are significant, and market transformation issues remain, but fuel cell technology represents a promising route to cleaner, more efficient energy production. Fuel cells can provide the desired societal benefits articulated by the Commission during the design of the Customer-Sited Tier Program;[88] they can be rapidly installed at locations within load pockets; sized to appeal to both residential and small business consumers; typically run base-loaded and reduce demand at all times including during system peak periods; provide process heat to the host site, deliver uninterrupted electrical service to critical loads, drive economic development in New York (new jobs, job retention, siting of new companies and manufacturing facilities, increased manufacturing output from existing facilities) and are recognized for their environmental benefits and reduction of harmful emissions.

[88] Case 03-E-0188; "Order Approving Implementation Plan, Adopting Clarifications, and Modifying Environmental Disclosure Program," issued and effective April 14, 2005.

Market Transformation

In order to provide support to all phases of the commercialization and adoption of fuel cell technologies, NYSERDA administers three fuel cell programs using statutory, SBC, and CST program funding. The statutory and SBC-funded programs seek to help New York fuel cell manufacturers invent new and improved fuel cells, components thereof, and manufacturing techniques. For several years prior to the RPS CST program, NYSERDA provided financial support for fuel cell technologies to improve the efficiency, durability, and manufacturability of fuel cell components and systems. NYSERDA has also employed programs to support the long-term demonstration of the operational reliability and effectiveness of fuel cells at end-use sites in commercially promising applications; these sites consist of predominantly large institutional customers.

Fuel cell technology shows signs of improvement and cost reduction:

- For the period 2001-2007 NYSERDA supported eight experimental fuel cell installation projects having an average total installed cost of roughly $8 per Watt. NYSERDA incentives during this period averaged about one-half of this total installed cost. Presuming a capacity factor of 85% and a five year lifespan, this equates to an incentive payment of roughly ten cents per kilowatt-hour.
- For the period 2007-2009 NYSERDA supported eight experimental fuel cell installation projects having an average total installed cost of roughly $5 per Watt. NYSERDA incentives during this period again have averaged about one-half of this total installed cost. Presuming a capacity factor of 85%, this equates to an incentive payment of roughly four cents per kilowatt-hour. This improvement in product quality and reduction in cost is a positive trend which has been induced by the ongoing fuel cell programs in New York and elsewhere.
- The UTC fuel cell has evolved from a five-year lifespan to a ten-year lifespan. Recent SBC-funded fuel cell projects involving the new UTC 400-kW fuel cell have averaged roughly $5 per Watt total installed cost, of which NYSERDA paid roughly one-half in incentives. Presuming a capacity factor of 85% this equates to an incentive payment of roughly four cents per kilowatt-hour.

- The RPS Market Conditions Final Report (prepared for NYSERDA by Summit Blue, February 2009) indicates that, in California, fuel cells are also averaging a total installed cost of roughly $8 per Watt, and that both the New Jersey Customer On-site Renewable Energy Program and the California feed-in tariff provide more-lucrative incentives for fuel cells than New York's current CST program.

While improvement in product quality and reduction in cost is a positive trend which has been induced by the ongoing fuel cell programs in New York and elsewhere, there still are a very limited number of original equipment manufacturers (OEMs) of "mature" fuel cells. The business practices of this small group of OEMs have been the most influential factor affecting the penetration of fuel cells in the New York State marketplace, and make the circumstances of the Fuel Cell program element unique within the suite of CST programs.

Program concepts were discussed with the OEMs when the CST 2007-2009 Operating Plan was being developed, and at that time there were affirmative indications that the program mechanisms would be properly aligned with the OEMs' ability to deliver. After the CST 2007-2009 Operating Plan was issued, two major changes in OEM business practices occurred (because of these two changes in OEM business strategy, the Fuel Cell program has under-performed with respect to the 2007 CST Operating Plan):

- United Technology Corporation ceased production of their 200 kW "mature" fuel cell in favor of production of their 400 kW "experimental" fuel cell, and
- Fuel Cell Energy diminished their pursuit of "single fuel cell" installations in favor of larger "clustered fuel cell" installations.

With respect to the smaller scale fuel cell market, expectations as to customer interest have not yet materialized.

The current market demand for fuel cells is driven by many non-price factors including environmental benefit and green marketing value. Projections of achievable market potential, contained in the NYSERDA Report, Market Potential, Program Expectations and Funding Considerations, dated June 22, 2009, are based on reasonable assumptions of market activity and incentive structures, including recently revised business practices of the small group of

original fuel cell equipment manufacturers (OEM) that are expected to define the potential penetration of fuel cells in the New York State marketplace.

The CST program will continue to be the primary venue for supporting the cost-effective acquisition of fuel cells for long-term operation at end-user sites. Specifically, the CST Fuel Cell program will be designed to inspire maximized production of electricity from fuel cells, and therefore addresses "mature" fuel cells which are expected to have consistent and reliable operation. "Mature" fuel cells are those that are commercially available and have achieved certification by a nationally recognized product standard for stationary fuel cell power systems (such as: ANSI/CSA America FC1-2004 [formerly ANSI Z21.83], are covered by the original equipment vendor with a commercial warrantee for a three-year performance period, and have an MEA number for New York City sites. United Technology Corporation's 400 kW fuel cell is on track to become "mature" in first quarter 2010 and enter the CST program. While considered "experimental" in 2008 and early 2009, using the SBC-funded program specific for this purpose, NYSERDA has selected for funding the installation of this fuel cell at eight (8) distinct sites, indicating aggressive efforts by the OEM to sell this product into the New York marketplace and concomitant acceptance of this product by the marketplace).

Fuel Cell Energy has indicated a belief that they can sell larger "clustered fuel cell" installations into the marketplace if the Fuel Cell program's per-site funding cap were to be dramatically increased (e.g., elevated from the current $1 million maximum to a desired $3 million level).

The creation of small fuel cell set-aside category under the 2007 CST Operating Plan was predicated on a concern that the large fuel cells could consume a dominant portion of program funding before the small fuel cells could make a sufficient number of sales, and that a dedicated set-aside for the small fuel cells would establish signals that would stimulate the marketplace. With respect to the smaller scale fuel cell market, customer interest has not materialized as expected, and future expectations on achievable market potential for this class of fuel cells will reflect this experience.

Attachment E Analysis of A Utility-Sited Tier

Basic Assumptions for the Study

It was assumed that utilities would want to be allowed to place the cost of these above-market-cost public benefit projects within their rate structure (incorporated in rate base) for recovery from their customers who will obtain the benefits. Since the potential cost of such facilities could be substantial, the study assumed there should be a cap on the annual expense to ratepayers associated with these projects. The combined depreciation expense and return on un-depreciated balance, grossed-up for applicable federal, state and local taxes, for the sum of all such projects undertaken by a respective utility, was assumed not to exceed $25 million.

Expected Production

Assuming that a Utility-Sited Tier is subscribed to the maximum cap of $25 million per year, the performance expectation for calendar years 2010 through 2015 (assumes proposal development and approval in 2010) is as shown in the following tables:

Utility-Sited Tier Performance Expectation (MWh)

	2010	2011	2012	2013	2014	2015	Total
Solar Photovoltaic	0	10,759	0	0	0	0	10,759

Utility-Sited Tier Performance Expectation (MW)

	2010	2011	2012	2013	2014	2015	Total
Solar Photovoltaic	0.00	9.44	0.00	0.00	0.00	0.00	9.44

The above tables were calculated using the assumptions and results that follow: an initial investment of $75,500,000; a total cost of $8/watt; a total yield of 9.44 MW; and an annual yield of 10,759 MWh per year (1,140 MWh/MW/year).

Unit Cost Calculation

The table below compares the cumulative annual MWhs of renewable energy that would be generated in year 2015 to the funding in the Utility-Sited Tier for the years 2010 through 2015. For comparison purposes, the total cost per MWh is calculated with and without avoided costs at two assumption levels. The table is provided so that the relative cost of solar photovoltaic systems funded by a Utility-Sited Tier may be readily compared to the cost of solar photovoltaic systems funded by the Customer-Sited Tier:

Comparison of Utility-Sited Tier Costs to Customer-Sited Tier Costs

	Total Cost 2010 - 2015	Total MWhs 2015	Total Cost/ MWh
Customer-Sited Solar Photovoltaic	$294,000,000	129,646	$2,268
Utility-Sited Solar Photovoltaic	$193,750,000	10,759	$18,009
Utility-Sited Solar Photovoltaic (less Avoided Costs)	$167,678,831	10,759	$15,585
Utility-Sited Solar Photovoltaic (less 2X Avoided Costs)	$141,607,662	10,759	$13,162

The above table was calculated using the assumptions and results that follow: an initial investment of $75,500,000; a total cost of $8/watt; a total yield of 9.44 MW; an annual yield of 10,759 MWh per year (1,140 MWh/MW/year); a 10 year depreciation period which produces an annual depreciation expense of $7,550,000 ($75,500,000/10years); a 10% return on the undepreciated balance for 10 years totaling $41,525,000; a gross-up factor of 0.604 for applicable federal, state and local taxes totaling $76,725,000 in taxes over 10 years; and a total expense in the first year of $25,000,000 ($7,550,000 depreciation expense + $7,550,000 return on undepreciated balance+$9,900,000 for applicable federal, state and local taxes). The total cost of the program is $193.75M ($75.500M depreciation + $41.525M return + $76.725M taxes). The avoided costs are based on 10 years and an energy cost of $76.22/MWh; marginal generation capacity costs of $105.88/kW; and marginal distribution capacity costs of $83.48/kW, yielding annual avoided costs of $2,607,117. Since the utilities would be able to

avoid some incremental distribution costs by choosing the optimal interconnection location on their system, a comparison of twice the avoided costs was calculated to reflect an allowance for this additional level of avoided costs not already reflected.

APPENDIX

Bill Impact Tables

2015 RPS Bill Impacts - 25% of Pre-EEPS Load Goal - With 2% CST Target

	Cents Per kWh			Percentage Impact			Monthly Bill			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.22	(0.12)	0.10	2.58%	-1.06%	0.51%	$1.48	($0.80)	$0.67	$2,011,376
Non-Residential:	0.22	(0.12)	0.10	5.12%	-1.07%	0.65%	$13.46	($7.34)	$6.12	$3,361,260
Con Edison:										
Residential:	0.15	(0.04)	0.12	1.57%	-0.18%	0.38%	$0.78	($0.19)	$0.59	$19,258,499
Non-Residential:	0.15	(0.04)	0.12	1.90%	-0.21%	0.44%	$8.59	($2.12)	$6.47	$36,871,890
NYSEG										
Residential:	0.21	(0.15)	0.05	2.05%	-1.38%	0.25%	$1.29	($0.95)	$0.34	$3,042,143
Non-Residential:	0.21	(0.15)	0.05	3.23%	-1.23%	0.29%	$12.16	($8.98)	$3.17	$4,405,016
National Grid:										
Residential:	0.25	(0.16)	0.08	2.09%	-1.33%	0.35%	$1.43	($0.95)	$0.49	$8,383,544
Non-Residential:	0.25	(0.16)	0.08	3.14%	-1.10%	0.37%	$20.55	($13.57)	$6.97	$13,728,953
Orange & Rockland:										
Residential:	0.21	(0.13)	0.08	2.06%	-1.02%	0.35%	$1.50	($0.92)	$0.58	$1,315,986
Non-Residential:	0.21	(0.13)	0.08	3.76%	-1.06%	0.45%	$14.69	($9.04)	$5.65	$2,045,947
RG&E										
Residential:	0.21	(0.17)	0.04	1.97%	-1.77%	0.20%	$1.22	($0.98)	$0.24	$906,332
Non-Residential:	0.21	(0.17)	0.04	2.52%	-1.60%	0.22%	$18.91	($15.24)	$3.67	$1,762,751
									Total:	$97,093,697

2015 RPS Bill Impacts - 25% Post-EEPS Load Goal - With $24 Million of PV in the CST

	Cents Per kWh			Percentage Impact			Monthly Bill Impact			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.07	(0.10)	(0.03)	0.84%	-0.88%	-0.14%	$0.48	($0.67)	($0.19)	($559,352)
Non-Residential:	0.07	(0.10)	(0.03)	1.67%	-0.89%	-0.18%	$4.38	($6.09)	($1.70)	($934,748)
Con Edison:										
Residential:	0.05	(0.05)	0.00	0.51%	-0.22%	0.01%	$0.25	($0.24)	$0.02	$622,757
Non-Residential:	0.05	(0.05)	0.00	0.62%	-0.25%	0.01%	$2.80	($2.59)	$0.21	$1,192,316
NYSEG:										
Residential:	0.07	(0.11)	(0.04)	0.67%	-0.94%	-0.18%	$0.42	($0.66)	($0.23)	($2,117,958)
Non-Residential:	0.07	(0.11)	(0.04)	1.05%	-0.84%	-0.20%	$3.96	($6.17)	($2.21)	($3,066,798)
National Grid:										
Residential:	0.08	(0.11)	(0.03)	0.68%	-0.90%	-0.13%	$0.47	($0.64)	($0.18)	($3,026,932)
Non-Residential:	0.08	(0.11)	(0.03)	1.02%	-0.74%	-0.13%	$6.69	($9.21)	($2.52)	($4,956,926)
Orange & Rockland:										
Residential:	0.07	(0.11)	(0.04)	0.67%	-0.84%	-0.17%	$0.49	($0.77)	($0.28)	($633,941)
Non-Residential:	0.07	(0.11)	(0.04)	1.23%	-0.88%	-0.22%	$4.78	($7.50)	($2.72)	($985,580)
RG&E:										
Residential:	0.07	(0.11)	(0.04)	0.64%	-1.15%	-0.21%	$0.40	($0.64)	($0.24)	($925,785)
Non-Residential:	0.07	(0.11)	(0.04)	0.82%	-1.03%	-0.22%	$6.16	($9.90)	($3.74)	($1,800,586)
									Total:	($17,193,533)

2015 RPS Bill Impacts - 25% Post-EEPS Load Goal - With $49 Million of PV in the CST

	Cents Per kWh			Percentage Impact			Monthly Bill Impact			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.07	(0.10)	(0.03)	0.84%	-0.88%	-0.14%	$0.48	($0.67)	($0.19)	($556,457)
Non-Residential:	0.07	(0.10)	(0.03)	1.67%	-0.89%	-0.18%	$4.39	($6.09)	($1.69)	($929,909)
Con Edison:										
Residential:	0.05	(0.05)	0.00	0.51%	-0.22%	0.01%	$0.25	($0.24)	$0.02	$639,494
Non-Residential:	0.05	(0.05)	0.00	0.62%	-0.25%	0.01%	$2.80	($2.59)	$0.21	$1,224,362
NYSEG:										
Residential:	0.07	(0.11)	(0.04)	0.67%	-0.94%	-0.18%	$0.42	($0.66)	($0.23)	($2,110,326)
Non-Residential:	0.07	(0.11)	(0.04)	1.05%	-0.84%	-0.20%	$3.97	($6.17)	($2.20)	($3,055,748)
National Grid:										
Residential:	0.08	(0.11)	(0.03)	0.68%	-0.90%	-0.12%	$0.47	($0.64)	($0.17)	($3,010,758)
Non-Residential:	0.08	(0.11)	(0.03)	1.03%	-0.74%	-0.13%	$6.70	($9.21)	($2.50)	($4,930,439)
Orange & Rockland:										
Residential:	0.07	(0.11)	(0.04)	0.67%	-0.84%	-0.17%	$0.49	($0.77)	($0.28)	($631,702)
Non-Residential:	0.07	(0.11)	(0.04)	1.23%	-0.88%	-0.22%	$4.79	($7.50)	($2.71)	($982,099)
RG&E:										
Residential:	0.07	(0.11)	(0.04)	0.64%	-1.15%	-0.20%	$0.40	($0.64)	($0.24)	($922,724)
Non-Residential:	0.07	(0.11)	(0.04)	0.82%	-1.03%	-0.22%	$6.17	($9.90)	($3.73)	($1,794,632)
									Total:	($17,060,939)

2015 RPS Bill Impacts - 30% Post-EEPS Load Goal - With $24 Million of PV in the CST

	Cents Per kWh			Percentage Impact			Monthly Bill Impact			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.32	(0.17)	0.15	3.81%	-1.54%	0.76%	$2.17	($1.16)	$1.01	$3,023,984
Non-Residential:	0.32	(0.17)	0.15	7.54%	-1.55%	0.97%	$19.82	($10.61)	$9.21	$5,053,454
Con Edison:										
Residential:	0.23	(0.08)	0.15	2.32%	-0.38%	0.48%	$1.15	($0.40)	$0.75	$24,532,908
Non-Residential:	0.23	(0.08)	0.15	2.80%	-0.44%	0.56%	$12.65	($4.41)	$8.25	$46,970,155
NYSEG:										
Residential:	0.31	(0.21)	0.10	3.02%	-1.86%	0.47%	$1.90	($1.29)	$0.61	$5,545,589
Non-Residential:	0.31	(0.21)	0.10	4.76%	-1.67%	0.52%	$17.90	($12.11)	$5.78	$8,030,002
National Grid:										
Residential:	0.36	(0.21)	0.15	3.08%	-1.76%	0.62%	$2.11	($1.24)	$0.86	$14,889,936
Non-Residential:	0.36	(0.21)	0.15	4.63%	-1.45%	0.66%	$30.25	($17.87)	$12.38	$24,383,870
Orange & Rockland:										
Residential:	0.32	(0.19)	0.12	3.04%	-1.47%	0.53%	$2.21	($1.34)	$0.87	$1,989,992
Non-Residential:	0.32	(0.19)	0.12	5.54%	-1.53%	0.69%	$21.62	($13.08)	$8.55	$3,093,815
RG&E:										
Residential:	0.30	(0.20)	0.10	2.90%	-2.14%	0.52%	$1.80	($1.19)	$0.61	$2,331,743
Non-Residential:	0.30	(0.20)	0.10	3.71%	-1.94%	0.55%	$27.84	($18.41)	$9.43	$4,535,075
									Total:	$144,380,525

2015 RPS Bill Impacts - 30% Post-EEPS Load Goal - With $49 Million of PV in the CST

	Cents Per kWh			Percentage Impact			Monthly Bill Impact			Total Dollar Impact
	Delivery	Commodity	Overall	Delivery	Commodity	Overall	Delivery	Commodity	Overall	
Central Hudson:										
Residential:	0.35	(0.17)	0.18	4.11%	-1.54%	0.89%	$2.35	($1.16)	$1.19	$3,550,848
Non-Residential:	0.35	(0.17)	0.18	8.15%	-1.55%	1.14%	$21.42	($10.61)	$10.81	$5,933,911
Con Edison:										
Residential:	0.24	(0.08)	0.17	2.51%	-0.38%	0.54%	$1.24	($0.40)	$0.84	$27,578,516
Non-Residential:	0.24	(0.08)	0.17	3.03%	-0.44%	0.63%	$13.68	($4.41)	$9.27	$52,801,207
NYSEG:										
Residential:	0.33	(0.21)	0.12	3.27%	-1.86%	0.58%	$2.05	($1.29)	$0.77	$6,934,146
Non-Residential:	0.33	(0.21)	0.12	5.14%	-1.67%	0.66%	$19.35	($12.11)	$7.23	$10,040,629
National Grid:										
Residential:	0.39	(0.21)	0.18	3.33%	-1.76%	0.74%	$2.28	($1.24)	$1.03	$17,832,950
Non-Residential:	0.39	(0.21)	0.18	5.00%	-1.45%	0.79%	$32.70	($17.87)	$14.83	$29,203,371
Orange & Rockland:										
Residential:	0.34	(0.19)	0.15	3.28%	-1.47%	0.64%	$2.39	($1.34)	$1.05	$2,397,441
Non-Residential:	0.34	(0.19)	0.15	5.99%	-1.53%	0.83%	$23.37	($13.08)	$10.29	$3,727,269
RG&E:										
Residential:	0.33	(0.20)	0.13	3.13%	-2.14%	0.64%	$1.94	($1.19)	$0.75	$2,888,727
Non-Residential:	0.33	(0.20)	0.13	4.01%	-1.94%	0.69%	$30.09	($18.41)	$11.68	$5,618,370
									Total:	$168,507,386

RPS Main Tier Project Status

Facility	Type	Solicitation	County	New Renewable Capacity (MW)	Contract Capacity (MW)	Annual Contract Quantity (MWh)	Contract Duration (years)	Status
AES Greenridge Station	Biomass	3rd	Yates	4.0	3.8	28,500	3	In Construction
Allens Falls	Hydro	2nd	St. Lawrence	0.3	0.3	1,675	10	Operating
Bear Creek	Wind	1st	n/a - PA	22.0	22	68,704	4	Operating
Browns Falls	Hydro	2nd	St. Lawrence	0.4	0.4	1,277	10	Operating
Cohocton Wind Farm	Wind	2nd	Steuben	82.5	8.3	23,372	10	Operating
Colton	Hydro	2nd	St. Lawrence	0.7	0.7	4,851	10	Operating
Dutch Hill Wind Farm	Wind	2nd	Steuben	42.5	4.3	12,818	10	Operating
Eagle	Hydro	2nd	Lewis	0.5	0.5	3,181	10	Operating
East Norfolk	Hydro	2nd	St. Lawrence	0.9	0.9	6,207	10	Operating
Effley Hydro	Hydro	3rd	Lewis	0.3	0.3	1,399	10	In Construction
High Falls	Hydro	3rd	n/a - Quebec	14.7	14.0	26,410		In Construction
Higley Falls	Hydro	2nd	St. Lawrence	1.9	1.9	11,648	10	Operating
Maple Ridge	Wind	1st	Lewis	321.0	231	605,820	10	Operating
Niagara Generating Facility	Biomass	2nd	Niagara	26.0	26.0	189,525	10	Operating
Noble Altona Windpark	Wind	2nd	Clinton	102.0	96.9	270,782	10	Operating
Noble Bellmont Windpark	Wind	2nd	Franklin	21.0	20.0	63,438	10	In Construction
Noble Bliss Windpark	Wind	2nd	Wyoming	100.5	95.5	294,400	10	Operating
Noble Chateaugay WPark	Wind	2nd	Franklin	106.5	101.2	321,725	10	Operating
Noble Clinton Windpark I	Wind	2nd	Clinton	100.5	95.5	303,599	10	Operating
Noble Ellenburg Windpark	Wind	2nd	Clinton	81.0	77.0	252,107	10	Operating
Noble Wethersfield WPark	Wind	3rd	Wyoming	126.0	119.7	14,572	10	Operating
Norfolk	Hydro	2nd	St. Lawrence	1.5	1.5	10,154	10	Operating
Norwood	Hydro	2nd	St. Lawrence	0.5	0.5	4,628	10	Operating
Oswego Falls	Hydro	2nd	Oswego	0.6	0.6	4,049	10	Operating
Piercefield Hydro	Hydro	3rd	St. Lawrence	0.1	0.1	385	10	Operating
Raymondville	Hydro	2nd	St. Lawrence	0.7	0.7	5,044	10	Operating
Sherman Island	Hydro	3rd	Saratoga	4.7	4.5	19,292	10	In Construction
Spier Falls	Hydro	1st	Saratoga	0.8	0.8	3,582	10	Operating
			Maintenance Resources					
Boralex Chateaugay	Biomass	NY	Franklin		20.0	128,000	10	Operating
Lyonsdale	Biomass	NY	Lewis		19.0	131,238	7	Operating
					39	259,238		

Main Tier Funding as of July 31, 2009

	Main Tier Contract Commitments	Encumbered*	Pending (Agreement not yet Signed)	Invoiced	Invoices as % of Commitments
4Q 2007	$ 594,501,549	$ 473,308,261	$121,176,687	$22,624,241	4%
1Q 2008	$ 559,841,206	$ 438,664,519	$121,176,687	$27,437,885	5%
2Q 2008	$ 559,847,438	$ 525,264,509	$ 34,582,929	$31,326,304	6%
3Q 2008	$ 559,852,441	$ 533,428,646	$ 26,423,795	$34,115,779	6%
4Q 2008	$ 559,855,834	$ 550,571,414	$ 9,284,420	$38,721,271	7%
1Q 2009	$ 511,959,433	$ 511,959,433	$ -------	$46,179,700	9%
4/30/09	$ 474,227,189	$ 474,227,189	$ -------	$46,998,949	10%
5/31/09	$ 474,227,189	$ 474,227,189	$ -------	$54,214,374	11%
6/30/09	$ 474,227,189	$ 474,227,189	$ -------	$54,545,762	12%
7/31/09	$ 474,121,512	$ 474,121,512		$57,969,962	12%

Figures do not include Maintenance Resource purchases.

*Encumbered amounts may be disencumbered at the end of a contract year if

a) energy production is less than expected and/or

b) RPS Attributes are sold to the voluntary market, pursuant to contract suspension.

Note: These cost and collection schedules reflect the costs to achieve the RPS program at the level proposed in the Draft State Energy Plan (30% by 2015) after factoring-in energy efficiency goals (15% by 2015) and do not reflect offsetting bill credits that will occur due to wholesale generation price suppression and avoided capacity and transmission costs. These collection schedules also do not reflect the values of environmental and economic development benefits. These schedules also reflect some but not all offsetting revenues from interest earnings, letters of credit for defaulted contracts, and actual expenses that may be lower than budgeted amounts.

Original Statewide RPS Cost Projections (includes LIPA) through 2013
(2003 $)

	2006	2007	2008	2009
RPS Main Tier	$10,612,250	$31,045,475	$50,641,339	$71,079,114
RPS Customer-Sited Tier	$16,304,706	$16,304,706	$16,304,706	$16,304,706
Total Cost to Achieve RPS	$26,916,956	$47,350,181	$66,946,045	$87,383,819

	2010	2011	2012	2013
RPS Main Tier	$88,309,003	$108,695,905	$122,775,285	$148,120,262
RPS Customer-Sited Tier	$16,304,706	$16,304,706	$16,304,706	$16,304,706
Total Cost to Achieve RPS	$104,613,709	$125,000,611	$139,079,991	$164,424,968

Original Statewide RPS Cost Projections (includes LIPA) through 2013
(Nominal $)

	2006	2007	2008	2009
RPS Main Tier	$11,261,804	$33,604,621	$55,912,130	$80,046,627
RPS Customer-Sited Tier	$17,302,684	$17,648,738	$18,001,713	$18,361,747
Total Cost to Achieve RPS	$28,564,489	$51,253,359	$73,913,843	$98,408,374

	2010	2011	2012	2013
RPS Main Tier	$101,439,286	$127,354,577	$146,727,830	$180,557,773
RPS Customer-Sited Tier	$18,728,982	$19,103,562	$19,485,633	$19,875,345
Total Cost to Achieve RPS	$120,168,268	$146,458,138	$166,213,463	$200,433,119

LIPA Share of Original Statewide RPS Cost Projections through 2013
(Nominal $)

	2006	2007	2008	2009
RPS Main Tier	$1,770,846	$5,317,603	$8,908,952	$12,826,267
RPS Customer-Sited Tier	$2,720,735	$2,792,740	$2,868,365	$2,942,194
Total Cost to Achieve RPS	$4,491,580	$8,110,343	$11,777,317	$15,768,461

	2010	2011	2012	2013
RPS Main Tier	$16,378,456	$20,730,648	$24,132,362	$29,917,105
RPS Customer-Sited Tier	$3,023,994	$3,109,658	$3,204,807	$3,293,200
Total Cost to Achieve RPS	$19,402,450	$23,840,306	$27,337,169	$33,210,305

Delivery Utility Customer Share of Original Statewide RPS Cost Projections through 2013
(Nominal $)

	2006	2007	2008	2009
RPS Main Tier	$9,490,959	$28,287,018	$47,003,178	$67,220,359
RPS Customer-Sited Tier	$14,581,950	$14,855,998	$15,133,348	$15,419,553
Total Cost to Achieve RPS	$24,072,909	$43,143,015	$62,136,526	$82,639,913

	2010	2011	2012	2013
RPS Main Tier	$85,060,830	$106,623,928	$122,595,469	$150,640,668
RPS Customer-Sited Tier	$15,704,988	$15,993,903	$16,280,826	$16,582,146
Total Cost to Achieve RPS	$100,765,818	$122,617,832	$138,876,295	$167,222,814

Total Delivery Utility Customer Share of Original Statewide RPS Cost Projections through 2013
(Nominal $)

	2006-2013
RPS Main Tier	$616,922,410
RPS Customer-Sited Tier	$124,552,712
Total Cost to Achieve RPS	$741,475,122

Original Schedule of RPS Collections from Delivery Utility Customers through 2013
(Nominal $)

	2006	2007	2008	2009
Central Hudson	$1,196,509	$2,161,842	$3,130,122	$4,200,634
Con Edison	$10,181,631	$18,310,499	$26,411,100	$35,271,313
NYSEG	$3,041,702	$5,422,156	$7,774,090	$10,263,723
Niagara Mohawk	$7,086,698	$12,633,111	$18,158,625	$23,998,862
O&R	$945,446	$1,693,188	$2,432,021	$3,234,890
RG&E	$1,620,922	$2,922,221	$4,230,568	$5,670,491
Total Collections	$24,072,909	$43,143,015	$62,136,526	$82,639,913

	2010	2011	2012	2013
Central Hudson	$5,152,111	$6,306,560	$7,184,776	$8,712,759
Con Edison	$43,080,806	$52,532,758	$59,606,575	$72,054,077
NYSEG	$12,430,793	$15,027,145	$16,952,823	$20,265,055
Niagara Mohawk	$29,212,826	$35,469,579	$40,068,400	$47,986,941
O&R	$3,935,793	$4,779,560	$5,401,238	$6,504,912
RG&E	$6,953,489	$8,502,230	$9,662,482	$11,699,070
Total Collections	$100,765,818	$122,617,832	$138,876,295	$167,222,814

Total RPS Collections from Delivery Utility Customers through 2013
(Nominal $)

	2006-2013
Total Collections	$741,475,122

Current Main Tier Maximum Contract Costs Projected through 2024
(Nominal $)

	2006	2007	2008	2009
Main Tier	$12,877,600	$13,106,441	$16,455,460	$49,450,643

	2010	2011	2012	2013
Main Tier	$48,131,527	$48,131,527	$47,582,902	$45,163,316

	2014	2015	2016	2017
Main Tier	$45,163,316	$45,163,316	$31,249,932	$31,249,932

	2018	2019	2020	2021
Main Tier	$7,162,486	$0	$0	$0

	2022	2023	2024
Main Tier	$0	$0	$0

Future Main Tier Contract Costs Projected through 2024
(Nominal $)

	2006	2007	2008	2009
Main Tier	$0	$0	$0	$0

	2010	2011	2012	2013
Main Tier	$0	$34,978,632	$70,316,818	$115,170,318

	2014	2015	2016	2017
Main Tier	$154,616,964	$197,333,273	$197,333,273	$197,333,273

	2018	2019	2020	2021
Main Tier	$197,333,273	$197,333,273	$197,333,273	$162,354,641

	2022	2023	2024
Main Tier	$127,016,455	$82,162,955	$42,716,309

Current Main Tier Maintenance Costs Projected through 2024
(Nominal $)

	2006	2007	2008	2009
Maintenance Costs	$1,519,080	$1,961,670	$3,912,624	$4,019,808

	2010	2011	2012	2013
Maintenance Costs	$4,019,808	$4,019,808	$4,019,808	$4,019,808

	2014	2015	2016	2017
Maintenance Costs	$4,019,808	$1,920,000	$0	$0

	2018	2019	2020	2021
Maintenance Costs	$0	$0	$0	$0

	2022	2023	2024
Maintenance Costs	$0	$0	$0

Customer-Sited Tier Budget to Date
(Nominal $)

	2006-2009	2010-2013	TOTAL
Solar Photovoltaic	$75,300,000	$0	$75,300,000
Anaerobic Digesters	$20,110,000	$0	$20,110,000
Fuel Cells	$5,790,000	$0	$5,790,000
Small Wind	$2,100,000	$0	$2,100,000
Total Customer-Sited Tier	$103,300,000	$0	$103,300,000

Note: Excludes Administration and Evaluation Costs

Projected Customer-Sited Tier Budget
(Nominal $)

	2010	2011	2012
Solar Photovoltaic	$24,000,000	$24,000,000	$24,000,000
Anaerobic Digesters	$13,700,000	$13,300,000	$12,000,000
Fuel Cells	$6,100,000	$6,100,000	$6,100,000
Small Wind	$1,900,000	$2,800,000	$2,900,000
Solar Thermal	$4,300,000	$4,300,000	$4,300,000
Total Customer-Sited Tier	$50,000,000	$50,500,000	$49,300,000

	2013	2014	2015
Solar Photovoltaic	$24,000,000	$24,000,000	$24,000,000
Anaerobic Digesters	$11,600,000	$10,200,000	$10,200,000
Fuel Cells	$6,100,000	$6,100,000	$6,100,000
Small Wind	$3,100,000	$3,800,000	$4,000,000
Solar Thermal	$4,300,000	$4,300,000	$4,300,000
Total Customer-Sited Tier	$49,100,000	$48,400,000	$48,600,000

Note: Excludes Administration and Evaluation Costs

Customer-Sited Tier Budget to Date and Projected Budget
(Nominal $)

	2006-2009	2010-2015	TOTAL
Solar Photovoltaic	$75,300,000	$144,000,000	$219,300,000
Anaerobic Digesters	$20,110,000	$71,000,000	$91,110,000
Fuel Cells	$5,790,000	$36,600,000	$42,390,000
Small Wind	$2,100,000	$18,500,000	$20,600,000
Solar Thermal	$0	$25,800,000	$25,800,000
Total Customer-Sited Tier	$103,300,000	$295,900,000	$399,200,000

Note: Excludes Administration and Evaluation Costs

Administration & Evaluation Budget to Date

(Nominal $)

	2006	2007	2008	2009
Admin & Eval - Main Tier	$2,125,000	$2,125,000	$2,125,000	$2,125,000
Admin & Eval - Customer-Sited Tier	$1,075,000	$1,075,000	$1,075,000	$1,075,000
NYS Cost Recovery Fee	$1,515,393	$1,515,393	$1,515,393	$1,515,393
Total Budgeted	$4,715,393	$4,715,393	$4,715,393	$4,715,393

	2010	2011	2012	2013
Admin & Eval - Main Tier	$3,200,000	$3,200,000	$3,200,000	$3,200,000
Admin & Eval - Customer-Sited Tier	$0	$0	$0	$0
NYS Cost Recovery Fee	$1,515,393	$1,515,393	$1,515,393	$1,515,393
Total Budgeted	$4,715,393	$4,715,393	$4,715,393	$4,715,393

Total Administration & Evaluation Budget to Date

(Nominal $)

	2006-2009	2010-2013	TOTAL
Admin & Eval - Main Tier	$8,500,000	$12,800,000	$21,300,000
Admin & Eval - Customer-Sited Tier	$4,300,000	$0	$4,300,000
NYS Cost Recovery Fee	$6,061,574	$6,061,574	$12,123,147
Total Budgeted	$18,861,574	$18,861,574	$37,723,147

Proposed Administration & Evaluation Budget
(Nominal $)

	2010	2011	2012	2013
Admin & Eval - Main Tier	$2,125,000	$2,125,000	$2,125,000	$2,125,000
Admin & Eval - Customer-Sited Tier	$2,083,333	$2,104,167	$2,054,167	$2,045,833
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total Budgeted	$5,200,333	$5,221,167	$5,171,167	$5,162,833

	2014	2015	2016	2017
Admin & Eval - Main Tier	$2,125,000	$2,125,000	$1,912,500	$1,700,000
Admin & Eval - Customer-Sited Tier	$2,016,667	$2,025,000	$1,518,750	$1,012,500
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total Budgeted	$5,133,667	$5,142,000	$4,423,250	$3,704,500

	2018	2019	2020	2021
Admin & Eval - Main Tier	$1,487,500	$1,275,000	$1,062,500	$850,000
Admin & Eval - Customer-Sited Tier	$506,250	$0	$0	$0
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total Budgeted	$2,985,750	$2,267,000	$2,054,500	$1,842,000

	2022	2023	2024
Admin & Eval - Main Tier	$637,500	$425,000	$212,500
Admin & Eval - Customer-Sited Tier	$0	$0	$0
NYS Cost Recovery Fee	$992,000	$744,000	$496,000
Total Budgeted	$1,629,500	$1,169,000	$708,500

Administration & Evaluation Budget to Date and Projected Budget
(Nominal $)

	2006-2009	2010-2015	2016-2024
Admin & Eval - Main Tier	$8,500,000	$12,750,000	$9,562,500
Admin & Eval - Customer-Sited Tier	$4,300,000	$12,329,167	$3,037,500
NYS Cost Recovery Fee	$6,061,574	$5,952,000	$8,184,000
Total Budgeted	$18,861,574	$31,031,167	$20,784,000

Projected Total RPS Program Budget through 2024
(Nominal $)

	2006	2007	2008	2009
Current Main Tier	$12,877,600	$13,106,441	$16,455,460	$49,450,643
Future Main Tier	$0	$0	$0	$0
Maintenance Costs	$1,519,080	$1,961,670	$3,912,624	$4,019,808
Customer-Sited Tier	$11,250,000	$11,250,000	$32,900,000	$47,900,000
Admin & Eval**	$3,200,000	$3,200,000	$3,200,000	$3,200,000
NYS Cost Recovery Fee*	$460,820	$511,003	$683,502	$992,000
Total RPS Budget	$29,307,500	$30,029,114	$57,151,586	$105,562,451

	2010	2011	2012	2013
Current Main Tier	$48,131,527	$48,131,527	$47,582,902	$45,163,316
Future Main Tier	$0	$34,978,632	$70,316,818	$115,170,318
Maintenance Costs	$4,019,808	$4,019,808	$4,019,808	$4,019,808
Customer-Sited Tier	$50,000,000	$50,500,000	$49,300,000	$49,100,000
Admin & Eval	$4,208,333	$4,229,167	$4,179,167	$4,170,833
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total RPS Budget	$107,351,668	$142,851,133	$176,390,695	$218,616,275

	2014	2015	2016	2017
Current Main Tier	$45,163,316	$45,163,316	$31,249,932	$31,249,932
Future Main Tier	$154,616,964	$197,333,273	$197,333,273	$197,333,273
Maintenance Costs	$4,019,808	$1,920,000	$0	$0
Customer-Sited Tier	$48,400,000	$48,600,000	$0	$0
Admin & Eval	$4,141,667	$4,150,000	$3,431,250	$2,712,500
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total RPS Budget	$257,333,755	$298,158,589	$233,006,455	$232,287,705

	2018	2019	2020	2021
Current Main Tier	$7,162,486	$0	$0	$0
Future Main Tier	$197,333,273	$197,333,273	$197,333,273	$162,354,641
Maintenance Costs	$0	$0	$0	$0
Customer-Sited Tier	$0	$0	$0	$0
Admin & Eval	$1,993,750	$1,275,000	$1,062,500	$850,000
NYS Cost Recovery Fee	$992,000	$992,000	$992,000	$992,000
Total RPS Budget	$207,481,509	$199,600,273	$199,387,773	$164,196,641

	2022	2023	2024
Current Main Tier	$0	$0	$0
Future Main Tier	$127,016,455	$82,162,955	$42,716,309
Maintenance Costs	$0	$0	$0
Customer-Sited Tier	$0	$0	$0
Admin & Eval	$637,500	$425,000	$212,500
NYS Cost Recovery Fee	$992,000	$744,000	$496,000
Total RPS Budget	$128,645,955	$83,331,955	$43,424,809

*Reduced from prior budget.
**Actual costs expected to be less.

Comparison of Costs, Collections and Cash Flow through 2024
(Nominal $)

	2006	2007	2008	2009
Original Collections	$24,072,909	$43,143,015	$62,136,526	$82,639,913
Costs	$29,307,500	$30,029,114	$57,151,586	$105,562,451
Interest and LC Proceeds	($500,933)	($1,909,312)	($1,603,439)	($898,776)
Difference	($4,733,658)	$15,023,213	$6,588,379	($22,023,762)
Cash Flow	($4,733,658)	$10,289,555	$16,877,933	($5,145,829)
Additional Collections	$0	$0	$0	$0
Difference	($4,733,658)	$15,023,213	$6,588,379	($22,023,762)
Cash Flow	($4,733,658)	$10,289,555	$16,877,933	($5,145,829)
Total Collections	$24,072,909	$43,143,015	$62,136,526	$82,639,913
Increase from Prior Year	$24,072,909	$19,070,106	$18,993,511	$20,503,387

	2010	2011	2012	2013
Original Collections	$100,765,818	$122,617,832	$138,876,295	$167,222,814
Costs	$107,351,668	$142,851,133	$176,390,695	$218,616,275
Difference	($6,585,850)	($20,233,301)	($37,514,400)	($51,393,461)
Cash Flow	($11,731,679)	($31,964,980)	($69,479,380)	($120,872,841)
Additional Collections	$11,731,679	$20,233,301	$37,514,400	$51,393,461
Difference	$5,145,829	($0)	$0	($0)
Cash Flow	($0)	($0)	($0)	($0)
Total Collections	$112,497,497	$142,851,133	$176,390,695	$218,616,275
Increase from Prior Year	$29,857,584	$30,353,636	$33,539,562	$42,225,580

	2014	2015	2016	2017
Original Collections	$0	$0	$0	$0
Costs	$257,333,755	$298,158,589	$233,006,455	$232,287,705
Difference	($257,333,755)	($298,158,589)	($233,006,455)	($232,287,705)
Cash Flow	($378,206,596)	($676,365,185)	($909,371,640)	($1,141,659,346)
Additional Collections	$257,333,755	$298,158,589	$233,006,455	$232,287,705
Difference	$0	($0)	$0	$0
Cash Flow	$0	$0	$0	$0
Total Collections	$257,333,755	$298,158,589	$233,006,455	$232,287,705
Increase from Prior Year	$38,717,480	$40,824,834	($65,152,134)	($718,750)

	2018	2019	2020	2021
Original Collections	$0	$0	$0	$0
Costs	$207,481,509	$199,600,273	$199,387,773	$164,196,641
Difference	($207,481,509)	($199,600,273)	($199,387,773)	($164,196,641)
Cash Flow	($1,349,140,855)	($1,548,741,128)	($1,748,128,901)	($1,912,325,542)
Additional Collections	$207,481,509	$199,600,273	$199,387,773	$164,196,641
Difference	$0	$0	$0	$0
Cash Flow	$0	$0	$0	$0
Total Collections	$207,481,509	$199,600,273	$199,387,773	$164,196,641
Increase from Prior Year	($24,806,196)	($7,881,236)	($212,500)	($35,191,132)

Comparison of Costs, Collections and Cash Flow through 2024
(Continued - Nominal $)

	2022	2023	2024
Original Collections	$0	$0	$0
Costs	$128,645,955	$83,331,955	$43,424,809
Difference	($128,645,955)	($83,331,955)	($43,424,809)
Cash Flow	($2,040,971,497)	($2,124,303,452)	($2,167,728,262)
Additional Collections	$128,645,955	$83,331,955	$43,424,809
Difference	$0	$0	$0
Cash Flow	$0	$0	$0
Total Collections	$128,645,955	$83,331,955	$43,424,809
Increase from Prior Year	($35,550,687)	($45,313,999)	($39,907,146)

Projected Schedule of RPS Collections from Delivery Utility Customers through 2024
(Nominal $)

	2006	2007	2008	2009
Central Hudson	$1,196,509	$2,161,842	$3,130,122	$4,200,634
Con Edison	$10,181,631	$18,310,499	$26,411,100	$35,271,313
NYSEG	$3,041,702	$5,422,156	$7,774,090	$10,263,723
Niagara Mohawk	$7,086,698	$12,633,111	$18,158,625	$23,998,862
O&R	$945,446	$1,693,188	$2,432,021	$3,234,890
RG&E	$1,620,922	$2,922,221	$4,230,568	$5,670,491
Total Collections	$24,072,909	$43,143,015	$62,136,526	$82,639,913

	2010	2011	2012	2013
Central Hudson	$5,751,946	$7,347,212	$9,125,586	$11,390,497
Con Edison	$48,096,497	$61,201,245	$75,707,990	$94,198,833
NYSEG	$13,878,050	$17,506,790	$21,532,258	$26,493,220
Niagara Mohawk	$32,613,935	$41,322,453	$50,892,004	$62,735,018
O&R	$4,394,018	$5,568,240	$6,860,265	$8,504,101
RG&E	$7,763,050	$9,905,192	$12,272,591	$15,294,606
Total Collections	$112,497,497	$142,851,133	$176,390,695	$218,616,275

	2014	2015	2016	2017
Central Hudson	$13,407,782	$15,534,866	$12,140,264	$12,102,815
Con Edison	$110,881,678	$128,472,554	$100,399,369	$100,089,670
NYSEG	$31,185,235	$36,132,631	$28,237,108	$28,150,005
Niagara Mohawk	$73,845,544	$85,560,805	$66,864,483	$66,658,228
O&R	$10,010,198	$11,598,270	$9,063,874	$9,035,915
RG&E	$18,003,319	$20,859,464	$16,301,357	$16,251,073
Total Collections	$257,333,755	$298,158,589	$233,006,455	$232,287,705

	2018	2019	2020	2021
Central Hudson	$10,810,345	$10,399,712	$10,388,640	$8,555,087
Con Edison	$89,401,011	$86,005,092	$85,913,528	$70,750,140
NYSEG	$25,143,843	$24,188,748	$24,162,996	$19,898,325
Niagara Mohawk	$59,539,740	$57,278,109	$57,217,129	$47,118,538
O&R	$8,070,962	$7,764,384	$7,756,118	$6,387,195
RG&E	$14,515,607	$13,964,228	$13,949,362	$11,487,356
Total Collections	$207,481,509	$199,600,273	$199,387,773	$164,196,641

	2022	2023	2024
Central Hudson	$6,702,801	$4,341,819	$2,262,550
Con Edison	$55,431,824	$35,906,627	$18,711,170
NYSEG	$15,590,082	$10,098,662	$5,262,477
Niagara Mohawk	$36,916,768	$23,913,278	$12,461,360
O&R	$5,004,285	$3,241,585	$1,689,211
RG&E	$9,000,196	$5,829,984	$3,038,042
Total Collections	$128,645,955	$83,331,955	$43,424,809

Summary of MWh Results
(MWhs)

	15x15 load	Baseline	EO 111	Grn Mktg	GAP	TOTAL
2003	158,013,000	31,210,710	0	1,580,130	14,613,060	47,403,900
2004	160,211,000	31,468,717	0	1,602,110	14,992,473	48,063,300
2005	167,208,000	31,486,189	251,065	1,672,080	16,753,066	50,162,400
2006	162,237,000	31,503,661	282,812	1,622,370	15,262,258	48,671,100
2007	162,433,219	31,509,370	314,579	1,624,332	15,281,685	48,729,966
2008	163,552,495	31,515,079	346,366	1,635,525	15,568,779	49,065,749
2009	162,041,065	31,520,788	378,174	1,620,411	15,092,948	48,612,320
2010	160,192,211	31,526,497	410,002	1,601,922	14,519,243	48,057,663
2011	159,167,794	31,532,206	391,857	1,591,678	14,234,598	47,750,338
2012	157,553,065	31,537,915	373,712	1,575,531	13,778,762	47,265,920
2013	156,016,509	31,543,624	355,568	1,560,165	13,345,596	46,804,953
2014	154,177,290	31,543,624	337,424	1,541,773	12,830,366	46,253,187
2015	152,351,948	31,543,624	319,280	1,523,519	12,319,161	45,705,584

	LIPA Share of GAP	RPS Share of GAP	Current RPS Main Tier	Current RPS CST	Proposed RPS New CST	Needed RPS New MT in 2015	New Smoothed Main Tier Targets	Total Main Tier	Total CST	Total RPS
2003										
2004										
2005										
2006			582,082					582,082		582,082
2007	2,298,789	12,982,896	582,812					582,812		582,812
2008	2,354,211	13,214,568	822,819					822,819		822,819
2009	2,287,566	12,805,381	2,947,044	108,296				2,947,044	108,296	3,055,340
2010	2,215,600	12,303,643	2,878,340	108,296	69,069			2,878,340	177,365	3,055,705
2011	2,172,287	12,062,311	2,878,340	108,296	143,491		1,437,061	4,315,401	251,787	4,567,188
2012	2,120,176	11,658,586	2,849,840	108,296	215,720		2,874,123	5,723,963	324,016	6,047,979
2013	2,057,073	11,288,524	2,686,793	108,296	282,635		4,311,184	6,997,977	390,931	7,388,908
2014	1,989,898	10,840,468	2,686,793	108,296	349,794		5,748,246	8,435,039	458,090	8,893,129
2015	1,921,307	10,397,854	2,686,793	108,296	417,458	7,185,307	7,185,307	9,872,100	525,754	10,397,854