STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

NEW YORK RENEWABLE PORTFOLIO STANDARD COST STUDY REPORT II

VOLUME B

PREPARED BY:

NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE
NEW YORK STATE ENERGY RESEARCH & DEVELOPMENT AUTHORITY
SUSTAINABLE ENERGY ADVANTAGE, LLC
LA CAPRA ASSOCIATES

CASE 03-E-0188 MARCH 9, 2004

Prepared By:

New York State Department of Public Service
3 Empire State Plaza
Albany, N.Y. 12223
(518) 474-7080
www.dps.state.ny.us

New York State Energy Research & Development Authority
17 Columbia Circle
Albany, NY 12203-6399
(518) 862-1090
www.nyserda.org

Sustainable Energy Advantage, LLC
4 Lodge Lane
Natick, MA 01760
(508) 653-6737
www.seadvantage.com

La Capra Associates
20 Winthrop Square
Boston, MA 02110
(617) 367-6500
www.lacapra.com

Table of Contents

VOLUME B

I. INTRODUCTION 1

II. OVERVIEW 2

III. PRIME CASE SENSITIVITIES 3

- III-A NO IMPORTS SENSITIVITY 3
- III-B NO DELIVERY REQUIREMENT SENSITIVITY 4
- III-C NO PRODUCTION TAX CREDIT SENSITIVITY 5
- III-D WASTE-TO-ENERGY SENSITIVITY 6
- III-E DEMAND SIDE MANAGEMENT SENSITIVITY 9
- III-F NO LOAD GROWTH SENSITIVITY 12
- III-G 0% SBC-LIKE TIER SENSITIVITY 13
- III-H 2% SBC-LIKE TIER SENSITIVITY 16
- III-I 5% SBC-LIKE TIER SENSITIVITY 17
- III-J 10% SBC-LIKE TIER SENSITIVITY 18
- III-K ALTERNATIVE COMPLIANCE MECHANISM SENSITIVITY 19

IV. ALTERNATIVE CASE SCENARIOS 21

- IV-A MULTIPLE INTERVENORS RAMP SCENARIO 21
- IV-B CENTRAL HUDSON RAMP SCENARIO 22
- IV-C RETEC RAMP SCENARIO 23
- IV-D JOINT UTILITIES SCENARIO 24
- IV-E JOINT UTILITIES 2ND CASE SCENARIO 25

V. TABULATION OF RESULTS 26

- V-A QUANTITIES OF RENEWABLES DEVELOPED 26
- V-B COST COMPARISON 31
- V-C AIR EMISSIONS COMPARISON 32
- V-D ENERGY SECURITY COMPARISON 33

List of Tables

Table 3B-1	*Net Impact of Eliminating the Delivery Requirement – Year 2013*	4
Table 3D-1	*Estimated WTE Cost Premium – NYC & Lower Hudson Valley*	7
Table 3D-2	*Comparison of Waste-to-Energy and Other Cost Premiums*	7
Table 3E-1	*Costs and Energy Savings from Selected New York Energy $mart DSM Programs*	10
Table 3E-2	*Comparison of Cost Premiums Necessary to Obtain Various Resources*	11
Table 3F-1	*Comparison of Prime Case and No Growth Case*	12
Table 3G-1	*Comparison of Customer-Sited Resources and Other Cost Premiums*	14
Table 3G-2	*Cost Impact of Eliminating the SBC-Like Tier*	15
Table 3H-1	*Nominal Cost of the SBC-Like Tier @ 2%*	16
Table 3H-2	*Cost Impact of Increasing the SBC-Like Tier from 1% to 2%*	16
Table 3I-1	*Nominal Cost of the SBC-Like Tier @ 5%*	17
Table 3I-2	*Cost Impact of Increasing the SBC-Like Tier from 1% to 5%*	17
Table 3J-1	*Nominal Cost of the SBC-Like Tier @ 10%*	18
Table 3J-2	*Cost Impact of Increasing the SBC-Like Tier from 1% to 10%*	18
Table 3K-1	*Calculation of Year 2009 Alternative Compliance Mechanism Cost Cap*	19
Table 3K-2	*Calculation of Year 2009 Alternative Compliance Mechanism Cost Differences*	20
Table 3K-3	*Calculation of Year 2013 Alternative Compliance Mechanism Cost Cap*	20
Table 3K-4	*Calculation of Year 2013 Alternative Compliance Mechanism Cost Differences*	20
Table 4A-1	*Comparison of Prime Case and MI Ramp*	21
Table 4B-1	*Comparison of Prime Case and Central Hudson Ramp*	22
Table 4C-1	*Comparison of Prime Case and RETEC Ramp*	23
Table 5A-1	*Quantity of Renewable Resources Reached Through 2013*	27
Table 5B-1	*Comparison of Year 2003 Present Value of 2006-2013 Bill Impacts*	31
Table 5C-1	*Comparison of Air Emissions Reductions*	32
Table 5D-1	*Displacement of Generation Resources and Reduction in Fuel Price & Supply Risk*	33

NY RPS COST STUDY REPORT II

VOLUME B

I. INTRODUCTION

In meeting the needs of retail electric customers, New York State supports the commercialization and development of significant new renewable energy supplies to increase energy resource diversity and to reduce air emissions. To realize these objectives, State policies should be based on long-term, incremental strategies designed with an understanding of relevant economic, environmental, service reliability and equity considerations. To that end, the New York Public Service Commission (Commission) instituted a proceeding, Case 03-E-0188, to develop and implement a renewable portfolio standard (RPS) for electric energy retailed in New York State to increase the renewable energy share of New York's electric supply from the current level (current projected year 2005 level is approximately 20%) to 25%. The Commission also directed the parties to examine appropriate methodologies for assessing benefits and costs of the RPS and how to balance that analysis with other factors.

Staff of the Department of Public Service (Staff) has prepared this report as a collaborative effort, with significant input from Sustainable Energy Advantage, LLC (including its subcontractor, La Capra Associates) and assistance from the New York State Energy Research and Development Authority (NYSERDA). The purpose of this report is to provide an estimate of the potential direct ratepayer costs to New York's retail electric customers of the implementation of an RPS to increase the renewable energy share of New York's electric supply from the current level to 25% by the year 2013. A secondary purpose of the report is to provide estimates of (a) the contribution of different resource types to meeting the RPS and (b) the displacement of existing generation sources and their air emissions. The report does not attempt to fully quantify the indirect fuel diversity/energy security, public health, or economic development benefits of the implementation of the RPS.

This Cost Study Report II is a revised and more comprehensive study undertaken at the request of Administrative Law Judge Eleanor Stein. Volume A reported the study of the Prime Case proposed by Staff. This Volume B reports the study of numerous sensitivities to the Prime Case as well as numerous alternatives to the Prime Case proposed by parties to Case 03-E-0188.

II. OVERVIEW

Section III sets forth the key assumptions made in conducting the various sensitivities to the Prime Case reported, and for the minor sensitivities describes in detail each component analysis, including impacts. Section IV sets forth the key assumptions made in conducting the various alternative case scenarios reported, and for the minor alternative case scenarios describes in detail each component analysis, including impacts. Section V provides a tabulation of the key results for each major sensitivity and major alternative case scenario reported.

III. PRIME CASE SENSITIVITIES

III-A NO IMPORTS SENSITIVITY

The Prime Case assumes that imported resources are eligible for RPS compliance. For this scenario, we have made all the same assumptions we made for the Prime Case except that we have eliminated all imports. The result is higher premium costs for the RPS program due to the replacement of imported resources with higher-priced domestic resources.

III-B NO DELIVERY REQUIREMENT SENSITIVITY

Several parties have advocated that the Commission forego any requirement that energy from renewable resources actually be delivered into the New York electric grid and sold to retail customers in New York State for it to be eligible towards any required target, so long as eligibility is limited to neighboring markets. Generally, they advocate that the purchase of renewable energy "credits" from such regional but out-of-grid resources would be sufficient to achieve the RPS goals, potentially at a lower cost. Other parties have taken an opposite view because of concerns about a lack of environmental and energy security benefits from resources that do not alter the dispatch of power plants in New York, the potential for renewable energy credit trades that would maintain or increase air emissions in upwind areas to the detriment of New York, potential interstate commerce and U.S. treaty complications, and potential adverse impacts on the functionality and credibility of the New York environmental disclosure program. This sensitivity is not intended to address the non-cost related impacts of the delivery issue or the validity of the concerns described above. The purpose of this sensitivity is to provide an estimate of the direct cost effects to New York State ratepayers of foregoing a delivery requirement in New York.

For the purposes of this sensitivity, we assume the delivery requirement will only affect the amount of imports reached on the supply curve in each year studied. However, because lower-cost imports would likely result in re-ordering the supply curve, a larger volume of non-New York generation would be expected to be used for compliance, increasing the direct savings (and decreasing the market price suppression) accordingly. We have considered the effect of pricing all year 2013 New York RPS imports (i.e., the 4,333,260 MWh's that we assumed would flow into New York under the RPS program with a delivery requirement) as if they required no delivery costs, along with the effect of removing those imports from the New York Control Area. If there was no delivery requirement, the impact of this sensitivity would be to reduce the premium costs in year 2013 by approximately $21.1 million.[1] But since the energy would not be displacing resources in the New York Control Area, wholesale energy costs in New York would be approximately $29.7 million to $44.2 million higher than they would be with the delivery of the energy. The net impact of this sensitivity would be to increase the year 2013 costs to achieve the RPS by approximately $8.6 million to $23.1 million. See Table 3B-1 below:

Table 3B-1

Net Impact of Eliminating the Delivery Requirement - Year 2013 (2003$)

	PRIME CASE COST BASED	PRIME CASE MARKET CLEARING APPROACH	PRIME CASE COST BASED NEW FUEL	PRIME CASE NEW FUEL MARKET CLEARING APPROACH
Premium Cost (Transmission)	($35,684,786)	($35,684,786)	($35,684,786)	($35,684,786)
Premium Cost (UCAP Revenues)	$14,556,925	$14,556,925	$14,556,925	$14,556,925
Wholesale Price Cost	$29,735,715	$29,735,715	$44,184,707	$44,184,707
TOTAL IMPACT	**$8,607,854**	**$8,607,854**	**$23,056,846**	**$23,056,846**

[1] As described above, this amount is understated due to (a) ignoring losses, and (b) shift in order of supply curve that may result in increase in non-NY generation.

III-C NO PRODUCTION TAX CREDIT SENSITIVITY

The Prime Case assumes renewal of the Federal production tax credit for certain renewable resources. For this sensitivity, we have made all the same assumptions we made for the Prime Case except that we have increased the level of premiums needed by affected generators to offset an increase in their tax payments that will be necessary if the production tax credit is not renewed. The result is higher costs for the RPS program due to higher premium costs for affected resources and a reordering of resources on the supply curve.

III-D WASTE-TO-ENERGY SENSITIVITY

New York currently has ten operating waste-to-energy electric generation facilities. The fuel or "feedstock" for these facilities is generally municipal solid waste. Several parties have suggested that the Commission qualify that type of waste-to-energy facility as a directly eligible "renewable" resource technology – renewable in the sense that new municipal solid waste is created and collected on a daily basis. Other parties have opposed the eligibility of such waste-to-energy plants because of concerns about air emissions, potential adverse impacts on recycling programs and on New York State's solid waste policy that promotes the reduction, re-use and recycling of solid waste over disposal or combustion options, and potential public acceptance/credibility issues. This sensitivity is not intended to address the eligibility issue or the validity of the concerns described above. The purpose of this sensitivity is to provide an estimate of the cost and availability of waste-to-energy in relation to other technologies. In that regard, the cost and potential availability of new waste-to-energy facilities has been estimated and compared to other resources in the supply curve.

Experience shows that the siting of waste-to-energy facilities is difficult and controversial.[2] Generally, such facilities are only successfully sited when the municipality that is charged with the responsibility for solid waste collection and disposal puts its governmental powers behind the effort to site the facility. No new waste-to-energy facility has been sited in New York State since the Onondaga County Resource Recovery Facility was built in Jamesville in 1994. The ten existing facilities range in size from 2 MWs to 78 MWs and generated approximately 1,842,000 MWh's of electricity in 2002. Given this background, for the purposes of this sensitivity we estimate that perhaps two additional 50 MW waste-to-energy facilities could be sited in New York in the 2006 through 2013 timeframe. We assumed a capacity factor of 85% yielding annual generation of 744,600 MWh's. We have assumed that one would be located in New York City and the other in the lower Hudson Valley based on the availability of a significant volume of solid waste in that region of the State.

Given the lack of recent waste-to-energy projects, it is difficult to estimate the cost premium that would be necessary to support such facilities. An additional complicating factor is that "tipping fees" - the fees charged to dispose of solid waste at such a waste-to-energy facility - provide an important revenue stream that provides economic support for such facilities such that it is unclear how to estimate the need for a cost premium since those fees are set at the discretion of the operator.[3] For the purposes of this sensitivity, we estimate that a total cost of six cents per kWh less the market value of the energy would provide a sufficient cost premium to attract the interest of waste-to-energy developers. We note that the six-cent level of above-market price support was sufficient in the past to attract developers of many diverse electric generation projects including the waste-to-energy projects.

---

[2] Waste-to-energy facilities are subject to environmental review under SEQRA and have been exempt from the power-plant siting laws (Article X of the Public Service Law, which expired in January 2002). The exemption was based on recognition that Article X was not an appropriate process for a facility whose primary purpose is processing municipal solid waste and generates electricity as a secondary output. SEQRA was a more appropriate process to address the major issues associated with WTE facilities.

[3] An additional revenue source in some municipalities is provided through special real property benefit assessments.

Using study-year 2013 MAPS data electric energy price outputs, waste-to-energy cost premiums can be calculated. See Table 3D-1 below:

Table 3D-1
Estimated WTE Cost Premium – NYC & Lower Hudson Valley

(2003$)	$/MWh	$/kWh
WTE Total Cost Assumption		0.0600
Con Edison Electric Energy Price	$29.77	
O&R Electric Energy Price	$29.94	
CHGE Electric Energy Price	$29.31	
Average Electric Energy Price	29.67	0.0297
WTE Price Premium		**0.0303**

Based on the estimated unit cost, waste-to-energy generation would only displace the higher-priced renewable technologies on the supply curve. If waste-to-energy facilities were deemed to qualify as an eligible RPS resource technology, they would increase the supply of potential resources available to meet the RPS requirement. Based on the assumptions stated above, however, this sensitivity would not change the resources chosen or the direct costs to achieve the 25% standard because the estimated waste-to-energy cost premium exceeds that of all other chosen resources through year 2013 (except those in the SBC-Like Tier). See Table 3D-2 below:

Table 3D-2
Comparison of Waste-to-Energy and Other Cost Premiums (2003$/kWh)

UNICODE	RESOURCE	COST PREMIUM
	Waste-to-Energy	**$0.0303**
67	Eligible Hydro Maintenance NY z1	$0.0229
30	Biomass Co-firing w/Coal NY-z1 b3	$0.0229
57	Hydro Upgrades Ontario	$0.0221
56	Hydro Upgrades Quebec	$0.0208
11	Wind Clusters NY-z1b2	$0.0208
23	Wind Farms PJM b1	$0.0203
29	Biomass Co-firing w/Coal NY-z1 b2	$0.0203
17	Wind Clusters NY-z3b2	$0.0164
3	Wind Farms NY-z1b3	$0.0164
63	Landfill Gas IC Engines NY z3	$0.0158
10	Wind Clusters NY-z1b1	$0.0147
6	Wind Farms NY-z2b3	$0.0142
2	Wind Farms NY-z1b2	$0.0104
31	Biomass Co-firing w/Coal NY-z2	$0.0091
5	Wind Farms NY-z2b2	$0.0082
1	Wind Farms NY-z1b1	$0.0055
28	Biomass Co-firing w/Coal NY-z1 b1	$0.0040
61	Landfill Gas IC Engines NY z1	$0.0030
62	Landfill Gas IC Engines NY z2	$0.0024

Note: There are additional resources on the supply curve that have lower costs than waste-to-energy that also were not reached during the study period of 2006 through 2013.

With respect to statewide air emission changes, the substitution of 100 MW's of waste-to-energy facilities, if it were reached on the supply curve, might result in a difference in emissions reductions from conventional fossil-fueled facilities depending on what renewable resource is displaced by the waste-to-energy resource. Emission and impact differences, though difficult to quantify, are also possible in the area of non-criteria pollutants (e.g., mercury, dioxins, and furan emissions). Any new generator would have to meet current permitting requirements which, depending on size, could include new source review, and meet Maximum Achievable Control Technology.

III-E DEMAND SIDE MANAGEMENT SENSITIVITY

Demand Side Management (DSM) is the act of implementing programs that improve efficiency and cost-effectiveness of energy usage at the customer level. Accordingly, DSM program activities typically occur on the customer or "demand" side of the meter rather than on the utility or "supply" side of the meter. DSM programs directed primarily at reducing energy usage can be generally described as efficiency or "energy management" programs. Energy management programs generally reduce total energy usage, usually by lowering energy usage in every hour. DSM programs directed primarily at reducing the cost or cost-effectiveness of energy usage can be generally described as peak-load or "peak management" programs. Peak management programs typically seek to shave energy usage during peak periods when the price of supplying energy is at its highest and shift such usage to off-peak, lower priced periods. Peak management programs do not necessarily result in a reduction in total energy usage and although valuable for other purposes, would do little to reduce the amount of electric energy usage used as the base upon which the 25% RPS standard is applied. The remainder of this DSM sensitivity analysis will be directed solely towards "energy management" type DSM programs.

Supply-side electric energy derived from renewable resources is typically purchased from commercial generators. DSM participation resulting in reductions in electric energy usage can also be purchased, but unlike supply-side resources, the purchase can be made only from customers that are willing to participate in an identified program. Customer participation depends on many factors including, among others, customer savings in energy cost, economic incentives, up-front costs, pay-back period, and customer tolerance of impacts on lifestyle and commercial processes.

The incremental amount of renewable resources needed to reach the 25% standard is determined by the amount of electric energy that will be consumed by retail customers in New York State in 2013, the target year. Several parties have suggested that the Commission consider whether the purchase of energy usage reductions would be a cost-effective component of an RPS policy either (a) as a reduction in the amount of electric energy that will be retailed in New York State (thereby reducing the increment of new renewable resources that must be purchased), or (b) as a directly eligible resource technology – a kind of *de-facto* renewable resource sharing many of the emissions reduction, wholesale energy price reduction and energy security benefits of the other eligible resources.

The purpose of this sensitivity is to provide an estimate of the cost of a DSM alternative that would either reduce the base amount of electric energy that will be retailed in New York State or qualify DSM programs as an eligible RPS resource technology. In that regard, the cost of existing "energy management" type DSM programs has been examined and an estimate of DSM costs has been prepared.

Table 3E-1
Costs and Energy Savings from Selected New York Energy $mart DSM Programs

Program	Energy $mart Cost	Total Cost	Lifetime Savings (MWhs)	Total Cost $$$/kWh	Energy $mart Cost $$$/kWh
Business Institutional Programs					
C/I Performance	$84,200,000	$325,100,000	7,800,000	$0.042	$0.011
New Construction	$67,300,000	$123,400,000	4,409,000	$0.028	$0.015
Smart Equipment Choices	$4,400,000	$8,800,000	210,000	$0.042	$0.021
Technical Assistance	$24,700,000	$421,200,000	8,400,000	$0.050	$0.003
Premium-Efficiency Motors	$1,500,000	$2,000,000	70,000	$0.029	$0.021
Residential Programs					
Energy Star Products	$43,300,000	$71,800,000	1,333,000	$0.054	$0.032
Keep Cool	$31,700,000	$37,500,000	222,000	$0.169	$0.143
TOTAL	$257,100,000	$989,800,000	22,444,000	$0.044	$0.011

Source: Table 4-13, NYSERDA, New York Energy $mart Program Evaluation and Status Report, May 2003. As noted therein, the programs were selected based on program maturity. Newer programs or programs with an overriding emphasis on infrastructure development were not included.

The Energy $mart cost /kWh of $0.011 represents the average unit-cost economic incentive provided by NYSERDA to obtain the stated energy usage reductions. The remainder of the total cost of the Energy $mart DSM programs is co-funded, typically by the customer that will benefit from the energy reductions. To be conservative, for the purposes of this sensitivity, we have grossed-up by 25% the actual DSM economic incentive on the assumption that NYSERDA has been efficient in the procurement of the Energy $mart DSM programs and it would likely be more expensive to obtain a higher increment of energy usage reductions and to account for inflation. Therefore, a DSM program cost/kWh of $0.0138 in (2003$) is assumed.

DSM programs appear to be less expensive than most renewable resources. If energy usage reductions were deemed to qualify as an eligible RPS resource technology, the impact of this sensitivity would be to reduce the direct costs to achieve the 25% standard. Because of their substantially lower unit cost, acquired energy usage reductions would displace a majority of the renewable technologies. The reduction in premium costs differs depending on the technology that is displaced.[4] See Table 3E-2 below:

[4] It was beyond the scope of this analysis to estimate the availability of DSM programs or to create a DSM supply curve related to specific types of programs.

Table 3E-2
Comparison of Cost Premiums Necessary to Obtain Various Resources (2003$/kWh)

UNICODE	RESOURCE	YEAR 2013 COST PREMIUM
67	Eligible Hydro Maintenance NY z1	$0.0229
30	Biomass Co-firing w/Coal NY -z1 b3	$0.0229
57	Hydro Upgrades Ontario	$0.0221
56	Hydro Upgrades Quebec	$0.0208
11	Wind Clusters NY -z1b2	$0.0208
23	Wind Farms PJM b1	$0.0203
29	Biomass Co-firing w/Coal NY -z1 b2	$0.0203
17	Wind Clusters NY -z3b2	$0.0164
3	Wind Farms NY -z1b3	$0.0164
63	Landfill Gas IC Engines NY z3	$0.0158
10	Wind Clusters NY -z1b1	$0.0147
6	Wind Farms NY -z2b3	$0.0142
	DSM Energy Usage Reduction Programs	**$0.0138**
2	Wind Farms NY -z1b2	$0.0104
31	Biomass Co-firing w/Coal NY -z2	$0.0091
5	Wind Farms NY -z2b2	$0.0082
1	Wind Farms NY -z1b1	$0.0055
28	Biomass Co-firing w/Coal NY -z1 b1	$0.0040
61	Landfill Gas IC Engines NY z1	$0.0030
62	Landfill Gas IC Engines NY z2	$0.0024

If DSM reductions were not deemed to qualify as an eligible RPS resource technology, but new energy usage reduction programs were undertaken explicitly as a means to reduce the amount of electric energy that will be retailed in New York State, thereby reducing the increment of new renewable resources that must be purchased to achieve the RPS targets, the impact of this sensitivity on the RPS program would likely be to increase the direct costs to achieve the 25% standard. Since the RPS goal is set at 25% of sales, to eliminate the need to acquire one unit of eligible resources you must eliminate four units of sales. In other words, for every four MWh reduction in sales there is a one MWh reduction in the number of eligible resources that must be acquired. Due to this four-to-one relationship, the cost premium for energy usage reductions must be multiplied by four to put it on a comparable basis. Therefore, a DSM program cost/kWh of $0.0552 is assumed for the direct cost. However, it should be noted that the benefits (emissions reduction, wholesale energy price reduction and energy security benefits) would also be four times greater than for other resources. The unit cost of this approach exceeds that of all but the higher-priced tier of resources (Solar PV, Fuel Cells & Small Wind).

If energy usage reductions are undertaken for purposes other than RPS compliance, they will reduce the amount of energy retailed in New York and therefore the amount of new renewable generation required. Such reductions (which would reduce RPS volume requirements on a 25 percent basis) would reduce the estimated RPS compliance costs in absolute dollars, and would modestly reduce the average cost of new renewable supplies needed to meet the RPS targets.

III-F NO LOAD GROWTH SENSITIVITY

The purpose of this sensitivity is to provide a lowest-bound estimate of the amount of additional renewable resources that would be needed to reach the level of 25% total renewable resources by year 2013. For this scenario, we have made all the same assumptions we made for the Prime Case except that we have held the level of retail energy sales constant at the year 2003 rate through year 2013. While we have provided cost estimates for this sensitivity (see Table 5B-1), the estimates of capacity costs and wholesale price effects for this sensitivity should be considered rough as the dramatic change in retail electric sales from the other cases studied likely warrant additional changes to the values used in the models. Table 3F-1 below demonstrates the minimum amount of incremental renewable resources that would be needed by 2013 even if retail energy sales were not to grow:

Table 3F-1
Comparison of Prime Case and No Growth Case

	PRIME CASE			NO GROWTH CASE		
Year	Increment Target	Total Renewables	Renewables Percentage	Increment Target	Total Renewables	Renewables Percentage
2003	0	32,648,035	20.34%	0	32,648,035	20.34%
2004	0	32,834,662	20.16%	0	32,834,662	20.46%
2005	0	33,620,339	20.34%	0	33,620,339	20.95%
2006	1,202,925	35,045,212	20.92%	588,602	34,432,797	21.46%
2007	2,680,178	36,555,395	21.51%	1,366,222	35,245,255	21.96%
2008	4,173,125	38,081,290	22.09%	2,143,829	36,057,712	22.47%
2009	5,655,102	39,596,230	22.67%	2,921,421	36,870,170	22.97%
2010	7,162,848	41,136,956	23.25%	3,698,999	37,682,627	23.48%
2011	8,715,562	42,672,685	23.84%	4,526,537	38,495,085	23.99%
2012	10,233,155	44,173,293	24.42%	5,354,075	39,307,542	24.49%
2013	11,793,596	45,716,750	25.00%	6,181,614	40,120,000	25.00%

III-G 0% SBC-LIKE TIER SENSITIVITY

Certain resources including solar (photovoltaics), very small wind turbines (up to 300 kW, but generally 10 kW in size), and fuel cells are "customer-sited" in that they are generally installed on the customer side of the meter and are generally sized in relation to the customer's electric usage. They may, or may not, be part of a net-metering regime in which excess energy produced acts as a credit against energy purchased. The SBC-Like Tier assumes a set-aside of a stream of funding to ensure that the commercialization of these resources is advanced as a component of the RPS. The tier is "SBC-Like" in the sense that we envision that the funds to support this tier would be charged to customers on a volumetric basis similar to the System Benefits Charge (SBC) currently in effect. The purpose of this sensitivity is to provide an estimate of the cost and resource impact of eliminating the SBC-Like set-aside for customer-sited resources. In that regard, the cost and potential availability of new customer-sited resources has been estimated and compared to other resources in the supply curve.

Table 3G-1, below, compares the per kWh cost premium of customer-sited resources and other resources if they had to compete against each other on a per-kWh basis in year 2013. In other words, if there is no set-aside of money to be paid out in lump-sum incentive payments to customer-sited resources as was provided for in the SBC-Like Tier. The comparison demonstrates that the customer-sited resources are significantly more expensive than the other resources.[5] Except for small quantities of two fuel cell technologies, the customer-sited resources would never be reached in the supply curve in year 2013 because of their higher cost premium. Therefore, solar, very small wind turbine and one-half of the fuel cell resources would not participate as a component of the RPS.

[5] The premiums for main tier resources are measured against wholesale prices, while the premiums for customer-sited resources are measured against retail rates.

Table 3G-1

Comparison of Customer-Sited Resources and Other Cost Premiums (2003$/kWh)

UNICODE	RESOURCE	YEAR 2013 COST PREMIUM
	BIPV NY z1b1	**$0.2402**
	BIPV NY z2b1	**$0.2368**
	BIPV NY z3b1	**$0.2347**
	C/I Solar PV NY z1b1	**$0.2158**
	C/I Solar PV NY z2b1	**$0.2118**
	C/I Solar PV NY z3b1	**$0.2096**
	Residential Solar PV NY z1b1	**$0.1644**
	Residential Solar PV NY z2b1	**$0.1605**
	Residential Solar PV NY z3b1	**$0.1583**
	Small Wind NY-z1	**$0.1417**
	Small Wind NY-z2	**$0.1396**
	Small Wind NY-z3	**$0.1374**
	Fuel Cell PEM NY z1b1	**$0.0908**
	Fuel Cell PEM NY z2b1	**$0.0878**
	Fuel Cell PEM NY z3b1	**$0.0858**
	Fuel Cell PAFC NY z1b1	**$0.0435**
	Fuel Cell PAFC NY z2b1	**$0.0408**
	Fuel Cell PAFC NY z3b1	**$0.0387**
	Fuel Cell SOFC NY z1b1	**$0.0272**
	Fuel Cell SOFC NY z2b1	**$0.0245**
67	Eligible Hydro Maintenance NY z1	$0.0229
30	Biomass Co-firing w/Coal NY-z1 b3	$0.0229
	Fuel Cell SOFC NY z3b1	**$0.0225**
57	Hydro Upgrades Ontario	$0.0221
56	Hydro Upgrades Quebec	$0.0208
11	Wind Clusters NY-z1b2	$0.0208
23	Wind Farms PJM b1	$0.0203
29	Biomass Co-firing w/Coal NY-z1 b2	$0.0203
17	Wind Clusters NY-z3b2	$0.0164
3	Wind Farms NY-z1b3	$0.0164
63	Landfill Gas IC Engines NY z3	$0.0158
	Fuel Cell MCFC NY z1b1	**$0.0152**
10	Wind Clusters NY-z1b1	$0.0147
6	Wind Farms NY-z2b3	$0.0142
	Fuel Cell MCFC NY z2b1	**$0.0122**
2	Wind Farms NY-z1b2	$0.0104
	Fuel Cell MCFC NY z3b1	**$0.0102**
31	Biomass Co-firing w/Coal NY-z2	$0.0091
5	Wind Farms NY-z2b2	$0.0082
1	Wind Farms NY-z1b1	$0.0055
28	Biomass Co-firing w/Coal NY-z1 b1	$0.0040
61	Landfill Gas IC Engines NY z1	$0.0030
62	Landfill Gas IC Engines NY z2	$0.0024

If one looks only at the 2006 through 2013 time period, elimination of the SBC-Like Tier (including elimination of even the small amount of fuel cells) would reduce the cost of the RPS by approximately $53 million during that time period. However, if one considers the life-cycle of the photovoltaic, very small wind and fuel cell resources that would be installed as the result of SBC-Like Tier incentive payments, elimination of the SBC-Like Tier would decrease the cost of the RPS by only approximately $24.4 million during the life-cycle of the installed facilities. In other words, the cost of $64,800,238 to obtain the benefits of adding photovoltaic, very small wind and fuel cell resources to the RPS, when you consider the life-cycle of the resources obtained, really only costs about $24.4 million more than if you purchased the same amount of Main Tier renewable resources over the life-cycle of the installed facilities. The two contributing factors to this outcome are the up-front nature of the SBC-Like Tier incentive payments (i.e., resources are procured through lump-sum incentives, and are compared against resources whose costs are financed to spread them over time), and the more cost-efficient nature of the incentive approach (similar to the financial benefit to a generator from reducing risk through long-term contracts vs. reliance on a spot market) that results in a lower unit cost premium over the life-cycle of the installed facilities than can be obtained making payments on a per kWh basis. It should be noted that the results reported in this sensitivity are limited to the cost-based approach. Under the market clearing approach, the replacement costs given below would be higher, making the cost impact of eliminating the SBC-Like Tier somewhat lower. See Table 3G-2, below:

Table 3G-2
Cost Impact of Eliminating the SBC-Like Tier (2003$)

	2006-2013	Life-Cycle
Cost	$64,800,238	$64,800,238
MWhs	689,857	2,351,915
Cost/MWh	$94	$28
Cost/kWh	$0.0939	$0.0276
Replacement Cost/kWh	$0.0172	$0.0172
Replacement Cost	$11,844,503	$40,381,245
Difference	**$52,955,735**	**$24,418,993**

III-H 2% SBC-LIKE TIER SENSITIVITY

The purpose of this sensitivity is to provide an estimate of the cost impact of increasing the SBC-Like set-aside for customer-sited resources from the 1% in the Prime Case to 2%. If one looks only at the 2006 through 2013 time period, increasing the SBC-Like Tier from 1% to 2% would increase the cost of the RPS by approximately $48 million during that time period. However, if one considers the life-cycle of the photovoltaic, very small wind and fuel cell resources that would be installed as the result of SBC-Like Tier incentive payments, increasing the SBC-Like Tier from 1% to 2% would increase the cost of the RPS by only approximately $10.6 million during the life-cycle of the installed facilities. It should be noted that the results reported in this sensitivity are limited to the cost-based approach. Under the market clearing approach, the replacement costs given below would be higher, making the cost impact of increasing the SBC-Like Tier from 1% to 2% somewhat lower. See Tables 3H-1 and 3H-2, below:

Table 3H-1
Nominal Cost of the SBC-Like Tier @ 2% (2003$)

2006-2013	MWh's	MW's	TOTAL
Solar PV	21,080	16.04	$72,190,590
Wind Small	1,361	0.78	$2,000,000
Fuel Cells	213,431	27.07	$54,142,943
Totals	235,872	43.89	$128,333,533

Table 3H-2
Cost Impact of Increasing the SBC-Like Tier from 1% to 2%

	2006-2013	Life-Cycle
Cost	$128,333,533	$128,333,533
MWhs	1,381,571	4,710,634
Cost/MWh	$93	$27
Cost/kWh	$0.0929	$0.0272
Replacement Cost/kWh	$0.0224	$0.0224
MWHs @ 1%	689,857	2,351,915
Added MWhs	691,714	2,358,719
Replacement Cost	$15,522,612	$52,931,550
Subtotal	$112,810,921	$75,401,982
Cost @ 1% SBC-Like Tier	$64,800,238	$64,800,238
Difference	**$48,010,683**	**$10,601,744**

III-I 5% SBC-LIKE TIER SENSITIVITY

The purpose of this sensitivity is to provide an estimate of the cost impact of increasing the SBC-Like set-aside for customer-sited resources from the 1% in the Prime Case to 5%. If one looks only at the 2006 through 2013 time period, increasing the SBC-Like Tier from 1% to 5% would increase the cost of the RPS by approximately $205 million during that time period. However, if one considers the life-cycle of the photovoltaic, very small wind and fuel cell resources that would be installed as the result of SBC-Like Tier incentive payments, increasing the SBC-Like Tier from 1% to 5% would increase the cost of the RPS by only approximately $87 million during the life-cycle of the installed facilities. It should be noted that the results reported in this sensitivity are limited to the cost-based approach. Under the market clearing approach, the replacement costs given below would be higher, making the cost impact of increasing the SBC-Like Tier from 1% to 5% somewhat lower. See Tables 3I-1 and 3I-2, below:

Table 3I-1
Nominal Cost of the SBC-Like Tier @ 5% (2003$

2006-2013	MWh's	MW's	TOTAL
Solar PV	52,883	40.25	$181,104,822
Wind Small	1,361	0.78	$2,000,000
Fuel Cells	535,436	67.91	$135,828,617
Totals	589,680	108.94	$318,933,439

Table 3I-2
Cost Impact of Increasing the SBC-Like Tier from 1% to 5% (2003$

	2006-2013	Life-Cycle
Cost	$318,933,439	$318,933,439
MWhs	3,456,714	11,786,792
Cost/MWh	$92	$27
Cost/kWh	$0.0923	$0.0271
Replacement Cost/kWh	$0.0141	$0.0141
MWHs @ 1%	689,857	2,351,915
Added MWhs	2,766,857	9,434,877
Replacement Cost	$48,873,992	$166,651,805
Subtotal	$270,059,447	$152,281,634
Cost @ 1% SBC-Like Tier	$64,800,238	$64,800,238
Difference	**$205,259,209**	**$87,481,396**

III-J 10% SBC-LIKE TIER SENSITIVITY

The purpose of this sensitivity is to provide an estimate of the cost impact of increasing the SBC-Like set-aside for customer-sited resources from the 1% in the Prime Case to 10%. If one looks only at the 2006 through 2013 time period, increasing the SBC-Like Tier from 1% to 10% would increase the cost of the RPS by approximately $459.7 million during that time period. However, if one considers the life-cycle of the photovoltaic, very small wind and fuel cell resources that would be installed as the result of SBC-Like Tier incentive payments, increasing the SBC-Like Tier from 1% to 10% would increase the cost of the RPS by only approximately $189.5 million during the life-cycle of the installed facilities. It should be noted that the results reported in this sensitivity are limited to the cost-based approach. Under the market clearing approach, the replacement costs given below would be higher, making the cost impact of increasing the SBC-Like Tier from 1% to 10% somewhat lower. See Tables 3J-1 and 3J-2, below:

Table 3J-1
Nominal Cost of the SBC-Like Tier @ 10% (2003$)

	MWh's	MW's	TOTAL
Solar PV	105,888	80.58	$362,628,540
Wind Small	1,361	0.78	$2,000,000
Fuel Cells	1,072,111	135.99	$271,971,405
Totals	1,179,360	217.35	$636,599,945

Table 3J-2
Cost Impact of Increasing the SBC-Like Tier from 1% to 10% (2003$)

	2006-2013	Life-Cycle
Cost	$636,599,945	$636,599,945
MWhs	6,915,285	23,580,388
Cost/MWh	$92	$27
Cost/kWh	$0.0921	$0.0270
Replacement Cost/kWh	$0.0162	$0.0162
MWHs @ 1%	689,857	2,351,915
Added MWhs	6,225,428	21,228,473
Replacement Cost	$112,102,445	$382,257,436
Subtotal	$524,497,500	$254,342,509
Cost @ 1% SBC-Like Tier	$64,800,238	$64,800,238
Difference	**$459,697,262**	**$189,542,271**

III-K ALTERNATIVE COMPLIANCE MECHANISM SENSITIVITY

Under certain conceivable circumstances, there is a potential that a responsible and prudent Load Serving Entity (LSE) would be unable to provide its customers with a sufficient supply of reasonably-priced energy derived from renewable resources to meet its required target. To mitigate concerns regarding unbounded costs of RPS compliance, we considered an alternative compliance mechanism as a component of the RPS program. Under an alternative compliance mechanism approach, the LSE can either obtain its necessary supply of renewable resources, or if it is unable to do so at a reasonable cost, pay into a fund. The amount of the alternative compliance mechanism payment is intended to be sizable enough to encourage the LSE to obtain the required renewable resources, but low enough to act as an effective cost-cap on compliance with the RPS, as circumstances dictate. Similar mechanisms have been adopted in other state RPS rules, including Texas and Massachusetts.

The purpose of this sensitivity is to provide two test year estimates of the cost impact of an inability to obtain an additional year's increment of renewable resources, resulting in resort to alternative compliance mechanism payments. The test years selected are 2009 and 2013. The level of the alternative compliance mechanism payments studied is the lesser of 150% of the (projected) market value of renewable cost premiums for the test year, or $50/MWh. The projections suggest that a $50/MWh cap would not be hit on a long-term trend basis, but such a cap is assumed as a hedge against unforeseen fluctuations.

The use of 150% of market value as a price cap requires an independent index or source for market value. For illustrative purposes, we assume that our analysis has accurately reflected the market price, so that individual LSEs would be relieved from having to pay more than 150% of this value. If no reasonably priced renewable resources were available in 2009 such that the full RPS target increment (i.e., the increase in RPS target from 2008 to 2009) was subject to an alternative compliance mechanism payment, the impact of this sensitivity would be to increase the RPS costs for 2009 by either $14,623,060 or $16,257,599 depending on whether an average price method or market clearing price method is used to establish the benchmark market value of renewable cost premiums for the year. In addition, incremental reductions in wholesale energy prices for 2009 would not occur due to the inability to add 1,468,708 MWhs of new resources. See Tables 3K-1 and 3K-2 below:

Table 3K-1

Calculation of Year 2009 Alternative Compliance Mechanism Cost Cap (2003$)

Year 2009	$/MWh	150%	CAP
Average Price Method	$19.91	$29.87	$29.87
Clearing Price Method	$22.14	$33.21	$33.21

Note: The $50/MWh upper-bound cap is not reached.

Table 3K-2
Calculation of Year 2009 Alternative Compliance Mechanism Cost Differences (2003$)

Year 2009	$/MWh CAP	Incremental MWhs	Renewables Cost	Alternative Compliance Cost	Difference
Average Price Method	$29.87	1,468,708	$29,246,120	$43,869,180	$14,623,060
Clearing Price Method	$33.21	1,468,708	$32,515,198	$48,772,796	$16,257,599

If no reasonably priced renewable resources were available in 2013 such that the full RPS target increment was subject to an alternative compliance mechanism payment, the impact of this sensitivity would be to increase the RPS costs for 2013 by either $15,616,111 or $17,872,478 depending on whether an average price method or market clearing price method is used to establish the benchmark market value of renewable cost premiums for the year. In addition, incremental reductions in wholesale energy prices for 2013 would not occur due to the inability to add 1,558,961 MWhs of new resources. See Tables 3K-3 and 3K-4 below:

Table 3K-3
Calculation of Year 2013 Alternative Compliance Mechanism Cost Cap

Year 2013	$/MWh	150%	CAP
Average Price Method	$20.03	$30.05	$30.05
Clearing Price Method	$22.93	$34.39	$34.39

Note: The $50/MWh upper-bound cap is not reached.

Table 3K-4
Calculation of Year 2013 Alternative Compliance Mechanism Cost Differences

Year 2013	$/MWh CAP	Incremental MWhs	Renewables Cost	Alternative Compliance Cost	Difference
Average Price Method	$30.05	1,558,961	$31,232,223	$46,848,334	$15,616,111
Clearing Price Method	$34.39	1,558,961	$35,744,957	$53,617,435	$17,872,478

The effect of having foregone incremental reductions in wholesale energy prices due to a lack of added renewable resources would be mitigated somewhat in later years to the degree that the dollars paid into the alternative compliance fund are used to procure additional renewable resources.

IV. ALTERNATIVE CASE SCENARIOS

IV-A MULTIPLE INTERVENORS RAMP SCENARIO

Multiple Intervenors (MI) has advocated that the Commission not require the RPS requirements to begin until year 2009, rather than year 2006 as advocated by DPS Staff, and that total renewable resources not reach the 25% level until year 2020. In addition, MI has advocated that there be no SBC-Like Tier. To keep this scenario on a comparative basis with the others, we have fully modeled it only through year 2013. Through year 2013, as would be expected, this scenario results in significantly lower costs (see Table 5B-1) and achievements. Table 4A-1 below demonstrates the deceleration of RPS compliance targets advocated by MI:

Table 4A-1
Comparison of Prime Case and MI Ramp

	PRIME CASE			MI RAMP		
Year	Increment Target	Total Renewables	Renewables Percentage	Increment Target	Total Renewables	Renewables Percentage
2003	0	32,648,035	20.34%	0	32,648,035	20.34%
2004	0	32,834,662	20.16%	0	32,834,662	20.16%
2005	0	33,620,339	20.34%	0	33,620,339	20.34%
2006	1,202,925	35,045,212	20.92%	0	33,856,899	20.21%
2007	2,680,178	36,555,395	21.51%	0	33,904,425	19.95%
2008	4,173,125	38,081,290	22.09%	0	33,951,951	19.69%
2009	5,655,102	39,596,230	22.67%	1,179,826	35,168,226	20.14%
2010	7,162,848	41,136,956	23.25%	2,379,164	36,404,024	20.58%
2011	8,715,562	42,672,685	23.84%	3,620,822	37,632,205	21.02%
2012	10,233,155	44,173,293	24.42%	4,828,657	38,826,562	21.46%
2013	11,793,596	45,716,750	25.00%	6,071,484	40,055,912	21.90%

IV-B CENTRAL HUDSON RAMP SCENARIO

Central Hudson Gas & Electric Corporation (Central Hudson) has advocated that the Commission exclude exports from eligibility and limit the ultimate RPS targets to the 56.32% level of domestic MWhs reached in the Prime Case reported in the NY RPS Cost Study Report issued last July. Applying that position results in a year 2013 total renewable resources level of 22.97%, instead of the 25% advocated by DPS Staff. In addition, Central Hudson has advocated that there be no SBC-Like Tier. Table 4B-1 below demonstrates the deceleration of RPS compliance targets advocated by Central Hudson:

Table 4B-1
Comparison of Prime Case and Central Hudson Ramp

	PRIME CASE			CENTRAL HUDSON RAMP		
Year	Increment Target	Total Renewables	Renewables Percentage	Increment Target	Total Renewables	Renewables Percentage
2003	0	32,648,035	20.34%	0	32,648,035	20.34%
2004	0	32,834,662	20.16%	0	32,834,662	20.16%
2005	0	33,620,339	20.34%	0	33,620,339	20.34%
2006	1,202,925	35,045,212	20.92%	771,552	34,620,206	20.67%
2007	2,680,178	36,555,395	21.51%	1,804,817	35,692,762	21.00%
2008	4,173,125	38,081,290	22.09%	2,841,619	36,768,864	21.33%
2009	5,655,102	39,596,230	22.67%	3,856,897	37,823,451	21.66%
2010	7,162,848	41,136,956	23.25%	4,886,537	38,892,410	21.98%
2011	8,715,562	42,672,685	23.84%	5,951,697	39,946,938	22.31%
2012	10,233,155	44,173,293	24.42%	6,975,323	40,959,933	22.64%
2013	11,793,596	45,716,750	25.00%	8,030,572	42,004,550	22.97%

IV-C RETEC RAMP SCENARIO

RETEC has advocated that the Commission require the RPS requirements to begin in year 2005, rather than year 2006 as advocated by DPS Staff. The "ramp" of RPS targets would commence a year earlier than as shown in the Prime Case, but total renewable resources would reach the same 25% level in year 2013. Accelerating the RPS program as advocated by RETEC would likely result in little overall change in projected costs from the Prime Case through year 2013, but would accelerate the costs and compliance targets into year 2005 and in each year until year 2013.[6] Table 4C-1 below demonstrates the acceleration of RPS compliance targets advocated by RETEC:

Table 4C-1
Comparison of Prime Case and RETEC Ramp

	PRIME CASE			RETEC RAMP		
Year	Increment Target	Total Renewables	Renewables Percentage	Increment Target	Total Renewables	Renewables Percentage
2003	0	32,648,035	20.34%	0	32,648,035	20.34%
2004	0	32,834,662	20.16%	0	32,834,662	20.16%
2005	0	33,620,339	20.34%	593,740	34,214,079	20.70%
2006	1,202,925	35,045,212	20.92%	1,729,394	35,571,681	21.24%
2007	2,680,178	36,555,395	21.51%	3,138,137	37,013,355	21.78%
2008	4,173,125	38,081,290	22.09%	4,560,207	38,468,372	22.31%
2009	5,655,102	39,596,230	22.67%	5,968,816	39,909,944	22.85%
2010	7,162,848	41,136,956	23.25%	7,401,167	41,375,275	23.39%
2011	8,715,562	42,672,685	23.84%	8,876,346	42,833,470	23.93%
2012	10,233,155	44,173,293	24.42%	10,314,389	44,254,528	24.46%
2013	11,793,596	45,716,750	25.00%	11,793,596	45,716,750	25.00%

[6] We did not create a supply curve for year 2005, therefore we cannot project whether adequate renewable resource projects would be available to meet an RPS target in year 2005.

IV-D JOINT UTILITIES SCENARIO

The purpose of this scenario was to replicate the first of two scenarios studied by the Joint Utilities using their assumptions but our methodologies and, generally, our expected premium costs for renewable technologies. For this scenario, we have assumed:

- no eligibility of imports;
- no New England demand competing for renewable resources in New York;
- 10% SBC-Like Tier (50% PV / 50% Fuel Cells);
- biomass co-firing limited to 10 MWs;
- no off-shore wind;
- higher costs for each new increment of wind as projects are built;
- no new hydropower;
- landfill gas availability reduced by 20 MWs; and
- no combined heat and power (CHP) projects.

IV-E JOINT UTILITIES 2ND CASE SCENARIO

The purpose of this scenario was to replicate the second of two scenarios studied by the Joint Utilities using their assumptions but our methodologies and, generally, our expected premium costs for renewable technologies. For this scenario, we have assumed:

- no eligibility of imports;
- no New England demand competing for renewable resources in New York;
- 1% SBC-Like Tier (mix same as Prime Case);
- biomass co-firing limited to 10 MWs;
- no off-shore wind;
- higher costs for each new increment of wind as projects are built;
- no new hydropower;
- landfill gas availability reduced by 20 MWs; and
- no combined heat and power (CHP) projects.

The Joint Utilities 2nd Case scenario differs from the Joint Utilities scenario only in the size and components of the assumed SBC-Like Tier.

V. TABULATION OF RESULTS

V-A QUANTITIES OF RENEWABLES DEVELOPED

Table 5A-1 below displays a breakdown of the renewable resources that we estimate would be reached in New York under the Prime Case and each major Prime Case sensitivity and alternate scenario studied. Most cases shown include combined demand from the NY RPS Incremental or Main Tier, the NY RPS SBC-Like Tier, NY Executive Order 111 State Agency needs, and excess New England RPS demand. However, the two Joint Utility scenarios purposefully do not include any excess New England RPS demand.

Table 5A-1

Quantity of Renewable Resources Reached Through 2013

	NO IMPORTS		NO PROD. TAX CREDIT		NO LOAD GROWTH	
New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 28,29,30	1,279,398	238.00	1,279,398	238.00	619,332	101.00
Hydro 48, 53, 58, 67	127,333	41.53	127,333	41.53	127,333	41.53
Landfill Gas 61,64	757,792	91.06	757,792	91.06	733,577	88.15
Manure Digestion 25	201,937	38.42	41,679	7.93	0	0.00
Wind 1, 2, 3, 10, 11, 12	6,026,004	2,270.00	1,462,920	500.00	5,084,304	1,920.00
Off-Shore Wind 19	926,282	311.00	0	0.00	0	0.00
Biomass Gasification 34, 35, 36, 37	382,637	54.60	0	0.00	0	0.00
Biomass CHP 42, 43	0	0.00	0	0.00	0	0.00
Imports - New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 32,33	0	0.00	3,416,400	600.00	0	0.00
Hydro 51, 52, 56, 57	0	0.00	5,409,000	1,300.00	0	0.00
Wind 21, 22, 23	0	0.00	0	0.00	261,928	90.61
New York Zone 2	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 31	294,336	56.00	294,336	56.00	294,336	56.00
Hydro 49, 54, 59	51,550	22.90	0	0.00	0	0.00
Landfill Gas 62, 65	223,149	26.81	223,149	26.81	214,117	25.73
Manure Digestion 26	32,663	6.21	32,663	6.21	0	0.00
Wind 5, 6	271,560	100.00	144,540	50.00	271,560	100.00
Biomass Gasification 38, 39, 40	808,179	115	0	0.00	0	0
New York Zone 3	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Hydro 50, 60	429	0.08	0	0.00	0	0.00
Landfill Gas 63, 66	27,773	3.34	27,773	3.34	26,505	3.18
Wind 17, 18	81,468	30.00	0	0.00	43,362	15.00
Offshore Wind 20	1,724,494	579.00	0	0.00	0	0.00
SBC-Like Tier	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Solar PV	10,479	7.97	10,479	7.97	5,434	4.14
Wind Small	1,361	0.78	1,361	0.78	1,361	0.78
Fuel Cells	106,096	13.46	106,097	13.46	55,021	6.98
TOTALS	13,334,920	4,006.49	13,334,920	2,943.09	7,738,170	2,453.09

Table 5A-1 (Continued)

Quantity of Renewable Resources Reached Through 2013

	0% SBC-LIKE TIER		2% SBC-LIKE TIER		5% SBC-LIKE TIER	
New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 28,29,30	1,200,906	221.71	965,034	172.75	619,332	101.00
Hydro 48, 53, 58, 67	127,333	41.53	127,333	41.53	127,333	41.53
Landfill Gas 61,64	733,577	88.15	733,577	88.15	733,577	88.15
Manure Digestion 25	0	0.00	0	0.00	0	0.00
Wind 1, 2, 3, 10, 11, 12	5,517,924	2,070.00	5,517,924	2,070.00	5,517,924	2,070.00
Off-Shore Wind 19	0	0.00	0	0.00	0	0.00
Biomass Gasification 34, 35, 36, 37	0	0.00	0	0.00	0	0.00
Biomass CHP 42, 43	0	0.00	0	0.00	0	0.00
Imports - New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 32,33	0	0.00	0	0.00	0	0.00
Hydro 51, 52, 56, 57	4,182,600	1,100.00	4,182,600	1,100.00	4,174,494	1,097.84
Wind 21, 22, 23	722,700	250.00	722,700	250.00	722,700	250.00
New York Zone 2	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 31	294,336	56.00	294,336	56.00	294,336	56.00
Hydro 49, 54, 59	0	0.00	0	0.00	0	0.00
Landfill Gas 62, 65	214,117	25.73	214,117	25.73	214,117	25.73
Manure Digestion 26	0	0.00	0	0.00	0	0.00
Wind 5, 6	271,560	100.00	271,560	100.00	271,560	100.00
Biomass Gasification 38, 39, 40	0	0	0	0	0	0
New York Zone 3	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Hydro 50, 60	0	0.00	0	0.00	0	0.00
Landfill Gas 63, 66	26,505	3.18	26,505	3.18	26,505	3.18
Wind 17, 18	43,362	15.00	43,362	15.00	43,362	15.00
Offshore Wind 20	0	0.00	0	0.00	0	0.00
SBC-Like Tier	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Solar PV	0	0.00	21,080	16.04	52,883	40.25
Wind Small	0	0.00	1,361	0.78	1,361	0.78
Fuel Cells	0	0.00	213,431	27.07	535,436	67.91
TOTALS	13,334,920	3,971.30	13,334,920	3,966.24	13,334,920	3,957.37

Table 5A-1 (Continued)
Quantity of Renewable Resources Reached Through 2013

	10% SBC-LIKE TIER		MI RAMP		CH RAMP	
New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 28,29,30	619,332	101.00	619,332	101.00	1,279,398	238.00
Hydro 48, 53, 58, 67	127,333	41.53	127,333	41.53	127,333	41.53
Landfill Gas 61,64	733,577	88.15	733,577	88.15	733,577	88.15
Manure Digestion 25	0	0.00	0	0.00	0	0.00
Wind 1, 2, 3, 10, 11, 12	5,517,924	2,070.00	5,084,304	1,920.00	5,517,924	2,070.00
Off-Shore Wind 19	0	0.00	0	0.00	0	0.00
Biomass Gasification 34, 35, 36, 37	0	0.00	0	0.00	0	0.00
Biomass CHP 42, 43	0	0.00	0	0.00	0	0.00
Imports - New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 32,33	0	0.00	0	0.00	0	0.00
Hydro 51, 52, 56, 57	3,584,814	940.59	0	0.00	0	0.00
Wind 21, 22, 23	722,700	250.00	259,656	89.82	0	0.00
New York Zone 2	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 31	294,336	56.00	294,336	56.00	294,336	56.00
Hydro 49, 54, 59	0	0.00	0	0.00	0	0.00
Landfill Gas 62, 65	214,117	25.73	214,117	25.73	222,958	26.79
Manure Digestion 26	0	0.00	0	0.00	0	0.00
Wind 5, 6	271,560	100.00	271,560	100.00	271,560	100.00
Biomass Gasification 38, 39, 40	0	0	0	0	0	0
New York Zone 3	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Hydro 50, 60	0	0.00	0	0.00	0	0.00
Landfill Gas 63, 66	26,505	3.18	26,505	3.18	26,505	3.18
Wind 17, 18	43,362	15.00	43,362	15.00	81,468	30.00
Offshore Wind 20	0	0.00	0	0.00	1,067,661	358.47
SBC-Like Tier	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Solar PV	105,888	80.58	0	0.00	0	0.00
Wind Small	1,361	0.78	0	0.00	0	0.00
Fuel Cells	1,072,111	135.99	0	0.00	0	0.00
TOTALS	13,334,920	3,908.53	7,674,082	2,440.42	9,622,720	3,012.12

Table 5A-1 (Continued)
Quantity of Renewable Resources Reached Through 2013

	JOINT UTILITY CASE		JOINT UTILITY 2ND CASE		PRIME CASE	
New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 28,29,30	0	0.00	0	0.00	1,082,970	197.23
Hydro 48, 53, 58, 67	127,333	41.53	127,333	41.53	127,333	41.53
Landfill Gas 61,64	591,354	71.06	591,354	71.06	733,577	88.15
Manure Digestion 25	0	0.00	0	0.00	0	0.00
Wind 1, 2, 3, 10, 11, 12	6,026,004	2,270.00	6,026,004	2,270.00	5,517,924	2,070.00
Off-Shore Wind 19	0	0.00	0	0.00	0	0.00
Biomass Gasification 34, 35, 36, 37	1,840,744	262.66	2,902,168	414.12	0	0.00
Biomass CHP 42, 43	0	0.00	0	0.00	0	0.00
Imports - New York Zone 1	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 32,33	0	0.00	0	0.00	0	0.00
Hydro 51, 52, 56, 57	0	0.00	0	0.00	4,182,600	1,100.00
Wind 21, 22, 23	0	0.00	0	0.00	722,700	250.00
New York Zone 2	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Biomass Co-Firing 31	52,560	10.00	52,560	10.00	294,336	56.00
Hydro 49, 54, 59	0	0.00	0	0.00	0	0.00
Landfill Gas 62, 65	223,149	26.81	223,149	26.81	214,117	25.73
Manure Digestion 26	0	0.00	0	0.00	0	0.00
Wind 5, 6	271,560	100.00	271,560	100.00	271,560	100.00
Biomass Gasification 38, 39, 40	1,505,318	215	1,505,318	215	0	0
New York Zone 3	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Hydro 50, 60	0	0.00	0	0.00	0	0.00
Landfill Gas 63, 66	27,773	3.34	27,773	3.34	26,505	3.18
Wind 17, 18	81,468	30.00	81,468	30.00	43,362	15.00
Offshore Wind 20	0	0.00	0	0.00	0	0.00
SBC-Like Tier	**MWhs**	**MWs**	**MWhs**	**MWs**	**MWhs**	**MWs**
Solar PV	589,680	448.77	10,479	7.97	10,479	7.97
Wind Small	0	0.00	1,361	0.78	1,361	0.78
Fuel Cells	589,680	74.79	106,096	13.46	106,097	13.46
TOTALS	11,926,623	3,553.77	11,926,623	3,203.87	13,334,920	3,969.03

V-B COST COMPARISON

Table 5B-1 below compares the present value of the cumulative year 2006 through year 2013 net bill impacts for each major case studied:

Table 5B-1
Comparison of Year 2003 Present Value of 2006-2013 Bill Impacts (2003$)

Present Value:	Cost-Based Approach	Market Clearing Approach
Prime Case w/Current Fuel Prices:	$109,142,616	$275,068,461
No Load Growth Sensitivity:	$288,565,864	$313,454,509
Multiple Intervenors Ramp Scenario:	$304,549,120	$348,587,775
Central Hudson Ramp Scenario:	$373,698,262	$509,018,507
0% SBC-Like Tier Sensitivity:	$427,237,744	$590,844,070
Prime Case:	$555,716,661	$721,642,505
2% SBC-Like Tier Sensitivity:	$648,552,096	$816,860,984
5% SBC-Like Tier Sensitivity:	$654,103,907	$819,421,880
No Production Tax Credit Sensitivity:	$646,926,563	$848,837,996
No Imports Sensitivity:	$586,795,435	$850,557,776
Joint Utility 2nd Case Scenario:	$577,031,532	$958,413,626
10% SBC-Like Tier Sensitivity:	$1,031,485,051	$1,202,722,479
Joint Utility Scenario:	$2,254,517,556	$2,527,810,501

V-C AIR EMISSIONS COMPARISON

The MAPS modeling results show that implementation of the RPS would result in reductions in statewide air emissions (see Table 5C-1 below). This result is expected because the dispatch of new renewable electric generation facilities will mean that fossil-fired generating plants will produce less electricity, resulting in a reduction of total emissions. A reduction in nitrogen oxide (NO_x), sulfur dioxide ($S0_2$) and carbon dioxide ($C0_2$) emissions is an important environmental benefit because of their contribution to acid deposition (acid rain), ozone pollution (smog) and global warming and their resultant health and welfare affects on the public and the environment.

Table 5C-1

Comparison of Air Emissions Reductions (x 1,000 tons)

		NO IMPORTS		NO PROD. TAX CREDIT		NO LOAD GROWTH	
	Emission	Change	%	Change	%	Change	%
Total Statewide Emissions	NOx	(3)	-8.09%	(1)	-1.35%	(0)	-0.69%
	SO2	(5)	-4.46%	(8)	-6.66%	(2)	-2.08%
	CO2	(4,458)	-9.00%	(2,769)	-5.59%	(2,171)	-5.76%
Total NYC & Long Island	NOx	(2)	-13.99%	(0)	-1.63%	(0)	-4.57%
	SO2	(2)	-18.45%	0	0.53%	(0)	-4.30%
	CO2	(3,232)	-11.05%	(1,773)	-6.06%	(1,534)	-7.36%

		0% SBC-LIKE TIER		2% SBC-LIKE TIER		5% SBC-LIKE TIER	
	Emission	Change	%	Change	%	Change	%
Total Statewide Emissions	NOx	(2)	-5.09%	(1)	-3.07%	(2)	-5.88%
	SO2	(7)	-6.02%	(2)	-1.26%	(7)	-6.18%
	CO2	(3,621)	-7.31%	(3,114)	-6.29%	(3,908)	-7.89%
Total NYC & Long Island	NOx	(1)	-6.89%	(1)	-7.66%	(1)	-8.54%
	SO2	(1)	-7.12%	(1)	-5.42%	(1)	-8.06%
	CO2	(2,354)	-8.05%	(2,445)	-8.36%	(2,602)	-8.90%

		10% SBC-LIKE TIER		MI RAMP		CH RAMP	
	Emission	Change	%	Change	%	Change	%
Total Statewide Emissions	NOx	(2)	-4.37%	(1)	-2.23%	(1)	-3.41%
	SO2	(2)	-1.99%	(3)	-2.16%	(3)	-2.46%
	CO2	(3,468)	-7.00%	(2,576)	-5.20%	(2,911)	-5.88%
Total NYC & Long Island	NOx	(1)	-9.56%	(1)	-5.56%	(1)	-7.64%
	SO2	(1)	-9.36%	(1)	-9.43%	(1)	-10.25%
	CO2	(2,690)	-9.20%	(1,954)	-6.68%	(2,190)	-7.49%

		JOINT UTILITY CASE		JOINT UTILITY 2ND CASE		PRIME CASE	
	Emission	Change	%	Change	%	Change	%
Total Statewide Emissions	NOx	(4)	-9.06%	(4)	-8.99%	(2)	-5.22%
	SO2	(6)	-5.10%	(6)	-5.21%	(7)	-6.04%
	CO2	(4,618)	-9.32%	(4,589)	-9.26%	(3,683)	-7.43%
Total NYC & Long Island	NOx	(2)	-14.15%	(2)	-13.21%	(1)	-7.20%
	SO2	(2)	-22.27%	(2)	-22.08%	(1)	-7.09%
	CO2	(3,320)	-11.35%	(3,185)	-10.89%	(2,414)	-8.25%

V-D ENERGY SECURITY COMPARISON

The addition of new renewable electricity supplies due to RPS demand will result in the displacement of existing generation supplies, including those that rely on oil and natural gas as fuel. In that regard, the changes in generation resources due to the RPS program as estimated by the MAPS production simulation model have been examined. That change, creating greater diversity in New York's electric energy supply portfolio, will reduce the exposure to wholesale oil and natural gas price spikes and supply interruptions, thereby increasing the security of New York's electric energy supply. See Table 5D-1 below:

Table 5D-1

Displacement of Generation Resources and Reduction in Fuel Price & Supply Risk (GWhs)

	NO IMPORTS	NO PROD. TAX CREDIT	NO LOAD GROWTH
Oil:	720	324	93
Gas:	6,525	4,555	3,975
All Others:	(1,705)	(8)	(706)
Totals:	5,541	4,872	3,362
Oil & Gas:	7,246	4,879	4,067
Percent:	10.56%	7.11%	8.17%

	0% SBC-LIKE TIER	2% SBC-LIKE TIER	5% SBC-LIKE TIER
Oil:	604	612	643
Gas:	5,334	5,218	5,730
All Others:	(142)	(624)	(117)
Totals:	5,797	5,206	6,256
Oil & Gas:	5,939	5,830	6,373
Percent:	8.66%	8.50%	9.29%

	10% SBC-LIKE TIER	MI RAMP	CH RAMP
Oil:	579	422	437
Gas:	5,689	3,979	4,578
All Others:	(591)	(653)	(688)
Totals:	5,677	3,748	4,326
Oil & Gas:	6,268	4,400	5,014
Percent:	9.14%	6.42%	7.31%

Table 5D-1 (Continued)

Displacement of Generation Resources and Reduction in Fuel Price & Supply Risk (GWhs)

	JOINT UTILITY CASE	JOINT UTILITY 2ND CASE	PRIME CASE
Oil:	704	701	608
Gas:	6,807	6,702	5,437
All Others:	(3,713)	(4,721)	(140)
Totals:	3,799	2,682	5,906
Oil & Gas:	7,512	7,403	6,046
Percent:	10.95%	10.79%	8.82%