New York State Energy Research and Development Authority

NYSERDA Renewable Portfolio Standard Main Tier 2013 Program Review

Direct Investments in New York State

Final Report

September 5, 2013

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

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

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

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

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NYSERDA
Renewable Portfolio Standard
Main Tier 2013 Program Review

Direct Investments in New York State

Final Report

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Notice

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Summary

One of the key objectives of New York State's Renewable Portfolio Standard (RPS) is to stimulate and capture the direct investments associated with expanding the role of renewable energy in the State's electricity supply mix. Specifically, the Public Service Commission (Commission) in its September 2004 Order[1] specified program objectives that were used to guide the development of the RPS program. One such objective, Economic Benefits, was defined as developing "renewable resources and advance renewable resource technologies in and attract renewable resource generators, manufacturers and installers to New York State."

As a result, NYSERDA has designed most RPS Main Tier procurements to quantify verifiable direct investments in New York State as part of the evaluation criteria. Winning bids are determined based on a weighted combined score with RPS Attribute price comprising 70% and direct investments in New York State at 30% of the weight. After a Main Tier RPS contract has been in operation for three years, NYSERDA receives data about related direct investments in New York State. The data is verified by NYSERDA and available for use in producing a reliable assessment of the direct investments in the New York State economy associated with the RPS program.

This analysis focuses on the direct investment impacts associated with RPS program activity, in terms of the scale and type of New York State spending previously incurred and expected to be incurred by Main Tier RPS-contracted projects in the Current Portfolio[2] in their development and for their ongoing operations. These data are further used as inputs for the overall Benefit-Cost and Macroeconomic analysis conducted for the 2013 RPS Main Tier Program Evaluation.

The focus of this study is on direct investments in New York State, which is a subset of the total amount spent by project developers, as this provides an estimate of the direct economic development benefit realized in New York State. Some studies simply provide the total cost of project development, including imported hardware and services, so comparison to other economic development reports should be made with care.

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

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

Key findings of this analysis include:

- Approximately $2.7 billion dollars of direct investments in New York State are expected over the projected life of the Current Portfolio of Main Tier RPS facilities, as measured in jobs, payments to public entities, in-state purchases and land leases.
- For every $1 spent on the acquisition of RPS Attributes for the Current Portfolio of Main Tier RPS projects under contract with NYSERDA, New York State is expected to capture on average approximately $3 in direct investments associated with project spending over project lifetime on a Net Present Value (NPV) basis.
- Overall, approximately $27 in direct investment results from project expenditures in New York State for every 1 megawatt hour (MWh) of renewable energy that is generated under the RPS.

Scope

The objective of this study is to analyze verified direct investments in New York State associated with a subset of Main Tier and Maintenance resource[3] RPS contracts, and to estimate those investments associated with the remaining projects with current Main Tier contracts as of December 31, 2012. This analysis evaluates verified in-state direct spending data from 18 projects with NYSERDA Main Tier RPS contracts and extrapolates these investments through the life of each project. The resulting data is then used to project New York State-specific direct investments attributable to all current RPS projects.

This analysis only considers the direct impacts of the Current Portfolio of Main Tier RPS contracts, without consideration of multiplier or induced effects, or net impacts. These investments are then compared with the value or cost of RPS contracts for a direct benefit-cost analysis of current projects in the Main Tier RPS program, which is referred to in this report as an investment ratio. Direct investments include all in-state spending by projects, in the form of purchases or salary payments, over their development, construction, and operating life. Direct investment data verified through internal NYSERDA reviews was subject to additional analysis by NYSERDA's consultants in an effort to better understand the scope and scale of the direct investments resulting from incentivizing renewable energy development within the State.

The analysis of the benefits associated with direct project investment is comprised of two parts:

- To provide an assessment of the direct investments in New York State that were associated with the projects that had submitted verified data, The first part was focused on the subset of verified projects, including a Maintenance resource project, and includes all verified and anticipated direct benefits (referred to as "Group 1" in this report).
- To provide an analysis of the portfolio of Main Tier projects under contract as of December 31, 2012 ("Current Portfolio") for use in the 2013 RPS Main Tier Program Evaluation. This second part includes all Main Tier RPS projects in the Current Portfolio, but excludes Maintenance resource projects, and reflects some modeled inputs and adjustments necessary to support conducting Net Macroeconomic and Benefit-Cost analyses for the 2013 RPS Main Tier Program Evaluation.

[3] This effort includes stand-alone analyses of 17 Main Tier projects and one Maintenance Resource project with verified benefits.

NYSERDA collected the direct investment data used as the basis for this study as part of its administration of the RPS Program. NYSERDA's RPS Main Tier contracts require each contractor to demonstrate, after three years of facility operations, that at least 85% of the direct investments in New York State that were claimed in the contractor's Bid Proposal have actually accrued to the State. Failure to make that demonstration results in a proportionate reduction in the contract bid price for the remaining seven years of the contract term.[4]

The direct investments in New York State were calculated and analyzed for short and long-term economic impacts. Short-term impacts included:

- Jobs lasting three years or less, such as construction, planning, engineering and legal jobs.
- Initial equipment or one-time capital expenditures for the development and construction of the project.

Long-term impacts included:

- Project ongoing operations and maintenance payroll (including salaries and benefits).
- Taxes or Payments in Lieu of Taxes to the State, municipalities, and schools (payments to public entities).
- Fuel purchases.
- Landowner payments.
- Other Operations and Maintenance in-state spending on equipment, supplies and services.

Results

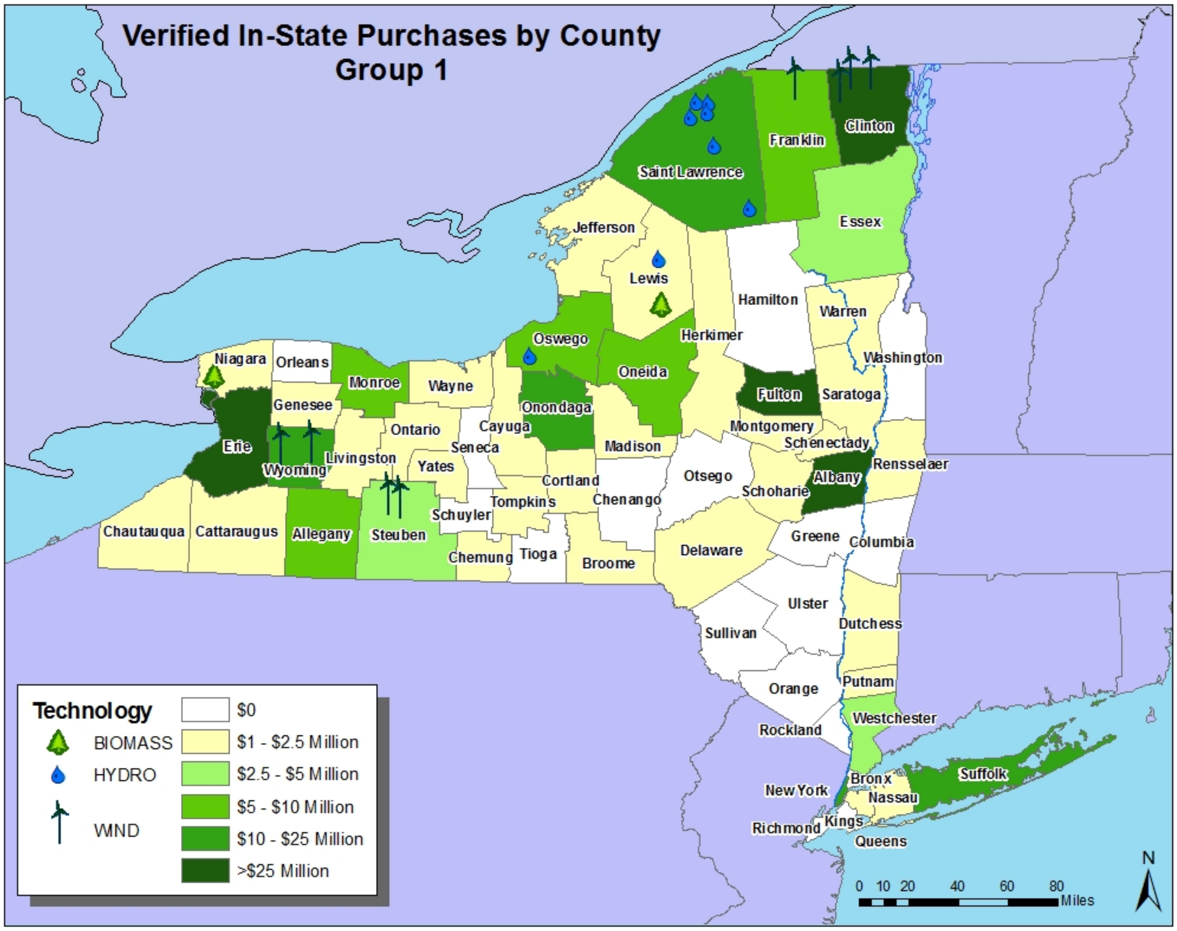
Verified Direct Investments in New York State Analysis

Key findings of the verification effort included corroboration of over $450 million already spent in New York State over the first three years of commercial operation for the 18 Group 1 facilities.[5] The verified data confirm that over 1,000 in-state businesses benefited through the development, construction and operation of the referenced Group 1 facilities through three years of operation. The geographic impacts of these projects are often concentrated around, but also extend beyond, the host counties where the projects are located. Figure 1 shows a map of spending by county, as reported in the verified 3-year dataset.

4 For example, if through the verification process a contractor demonstrates the accrual of 75% of the economic benefits claimed, the bid price payable will be reduced by 25%.

5 The total expenditures in this paragraph are expressed in nominal dollars added across calendar years.

Figure 1. Verified In-State Purchases by County



Projection of anticipated long-term expenditures through the estimated life of the projects with verified investments adds over $700 million in expenditures. In total, these projects are anticipated to add over $1.1 billion to the New York State economy through their respective operating lives.[6]

Table 1 shows the anticipated direct investments in New York State for Group 1 projects in total and as a function of the nameplate capacity and anticipated generation of these facilities. Group 1 projects have a projected total of $1.1 Billion in direct investments over the expected lifetime of all projects. This averages to approximately $1.3 Million/MW of nameplate capacity and $28 per MWh of production (2012 Dollars).

6 The total expenditures in this paragraph are expressed in nominal dollars added across calendar years.

Table 1. Total Verified and Anticipated Direct Investments in New York State for Group 1 Projects

Technology	2012 Dollars			Nominal Dollars		
	Total $ (Millions)	$/MWh	$/MW (Nameplate)	Total $ (Millions)	$/MWh	$/MW (Nameplate)
Wind	$ 800	$25	$1,079,000	$ 823	$26	$1,110,000
Hydroelectric	$ 12	$11	$ 319,000	$ 11	$10	$ 281,000
Biomass	$ 286	$47	$3,915,000	$ 313	$51	$4,291,000
Total	$1,098	$28	$1,288,000	$1,147	$29	$1,346,000

Total Current Portfolio Analysis

To align the verified dataset with conventions used for Benefit-Cost and Macroeconomic modeling completed for the 2013 Main Tier RPS Program Evaluation, only Main Tier projects with contracts as of December 31, 2012 were included in the Current Portfolio analyses. The data was also adjusted to include a de-rated estimate of investments that were not expressly verified as in-state expenditures (demand), and all investments in the trade sectors—verified and estimated—were further de-rated to represent only the applicable margin. Therefore, analyses associated with the Current Portfolio will not exactly align with Group 1 analyses above.

The results in Table 2 show the total direct investments in New York State for the Current Portfolio of projects in both real (2012 Dollars) and nominal dollars as compared to the projects' capacity and generation.

Table 2. Summary of Total, $/MW and $/MWh Direct Investments in New York State – Current Portfolio

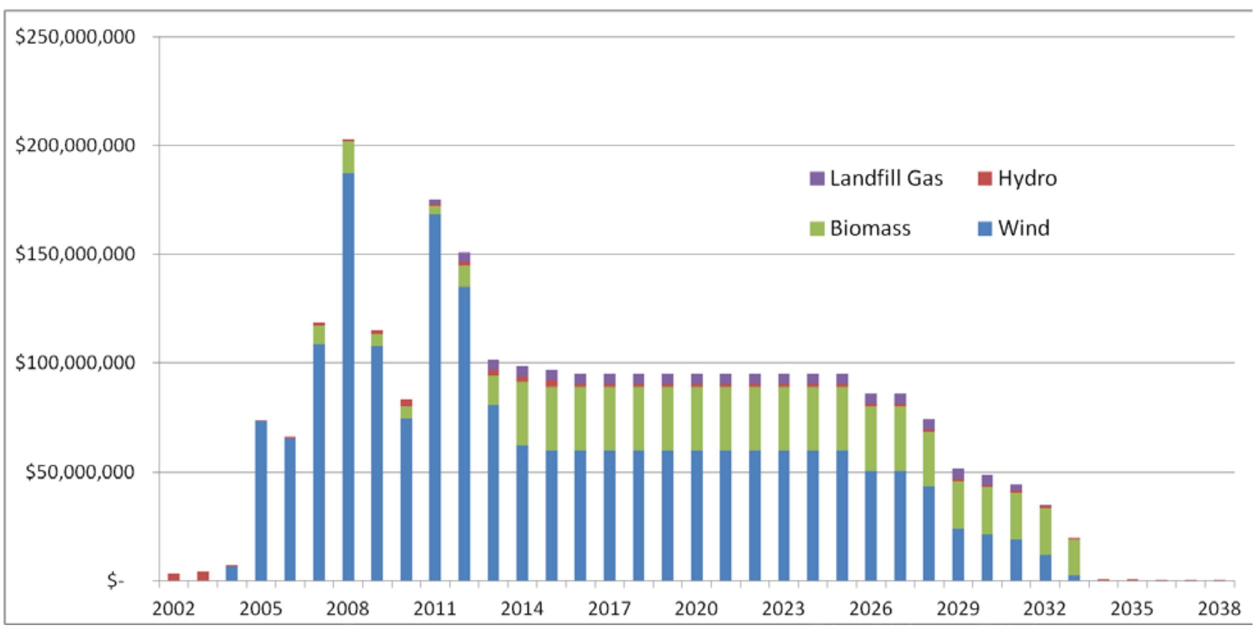
Technology	2012 Dollars			Nominal Dollars		
	Total (Millions)	$/MWh	$/MW (Nameplate)	Total (Millions)	$/MWh	$/MW (Nameplate)
Wind	$1,951	$24	$1,199,000	$2,065	$26	$1,269,000
Hydroelectric	$ 51	$11	$ 298,000	$ 55	$12	$ 323,000
Biomass	$ 603	$59	$2,765,000	$ 709	$69	$3,252,000
Landfill Gas	$ 95	$18	$1,623,000	$ 111	$21	$1,894,000
Total	$2,699	$27	$1,301,000	$2,940	$29	$1,417,000

Direct investments in New York State for the Current Portfolio of Main Tier projects totaled approximately $2.7 billion, with the majority of investments occurring as long-term project expenditures for operating and maintaining the projects over their useful life. Due to extensive ongoing payments for fuel, biomass projects have the highest $/MWh direct spending over the life of the projects. Overall, approximately $27 in direct investment is produced as a result of project expenditures in New York State for every MWh that is generated under the RPS.

Direct Investments in New York State as Inputs to 2013 RPS Main Tier Program Evaluation

As reviewed above, the results from this study were used as inputs for the Benefit-Cost and Macroeconomic analyses for the 2013 RPS Main Tier Program Evaluation. Both analyses required year by year spending summaries by technology, as well as some detail on the type of spending incurred in different categories and sectors. The previous figures and tables show summaries of spending by category and sector. Figure 2 depicts the direct investments in New York State by year, broken down by technology. Direct spending fluctuates in the early years as projects are being developed and installed, and then stabilizes as the portfolio of projects complete installation and commence stable long-term operations.

Figure 2. Direct Investments in New York State by Year and Technology (2012 Dollars)



Direct Investments in New York State versus RPS Program Investment

In this analysis, an investment ratio was calculated that compares the Current Portfolio of project's direct investments in New York State with the RPS investments in Main Tier and Maintenance Resource projects. The direct investments in New York State are calculated as all direct in-state spending over the project's useful life, which extends beyond the 10-year RPS contract. The RPS investment portion of this comparison is the total RPS-related cost premium borne by ratepayers for procuring RPS Attributes over what is typically a 10 year term. The premise of this assumption is that the RPS program is responsible for stimulating construction and operation, whether or not NYSERDA contracts for the whole project output over a project's entire useful life. Table 3 summarizes the Direct Investments in New York State and RPS Program Investment in nominal dollars for Group 1 and Group 2.

Table 3. Total Direct Investments in New York State and RPS Program Investment (Nominal Dollars)

Technology	Total Direct Investments in New York State (Millions)		Total RPS Program Investment (Millions)[a]	
	Group 1	Group 2	Group 1	Group 2
Wind	$ 987	$1,078	$220	$455
Hydroelectric	$ 17	$ 38	$ 4	$ 22
Biomass	$ 178	$ 531	$ 30	$133
Landfill Gas	n/a	$ 111	n/a	$ 58
Total	$1,182	$1,758	$254	$668

[a] For this calculation, RPS Program Investment included the actual historical payments and future contracted payments for RPS Attributes in addition to the historical and projected Administration costs for the Current Portfolio of Main Tier and Maintenance Resource projects.

Table 4 shows the Direct Investments in New York State and RPS Program Investments in 2012 Dollars on a Net Present Value (NPV) basis, which is used to calculate an investment ratio for each technology. An investment ratio in excess of 1 reflects greater direct investment realized than what was spent to implement and execute RPS contracts. An investment ratio in excess of 1 was realized, or is expected, across technologies. In total, the Current Portfolio studied yielded much more benefit than cost, on average, by approximately a 3:1 ratio.

Table 4. Current Portfolio Investment Ratios (2012 Dollars)

Technology	NPV[a] Total Direct Investments in New York State (Millions)	NPV Total RPS Program Investment (Millions)	Investment Ratio
Wind	$ 979	$324	3.0
Hydroelectric	$ 25	$ 12	2.0
Biomass	$ 214	$ 71	3.0
Landfill Gas	$ 34	$ 24	1.4
Total	$1,252	$431	2.9

[a] NPV was calculated using 2002 as the base year, which matches the first year in which benefits accrue.

Key Findings and Conclusions

Through December 31, 2012, the RPS Main Tier has provided substantial revenue to support new generation from wind, biomass, hydroelectric and landfill gas systems. Through a comprehensive verification process on 18 Main Tier facilities, NYSERDA has confirmed that the currently contracted resources have yielded and will continue to yield significant direct investments to the State which far exceed the RPS funds committed to these projects.

The verification of New York State spending through three years of operation from 18 Main Tier facilities has shown that over 1,000 in-state businesses spread over 44 counties benefited through the development, construction and operation of these facilities. The geographic and economic impacts of these projects are often concentrated around the project location but also extend beyond the host counties where the projects are located. While fuel resource access and tax/local permit payments typically remain within the host county, purchases of goods and services for these projects were sourced throughout New York State.

Approximately $2.7 billion dollars of direct investments in New York State are expected over the projected life of the Current Portfolio of Main Tier RPS facilities, as measured in jobs, taxes and local payments, in-state purchases and land leases. In the short-term, the greatest impacts come from spending on construction materials and services. In the long-term, PILOT payments, payroll expenses, fuel and landowner payments trigger the largest economic impacts. Overall, approximately $27 in direct investments are produced as a result of project expenditures in New York for every 1 MWh of renewable energy that is generated under the Main Tier program.

The analysis indicates that for every $1 spent on the acquisition of RPS Attributes for the Current Portfolio of RPS projects under contract with NYSERDA, the State will capture on average approximately $3 in direct investments associated with project spending over project lifetime. Clearly the RPS Main Tier has brought and will continue to bring significant investments to many sectors of the state’s economy.

1 Introduction

1.1 Objective

The objective of this study was to analyze verified direct investments in New York State which are associated with a subset of New York State Main Tier and Maintenance resource RPS[7] contracts, and to estimate these investments associated with the remaining projects with current Main Tier contracts as of December 31, 2012. This analysis was accomplished by evaluating verified in-state direct investment data from 18 projects with NYSERDA Main Tier and Maintenance resource RPS contracts, and extrapolating these investments through the life of each project. The resulting data was then used to project the direct investments in New York State that are attributable to all current RPS projects.

This analysis only considers the direct impacts of the Current Portfolio of Main Tier RPS contracts, without consideration of multiplier or induced effects, or net impacts. These investments are then compared with the value or cost of RPS contracts for a direct benefit-cost analysis of current projects in the Main Tier RPS program, referred to in this report as an investment ratio. Direct investments include all in-state spending by projects, in the form of purchases or salary payments, over their development, construction, and operating life. NYSERDA’s consultants verified data that were submitted in an effort to better understand the scope and scale of the direct investments resulting from incentivizing renewable energy development within the State.

The focus of this study is on direct investments in New York State, which is a subset of the total amount spent by project developers, as this provides an estimate of the direct economic development benefit realized in New York State. Some studies simply provide the total cost of project development, including imported hardware and services, so comparison to other economic development reports should be made with care.

The analysis of the benefits associated with direct project investment is comprised of two parts:

- To provide an assessment of the direct investments in New York State that were associated with the projects that had submitted verified data, The first part was focused on the subset of verified projects, including a Maintenance resource project, and includes all verified and anticipated direct benefits.
- To provide an analysis of the portfolio of Main Tier projects under contract as of December 31, 2012 (“Current Portfolio”) for use in the 2013 RPS Main Tier Program Evaluation. This second part includes all Main Tier RPS projects in the Current Portfolio, but excludes Maintenance resource projects, and reflects some modeled inputs and adjustments necessary to support conducting Net Macroeconomic and Benefit-Cost analyses for the 2013 RPS Main Tier Program Evaluation.

[7] This effort includes stand-alone analyses of 17 Main Tier projects and one Maintenance Resource project with verified benefits.

1.2 Background

Five categories of direct investments in New York State were used as the basis for this study. Data was collected by NYSERDA from operating projects for the purpose of substantiating the direct investments in New York State which were included in project bid proposals.[8] (See Section 1.2.2 for a detailed explanation of this process). These data were then analyzed by NYSERDA's consultants – Sustainable Energy Advantage, LLC and Economic Development Research Group, Inc. – in an effort to better understand the nature of the direct investments realized as a result of incentivizing renewable energy development within the State. These benefits as described in the following section include in-state expenditures by each project through development, construction, and operating (including maintenance) phases, have significant direct impacts on the New York State economy.

1.2.1 Benefits Categories

NYSERDA verifies actual direct investments in New York State created by an RPS project through the first three years of the NYSERDA contract in the following categories:

1. Long-Term New York State Jobs: The degree to which the operation of the project directly created long-term jobs (jobs lasting more than three years) in New York State. Examples of such jobs include, but are not limited to, those associated with operations and maintenance, plant management, or similar.
2. Payments to New York State and/or its Municipalities (Payments to Public Entities): The degree to which the operation of the project provided new or increased local property tax revenues to school districts, cities, towns or other taxing jurisdictions in New York State, or alternatively, Payments in Lieu of Taxes (PILOT) or other alternative taxing mechanisms and forms of compensation.
3. Payments for Fuels and Resource Access: The degree to which the operation of the project provided royalties, production-based payments, land lease or land use payments or other forms of compensation, associated with securing rights to or directly acquiring fuel or access to wind resources for the project. Examples include payments for leases of land in New York State, payments associated with the production of electricity, fuel purchases of biomass sourced or harvested in New York State, and purchases for landfill gas produced in New York State.
4. In-State Purchases or Consumption of Goods: The degree to which local and state economic activity increased as a result of:

    - The purchase and consumption of local goods and services by non-New York State-resident workers, such as, but not limited to, food, lodging, vehicles, equipment, fuel.
    - The purchase of materials sourced from within New York State such as, but not limited to, gravel, steel, concrete and similar materials and/or the purchase and use of equipment and products manufactured or assembled within New York State and/or the use of rental equipment or similar supplies sourced from within New York State.

8 RPS Contract terms require the facilities to demonstrate actual investment of no less than 85% of the bid-based amount, or face a penalty through a lowering of contract prices.

- o Ongoing operations and maintenance expenses occurring through the first three years of the NYSERDA contract.

5. Short-Term Employment: The degree to which New York State workers were employed on a short-term basis. Illustrative examples include direct employment of New York State construction, rail and port workers, contractors and laborers, engineering or environmental service providers, consultants, financial service advisors, and legal service providers associated with the development and construction/modification of the project.

1.2.2 Benefits Verification Process

NYSERDA's RPS Main Tier contracts require each of NYSERDA's contractors, after the first three years of project operations under contract, to demonstrate that at least 85% of the direct investments in New York State that were claimed in the contractor's Bid Proposal have actually accrued to New York State. Failure to make that demonstration results in a proportionate reduction in the contract bid price for the remaining seven years of the contract term.[9] This requirement is based on the Commission Order that authorized economic benefits evaluation criteria to constitute 30% of the weight in bid evaluation, which stated that "the economic benefits category shall be designed such that any project, regardless where located, would have the same opportunity to quantitatively demonstrate its likely – and verifiable – economic benefits to New York State."[10] NYSERDA recognizes the importance of the accurate, verifiable quantification of the direct investments of projects receiving RPS Main Tier funding to the integrity of the 30% weighting. The comprehensive process developed by NYSERDA to verify the accrual of direct investments in New York State reflects this priority.

NYSERDA program staff is responsible for reviewing the documentation provided by contractors after the third year of operation, and, in consultation with NYSERDA legal staff, determining whether the actual direct investments were consistent with those claimed in the bid proposals. Records provided as demonstration of benefits differ by project, type of direct investment claimed, and contractor, but to be acceptable all records must be third-party verifiable. Examples of records provided for this purpose include: W-2 (Wage and Tax Statement), 1099 (Non-Employee Compensation), invoices and accompanying records of payment, Payment-in-lieu of taxes (PILOT) or Host Community Agreements with accompanying records of payment, and subcontracts with supplier breakdown and associated documentation.

Regardless of the form of documentation, NYSERDA considers overarching factors throughout this process such as the reasonableness of the claimed expenses, the presence of satisfactory demonstration that an expense was actually incurred, and assurance that expenses were not double counted.

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9 For example, if through the verification process a contractor demonstrates the accrual of 75% of the economic benefits claimed, the bid price payable will be reduced by 25%.

10 Case 03-E-0188; Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard; "Order Authorizing Solicitation Methods and Consideration of Bid Evaluation Criteria and Denying Request for Clarification," issued and effective October 19, 2006, p. 16.

Procedurally, the process for verifying direct investments in New York State consists of five primary steps:

1. RPS program staff engages each contractor in advance of the report due date to discuss the obligation to demonstrate the actual accrual of economic benefits through the submission of verifiable, defensible documentation confirming the bid proposal claims. Eligible data sources are also reviewed with the contractor.
2. RPS program staff reviews the initial submission.
3. RPS program staff engages the contractor to review additional data needs; follow up ensues to ensure that NYSERDA is collecting the best and most complete data set available to substantiate economic benefit claims. Should the need arise RPS program staff engages RPS legal staff for support. RPS program staff may also engage outside support from subcontractors, other State agencies, local taxing jurisdictions, etc. to assist with the independent verification of direct investments in New York State.
4. Once a file is complete and thoroughly evaluated, a letter recommendation and summary report are prepared and circulated internally along with all supporting documentation for approval by NYSERDA legal and senior RPS program staff.
5. Contractors are notified of their compliance status in writing.

1.2.3 Direct Investments in New York State Verification Status

As of December 31, 2012, 18 facilities with claimed direct investments in New York State had passed their three-year anniversary of operations under contract. These facilities include 8 wind farms, 2 biomass facilities (including one Maintenance resource project) and 8 hydroelectric facility upgrades, which are all located in New York State. For purposes of this study, these projects are referred to as Group 1 facilities. RPS staff completed a thorough review of the documentation provided to substantiate the claims made for each of these facilities. Through the process described above, more than 30,000 documents were received and examined by RPS staff.[11] All 18 facilities were determined to be at or above their contract compliance obligation.

1.2.4 In-State Purchases versus Short-Term Employment

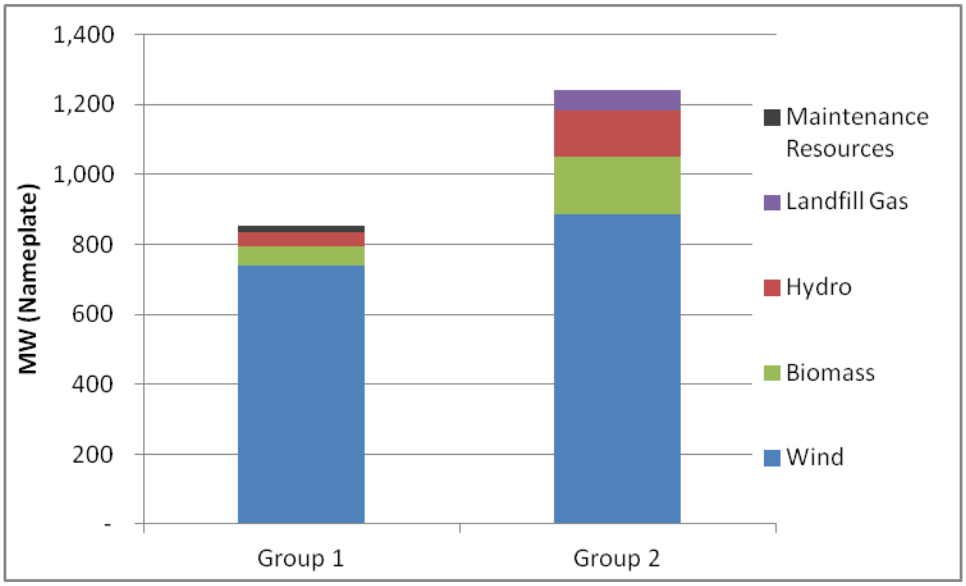
Through the direct investment verification process, significant short term employment benefits were verified by NYSERDA. However, a preponderance of short term employment was verified as falling under the In-State Purchases category. The reason is that vast majority of short term workers were not paid as independent contractors, where the individual employee's salary and length of work could be verified by NYSERDA as defined through the categories above. Rather, this labor was largely obtained through contracts with construction or other service firms, and the associated invoices included fees for both materials and labor. Therefore, much of the short-term employment was actually verified in the In-State Purchases category, a factor that is considered and addressed through this analysis.

[11] Most of the referenced documents were submitted to NYSERDA under a claim of confidentiality under Public Officers' Law § 87(2)(d), as records submitted to an agency by a commercial enterprise.

1.3 Project Data

The RPS projects were analyzed in two groups. Group 1 projects submitted, and NYSERDA has verified, three years worth of spending data, which was used as the basis for this direct investment analysis. Group 2 projects consist of the remaining projects under contract with NYSERDA. Many of these projects submitted bid data on expected direct investments but have not operated under the NYSERDA contract for three years, the period after which reporting is required. Group 1 (834 MW) has fewer megawatts than Group 2 (1,241 MW) as shown in Figure 3. The Group 1 total includes one 19 MW Maintenance resource project which was used for the verified data analysis but not included in the Main Tier Current Portfolio Analysis which followed.

Figure 3. Nameplate MW by Technology and Group



The direct investment data that have been verified for the 18 Group 1 facilities shown in Figure 4 and listed in Table 5 form the basis for projecting the direct investments that are anticipated to accrue to New York State from the operation of 30 additional projects (referred to hereafter as Group 2 facilities). Group 2 facilities have been approved for an RPS contract with NYSERDA, but either

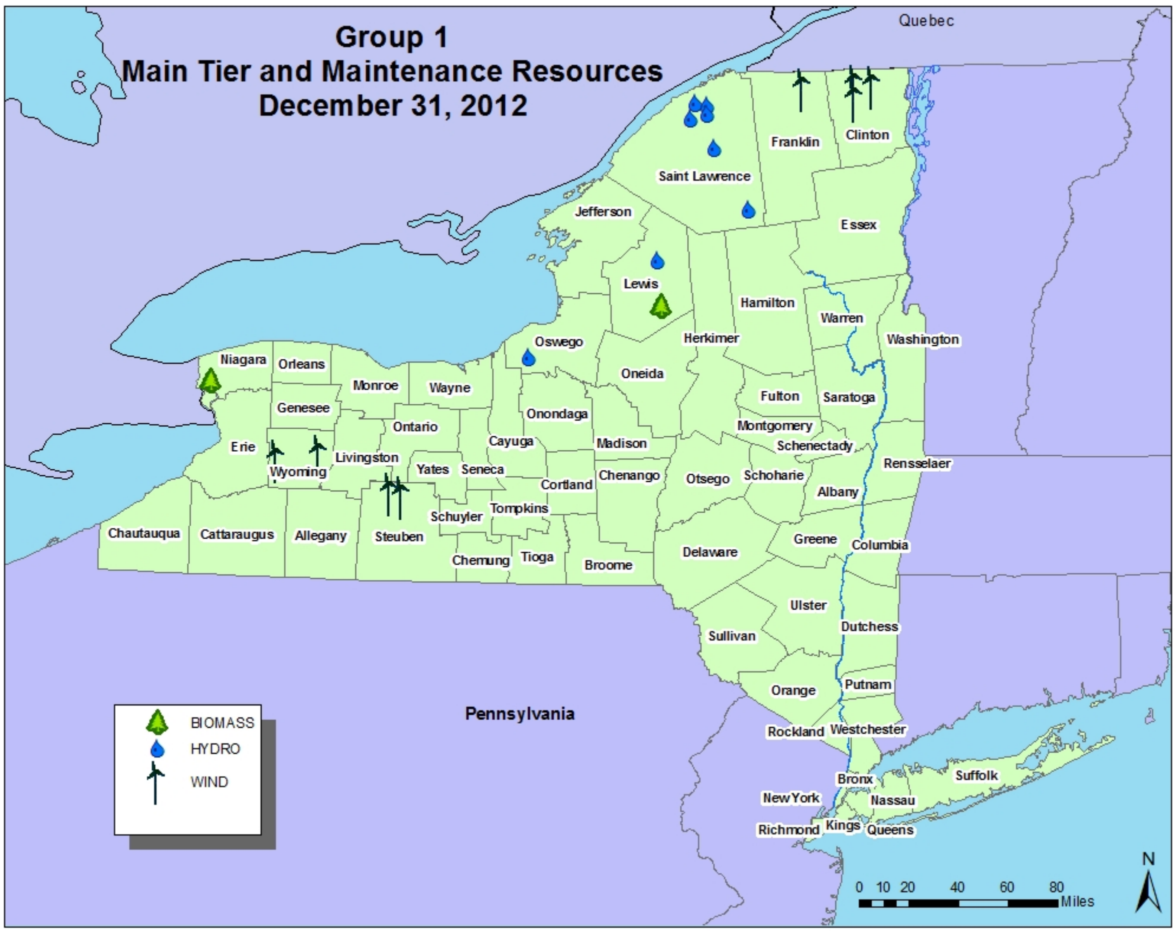
- Have not been reached their three-year contract year anniversary and a verified data set of spending is not yet available.
- Anticipated in-state benefits were not eligible for NYSERDA's consideration pursuant to specific requirements of the RPS solicitation under which the project received an award.[12]

[12] RFP 916 awards were based only on the price bid for RPS Attributes. RFP 1851 included a requirement based on Commission Orders which restricted economic benefits eligibility to those projects entering commercial operation after January 8, 2010.

There were an additional 10 projects for which direct investments were not projected because New York State investments were not claimed in their RPS bid despite the eligibility of such claims. Though no direct investments were attributed to those projects in this analysis, the budgeted costs to be paid by NYSERDA for RPS Attributes were included in later benefit-cost analyses.[13]

Group 2 facilities are listed in Table 6 and shown on a map in Figure 5.

Figure 4. Map of Projects with Verified Direct Investments in New York State (Group 1)



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13 RFP 916 awards were based only on the price bid for RPS Attributes. RFP 1851 included a requirement based on Commission Orders which restricted economic benefits eligibility to those projects entering commercial operation after January 8, 2010.

Table 5. Projects with Verified Direct Investments in New York State (Group 1)

Technology	Project Name	Nameplate Capacity (MW)[14]	Delivery Start Date
Wind	Altona Windpark	102.00	February 2009
Wind	Bliss Windpark	100.50	June 2008
Wind	Chateaugay Windpark	106.50	February 2009
Wind	Clinton Windpark	100.50	June 2008
Wind	Dutch Hill Farm/Cohocton Wind Farm	125.00	February 2009
Wind	Ellenburg Windpark	81.00	June 2008
Wind	Wethersfield Windpark	126.00	February 2009
Biomass	Lyonsdale Biomass (Maintenance Resource)	19.00	January 2008
Biomass	Niagara Generation Facility	54.00	May 2008
Hydroelectric	Eagle	6.57	January 2008
Hydroelectric	East Norfolk	4.05	January 2008
Hydroelectric	Higley Falls	6.20	January 2008
Hydroelectric	Norfolk	5.75	January 2008
Hydroelectric	Norwood	2.67	November 2008
Hydroelectric	Oswego Falls	7.47	November 2008
Hydroelectric	Piercefield	2.70	January 2009
Hydroelectric	Raymondville	2.70	November 2008

[14] Nameplate Capacity refers to the Bid Facility's full capacity whereas Bid Capacity refers to the portion of the Bid Facility's capacity associated with production which is under an RPS contract.

Figure 5. Map of Projects with Calculated Direct Investments in New York State (Group 2)

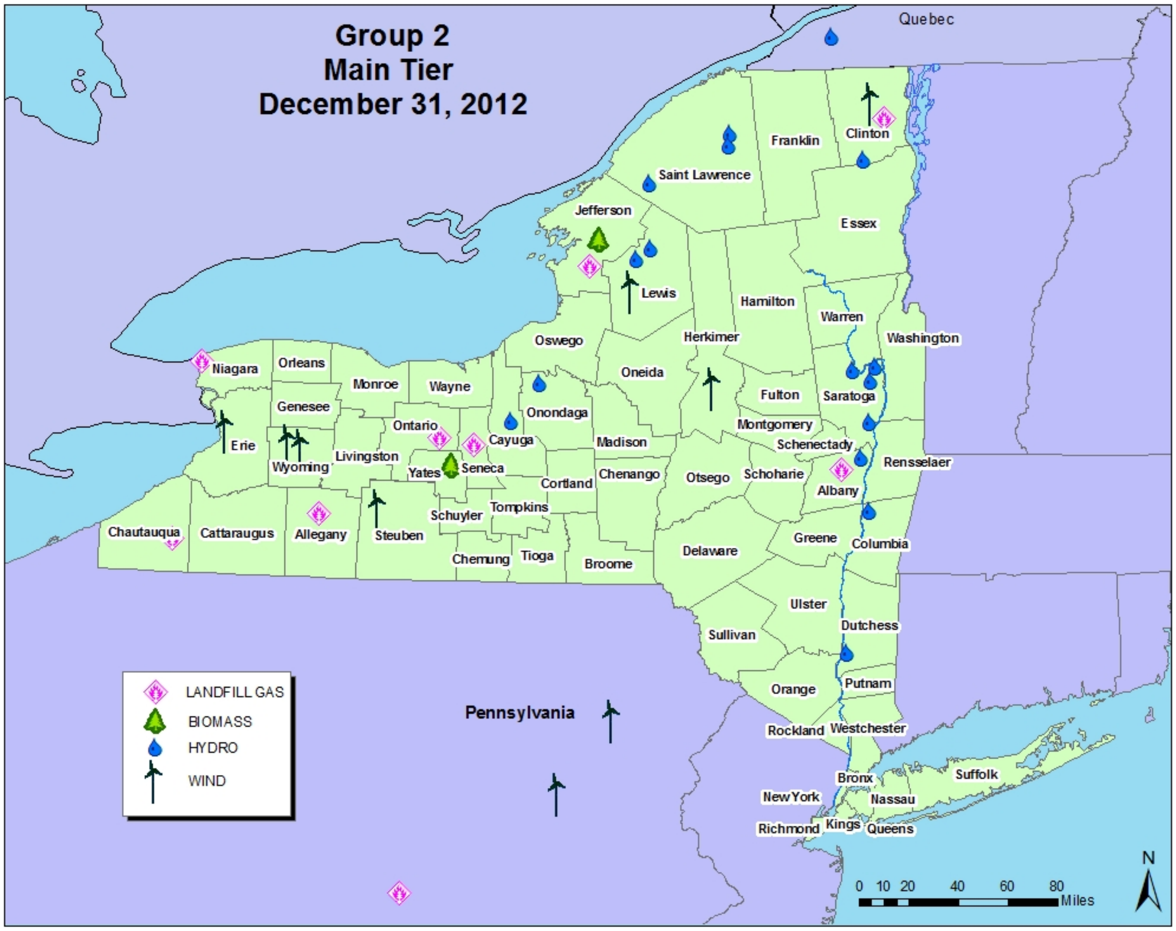

Table 6. Projects with Calculated Direct Investments in New York State (Group 2)

Technology	Project Name	Nameplate Capacity (MW)	Delivery Start Date
Wind	Hardscrabble Wind Farm	74.00	March 2011
Wind	High Sheldon Wind Farm	112.50	March 2012
Wind	Howard Wind Farm	51.25	January 2012
Wind	Howard Wind Farm Expansion	4.10	January 2013
Wind	Maple Ridge Wind Farm	321.00	January 2006
Wind	Marble River Wind Farm	215.25	December 2012
Wind	Steel Winds II Wind Farm	15.00	February 2012
Wind	Orangeville Wind Farm	92.80	October 2013
Biomass	AES Greenidge, LLC	104.00	August 2009
Biomass	Black River Facility	60.00	October 2013
Hydroelectric	Black Brook Hydro	0.64	June 2011
Hydroelectric	Brown Falls	15.90	January 2008
Hydroelectric	Mechanicville Hydroelectric	4.50	June 2011
Hydroelectric	Mill Street Dam	0.60	October 2013
Hydroelectric	School Street Hydroelectric	38.80	January 2011
Hydroelectric	Spier Falls	56.60	January 2006
Hydroelectric	Stewarts Bridge Hydroelectric	2.60	July 2013
Hydroelectric	Stuyvesant Falls Hydroelectric	6.00	January 2013
Hydroelectric	Taylorville Hydroelectric Project	4.60	January 2011
Hydroelectric	Wappingers Falls Hydroelectric	2.10	July 2011
Hydroelectric	Wave Hydro LLC	0.42	July 2011
Landfill Gas	Albany 1	0.90	January 2011
Landfill Gas	Albany 2	3.20	July 2012
Landfill Gas	Chautauqua LFGE	8.00	July 2011
Landfill Gas	Clinton County Landfill	6.40	May 2012
Landfill Gas	DANC LFGE	4.80	July 2011
Landfill Gas	Hyland LFGE	4.80	July 2011
Landfill Gas	Modern LFGE	6.40	July 2011
Landfill Gas	Ontario LFGE	6.40	July 2011
Landfill Gas	Seneca Energy	17.60	July 2011

2 Methodology

2.1 Overview

The direct investments in New York State assessment was based on the verified data set. Data on Group 1 projects included verified spending data through three years of operation, which was then extrapolated by technology for expected long-term expenditures over a project's useful life. For every technology, a dollars-per-megawatt ($/MW) factor was calculated by expenditure category, which was used to calculate expected short-term and long-term direct investments in New York State for projects with no verified data.

2.2 Data Source

The main data source for this evaluation comes from the 18 Group 1 projects with NYSERDA RPS contracts that have reported three years of project data verified by NYSERDA staff according to the process referenced in Section 1.2.2.[15] Detailed results and analysis of the verified investments in New York State are included in Section 3.1 of this report.

Group 1 projects were sorted by technology, and each project's verified expenditures were summed up by year and by the categories detailed in Section 1.2.1. This three-year data set comprised a mix of short-term spending - characterized as initial investments for project upgrades or development - and long-term spending for operations and maintenance. Group 2 projects did not have verified data reported, so their direct investments in New York State were calculated by applying metrics developed from the Group 1 data set or by using bid data in the absence of a correlating Group 1 data set. Because all Group 1 facilities with verified investments met or exceeded the threshold for contractual adjustment, it is reasonable to assume that the RPS contractual repercussions are an effective deterrent to overstating benefits, and thus bid proposal data was considered to be an acceptable proxy for verified data.

2.3 General Assumptions

Despite having a robust data set of verified investments from Group 1 projects, the study still required developing a number of educated assumptions to complete the data set. These assumptions included the split between short-term versus long-term spending within these data sets, anticipated project life, fuel cost, and the magnitude of unreported long-term spending for capital replacements. These assumptions were largely based on inputs to be used for NYSERDA's 2013 Main Tier RPS Program Evaluation. Section 2.4.2.3 provides more detail about how these assumptions were used to extrapolate Operations and Maintenance expenditures (O&M) over the project's expected life. The analysis was conducted in 2012 dollars, and all verified data, which were reported in nominal dollars, were

[15] The verification process yielded documentation which required the inclusion of short-term jobs in the in-state purchases category. See Section 1.2.4 for additional discussion on this topic.

converted using the GDP Inflation Index from U.S. Energy Information Administration (EIA)'s Annual Energy Outlook 2013.[16] Results are shown in both real and nominal dollars.

2.4 Group 1 Investment Calculations

Direct investments in New York State were calculated for each project over the expected project life, including expected operating years that extend beyond the end of the RPS contract. Direct investments are defined as total New York State spending from the project, which includes short-term expenditures for project upgrades or development, as well as long-term expenditures for ongoing O&M.

The direct investments in New York State were calculated and analyzed for short and long-term economic impacts. Short-term impacts included:

- Jobs lasting three years or less, such as construction, planning, engineering and legal jobs.
- Initial equipment or one-time capital expenditures for the development and construction of the project.

Long-term impacts included:

- Project ongoing operations and maintenance payroll (including salaries and benefits).
- Taxes or Payments in Lieu of Taxes to the State, municipalities, and schools (payments to public entities).
- Fuel purchases.
- Landowner payments.
- Other O&M in-state spending on equipment, supplies and services.

For Group 1, each project's direct investments comprised both verified and modeled expenditures, with heavy emphasis on verified investments wherever available. The verified direct investments in New York State during the first three years of operating life include neither capital replacement costs nor higher O&M spending one would expect as projects age. Therefore, a small incremental O&M expenditure was added into the In-state Purchases category to account for these expected but unverified expenditures, to paint a full picture of each project's realistic O&M spending over its useful life. All verified and modeled data were converted to 2012 dollars for consistency. The complete modeling process is described in Section 2.4.2.3. As described earlier, Group 1 benefit per-unit ratios were used as the primary basis for calculating projected investments for Group 2 projects. This approach is explained more fully in Section 2.5.

Figure 6 illustrates the direct investments in New York State calculation process for all categories except for In-state Purchases. Verified data was split up into short-term expenditures (construction-related) and long-term expenditures (O&M related) for the first three years. The long-term spending was then extrapolated over the rest of the project's projected useful life to calculate the project's total direct investment.

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[16] EIA's Annual Energy Outlook .http://www.eia.gov/forecasts/aeo/.

Figure 6. Direct Investment in New York State Calculation for Jobs, Payments to Public Entities, and Fuel Resource Access Categories

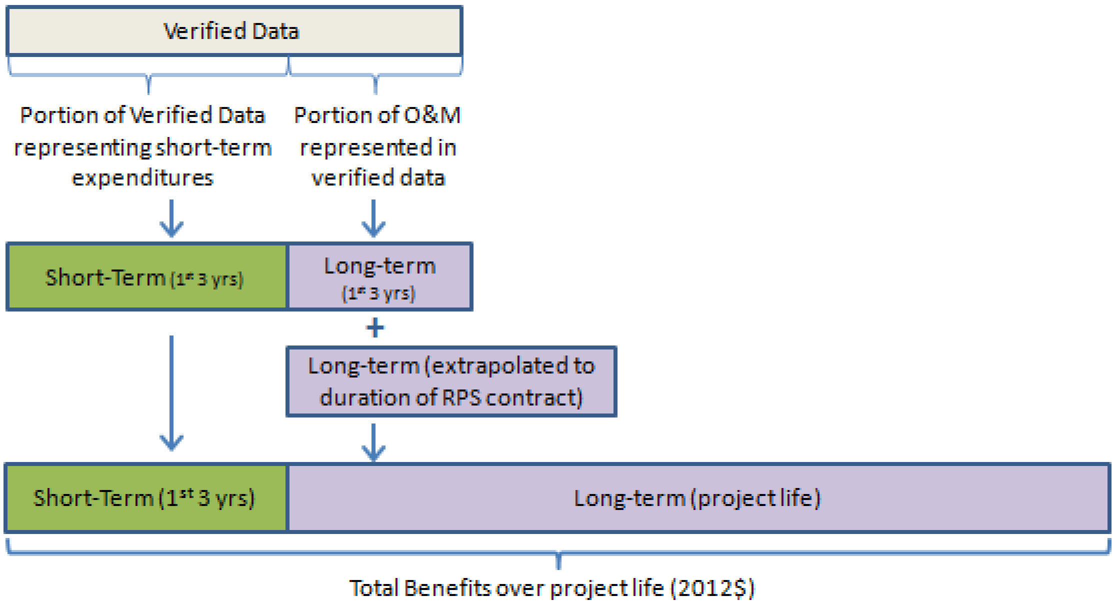
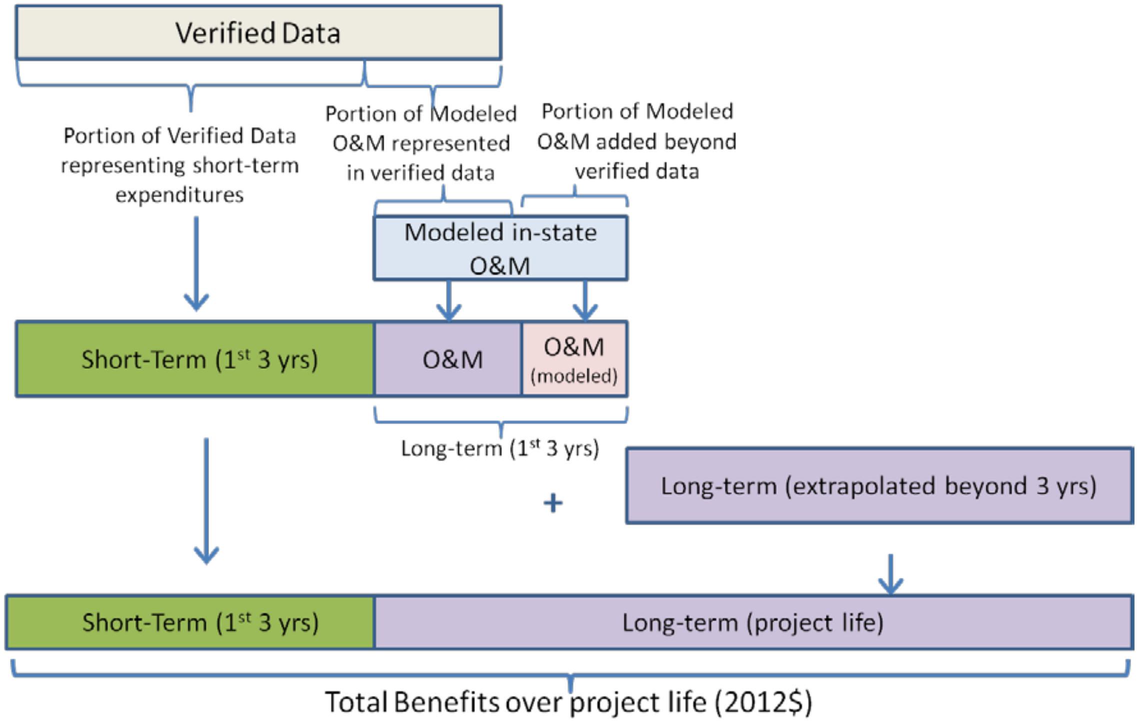


Figure 7 shows the process for calculating In-state Purchases. It is similar to the process used for other spending categories, but also includes modeled O&M. As with the other categories, verified direct investments in New York State were split into short-term expenditures and long-term expenditures representing O&M spending for the first three years. Because projects are expected to increase O&M spending on parts and maintenance over their operating life, a small portion of modeled O&M was added to the long-term expenditures for each operating year. Direct investments are extrapolated for all projects through expected operating life, which extends past the end of the RPS contract. In-state Purchases are broken down into a number of sectors, such as construction, utilities, or legal services. For the direct investment calculations developed for the 2013 Main Tier Program Evaluation, a further adjustment was made to all project-related spending modeled as transactions through the New York State wholesale or retail trade sectors. Only the “mark-up” dollars or “margin”reflects the New York State for these sectors. The mark-up percent for Wholesale trade business is 20% and 28% for Retail trade businesses; this percentage was applied to all purchases in the these categories.[17]

[17] 2010 NYS IMPLAN Model industry database. http://implan.com/V4/Index.php.

Figure 7. Direct Investment in New York State Calculation for In-State Purchases Category



2.4.1 Short-term Expenditures

Short-term expenditures were defined as all direct investments in New York State not associated with O&M or capital replacement costs. For Group 1 projects, short-term expenditures were calculated by taking all verified investments and subtracting out long-term O&M expenditures for each operating year, assuming no capital replacement costs were included in the verified investments data set.

2.4.2 Long-term Expenditures

Long-term expenditures represent all of the ongoing O&M direct investments in New York State over a project's life, including payments to public entities and landowners, fuel costs, labor, and materials. For this analysis, Group 1 projects reported the first three years of in-state expenditures, which were divided between short-term and long-term costs. Group 1 long-term expenditures, by expenditure category and by technology, were converted to a dollars per unit of capacity or $/MW per year measure that was then extrapolated for the project life.

Details on the specific modeling approach used for Group 1 projects for each category of long-term expenditures are presented in the following sections.

2.4.2.1 Long-term Fuel Payments – Biomass

Biomass projects incur significant fuel payments over the life of the project that varies by expected production. For projects that are operating and have been producing at expected output, historic fuel cost was extrapolated in a similar method as other categories, with the expectation that production[18] and thus fuel use would remain the same.[19] For projects that had under-produced relative to their Bid Quantities during the period of data verification, a $/MWh fuel cost was calculated from historic data and applied to future expected production based on contracted production over the project life.

2.4.2.2 Long-term Labor, Payments to Public Entities, Landowner Payments

Long-term costs for labor as well as payments to public entities and landowners were extracted from the rest of the verified direct investments in New York State for each project by using the last full year directly following commercial operation from the reported and verified data. For example, if a project began operating on July 1, 2008 and submitted spending data through mid 2011, costs in 2010 are assumed to represent a full year of likely ongoing long-term costs in these categories.

The remaining long-term costs for in-state purchases related to O&M were estimated using verified and modeled quantities and applied over the expected project life as described in Section 2.4.3.3.

2.4.2.3 Remaining Operations & Maintenance Expenditures Calculation

O&M from Verified Data

All verified expenditures in the In-state Purchases category that were not considered as O&M expenses remained under short-term spending. Table 7 shows an illustration of separating and projecting O&M from the verified data.

Table 7. Illustrative O&M Allocation from Verified Project (2012 Dollars)

	2008	**2009**	**2010**	**2011-2027**
Total verified expenditures	$2M	$1.5M	$1M	(extrapolated)
Short-term portion	$1M	$0.5M	$0	n/a
Long-term portion (O&M)	$1M	$1M	$1M	$17M

18 This study assumed no production degradation over the projected life of the projects.
19 Verified fuel purchases showed that biomass plants' fuel costs averaged approximately $30/MWh.

As discussed in Section 2.4.2.2, the full final year of verified data for the compliance period was assumed to be representative of a typical year of long-term O&M costs. In this example, 2010 is the final year with verified data, and the project reported $1M of expenditures during that year. This sample project began operating in 2008, so $1M of each year's reported expenditures were categorized as ongoing O&M and the remainder was categorized as short-term expenditures. This $1M/year was extrapolated for the remainder of expected project life (17 years), totaling $20M in long-term O&M expenses over the project's useful life. The project also had $1.5M in remaining short-term expenditures incurred in 2008 and 2009.

The exception to this methodology is hydroelectric facilities, which reported only short-term expenditures. Long-term expenditures for hydroelectric facilities were all modeled according to the methodology described as follows.

Modeled O&M

Table 8 presents key metrics used to extrapolate O&M direct investments in New York State, consistent with those investments used in the 2013 RPS Main Tier Program Evaluation. Assumed project life was used to determine the number of years for extrapolating direct investments and production. These O&M costs were used to estimate each project's total O&M expenditures, a portion of which are assumed to be spent in New York State.

Table 8. Modeling Metrics for Extrapolation (2012 Dollars)

Technology	Project Life	Fixed O&M ($/kW-yr)	Variable O&M ($/MWh)[a]
Wind	20	67.1	0.58
Hydroelectric	25	60.0	6.1
Biomass	20[b]	84.5	11.2
Landfill Gas	20	112.0	13.2

[a] kW and MWh were based on the project's bid capacity to match requirements for what projects could report as verified in-state spending.
[b]Biomass co-firing is often modeled with a shorter project life because many are converted coal plants near the end of their useful life. The two co-firing plants in Group 1 and Group 2 were both newer coal plants which included significant investments, consequently both are expected to operate for 20+ years.

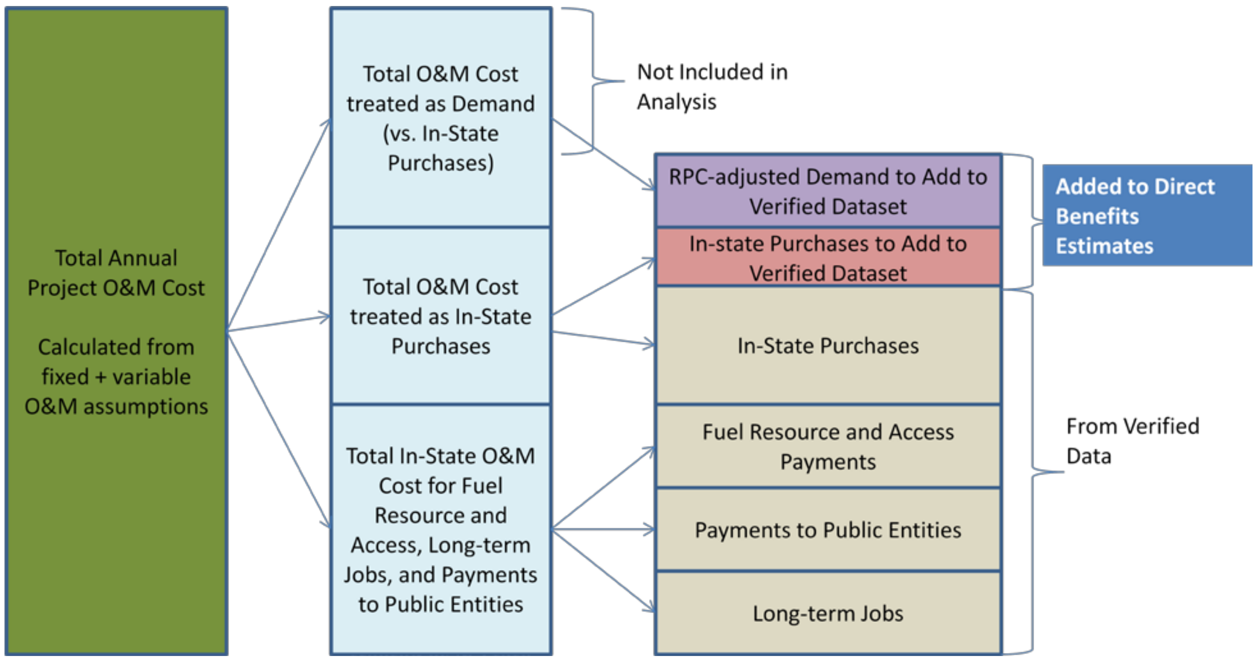
The verified data set only accounts for typical and verified O&M in-state expenses incurred within the three-year period during which projects reported verified expenses, and does not capture whether capital replacements or any O&M increase occurs over time as projects age. Models and reports in the electric power sector typically estimate O&M over a plant's life using escalation at a rate higher than inflation to account for higher maintenance costs universally experienced to keep aging equipment operating on a regular basis. To account for that portion of cost, the analysis compares the reported O&M with a modeled O&M projection by technology, and makes an assumption of what portion of the difference over time should be included as long term direct investments in New York State. This modeled O&M number estimates one year of O&M cost that accounts for future capital replacements and increases over time. This figure is higher than a project's initial O&M, but should plateau over the project's operating life. The remaining portion of modeled O&M that was not considered direct in-state spending was summed by sector and treated as demand that may or may not yield benefits to the State. Using the regional price coefficients (RPC) from Regional Economic Models Inc. (REMI), these demand benefits were de-rated to estimate their in-state benefits, and added to each project's total direct investments in New York State.

Each project's annual expected O&M expenditure was calculated based on its bid capacity and bid quantity. The calculated O&M expenditure includes all ongoing expenditures except for fuel costs. Although some O&M expenditures may have been directed out-of-state, this analysis assumed that long-term jobs, fuel resource access, and payments to public entities were all spent in-state, included in the verified data set and did not require any modeling considerations. Purchases are the only category[20] where the project's verified bid data do not represent a complete picture of their total direct investments in New York State. Therefore, a conservative assumption was made that only in-state purchases would see an expected increase in O&M costs as projects age.

Figure 8 depicts the breakdown of a project's annual O&M cost, including the de-rated Demand benefits that were included in the analyses for the 2013 Main Tier Program Evaluation. The green bar on the left represents one project's total O&M expenses, which include all costs except for fuel. The second bar shows the breakdown of that O&M expense into the demand portion, part of which is included in this analysis, and the in-state portions. The in-state portions are divided into Purchases and Other O&M. The third bar shows how these two in-state portions were compared with the verified data set to determine the O&M cost to be added to the in-state purchases category to account for higher ongoing costs over time. The rose-colored box near the top of the third stack represents direct investments in New York State that are added to the verified data set, and the purple box shows demand de-rated by RPC values to, both of which are added to the verified data to arrive at the total estimate for ongoing direct investments in New York State.

[20] These categories were divided into subcategories such as types of jobs or sectors for in-state purchases. The modeling process of estimating in-state purchases was done on each sub-category based on default data from existing macroeconomic models that estimated the percentage of O&M cost by sector, as well as the percentage of spending in New York State.

Figure 8. Diagram of O&M Cost Breakdown



2.5 Applying Group 1 Verified Investments to Group 2 Projects

Once the Group 1 project expenditures were adequately characterized and extrapolated through the project life, much of the resulting data could be applied to estimate projected investments for Group 2 projects of the same resource types throughout their respective project lives. Due to the greater level of accuracy and reliability of verified data compared to project bid data, Group 1 verified expenditure data were selected for this purpose over bid-based/proposed data whenever possible.

2.5.1 Short-term Expenditures

To calculate Group 2 investments from Group 1 data for Wind and Hydroelectric projects, the total amount of short-term expenditures for Group 1 projects were calculated on a $/MW basis by technology. Because short-term expenditures for most projects occurred over a span of years prior to the verification date, extrapolating to Group 2 projects required the development of a temporal profile of expenditures for short-term spending. This schedule was based on the typical temporal profile of expenditures for Group 1 projects by technology, and does not reflect additional research on the typical timeline of short-term expenditures for project development. This approach only applies to wind and hydroelectric projects, and Table 9 shows the temporal profile used for each technology starting three years prior to commercial operation (Op Yr – 3). Group 2 Biomass short-term expenditures were projected using bid data, as the technology- and site-specific nature of biomass plants suggests that data from Group 1 projects is unlikely to be representative of specific Group 2 projects. Landfill gas projects were not assigned short-term expenditures because these projects were already operating prior to the commencement of the RPS contract, or short-term expenditures were not included in the bid proposal provided for these projects. There were also no Group 1 Landfill Gas projects, so verified data were not available to estimate typical short-term expenditures in the absence of bid data.

Table 9. Short-Term Expenditure Schedule for Group 2 Calculation

Expenditure Category	Timeline (all numbers are percents)						
	Op Yr -3	Op Yr -2	Op Yr-1	Op Yr[a]	Op Yr+1	Op Yr+2	Op Yr+3
Wind							
Long-term Jobs	0	5	60	30	5	0	0
Payments to Public Entities	0	10	60	25	5	0	0
In-State Purchases	0	5	60	30	5	0	0
Fuel Resource Access Payments	10	20	40	25	5	0	0
Hydroelectric[b]							
In-State Purchases	10	30	60	0	0	0	0

[a] First year of commercial operation
[b] Group 1 Hydroelectric projects only reported in-state purchases

2.5.2 Long-Term Expenditures

Long-term in-state expenditures represent all of the ongoing O&M costs over a project's life, including payments to public entities and landowners, fuel costs, labor, and materials. Group 2 long-term expenditures were projected by applying the average Group 1 in-state $/MW per year unit measure of expenditures by technology and expenditure category to each Group 2 project's capacity.

Details on the specific modeling approach used for Group 2 projects for each technology category of long-term expenditures are presented below.

2.5.2.1 Wind and Hydroelectric Projects

Group 2 investments for wind and hydroelectric projects were calculated entirely based on Group 1 summary results on a $/MW basis across the main in-state expenditure categories and their subcategories. The standard metrics for projecting investments were calculated by totaling all Group 1 short-term verified spending and dividing by the total bid capacity (MW) in Group 1, yielding $/MW factors for every subcategory within long-term jobs (such as operations and administrative), payments to public entities, in-state purchases, and fuel resource access.[21] For short-term expenditures, the $/MW reflects total short-term spending for the project over a number of years. For any given Group 2 project, the $/MW was multiplied by that project's bid capacity and then spread out over time by the allocations presented in Table 9.

Long-term expenditures were based on the annual average $/MW for each technology and category. These expenditures were assumed to remain the same (in 2012 Dollars) over time, so the $/MW annual average was multiplied by the project's bid capacity and project life. The full set of data associated with Group 1 wind projects was included in the summary used to calculate Group 2 wind investments, but data from one hydroelectric project were removed as an outlier prior to developing extrapolation parameters.

2.5.2.2 Biomass Projects

Biomass projects differed in technology, size and fuel resource availability, and could not be accurately projected by applying total investments from Group 1 on a $/MW or $/MWh factor basis to estimate Group 2 investments. There were also fewer biomass projects than other technologies, some of which had low production or a short project life. Each biomass project's investments were estimated separately based on either their verified data (Group 1), or their bid data (Group 2). Bid data generally gave adequate information to calculate likely jobs by subcategory, other labor payments, fuel resource and access cost, as well as payments to public entities, especially as all Group 1 projects met or exceeded their bid proposal claims for benefits. Most bid proposals included in-state purchases in broader categories than required for this analysis, so the in-state purchase totals were allocated into sub-categories by using the relative percentages from Group 1 projects as a proxy.

Group 2 biomass fuel costs were not projected based on Group 1 project fuel costs, because each project could have different fuel requirements, fuel source mix (e.g., from waste wood and land clearing to forest biomass and silviculture, each with very different costs) and resource availability. Instead, Group 2 fuel costs were based on each project's bid data, which were compared to and generally consistent with the expected range verified for Group 1 projects. None of these estimates included assumptions for fuel cost increasing at higher-than-inflation rates over each project's operating life.

2.5.2.3 Landfill Gas Projects

Landfill Gas projects were not represented in Group 1, so there was no verified data available for extrapolation. Therefore, investments were estimated using bid proposals. As with Group 2 biomass projects, most of the Landfill Gas bid proposals included enough detail to estimate jobs, payments to public entities by category, and in-state purchases by category.

[21] Hydroelectric and Wind projects make ongoing payments for access to resources such as landowner payments to entities hosting wind turbines, but the associated Group 2 facility payments were estimated on a per MW basis rather than as a function of production, as landowner payments are generally more consistent over time.

Landfill Gas fuel payments were calculated based on reported resource access costs, which are paid to the landfill owner for fuel access or to the entity that owns the gas collection system. These costs ranged from $2-15/MWh. Because there were no verified data, and because none of the bid proposals specified fuel resource access costs, the landfill gas fuel costs were estimated by the project operator using their total resource access charges divided by production. One of the project operators provided fuel resource cost on a $/MWh basis for a majority of the Group 2 Landfill Gas projects, along with some general capital replacement estimates on a $/MW/yr basis. These fuel access costs were averaged and applied to projects with no cost data. The capital replacement estimates from projects making such estimates were applied to all remaining Landfill Gas projects as a proxy, and added to in-state purchases claimed in each project's bid proposal to reflect a "reported" total. This total was then adjusted to account for additional O&M costs over time as each project ages, using the same methodology as described in Section 2.4.2.3 on Modeled O&M. Group 2 Landfill Gas projects had no expected short-term costs because they were already operating prior to the start of the NYSERDA contract. However, direct investments were modeled over a 20-year expected life, beginning with the RPS contract start date. This approach represents a simplifying assumption that does not account for fuel resource degradation over time.[22]

2.6 Production Calculation

Through Main Tier RPS contracts, NYSERDA pays a production incentive to renewable electricity generators selected through competitive solicitations for the portion of electricity they deliver for end use in New York State covered under the contract. In exchange for receiving the production incentive, the renewable generator transfers to NYSERDA all rights and/or claims to the RPS Attributes associated with a specified percentage of the megawatt-hours (MWhs) of renewable electricity generated, and guarantees delivery of the associated electricity to the New York State ratepayers.[23] NYSERDA Main Tier RPS contracts includes provisions limiting NYSERDA's obligation to pay for up to a certain number of RPS Attributes per year, as well as over the typical 10-year contract term. The purchase quantity corresponds to the percentage of expected output of the project (or the output of the RPS-eligible upgrade) specified in the bid. This percentage may not exceed 95% of a project's expected output.[24]

Although the RPS contracts only obligate NYSERDA to pay for these RPS Attributes for the contract term – typically a 10-year period, with the exception of a few shorter contracts - this analysis incorporates direct investments in New York State and production for the entire project life based on the assumption that the initial RPS contract enabled the project to be built and the State will continue to experience the benefits of the associated in-

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22 We note that some landfill gas generators may experience declining production well before 20 years, as the methane production from capped landfill cells degrades, while others may be able to maintain a more level production profile over time as a landfill expands and additional gas is collected to replace depleting cells. There was insufficient data available in bidder submissions to distinguish the situation specific to each landfill gas project.

23 RPS Attributes include any and all reductions in harmful pollutants and emissions, such as carbon dioxide and oxides of sulfur and nitrogen. RPS Attributes are similar to Renewable Energy Certificates that are commonly used in other RPS programs to catalog and recognize environmental attributes of generation.

24 While many RPS Contracts are for 95% of the facility's output, a few bidders have exercised the ability to bid as low as 30% their output, as per the terms of the RPS Main Tier Solicitation.

state O&M spending through the life of the projects. The project's RPS contract start date was used as a proxy to model the project's operational date for the projection of associated investments.[25] Table 8 provides additional detail on the project life assumptions by technology type. This approach is explained in more detail in the benefit-cost analyses discussed in Section 3.4.

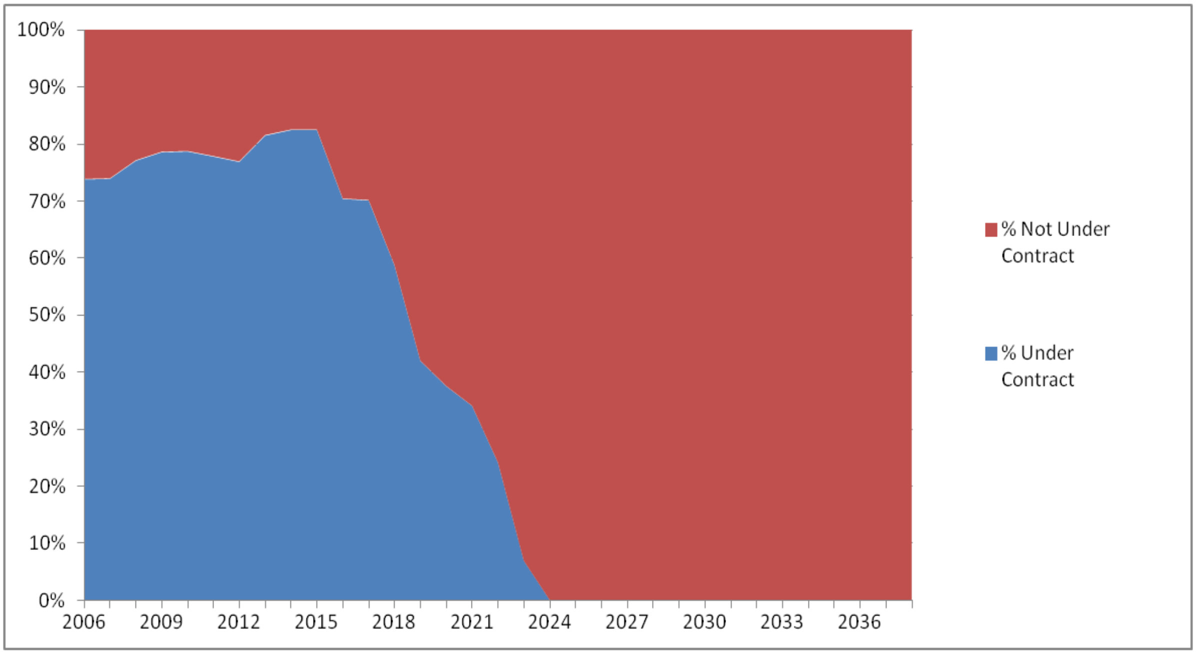
All projects were assumed to operate at maximum capacity for future years while historic production data and associated RPS payments were used for reported years. A number of Group 1 projects have underperformed to a degree such that contractual modifications were implemented by NYSERDA to decrease the maximum contractual production and payment obligations to these projects. These newer quantities and associated contract commitments are reflected in the analysis.[26]

Although direct investments in New York State are calculated as total in-state expenditures over the project's operating life, less than half of total lifetime production is generated while under an RPS contract. The RPS contracts cover the first 10 years and include up to 95% of a project's expected output. The aggregate summary for Group 1 and Group 2 production under contract as a percentage of total projected production is shown in Figure 9. Some projects only have a portion of their nameplate capacity under contract, which is why the portion under contract peaks at less than 90% instead of at 95% of total production. The RPS contracted portion tapers off as projects end their contracts from 2016-2024, and totals around 40% of production.

[25] A small number of projects began operating prior to the start of their RPS contract. By making this simplifying assumption, a small portion of production and benefits were likely offset in time by one or more years in this analysis.

[26] To ensure that the Main Tier target is met and other projects are afforded timely opportunities for funding, NYSERDA contractually requires that each project deliver at least a minimum percentage of the quantity of energy associated with its bid during each year. If a project fails to meet this percentage for a specified number of consecutive years, the annual quantity of RPS Attributes that NYSERDA is obligated to purchase from that project may be reduced for the remaining years of the contract.

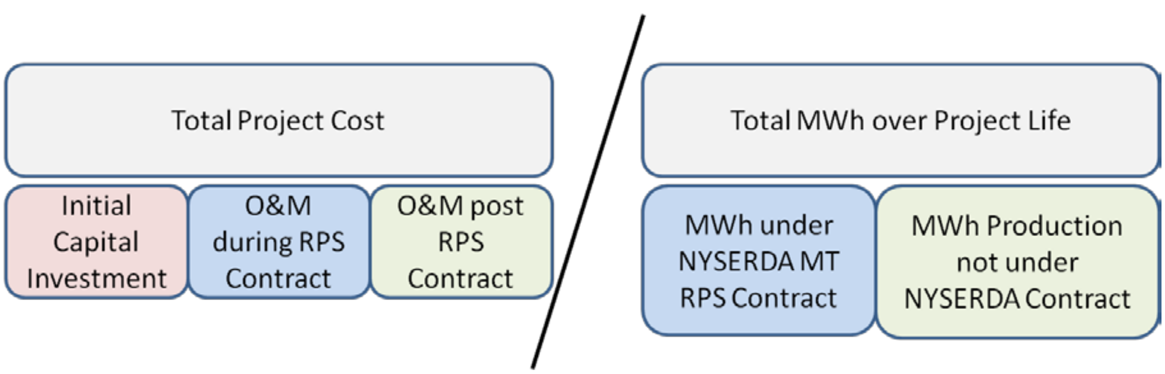
Figure 9. Aggregate Group 1 and Group 2 Proportion of RPS Contracted Production as Percentage of Total Production, by Year over Project Life



2.7 Direct Investments in New York State per MWh Produced

Using the methods described in previous sections, the total New York State short- and long-term spending for both Group 1 and Group 2 projects was then compared to the total production anticipated over the projects' operating lives. Figure 10 shows the breakdown of project spending and production categories. In this analysis, a project's total direct investments in New York State were compared with the cost of RPS contracts and total production over the project life. The calculation for $/MW is similar, except total spending is divided by the project's Nameplate or bid capacity, depending on the calculation.

Figure 10. Direct Investments in New York State and Production Components



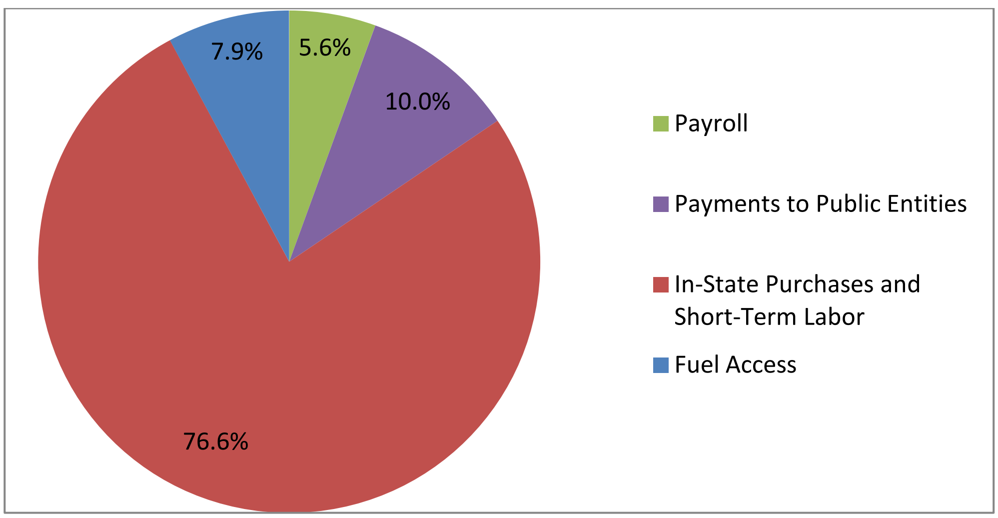
3 Results

3.1 Group 1 Verified Direct Investments in New York State Analysis

As previously discussed, the foundation for this analysis is a robust data set resulting from the verification of New York State spending spurred by the development, construction and operation of 18 Main Tier facilities listed in Table 5. Through this effort, more than 30,000 documents were examined by NYSERDA staff and extensive tracking tables were established for this subsequent analysis.

Key findings of the verification effort included corroboration of over $450 million already spent in New York State over the first three years of commercial operation for the 18 Group 1 facilities.[27] Figure 11 shows the four primary categories of 3-year verified spending for Group 1 projects and the percentage of spending in each category. The greatest percentage of verified spending was in the In-state Purchases and Short-Term Labor category, as this spending is highly concentrated in the construction and development phase. The other categories persist throughout the life of the facility for many resource types.

Figure 11. Verified Direct Investments in New York State by Category (Group 1) [a]



[a] Percentages may not add up to exactly 100% because of rounding.

[27] The total expenditures in this paragraph are expressed in nominal dollars added across calendar years.

3.1.1 Geographic Impacts

The geographic impacts of these projects extend beyond the host counties where the projects themselves are located. Although fuel resource access and payments to public entities typically remain within the host county, purchases of goods and services were sourced from all over the State. Figure 12 shows a map of spending by county, as reported in the verified three-year data set. Using the same three-year data set, Figure 13 shows the total number of affected businesses by county.

Figure 12. Verified In-State Purchases by County

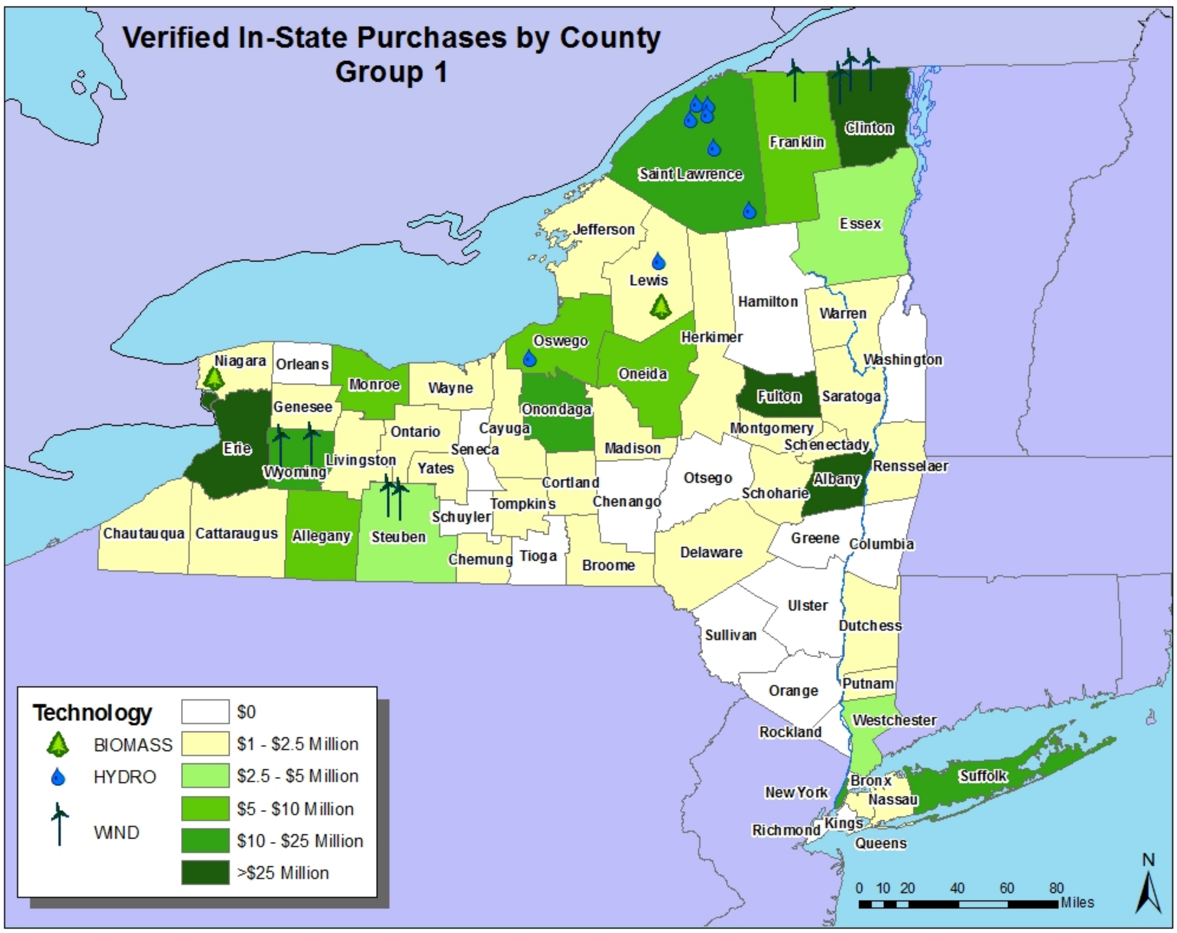


Figure 13. Number of Affected Businesses by County

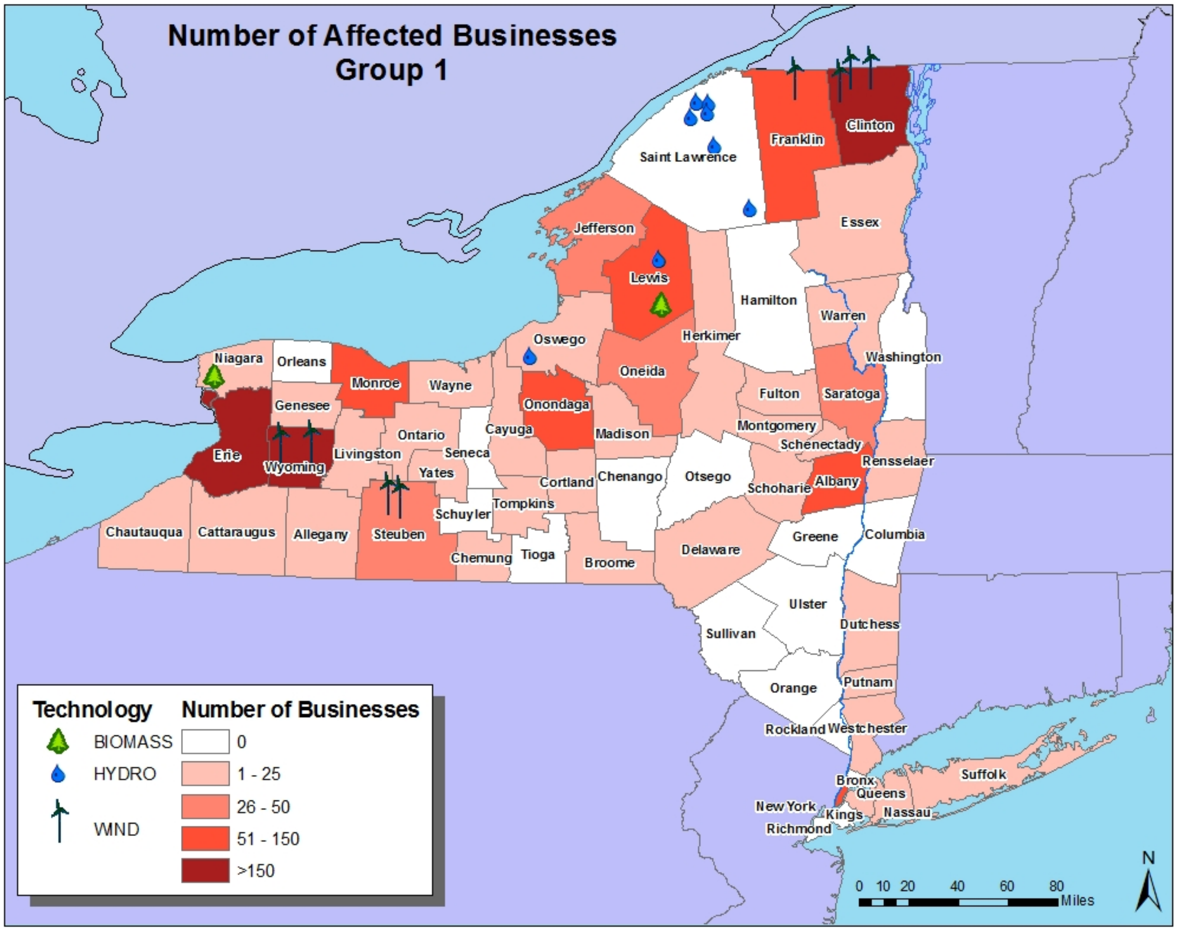


Table 10 highlights the 15 counties that received the largest share of verified In-State Purchases and Short-Term Jobs through the first three years of commercial operations. These numbers do not include payments for long-term jobs, payments to public entities, or fuel resource access payments. Most of these top counties host projects and received local direct investment benefits from purchases alone in addition to local tax payments land leases and jobs. New York State City also received a large portion of direct investments through the procurement of professional services.

Table 10. Verified In-State Purchases and Short-Term Jobs by County (Top 15)

County	$ Millions (nominal)
Erie	71.9
Fulton	62.5
Clinton	31.7
Albany	30.4
New York State	22.5
Onondaga	22.4
Wyoming	20.5
Suffolk	16.0
St. Lawrence	10.1
Oswego	7.5
Allegany	6.9
Monroe	6.3
Oneida	5.7
Franklin	5.1
Steuben	4.2

3.1.2 Industry Impacts

All told, more than 1,000 in-state businesses benefited through the development, construction and operation of the referenced Group 1 facilities. These businesses provided materials, equipment and services required for the projects and the scope of their efforts ranged from supplying gravel and cranes to engineering and legal support. Of additional significance is the fact that many of these businesses provided goods or services for multiple projects.

Typical goods and services which were obtained through New York State contractors and suppliers are presented in Table 11.

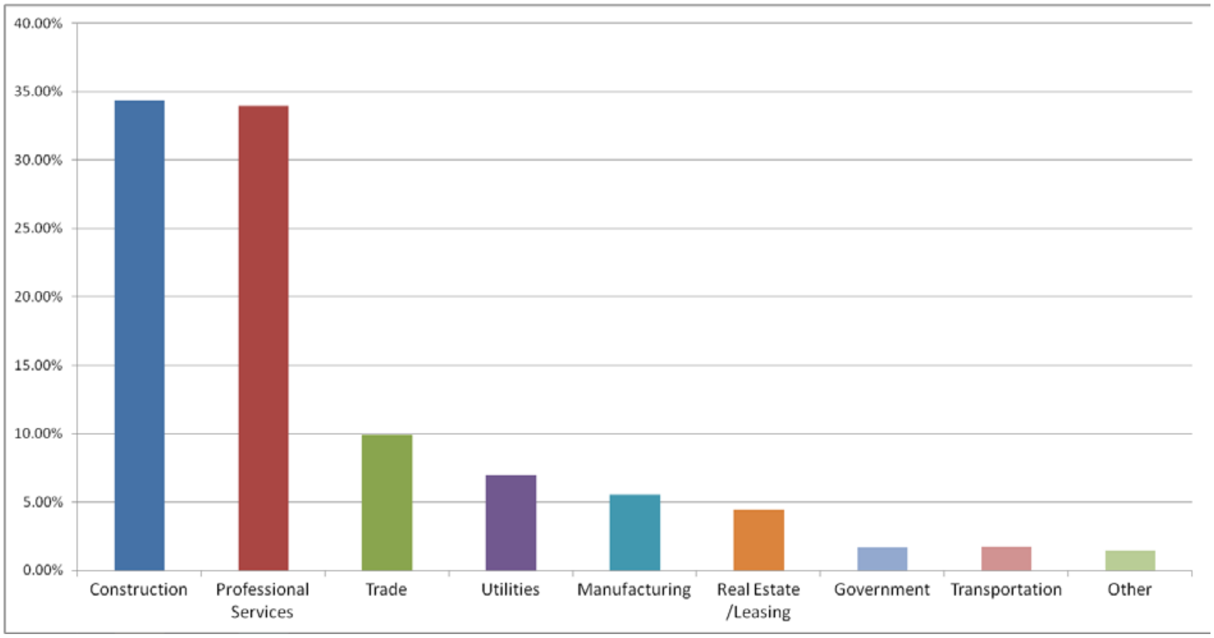
Table 11. Typical Goods Sourced in New York State

Goods	Services
Gravel	Construction
Electrical/Utility Equipment	Operations/Maintenance
Cranes	Loggers/Forestry
Wood Loads	Engineering
Foundations (Wind Projects)	Legal
Water	Marketing
Fuel (Gasoline/Diesel)	Accounting
Hardware	Environmental Permitting
Plumbing Supplies	Environmental Monitoring
	Public Relations
	Food Services
	Transportation/Trucking
	Real Estate/Leasing
	Utilities
	Trade
	Manufacturing

A significant portion of goods sourced in New York State include construction materials, from small items like hardware to crushed rock for building access roads or wind turbine foundations. Electrical/utility equipment comprises another significant portion of goods procured for these projects; typical expenditures range from meters to substations to high voltage lines.

In addition to material goods, millions of verified dollars went to procure services through New York State suppliers. Throughout the verification process, construction and engineering trades were most commonly represented, but Group 1 projects also required a significant number of different services in other areas. Environmental companies conducted site assessments and helped projects acquire permits or complete wetlands rehabilitation and site remediation. New York State City companies in the legal and finance sectors were hired by projects throughout the State. Figure 14 depicts the extent of the impacts on various sectors through the development, construction and operation of these projects.

Figure 14. Group 1 Total Verified and Anticipated In-State Purchases by Sector (2012 Dollars)



Sectors with the most significant direct investments are Construction and Professional Services (including Finance & Insurance, Architecture & Engineering). Trade, Utilities, Manufacturing and Real Estate contributed approximately 5-10% each, while Government, Transportation and Other expenditures were just a few percent of total direct investments. In total, Group 1 projects are expected to contribute approximately $500 million of direct investments in New York State as in-state purchases.

3.1.3 Total Group 1 Direct Investments in New York State by Category

The direct investments from Group 1 were primarily verified in the In-State Purchases and Short-Term Jobs category, with the rest spread out among payroll, fuel, payments to public entities or payments for land access. Using the methods described in Section 2.4, the verified spending was then projected through the estimated life of each Group 1 project. Extrapolation of anticipated long-term expenditures - such as salaries, payment-in-lieu-of-taxes agreements and host community payments, operations and maintenance expenses and payments for land use or fuel – add significant expenditures over the projected lives of these projects. In total, these projects are anticipated to add more than $1 billion (2012 Dollars) to the New York State economy through their respective operating lives.

Table 12 shows the total anticipated spending by category for these projects over the expected life of the projects.

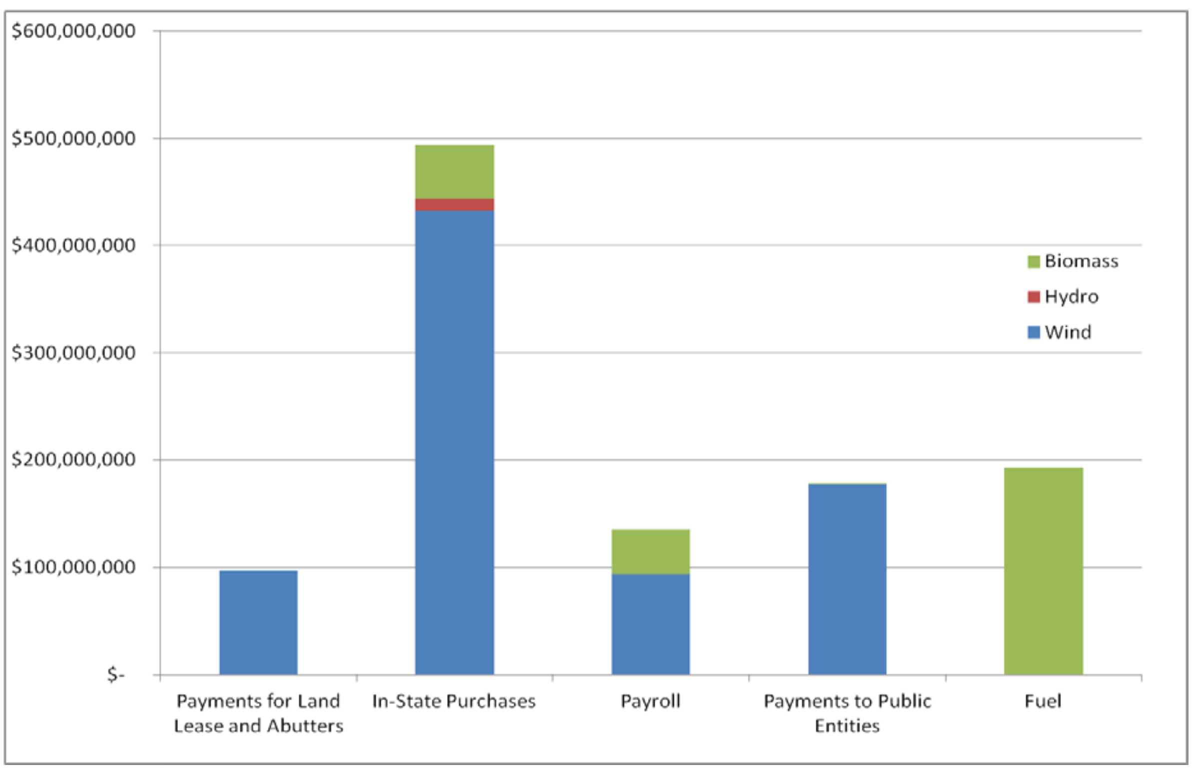
Table 12. Total Verified and Anticipated Direct Investments in New York State for Group 1 by Resource and Category (Millions 2012 Dollars)[a]

Technology	Short-term Spending				O&M Spending				
	Payroll	Payments to Public Entities	Fuel Resource Access	In-State Purchases	Payroll	Payments to Public Entities	Fuel and Resource Access	In-State Purchases	Total
Wind	8.8	26.1	6.0	331.9	85.0	151.3	90.9	100.1	800.1
Hydro	-	-	-	10.4	-	-	-	1.7	12.1
Biomass	1.0	0.0	2.3	21.7	40.4	1.2	190.7	28.5	285.8
Total	9.9	26.1	8.3	364.0	125.4	152.5	281.6	130.3	1,098.1

[a] Numbers may not add up due to rounding

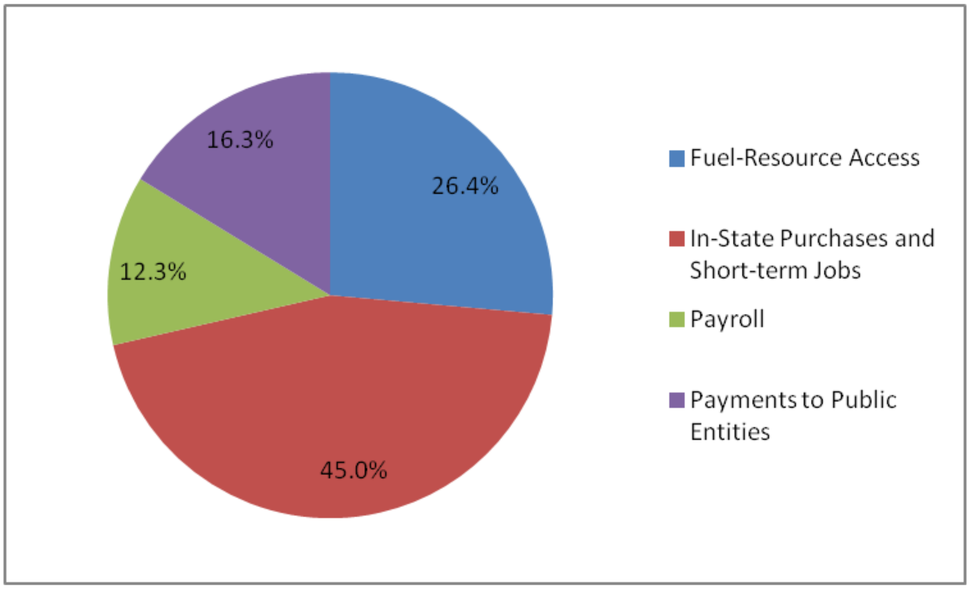
As seen in Figure 15, wind project expenditures contributed the most significant percentage of investments in all categories other than fuel. Biomass projects were responsible for all of the fuel expenditures and a significant portion of In-State Purchases and Payroll.

Figure 15. Total Verified and Anticipated Direct Spending Categories for Group 1 Projects (2012 Dollars)



For Group 1, including both short and long-term expenditures, In-State Purchases comprised the largest portion of direct investments in New York State, totaling about 45% of all investments from project expenditures. Ongoing payments such as those for Fuel Resource Access, Payments to Public Entities and Long-term Jobs comprised smaller percentages of the total expenditures over the life of the projects.

Figure 16. Percentage of Total Verified and Anticipated Direct Investments in New York State by Category for Group 1 (2012 Dollars)



3.1.4 Group 1 Capacity and Production

Table 13 shows the nameplate capacity, bid capacity, maximum annual production and total expected production for the Group 1 projects that are referenced in this report. These project-specific metrics were used for extrapolation throughout this analysis as well as specific benefit-cost analyses. Figure 17 shows the total annual production by technology for each year (historic and expected).

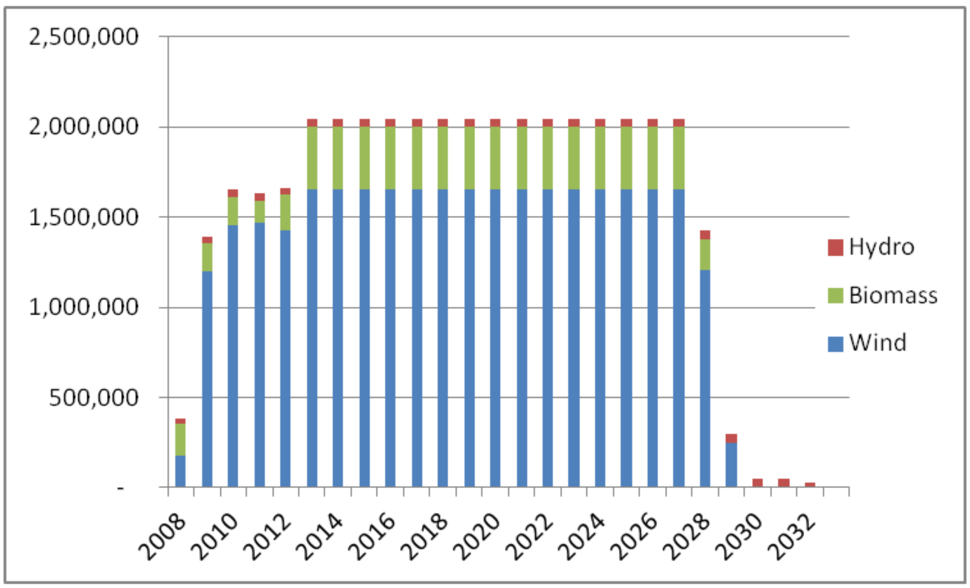
Table 13. Group 1 Project Capacity and Production

Technology	Nameplate Capacity (MW)	Bid Capacity (MW)	Max Annual Production (Approx MWh)	Total Expected Production over Project Life (GWh)[a]
Wind	742	636[b]	1,650,000	32,000
Hydroelectric	38	7	50,000	1,000
Biomass	54	26	340,000	6,000
Total	834	669	2,040,000	39,000

[a] Based on historic generation for past years and maximum annual production for future years.

[b] Dutch Hill Farm/Cohocton's contracted bid capacity was only on a portion of its 125 MW nameplate capacity. This calculation only includes 50.2 MW of contract bid capacity, but the direct benefits assessment assumed that the project had reported benefits associated with the total nameplate capacity.

Figure 17. Historic and Expected Annual Production for Group 1 Projects (MWh)



3.1.5 Group 1 Direct Investments in New York State Summary

Table 14 shows the anticipated direct investments in New York State for Group 1 projects in total and as a function of the nameplate capacity and anticipated generation of these facilities. Group 1 projects have a projected total of $1.1 Billion in direct investments over the expected lifetime of all projects. This averages to approximately $1.3 Million/MW of nameplate capacity and $28 per MWh of production (2012 Dollars).

Table 14. Direct Investments in New York State Summary for Verified Projects (Group 1)

Technology	2012 Dollars			Nominal Dollars		
	Total $ (millions)	$/MWh	$/MW (Nameplate)	Total $ (millions)	$/MWh	$/MW (Nameplate)
Wind	$ 800	$25	$1,079,000	$ 823	$26	$1,110,000
Hydroelectric	$ 12	$11	$ 319,000	$ 11	$10	$ 281,000
Biomass	$ 286	$47	$3,915,000	$ 313	$51	$4,291,000
Total	$1,098	$28	$1,288,000	$1,147	$29	$1,346,000

As Table 14 shows, the direct investments from large-scale wind, repowered hydropower and biomass facilities differ materially. On a nominal dollar per-MWh basis, the verified data show that biomass projects stimulate greater direct investments than wind ($51 versus $26 per MWh). Not surprisingly, the hydropower projects receiving RPS awards, which typically involve project upgrades and/or repowering, have the lowest direct economic benefit per MWh.

3.2 Current Portfolio Direct Investments in New York State Results

As described in Section 1, the analyses presented in this report serve two purposes. The earlier section focused on an assessment of the verified economic benefits to New York State from direct investment by RPS projects. This section presents an assessment of the direct investments of the Current Portfolio of Main Tier RPS projects, excluding existing Maintenance resource projects, and reflects some modeled inputs and adjustments necessary to support the Net Macroeconomic and Benefit-Cost analyses in the 2013 RPS Main Tier Program Evaluation.

As discussed in Section 2.5, Group 1 expenditures were used where applicable to help estimate direct investments in New York State for Group 2 projects for the same resource types through their respective project lives. Where data corresponding to Group 2 resources wasn't present in the Group 1 data set, bid proposal data were used. The combined total actual and projected direct investments associated with Group 1 and Group 2 projects, which comprise the current RPS Main Tier project portfolio ("Current Portfolio"), approaches $2.7 billion. This total, along with detailed analyses, were developed and used for the 2013 RPS Main Tier Program Evaluation by including only Main Tier projects and making the analytical adjustments discussed in Section 2.4 and 2.4.2.3 relating to demand benefits and the trade sectors. Because of this different approach for the Current Portfolio Analysis, Group 1 results in the following sections will not align with results from Section 2.1.

3.2.1 Group 2 Capacity and Production

There were significantly more projects and capacity installed as part of Group 2, totaling 1,241 MW of nameplate capacity versus the Group 1 total of 834 MW. Table 15 summarizes Group 2 capacity and production totals, showing approximately 64 million MWh of expected production over the useful life of all Group 2 projects.

Table 15. Group 2 Project Capacity and Production

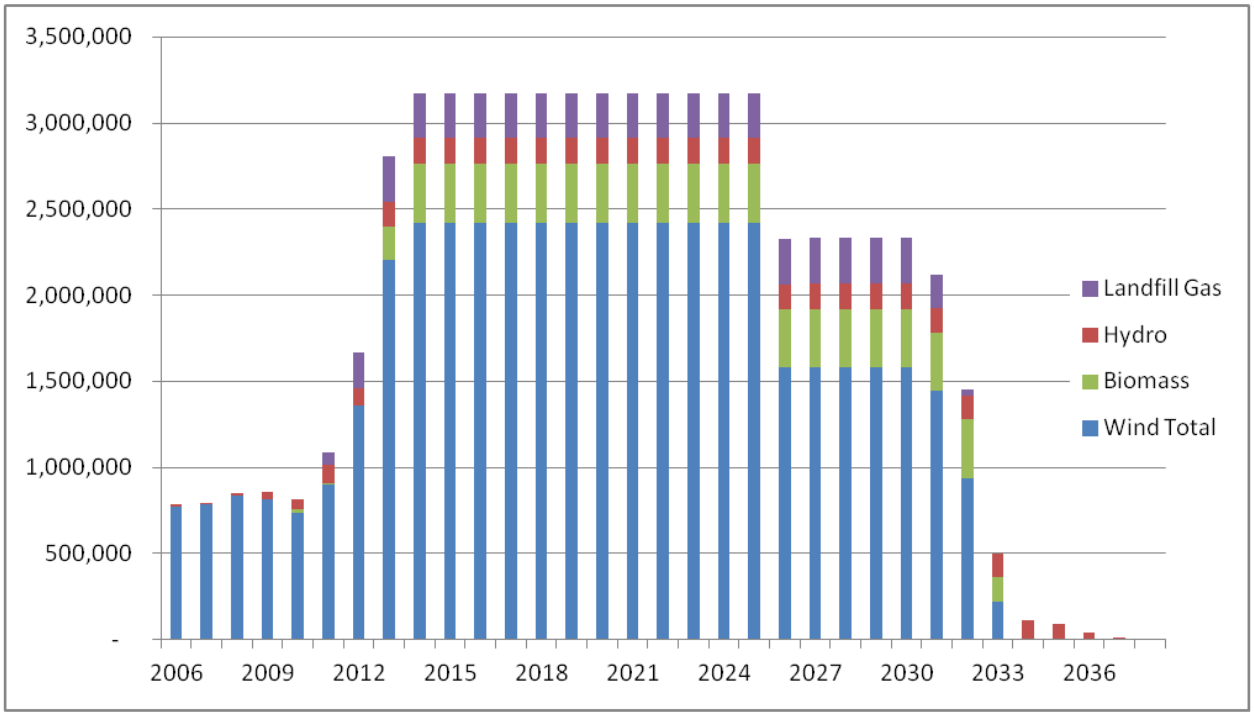
Technology	Nameplate Capacity (MW)	Bid Capacity (MW)	Max Annual Production (MWh)	Total Expected Production over Project Life (GWh)[a]
Wind	886	765[b]	2,400,000	48,000
Hydroelectric	133	20	150,000	4,000
Biomass	164	45	340,000	7,000
Landfill Gas	59	25	260,000	5,000
Total	1,241	855	3,170,000	64,000

[a] Based on historic generation for past years and maximum annual production for future years.

[b]Maple Ridge offered a bid capacity of 231 MW of a 321 MW nameplate capacity. The bid capacity was used to estimate direct benefits, and is also included in this calculation.

The timeframe for Group 2 project construction and operation is generally a few years later than Group 1 projects, with the exception of two Group 2 projects that began operating under contract in 2006. As a result, the Group 2 production period extends from 2006 through 2038, compared with the shorter Group 1 period of 2008 through 2033. Figure 18 details the expected historic and expected production for Group 2 projects.

Figure 18. Historic and Expected Production for Group 2 Projects (MWh)



3.2.2 Group 1 and 2 Comparative Analysis – Total Direct Investments in New York State

The results in Table 16 show the anticipated direct investments in New York State from Group 1 and Group 2 Main Tier projects by category and time-phase of expenditure in 2012 Dollars.

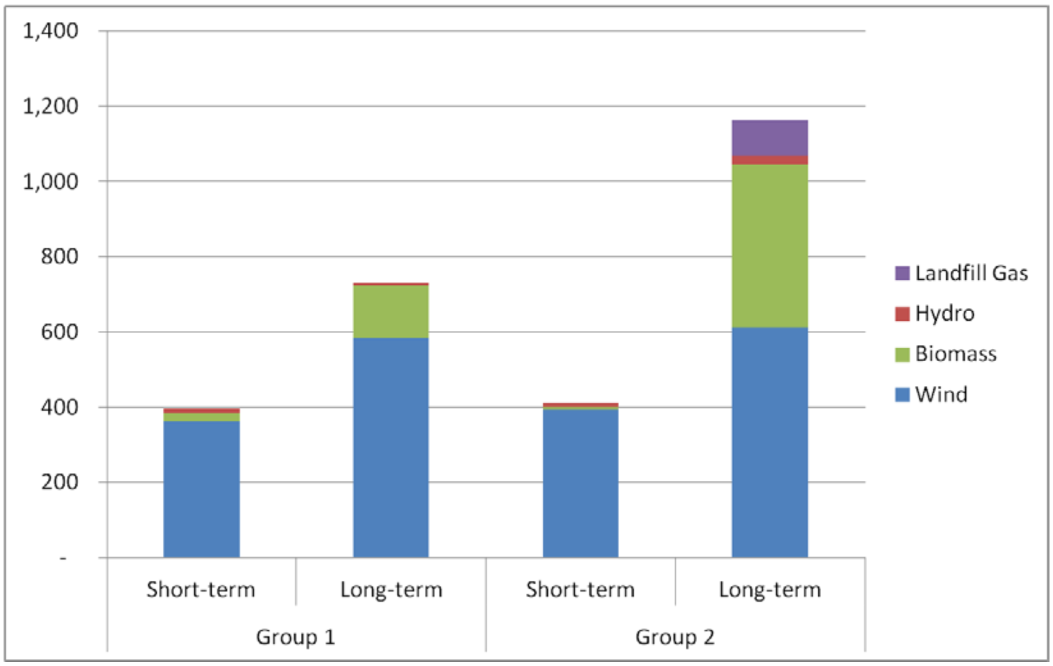
Table 16. Total Direct Investments in New York State by Technology for Group 1 and Group 2 Projects (Millions 2012 Dollars)a

Technology	Group 1		Group 2	
	Short-Term	Long-Term	Short-Term	Long-Term
Wind	$ 362	$583	$ 394	$ 612
Hydroelectric	$ 10	$ 8	$ 10	$ 23
Biomass	$ 23	$139	$ 7	$ 434
Landfill Gas	-	-	$ 0	$ 95
Total	$395	$730	$411	$1,163

[a] Numbers may not add up due to rounding

Figure 19 depicts this breakdown between Group 1 and Group 2 totals for short-term versus long-term direct investments in New York State. Short-term investments represent project expenses for project development, construction, upgrades, and other expenses that are not expected to recur annually over the course of the project's operating life. Long-term investments are the project expenses necessary to keep the project operating, and represent an average of operations and maintenance expenses, ongoing payments, as well as capital replacement costs over each project's expected useful life.

Figure 19. Total Direct Investments in New York State by Technology for Group 1 and Group 2 Projects



Due to the largely front-loaded cost of wind project development and construction, short-term investments are a significant portion of total investment in New York State for both groups but ongoing expenditures dominate as they persist for the project's operating life. Hydroelectric projects also have significant short-term investments as a percentage of total investments, as these projects are typically upgrades to existing projects and have few eligible incremental maintenance costs. Therefore, little in-state spending for hydroelectric operations and maintenance could be attributed to the RPS capacity.

As expected, biomass facilities have significant long-term expenditures compared with short-term costs due to extensive ongoing fuel costs. Landfill gas was only represented in Group 2 and was modeled as only having long-term investments because the majority of the projects were operating prior to starting their RPS contract, and no construction-related expenditures were claimed in the RPS proposal. As with biomass projects, landfill gas projects also have large ongoing fuel costs for access to landfill gas in addition to ongoing costs for equipment maintenance and replacement.

3.2.3 Group 1 and 2 Comparative Analysis – Total Direct Investments in New York State per MW Installed and MWh Produced

Table 17 shows the components of the total direct investments in New York State associated with Group 1 and Group 2 facilities, as calculated for the 2013 RPS Main Tier Program Evaluation. As previously discussed, these results include adjustments for demand and the trade sectors, and do not include maintenance resource projects. The $/MWh figures represent total direct investments per MWh of production, both calculated over each project's full expected operating life.

Table 17. Direct Investments in New York State Summary for Group 1 and Group 2 (2012 Dollars)

Technology	Group 1			Group 2		
	Total $ (millions)	$/MWh	$/MW (Nameplate)	Total $ (millions)	$/MWh	$/MW (Nameplate)
Wind	$ 945	$30	$1,275,000	$1,005	$21	$1,135,000
Hydroelectric	$ 18	$16	$ 471,000	$ 33	$ 9	$ 248,000
Biomass	$ 162	$47	$2,995,000	$ 441	$64	$2,690,000
Landfill Gas	n/a	n/a	n/a	$ 95	$18	$1,623,000
Total	$1,125	$31	$1,349,000	$1,574	$25	$1,268,000

Comparing the results between Groups 1 and 2, both groups had very similar $/MW direct investments in New York State, though the breakdown by technology differs and changes between groups. Between Group 1 and Group 2, the difference in $/MWh results are attributable to cost differences between projects of the same technology and differences in anticipated generation for the same technology types.

For biomass, this difference is driven by project-specific differences for verified and expected expenditures. Biomass projects had the highest $/MWh direct investment when compared with other technologies because of high up-front construction expenditures combined with high ongoing fuel and maintenance costs associated with these projects.

The large drop in $/MW for hydroelectric projects is due to one outlier project within the Group 1 hydroelectric technology that had significantly higher expenditures (and thus investments) than all of the other hydroelectric projects. This outlier project was removed when calculating the $/MW extrapolation factors, so Group 2 hydroelectric investments, which are calculated on the basis of lower Group 1 average expenditures, are much lower.

On the whole, Biomass and Landfill Gas projects have higher $/MW investments due to their higher capacity factors and ongoing fuel or fuel access costs that persist for the life of the project. Biomass fuel costs are estimated from historic fuel costs, while Landfill Gas fuel costs are the access charges paid to the landfill or pipeline owner.

Table 18 summarizes Group 1 and Group 2 direct investment in New York State totals on a 2012 Dollars/MWh and Nominal Dollars/MWh basis.

Table 18. Direct Investments in New York State/MWh by Technology for Group 1 and Group 2 Projects (2012 Dollars/MWh and Nominal Dollars/MWh)

Technology	2012 Dollars/MWh		Nominal Dollars/MWh[a]	
	Group 1	Group 2	Group 1	Group 2
Wind	$30	$21	$31	$22
Hydroelectric	$16	$ 9	$16	$10
Biomass	$47	$64	$52	$78
Landfill Gas	n/a	$18	n/a	$21
Total	$31	$25	$32	$28

[a] Nominal dollars were added across years without applying a discount rate.

3.2.4 Current Portfolio Analysis

Table 19 summarizes the results combining Group 1 and Group 2 into a total Current Portfolio Analysis. The Current Portfolio includes more than 2,000 MW of nameplate capacity. Over their expected operating life, these projects are expected to generate approximately 100 million MWh and $2.7 billion dollars of estimated direct investments in New York State. Overall, approximately $27 in direct investment is produced as a result of project expenditures in New York State for every MWh that is generated under the RPS.

Table 19. Summary of Current Portfolio and Direct Investments in New York State (2012 Dollars)

Technology	MW (Nameplate)	Total Investments (Millions)	$/MWh	$/MW (Nameplate)	Total Production (GWh)
Wind	1,627	1,951	$24	$1,199,000	80,000
Hydroelectric	171	51	$11	$ 298,000	5,000
Biomass	218	603	$59	$2,765,000	10,000
Landfill Gas	59	95	$18	$1,623,000	5,000
Total	2,075	2,699	$27	$1,301,000	100,000

On average, hydroelectric upgrade projects, the smallest group, have the lowest $/MWh and $/MW direct investments due to their relative low upgrade and operating costs. Wind, which comprises the bulk of production and direct investments, averages $24/MWh and approximately $1 million/MW installed. As described above, Biomass and Landfill Gas projects have the highest direct investments per MW and MWh due to their high ongoing operating costs.

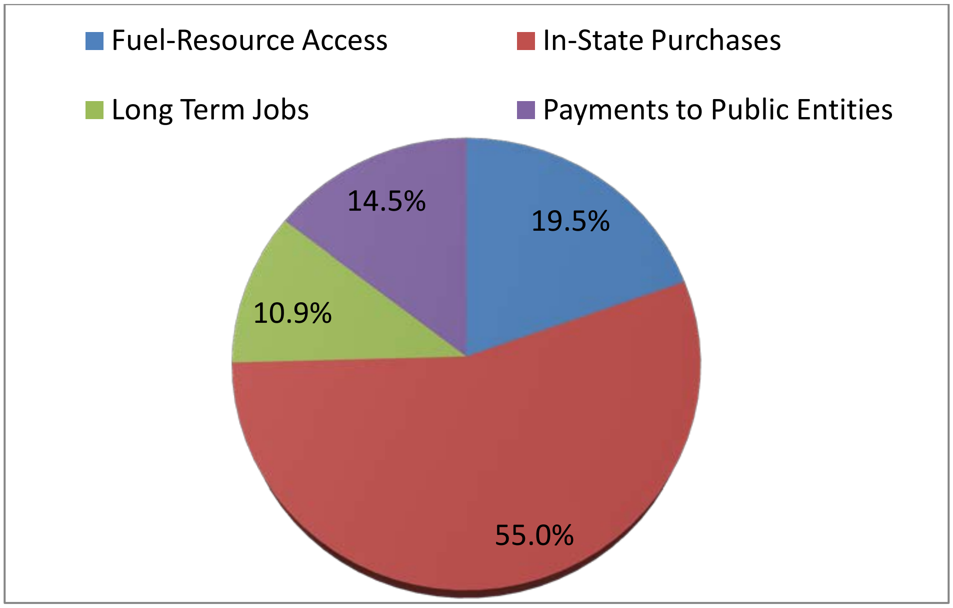
The results in Table 20 show the total direct investments in New York State for the Current Portfolio of projects in both real (2012 Dollars) and nominal dollars as compared to the projects' capacity and generation.

Table 20. Summary of Total, $/MW and $/MWh Direct Investments in New York State 2012 Dollars and Nominal Dollars – Current Portfolio

Technology	2012 Dollars			Nominal Dollars		
	Total (Millions)	$/MWh	$/MW (Nameplate)	Total (Millions)	$/MWh	$/MW (Nameplate)
Wind	$1,951	$24	$1,199,000	$2,065	$26	$1,269,000
Hydroelectric	$ 51	$11	$ 298,000	$ 55	$12	$ 323,000
Biomass	$ 603	$59	$2,765,000	$ 709	$69	$3,252,000
Landfill Gas	$ 95	$18	$1,623,000	$ 111	$21	$1,894,000
Total	$2,699	$27	$1,301,000	$2,940	$29	$1,417,000

As shown in Figure 20, for the entire program, including both short and long-term expenditures, In-State Purchases comprised the largest portion of direct investments in New York State, totaling about 55% of all investments from project expenditures. Fuel Resource and Access made up almost 20% of direct investments, while ongoing payments for Long-term Jobs and Payments to Public Entities comprised smaller percentages of the total expenditures over the life of the projects.

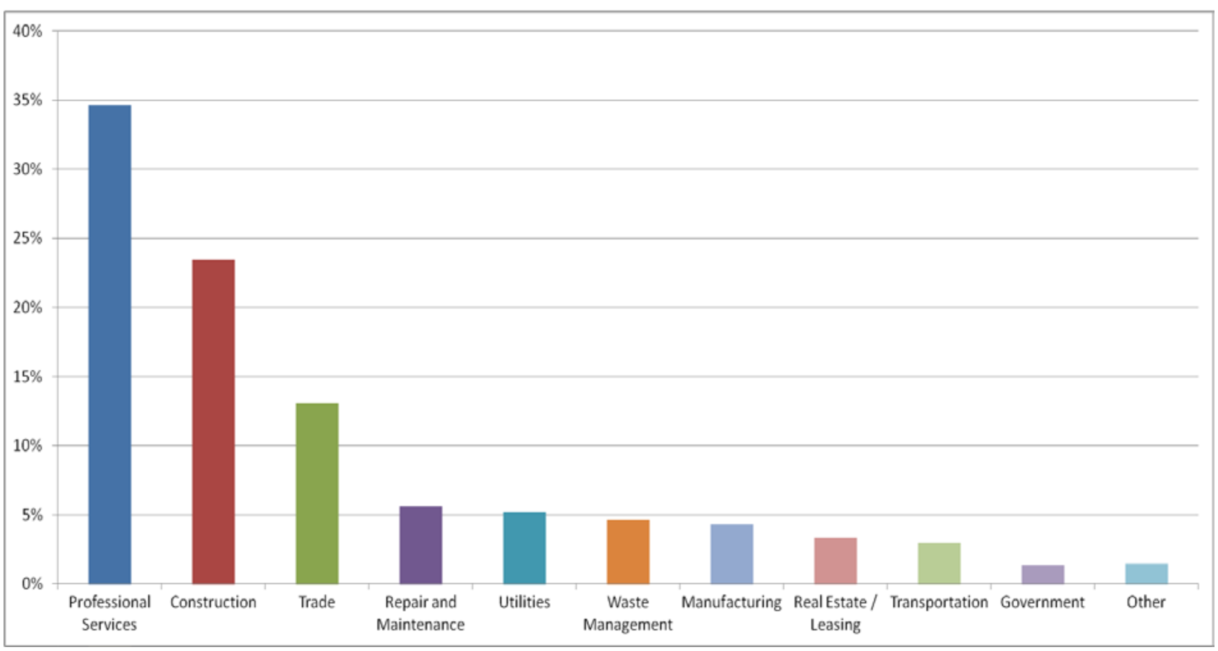
Figure 20. Percentage of Total Direct Investments in New York State by Category for the Current Portfolio (2012 Dollars)[a]



[a] Percentages may not add to exactly 100% because of rounding.

These direct investments in New York State have a greater impact on some sectors of the economy than on others. Figure 21 shows the breakdown for in-state purchases by industry sector. The sectors with the greatest portion of benefits include Professional Services (including Finance and Insurance, Legal, and Architectural & Engineering Services), Construction, and Trade.

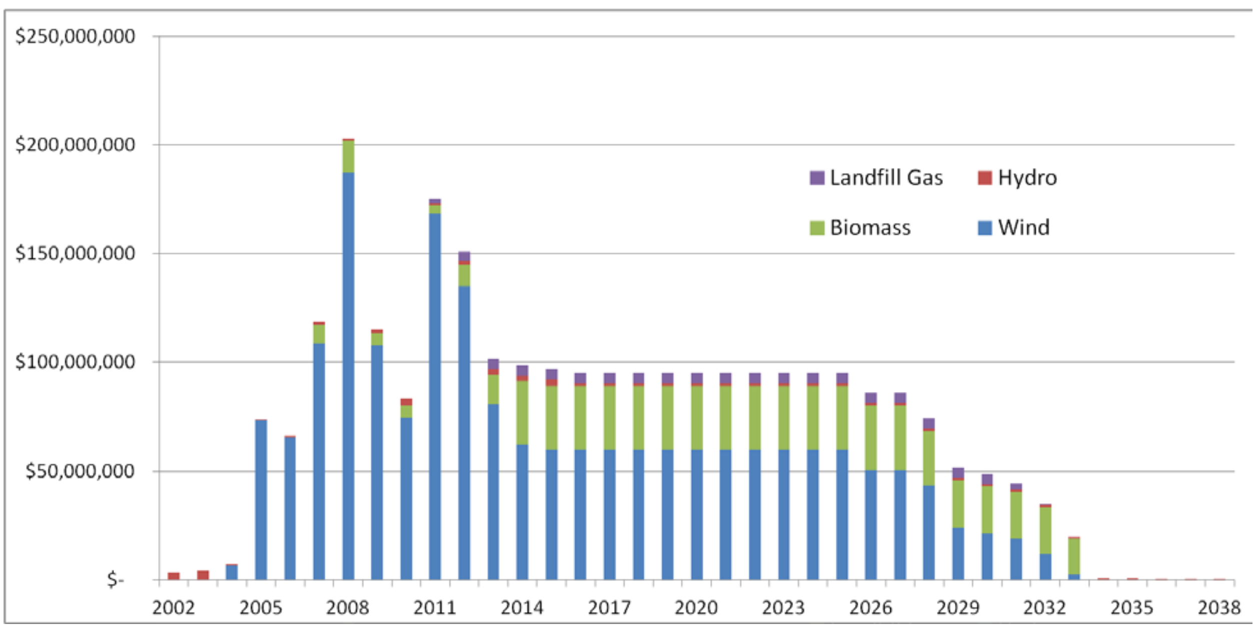
Figure 21. Total In-State Purchases by Sector (2012 Dollars)



3.3 Direct Investments in New York State as Inputs to 2013 RPS Main Tier Program Evaluation

As previously reviewed, the results from part two of this study were used as inputs for the Benefit-Cost and Macroeconomic analyses for the 2013 RPS Main Tier Program Evaluation. Both analyses required year-by-year spending summaries by technology, as well as some detail on the type of spending incurred in different categories and sectors. The previous figures and tables show summaries of spending by category and sector. Figure 22 depicts the amount of New York State direct spending by year, broken down by technology. Direct spending fluctuates in the early years as projects are being developed and installed, and then stabilizes as the portfolio of projects complete installation and commence stable long-term operations. Wind projects made considerable short-term investments in the construction phase of these projects, which resulted in comparatively high totals in 2008, 2011, and 2012.

Figure 22. Direct Investment by Year and Technology (2012 Dollars)



3.4 Direct Investments in New York State Versus RPS Program Investment

Using the components of the Current Portfolio Analysis discussed above in Section 3 with results summarized in Section 3.2, an investment ratio was calculated which compares the Current Portfolio of project's direct investments in New York State with the RPS investments in Main Tier and Maintenance Resource projects.. The direct investments in New York State are calculated as all direct in-state spending over the project's useful life, which goes beyond the 10-year RPS contract. The RPS investment portion of this comparison is the total RPS-related cost premium borne by ratepayers for procuring RPS Attributes over what is typically a 10-year term. The premise of this assumption is that the RPS program is responsible for stimulating construction and operation, whether or not NYSERDA contracts for the whole project output over a project's entire useful life.

3.4.1 RPS Program Investment Description

RPS program investment comprises the actual funds disbursed or anticipated to be disbursed by NYSERDA for RPS Attributes associated with the Current Portfolio, as well as overhead costs associated with administrative staffing necessary for program implementation and management. Actual administrative costs were used for years prior to 2013 and projected costs were used for future years, as program administration will persist for the life of these projects. For this analysis, these costs were prorated among the technology categories.

3.4.2 Investment Ratio Results

There are a number of ways to look at the RPS program's investment ratio. Table 21 shows the total Direct Investments in New York State compared with RPS Program Investment by technology in 2012 dollars, Table 22 shows the same results in nominal dollars.

Table 21. Total Direct Investments in New York State and RPS Program Investment (2012 Dollars)

Technology	Total Direct Investments in New York State (Millions)		Total RPS Program Investment (Millions)[a]	
	Group 1	Group 2	Group 1	Group 2
Wind	$ 945	$1,005	$215	$434
Hydroelectric	$ 18	$ 33	$ 4	$ 21
Biomass	$ 162	$ 441	$ 30	$ 123
Landfill Gas	n/a	$ 95	n/a	$ 54
Total	$1,125	$1,574	$249	$633

[a] For this calculation, RPS Program Investment included the actual historical payments and future contracted payments for RPS Attributes in addition to the historical and projected Administration costs for the Current Portfolio of Main Tier and Maintenance Resource projects.

Table 22. Total Direct Investments in New York State and RPS Program Investment (Nominal Dollars)

Technology	Total Direct Investments in New York State (Millions)		Total RPS Program Investment (Millions)[a]	
	Group 1	Group 2	Group 1	Group 2
Wind	$ 987	$1,078	$220	$455
Hydroelectric	$ 17	$ 38	$ 4	$ 22
Biomass	$ 178	$ 531	$ 30	$133
Landfill Gas	n/a	$ 111	n/a	$ 58
Total	$1,182	$1,758	$254	$668

[a] For this calculation, RPS Program Investment included the actual historical payments and future contracted payments for RPS Attributes in addition to the historical and projected Administration costs for the Current Portfolio of Main Tier and Maintenance Resource projects.

Table 23 shows the Direct Investments in New York State and RPS Program Investment in 2012 Dollars by group on a Net Present Value (NPV) basis, which is used to calculate an investment ratio for each technology.

Table 24 aggregates this investment ratio across the entire Current Portfolio of Main Tier projects. An investment ratio in excess of 1 reflects greater direct investments in New York State realized than what was spent to implement and execute RPS contracts. An investment ratio in excess of 1 was realized, or is expected, across technologies and both group averages. In total, the Current Portfolio of projects (including all technologies) studied yielded much more benefit than cost, on average, by approximately a 3:1 ratio.

To explain these results, several factors can be considered. The RPS contracts for Group 1 cost in aggregate less than half of Group 2 contracts, but the total Group 1 investments were similar to Group 2, yielding higher investment ratios for Group 1 than Group 2. Biomass and wind have the highest investment ratios of all technologies. Also, several large Group 1 projects have incurred production-based contract adjustments due to underperformance which have reduced the contract commitment on the part of NYSERDA but have not affected the in-state spending attributed to the project. This results in a higher investment ratio for these projects. Also, as is referenced in the most recent RPS annual performance report,[28] RPS Attribute prices have generally risen over time, and Group 2 projects often received awards in later procurements, which increases the associated costs of these contracts. The lower investment ratio for landfill gas projects is due to the lack of short-term investments for the landfill gas projects included in this analysis. The Group 1 average for hydroelectric is high due to the outlier project described in Section 3.2, but the Group 2 hydroelectric average reflects much lower expected direct investments with no such outliers.

[28] The New York State Renewable Portfolio Standard Performance Report, Through December 31, 2012 http://www.nyserda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Program-Planning/Renewable-Portfolio-Standard/Main-Tier/-/media/Files/Publications/PPSER/NYSERDA/2013-rps-report.pdf

Table 23. NPV of Total Direct Investments in New York State, RPS Program Investment and Investment Ratios (2012 Dollars)

Technology	NPV[a] Total Direct Investments in New York State (Millions)		NPV Total RPS Program Investment (Millions)		Investment Ratio		
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Total
Wind	$493	$486	$111	$213	4.4	2.3	3.0
Hydroelectric	$ 12	$ 13	$ 2	$ 10	5.5	1.3	2.0
Biomass	$ 70	$144	$ 16	$ 54	4.3	2.6	3.0
Landfill Gas	n/a	$ 34	n/a	$ 24	n/a	1.4	1.4
Total	$575	$677	$130	$302	4.4	2.2	2.9

[a] NPV was calculated using 2002 as the base year, which matches the first year in which benefits accrue.

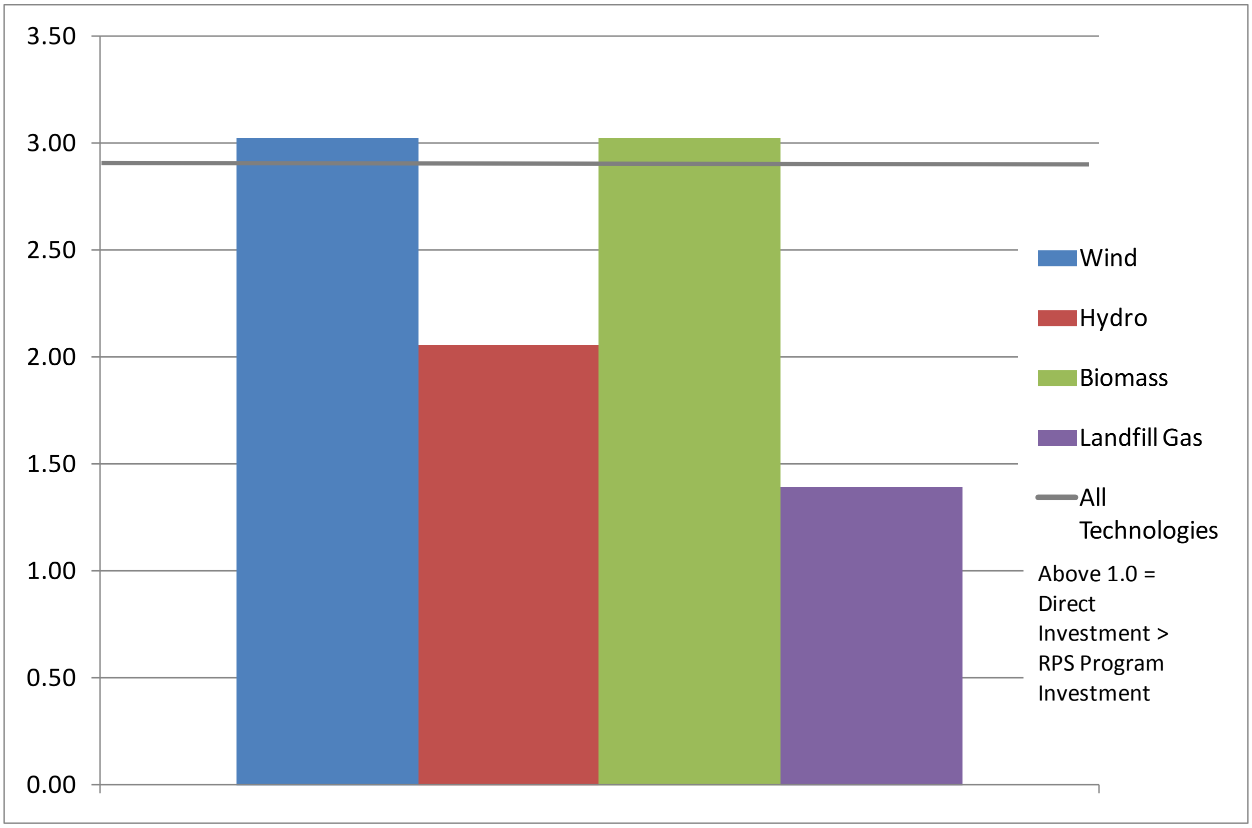
Table 24. Current Portfolio Investment Ratios (2012 Dollars)

Technology	NPV[a] Total Direct Investments in New York State (Millions)	NPV Total RPS Program Investment (Millions)	Investment Ratio
Wind	$ 979	$324	3.0
Hydroelectric	$ 25	$ 12	2.0
Biomass	$ 214	$ 71	3.0
Landfill Gas	$ 34	$ 24	1.4
Total	$1,252	$431	2.9

[a] NPV was calculated using 2002 as the base year, which matches the first year in which benefits accrue.

Figure 23 depicts the same Investment Ratio results including the program average by technology for the Current Portfolio of projects.

Figure 23. Current Portfolio Investment Ratios by Technology



4 Conclusions

Through December 31, 2012, the RPS Main Tier has provided substantial revenue to support new generation from wind, biomass, hydroelectric and landfill gas systems. Through a comprehensive verification process on 18 Main Tier facilities, NYSERDA has confirmed that the currently contracted resources have yielded and will continue to yield significant direct investments to the State which far exceeds the RPS funds committed to these projects.

The verification of New York State spending through three years of operation from 18 Main Tier facilities has shown that more than 1,000 in-state businesses spread over 44 counties benefited through the development, construction and operation of these facilities. The geographic and economic impacts of these projects are often concentrated around the project location but also extend beyond the host counties where the projects are located. Although fuel resource access and tax/local permit payments typically remain within the host county, purchases of goods and services for these projects were sourced throughout New York State.

Approximately $2.7 billion dollars of direct investments in New York State are expected over the projected life of the Current Portfolio of Main Tier RPS facilities, as measured in jobs, taxes and local payments, in-state purchases and land leases. In the short term, the greatest impacts come from spending on construction materials and services. In the long term, PILOT payments, payroll expenses, fuel and landowner payments trigger the largest economic impacts. Overall, approximately $27 in direct investments are produced as a result of project expenditures in New York for every 1 MWh of renewable energy that is generated under the Main Tier program.

The analysis indicates that for every $1 spent on the acquisition of RPS Attributes for the Current Portfolio of RPS projects under contract with NYSERDA, the State will capture on average approximately $3 in direct investments associated with project spending over project lifetime. These direct in-state investments have a greater impact on some sectors of the economy than on others. The sectors with the greatest portion of benefits include Professional Services (including Finance & Insurance, Legal, and Architectural & Engineering Services), Construction, and Trade.

Clearly the RPS Main Tier has brought and will continue to bring significant investments to many sectors of the State’s economy.

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Andrew M. Cuomo, Governor

NYSERDA
Renewable Portfolio Standard
Main Tier 2013 Program Review

Direct Investments In New York State

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