



NYSERDA Main Tier RPS Economic Benefits Report



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Exhibit D

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ABSTRACT

NYSERDA is required to present the New York Public Service Commission (PSC) with an evaluation report of the NYS RPS program results through the end of 2008. The report is to be issued for public comment by March 31, 2009. In support of this evaluation effort, KEMA, Inc. and its affiliates (the KEMA Team) were selected to report on the economic benefits to NYS resulting from in-state spending on renewable energy projects. Benefits from direct project spending are measured as well as those that accrue indirectly as a result of increased economic activity in the state. This report will help the PSC and other policy-makers to understand how effective the program has been at spurring economic development within the state, and what level of short-and long-term benefits can be expected in the future. This work will be a stand-alone report, with key findings included in a more comprehensive impact assessment report submitted to NYSERDA at a later date.



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Section 1

EXECUTIVE SUMMARY

SCOPE

This report analyzes the economic impacts or effects associated with expenditures on renewable energy facilities' construction & operations in New York for facilities supported by the RPS Main Tier and Maintenance Resources program. It used a discrete set of economic measures that covered the facility's construction phase and over the life of the facility. The construction phase was estimated to last for three years (herein referred to as short-term) and the "over the life of the facility" phase was estimated to last 20 years (herein referred to as long-term). The economic benefits or effects of these measures were analyzed at two levels – the direct benefits or effects in the economy resulting from the facilities were calculated, and the indirect or multiplier effects were modeled (using an IMPLAN input/out model) throughout other sectors of the economy. The results are explained for three scenarios:

- First Three Competitive Solicitations (RFP 916, RFP 1037, RFP 1168)
- 25% RPS Goal by 2013 Using the Post-EEPS Load Forecast
- 30% RPS Goal by 2015 Using the Post-EEPS Load Forecast

The economic measures were estimated and reported by the developers in response to the second and third solicitations issued by NYSERDA for the RPS Main Tier program. KEMA verified the estimates' accuracy, assessed them for credibility, and extrapolated economic measures for facilities from the first competitive solicitation which lacked developers' estimates of economic benefits.

The direct and indirect effects were calculated for the short and long-term economic measures:

Short-Term measures:

- Jobs lasting up to 3 years such as construction, planning and engineering
- Payments to municipalities that do not persist over the life of the facility
- Payments to abutting landowners or others that may be affected by the facility but that are not receiving payments from hosting the facility on their land
- Initial equipment or one-time capital expenditures (such as turbines or repowered upgrade equipment)

Long-Term measures, which are tied to the life of the facility's operations and include:

- Payroll
- Number of Jobs and their Duration described as Job Years
- Taxes or Payments in Lieu of Taxes to State and municipalities
- Fuel Purchases (for biofuels)
- Land Leases
- Other O&M in-state spending on equipment, supplies and services

The report does not include the price suppression effects of the RPS Main Tier program on wholesale electricity prices and potential ratepayer savings after netting out the RPS surcharge paid. It does not include all of the ancillary benefits, such as air quality improvements or health impacts, nor any indirect costs by diverting these funds from spending in other sectors.

RESULTS

Benefits – Direct & Indirect

This report provides an assessment of the total economic benefits that result from NYSERDA's Renewable Portfolio Standard (RPS) Main Tier program. These benefits include direct project benefits as well as the indirect—or *multiplier induced*—benefits to New York's economy. The results were modeled for the three scenarios. One scenario covered the RPS Main Tier and Maintenance Resources program progress made to date, as well as two potential scenarios for NYSERDA's Main Tier¹ RPS Program going forward. The analysis interval was extended over the 20-year life of a facility.

- First Three Solicitations – Analysis interval 2005-2028
- 25% RE by 2013 – Analysis interval 2005-2030
- 30% RE by 2015 - Analysis interval 2005-2034

Direct benefits reported by developers of wind, hydropower, and biofuel generation facilities include both short-term and persistent long-term impacts. Short-term impacts primarily result from construction jobs and compensation to municipalities, abutting property owners, and others. Long-term impacts are jobs tied

¹ Hereinafter Main Tier includes Maintenance Tier resources.

to facility operations and maintenance (O&M), state and municipal revenues (as taxes or payments in lieu of taxes), payments to land owners for land leases, fuel purchases for biofuel facilities, and in-state spending on equipment, supplies and services and other annual O&M expenses.

Table 1 shows within each scenario the *total direct economic benefits* (reported by developers in dollars per megawatt-hour (MWh) of RE generation)² associated with the nameplate capacity of the facility.

Table 1
Direct Economic Benefits by Scenario (\$ per MWh)

	Resource	New Renewable Energy Production (MWh/yr)	New Renewable Energy Production (MWh over 20 years)	Total Direct \$ (Construction to end of facility life)	Total Direct \$ per MWh
First Solicitations	All	4,042,647	80,852,940	\$2,064,621,293	\$25.54
25% by 2013	All	5,266,252	105,325,040	\$2,627,132,184	\$24.94
30% by 2015	All	10,995,279	219,905,580	\$6,006,979,054	\$27.32

As Table 1 shows, based on the existing resources contracted to date through the first three solicitations, \$25 in total direct benefits is produced as a result of project expenditures in New York for every MWh of renewable energy that is generated for the RPS.

Direct Benefits, by Technology Type

The direct benefits from large scale wind, repowered hydropower, biofuels, and landfill gas facilities vary considerably. On a per-MWh basis, biofuel projects are associated with larger direct economic benefits than wind (\$39 versus \$24 in the first three solicitations), and landfill gas projects, which are expected to play a role in either the 25% or 30% projected scenarios, would have the highest direct economic benefits (about \$50 per MWh). Hydropower projects, which are repowering upgrades, have the lowest direct economic benefit per MWh. Table 2 breaks out the total direct benefits from Table 1 by technology, showing within each scenario the *direct economic benefit* by wind, hydro, biofuels and landfill gas.

² The direct benefits exclude any consideration of the RPS' potential impacts on electricity prices.

Table 2
Direct Economic Benefits by Technology (\$ per MWh)

	Resource	New Renewable Energy Production (MWh/yr)	Total Direct \$ (Construction to end of facility life)	Total Direct \$ per MWh
First Three Procurements	Biofuel	486,145	\$377,097,675	\$38.78
	Hydro	75,986	\$22,098,225	\$11.06
	Wind	3,480,516	\$1,665,425,393	\$23.92
25% by 2013	Biofuel	681,377	\$536,617,806	\$39.38
	Hydro	548,680	\$106,353,661	\$9.69
	Wind	4,021,395	\$1,969,273,616	\$24.48
	Landfill Gas	14,800	\$14,887,101	\$50.29
30% by 2015	Biofuel	2,026,377	\$1,695,726,691	\$41.84
	Hydro	1,366,340	\$256,393,340	\$9.38
	Wind	7,565,562	\$4,018,265,621	\$26.56
	Landfill Gas	37,000	\$36,593,402	\$49.45

Total Economic Benefits

An IMPLAN input-output economic model of NYS was used to measure the *multiplier effects* (henceforth termed the indirect effects³) based on the direct dollars tied to in-state spending on Main Tier projects. The economic multiplier impacts are a result of direct expenditures to build (or upgrade), operate, and maintain a mix of renewable energy (RE) generating facilities. These multiplier effects reflect the stimulus to local businesses and the associated jobs created (especially in the service sectors) as a result of this public investment in RE technologies. The results were modeled for the three scenarios, one covering RPS Main Tier program accomplishments made to date as well as two potential scenarios going forward. The analysis interval extended over the 20 year life of a facility. The total economic impact from the three scenarios of the RPS Main Tier and Maintenance resources are shown in Table 3. The total dollars of impact represent total NYS output.

³ NYSERDA's reference to *indirect* is different from what I-O models refer to as the indirect impact. For the purposes of this document, the indirect will include both the wage spending effects (termed induced), and the supplier transaction (the traditional definition of indirect) effects.

Table 3
NYS Total \$ Output (i.e., Total Economic Benefits)

Scenario	Analysis Interval	Direct Project Benefits (\$m)	Indirect Benefits (m\$)	Total Benefits (m\$)
First 3 Solicitations	2005-2028	\$2,065	\$2,183	\$4,248
25% by 2013	2005-2030	\$2,627	\$2,796	\$5,423
30% by 2015	2005-2034	\$6,007	\$6,567	\$12,574

Short and Long-Term Effects of Total Economic Benefits

Table 4 shows the total short-term (the construction phase - first 3 years) and long-term spending (life of the facility over 20 years) effects, by scenario.

Table 4
Short and Long-term Facility Spending

Scenario	Short Term (m\$)	Long Term (m\$)	Total (m\$)
First 3 Solicitations	\$1,377	\$2,871	\$4,248
25% by 2013	\$1,671	\$3,752	\$5,423
30% by 2015	\$3,455	\$9,119	\$12,574

As Table 4 (above) indicates, the long-term phase for all three scenarios of NYSERDA’s Main Tier RPS is associated with creating the majority of the state’s economic impacts. This should not be surprising since the interval spans 20 years from the staggered introduction of RE facilities coming on-line. On-going payments by these RE generators to municipalities (in the form of PILOTs) infuse state and local governments with additional revenues that stimulate the economy through government spending. As biofuel projects are relied upon more to help meet future Main Tier RPS generation targets, on-going fuel purchasing (predominantly for woody biomass) creates significant economic impacts. While PILOT payments continue to account for a significant percentage of total program benefits, the impact from biofuel projects increase in the later years of the program as biofuel begin to claim a larger share of the RE generation mix. Table 5 shows the percentage allocation of long term spending among different outputs.

Table 5
Allocation of Total Impacts Due to Long-term Spending

Scenario	Role in Output (\$) Impacts				
	On-going Payroll	PILOT \$	Fuel Purchases	Land-lease\$	Other O&M\$
First Three Solicitations	20%	32%	23%	7%	18%
25% by 2013	20%	29%	25%	7%	19%
30% by 2015	20%	25%	33%	5%	17%

Jobs

Annual jobs created in NYS from the RPS Main Tier projects are tied to a short-term (construction) phase assumed to average three years in duration, and the long-term operations phase of a facility, assumed to last for the twenty year life. These are shown in Table 6.

Table 6
Direct Annual Jobs Created in NYS from Main Tier RPS

Annual	First Three Solicitations	25% by 2013	30% by 2015
Short-term Jobs	677	857	1,764
Long-term Jobs	223	279	600

The direct jobs to construct and operate the RE facilities tend to be in well-paying occupations. Table 7 shows *average yearly compensation per job* for each scenario based on the direct jobs and associated indirect job creation (along with an assumed level of labor compensation) over the analysis interval. For comparison, the State's average annual employee compensation is \$62,797⁴. The results shown in Table 7 confirm that energy-sector jobs are well paying. (The average reflects the initial presence of construction payroll as well.) The lower average annual compensation per job among the indirect jobs created reflects in part the large role that household spending (by RE facility workers spending their wages in New York) exerts in the added economic value. Households tend to purchase goods and services from lower-wage sectors, such as retail. *Note:* the reference to job years is customary when discussing employment changes

⁴ As a shown in the IMPLAN NYS Model calibrated to 2006 data.

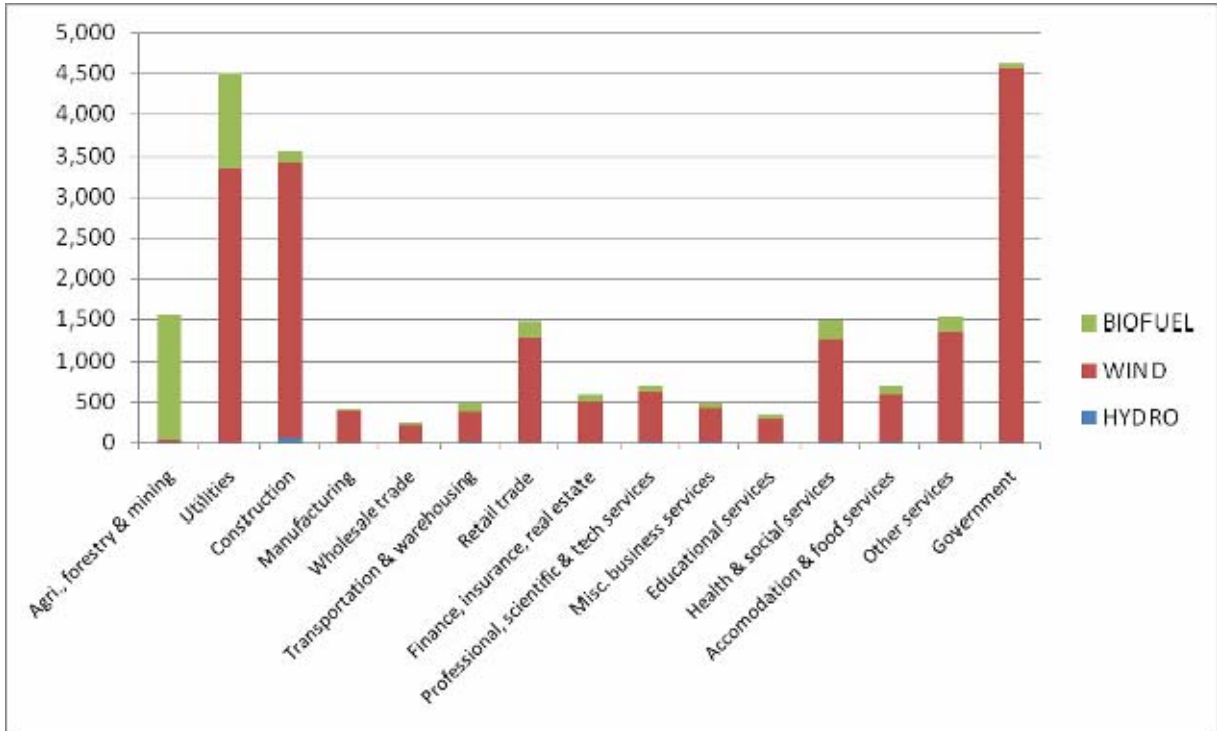
over a time-span. Three construction jobs that are in effect for one year are the equivalent of three job years. A single job that persists for three years also represents three job years.

**Table 7
Main Tier RPS Impacts on Average Annual Worker Compensation**

Over Facility Life	First Three Solicitations	25% by 2013	30% by 2015
Direct Job Years	6,492	8,298	19,607
Direct Payroll	\$501,788,643	\$635,533,210	\$1,481,422,272
<i>Avg. Compensation per Job</i>	\$77,293	\$76,589	\$75,556
Indirect Job Year Impact	16,184	20,230	45,201
Indirect Payroll Impact	\$860,000,000	\$1,070,000,000	\$2,331,000,000
<i>Avg. Compensation per Job</i>	\$53,139	\$52,892	\$51,570
Total Job Years	22,676	28,528	64,808

Total job (year) impact results above reflect a job multiplier effect between 3.3 and 3.5 across all scenarios analyzed, that is total jobs ÷ direct jobs. The industry allocation of the total jobs created, shown in Figure 1 for the First Three Main Tier Solicitations, emphasizes (a) the initial requirement for Construction activities to build (retrofit) RE facilities, (b) the long-term persistence of added O&M workers in the Power Generation & Supply (Utilities) sector, (c) additional state and local Government activities supported by payments in lieu of taxes (PILOTs) or similar payments remitted by RE facilities, and (d) jobs in Forestry and Logging related to the fuel requirements of biofuel facilities (primarily for woody biomass). These employees in the construction, utilities, government, and forestry sectors in turn spend their wages on local goods and services, providing a stimulus to local business and creating new indirect jobs, especially in the service sectors. Wind projects are responsible for the majority of total job impacts (though the Forestry & Logging jobs are solely attributed to biofuels).

Figure 1
Total Job Impacts by Industry - First Three Solicitations, 2005-2028



Conclusion

The RPS Main Tier has committed substantial funding resources to support new generation from wind, biomass, and repowered hydropower facilities, with wind predominating in number and size of facilities and economic benefits produced. Together with Maintenance Tier resources, all of the contracted facilities will yield significant direct economic benefits totaling far more than the direct funds committed.

Approximately \$2.1 billion dollars over the 20-year life of the facilities is expected in direct economic benefits measured in jobs, taxes and local payments, in-state purchases, and land leases. When the effects induced on the broader economy are considered, the total economic benefits are more than \$4.2 billion. Wind projects contribute 80% of these direct dollars, biofuel retrofits 18%, and hydro upgrades the balance. In the short-term, the greatest positive economic impacts come from “in-state spending” on construction materials and services, excluding construction wages. In the long-term, PILOTs or state and local taxes trigger the largest total economic impacts.

Most of the benefits from existing wind projects are created through payroll benefits, while biomass is producing most of its economic benefits from both payroll and the purchase of fuel from in-state feedstocks. Overall, many of the 900 jobs being created directly and indirectly from the existing contracted facilities will be well-paying. Average salaries for jobs at the facilities are \$77,000 (in 2006 \$) and for \$53,000 for indirect jobs. Moreover, most of the jobs are long-lasting. The direct payroll benefits from existing contracted facilities will be more than \$500 million over the life of the facilities, and if other sectors are factored in, the total payroll infusion into the state's economy would be over \$1.3 billion. In a 30% RPS by 2015 scenario, the total economic benefits would be more than \$12 billion over the next 29 years. The total jobs are considerably higher – more than 2,300 jobs would be created throughout the economy. The direct payroll effect would be \$1.4 billion, and nearly doubling to \$2.3 billion when considering the total payroll effect throughout the economy.

While wind will continue to be the largest share of renewable energy facility growth, biofuels are expected to grow even more proportionately in the future, up to 19% of the incremental target in the 25% by 2013 scenario and up to 27% of the incremental target in the 30% by 2015 scenario.

Under all scenarios the RPS will bring significant benefits to other traditionally important economic sectors such as forestry and agricultural sectors as well. Clearly, the economic benefits to New Yorkers are considerable.

Section 2

INTRODUCTION

The purpose of this study is to measure the impacts to the New York economy that result from in-state on projects that are awarded with contracts under the Main Tier and Maintenance Tier of NYSERDA's Renewable Portfolio Standard (RPS). These include benefits that are accrued from direct project spending as well as indirect spending due to the increased economic activity in the state (the multiplier effect). This study is only intended to address economic benefits to the state's economy that result from in-state spending, not net impacts which would also include electricity price suppression, program costs, and intangible effects (e.g., reduced greenhouse gas emissions, clean air and water, visual/landscape impacts, etc.). Impacts are estimated for existing contracts and for two potential future scenarios, as follows:

1. First Three Solicitations - Renewable energy investments and generation since program inception (in 2005) through the third RPS procurement issued late 2007 (last round of awarded contracts on-line for 2009)
2. 25% by 2013 - a projected continuation of RPS contracts to achieve a goal of 25% renewable generation by 2013 based upon the post-Energy Efficiency Portfolio Standard (EEPS) load forecast
3. 30% by 2015- a projected continuation of RPS contracts to achieve a goal of 30% renewable generation by 2015 post-EEPS load forecast.

The total economic impacts were measured for the bundle of contracted (or anticipated) projects in wind, biofuel⁵ (retrofits), and hydro (upgrades) technologies for generating electricity. The direct effects of these projects which trigger the additional economic activity include the following:

- Short-term construction stimulus (jobs and other construction purchases "in-state")
- One-time transfers to abutters and payments in lieu of taxes (PILOT)
- Longer-term annual facility operations, including:
 - added jobs at the renewable energy (RE) generating facility
 - fuels purchases for biofuel facilities
 - other O&M purchases

⁵ Under the projected RPS scenarios, the technology mix will also include a small role for biomass in the form of land-fill gas.

-
- on-going PILOT and land-lease payments

Given the project scope and the economic model (IMPLAN) chosen, considerations for potential electric price reductions to NY ratepayers as a result of increased renewable energy (RE) production were not identified for the modeling effort. The potential negative economic impacts due to the collection of RPS charges from customers were also not considered.

This study is performed over a time interval which accommodates the assumed 20 year (or more) average life of these facilities (from 2006 to an end-period ranging from 2028 to 2034), which themselves come on-line in a staggered fashion based on when they were contracted and construction was completed.

The remainder of this report is organized as follows:

- Chapter 3 describes NYSERDA's Main Tier (& Maintenance –tier) RPS programs and its goals.
- Chapter 4 presents the direct effects (also referred to as the direct economic benefits) of the RE projects that have been selected and contracted under the first three solicitations (offered to date).
 - Chapter 4 also includes the results of a data credibility assessment.
- Chapter 5 presents the total economic impacts resulting from the direct effects described in Chapter 4.
- Chapter 6 presents the projected direct effects for scenarios 2 and 3.
- Chapter 7 presents the resulting total economic impacts.
- Chapter 8 presents the conclusions from this study.
- Three appendices provide additional documentation for this analysis and report:
 - Background on the IMPLAN model and how it was used for this application.
 - A description on how additional O&M costs were identified by technology.
 - The raw data spreadsheets of the direct economic benefits.

Section 3

OVERVIEW OF NYSERDA'S RPS PROGRAMS TO DATE

This section presents an overview of NYSERDA's RPS Programs and a brief summary of the acquisition processes to date. The following summary from NYSERDA provides an overview of its RPS programs to date:

“On September 24, 2004 the New York State Public Service Commission (PSC) issued an order adopting a Renewable Portfolio Standard (RPS), with the goal of increasing the proportion of renewable energy used by New York consumers from the then current 19.3% to at least 25% by 2013. The RPS was adopted to address the energy, economic, and environmental objectives of New York State by integrating environmentally responsible energy technologies in the electricity supply portfolio.

NYSERDA was authorized by the NY PSC to administer the RPS and major investor-owned utilities were to collect funds from ratepayers to be administered by NYSERDA for the purpose of achieving an RPS target set at 25% of retail consumption. This funding approach assures that all contributing ratepayers pay a pro rata share for the public benefits resulting from the RPS program. These funds have allowed for New York to commit \$741 million through 2013 to implement the RPS program under a two-tiered approach, the Customer Sited Tier and the Main Tier⁶.”

The customer-sited tier is not the focus of the current study.

SUMMARY OF MAIN TIER PROGRAM ACTIVITIES AND RPS REQUIREMENTS

The Main Tier is designed to stimulate the development and construction of large-scale renewable generation facilities that sell their electrical output into the wholesale power market administered by the New York Independent System Operator (NYISO). Under the Main Tier, NYSERDA does not procure energy, but rather offers competitive solicitations for NYSERDA to purchase renewable attributes (Renewable Energy Certificates (REC)) produced by each facility under long-term contracts of up to ten years. To be eligible to participate in a Main Tier competitive solicitation, a Bid Facility must have first commenced commercial operation on or after January 1, 2003, or must first produce new or incremental

⁶ “The Expected Economic Impacts of Renewable Generators Participating in the New York Renewable Portfolio Standard Program,” NYSERDA *draft* document July 31, 2008

REC after that date. This ensures that the new technologies are in addition to the renewable generating energy facilities already in existence within the state.

As of spring 2008, NYSERDA had conducted three competitive Main Tier solicitations. The first competitive Main Tier solicitation (RFP 916) was issued in 2005 as a sealed bid pay-as-bid Request for Proposal (RFP). In this solicitation, bidders were awarded contracts based on price alone. No other factors were taken into account to determine selection or with respect to the ultimate level of award in the resulting contract. NYSERDA's second (RFP 1037) and third (RFP 1168) Main Tier competitive solicitations were completed in early 2007 and early 2008, respectively. Unlike the first Main Tier solicitation, awards in the second and third solicitations were based on two evaluation components: (1) price, weighted at 70%; and (2) the ability of the bidder to demonstrate economic benefits to New York State created by the construction and operation of the bid facility, weighted at 30%. For NYSERDA and its proposal evaluation panel to assess the second evaluation component, bidders were instructed to submit a report for each bid facility addressing five specifically defined economic benefits categories: 1) long-term jobs, 2) short-term jobs, 3) payments to NY State and/or its municipalities, 4) payments for fuels and resource access, 5) and in-state purchases and consumption of goods and services.⁷

The three competitive Main Tier solicitations have resulted in contracts with 28 in-state Main Tier facilities.⁸ Of the 28, 21 are operating or fully constructed and awaiting interconnection. The remaining 7 are either in construction or in late stages of development and are expected to be operating by the end of 2009. Total program funding commitments from the three competitive Main Tier solicitations is approximately \$548.6 million.

In addition to the 28 in-state facilities under contract from the three competitive solicitations, NYSERDA has contracts with two "maintenance resources." These facilities were in operation prior to 2003, and have successfully petitioned the PSC for RPS funding due to financial hardship. These two maintenance facilities represent a combined capacity of 39 MW and are under contract for 259,238 MWh per year. NYSERDA has committed \$33.9 million to these two facilities.

⁷ The text of the first three competitive solicitations can be found online at: www.nyserda.org/rps/pastSolicitations.asp.

⁸ Out of state facilities do not provide any economic benefits to New York. Therefore the capacity, energy and funding figures relating to the two out of state facilities have been purposely omitted.

For purposes of this report, capacity, energy, and funding commitments of the two maintenance resources have been added to the Main Tier totals and their associated economic benefits have been included as retained benefits from ongoing activities. Furthermore, all capacity and energy above that which is under contract with NYSERDA is included in this study.

Table 8 shows the total capacity, energy, and funding commitments for the Main Tier and Maintenance Tier facilities that are used in this report:

Table 8
Capacity, Energy, and Funding Summary⁹

	Total MW	Total MWh	Funding Commitments (\$m)
Main Tier Solicitations	1,301	3,783,409	\$548.6
Maintenance Resources	39	259,238	\$33.9
Total	1,340	4,042,647	\$582.5

⁹ 2008 Performance Report, pg. 5

Table 9 below lists all in-state projects contracted by NYSERDA (as out-of-state projects were not included for purposes of calculating economic benefits), along with the technology and the county in which each project is located.

**Table 9
Facilities under RPS Program Contracts**

Bid Facility	Resource	County
AES Greenidge, LLC	Biomass	Yates
Chateaugay Biomass	Biomass	Franklin
Lyonsdale Biomass	Biomass	Lewis
Niagara Generating Facility	Biomass	Niagara
Allens Falls	Hydro	St. Lawrence
Browns Falls	Hydro	St. Lawrence
Colton	Hydro	St. Lawrence
Eagle	Hydro	Lewis
East Norfolk	Hydro	St. Lawrence
Effley Hydro	Hydro	Lewis
Higley	Hydro	St. Lawrence
Norfolk	Hydro	St. Lawrence
Norwood	Hydro	St. Lawrence
Oswego Falls	Hydro	Oswego
Piercefield Hydro	Hydro	St. Lawrence
Raymondville	Hydro	St. Lawrence
Sherman Island	Hydro	Saratoga
Cohocton Wind Farm	Wind	Steuben
Dutch Hill Wind Farm	Wind	Steuben
Maple Ridge Windpower	Wind	Lewis
Noble Allegany Windpark	Wind	Allegany
Noble Altona Windpark	Wind	Clinton
Noble Bliss Windpark	Wind	Wyoming
Noble Chateaugay Windpark	Wind	Franklin
Noble Chateaugay Windpark II	Wind	Franklin
Noble Clinton Windpark I	Wind	Clinton
Noble Ellenburg Windpark	Wind	Clinton
Noble Wethersfield Windpark	Wind	Wyoming
Wind Farm Prattsburg	Wind	Steuben

POTENTIAL INCREASE IN RPS GOAL

The RPS program as established by the Public Service Commission (PSC) in its September 24, 2004 order set a target of having 25% of retail load served by renewable energy by 2013.¹⁰ With respect to Main Tier resources, the order resulted in a Main Tier program target of 9.85 million MWh. There is an expectation by the PSC that the RPS goal will also be met with contributions from other sectors, including: renewable energy facilities in existence prior to the RPS, and similar procurement activities conducted by the Long Island Power Authority, New York Power Authority, State entities complying with Executive Order 111, the RPS Program's Customer-sited Tier, and the voluntary market. Derived Main Tier targets accordingly reflect this expectation.

In June 2008, New York enacted an Energy Efficiency Portfolio Standard (EEPS) that seeks to reduce forecast energy use by 15% by 2015 (or, "15 x 15").¹¹ As a result of the EEPS, the total level of annual electricity consumption in New York is expected to decrease significantly, from 162 million MWh in 2006 to 152 million MWh by 2015.¹²

On the basis of a target of 25% renewable energy by 2013 and an updated load forecast for 2013 adjusted by the EEPS, the RPS Main Tier program target is expected to be reduced to 4.57 million MWh of renewable attributes.¹³ Of that total, NYSERDA has already contracted for about 3.49 million MWh, leaving only an additional 1.1 million MWh to be procured to meet the 25% by 2013 goal.

The PSC is considering the adoption of an expanded RPS goal of 30% renewable energy by 2015. Based on the post-EEPS load forecast for 2015 with this 30% target, the RPS Main Tier program would need to have a total of 10.1 million MWh of renewable attributes, leaving an additional 6.5 million MWh to be procured in the future.

¹⁰ State of New York, Public Service Commission, "Order Regarding Retail Renewable Portfolio Standard," September 2004.

¹¹ State of New York Public Service Commission, "Order Establishing Energy Efficiency Portfolio Standard and Approval Programs," June 2008. pg. 3.

¹² La Capra Associates & Sustainable Energy Advantage, LLC, "New York Renewable Portfolio Standard Cost Study Update – Main Tier Target and Resources," March 18, 2008. pg. 6. Hereafter: "LaCapra/SEA Cost Study."

¹³ La Capra/SEA Cost Study. Pg. 6.

Interestingly, the current as-ordered Main Tier target of 9.85 million MWh associated with a 25% goal by 2013, increases slightly to 10.1 million MWh should the target be expanded to 30 % by 2015 under an updated load forecast adjusted for the Post-EEPS.

Table 10 shows these new targets, by year. The “Post-EPS” columns predict Main Tier RPS procurement levels under the 25% by 2013 and 30% by 2015 program scenarios. For the remainder of this report, only the Post-EEPS scenarios are examined.

Table 10
Main Tier RPS Targets by Year and Scenario

Year	Cumulative (MWh)			Incremental (MWh)		
	Under Contract	Post-EEPS 25% Target	Post-EEPS 30% Target	Under Contract	Post-EEPS 25% Target	Post-EEPS 30% Target
2006	865,582			865,582		
2007	865,582			0		
2008	2,665,720			1,800,138		
2009	3,490,270			824,550		
2010		4,026,932	4,588,262		524,259	1,085,589
2011		4,570,699	5,867,057		543,767	1,278,795
2012		4,570,699	6,994,385		0	1,127,328
2013		4,570,699	8,113,747		0	1,119,362
2014			9,134,589			1,020,842
2015			10,123,157			988,568

Section 4

DIRECT ECONOMIC BENEFITS FROM MAIN TIER SOLICITATIONS THROUGH 2008

This chapter presents data compiled from developers' applications under NYSERDA's first three RPS Main Tier procurement. This data was self reported by developers, recorded by NYSERDA, and verified for accuracy by KEMA. Before the additional economic impacts associated with these projects were calculated, KEMA completed a credibility assessment on the resulting data. This data was then used throughout this report. The data describe the direct "economic" benefit (*also referred to as either direct impact or direct effect*) expected from temporary construction activities, initial project payments to begin construction (to other impacted landowners and/or municipalities), and from annual operations of the completed facility. These self-reported data reflect technology-specific (i.e., wind, biofuel, or hydro) benefits, as the cost of developing, operating, and maintaining the three types of Main Tier technologies differs dramatically from one technology to another. Budgets vary by technology in terms of the emphasis on short-term and long-term requirements as well as specific expenditures within each phase.

Table 11 through Table 15 present a summary "view" of these direct economic impacts. The data are presented in constant 2006 dollars¹⁴ and reflect adjustments for the timing of the three solicitations. Appendix III contains the comprehensive data in the format compiled by NYSERDA. A discussion of the characteristics of the different direct economic benefits follows in the next section.

One additional caveat must be noted before presenting the summary view of the direct economic impacts. An additional component of direct economic impact has been added by the consultant team after discussion with NYSERDA staff and La Capra Associates, which co-authored the Cost Study Update. The component, called "Annual O&M spending –Other," is a long-term component, and the values assigned represent either (a) a reclassification (for wind and biofuel) of dollar amounts reported in developers' applications (from short-term 3-year spending), or (b) an estimate (specifically, for hydro projects) where the information was missing. Appendix II presents the method (using the La Capra technology-specific fixed/variable O&M costs) to identify the omitted spending to cover routine replacement of equipment during normal operations.

¹⁴ The base year of the NYS IMPLAN model used for this analysis is currently set to 2006.

Table 11
RPS Direct Benefit \$ by Resource and Spending Component, 2006\$

	3 Year Construction Payroll	Initial PILOT Payments	Initial Payments to Other Impacted Landowners	3 Year Construction Purchases	Cumul. L-T Term Payroll	Cumul. L-T PILOT Payments	Cumul. L-T Land Lease	Cumul. Fuel Expense	Cumul. L-T Other Annual O&M	Total
Wind	\$159,699,332	\$13,831,068	\$9,330,281	\$359,205,388	\$255,294,449	\$361,396,505	\$188,703,484	\$0	\$317,964,887	\$1,665,425,393
Hydro	\$2,916,498	\$0	\$0	\$1,210,537	\$0	\$0	\$0	\$0	\$17,971,190	\$22,098,225
Biofuel	\$1,852,663	\$66,000	\$0	\$15,469,786	\$82,025,702	\$4,854,347	\$0	\$254,994,936	\$17,834,241	\$377,097,675
Total	\$164,468,492	\$13,897,068	\$9,330,281	\$375,885,710	\$337,320,151	\$366,250,851	\$188,703,484	\$254,994,936	\$353,770,318	\$2,064,621,293

Table 12
RPS Projects' Direct Benefits (\$ and \$-per MWh, 2006 Basis)

Resource	New Renewable Energy Production (MWh/yr)	Total Direct \$ (from Construction to end of facility life)	Total Direct \$ per MWh
Biofuel	486,145	\$377,097,675	\$38.78
Hydro	75,986	\$22,098,225	\$11.06
Wind	3,480,516	\$1,665,425,393	\$23.92
Total	4,066,553	\$2,064,621,293	\$25.39

Table 13
Direct Benefits by County, 2006\$

County	Total Direct \$ (from Construction to end of facility life)
Allegany	\$108,686,180
Clinton	\$444,448,284
Franklin	\$335,395,539
Lewis	\$486,099,036
Niagara	\$75,162,697
Oswego	\$1,129,519
Saratoga	\$3,525,356
St. Lawrence	\$8,995,883
Steuben	\$254,618,093
Wyoming	\$304,685,275
Yates	\$33,950,774
Total	\$2,064,621,293

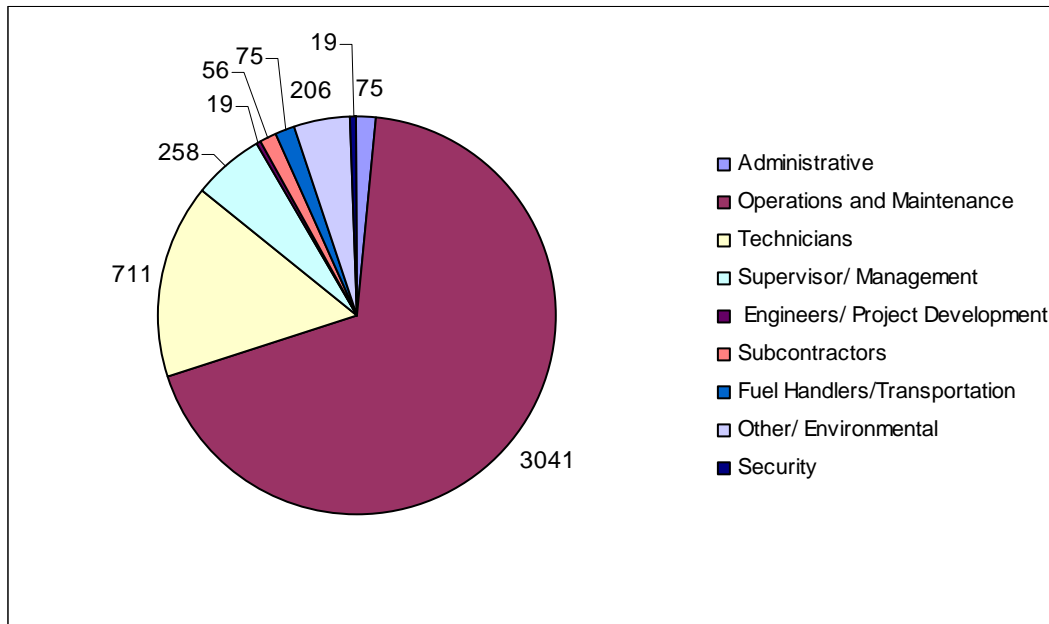
Table 14 shows, for each Main Tier technology, the direct jobs required, either in the initial 3-year construction interval or the annual facility operations jobs (expected to persist for 20 years).

Table 14
RPS Direct Employment by Resource

Resource	3-Year Construction Jobs	Cumul. L-T Jobs (over 20 years)	Total Job Years
Wind	1,980	3,320	5,301
Hydro	42	0	42
Biofuel	9	1,140	1,149
Total	2,031	4,460	6,492

Figure 2 shows the allocation of the \$2.064 billion of direct economic benefits (cumulative through 2028) into the various short-term and long-term categories. The long-term payroll, PILOT payments, land-lease/fuel (biomass/biofuel) payments, and other annual O&M expenses comprise the majority of the direct benefit dollars over the 20-year facility life span. The immediate 3-year construction phase adds a significant amount to this total with respect to (non-labor) expenditures on construction goods and services. The on-going payroll supports 4,460 job-years related to the operations of the facilities. Nearly 70% of the positions have O&M functions, 16% as technicians, and another 6% in managerial functions. The remaining job categories are described in the table below.

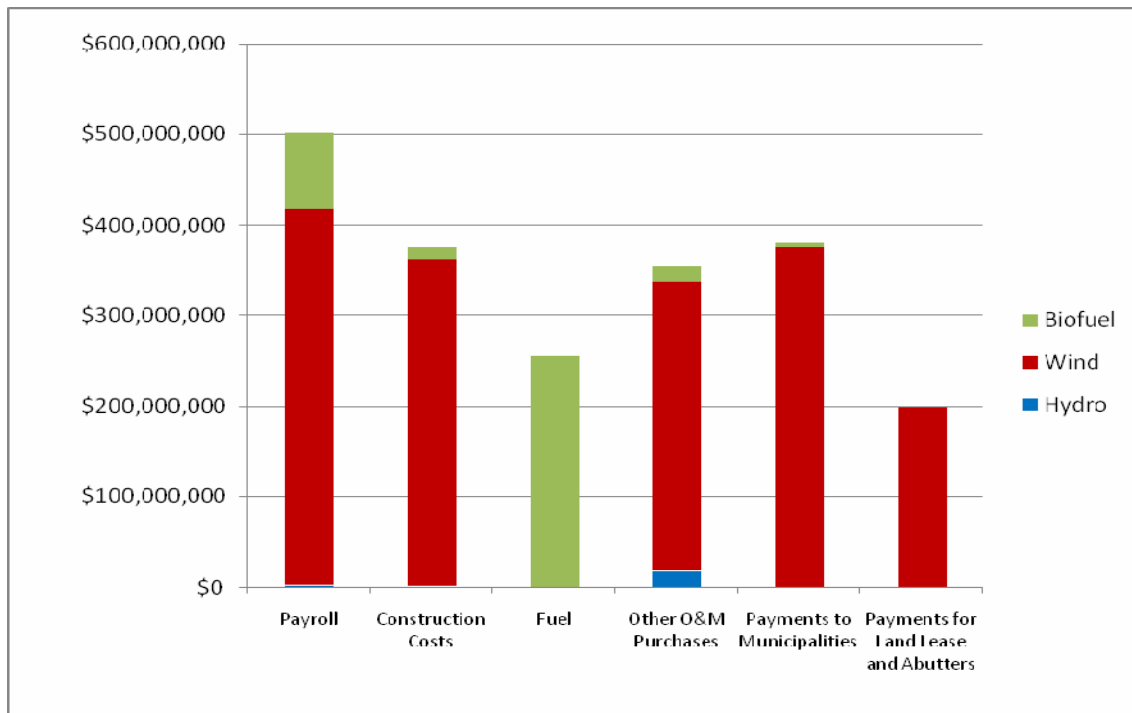
Figure 2
Type of Long-term Jobs in the RE Power Generation & Supply Sector



* Job percentages tabulated NYSERDA, *Entire RPS Direct Benefits JUL 31 2008 working version.xls*.

Figure 3 portrays each technology’s pattern of direct economic benefits (\$), in particular how the spending is committed to the NYS economy. Fuel purchases are solely associated with biofuel facilities and will stimulate forestry-logging activity in the State. Since attributes from wind projects comprise the majority of the RE generation targets, and they are new facilities (constructed after 2004), this technology contributes the majority of direct payroll, other construction spending, payments to municipalities, and O&M spending.

Figure 3
Categories of Direct Benefit \$ by Resource, 2006\$



Discussion of Direct Economic Benefits from Main Tier Projects

NYSERDA’s second and third solicitations requested information on five specifically defined economic benefits categories: 1) long-term jobs, 2) short-term jobs, 3) payments to NY State and/or its municipalities, 4) payments for fuels and resource access, 5) and in-state purchases of goods and services.

Long-term Jobs.

The long-term jobs category represents jobs related to operation and maintenance of bid facilities in New York. These jobs, expressed as full-time equivalents, last more than three years. Bidders were instructed to

describe the types of jobs (occupational classes assumed to occur within the Power Generation & Supply industry), and the expected average annual compensation (inclusive of fringe benefits) for all jobs.

Short-term Jobs

Short-term jobs last less than three years, and are primarily related to construction and planning. For new facilities (primarily wind, all of which are new facilities), short-term jobs are largely in the construction sector, as well as a significant number in the engineering and consulting fields, and a few in the utility sector. Biofuel and hydro facilities contracted thus far are either maintenance resources or expansions of existing facilities; thus, the short-term jobs are more focused on planning and engineering than construction.

Payments to NY State and Municipalities

The category of payments to NY State and/or its municipalities shows the new or increased local property tax revenues resulting from the project. These payments are made to school districts, cities, towns or other taxing jurisdictions in New York. In some cases, developers instead make Payments in Lieu of Taxes (PILOT) or form other compensatory agreements that serve as alternatives to taxing mechanisms. Bidders made note of whether these were one-time or annually recurring payments.

Payments for Fuels and Resources/Land-leases

The payments for fuels and resource access category describes annual payments and compensation related to royalties, production-based payments, land-lease or land-use payments, and other forms of compensation to residents and companies in New York. These payments are associated with securing the rights to access, or in some cases directly acquiring, the land used to build renewable energy facilities. This category also includes purchases of biofuels from local suppliers.

In-state Purchases

For the (short-term) in-state purchases of goods category, bidders were instructed to describe and quantify the degree to which local and state economic activity will increase from construction-related purchases and/or rental of materials and equipment associated with the manufacture, assembly, transport, and construction of a bid facility that is sourced from within New York. This category includes, but is not limited to, gravel, steel, concrete, and mechanical equipment.

The relative roles of the three Main Tier technologies over the first three solicitations are as follows (in-state projects only):¹⁵

- **Wind:** Thirteen wind farms will provide nearly 1,280 MW of renewable capacity, with new renewable energy production of 3.5 million MWh per year. As bidders had the option to offer only a percentage of their project's output, NYSERDA's contracts account for only 1,044 MW, or 82%, of the total 1,280 MW of new wind capacity.
- **Hydropower:** Fourteen upgraded hydropower projects will provide New York with 26.8 MW of new renewable capacity. New renewable energy production will amount to 99,892 MWh per year, of which 95% is supported by NYSERDA's contracts.
- **Biofuel:** Four projects will provide nearly 67 MW of renewable capacity, and 486,145 MWh of renewable energy production annually. Two facilities, Lyonsdale Biomass and the Chateaugay Power Plant both burn biofuels exclusively, and have entered the RPS program as Maintenance Resources.¹⁶ Since Lyonsdale Biomass was chosen through the second Main Tier solicitation, NYSERDA has information on its retained economic benefits to the state.

Contractual Obligations

A key piece of the standard NYSERDA contract is that winning bidders from the second and third solicitations must demonstrate that at least 85% of the expected total benefits from their projects are actually achieved. All RPS attribute sellers who submitted bids under the second and third RFPs are required to submit reports with documentation demonstrating the actual economic benefits that resulted from the construction and operation of their facilities. This report should include sufficient records and documents relating to employment, purchases, and other payments necessary to demonstrate the economic benefits created by each bid facility. Sellers with a Contract Delivery Term of three years are required to submit such report within 60 days of the first anniversary of the Commercial Operation Date. Sellers with a Contract Delivery Term greater than three years will be required to submit the report within 60 days of the third anniversary of the Commercial Operation Date.

¹⁵ These figures do not match the figures presented in Section 3 that show the totals from the first three solicitations, as the figures presented in this section only include in-state projects.

¹⁶ These existing biomass facilities were determined by the PSC to be eligible as Maintenance Resources. These RPS Program contracts will support the retention of approximately 39 MW of in-state biomass capacity and involve approximately 259,000 MWh of annual renewable energy production. The retained economic benefits from these facilities are included in this report.

Should the contractor fail to demonstrate that at least 85% of the benefits have been achieved, NYSERDA may reduce the Bid Price payable for the remainder of the Contract Delivery Term. Such reduction in the Bid Price payable for the remainder of the Contract Delivery Term will be made by an amount equal to the percentage shortfall of the economic benefits actually demonstrated compared to the Expected Total Dollars included in the Bid Proposal.¹⁷

Credibility Assessment of Estimated Direct Economic Benefits

A “Credibility Assessment” was conducted on the Direct Economic Benefits reported by participating developers in their solicitation responses. The study explores the extent to which the self-reported solicitation data from winning bidders are credible and reliable sources for estimating the economic benefits associated with the program. Specifically, the study was designed to:

- Assess the extent to which the solicitations collect the necessary data on Economic Benefits for appropriate data-driven decision-making.
- Characterize the extent to which developer-reported benefits in the interviews compare with solicitation data and the bidders’ surveys.

Besides the solicitation data, the study drew on surveys and interviews with RPS stakeholders as well as reports from NYSERDA, RPS consultant, and other industry sources. One key piece of the Credibility Assessment was a comparison of self-reported from winning bidders with data from three other sources:

- A pre-construction report on the expected benefits from the Maple Ridge Wind Farm¹⁸
- A follow-up interview to verify estimated benefits data from a wind farm operated by a Main Tier bidder.
- A report based on the verified economic impacts from wind farms constructed in Michigan¹⁹

¹⁷ NYSERDA, Renewable Portfolio Standard Program Purchase of Renewable Energy Attributes Request for Proposals (RFP) No. 1168, Fall 2007.

¹⁸ Hale, Kevin of the New York State Energy Research and Development Authority, “Major Impacts of Utility-Scale Wind Projects in New York,” December 2005.

¹⁹ National Renewable Energy Laboratory, “Economic Benefits, Carbon Dioxide Emissions Reductions, and Water Conservation Benefits from 1,000 MW of New Wind Power in Michigan,” June 2008. DOE/GO-102008-2564.

The following table (Table 15) shows the findings from this comparison of average lifetime benefits from wind projects, on a per-MWh basis:

Table 15
Comparison of Lifetime per-MWh Economic Benefits

<u>Data Set</u>	<u>RPS Projects (1037 & 1168)</u>	<u>Maple Ridge Case Study</u>	<u>Developer Estimates</u>	<u>Michigan Case Study</u>	<u>Maple Ridge % of RPS</u>	<u>Developer % of RPS</u>	<u>Michigan % of RPS</u>
Short-term Impacts (Total)	\$8.21	\$4.24	\$4.65	\$8.47	52%	57%	103%
Short-term Jobs	\$2.53	\$0.81	\$1.50	n/a	32%	59%	n/a
Short-term PILOT & Fees	\$0.27	\$0.00	\$0.00	n/a	0%	0%	n/a
Construction (3-year Non-payroll Purchases)	\$5.22	\$3.05	\$3.05	n/a	58%	58%	n/a
Payments to Abutters	\$0.18	\$0.38	\$0.10	n/a	207%	54%	n/a
Long-term Impacts (Total)	\$17.70	\$5.95	\$10.54	\$17.88	34%	60%	101%
Long-term Jobs	\$4.58	\$1.02	\$2.30	\$9.13	22%	50%	199%
PILOT	\$5.96	\$2.89	\$4.24	\$6.09	48%	71%	102%
Fuels (Biomass) & Land Lease	\$2.70	\$2.04	\$4.00	\$2.66	76%	148%	99%
Other O&M (in addition to fuel, lease, PILOT and long-term labor costs)	\$4.45	n/a	n/a	n/a	n/a	n/a	n/a
Total 20-Year Benefits	\$21.46	\$10.19	\$15.19	\$26.35	47%	71%	123%



This study also provides a comparison of the range of high, low, and average self-reported benefits from all winning bidders, including biofuel and hydro developers as well as wind. These can be found in the following tables, reported on both a per-MWh and per-MW basis:

Table 16
Range of Lifetime per-MWh Economic Benefits from All Winning Bidders

Impact	<i>Low</i>	<i>High</i>	<i>Average</i>	<i>Low</i>	<i>High</i>	<i>Average</i>	<i>Low</i>	<i>High</i>	<i>Average</i>
Short-term Impacts (Total)			\$ 1.93			\$ 2.07			\$ 8.21
Short-term Jobs	\$ -	\$ 0.25	\$ 0.20	\$ -	\$ 82.02	\$ 1.46	\$ 0.63	\$ 3.85	\$ 2.53
Short-term PILOT & Fees	\$ -	\$ 0.02	\$ 0.01	\$ -	\$ -	\$ -	\$ -	\$ 0.38	\$ 0.27
Construction (3-year Non-payroll Purchases)	\$ 1.13	\$ 2.46	\$ 1.72	\$ -	\$ 5.41	\$ 0.61	\$ 3.43	\$ 6.89	\$ 5.22
Payments to Abutters			\$ -			\$ -	\$ -	\$ 0.34	\$ 0.18
Long-term Impacts (Total)			\$ 32.01	\$ -	\$ -	\$ -			\$ 17.70
Long-term Jobs	\$ 3.90	\$ 11.09	\$ 7.17	\$ -	\$ -	\$ -	\$ 3.33	\$ 6.37	\$ 4.58
PILOT	\$ -	\$ 0.88	\$ 0.34	\$ -	\$ -	\$ -	\$ 3.13	\$ 17.66	\$ 5.96
Fuels (Biomass) & Land Lease	\$ 9.66	\$ 39.36	\$ 22.01	\$ -	\$ -	\$ -	\$ 2.10	\$ 3.59	\$ 2.70
Other O&M (in addition to fuel, lease, PILOT and long-term labor costs)	\$ -	\$ 4.92	\$ 2.49	\$ 4.67	\$ 14.25	\$ -	\$ 0.50	\$ 7.20	\$ 4.45
Total 20-Year Benefits	\$ 15.86	\$ 51.66	\$ 31.45	\$ -	\$ 82.27	\$ 2.07	\$ 18.01	\$ 30.77	\$ 21.46



Table 17
Range of Lifetime per-MW Economic Benefits from All Winning Bidders

Impact	<i>Low</i>	<i>High</i>	<i>Average</i>	<i>Low</i>	<i>High</i>	<i>Average</i>	<i>Low</i>	<i>High</i>	<i>Average</i>
Short-term Impacts (Total)			\$564,149			\$307,414			\$879,396
Short-term Jobs	\$187,726	\$369,030	\$282,074	\$0	\$8,350,808	\$153,707	\$251,374	\$540,203	\$444,679
Short-term PILOT & Fees	\$0	\$37,126	\$28,754	\$0	\$8,325,074	\$108,622	\$31,725	\$202,579	\$137,223
Construction (3-year Non-payroll Purchases)	\$0	\$2,538	\$1,347	\$0	\$0	\$0	\$0	\$22,132	\$14,769
Payments to Abutters			\$251,973			\$45,085	\$180,205	\$361,199	\$282,725
Long-term Impacts (Total)			\$233,963	\$0	\$0	\$0			\$47,912
Long-term Jobs	\$28,486	\$80,669	\$52,420	\$0	\$0	\$0	\$8,343	\$17,320	\$12,410
PILOT	\$0	\$6,387	\$2,477	\$0	\$0	\$0	\$8,224	\$44,267	\$16,136
Fuels (Biomass) & Land Lease	\$70,556	\$295,224	\$160,868	\$0	\$0	\$0	\$5,261	\$9,446	\$7,314
Other O&M (in addition to fuel, lease, PILOT and long-term labor costs)	\$0	\$36,903	\$18,198	\$22,303	\$55,931	\$0	\$1,252	\$21,308	\$12,052
Total 20-Year Benefits	\$2,318,488	\$7,749,633	\$4,597,374	\$0	\$8,350,808	\$153,707	\$946,403	\$1,538,580	\$1,161,883

With a few minor exceptions, it was found that the data reported in these bids, after being modified by NYSERDA in a few cases of misinterpretations of bidding instructions, confirm that the Direct Benefits data is reliable and could serve as a basis for this and other analyses of the economic benefits that can be claimed from renewable energy development.

Section 5

TOTAL ECONOMIC IMPACTS FROM FIRST THREE SOLICITATIONS

An IMPLAN model of the New York state economy was applied to estimate the additional economic activity from the direct benefits of the Main Tier RPS projects, as described in Section 4. These added activities are termed *multiplier effects* and are the typical result from the *input-output* (I-O) economic analysis framework. The results are generated within a system that is calibrated to NYS economic data (through 2006). The IMPLAN model is in use in NYS and is among the set of analysis tools that NYSERDA staff use. The analysis builds from the data developers provided on applications regarding employment, payroll, and the amount of “in-state” expenditures that will occur during project construction and operations. For more detail about the IMPLAN economic model and how it was applied with the data of this study, refer to Appendix I at the end of this study.

This section presents the outputs of the IMPLAN model from the direct economic benefits data presented in Section 4. These IMPLAN modeled outputs represent the total economic benefits using the direct economic benefits data and the simulated multiplier effects. It is worth mentioning that the I-O analysis framework is time-path neutral. It provides a multiplier result calibrated to specific year (here 2006). The results articulated here for a specific out year (denoting end-of-facility life) make no assumption for how the underlying structure of the NY economy may change between now and say 2030.

The total economic impact for the first three solicitations of the Main Tier RPS program is presented below in Table 18 in terms of jobs, labor income, and output. Over the course of construction and operations of all RPS facilities, over \$4.2 billion in output, \$1.3 billion in labor income and 22,676 job-years are generated in New York. That represents a job multiplier effect of 3.5 and a labor income multiplier effect of 2.6.

Table 18
Total Economic Impacts from First Three Solicitations, 2005 – 2028

	2005	2006	2007	2008	2009	...2015	...2028	Total (2005- 2028)
Jobs								
Direct	100	595	677	756	305	223	44	6,492
Indirect	428	1,670	1,860	1,827	813	529	67	16,184
Total	528	2,265	2,537	2,583	1,118	752	111	22,676
Labor Income (2006\$ mil)*								
Direct	\$10.4	\$38.1	\$54.8	\$58.6	\$33.6	\$16.9	\$2.7	\$502
Indirect	\$23.8	\$92.9	\$102.7	\$99.2	\$42.8	\$27.5	\$3.5	\$860
Total	\$34.2	\$130.9	\$157.5	\$157.8	\$76.4	\$44.4	\$6.2	\$1,362
Output (2006\$ mil)								
Direct (est.)	\$44.5	\$172.3	\$195.3	\$205.0	\$107.7	\$75.1	\$10.3	\$2,086
Indirect	\$63.6	\$237.3	\$270.0	\$259.6	\$108.9	\$67.4	\$8.4	\$2,161
Total	\$108.0	\$409.7	\$465.3	\$464.6	\$216.6	\$142.5	\$18.7	\$4,248

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct “Output” includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending “in-state”, fuel payments, and payments to other impacted landowners.

* For every dollar of economic output (sales) a portion represents labor income. The output impact and the labor income impact for any year should not be added together. They are both reported however to convey how individuals filling the impacted jobs are compensated.

In the first five years (2005 through 2009) most of the economic activity in the state is generated from construction of the renewable facilities while it also includes the beginning of facility operations in 2008 and 2009 (depending on the year of solicitation award). By 2010, construction for all facilities has ended and the impacts through 2027 represent solely the annual effects of operations and maintenance of all facilities. By 2028, some projects have exceeded their 20 year useful life and the few remaining contribute impacts through their last year of operation.

The economic impacts for the same concepts and years are shown below broken down by renewable technology including biofuel, hydro and wind power in Tables 19, 20, and 21 respectively. It is immediately apparent that wind is the primary contributor of economic impact in the RPS program. This is not surprising as wind projects are much more expensive to build and maintain than biofuel and hydro facilities. Also, all of the wind facilities are new while most of the biofuel and hydro projects involve pre-existing facilities that either expanded or converted operations for the program.

Table 19
Economic Impacts for Biofuel Facilities: First Three Solicitations, 2005 – 2028

	2005	2006	2007	2008	2009	...2015	...2028	Total (2005- 2028)
Jobs								
Direct	0	3	3	54	57	57	6	1,149
Indirect	0	71	77	195	136	129	11	2,818
Total	0	74	80	249	193	186	17	3,967
Labor Income (2006\$ mil)*								
Direct	\$0.0	\$0.6	\$0.6	\$4.4	\$4.1	\$4.1	\$0.3	\$84
Indirect	\$0.0	\$3.9	\$4.2	\$8.9	\$5.5	\$5.1	\$0.4	\$115
Total	\$0.0	\$4.5	\$4.8	\$13.3	\$9.6	\$9.2	\$0.7	\$199
Output (2006\$ mil)								
Direct (est.)	\$0.0	\$5.3	\$5.8	\$22.1	\$18.5	\$18.0	\$1.6	\$377
Indirect	\$0.0	\$8.9	\$9.7	\$31.3	\$24.7	\$23.8	\$2.2	\$506
Total	\$0.0	\$14.2	\$15.4	\$53.5	\$43.2	\$41.8	\$3.8	\$883

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 18.

Table 20
Economic Impacts for Hydro Facilities: First Three Solicitations, 2005 – 2028

	2005	2006	2007	2008	2009	...2015	...2028	Total (2005- 2028)
Jobs								
Direct	0	11	14	14	3	0	0	42
Indirect	0	11	11	9	5	5	3	126
Total	0	22	25	23	8	5	3	168
Labor Income (2006\$ mil)*								
Direct	\$0.0	\$0.8	\$1.0	\$1.0	\$0.2	\$0.0	\$0.0	\$3
Indirect	\$0.0	\$0.5	\$0.6	\$0.7	\$0.4	\$0.3	\$0.2	\$8
Total	\$0.0	\$1.3	\$1.5	\$1.7	\$0.6	\$0.3	\$0.2	\$11
Output (2006\$ mil)								
Direct (est.)	\$0.0	\$1.2	\$1.4	\$1.7	\$1.1	\$0.9	\$0.6	\$22
Indirect	\$0.0	\$1.3	\$1.5	\$1.8	\$1.0	\$0.8	\$0.5	\$20
Total	\$0.0	\$2.5	\$2.9	\$3.5	\$2.1	\$1.7	\$1.1	\$42

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 18.

Table 21
Economic Impacts for Wind Facilities: First Three Solicitations, 2005 – 2028

	2005	2006	2007	2008	2009	...2015	...2028	Total (2005- 2028)
Jobs								
Direct	100	581	660	688	245	166	38	5,301
Indirect	428	1,587	1,772	1,623	672	395	52	13,239
Total	528	2,168	2,432	2,311	917	561	91	18,540
Labor Income (2006\$ mil)*								
Direct	\$10.4	\$36.7	\$53.2	\$53.2	\$29.3	\$12.8	\$2.4	\$415
Indirect	\$23.8	\$88.5	\$97.9	\$89.7	\$36.9	\$22.1	\$2.9	\$738
Total	\$34.2	\$125.2	\$151.1	\$142.9	\$66.2	\$34.9	\$5.3	\$1,153
Output (2006\$ mil)								
Direct (est.)	\$44.5	\$165.8	\$188.1	\$181.2	\$88.1	\$56.2	\$8.1	\$1,687
Indirect	\$63.6	\$227.1	\$258.9	\$226.5	\$83.3	\$42.8	\$5.7	\$1,636
Total	\$108.0	\$392.9	\$447.0	\$407.7	\$171.4	\$99.0	\$13.8	\$3,323

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 18.

Table 22 separates the itemized short-term (i.e. construction) and long-term (i.e. operations) impacts for all technologies in the RPS program (the results overlap each other in Table 18). This shows that the construction of facilities generates a larger incremental annual impact, although operation of facilities contributes more over the entire period of the program.

Table 22
Short and Long-Term Economic Impacts for All Technologies: First Three Solicitations,
2005 – 2028

	SHORT-TERM IMPACTS						LONG-TERM IMPACTS			
	2005	2006	2007	2008	2009	Total Short-Term	2005	2015	2028	Total Long-Term
Jobs										
Direct	100	595	677	577	82	2,031	0	223	44	4,460
Indirect	428	1,670	1,860	1,365	284	5,607	0	529	67	10,577
Total	528	2,265	2,537	1,942	366	7,638	0	752	111	15,037
Labor Income (2006\$ mil)*										
Direct	\$10.4	\$38.1	\$54.8	\$44.4	\$16.8	\$164	\$0.0	\$16.9	\$2.7	\$337
Indirect	\$23.8	\$92.9	\$102.7	\$75.2	\$15.3	\$310	\$0.0	\$27.5	\$3.5	\$551
Total	\$34.2	\$130.9	\$157.5	\$119.7	\$32.0	\$474	\$0.0	\$44.4	\$6.2	\$888
Output (2006\$ mil)										
Direct (est.)	\$41.9	\$165.0	\$185.8	\$138.2	\$32.7	\$564	\$2.6	\$75.1	\$10.3	\$1,522
Indirect	\$63.6	\$237.3	\$270.0	\$200.6	\$41.5	\$813	\$0.0	\$67.4	\$8.4	\$1,348
Total	\$105.4	\$402.3	\$455.9	\$338.8	\$74.2	\$1,377	\$2.6	\$142.5	\$18.7	\$2,871

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 18.

Resulting impacts by the components of short-term and long-term spending are shown below in Tables 23 and 24. The direct spending for each category is across the entire set of Main Tier RPS projects over the respective intervals. Construction purchases represent the largest impact in the short-term while PILOT payments generate the largest impact in the long-term through government spending.

Table 23
**Change in NYS Output: Impacts by Components of Short Term RPS Spending-
 First Three Solicitations, Total Amount 2005-2009**

	Construction Payroll	In-State Construction Spending	Payments to Other Impacted Landowners (one-time)	PILOT Payments (one-time)	Total
<i>Direct Spending (2006\$mil)</i>	\$164.5	\$375.9	\$9.3	\$13.9	\$564
<i>Total Labor Income (2006\$mil)</i>	\$210.0	-	-	-	-
<i>Total Output (2006\$mil)</i>	\$298.5	\$1,034.2	\$9.3	\$34.5	\$1,377

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Payments to other impacted landowners do not enter the IMPLAN multiplier model since these are compensations for productive capacity of land, aesthetics, noise, etc. Therefore, it was assumed that these payments did not lead to spin-off activity in the state economy.

Table 24
Change in NYS Output: Impacts by Components of Long Term RPS Spending- First Three Solicitations, Total Amount 2005-2028

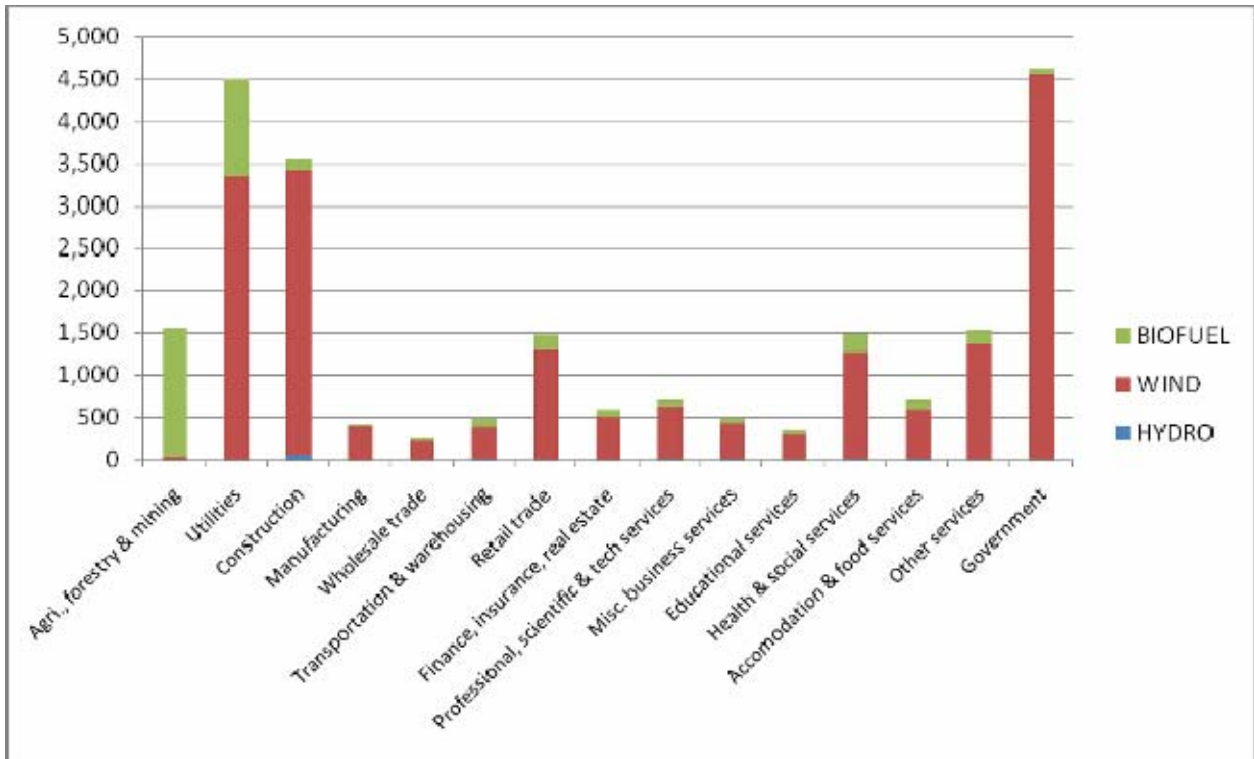
	O&M Payroll	PILOT Payments (on-going)	Fuels (on-going)	Land Lease (on-going)	Other O&M Spending*	Total
<i>Direct Spending (2006\$ mil)</i>	\$337.3	\$366.3	\$255.0	\$210.2	\$353.8	\$1,522
<i>Total Labor Income (2006\$ mil)</i>	\$421.8	-			-	-
<i>Total Output (2006\$ mil)</i>	\$586.6	\$910.4	\$650.7	\$210.2	\$513.0	\$2,871

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Land Lease payments, representing a transfer of wealth, do not enter the IMPLAN multiplier model.

*Other O&M spending includes purchases of supplies and services necessary for operation that were not included in the other components.

Figure 4 shows the job impacts by industry for each technology. The construction and operation associated with each technology affects the economy in noticeably different ways. This is due to the diverse set of requirements and, therefore, supplies and services that support each technology. The industries with the largest impact (in terms of jobs) are government, utilities and construction. Impacts on these industries mainly come through contributions of PILOT payments (short and long term) and direct jobs involving operations (i.e. utilities) and facility construction. Wind facilities contribute the most jobs to all industries--with the exception of agriculture, forestry and mining which supplies feedstock for biofuel facilities.

Figure 4
Total Job Impacts by Industry -First Three Solicitations, 2005-2028



Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group.

Many of the jobs generated from the Main Tier RPS program are high-paying and, therefore, contribute significant spending power to New York. Table 25 shows the average labor income per worker for the state. The utilities industry has the highest average income of any in the state. These jobs represented the second-highest impact in the chart above. Government and construction jobs also generate significant income while those industries that are affected by consumer spending (e.g. retail) tend to provide lower income.

Table 25
Average Income per Worker in New York State, 2006

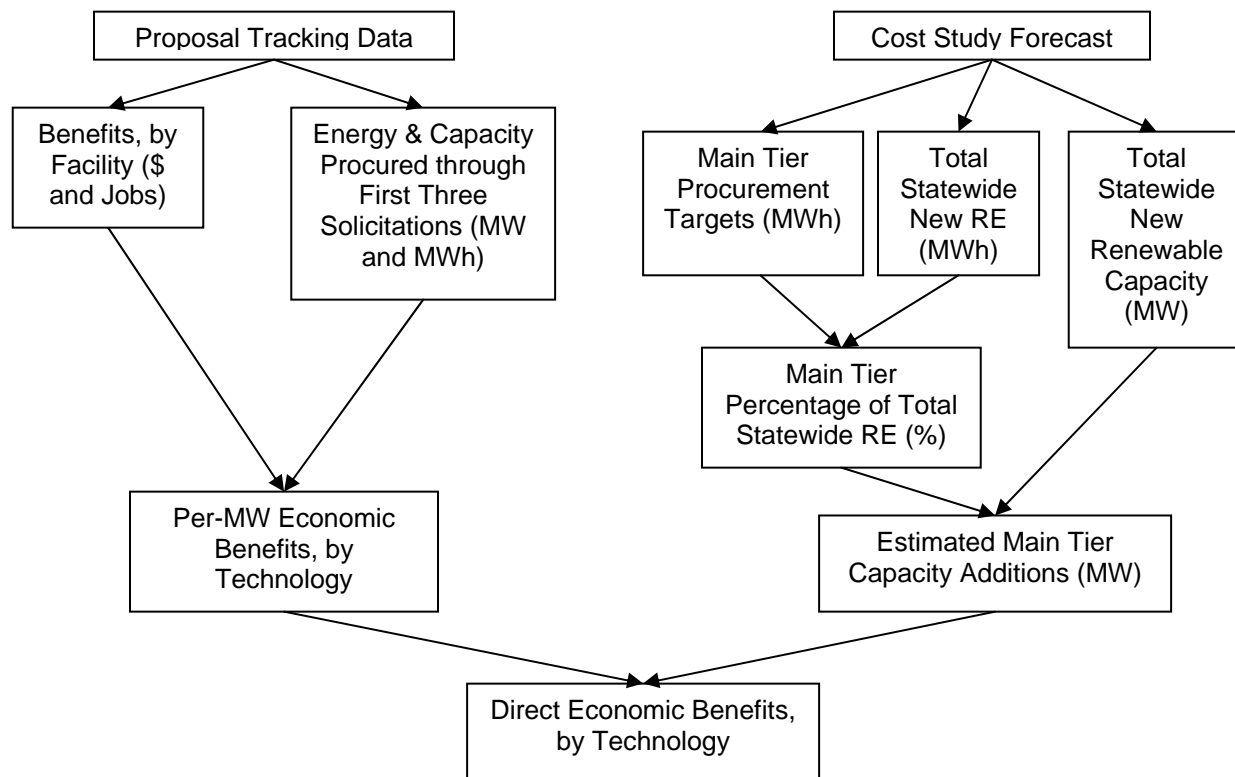
Industry	Income/Worker
Agric., forestry & mining	\$47,930
Utilities (Power Gen. & Supply)	\$144,506
Construction	\$56,940
Manufacturing	\$75,857
Wholesale trade	\$77,943
Transportation & warehousing	\$43,342
Retail trade	\$31,388
Finance, insurance, real estate	\$127,760
Professional, scientific & tech services	\$87,363
Misc. business services	\$58,367
Educational services	\$37,126
Health & social services	\$46,305
Accommodation & food services	\$24,812
Other services	\$52,698
Government	\$65,162
State Average	\$62,797

Section 6

PROJECTED DIRECT ECONOMIC BENEFITS FOR THE FUTURE RPS MAIN TIER PROGRAM (25% BY 2013 OR 30% BY 2015)

The direct economic benefits attributable to the RPS Main Tier program were modeled for both the 25% by 2013 and 30% by 2015 RPS scenarios, which are described in section 3. The basic methodology used to extrapolate the total benefits for each year (broken out by technology type) was to multiply the estimated RPS capacity additions by the estimated per-MW economic benefits from current RPS-funded projects. This methodology is described in greater detail below. The following flow chart (Figure 5) provides a visualization of each calculation step.

Figure 5
Flow Chart of Calculation to Estimating Future Direct Economic Benefits



INPUT DATA REVIEW AND SPECIFICATION

As part of the forecast estimate and IMPLAN model development process, KEMA gathered data from a number of sources including NYSERDA program tracking data and other secondary sources.

Data Sources

The direct economic benefits estimates drew on two sources of data:

- **Proposal Tracking Data** – NYSERDA compiled an internal data tracking tool based on proposal responses from winning bidders. Upon completion of an in-depth review of winning solicitation documents, the content of this program tracking tool was verified against the original solicitation response data. Verified data inputs included both project specification data and estimated economic direct benefits. Through this process, KEMA updated and adjusted specific values with respect to the timing of economic benefits received. KEMA also clarified the contribution of different projects to short- versus long-term estimated benefits.
- **La Capra/SEA Cost Study** – In March 2008, La Capra and Sustainable Energy Advantage submitted an updated RPS program cost study to account for changes in market conditions, the expected impacts of the Energy Efficiency Portfolio Standard (EEPS), and the potential of establishing a 30% RPS. The report projects Main Tier RPS solicitations for each program year, total new renewable capacity and generation expected to come online, and per-MWh market clearing prices for Main Tier resource environmental attributes. All are broken down by resource type. These data were used as additional input values in developing the forecasted direct economic benefits estimates.

Capacity vs. Energy

Through the Main Tier program, NYSERDA procures “RPS Attributes.” Each attribute represents the benefits associated with 1 MWh of qualified renewable energy generation. However, for purposes of determining economic benefits, it is generally more valuable to think in terms of the total size of a project than the energy (or attributes) produced by the facility. In the case of a wind project—and the bulk of RPS-contracted attributes comes from wind—a facility that runs, on average, at 25% of its total potential output (or “capacity factor”) and produces essentially the same benefits as a facility running at 40% of its total potential output. Both projects require the same levels of spending on construction, land leases, equipment, and operations and maintenance. The same could be probably said for biofuel or hydro facilities.

Therefore, it is more useful to think in terms of project size or capacity (measured in MW) than energy output or RPS Attributes (measured in MWh).

The exception to this capacity-based methodology is the fuel component of biofuel facilities. One of the major economic benefits from biofuel projects is that they require significant purchases of local fuels. A biofuel facility operating at 90% capacity factor requires significantly more fuel—and associated labor—than one operating at 60% capacity factor. Thus, benefits associated with future biofuel purchases, as well as the operations and maintenance of biofuel facilities, are estimated in terms of energy output, not capacity.

Per-MW and Per-MWh Benefits Results

To calculate the total benefits for projects currently under contract with NYSERDA, we began by using the bid proposal data to calculate the total capacity, energy, and benefits from each renewable energy resource (i.e., wind, hydro, or biofuel). Based on the assumption that renewable energy facilities are being built in response to an RPS program, the subsequent analysis assumes that all capacity from all projects bid into the RPS was built as a result of the RPS. Therefore, this assessment assumes that the RPS program claims 100% of a given facility's direct economic benefits.

To determine the benefits associated with each MW of new wind, hydro, or biofuel capacity, we took the following steps, with a separate calculation for each technology:

- Determined the sum of the dollar benefits from all projects contracted to date by NYSERDA for each benefit category (i.e., determined separate figures for short-term jobs, PILOT, etc.).²⁰
- Determined the sum of the total capacity and energy output of the contracted projects.²¹
- Divided each dollar benefits category by the total capacity of contracted projects to determine the per-MW and per-MWh benefits.²²

It was necessary to calculate separate results for each benefits category and renewable technology because the values for those individual line-items could vary greatly depending on the technology.

²⁰ Proposal Tracking Data

²¹ Proposal Tracking Data

²² Proposal Tracking Data

Biofuels, for example, provides significantly higher fuel/land lease payments than wind or hydro. Therefore, separate figures were calculated for short- and long- term jobs, annual O&M, payments to landowners, etc. to account for the varying benefits associated with each technology.

PROJECTED MAIN TIER CAPACITY ADDITIONS

The La Capra/SEA Cost Study included projections, by year, of the amount of renewable energy attributes (measured in MWh) that NYSERDA will need to procure to meet its procurement targets for both the 25% and 30% RPS goals. The study also contained projections of the total amount of new statewide renewable capacity and annual energy production added each year through 2015, broken down by technology.

Because the Cost Study did not include technology-specific projections of Main Tier capacity and energy additions which are necessary to estimate economic direct benefits—only of the entire statewide renewable capacity/energy additions (i.e., including LIPA, the CST, and sales to other markets). To project the amount of new technology-specific generation built each year, we took the following steps (separately for the two RPS scenarios):

1. Subtracted the energy exported to other markets (much of which was landfill gas delivered to New England) to determine the new statewide renewable energy generation amount for each year.
2. Determined the percentage of new statewide renewable energy generation being procured by NYSERDA to meet the RPS.
3. Multiplied the statewide new generation and new capacity from each resource by this percentage to determine the incremental annual Main Tier RPS solicitations from each resource.

The results are shown in Tables 26 and 27:

Table 26
Main Tier RPS Energy Generation in GWh (2010-2015)

Year		2010	2011	2012	2013	2014	2015
25% Post-EPS	Biomass	93.1	102.2				
	Hydro	214.0	234.8				
	LFG	7.4	7.4				
	Wind	272.9	268.0				
	Total	524.3	543.8	0.0	0.0	0.0	0.0
30% Post-EPS	Biomass	110.8	118.7	117.5	117.7	618.1	457.3
	Hydro	254.8	272.9	270.0	270.5	198.2	0.0
	LFG	7.4	7.4	7.4	7.4	7.4	7.4
	Wind	786.2	958.3	810.0	801.6	197.8	531.3
	Total	1,085.6	1,278.8	1,127.3	1,119.4	1,020.8	988.6

Table 27
Main Tier Bid Capacity in MW (2010-2015)

Year		2010	2011	2012	2013	2014	2015
25% Post-EPS	Biomass	13.3	14.5				
	Hydro	46.4	50.9				
	LFG	1.0	1.0				
	Wind	92.5	90.6				
30% Post-EPS	Biomass	15.9	16.9	16.8	16.8	89.4	74.5
	Hydro	55.2	59.1	58.5	58.6	39.0	0.0
	LFG	1.0	1.0	1.0	1.0	0.9	0.0
	Wind	269.7	329.1	277.7	274.8	68.4	197.6

Estimation of Total Capacity Based on Contracts with NYSERDA

From NYSERDA’s program tracking data, the values above only represent the amount of energy and capacity procured directly by NYSERDA to meet RPS targets, which is less than actual capacity. The results do not yet take into account the fact that (1) projects must be larger based on a 5% set-aside requirement and (2) some projects reserve a portion of their output for sales into other markets. Because the direct economic benefits from the Main Tier program are based on 100% of the capacity of all these projects—not just the contracted percentage—we have adjusted the future projections slightly consistent with NYSERDA’s internal tracking data. To do so, we estimated the adjustment factor by technology based on what was actually bid into the RPS.

The following table (Table 28) shows the percentage of total new statewide renewable energy capacity represented by current NYSERDA contracts:

Table 28
Adjustment Factor to Contracted Value by Technology

Resource	Contracted % of Incremental MW	Effect on Total Annual Incremental Capacity
Biomass	95.0%	+5.3%
Hydro	95.0%	+5.3%
LFG	55.9%	+78.9%
Wind	84.5%	+18.3%

To adjust the projections of economic benefits going forward, we applied the inflation factor for each technology as appropriate to estimate the effective capacity by technology upon which the direct economic benefits would be based.

After estimating the capacity and energy procurement increases necessary to meet the RPS, we simply multiplied these figures by the per-MW benefits to determine the final direct benefits from the program. Results for each scenario are shown in Chapter 7. Biomass and landfill gas projects were analyzed separately from one another. Thus, a separate set of results are presented for both categories of biofuels.

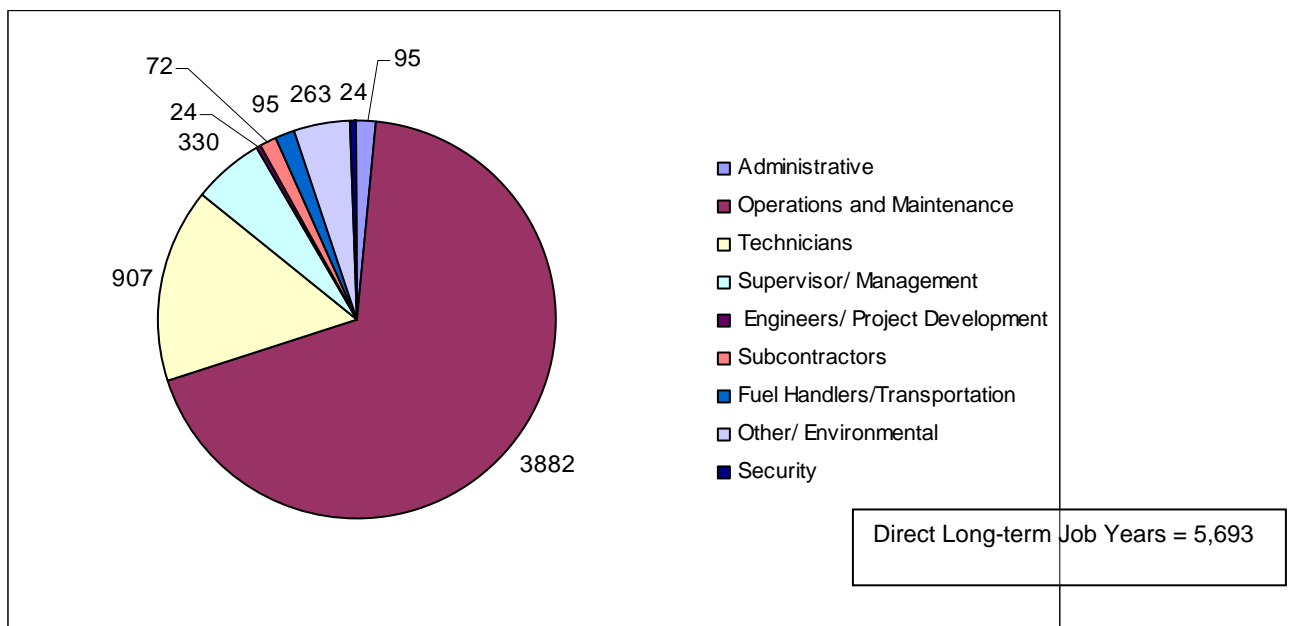
PRESENTATIONS OF DIRECT BENEFITS FOR 25% BY 2013 AND 30% BY 2015 SCENARIOS

Similar to the presentation in Chapter 4, various formats of the anticipated direct benefits for the *25% Post-EEPS Goal by 2013*, and the *30% Post-EEPS Goal by 2015* scenarios follow in Table 29 and Table 30, as well as Figure 6 and Figure 7 (the exception is the presentation *by county*). Appendix III contains the basic spreadsheet format for the data (presented in 2006 dollar basis) depicting the years post 2009. Each scenario is a potential attenuation of the accomplishments achieved through the first three solicitations. For 25% by 2013, the 2013 target is fulfilled by solicitations that come on-line by 2011. For 30% by 2015, the entire time-frame from 2010 through 2015 is necessary to put the capacity in place for the 30% target.

Table 29
25% by 2013- RPS Projects' Direct Benefits (\$ and \$-per MWh, 2006 Basis)

Resource	New Renewable Energy Production (MWh/yr)	New Renewable Energy Production (MWh over 20 years)	Total Direct \$ (from Construction to end of facility life)	Total Direct \$ per MWh
Biomass	681,377	13,627,540	\$536,617,806	\$39.38
Hydro	548,680	10,973,600	\$106,353,661	\$9.69
Wind	4,021,395	80,427,900	\$1,969,273,616	\$24.48
LFG	14,800	296,000	\$14,887,101	\$50.29
Total	5,266,252	105,325,040	\$2,627,132,184	\$24.94

Figure 6
25% by 2013- Type of Long-term Jobs in the RE Power Generation & Supply Sector

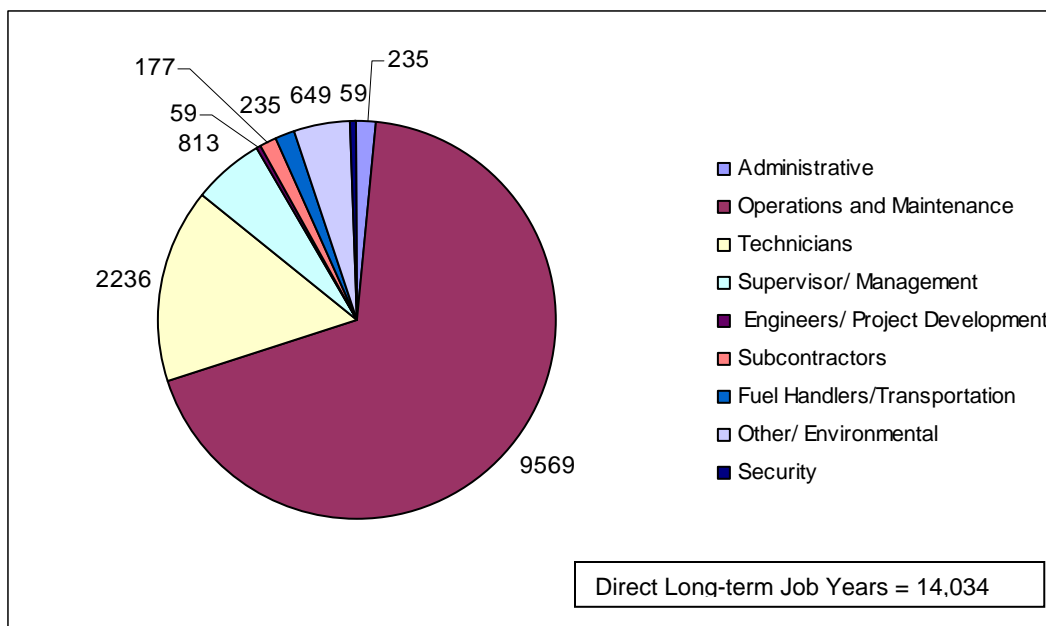


* Job percentages tabulated by NYSERDA, *Entire RPS direct Benefits JUL 31 2008 working version.xls*.

Table 30
30% by 2015- RPS Projects' Direct Benefits (\$ and \$-per MWh, 2006 Basis)

Resource	New Renewable Energy Production (MWh/yr)	New Renewable Energy Production (MWh over 20 years)	Total Direct \$ (from Construction to end of facility life)	Total Direct \$ per MWh
Biomass	2,026,377	40,527,540	\$1,695,726,691	\$41.84
Hydro	1,366,340	27,326,800	\$256,393,340	\$9.38
Wind	7,565,562	151,311,240	\$4,018,265,621	\$26.56
LFG	37,000	740,000	\$36,593,402	\$49.45
Total	10,995,279	219,905,580	\$6,006,979,054	\$27.32

Figure 7
30% by 2015- Type of Long-term Jobs in the RE Power Generation & Supply Sector



* Job percentages tabulated by NYSERDA, *Entire RPS direct Benefits JUL 31 2008 working version.xls*.



Section 7

**TOTAL ECONOMIC BENEFITS FROM THE PROJECTED RPS MAIN TIER PROGRAM
(SCENARIOS 2 AND 3)**

This section presents the outputs of the IMPLAN model for the direct benefits data presented in Section 6. These IMPLAN modeled outputs represent the total economic benefits using the direct economic benefits data and the simulated multiplier effects.

TOTAL ECONOMIC IMPACTS FROM 25% BY 2013

The total economic impact of 25% by 2013 is presented below in Table 31 in terms of jobs, labor income, and output. The construction and operations of future RPS facilities in this scenario contribute over \$5.4 billion in output, \$1.7 billion in labor income and 28,528 job-years to the state over the period from 2005 through 2030. That represents a job multiplier effect of 3.4 and a labor income multiplier effect of 2.7.

**Table 31
Economic Impacts for All Technologies -25% by 2013, 2005 – 2028**

	2005	2006	2007	2008	2009	2010	2011	2015	2028	2029	2030	Total (2005- 2030)
Jobs												
Direct	100	595	677	851	496	445	381	285	106	62	31	8,298
Indirect	428	1,670	1,860	2,052	1,225	968	852	672	210	143	73	20,230
Total	528	2,265	2,537	2,903	1,722	1,412	1,233	957	316	205	104	28,528
Labor Income (2006\$ mil)												
Direct	\$10.4	\$38.1	\$54.8	\$65.6	\$47.7	\$33.2	\$28.5	\$21.4	\$7.3	\$4.6	\$2.3	\$636
Indirect	\$23.8	\$92.9	\$102.7	\$112.2	\$66.4	\$51.9	\$44.8	\$34.6	\$10.6	\$7.1	\$3.6	\$1,070
Total	\$34.2	\$130.9	\$157.5	\$177.8	\$114.1	\$85.1	\$73.3	\$56.1	\$17.9	\$11.7	\$5.9	\$1,705
Output (2006\$ mil)												
Direct (est.)	\$44.5	\$172.3	\$195.3	\$228.2	\$151.2	\$125.9	\$116.7	\$97.0	\$32.3	\$22.0	\$11.2	\$2,652
Indirect	\$63.6	\$237.3	\$270.0	\$291.4	\$168.6	\$133.4	\$116.6	\$89.2	\$30.2	\$21.8	\$11.2	\$2,772
Total	\$108.0	\$409.7	\$465.3	\$519.6	\$319.9	\$259.3	\$233.3	\$186.3	\$62.5	\$43.8	\$22.3	\$5,424

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* For every dollar of economic output (sales) a portion represents labor income. The Output impact and the labor income impact for any year should not be added together. They are both reported however to convey how the impacted jobs are compensated

In the first seven years (2005 through 2011), current and future RPS facilities are under construction and projects begin operation; all RPS Main Tier projects currently under contract are on-line by 2009, and all future RPS projects are on-line by 2011. The annual impacts from 2012 to 2027 are identical since construction has ended and all facilities are operational. By 2028, projects from the first three solicitations start to surpass their useful life and in 2029 and 2030, facilities from the future RPS come off-line.

The economic impacts by renewable technology are shown below in Tables 32, 33, 34 and 35 with the addition of landfill gas which did not exist in the first three solicitations. As in the first three Main Tier solicitations (Table 18) wind power is the largest contributor of economic impact in the program. Landfill gas facilities generate the lowest impacts of any technology.

Table 32
Economic Impacts for Biofuel Facilities -25% by 2013, 2005 –2030

	2005	2006	2007	2008	2009	2010	2011	...2015	...2028	2029	2030	Total (2005- 2030)
Jobs												
Direct	0	3	3	55	58	70	82	81	30	24	13	1,635
Indirect	0	71	77	211	169	188	201	184	66	55	29	4,010
Total	0	74	80	265	227	258	283	265	96	79	41	5,646
Labor Income (2006\$ mil)*												
Direct	\$0.0	\$0.6	\$0.6	\$4.5	\$4.4	\$5.2	\$6.0	\$5.8	\$2.0	\$1.7	\$0.9	\$119
Indirect	\$0.0	\$3.9	\$4.2	\$9.7	\$7.3	\$7.9	\$8.2	\$7.3	\$2.6	\$2.2	\$1.1	\$163
Total	\$0.0	\$4.5	\$4.8	\$14.3	\$11.6	\$13.1	\$14.2	\$13.1	\$4.6	\$3.9	\$2.0	\$283
Output (2006\$ mil)												
Direct (est.)	\$0.0	\$5.3	\$5.8	\$23.3	\$20.9	\$24.1	\$26.9	\$25.6	\$9.2	\$7.6	\$4.0	\$537
Indirect	\$0.0	\$8.9	\$9.7	\$33.3	\$28.8	\$32.7	\$36.0	\$33.9	\$12.2	\$10.1	\$5.3	\$719
Total	\$0.0	\$14.2	\$15.4	\$56.6	\$49.7	\$56.8	\$62.9	\$59.5	\$21.5	\$17.7	\$9.2	\$1,256

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 33
Economic Impacts for Hydro Facilities -25% by 2013, 2005 – 2030

	2005	2006	2007	2008	2009	2010	2011	...2015	...2028	2029	2030	Total (2005- 2030)
Jobs												
Direct	0	11	14	39	57	53	28	0	0	0	0	202
Indirect	0	11	11	27	42	51	43	23	22	18	10	608
Total	0	22	25	66	99	105	71	23	22	18	10	810
Labor Income (2006\$ mil)*												
Direct	\$0.0	\$0.8	\$1.0	\$2.7	\$3.9	\$3.7	\$1.9	\$0.0	\$0.0	\$0.0	\$0.0	\$14
Indirect	\$0.0	\$0.5	\$0.6	\$1.7	\$2.6	\$3.0	\$2.6	\$1.5	\$1.3	\$1.1	\$0.6	\$37
Total	\$0.0	\$1.3	\$1.5	\$4.5	\$6.5	\$6.8	\$4.5	\$1.5	\$1.3	\$1.1	\$0.6	\$51
Output (2006\$ mil)												
Direct (est.)	\$0.0	\$1.2	\$1.4	\$4.2	\$6.4	\$7.8	\$7.1	\$4.3	\$4.0	\$3.4	\$1.8	\$106
Indirect	\$0.0	\$1.3	\$1.5	\$4.5	\$6.7	\$7.9	\$6.7	\$3.7	\$3.5	\$3.0	\$1.5	\$96
Total	\$0.0	\$2.5	\$2.9	\$8.7	\$13.0	\$15.7	\$13.8	\$8.1	\$7.5	\$6.4	\$3.3	\$203

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 34
Economic Impacts for Wind Facilities -25% by 2013, 2005 – 2030

	2005	2006	2007	2008	2009	2010	2011	...2015	...2028	2029	2030	Total (2005- 2030)
Jobs												
Direct	100	581	660	753	375	313	266	201	74	35	18	6,398
Indirect	428	1,587	1,772	1,809	1,003	716	600	461	118	66	33	15,507
Total	528	2,168	2,432	2,563	1,378	1,029	865	662	192	102	50	21,906
Labor Income (2006\$ mil)*												
Direct	\$10.4	\$36.7	\$53.2	\$58.2	\$39.2	\$24.0	\$20.4	\$15.5	\$5.1	\$2.7	\$1.3	\$498
Indirect	\$23.8	\$88.5	\$97.9	\$100.3	\$55.7	\$40.0	\$33.5	\$25.8	\$6.5	\$3.6	\$1.8	\$864
Total	\$34.2	\$125.2	\$151.1	\$158.5	\$94.9	\$64.0	\$53.8	\$41.2	\$11.6	\$6.3	\$3.1	\$1,362
Output (2006\$ mil)												
Direct (est.)	\$44.5	\$165.8	\$188.1	\$200.0	\$122.7	\$92.5	\$81.5	\$66.5	\$18.5	\$10.4	\$5.1	\$1,994
Indirect	\$63.6	\$227.1	\$258.9	\$252.6	\$131.1	\$90.4	\$72.2	\$51.0	\$13.8	\$8.1	\$4.0	\$1,937
Total	\$108.0	\$392.9	\$447.0	\$452.6	\$253.8	\$182.9	\$153.7	\$117.5	\$32.3	\$18.5	\$9.2	\$3,931

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 35
Economic Impacts for Landfill Gas Facilities -25% by 2013, 2005 – 2030

	2005	2006	2007	2008	2009	2010	2011	...2015	...2028	2029	2030	<i>Total (2005- 2030)</i>
Jobs												
Direct	0	0	0	3	7	8	6	2	2	2	1	63
Indirect	0	0	0	5	10	12	9	4	4	4	2	105
Total	0	0	0	9	17	20	14	6	6	6	3	167
Labor Income (2006\$ mil)*												
Direct	\$0.0	\$0.0	\$0.0	\$0.1	\$0.2	\$0.3	\$0.3	\$0.2	\$0.2	\$0.2	\$0.1	\$4
Indirect	\$0.0	\$0.0	\$0.0	\$0.4	\$0.9	\$0.9	\$0.6	\$0.1	\$0.1	\$0.1	\$0.1	\$5
Total	\$0.0	\$0.0	\$0.0	\$0.5	\$1.0	\$1.2	\$0.8	\$0.3	\$0.3	\$0.3	\$0.1	\$9
Output (2006\$ mil)												
Direct (est.)	\$0.0	\$0.0	\$0.0	\$0.6	\$1.3	\$1.5	\$1.2	\$0.6	\$0.6	\$0.6	\$0.3	\$15
Indirect	\$0.0	\$0.0	\$0.0	\$1.0	\$2.0	\$2.4	\$1.7	\$0.7	\$0.7	\$0.7	\$0.3	\$19
Total	\$0.0	\$0.0	\$0.0	\$1.6	\$3.3	\$3.9	\$2.9	\$1.2	\$1.2	\$1.2	\$0.6	\$34

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Tables 36 and 37 separate the short-term (i.e. construction) and long-term (i.e. operations) impacts for all technologies in the future RPS Main Tier program. As with the first three solicitations, construction of facilities generates a larger annual impact than the operation of facilities, although the operations contribute more over the entire period of the program.

Table 36
Short-Term Economic Impacts for All Technologies -25% by 2013, 2005 – 2011

	2005	2006	2007	2008	2009	2010	2011	Total Short-Term
Jobs								
Direct	100	595	677	672	273	191	96	2,605
Indirect	428	1,670	1,860	1,582	681	361	181	6,762
Total	528	2,265	2,537	2,254	954	552	277	9,367
Labor Income (2006\$ mil)*								
Direct	\$10.4	\$38.1	\$54.8	\$51.4	\$30.8	\$14.1	\$7.1	\$207
Indirect	\$23.8	\$92.9	\$102.7	\$87.7	\$37.9	\$20.4	\$10.2	\$375
Total	\$34.2	\$130.9	\$157.5	\$139.1	\$68.7	\$34.4	\$17.3	\$582
Output (2006\$ mil)								
Direct (est.)	\$41.9	\$165.0	\$185.8	\$160.6	\$74.6	\$39.3	\$19.7	\$687
Indirect	\$63.6	\$237.3	\$270.0	\$231.7	\$100.0	\$54.7	\$27.4	\$985
Total	\$105.4	\$402.3	\$455.9	\$392.3	\$174.6	\$94.0	\$47.0	\$1,671

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct “Output” includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending “in-state”, fuel payments, and payments to other impacted landowners.

* See note from Table 7-1.

Table 37
Long-Term Economic Impacts for All Technologies -25% by 2013, 2005 – 2030

	2005	...2015	...2028	2029	2030	Total Long-Term
Jobs						
Direct	0	285	106	62	31	5,693
Indirect	0	672	210	143	73	13,468
Total	0	957	316	205	104	19,161
Labor Income (2006\$ mil)*						
Direct	\$0.0	\$21.4	\$7.3	\$4.6	\$2.3	\$429
Indirect	\$0.0	\$34.6	\$10.6	\$7.1	\$3.6	\$694
Total	\$0.0	\$56.1	\$17.9	\$11.7	\$5.9	\$1,123
Output (2006\$ mil)						
Direct (est.)	\$2.6	\$97.0	\$32.3	\$22.0	\$11.2	\$1,965
Indirect	\$0.0	\$89.2	\$30.2	\$21.8	\$11.2	\$1,787
Total	\$2.6	\$186.3	\$62.5	\$43.8	\$22.3	\$3,752

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct “Output” includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending “in-state”, fuel payments, and payments to other impacted landowners.

* See note from Table 31.

The impacts by components of short-term and long-term spending are shown below in Tables 38 and 39. The direct spending for each category is across all projects in the RPS Main Tier program over their respective intervals. Construction purchases still represent the largest impact in the short-term while PILOT payments generate the largest impact in the long-term through government spending. Spending on fuels plays a larger role in this case than in the first three solicitations alone. This is due to the increasing role of biofuel technologies in meeting the next RPS target.

Table 38
Change in NYS Output: Impacts by Component of Short-Term Spending-
25% by 2013, Total Amount 2005-2011

	Construction Payroll	In-State Construction Spending	Payments to Other impacted landowners (one-time)	PILOT Payments (one-time)	Total
<i>Direct Spending (2006\$ mil)</i>	\$206.7	\$451.5	\$11.5	\$17.1	\$687
<i>Total Labor Income (2006\$ mil)</i>	\$263.8				
<i>Total Output (2006\$ mil)</i>	\$375.1	\$1,242.3	\$11.5	\$42.6	\$1,671

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Payments to other impacted landowners do not enter the IMPLAN multiplier model since these are compensations for productive capacity of land, aesthetics, noise, etc. Therefore, it was assumed that these payments did not lead to spin-off activity in the state economy.

Table 39
Change in NYS Output: Impacts by Component of Long-Term Spending-
25% by 2013, Total Amount 2005-2030

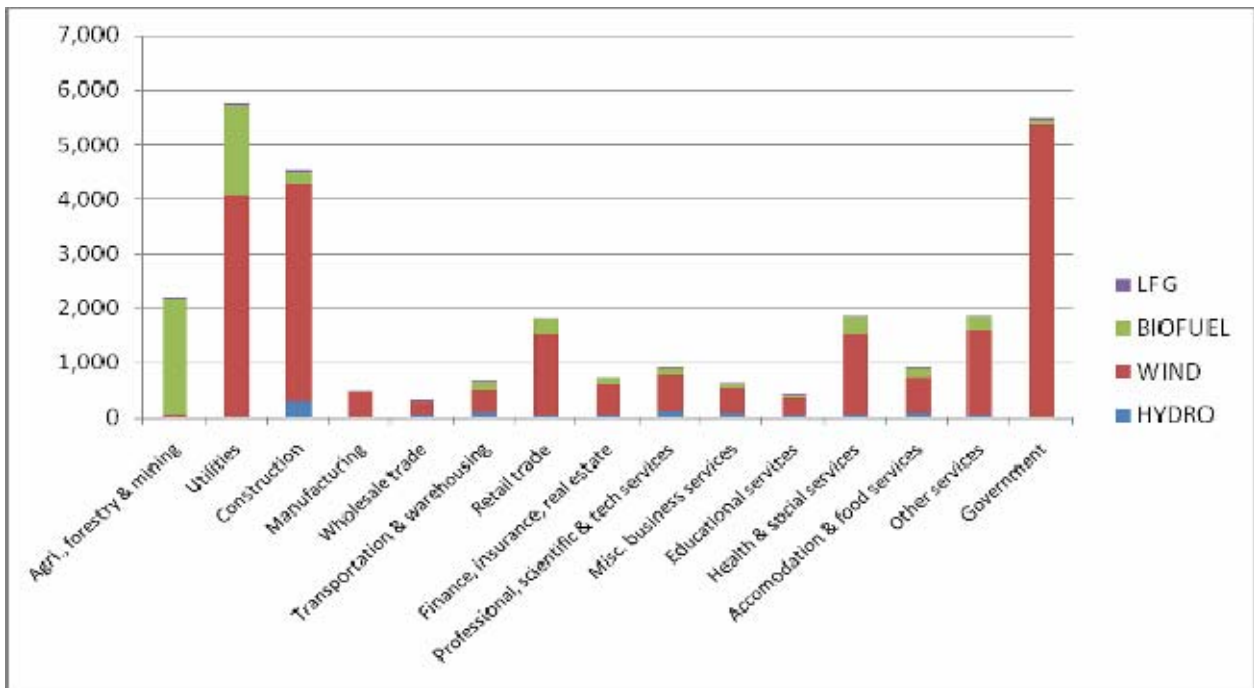
	O&M Payroll	PILOT Payments (on-going)	Fuels (on-going)	Land Lease (on-going)	Other O&M Spending*	Total
<i>Direct Spending (2006\$ mil)</i>	\$428.9	\$438.2	\$369.0	\$245.0	\$483.9	\$1,965
<i>Total Labor Income (2006\$ mil)</i>	\$536.4					
<i>Total Output (2006\$ mil)</i>	\$745.8	\$1,089.2	\$941.8	\$245.0	\$730.5	\$3,752

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Land Lease payments, representing a transfer of wealth, do not enter the IMPLAN multiplier model.

*Other O&M spending includes purchases of supplies and services necessary for operation that were not included in the other components.

Figure 8 shows the job impacts by industry for each technology. As in the first three solicitations, the industries with the largest impact (in terms of jobs) are government, utilities and construction. Impacts on these industries mainly come through contributions of PILOT payments (short and long term) and direct jobs involving operations (i.e. utilities) and facility construction. Wind is still the dominant technology in terms of impact; however, hydro and biofuel are becoming more prominent in this scenario when compared to the first three solicitations. This effect is noticeable when looking at the growth in agriculture, forestry and mining which is due to increasing supply requirements for biofuel feedstocks. Also, the distribution of job impacts in construction and utilities feature higher shares of biofuel and hydro, respectively, when compared to Figure 8.

Figure 8
Total Job Impacts by Industry -25% by 2013, 2005-2030



Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group

TOTAL ECONOMIC IMPACTS FROM 30% BY 2015

The total economic impact of 30% by 2015 is presented below in Table 40 in terms of jobs, labor income, and output. The construction and operations of future RPS facilities in this scenario contribute over \$12.5 billion in output, \$3.8 billion in labor income and 64,805 job-years to the state over the period from 2005 through 2034. That represents a job multiplier effect of 3.3 and a labor income multiplier effect of 2.6.

In the first 11 years (2005 through 2015) current and future RPS facilities are under construction and begin operations. Current RPS Main Tier projects come on-line in 2008 and 2009 (first three solicitations). Future RPS projects from 25% by 2013 come on-line in 2010 and 2011 while those from 30% by 2015 become operational from 2012 through 2015. The annual impacts from 2016 through 2027 are identical since construction has ended and facilities from all scenarios are operational. By 2028, projects from the first three Main Tier solicitations start to surpass their 20-year useful life and in 2029 and 2030, facilities from 25% by 2013 of the future RPS come off-line. In the final four years (2031 through 2034) projects from 30% by 2015 of the future RPS program exceed their useful life.

The economic impacts by renewable technology are shown in Tables 40, 41, 42 and 43 for biomass, hydro, wind and landfill gas, respectively. As in 25% by 2013, wind is the largest contributor of economic impact and landfill gas is the smallest. However, biofuel technologies continue to exert a larger share of the economic influence of the RPS Main Tier Program in 30% by 2015.

Table 40
Economic Impacts for All Technologies -30% by 2015, 2005 –2034

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2028	2029	2030	2031	2032	2033	2034	Total (2005- 2034)
Jobs																				
Direct	100	595	677	981	800	1,018	1,103	980	959	819	845	702	523	479	412	333	263	194	103	19,604
Indirect	428	1,670	1,860	2,415	2,004	2,313	2,483	2,209	2,316	1,972	1,944	1,554	1,092	1,025	884	719	572	427	218	45,201
Total	528	2,265	2,537	3,396	2,804	3,331	3,586	3,189	3,274	2,791	2,789	2,256	1,615	1,504	1,296	1,051	836	622	321	64,805
Labor Income (\$mil)																				
Direct	\$10	\$38	\$55	\$76	\$71	\$77	\$83	\$74	\$73	\$62	\$64	\$52	\$38	\$36	\$31	\$25	\$19	\$14	\$8	\$1,481
Indirect	\$24	\$93	\$103	\$133	\$110	\$128	\$137	\$120	\$125	\$103	\$99	\$77	\$53	\$50	\$42	\$34	\$26	\$19	\$10	\$2,331
Total	\$34	\$131	\$157	\$208	\$181	\$204	\$220	\$194	\$198	\$165	\$162	\$129	\$91	\$85	\$73	\$58	\$45	\$33	\$17	\$3,812
Output Required (\$mil)																				
Direct	\$44	\$172	\$195	\$265	\$232	\$271	\$297	\$274	\$288	\$260	\$268	\$229	\$164	\$154	\$132	\$107	\$84	\$61	\$32	\$6,053
Indirect	\$64	\$237	\$270	\$342	\$280	\$328	\$352	\$311	\$322	\$279	\$281	\$224	\$164	\$156	\$136	\$114	\$93	\$73	\$36	\$6,521
Total	\$108	\$410	\$465	\$607	\$512	\$600	\$650	\$586	\$610	\$539	\$549	\$453	\$329	\$310	\$269	\$220	\$177	\$134	\$67	\$12,574

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 41
Economic Impacts for Biofuel Facilities -30% by 2015, 2005 – 2034

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	...2028	2029	2030	2031	2032	2033	2034	<i>Total (2005- 2034)</i>
Jobs																				
Direct	0	3	3	55	58	73	88	106	123	199	260	256	205	199	186	171	156	142	65	5,167
Indirect	0	71	77	214	175	219	253	372	472	627	669	581	464	452	421	388	355	322	146	12,673
Total	0	74	80	268	233	292	341	477	595	826	928	838	669	651	607	559	511	464	211	17,840
Labor Income (\$mil)																				
Direct	\$0	\$1	\$1	\$5	\$4	\$6	\$7	\$8	\$10	\$15	\$19	\$18	\$15	\$14	\$13	\$12	\$11	\$10	\$5	\$377
Indirect	\$0	\$4	\$4	\$10	\$8	\$10	\$11	\$17	\$22	\$28	\$28	\$23	\$18	\$18	\$17	\$15	\$14	\$13	\$6	\$516
Total	\$0	\$4	\$5	\$14	\$12	\$15	\$17	\$25	\$32	\$43	\$47	\$41	\$33	\$32	\$30	\$28	\$25	\$23	\$10	\$893
Output Required (\$mil)																				
Direct	\$0	\$5	\$6	\$24	\$21	\$27	\$31	\$42	\$52	\$75	\$87	\$81	\$65	\$63	\$59	\$54	\$49	\$45	\$20	\$1,696
Indirect	\$0	\$9	\$10	\$34	\$30	\$37	\$43	\$60	\$74	\$104	\$118	\$107	\$85	\$83	\$78	\$71	\$65	\$59	\$27	\$2,273
Total	\$0	\$14	\$15	\$57	\$51	\$64	\$74	\$102	\$126	\$179	\$205	\$188	\$150	\$146	\$136	\$125	\$115	\$104	\$47	\$3,969

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.



Table 42
Economic Impacts for Hydro Facilities -30% by 2015, 2005 – 2034

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	...2028	2029	2030	2031	2032	2033	2034	Total (2005- 2034)
Jobs																				
Direct	0	11	14	44	66	95	97	86	54	21	0	0	0	0	0	0	0	0	0	487
Indirect	0	11	11	30	49	82	95	98	86	71	56	56	54	51	41	30	18	7	0	1,465
Total	0	22	25	74	115	177	191	184	140	93	56	56	54	51	41	30	18	7	0	1,952
Labor Income (\$mil)*																				
Direct	\$0.0	\$0.8	\$1.0	\$3.1	\$4.6	\$6.6	\$6.7	\$5.9	\$3.7	\$1.5	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$34
Indirect	\$0.0	\$0.5	\$0.6	\$1.9	\$2.9	\$4.9	\$5.6	\$5.9	\$5.2	\$4.4	\$3.5	\$3.5	\$3.4	\$3.2	\$2.5	\$1.8	\$1.2	\$0.5	\$0.0	\$90
Total	\$0.0	\$1.3	\$1.5	\$5.0	\$7.5	\$11.4	\$12.4	\$11.8	\$9.0	\$5.9	\$3.5	\$3.5	\$3.4	\$3.2	\$2.5	\$1.8	\$1.2	\$0.5	\$0.0	\$124
Output Required (\$mil)																				
Direct	\$0.0	\$1.2	\$1.4	\$4.7	\$7.3	\$12.2	\$14.4	\$15.4	\$14.3	\$12.5	\$10.4	\$10.4	\$10.1	\$9.5	\$7.6	\$5.5	\$3.4	\$1.4	\$0.0	\$256
Indirect	\$0.0	\$1.3	\$1.5	\$5.0	\$7.7	\$12.6	\$14.6	\$15.2	\$13.5	\$11.3	\$9.0	\$9.0	\$8.7	\$8.2	\$6.5	\$4.7	\$3.0	\$1.2	\$0.0	\$232
Total	\$0.0	\$2.5	\$2.9	\$9.7	\$15.0	\$24.8	\$29.0	\$30.6	\$27.9	\$23.8	\$19.4	\$19.4	\$18.8	\$17.7	\$14.1	\$10.2	\$6.4	\$2.6	\$0.0	\$488

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 43
Economic Impacts for Wind Facilities -30% by 2015, 2005 – 2034

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	...2028	2029	2030	2031	2032	2033	2034	Total (2005- 2034)
Jobs																				
Direct	100	581	660	879	669	839	906	775	772	590	580	440	313	274	222	159	105	52	38	13,799
Indirect	428	1,587	1,772	2,166	1,769	1,995	2,116	1,718	1,740	1,260	1,210	907	565	513	415	296	196	96	71	30,802
Total	528	2,168	2,432	3,044	2,438	2,834	3,022	2,494	2,511	1,850	1,790	1,348	878	787	637	455	300	148	110	44,602
Labor Income (\$mil)*																				
Direct	\$10	\$37	\$53	\$68	\$62	\$64	\$69	\$59	\$59	\$45	\$44	\$34	\$23	\$21	\$17	\$12	\$8	\$4	\$3	\$1,061
Indirect	\$24	\$88	\$98	\$121	\$99	\$112	\$119	\$96	\$97	\$70	\$67	\$50	\$31	\$28	\$23	\$16	\$11	\$5	\$4	\$1,712
Total	\$34	\$125	\$151	\$188	\$161	\$176	\$188	\$155	\$156	\$115	\$111	\$84	\$54	\$49	\$40	\$28	\$19	\$9	\$7	\$2,774
Output Required (\$mil)																				
Direct	\$44	\$166	\$188	\$236	\$202	\$230	\$249	\$214	\$219	\$171	\$169	\$137	\$88	\$80	\$65	\$46	\$31	\$15	\$11	\$4,064
Indirect	\$64	\$227	\$259	\$303	\$241	\$276	\$291	\$232	\$231	\$161	\$152	\$106	\$69	\$63	\$51	\$36	\$24	\$12	\$9	\$3,968
Total	\$108	\$393	\$447	\$539	\$443	\$506	\$540	\$446	\$450	\$332	\$321	\$242	\$157	\$143	\$116	\$83	\$55	\$27	\$20	\$8,033

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31

Table 44
Economic Impacts for Landfill Gas Facilities -30% by 2015, 2005 – 2034

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	...2028	2029	2030	2031	2032	2033	2034	Total (2005- 2034)
Jobs																				
Direct	0	0	0	3	7	12	12	13	11	8	5	5	5	5	4	3	2	1	0	150
Indirect	0	0	0	5	10	17	19	21	18	14	9	9	9	9	7	5	4	2	0	261
Total	0	0	0	9	17	29	32	34	28	22	14	14	14	14	11	8	6	3	0	412
Labor Income (\$mil)*																				
Direct	\$0.0	\$0.0	\$0.0	\$0.1	\$0.2	\$0.4	\$0.4	\$0.5	\$0.5	\$0.5	\$0.4	\$0.4	\$0.4	\$0.4	\$0.3	\$0.2	\$0.1	\$0.1	\$0.0	\$9
Indirect	\$0.0	\$0.0	\$0.0	\$0.4	\$0.9	\$1.3	\$1.4	\$1.4	\$1.1	\$0.7	\$0.3	\$0.3	\$0.3	\$0.3	\$0.3	\$0.2	\$0.1	\$0.1	\$0.0	\$13
Total	\$0.0	\$0.0	\$0.0	\$0.5	\$1.0	\$1.7	\$1.9	\$2.0	\$1.6	\$1.2	\$0.7	\$0.7	\$0.7	\$0.7	\$0.6	\$0.4	\$0.3	\$0.1	\$0.0	\$22
Output Required (\$mil)																				
Direct	\$0.0	\$0.0	\$0.0	\$0.6	\$1.3	\$2.2	\$2.4	\$2.7	\$2.3	\$1.9	\$1.4	\$1.4	\$1.4	\$1.4	\$1.1	\$0.8	\$0.5	\$0.3	\$0.0	\$37
Indirect	\$0.0	\$0.0	\$0.0	\$1.0	\$2.0	\$3.4	\$3.7	\$4.0	\$3.3	\$2.6	\$1.6	\$1.6	\$1.6	\$1.6	\$1.3	\$1.0	\$0.6	\$0.3	\$0.0	\$48
Total	\$0.0	\$0.0	\$0.0	\$1.6	\$3.3	\$5.6	\$6.2	\$6.6	\$5.6	\$4.5	\$3.0	\$3.0	\$3.0	\$3.0	\$2.4	\$1.8	\$1.2	\$0.6	\$0.0	\$84

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Tables 45 and 46 separate the short-term (i.e. construction) and long-term (i.e. operations) impacts for all technologies in the future RPS Main Tier program. The construction period generates a relatively smaller share of the total impacts than observed for the first three solicitations and 25% by 2013. The long-term period shows more impacts under 30% by 2015 since there are more facilities required to meet the 30% target and they operate over a longer time period.

Table 45
Short-Term Economic Impacts for All Technologies -30% by 2015, 2005 – 2015

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total Short-Term
Jobs												
Direct	100	595	677	803	577	728	733	541	451	220	143	5,569
Indirect	428	1,670	1,860	1,930	1,424	1,592	1,601	1,198	1,166	619	390	13,878
Total	528	2,265	2,537	2,732	2,001	2,320	2,335	1,739	1,618	839	533	19,448
Labor Income (2006\$ mil)												
Direct	\$10.4	\$38.1	\$54.8	\$61.4	\$54.0	\$54.8	\$55.2	\$41.0	\$34.9	\$17.5	\$11.4	\$433
Indirect	\$23.8	\$92.9	\$102.7	\$107.5	\$79.7	\$89.6	\$90.1	\$67.1	\$65.4	\$34.3	\$21.5	\$775
Total	\$34.2	\$130.9	\$157.5	\$168.8	\$133.8	\$144.4	\$145.3	\$108.1	\$100.3	\$51.9	\$32.9	\$1,208
Output (2006\$ mil)												
Direct (est.)	\$41.9	\$165.0	\$185.8	\$195.8	\$151.8	\$168.9	\$169.9	\$126.0	\$117.8	\$61.1	\$39.3	\$1,423
Indirect	\$63.6	\$237.3	\$270.0	\$281.5	\$208.9	\$237.2	\$238.7	\$178.6	\$169.2	\$89.6	\$57.2	\$2,032
Total	\$105.4	\$402.3	\$455.9	\$477.3	\$360.7	\$406.1	\$408.6	\$304.6	\$286.9	\$150.7	\$96.5	\$3,455

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct "Output" includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending "in-state", fuel payments, and payments to other impacted landowners.

* See note from Table 31.

Table 46
Long-Term Economic Impacts for All Technologies -30% by 2015, 2005 – 2034

	2005	...2015	...2028	2029	2030	2031	2032	2033	2034	<i>Total Long-Term</i>
Jobs										
Direct	0	702	523	479	412	333	263	194	103	14,034
Indirect	0	1,554	1,092	1,025	884	719	572	427	218	31,323
Total	0	2,256	1,615	1,504	1,296	1,051	836	622	321	45,358
Labor Income (2006\$ mil)										
Direct	\$0.0	\$52.4	\$38.2	\$35.5	\$30.5	\$24.5	\$19.3	\$14.2	\$7.5	\$1,048
Indirect	\$0.0	\$77.1	\$53.1	\$49.5	\$42.2	\$33.6	\$26.0	\$18.5	\$9.7	\$1,556
Total	\$0.0	\$129.5	\$91.3	\$85.1	\$72.7	\$58.2	\$45.4	\$32.7	\$17.2	\$2,604
Output (2006\$ mil)										
Direct (est.)	\$2.6	\$229.2	\$164.5	\$154.1	\$132.3	\$106.7	\$84.0	\$61.5	\$31.6	\$4,630
Indirect	\$0.0	\$223.5	\$164.5	\$156.1	\$136.4	\$113.5	\$93.0	\$72.6	\$35.7	\$4,489
Total	\$2.6	\$452.7	\$328.9	\$310.2	\$268.7	\$220.2	\$177.0	\$134.1	\$67.3	\$9,119

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Estimated direct “Output” includes payroll, PILOT payments, land leases, operations and maintenance spending, construction spending “in-state”, fuel payments, and payments to other impacted landowners.

* See note from Table 31.

The impacts by components of short-term and long-term spending are shown below in Tables 47 and 48. The direct spending for each category is across all projects expected to fulfill the 30% by 2015 target and represents spending over the respective intervals. In the short-term, construction purchases remain the highest spending category. However, in the long-term period, the largest spending category is payments for fuel—a departure from results in 25% by 2013 and in the first three solicitations where PILOT payments represented the largest share. This reflects the growing share of biofuel projects in meeting the 30% target.

Table 47

**Change in NYS Output: Impacts by Components of Short-Term Spending
-30% by 2015, Total Amount 2005-2015**

	Construction Payroll	In-State Construction Spending	Payments to Other impacted landowners (one-time)	PILOT Payments (one-time)	Total
<i>Direct Spending (2006\$ mil)</i>	\$433.4	\$924.8	\$26.0	\$38.9	\$1,423
<i>Total Labor Income (2006\$ mil)</i>	\$553.3				
<i>Total Output (2006\$ mil)</i>	\$786.7	\$2,545.5	\$26.0	\$96.7	\$3,455

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Payments to other impacted landowners do not enter the IMPLAN multiplier model since these are compensations for productive capacity of land, aesthetics, noise, etc. Therefore, it was assumed that these payments did not lead to spin-off activity in the state economy.

Table 48

**Change in NYS Output: Impacts by Components of Long-Term Spending
-30% by 2015, Total Amount 2005-2034**

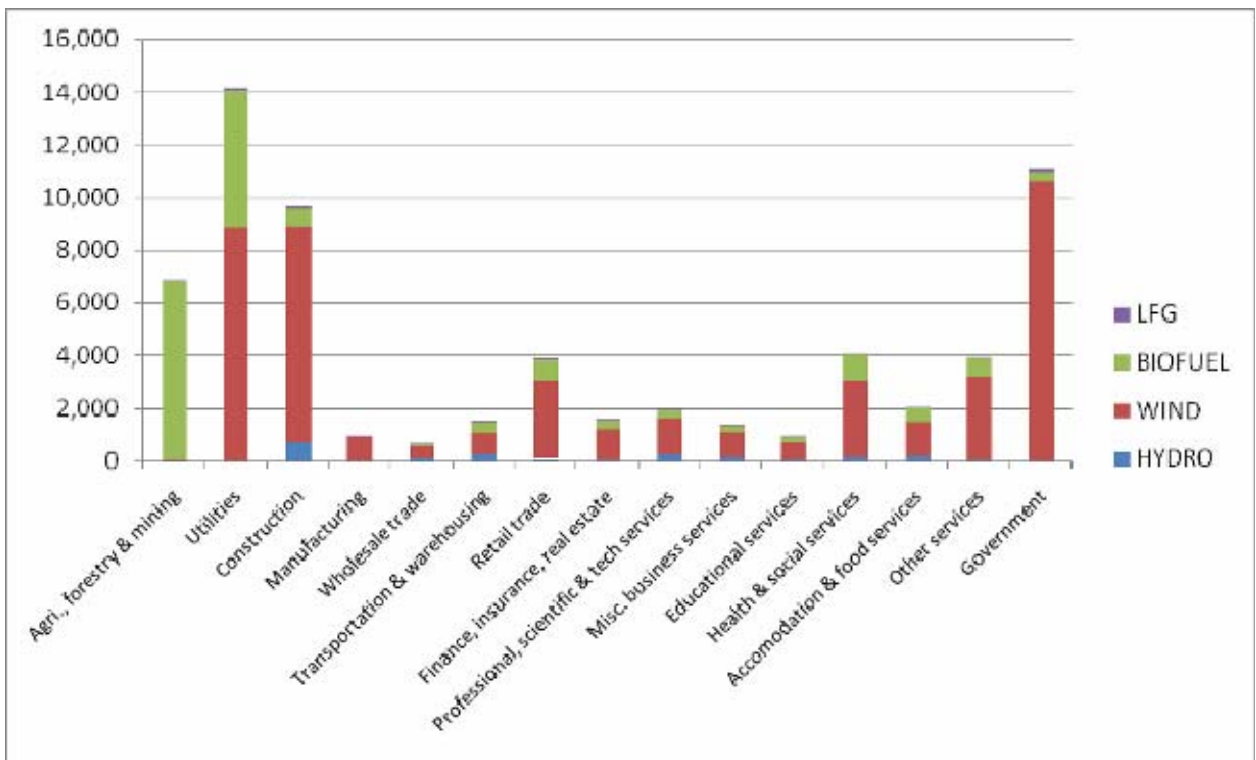
	O&M Payroll	PILOT Payments (on-going)	Fuels (on-going)	Land Lease (on-going)	Other O&M Spending*	Total
<i>Direct Spending (2006\$ mil)</i>	\$1,048.0	\$924.5	\$1,161.8	\$480.0	\$1,015.5	\$4,630
<i>Total Labor Income (2006\$ mil)</i>	\$1,310.7					
<i>Total Output (2006\$ mil)</i>	\$1,822.4	\$2,298.0	\$2,965.0	\$480.0	\$1,553.8	\$9,119

Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group. Land Lease payments, representing a transfer of wealth, do not enter the IMPLAN multiplier model.

*Other O&M spending includes purchases of supplies and services necessary for operation that were not included in the other components.

Figure 9 shows the job impacts by industry for each technology for 30% by 2015. Consistent with impacts from first three solicitations and 25% by 2013, the industries with the largest impact (in terms of jobs) are government, utilities (power generation & supply) and construction. Wind still contributes the largest amount of jobs to most industries. However, biofuel technologies exhibit an increased share in the impacts by industry -- most notably in utilities.

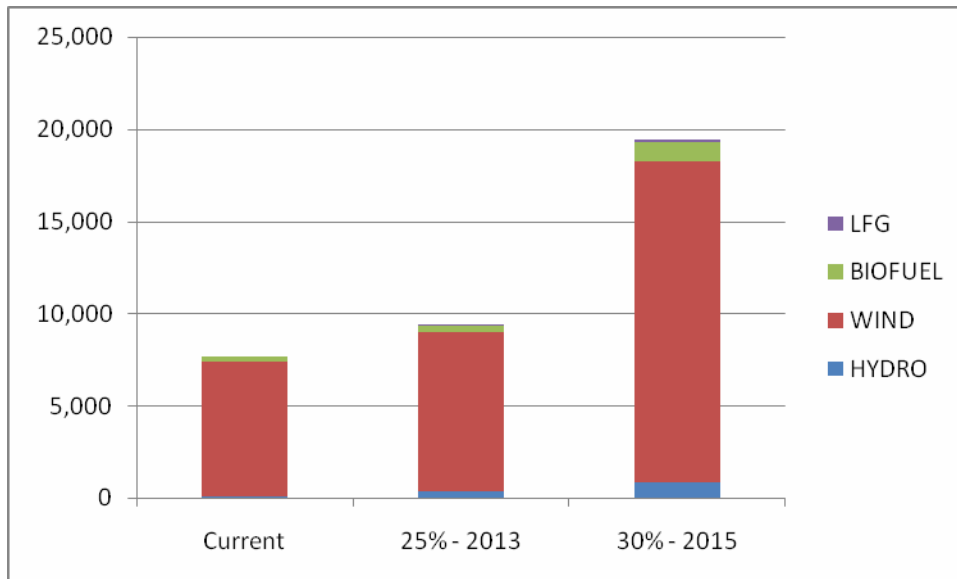
Figure 9
Total Job Impacts by Industry -30% by 2015, 2005-2034



Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group.

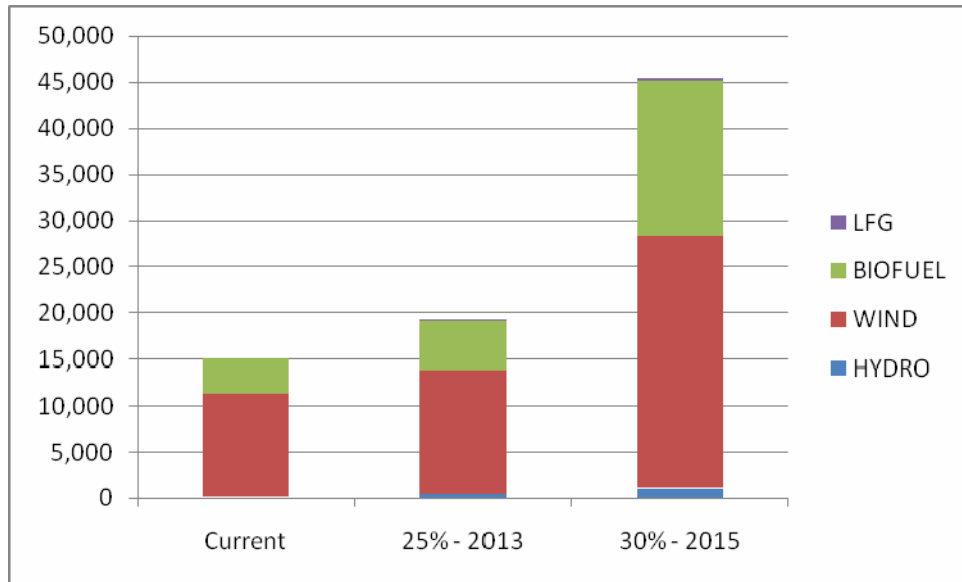
Figures 10 and 11 provide a comparison of the job impacts across scenarios for short-term and long-term periods. In the short-term, wind dominates the technologies in all scenarios due to the high cost of construction related to new wind farms. In the long-term impacts, while wind represents the majority of impacts, the increasingly important role of biofuel is readily apparent through its operations. It is also evident that the magnitude of total job impacts increases drastically in 30% by 2015 for the short and long-term periods. This is not surprising since the movement from 25% by 2013 to 30% by 2015) of renewable energy in New York requires a significantly larger construction effort and leads to a longer operational period with more facilities in every technology.

Figure 10
Total Short Term Job Impacts by Main Tier RPS Attainment



Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group.

Figure 11
Total Long Term Job Impacts by Main Tier RPS Attainment



Source: NYSERDA, IMPLAN. Calculations by KEMA and EDR Group.

Section 8 CONCLUSIONS

At a fairly high level, this analysis has yielded the following conclusions:

- For the first three solicitations, the cumulative direct dollars generated from RE projects, starting with construction and through the life of the facilities, is \$2.06 billion (in 2006\$). This amounts to \$25.39 per MWh of RE produced. Wind projects contribute 80% of these direct dollars of benefits, biofuel retrofits 18%, and hydro upgrades the balance.
- The job years for the 3-year construction interval are 2,031; for the associated 20-year operational phase for all facilities involved, the direct job years amount to 4,460.
- Lewis County is expected to receive 23% of the direct benefits (based on projects awarded, a mix of a large wind project, a large biofuel project, and two small hydro projects); Clinton 21% (all wind), Wyoming 15% (all wind) and Steuben County 12% (all wind).
- The total economic impacts by 2028 for the entire RPS are an extra 22,676 job years (an implied job multiplier of 3.5), cumulative labor income impacts of \$1.3 billion (an average compensation of \$60,000 per job) from \$4.24 billion of added business sales. Wind projects are responsible for generating the majority of the total economic impacts.
- Among the short-term, RPS projects trigger the greatest positive economic impacts by “in-state spending” on construction materials & services excluding the construction wages. In the long-term of facility operations, the PILOT payments, representing new revenues to State-Local governments, trigger the largest total economic impacts.
- Once operational, wind projects will create additional jobs, over and above the long-term jobs in power generation & supply (the Utilities sector) in the Government sector (average compensation of \$65,000 per job), due to increased revenue levels; for biofuel projects, added jobs most predominantly occur in the Forestry & Logging sector (average compensation of \$48,000 per job) where fuel feed stocks originate.

IMPACTS OF A PROJECTED RPS

There are two “target RE generation” options for how the first three solicitations will continue: 25% RE by 2013 and 30% RE by 2015. For the 25% by 2013 scenario, the cumulative direct benefits would grow to \$2.6 billion, amounting to \$24.91 per MWh of RE produced. For the 30% by 2015 scenario, the cumulative direct dollars would grow to \$6.0 billion, amounting to \$27.32 per MWh of RE produced. In the 25% by 2013 scenario, 2,605 direct job years are created over the 3-year construction interval; for the associated 20-year operational phase for all facilities involved, the direct job years amount to 5,693. In the

30% by 2015 scenario, 5,569 direct job years are created over the 3-year construction interval; for the associated 20-year operational phase for all facilities involved, the direct job years amount to 14,038. Total economic impacts on the statewide economy are as follows: by 2030 (25% by 2013), the number of extra job years are 25,528 (an implied jobs multiplier of 3.4) and cumulative labor income impacts are \$1.7 billion (an average compensation of \$59,600 per job) from \$5.4 billion of added business sales. For 30% by 2015 by 2034, the number of extra job years are 64,805 (an implied jobs multiplier of 3.3) and cumulative labor income impacts are \$3.8 billion (an average compensation of \$58,600 per job) from \$6.5 billion of added business sales.

Wind projects under both future scenarios still account for the largest share of total impacts created, but are lessened somewhat as biofuel projects are expected to play a larger role in meeting incremental RE goals of 19% in 25% by 2013, and 27% in 30% by 2015 compared to 17% under the first three solicitations.

In the short-term, “in-state spending” on construction materials and services, excluding construction wages, remains the largest source of total impacts for both scenarios. In the long-term of facility operations, the PILOT payments will trigger the largest total economic impacts under 25% by 2013 but for 30% by 2015, fuel purchases tied to the increased number of biofuel facilities will account for the largest share of total economic impacts created. A comparison of the total job impacts across all three RPS perspectives (current, 25% by 2013, or 30% by 2015) reveals the 30% Post-EEPS by 2015 target will create the largest additional job years (due to more direct spending and a longer time horizon to realize economic benefits). Wind technology is dominant across all three settings as the largest contributor to total economic impacts created, but the role of biofuels increases significantly under the 30% Post-EEPS by 2015 scenario.

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APPENDIX A – IMPLAN MODEL BACKGROUND AND MAPPING RPS DIRECT BENEFIT

A New York state IMPLAN model (calibrated on 2006 data, the most recent available from IMPLAN) was chosen for this evaluation since it met the needs of developing an economic impact assessment from the direct aspects of the RPS projects. The IMPLAN impact system is an *input-output* (I-O) economic framework and is ideal for evaluating how changes in (\$) demand or sales for specific industries cycle further through a region's economy. This framework is not capable however of tracing out how the economy is affected if a price change (e.g. electric price changes as a result of RPS generation) were to be considered. At the time of this analysis, any potential price impacts as a result of the RPS had yet to be identified.

ABOUT THE IMPLAN ECONOMIC ANALYSIS MODEL

IMPLAN²³ is the most widely used analysis tool for measuring or estimating the economic impacts associated with openings, closings, expansion, contraction, and on-going operations of facilities –ranging from industrial plants to national parks. It shares three fundamental features also found in the other two commonly-used economic impact tools within the US (RIMS-II and REMI):

- It is based on the national input-output technology tables, developed by the US Dept. of Commerce, Bureau of Economic Analysis. This shows how each type of industry relies on a different mix of its own labor and supplies purchased from other industries.
- It is calibrated to reflect local economic patterns (of employment, payroll and business sales) occurring within specified counties (or sub-county areas). This shows a default on the extent to which local industries purchase goods and services from suppliers located within the same county.
- It distinguishes the direct effects from indirect and induced (spin-off) effects and measures them in terms of jobs, income, value added and business sales (output).

²³ MIG IMPLAN, Stillwater, MN, is an interactive, hands-on model based on publicly-available data from the U.S. Dept. of Commerce and contains a complete set of state/county (sub-county) level economic accounts. It calculates output, employment, and income effects of changes in a region's economic activity

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Each IMPLAN model is calibrated by the vendor with region-specific industry data through the year 2006. Besides containing a NAICS code based industry database at the 3- and 4-digit levels (describing employment, sales, productivity, average compensation) the main capability of the IMPLAN model resides in its input-output core. The core combines the structure of relationships between industries, between industry and types of final demands arising in the region, the extent of local supply (or conversely *import dependence*) to meet local product demand, and the role of trade with the rest of the world.

The mechanism of multiplier analysis follows from the input-output relationships whereby the activity of facility construction and ultimate annual operation creates a) requirements for supplies for goods and services in various industries; and b) earnings for construction and power generation facility workers that become disposable income for use in the communities where they reside. A portion of the construction/O&M budgets creates additional local transactions for supplies, creating jobs and more household income. When the entire sequence is completed (and progressively more dollars leak away from the region under consideration) the **total** impact is identified (whether as *# of jobs*, *\$ of labor income*, *sales*, or *value-added*) based on a regional set of multipliers.²⁴

HOW NYSERDA RPS DIRECT ECONOMIC BENEFITS ENTER THE IMPLAN SYSTEM

NYSERDA's data collection of the RPS program's direct economic benefits (shown in Appendix III) depict more than the pure *direct* effect (from the impact modeling perspective) related to an initial construction phase, or a typical operational year for any of the involved facilities. The information collected and assembled from the developer surveys attempts to portray a *bill of goods* approach to facility construction or operation. This approach should describe what gets purchased from a construction budget (construction payroll, one-time abutter payments or PILOT payments, "In-state" construction purchases), or an annual O&M budget (payroll, land lease, fuel expense, PILOT payments). The more detail the better for assigning a spending stimulus within an impact model, and the extent to which *local purchases* ("In-state") will occur. Appendix II addresses the fact that not all of the annual O&M spending was captured through the developers' applications and we attempted to identify this component. We also rely on the information reported by developers²⁵ (or adjusted by NYSERDA) for the extent of "in-state" purchases.

²⁴ We use a Type SAM multiplier which captures the effects of household wage re-spending, business-to-business transactions, and government transfers.

²⁵ A separate document was developed by KEMA for NYSERDA addressing the veracity of the application data.

Appendices

Typically it would suffice to either know the number of jobs (and the associated pay scale) to construct/operate a facility and assume the economic model has (a) a suitable construction sector that would trigger the right amount and an allocation for the non-labor dollars to assemble a wind farm; and (b) a representative power generation sector that would do the same using the long-term operational jobs. However, there are not accurate depictions within the available economic models for wind, hydro and biofuel facilities (construction or operation) since they are somewhat atypical of the average mix of electric power generating facilities that are represented in the underlying model data. In this instance, modeling from a *bill of goods* approach is preferable. Below we show how the components of reported economic benefits are mapped for entry into the IMPLAN model. Note the short-term construction payroll and other construction spending “in-state” were reported from applications as 3-year cumulative amounts. For the model analysis, these were re-stated as annual amounts for consistency with the rest of the data elements.

Appendices

Table A.1

General Assignments of “Direct Project Benefits” under the RPS Main Tier

Direct Benefit Concept	Stimulates the NYS Economy through.....
Payroll (short-term or Long-term)	household spending from take-home pay
"In-state" construction spending (non-labor)	Increase \$ of sales from select NYS industries (mapping is technology-specific, details shown below)
PILOT Payments (one-time or long-term)	State & Local government spending (50% Education; 50% other S/L spending)
Fuel Purchases (biofuels)	Increase \$ of sales from NYS logging & forestry operations (for LFG treat as a PILOT payment)
O&M <i>Other</i> expenses	Increase \$ of demand from select NYS industries (mapping is technology-specific, details shown below)
<i>No further impact considered</i>	
Land lease payments	<i>wealth transfer</i>
One-time abutter payments	<i>compensatory transfer for value of abutter property, aesthetics & noise deterioration</i>

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DETAILED ASSIGNMENT OF “IN-STATE” CONSTRUCTION SPENDING BY TECHNOLOGY

Table A-2

Wind Technology Assignments

IMPLAN sector	Sector description	<i>share of non-labor Construction budget</i>
39	Non-facility Construction	34.4%
333	Electric power & specialty transformer mfg	8.7%
339	Fiber optic cable mfg	4.1%
343	Miscellaneous electrical equipment mfg	7.5%
41	Other new construction	11.1%
484	Electronic equipment repair and maintenance	24.0%
439	Architectural and engineering services	7.9%
437	Legal services	0.6%
499	Other State & local government enterprises	1.7%

Source: Initial data for budget shares sourced from NREL JEDI model for wind applications, and further adjusted by EDR Group to reflect significant leakage on the purchase of out-of-state turbines, towers and blades.

Table A-3

Hydro Assignments

IMPLAN sector	Sector description	<i>share of non-labor Construction budget</i>
41	Other new construction	80.0%
485	Commercial machinery repair & maintenance	20.0%

Source: New York Renewable Portfolio Standard Cost Study Update – Main Tier Target and Resources (La Capra Associates & SEA, 2008)

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Table A-4
Biofuel Assignments

IMPLAN sector	Sector description	<i>share of non-labor Construction budget</i>
41	Other new construction	85.0%
484	Electronic equipment repair & maintenance	15.0%

Source: New York Renewable Portfolio Standard Cost Study Update – Main Tier Target and Resources (La Capra Associates & SEA, 2008)

DETAILED ASSIGNMENT OF “O&M SPENDING - OTHER” BY TECHNOLOGY

The assignments shown below to depict an additional aspect of long-term annual spending for the RPS facilities are entered into the IMPLAN modeling as *\$ of new demand*.

Table A-5
Wind Assignment

IMPLAN sector	Sector description	<i>share of O&M Other budget</i>
401	Motor vehicle & parts dealers	4.2%
484	Elec. Equip. repair & maintenance	7.1%
499	Other State & local government enterprises	0.0%
30	Power generation & supply	5.8%
427	Insurance carriers	20.1%
407	Gasoline stations	3.0%
404	Building material supply stores	42.4%
400	Warehousing & storage	15.9%

Source: Data for budget shares sourced from NREL JEDI model for wind applications

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Table A-6
Hydro and Biofuel Assignment

	<i>share of O&M Other budget</i>
Power Generation Supplies	
Real estate & rental	3.2%
Prof.- scientific & tech services	16.3%
Archit. & engin. Services	1.0%
Management services	0.3%
Admin. & waste services	3.3%
Educational services	2.9%
Accommodation & food services	3.9%
Finance & insurance	6.6%
Other services	0.03%
Utilities	0.3%
Information services	1.5%
Power generation and supply	0.04%
Construction	9.3%
Manufacturing	17.1%
Wholesale Trade	3.3%
Trans. & Warehousing	28.9%
Truck transportation	1.6%
Retail trade	0.4%

Source: IMPLAN model intermediate input vector for Power Generation & Supply, adjusted to remove primary fuel input purchase (e.g. typically from the mining sector)

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APPENDIX B – ESTIMATING OTHER O&M SPENDING FOR RPS FACILITIES

NYSERDA's data collection from the developers' applications describes many aspects of a renewable power generation facility - from the short-term construction elements, as well as annual operational requirements upon completion. The long-term annual operational aspects included the payroll of the employees needed to operate the new –or-expanded facility, property taxes (in the form of PILOT payments), land lease payments, and fuel purchases for biofuel facilities. In addition to these items, each facility budgets for replacement components and installation services. This latter component of long-term facility spending is not evident in the majority of developer's applications, or were inconsistently allocated as short-term construction outlays (e.g., specific developer project applications, and biofuel applications typically included miscellaneous O&M spending in their accounting of short-term spending).

To have a complete account of the long-term annual O&M spending of the mix of renewable generation facilities the RPS has catalyzed, EDR Group estimated the total annual O&M requirements for hydro projects and deducted the reported components of long-term annual spending by a facility. The balance represents the replacement spending. For wind facilities (with the exception of Maple Ridge, for which no application data are available) and biofuel facilities, these dollar amounts were identified by reallocating specific line items out of 3-year construction spending and into a long-term spending category. For hydro facilities, the applications did not offer these data so we estimated the annual O&M spending using the method described below.

METHOD OF ESTIMATING TOTAL ANNUAL O&M SPENDING

The New York Renewable Portfolio Standard Cost Study Update – Main Tier Target and Resources (La Capra Associates & SEA, 2008) contains technology-specific assumptions (Tables 15, 18, & 20) that identify annual Fixed (per kW) and Variable O&M \$ (per MWh) in 2007 dollars. Each project from among the first three solicitations was associated with its technology-specific resource block before the fixed and variable O&M cost was calculated. The sum of the fixed and variable O&M costs is the total annual O&M cost associated with a project.

For the first three solicitations, this added \$744,000 of annual spending from biofuel facilities, \$898,496 additional annual spending from hydro facilities, and \$15.9 million in additional annual spending from wind facilities. Twenty-five percent of (\$4.0m of the near \$16m) wind projects' *annual O&M Other* is the estimated amount for the Maple Ridge facility which is 2.5 times larger than the next largest wind projects for which application data are available. These amounts are shown as *Annual O&M Other* in all presentations of the direct economic benefits in Appendix III. These annual spending amounts will be

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considered in the economic multiplier modeling as *dollars of demand for O&M goods & services arising in NYS* and rely upon the economic model's *regional purchase coefficients (RPC's)* to determine how much of the demand will be filled by NYS businesses. This is a conservative approach whereby the implication is not to assume these additional dollars (or initially misallocated project dollars) convert 1:1 to a purchase from a NYS business, as some leakage (determined by the regionally calibrated industry-specific RPC) will occur. The extent of leakage in part relies upon how the general O&M spending is described in the applications to subsequently be mapped to a good or service from a specific industry.



Appendices

APPENDIX C – RPS DIRECT BENEFITS DATA (\$ ARE 2006 BASIS)

SOLICITATIONS 1 THROUGH 3 (#916, 1037, AND 1168)

Projects contracted under 1168 contractually are required to be on-line by 2009.

First Three Solicitations: Based on Implementation of Current RPS Scenario

Resource	Nameplate Capacity	"Increment" RPS Renewable Capacity (MW)	New Renewable Energy Production (MWh/yr)	Bid Quantity (MWh/yr)	Bid Capacity (MW)
Biofuel	195	67	486,145	468,238	66
Hydro	241	27	99,892	95,863	101
Wind	1,258	1,258	3,480,516	2,844,772	1,022

(Table Continued)

Resource	Long-Term NYS Jobs			Payments to NYS and/or Municipalities		Payments for Fuels and Resource Access		In -State Purchases	In-State Purchases	Short-Term Employment of NYS Workers
	# Long Term Jobs	LT Jobs - Annual Total Dollars	PILOT - Annual Expected Total Dollars	Short term PILOTs and Fees	Fuels and land lease - Annual Expected Total Dollars	Payments to other impacted landowners	Non-payroll Purchases -3 years Expected Total Dollars - Construction	Annual O&M- OTHER (in addition to fuel, lease, PILOT and long-term labor costs)	ST Job (years)- Number of New Jobs	ST Jobs - Expected Total Dollars
Biofuel	57	\$4,101,285	\$242,717	\$66,000	\$12,749,747	\$0	\$15,469,786	\$891,712	9	\$1,852,663
Hydro	0	0	0	0	-	-	\$1,210,537	\$898,560	42	\$2,916,498
Wind	166	\$12,764,722	\$18,069,825	\$13,831,068	\$9,435,174	\$9,330,281	\$359,205,388	\$15,898,244	1,980	\$159,699,332



Appendices

25% by 2013: 25% Renewable Generation Post-EEPS by 2013 (achieved by 2011)

The projected values below would build upon the schedule of renewable capacity and generation already in place (or under contract) for solicitations 1 through 3 shown above.

On-line		Nameplate Capacity (MW)	RPS-Attributable Capacity (MW)	RPS-Attributable Procurement (MWh)	Project MT Energy Procurement (MWh)	Projected Main Tier Capacity (MW)	Long-Term NYS Jobs		Municipalities		Access		Purchases	Purchases	NYS Workers	
							# Long Term Jobs	LT Jobs - Annual Total Dollars	PILOT - Annual Expected Total Dollars	Short term PILOTs and Fees	Fuels and land lease - Annual Expected Total Dollars	Payments to abutters	Non-payroll Purchases -3 years Expected Total Dollars - Construction	Annual O&M- OTHER (in addition to fuel, lease, PILOT and long-term labor costs)	ST Job (years)- Number of New Jobs	ST Jobs - Expected Total Dollars
2010	Biomass	39	13.5	93,075	93,075	13.3	12	\$ 829,363	\$ 49,082	\$ 13,347	\$ 2,578,259	\$ -	\$ 3,128,306	\$ 180,322	2	\$ 374,646
2011	Biomass	43	14.8	102,157	102,157	14.5	13	\$ 905,565	\$ 53,592	\$ 14,573	\$ 2,815,148	\$ -	\$ 3,415,734	\$ 196,890	2	\$ 409,069
	BIOMASS subtot	82	28	195,232	195,232	28	24	1,734,929	102,674	27,919	5,393,407	-	6,544,040	377,213	4	783,715
2010	Hydro	437	48.8	213,956	213,956	46.4	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,200,406	\$ 1,633,321	76	\$ 5,301,350
2011	Hydro	480	53.6	234,831	234,831	50.9	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,415,092	\$ 1,792,679	84	\$ 5,818,584
	HYDRO subtot	917	102	448,788	448,788	97	-	-	-	-	-	-	4,615,498	3,426,000	160	11,119,934
2010	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,050	\$ -	\$ -	\$ 154,100	\$ -	\$ 1,590,308	\$ 46,230	10	\$ 287,653
2011	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,423	\$ -	\$ -	\$ 154,847	\$ -	\$ 1,598,020	\$ 46,454	10	\$ 289,047
	LFG subtot	4	4	14,800	14,800	2	2	154,473	-	-	308,946	-	3,188,328	92,684	21	576,700
2010	Wind	114	113.7	272,879	272,879	92.5	15	\$ 1,154,300	\$ 1,634,035	\$ 1,484,545	\$ 853,213	\$ 843,727	\$ 32,482,557	\$ 1,437,661	179	\$ 14,441,439
2011	Wind	111	111.4	268,000	268,000	90.6	15	\$ 1,130,774	\$ 1,600,732	\$ 1,454,289	\$ 835,823	\$ 826,531	\$ 31,820,534	\$ 1,408,360	175	\$ 14,147,109
	WIND subtot	225	225	540,879	540,879	183	30	2,285,075	3,234,767	2,938,834	1,689,036	1,670,259	64,303,091	2,846,021	355	28,588,548



Appendices

30% by 2015: 30% Renewable Generation Post-EEPS by 2015

Note that the values projected for 2010 and 2011 for the 30% scenario differ from what is projected in 25% by 2013. The reason for this is that the assumed *glides paths* by technology change depending on the ultimate renewable generation targets.

On-line		Nameplate Capacity (MW)	RPS-Attributable Capacity (MW)	RPS-Attributable Procurement (MWh)	Project MT Energy Procurement (MWh)	Projected Main Tier Capacity (MW)	Long-Term NYS Jobs		Municipalities		Access		Purchases	Purchases	NYS Workers	
							# Long Term Jobs	LT Jobs - Annual Total Dollars	PILOT - Annual Expected Total Dollars	Short term PILOTs and Fees	Fuels and land lease - Annual Expected Total Dollars	Payments to abutters	Non-payroll Purchases -3 years	Annual O&M- OTHER (in addition to fuel, lease, PILOT and long-term labor costs)	ST Job (years)- Number of New Jobs	ST Jobs - Expected Total Dollars
													Expected Total Dollars - Construction	Expected Total Dollars - Construction		
2010	Biomass	47	16.1	110,836	110,836	15.9	14	\$ 987,620	\$ 58,448	\$ 15,893	\$ 3,070,234	\$ -	\$ 3,725,240	\$ 214,731	2	\$ 446,135
2011	Biomass	50	17.2	118,727	118,727	16.9	15	\$ 1,052,452	\$ 62,285	\$ 16,937	\$ 3,271,779	\$ -	\$ 3,969,783	\$ 228,827	2	\$ 475,422
2012	Biomass	50	17.1	117,512	117,512	16.8	15	\$ 1,047,112	\$ 61,969	\$ 16,851	\$ 3,255,178	\$ -	\$ 3,949,640	\$ 227,666	2	\$ 473,009
2013	Biomass	50	17.0	117,717	117,717	16.8	15	\$ 1,043,498	\$ 61,755	\$ 16,793	\$ 3,243,944	\$ -	\$ 3,936,009	\$ 226,880	2	\$ 471,377
2014	Biomass	265	91.0	618,101	618,101	89.4	77	\$ 5,567,813	\$ 329,508	\$ 89,600	\$ 17,308,771	\$ -	\$ 21,001,434	\$ 1,210,568	12	\$ 2,515,134
2015	Biomass	221	75.8	457,339	457,339	74.5	65	\$ 4,642,812	\$ 274,765	\$ 74,715	\$ 14,433,201	\$ -	\$ 17,512,389	\$ 1,009,452	10	\$ 2,097,285
	BIOMASS subtot	682	234	1,540,232	1,540,232	230	142	10,210,624	604,273	164,315	31,741,971	-	38,513,823	2,220,020	22	4,612,419
2010	Hydro	521	58.1	254,783	254,783	55.2	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,620,281	\$ 1,944,987	91	\$ 6,312,937
2011	Hydro	558	62.3	272,922	272,922	59.1	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,806,832	\$ 2,083,460	97	\$ 6,762,388
2012	Hydro	551	61.5	270,043	270,043	58.5	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,773,986	\$ 2,059,080	96	\$ 6,683,254
2013	Hydro	553	61.7	270,513	270,513	58.6	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,782,952	\$ 2,065,735	97	\$ 6,704,855
2014	Hydro	368	41.0	198,186	198,186	39.0	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,850,594	\$ 1,373,662	64	\$ 4,458,562
2015	Hydro	-	-	-	-	-	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
	HYDRO subtot	2,551	285	1,266,448	1,266,448	270	-	-	-	-	-	-	12,834,645	9,526,924	445	30,921,996
2010	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,050	\$ -	\$ -	\$ 154,100	\$ -	\$ 1,590,308	\$ 46,230	10	\$ 287,653
2011	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,423	\$ -	\$ -	\$ 154,847	\$ -	\$ 1,598,020	\$ 46,454	10	\$ 289,047
2012	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,050	\$ -	\$ -	\$ 154,100	\$ -	\$ 1,590,308	\$ 46,230	10	\$ 287,653
2013	LFG	2	1.8	7,400	7,400	1.0	1	\$ 77,423	\$ -	\$ -	\$ 154,847	\$ -	\$ 1,598,020	\$ 46,454	10	\$ 289,047
2014	LFG	2	1.6	7,400	7,400	0.9	1	\$ 70,758	\$ -	\$ -	\$ 141,516	\$ -	\$ 1,460,449	\$ 42,455	10	\$ 264,164
2015	LFG	-	-	7,400	7,400	-	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
	LFG subtot	9	9	44,400	44,400	5	5	379,705	-	-	759,409	-	7,837,104	227,823	51	1,417,564
2010	Wind	332	331.7	786,203	786,203	269.7	44	\$ 3,366,646	\$ 4,765,847	\$ 4,329,843	\$ 2,488,491	\$ 2,460,826	\$ 94,739,040	\$ 4,193,101	522	\$ 42,120,085
2011	Wind	405	404.7	958,264	958,264	329.1	53	\$ 4,108,497	\$ 5,816,016	\$ 5,283,938	\$ 3,036,838	\$ 3,003,076	\$ 115,615,079	\$ 5,117,063	637	\$ 51,401,375
2012	Wind	342	341.6	809,956	809,956	277.7	45	\$ 3,467,213	\$ 4,908,210	\$ 4,459,182	\$ 2,562,826	\$ 2,534,334	\$ 97,569,029	\$ 4,318,355	538	\$ 43,378,271
2013	Wind	338	338.0	801,591	801,591	274.8	45	\$ 3,430,754	\$ 4,856,598	\$ 4,412,292	\$ 2,535,876	\$ 2,507,685	\$ 96,543,050	\$ 4,272,945	532	\$ 42,922,130
2014	Wind	84	84.2	197,772	197,772	68.4	11	\$ 854,570	\$ 1,209,735	\$ 1,099,062	\$ 631,664	\$ 624,642	\$ 24,048,008	\$ 1,064,352	133	\$ 10,691,518
2015	Wind	243	243.0	531,261	531,261	197.6	32	\$ 2,466,731	\$ 3,491,920	\$ 3,172,462	\$ 1,823,309	\$ 1,803,039	\$ 69,414,982	\$ 3,072,271	383	\$ 30,861,247
	WIND subtot	1,743	1,743	4,085,046	4,085,046	1,417	230	17,694,411	25,048,325	22,756,779	13,079,004	12,933,601	497,929,188	22,038,088	2,745	221,374,626