

# **Economic Impacts of Green Jobs Green New York (GJGNY) Program Report**

Prepared for:

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

Albany, NY

Michelle Salisbury  
Project Manager

Prepared by:

**ICF International, Inc.**

Elizabeth Johnston

Federico Garcia

Daniel Vickery

November 2013

## Notice

---

This report was prepared by ICF International, Inc. in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority (hereafter NYSERDA). The opinions expressed in this report do not necessarily reflect those of NYSERDA or the State of New York, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, NYSERDA, the State of New York, and the contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. NYSERDA, the State of New York, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

# Abstract

---

For Phase II of the Green Jobs Green New York (GJGNY) Jobs Evaluation, ICF estimated the total economic impact of GJGNY supported jobs and labor income in New York State, in 12 regions in the State, and in New York State’s disadvantaged communities. ICF used an input-output model, IMPLAN, to conduct the economic impact analysis, which allowed ICF to estimate the total impact of the GJGNY program by modeling the successive rounds of spending that result from direct GJGNY-related jobs and labor income in New York State. To conduct this analysis, ICF relied on primary survey data on 2013 and 2015 projected GJGNY program full-time equivalent (FTE) jobs and wages captured by a survey of trade allies and program partners conducted by NMR Group, Inc. under Phase I of the project. The results of NMR’s findings are presented in the Phase I report, Assessment of Job Impacts of the Green Jobs – Green New York Program.

According to ICF’s analysis, GJGNY program-related activity generates a significant economic impact throughout New York State. In addition to creating job opportunities for workers directly related to the GJGNY program, the program generates job opportunities in industries that sell to and buy from these sectors (i.e., indirect effects) as well as in consumer goods and services industries (i.e., induced effects). The total statewide 2013 job impact of the GJGNY program is 1,585 jobs, and is expected to increase 175 percent by 2015 to 4,363 jobs.<sup>1</sup> The GJGNY program similarly contributed \$124.9 million to New York State’s Gross State Product (GSP) in 2013; by 2015, the program’s contribution to the State’s GSP is expected to also increase 173 percent to \$341.5 million by 2015.<sup>2</sup>

# Keywords

---

GJGNY, Economic Impact, Program Evaluation, IMPLAN

---

<sup>1</sup> 2015 job estimates are based on projections that assume GJGNY funding continues through 2015.

<sup>2</sup> Throughout the GJGNY report, 2013 impacts are referred to in the past tense. This is based on data that NMR collected through the first quarter of 2013.

# Acknowledgements

---

ICF would like to acknowledge the assistance of Michelle Salisbury, Regina Connelly, Jennifer Meissner, Karl Michael, and GJGNY program staff at NYSERDA. We would like to thank Rohit Vaidya and Beth Poulin and the staff at NMR for data collection in Phase I, and Glenn Reed, Energy Futures Group, for support and review.

# Table of Contents

---

<b>Notice</b> .....	<b>i</b>
<b>Abstract</b> .....	<b>ii</b>
<b>Keywords</b> .....	<b>ii</b>
<b>Acknowledgements</b> .....	<b>iii</b>
<b>Table of Contents</b> .....	<b>iv</b>
<b>List of Figures</b> .....	<b>v</b>
<b>List of Tables</b> .....	<b>v</b>
<b>Acronyms and Abbreviations List</b> .....	<b>vi</b>
<b>Executive Summary</b> .....	<b>ES-1</b>
Approach.....	ES-2
Important Notes.....	ES-2
Findings.....	ES-3
<b>Section 1: Introduction</b> .....	<b>1-2</b>
1.1 Overview .....	1-2
1.2 Important Notes.....	1-2
<b>Section 2: Approach</b> .....	<b>2-1</b>
2.1 Introduction to the Model.....	2-1
2.2 Modeling Methodology .....	2-2
2.3 Output Metrics .....	2-3
2.4 Post-Model Analysis.....	2-3
<b>Section 3: Findings</b> .....	<b>3-1</b>
3.1 Statewide Results .....	3-1
3.1.1 Summary of Results .....	3-1
3.1.2 Job Impacts .....	3-2
3.1.3 Labor Income Impacts.....	3-3
3.1.4 GSP Impacts .....	3-4
3.1.5 Economic Output Impacts .....	3-5
3.1.6 Impacts by Job Type in 2013 and 2015 (Projected) .....	3-6
3.1.7 Impacts by Industry .....	3-8
3.2 Regional Results .....	13
3.3 Impacts to Disadvantaged Communities .....	15
<b>Section 4: Wage Comparison of Up-skilled and Up-waged Jobs</b> .....	<b>4-1</b>
<b>Conclusion</b> .....	<b>5-1</b>

<b>Appendix A: Overview of the IMPLAN Model</b> .....	<b>A-1</b>
<b>Appendix B: Additional Detail on Preparing the Data and Modeling Framework</b> .....	<b>B-1</b>
NAICS to IMPLAN Crosswalk .....	B-1
FTE to “Bodies” Conversion.....	B-3
Estimating Wage Data Not Provided by Survey Data.....	B-3
Tables of Model Inputs.....	B-4
<b>Appendix C: Output Summary Tables</b> .....	<b>C-1</b>
<b>Appendix D: Detailed Output Tables</b> .....	<b>D-1</b>

## List of Figures

---

Figure ES-1. GJGNY Program Impacts on Jobs in New York State, 2013 and 2015 (Projected) .....	ES-4
Figure ES-2. Job Impacts for the Top 10 Sectors, Ranked by Direct Jobs: 2013 .....	ES-5
Figure 1. Economic Impact Analysis Framework.....	2-2
Figure 2. Statewide GJGNY Impacts on Jobs: 2013 and 2015 (Projected) .....	3-2
Figure 3. Statewide GJGNY Impacts on Labor Income (Millions of Dollars): 2013 and 2015 (Projected) .....	3-4
Figure 4. Statewide GJGNY Impacts on GSP (Millions of Dollars): 2013 and 2015 (Projected).....	3-5
Figure 5. Statewide GJGNY Impacts on Output (Millions of Dollars): 2013 and 2015 (Projected) .....	3-6
Figure 6. Job Impacts, Top 10 Sectors, Ranked by Direct Jobs: 2013 .....	3-9
Figure 7. Job Impacts, Top 10 Sectors, Ranked by Direct Jobs: 2015 (Projected).....	3-11
Figure 8. Job Impacts Attributable to GJGNY, by Region: 2013 .....	3-14
Figure 9. GSP Attributable to GJGNY by Region (Millions of Dollars): 2013 .....	3-14
Figure 10. Job Impacts in Disadvantaged Communities Attributable to GJGNY: 2013 and 2015 (Projected).....	3-17
Figure 11. GSP Impacts in Disadvantaged Communities Attributable to GJGNY: 2013 and 2015 (Projected).....	3-17
Figure 12. Wage Differential and Percent Increase in Wages for Up-skilled and Up-waged Jobs, Top 5 Industries.....	4-3

## List of Tables

---

Table ES-1. Summary of Statewide GJGNY Impacts: 2013 and 2015 (Projected).....	ES-3
Table 1. Summary of 2013 and 2015 (Projected) Statewide GJGNY Impacts.....	3-1
Table 2. Statewide GJGNY Impacts, by Job Type: 2013 .....	3-7
Table 3. Statewide GJGNY Impacts, by Job Type: 2015 (Projected).....	3-8
Table 4. Impacts by Sector, Top 10 Sectors Ranked by Job Impacts: 2013.....	3-10
Table 5. Impacts by Sector, Top 10 Sectors Ranked by Job Impacts: 2015 (Projected) .....	3-12
Table 6. Incremental 2015 Direct Jobs in the Construction Sector.....	3-13
Table 7. Total 2013 Impacts Attributable to GJGNY, by Region .....	3-15
Table 8. Summary of GJGNY Impacts to Disadvantaged Communities, 2013 and 2015 (Projected) ....	3-16

Table 9. 2013 Up-skilled and Up-waged Jobs by Sector, Ranked by Percentage Wage Increase.....	4-2
Table 10. NAICS Code – IMPLAN Crosswalk .....	B-2
Table 11. IMPLAN Inputs for Jobs and Labor Income: 2013.....	B-4
Table 12. IMPLAN Inputs for Jobs and Labor Income: 2015.....	B-5
Table 13. Summary of Impacts: 2013.....	C-1
Table 14. Summary of Incremental Impacts: 2015.....	C-1
Table 15. Summary of Impacts: 2015.....	C-2
Table 16. New Job Impacts: 2013 .....	D-1
Table 17. Retained Job Impacts: 2013 .....	D-1
Table 18. Up-skilled and Up-waged Job Impacts: 2013 .....	D-2
Table 19. New Job Impacts: 2015 .....	D-2
Table 20. Retained Job Impacts: 2015 .....	D-3
Table 21. Up-skilled and Up-waged Job Impacts: 2015 .....	D-3

## Acronyms and Abbreviations List

---

FTE	Full-Time Equivalent
GJGNY	Green Jobs Green New York
GSP	Gross State Product
HPwES	Home Performance with ENERGY STAR Program
NAICS	North American Industry Classification System
NIPA	National Income and Product Accounts
NYSERDA	New York State Energy Research and Development Authority
QCEW	Quarterly Census of Employment and Wages

# Executive Summary

---

For Phase II of the Green Jobs Green New York (GJGNY) Jobs Evaluation, ICF estimated the total economic impact of GJGNY-supported jobs and labor income in New York State. ICF used an input-output model, IMPLAN, to conduct the economic impact analysis. Using IMPLAN, ICF estimated the total impact of the GJGNY program by modeling the successive rounds of spending that result from direct GJGNY-related jobs and labor income in New York State. In addition to conducting a base assessment of the 2013 impact, ICF also evaluated the program's expected impact in 2015, based on employer hiring projections.<sup>3</sup> Lastly, ICF conducted an analysis of the wage differential associated with up-skilled and up-waged GJGNY jobs.

## Definition of Key Terms

**Direct effects:** Primary impact within the industries which experience direct GJGNY-related jobs.

**Indirect effects:** Inter-industry purchases due to new demands of the directly affected industries.

**Induced effects:** Economy-wide impacts that result from increases in household income and expenditures generated by both the direct and indirect effects.

**New Jobs:** Workers who were hired to support GJGNY program functions.

**Retained Jobs:** Workers who were retained to support GJGNY program functions.

**Up-skilled and Up-waged Jobs:** Workers in existing positions that received both increased responsibilities and increased hourly wages.

**Gross State Product (GSP):** Value added in the economy; the “catch-all” for payments made by individual industry sectors to workers, interests, profits, and indirect business taxes.

**Output:** Total value of the output from each industry, which is attributable to program jobs and industry spending.

---

<sup>3</sup> 2015 job estimates are based on projections that assume GJGNY funding continues through 2015.



## Approach

An economic impact analysis is an assessment of the contribution that an economic activity can have on a regional economy. This analysis estimates the extent to which the GJGNY program supports additional economic activity statewide in New York, in 12 regions, and in disadvantaged communities identified throughout the State.<sup>4</sup>

To conduct this analysis, ICF relied on primary survey data of 2013 and 2015 projected GJGNY program FTE and wages captured by a survey of trade allies and program partners conducted by NMR in first quarter of 2013.<sup>5</sup> ICF used this data to create IMPLAN modeling scenarios for new, retained and up-skilled and up-waged jobs.

After conducting the statewide analysis of 2013 and 2015 (projected) impacts associated with GJGNY program, ICF conducted post-model regional analysis of statewide results, by apportioning total impacts (for jobs, labor income, GSP, and output) based on the number of direct jobs in each region.

## Important Notes

For the following reasons, results from the GJGNY study should not be added or compared to results from jobs studies or analyses of other NYSERDA programs or portfolios.

- **Direct jobs (in FTEs) are point-in-time estimates by survey respondents.** This is one key way in which this GJGNY study differs from other jobs analyses conducted by NYSERDA that rely mainly on energy savings and program spending as inputs to macroeconomic modeling.
- **Given the close linkage of GJGNY with ratepayer-funded programs, the survey research conducted by NMR that preceded this economic impact analysis carefully addressed attribution and worked to isolate the GJGNY impacts.** The survey approach to develop inputs to the economic impact modeling allowed NYSERDA to take a careful and deliberate approach to attribution. The attribution of jobs created was based on the percentage of program contract or incentive funding provided by GJGNY (as opposed to funding from other sources) and also survey responses by Home Performance with ENERGY STAR Program (HPwES) contractors on the influence of GJGNY program components on their level of activity.

---

<sup>4</sup> NMR determined disadvantaged community status by comparing the county unemployment rate with the State average. Cities and towns in counties with unemployment rates higher than the State average were classified as disadvantaged. County unemployment levels were selected from the New York State Department of Labor. *Labor Force and Unemployment Data*. 2013. <http://labor.ny.gov/stats/LSLAUS.shtm>

<sup>5</sup> For more information about the survey data, methodology and direct job calculations, see the Phase I GJGNY report *Assessment of Job Impacts of the Green Jobs – Green New York Program*.

- **The economic impact analysis output is gross jobs and is not net of the potential impacts of alternative spending of the GJGNY funds.** This economic impact analysis is not a net analysis in that it does not subtract the potential impact of alternative spending of the GJGNY funds.

## Findings

GJGNY program-related activity generates a significant economic impact throughout New York State. In addition to creating job opportunities for workers directly related to the GJGNY program, the program generates job opportunities in industries that sell to and buy from these sectors (i.e., indirect effects) as well as in consumer goods and services industries (i.e., induced effects). IMPLAN estimates the results of these direct, indirect, and induced impacts. Table ES-1 provides a summary of findings. According to ICF’s analysis, the GJGNY program added 1,585 jobs, \$91.2 million in labor income, and \$124.9 million to New York’s GSP in 2013.<sup>6</sup> Based on projections by survey respondents of GJGNY program-related jobs, ICF estimates that by 2015, the impact of the GJGNY program is expected to grow to 4,363 jobs, \$238.4 million in labor income, and \$341.5 in GSP.<sup>7</sup>

**Table ES-1. Summary of Statewide GJGNY Impacts: 2013 and 2015 (Projected)**

Description	Total Impact (Direct, Indirect, Induced)	
	2013	2015
Jobs	1,585	4,363
Labor Income (million 2013\$)	\$91.2	\$238.4
GSP, Value added (million 2013\$)	\$124.9	\$341.5
Output (million 2013\$)	\$223.2	\$637.1

Source: IMPLAN results

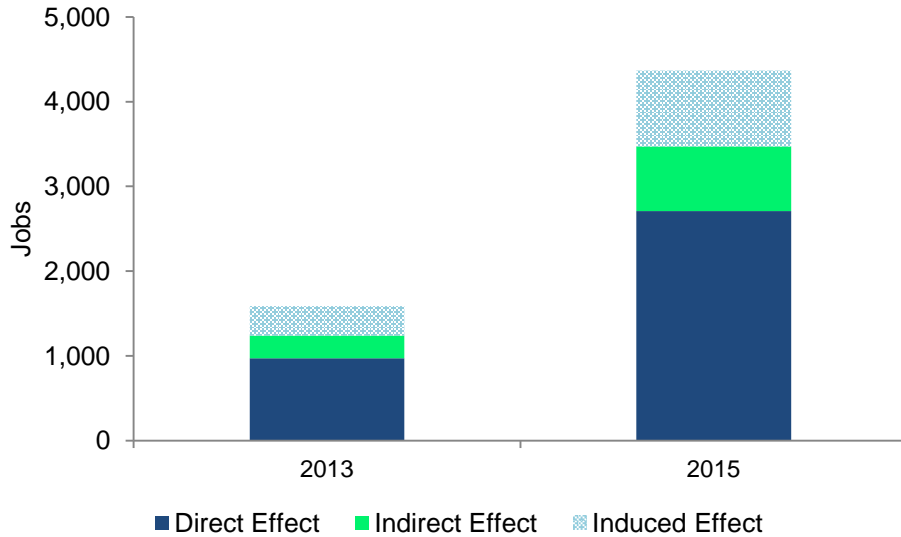
Figure ES-1 provides a more detailed look at the job impacts. GJGNY’s 2013 total statewide job impact is 1,585 jobs. This takes into account the 969 jobs directly engaged in the GJGNY program as well as the 268 indirect jobs generated by local purchases and 348 induced jobs in related and consumer industries.<sup>8</sup> By 2015, the total impact of the GJGNY program in the State is projected to increase by 175 percent to approximately 4,363 jobs.

<sup>6</sup> Throughout the GJGNY report, 2013 impacts are referred to in the past tense. This is based on data that NMR collected through the first quarter of 2013.

<sup>7</sup> Labor income represents the total income associated with the increase in total jobs. GSP represents the value added or the total revenue minus the costs of inputs, compared to output which represents the total value of the revenues, sales and value from each industry.

<sup>8</sup> Findings reported in this analysis are modeled estimates and ICF acknowledges the implied “false precision” of reporting job figures that have not been rounded. Dollar figures are presented rounded to the nearest \$1,000.

**Figure ES-1. GJGNY Program Impacts on Jobs in New York State, 2013 and 2015 (Projected)**

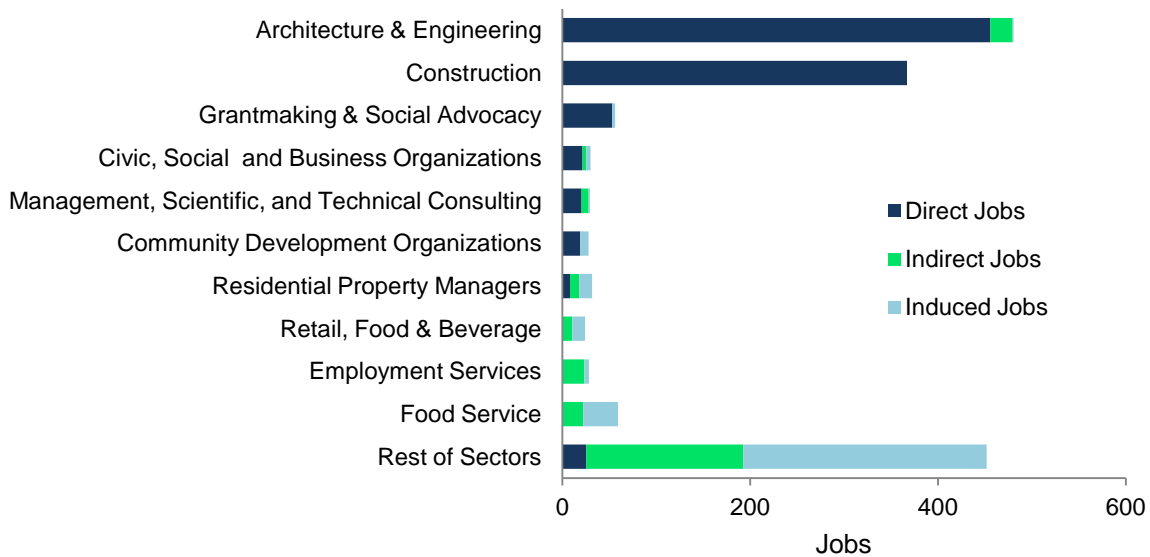


Note: Total job impact is projected to be 1,585 in 2013 and 4,363 in 2015.

Source: IMPLAN results.

Because of the indirect and induced impacts (i.e., the multiplier effect), the industries that are directly engaged in GJGNY are not the only ones that benefit. Jobs and wages associated with the GJGNY program effectively create new job opportunities and economic activity across the economy. This multiplicative effect highlights the importance of the GJGNY program not just for the growth of green industries, but for overall economic growth to the region. Figure ES-2 shows the top ten industries in terms of job impacts in 2013. As can be seen, industries directly related to the GJGNY program, such as those in the architecture and engineering sector and the construction sector, benefit the most in 2013; six of the top ten sectors are driven by direct job growth. That said, three of the top ten sectors—retail, employment services, and food services—benefit exclusively from indirect and induced expenditures after the initial jobs are created.

**Figure ES-2. Job Impacts for the Top 10 Sectors, Ranked by Direct Jobs: 2013**



**Notes:**

Total projected job impacts of the top ten sectors shown in this graph for 2013 are 1,133 jobs, which represents 72 percent of the total projected job impacts for 2013 (1,585).

Sub-sectors related to the architecture and engineering sector includes inspection services and electrical contracting. Sub-sectors related to the construction sector include HVAC installers, plumbing, new building and renovation.

Source: IMPLAN results.

In addition to a statewide analysis, ICF assessed the impact of the GJGNY program on New York State’s 12 regions: Bronx, Capital, Central, Finger Lakes, Kings and Richmond, Long Island, Mid-Hudson/Westchester, New York, North Country, Queens, Southern Tier, and Western New York. Program impacts were experienced most significantly in the Finger Lakes region, with 390 total jobs and \$30.7 million in GSP. The number of jobs created in Long Island, Mid-Hudson/Westchester, Western New York, Capital, Southern Tier, Central, and New York are all of a similar magnitude—ranging from 186 jobs (in Long Island) to 125 jobs (in New York). There is then a significant drop in jobs created in the four least-impacted regions—Queens, Bronx, Kings and Richmond, and North Country, where Queens had the highest job count at 38 jobs. This pattern is similar for GSP, labor income and output.

ICF’s analysis also included a wage comparison of the annual average wage increase for up-skilled workers who were also up-waged. On average, up-skilled and up-waged workers experienced an 18 percent increase, or an additional \$11,300 added to their annual pay. Notably, the sectors that are core to the GJGNY program, such as residential remodelers, drywall and insulation contractors, plumbing, heating and air-conditioning contractors and engineering services, all experienced higher than average wage increases, in excess of 20 percent, due to up-skilling.

# Section 1: Introduction

---

## 1.1 Overview

Direct job creation and labor income from the Green Jobs Green New York (GJGNY) program does not fully capture the total impact that the program has on New York State. The GJGNY program generates additional economic benefits, such as increased spending in the industries that support and are supported by direct program activity, and broader economy-wide benefits from increased labor income and consumer spending.

ICF estimated the total economic impact of the GJGNY program on the New York State economy. For this analysis, ICF used the IMPLAN model, an input-output model widely used by states and regions across the United States. The model estimated the impact generated by the “multiplier effect,” which captures successive rounds of ripple spending resulting from direct jobs in the GJGNY program as well as the increased labor income from the program. In addition to analyzing impacts in terms of 2013 jobs, ICF also estimated the anticipated impacts by 2015 using 2015 GJGNY program job projections as reported by survey respondents.

ICF conducted the analysis at the State and regional levels—including for each of the 12 regions in New York State and for all disadvantaged communities. Using survey data that captured the direct job counts by industry, ICF then used the IMPLAN model to analyze the total economic impact of the GJGNY program in terms of jobs, labor income, GSP, and output (i.e., industry activity) for the State and each region.

This report provides a detailed account of the modeling analysis to estimate the 2013 and 2015 (projected) total impact of the GJGNY program. The Approach section presents an overview of the methodology, which includes background information on the IMPLAN model and the steps ICF took to create the model inputs and run the model. ICF’s analysis is presented in Findings section. ICF presents results first as a statewide summary of findings for 2013 and 2015, and then by each metric—jobs, labor income, GSP, and output. This is followed by a discussion of impacts by job category and industry. After presenting the statewide results for 2013 and 2015, ICF reports findings at the regional level, which includes 12 regions, and for all disadvantaged communities in New York.

## 1.2 Important Notes

For the following reasons, results from the GJGNY study should not be added or compared to results from jobs studies or analyses of other NYSERDA programs or portfolios.

- **Direct jobs (in FTEs) are point-in-time estimates by survey respondents.** This is one key way in which this GJGNY study differs from other jobs analyses conducted by NYSERDA that rely mainly on energy savings and program spending as inputs to macroeconomic modeling.

- **Given the close linkage of GJGNY with ratepayer-funded programs, the survey research conducted by NMR that preceded this economic impact analysis carefully addressed attribution and worked to isolate the GJGNY impacts.** The survey approach to develop inputs to the economic impact modeling allowed NYSERDA to take a careful and deliberate approach to attribution. The attribution of jobs created was based on the percentage of program contract or incentive funding provided by GJGNY (as opposed to funding from other sources) and also survey responses by HPwES contractors on the influence of GJGNY program components on their level of activity.
- **The economic impact analysis output is gross jobs and is not net of the potential impacts of alternative spending of the GJGNY funds.** This economic impact analysis is not a net analysis in that it does not subtract the potential impact of alternative spending of the GJGNY funds.

## Section 2: Approach

---

This section outlines ICF’s analytical approach, including an overview of the IMPLAN model, and a discussion of input data configuration and the post-model analysis.

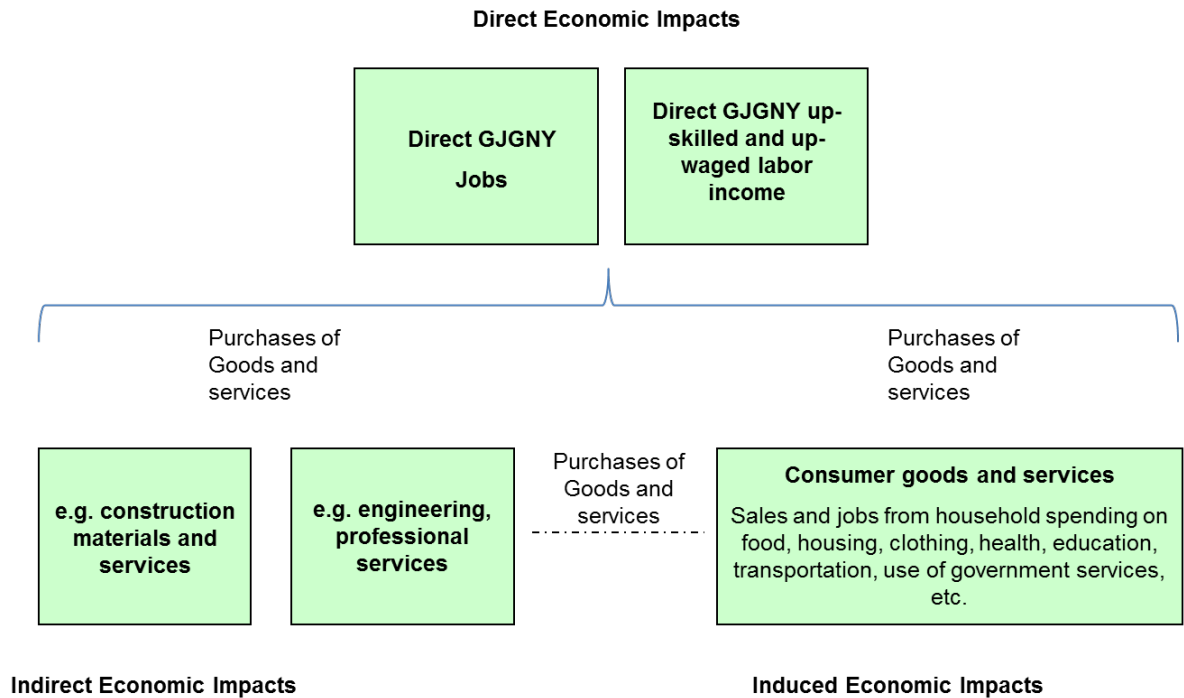
### 2.1 Introduction to the Model

To estimate the economic impacts associated with the GJGNY program, ICF used the economic impact modeling software IMPLAN, a tool used by state agencies throughout the United States to assess regional impacts of programs and policies. The IMPLAN model is a propriety model created and maintained by the Minnesota IMPLAN Group (MIG). It is a static input-output framework used to analyze the effects of an economic stimulus on a pre-specified economic region; in this case, the State of New York. The IMPLAN model is based on the input-output data from the U.S. National Income and Product Accounts (NIPA) maintained by the Bureau of Economic Analysis. The model includes 440 sectors based on the North American Industry Classification System (NAICS). For more information about the IMPLAN model specifications, see Appendix A.

The model uses state-specific multipliers to trace and calculate the flow of dollars from the industries that originate the impact to supplier industries. Whenever new industry activity or income is injected into a regional economy, it initiates a “ripple” or multiplier effect that creates an economic impact in the region. The multiplier effect is generated because the recipients of the new income spend some percentage of that new income in the region and the subsequent recipients of that share, in turn, spend some share of it, and so on. The total spending impact of the new activity is the sum of these progressively smaller rounds of spending within the local economy. The total impact of this additional economic activity is collectively referred to as the induced impact, and can be measured in terms of jobs, labor income, GSP, and output, among other metrics.

Figure 1 is a visual diagram of the modeling framework. It illustrates the relationship between the direct, indirect, and induced impacts. At the top is the direct economic impact from the jobs quantified in the survey conducted by NMR in Phase I. Indirect impacts are generated by spending in related industries that buy from or sell to GJGNY program industries. Induced impacts are generated across the economy by the consumer spending of individuals employed in the direct and indirect sectors. The GJGNY program generates additional labor income for up-skilled and up-waged workers, and the additional GJGNY-related income also creates additional induced impacts. By evaluating the total effect associated with these multiple rounds of spending, IMPLAN generates model outputs in terms of jobs, labor income, GSP, and economic output.

**Figure 1. Economic Impact Analysis Framework**



Source: ICF International.

## 2.2 Modeling Methodology

ICF configured the modeling inputs for the 2013 and 2015 modeling runs using the results of the survey conducted by NMR.<sup>9</sup> NMR provided ICF with direct FTE and wage data from a survey of GJGNY program employers, by industry (e.g., construction) and job category (i.e., new, retained, up-skilled and up-waged). NMR data for 2013 is an estimate of all 2013 GJGNY-related FTE, which includes all direct FTE added or retained by employers from the program’s inception. NMR data for 2015 is an estimate of the projected GJGNY-related FTE by 2015, which includes all direct FTE added or retained by employers from the program’s inception to 2015.

Using the survey data collected by NMR in Phase I, ICF created a template of modeling inputs comprised of a series of direct job vectors and associated labor income by industry and by job category. ICF created four modeling scenarios:

- New jobs: Workers hired by 2013 to support GJGNY-related work
- Retained jobs: Workers who were retained by 2013 specifically to support GJGNY program functions.

<sup>9</sup> For more information about the survey data, methodology and direct job calculations, see the Phase I GJGNY report *Assessment of Job Impacts of the Green Jobs – Green New York Program*.



- The labor income associated with up-skilled and up-waged jobs: Workers who were provided up-skilling and subsequently higher wages to support GJGNY-related work
- 2015 Jobs: Workers hired to support GJGNY-related work by 2015, which includes all new and retained by employers from the program’s inception to 2015.

For new and retained workers, ICF created input vectors by industry for direct jobs and associated labor income. For up-skilled and up-waged workers, ICF created an input vector that accounted for the labor income associated with the wage differential between their previous wage and their GJGNY-dependent up-skilled and up-waged rate.

After using direct job values from the survey conducted by NMR in Phase I to create the industry-specific input vectors, ICF used the survey-collected wage information to calibrate the 2013 input vectors to more closely align with the specifics of GJGNY program jobs. To do so, ICF calculated labor income associated with each worker in each sector using the wage data provided by the survey. ICF used the GJGNY-specific labor income reported in the survey to replace the default labor income provided by the IMPLAN model for each industry. Additional technical details regarding how ICF used the survey data to create the modeling inputs, including the sectors used for this analysis and model input tables, can be found in Appendix B.

## 2.3 Output Metrics

ICF presented the direct, indirect, induced, and total impact results for the 2013 and 2015 modeling runs for each of the following metrics.

- Jobs: Total jobs created by industry, based on the output per worker and output impacts for each industry.
- Job multipliers: As a ratio, job multipliers represent the total number of jobs that are created by the direct jobs.
- Labor income: Total income associated with the increase in total jobs.
- GSP: Value added in the economy, and is the “catch-all” for payments made by individual industry sectors to workers, interests, profits, and indirect business taxes.
- GSP multipliers: Total additional amount of GSP that is created by the initial investment in the program.
- Output: Total value of the output from each industry, which is attributable to program jobs and industry spending.

## 2.4 Post-Model Analysis

After producing state-level model outputs for the 2013 and 2015 runs, ICF apportioned the 2013 total impact regionally, based on the proportion of direct jobs reported in each region. With this approach, ICF estimated the total impact for each output metric for each of the 12 New York regions: Bronx, Capital, Central, Finger Lakes, Kings and Richmond, Long Island, Mid-Hudson/Westchester, New York, North Country, Queens, Southern Tier, and Western region. Lastly, ICF estimated the impact for each metric to economically disadvantaged communities by

apportioning total impacts based on the proportion of direct jobs that were identified as being located in economically disadvantaged communities, according to the survey conducted by NMR in Phase I.<sup>10</sup>

---

<sup>10</sup> For more information about the regions of analysis, see the Phase I GJGNY report *Assessment of Job Impacts of the Green Jobs – Green New York Program*.

## Section 3: Findings

---

The following section presents the findings of the GJGNY program impact analysis at the State and regional levels. The results are also broken down by job type to demonstrate how the program components affect the State economy. ICF also discusses the results broken down by industry to highlight the industry-specific impacts of the program.

### 3.1 Statewide Results

GJGNY program activity generates an economic impact throughout New York State. The discussion below provides a summary of results as well as a discussion of results by each metric, including jobs, labor income, GSP, and output. Output summary tables and detailed tables can be found in Appendix C and Appendix D.

#### 3.1.1 Summary of Results

ICF estimated the total economic impacts for 2013 and projected impacts in 2015. Table 1 provides a summary of impacts on jobs, labor income, GSP, and output. The total impact of the GJGNY program in 2013 was 1,585 jobs, accounting for \$91.2 million in additional labor income. It is estimated that total GJGNY jobs are projected to increase 175 percent to 4,363 jobs and labor income is projected to increase by 161 percent to \$238.4 million by 2015.

In 2013, the GJGNY program added \$124.9 million to New York's GSP and \$223.2 million in total economic output. Like job impacts and labor income, GSP and output are similarly expected to grow significantly by 2015—by 173 percent and 185 percent, respectively.

**Table 1. Summary of 2013 and 2015 (Projected) Statewide GJGNY Impacts**

Description	Total Impact (Direct, Indirect, Induced)	
	2013	2015
Jobs	1,585	4,363
Labor Income (million 2013\$)	\$91.2	\$238.4
GSP, Value added (million 2013\$)	\$124.9	\$341.5
Output (million 2013\$)	\$223.2	\$637.1

Source: IMPLAN results.

In addition to the industries that are directly affected by the GJGNY program, some related industries benefit indirectly by the program's activity. These impacts are typically in up- or down-stream industries that sell to or buy

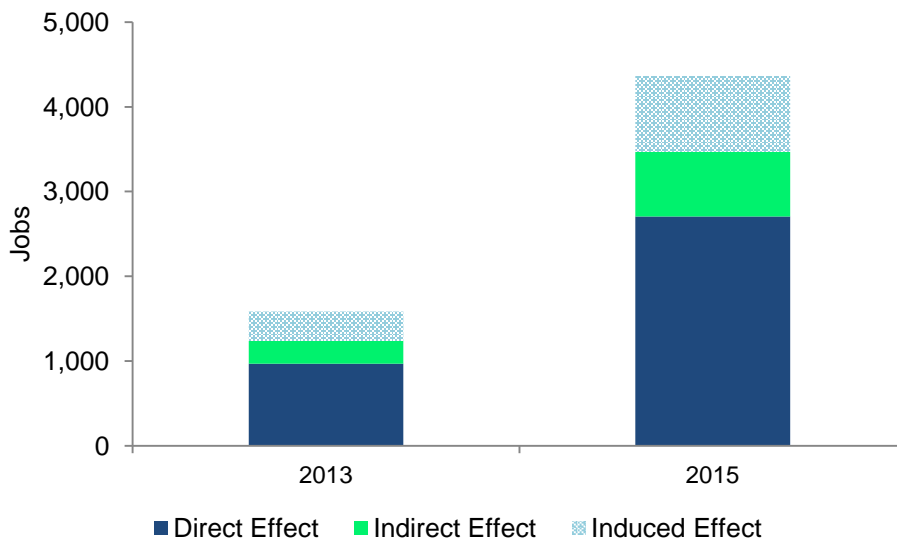
from GJGNY employers or consumer goods industries that benefit from the increased income that the GJGNY program jobs might bring. The top 6 sectors that gained the most from GJGNY activity in 2013 are driven by direct job growth in GJGNY-related industries (i.e. architecture and engineering, construction, environmental conservation, civic and business organizations and consulting) but the latter four sectors are driven by induced impacts in consumer goods and service sectors (e.g., housing, food, retail, employment service).

The following sub-sections provide greater detail on the impacts for each of the four output metrics: jobs, labor income, GSP, and output.

### 3.1.2 Job Impacts

Figure 2 illustrates the relationship between direct, indirect, and induced job impacts for 2013 and 2015. Again, the direct impact value is driven by the GJGNY program, as captured by the survey of GJGNY program participants by NMR in Phase I.<sup>11</sup> The indirect impacts represent the jobs created in related industries that, due to increased demand from the green activity, are producing more goods and services. When jobs are created in directly and indirectly related sectors, household incomes and consumer expenditures increase throughout the State, creating additional jobs, shown in Figure 2 as the induced effect.

**Figure 2. Statewide GJGNY Impacts on Jobs: 2013 and 2015 (Projected)**



Note: Total job impact is projected to be 1,585 in 2013 and 4,363 in 2015.

Source: IMPLAN results.

<sup>11</sup> Phase I GJGNY Assessment of Job Impacts of the Green Jobs – Green New York Program Report.

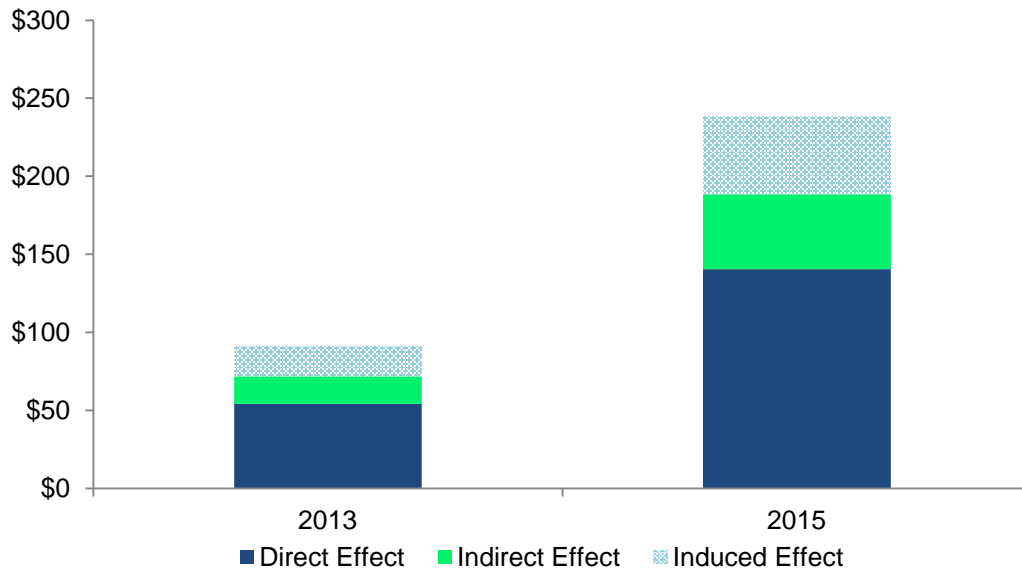
In 2013, total jobs attributable to the program included 1,585 direct, indirect, and induced jobs; by 2015, this figure is projected to rise to 4,363. Of these, roughly 60 percent are jobs directly created by the program, and the remaining 40 percent attributed to indirect and induced spending. Direct jobs are expected to grow 179 percent (2,705 jobs) by 2015; indirect jobs are projected to grow slightly faster at 185 percent (764 jobs), and induced jobs slightly slower at 157 percent (894 jobs). The larger impacts in 2015 are driven by the growth in direct jobs from 2013 to 2015. Statewide in 2013, GJGNY jobs have a multiplier effect of 1.64, indicating that for every GJGNY job, 0.64 secondary and tertiary jobs are created.

### **3.1.3 Labor Income Impacts**

Figure 3 illustrates the direct, indirect, and induced effects of GJGNY wages on statewide labor income. Total labor income associated with the 1,585 direct, indirect, and induced jobs in 2013 is \$91.2 million; by 2015, labor income associated with the 4,363 GJGNY jobs is expected to increase to \$238.4 million, an increase of roughly 162 percent. In 2013 and by 2015, direct labor income also represents about 60 percent of total labor income, meaning that the remaining 40 percent comes from indirect and induced labor income.

Labor income is a particularly useful metric for assessing the impact of the GJGNY program because it accounts for the program's ability to up-skill current workers so that they receive a higher wage. In 2013, GJGNY program up-skilling spurred \$2.5 million in direct up-skilled and up-waged labor income to New York State.

**Figure 3. Statewide GJGNY Impacts on Labor Income (Millions of Dollars): 2013 and 2015 (Projected)**



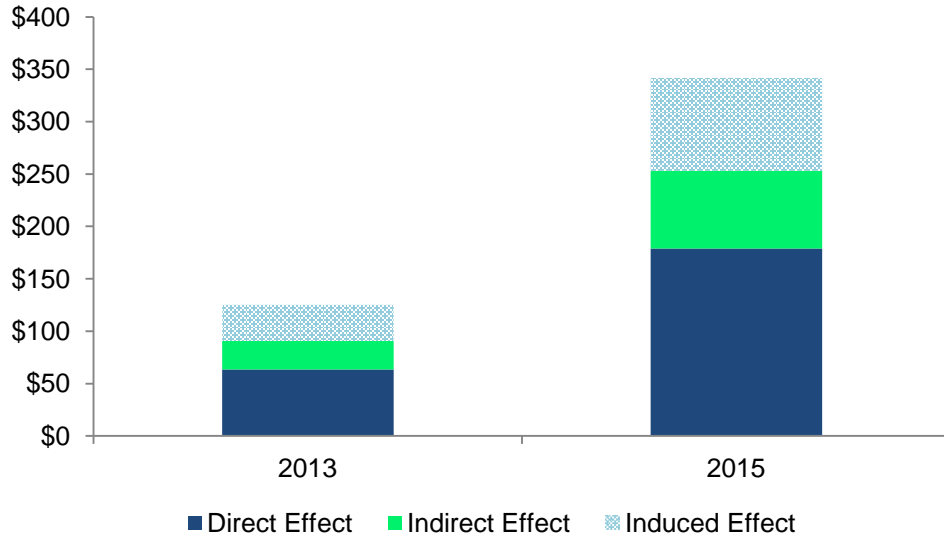
Note: Total labor income impact is projected to be \$91.2 million in 2013 and \$238.4 in 2015.

Source: IMPLAN results.

### 3.1.4 GSP Impacts

The GSP equals the economic output minus the value of the industrial inputs, such as raw materials, semi-finished goods, and other services purchased from domestic industries or foreign sources. Figure 4 illustrates the direct, indirect, and induced effects of GJGNY program activity on GSP. In 2013, the GJGNY program contributed \$124.9 million to the GSP of New York. By 2015, it is expected that GJGNY-related GSP is projected to increase 174 percent to \$341.5 million. Unlike job impacts and labor income, where the contribution from the direct impact is higher than the combined indirect and induced impacts, more than 50 percent of the GSP comes from indirect and induced impacts.

**Figure 4. Statewide GJGNY Impacts on GSP (Millions of Dollars): 2013 and 2015 (Projected)**



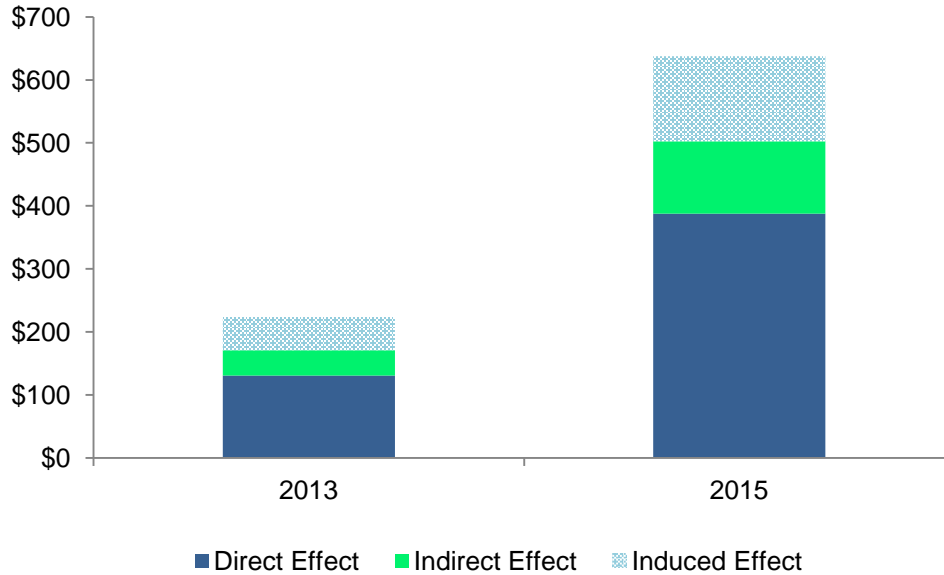
Note: Total GSP impact is projected to be \$124.9 million in 2013 and \$341.5 in 2015.

Source: IMPLAN results.

### 3.1.5 Economic Output Impacts

Figure 5 illustrates the direct, indirect, and induced effects of GJGNY program activity on economic output. Output represents the value of industry production, including inter-industry purchases of intermediate goods, raw materials, cost for energy, and other inputs. For manufacturing sectors, economic output includes total sales with inventory change. For service sectors, output is equal to total sales. For retail and wholesale trade, output is equal to gross margin. In 2013, output related to the GJGNY program was \$223.2 million; by 2015, total output is expected to increase to \$637.1 million. Similar to job impacts and labor income, output related to the program's direct jobs accounts for roughly 60 percent of total output, with the remaining 40 percent attributable to indirect and induced spending.

**Figure 5. Statewide GJGNY Impacts on Output (Millions of Dollars): 2013 and 2015 (Projected)**



Note: Total output impact is projected to be \$223.2 million in 2013 and \$637.1 in 2015.

Source: IMPLAN results.

### **3.1.6 Impacts by Job Type in 2013 and 2015 (Projected)**

To gain an understanding of how the different job types (i.e., new, retained, and up-skilled and up-waged) contribute to the overall impact; the discussion below distinguishes impacts by job type. As shown in Table 2, the most significant economic impacts result from new jobs. Roughly 61 percent of the overall job impact in 2013 is attributable to new jobs generated by the GJGNY program. Retained jobs, however, have a slightly higher jobs multiplier (1.64) due to higher labor income-per-worker for retained workers than for new workers. Table 2 captures direct, indirect and induced effects. The small number of jobs associated with up-skilled and up-waged workers reflects that only the additional wage was used for the economic impact analysis (no direct jobs were counted for up-skilled and up-waged workers).



**Table 2. Statewide GJGNY Impacts, by Job Type: 2013**

<b>Job Type</b>	<b>Jobs</b>	<b>Labor Income</b>	<b>GSP</b>	<b>Output</b>	<b>Jobs Multiplier</b>	<b>GSP Multiplier</b>
New Jobs	962	\$52,957,000	\$73,851,000	\$137,383,000	1.61	1.97
Retained Jobs	611	\$37,583,000	\$49,846,000	\$84,098,000	1.64	1.93
Up-skilled/Up-waged Jobs	12*	\$656,000	\$1,161,000	\$1,764,000	N/A	N/A
<b>Total</b>	<b>1,585</b>	<b>\$91,196,000</b>	<b>\$124,858,000</b>	<b>\$223,246,000</b>	<b>1.64</b>	<b>1.97</b>

Notes:

Dollar figures rounded to the nearest thousand.

Multipliers are not provided for up-skilled and up-waged workers because no direct jobs are associated with this job type.

The 12 induced jobs are estimated to be generated as a result of incremental up-waged income associated with the existing 282 jobs that received up-skilling through the GJGNY program.

Source: *IMPLAN results*.

As shown in Table 3, the impacts associated with additional new jobs by 2015 are significant. By 2015, new jobs created by the GJGNY program are expected to result in 3,740 total jobs (an increase of 2,778 jobs over 2013 job estimates), over \$200 million in labor income, over \$290 million in GSP, and over \$551 million in output. The 2015 job and GSP multipliers for new jobs are slightly lower than they were in 2013, in which each new job spurs another 0.6 jobs, and each direct dollar of GSP generates another \$0.90. Again, small number of jobs associated with up-skilled and up-waged workers reflects that only the additional wage was used for the economic impact analysis (no direct jobs were counted for up-skilled and up-waged workers).

**Table 3. Statewide GJGNY Impacts, by Job Type: 2015 (Projected)**

<b>Job Type</b>	<b>Jobs</b>	<b>Labor Income</b>	<b>GSP</b>	<b>Output</b>	<b>Jobs Multiplier</b>	<b>GSP Multiplier</b>
New Jobs	3,740	\$200,180,000	\$290,492,000	\$551,214,000	1.60	1.90
Retained Jobs	611	\$37,583,000	\$49,846,000	\$84,098,000	1.64	1.93
Up-skilled/Up-waged Jobs	12*	\$656,000	\$1,161,000	\$1,764,000	N/A	N/A
<b>Total</b>	<b>4,363</b>	<b>\$238,419,000</b>	<b>\$341,499,000</b>	<b>\$637,077,000</b>	<b>1.61</b>	<b>1.91</b>

Notes:

Dollar figures rounded to the nearest thousand.

Multipliers are not provided for up-skilled and up-waged workers because no direct jobs are associated with this job type.

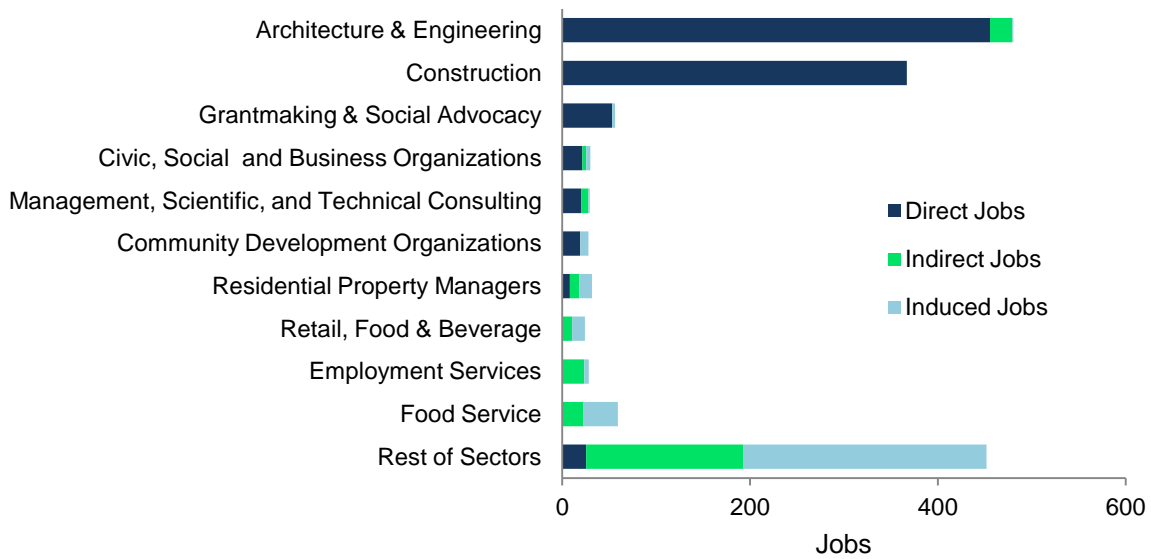
The 12 induced jobs are estimated to be generated as a result of incremental up-waged income associated with the existing 282 jobs that received up-skilling through the GJGNY program.

Source: *IMPLAN results*.

### **3.1.7 Impacts by Industry**

The previous discussions articulate the industry-specific effects. However, as shown in the next four figures, the bulk of GJGNY program impacts are concentrated in specific industries. Shown graphically in Figure 6, it is clear the architecture and engineering sector and the construction sector benefit the most in 2013. Nearly all of the jobs in those two sectors are directly a result of the program. In contrast, retail, employment services, and food services, the three industries at the bottom of the figure, are driven primarily by indirect and induced expenditures after the initial jobs are created.

**Figure 6. Job Impacts, Top 10 Sectors, Ranked by Direct Jobs: 2013**



**Notes:**

Total projected job impacts of the top ten sectors shown in this graph for 2013 are 1,133 jobs, which represents 72 percent of the total projected job impacts for 2013 (1,585).

Sub-sectors related to the architecture and engineering sector includes inspection services and electrical contracting. Sub-sectors related to the construction sector include HVAC installers, plumbing, new building and renovation.

*Source: IMPLAN results.*

Table 4 shows the labor income, GSP, and output in addition to the jobs directly and indirectly created by the GJGNY program, by industry. The labor income, GSP, and output impacts are highest for the architecture and engineering and construction sectors. The construction sector, which includes sub-sectors such as HVAC installers, plumbing, new building, and renovation services accounts for 20 to 26 percent of each metric (i.e., jobs, labor income, GSP, output) in 2013. The architectural, engineering, and related services industry—which includes sub-sectors such as inspection services and electrical contracting—accounts for between 24 to 32 percent of the impact for each metric in 2013.

**Table 4. Impacts by Sector, Top 10 Sectors Ranked by Job Impacts: 2013**

<b>Sector Description</b>	<b>Jobs</b>	<b>Labor Income</b>	<b>GSP</b>	<b>Output</b>
Architectural & engineering services (inspection services, electrical contracting)	480	\$28,834,000	\$29,575,000	\$61,803,000
Construction (e.g., HVAC, plumbing, new building and renovation)	367	\$18,561,000	\$25,883,000	\$57,191,000
Food services (e.g., restaurants, bars)	59	\$1,638,000	\$2,353,000	\$3,971,000
Grant making and social advocacy	56	\$2,376,000	\$2,053,000	\$5,406,000
Residential property managers	32	\$987,000	\$6,215,000	\$7,378,000
Civic, social and business organizations	30	\$1,601,000	\$1,425,000	\$1,868,000
Management, scientific, and technical consulting	29	\$3,631,000	\$3,871,000	\$5,215,000
Employment services	28	\$1,218,000	\$1,345,000	\$1,575,000
Community development organizations	28	\$1,093,000	\$1,082,000	\$1,110,000
Retail, food and beverage	24	\$817,000	\$1,080,000	\$1,507,000
Rest of Sectors	507	\$31,401,000	\$49,162,000	\$76,964,000
<b>Total</b>	<b>1,585</b>	<b>\$91,196,000</b>	<b>\$124,858,000</b>	<b>\$223,246,000</b>

Note: Dollar figures rounded to the nearest thousands. Totals may not sum due to independent rounding.

Source: IMPLAN results.

As shown in Figure 7, the same top two industries dominate in 2015 and in 2013, but the construction sector overtakes the architecture and engineering sector for the top spot. The significantly higher impact in the construction sector in 2015 is driven by growth in the number of direct jobs in that sector. While direct jobs in the architecture and engineering sector are expected to remain relatively static between 2013 and 2015 (increasing from 455 to 463), direct jobs in the construction sector are expected to grow nearly five-fold (from 367 to 1,777). Within the construction sector, there are expected significant job gains in HVAC services (roughly 600 additional direct jobs), drywall and insulation contractors (roughly 300 additional direct jobs), and residential remodelers (roughly 400 additional direct jobs).

**Figure 7. Job Impacts, Top 10 Sectors, Ranked by Direct Jobs: 2015 (Projected)**



**Notes:**

Total projected job impacts of the top ten sectors shown in this graph for 2015 are 3,134 jobs, which represents 72 percent of the total projected job impacts for 2015 (4,363).

Sub-sectors related to the architecture and engineering sector includes inspection services and electrical contracting. Sub-sectors related to the construction sector include HVAC installers, plumbing, new building and renovation.

Source: *IMPLAN results.*

As shown in Table 5, the construction sector accounts for 41 percent of total jobs, 36 percent of labor income, 35 percent of GSP, and 43 percent of output. Growth in the architectural and engineering sector—which includes sub-sectors such as inspection services and electrical contracting—is far slower, though the sector remains the second largest beneficiary of the GJGNY program in terms of total jobs. The architecture and engineering sector accounts for between 24 to 32 percent of the impact for each metric in 2013, but is expected to be only between 10 to 14 percent of the impact in 2015.

**Table 5. Impacts by Sector, Top 10 Sectors Ranked by Job Impacts: 2015 (Projected)**

<b>Sector Description</b>	<b>Jobs</b>	<b>Labor Income</b>	<b>GSP</b>	<b>Output</b>
Construction (e.g., HVAC, plumbing, new building and renovation)	1,777	\$85,272,000	\$120,018,000	\$271,371,000
Architectural and engineering services (inspection services, electrical contracting)	529	\$32,844,000	\$33,664,000	\$68,311,000
Management, scientific, and technical consulting	240	\$18,889,000	\$20,754,000	\$40,573,000
Food services (e.g., restaurants, bars)	135	\$3,717,000	\$5,339,000	\$9,008,000
Civic, social and business organizations	107	\$4,802,000	\$4,189,000	\$6,525,000
Retail, food and beverage	84	\$2,851,000	\$3,769,000	\$5,259,000
Grant making and social advocacy	77	\$3,353,000	\$2,910,000	\$7,410,000
Residential property managers	66	\$1,847,000	\$12,777,000	\$15,426,000
Retail, general merchandise	65	\$1,834,000	\$3,129,000	\$4,016,000
Employment services	54	\$2,341,000	\$2,586,000	\$3,028,000
Rest of sectors	1,229	\$80,669,000	\$132,364,000	\$206,150,000
<b>Total</b>	<b>4,363</b>	<b>\$238,419,000</b>	<b>\$341,499,000</b>	<b>\$637,077,000</b>

Note: Dollar figures rounded to the nearest thousands. Totals may not sum due to independent rounding.

Source: IMPLAN results.

As shown in Table 6, the direct impacts to each specific industry within the construction sector varied, but were focused almost exclusively in the plumbing, residential remodelers, and drywall and insulation contractors industries. The increase in jobs in these industries is indicative of anticipated significant investments in household energy efficiency improvements expected after 2013, according to survey respondent projections.

**Table 6. Incremental 2015 Direct Jobs in the Construction Sector**

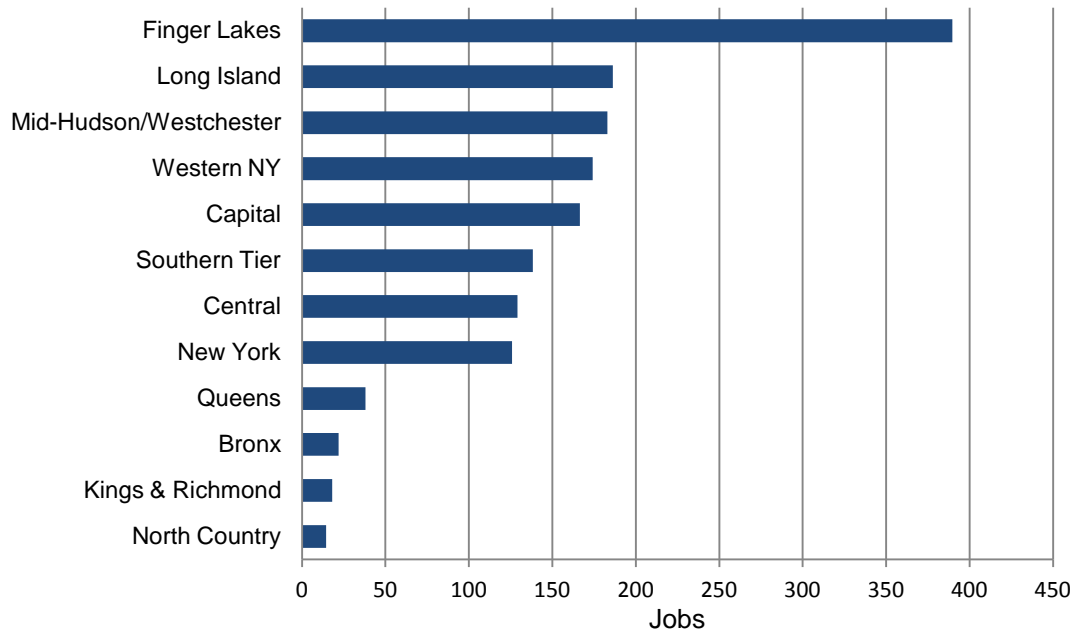
<b>NAICS</b>	<b>Industry Description</b>	<b>Jobs</b>
238220	Plumbing, heating and air-conditioning contractors	629
236118	Residential remodelers	373
238310	Drywall and insulation contractors	328
236115	New single-family housing construction	6
236116	New multifamily housing construction (building multifamily residential buildings for others as general contractors)	5
238150	Glass and glazing contractors, windows	3
236117	New housing operative builders	1

*Source: NMR and ICF International.*

### **3.2 Regional Results**

For this analysis, New York State is divided into 12 regions: Bronx, Capital, Central, Finger Lakes, Kings and Richmond, Long Island, Mid-Hudson/Westchester, New York, North Country, Queens, Southern Tier, and Western New York. As shown in Figure 8, the share of jobs related to the GJGNY program are disproportionately located throughout the State. Jobs and GSP in the Finger Lakes region attributable to the program (390 jobs and \$30.7 million in GSP) are significantly greater than those impacts attributable to the program in Long Island, the second most-impacted region (186 jobs and \$14.7 million in GSP). The number of jobs created in Long Island, Mid-Hudson/Westchester, Western New York, Capital, Southern Tier, Central, and New York are all of a similar magnitude—ranging from 186 jobs (in Long Island) to 125 jobs (in New York). There is then a significant drop in jobs created in the four least-impacted regions (Queens, Bronx, Kings and Richmond, and North Country), where jobs ranged from 38 jobs (in Queens) to as few as 14 jobs (in North Country). This pattern is similar for GSP, as shown in Figure 9.

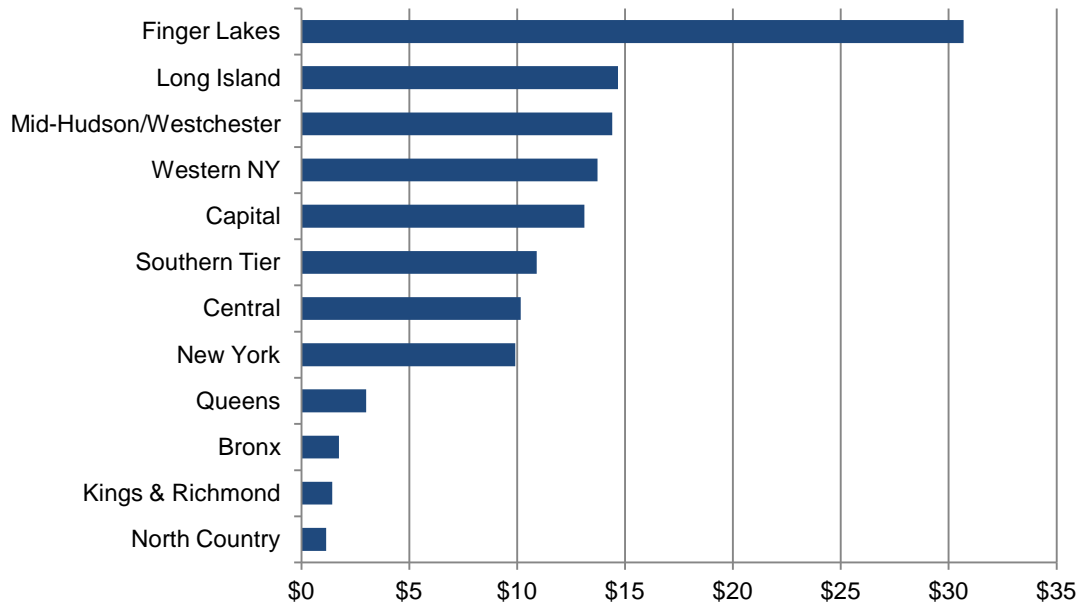
**Figure 8. Job Impacts Attributable to GJGNY, by Region: 2013**



Note: Total jobs are projected to be 1,585 in 2013.

Source: IMPLAN results.

**Figure 9. GSP Attributable to GJGNY by Region (Millions of Dollars): 2013**



Note: Total GSP impact is projected to be \$124.9 in 2013.

Source: IMPLAN results.



As shown in Table 7, the five largest regions in terms of job impacts, labor income, GSP, and output account for nearly 70 percent of all GJGNY-related jobs in the State. The Finger Lakes region—the region with the most jobs—accounted for 25 percent of all statewide jobs created by the program; GJGNY created 390 direct, indirect, and induced jobs in the Finger Lakes region. GJGNY-related jobs in the Finger Lakes created an additional \$22.4 million in labor income, \$30.7 million in GSP, and \$54.9 million in output for the region, each accounting for one-quarter of the statewide impact.

Alternatively, GJGNY-related impacts are minimal in Queens, Bronx, Kings and Richmond, and North Country—each region accounting for a two percent share or less of GJGNY-related impacts, including for jobs, labor income, GSP, and output. Collectively, the bottom four regions accounted for less than six percent of all GJGNY-related impacts.

**Table 7. Total 2013 Impacts Attributable to GJGNY, by Region**

Region	Jobs	Labor Income	GSP	Output	Percent of Total Impact
Finger Lakes	389	\$22,409,000	\$30,680,000	\$54,856,000	25%
Long Island	186	\$10,716,000	\$14,671,000	\$26,232,000	12%
Mid-Hudson/Westchester	183	\$10,522,000	\$14,405,000	\$25,757,000	12%
Western NY	174	\$10,020,000	\$13,718,000	\$24,529,000	11%
Capital	167	\$9,580,000	\$13,116,000	\$23,452,000	11%
Southern Tier	138	\$7,958,000	\$10,896,000	\$19,481,000	9%
Central	129	\$7,425,000	\$10,166,000	\$18,176,000	8%
New York	126	\$7,236,000	\$9,906,000	\$17,712,000	8%
Queens	38	\$2,191,000	\$2,999,000	\$5,363,000	2%
Bronx	22	\$1,266,000	\$1,734,000	\$3,100,000	1%
Kings & Richmond	18	\$1,040,000	\$1,424,000	\$2,547,000	1%
North Country	14	\$834,000	\$1,141,000	\$2,041,000	1%
<b>Total</b>	<b>1,585</b>	<b>\$91,196,000</b>	<b>\$124,858,000</b>	<b>\$223,246,000</b>	<b>100%</b>

Notes: Dollar figures rounded to the nearest thousands. Totals may not sum due to independent rounding.

Source: IMPLAN results.

### 3.3 Impacts to Disadvantaged Communities

The following discussion presents the results of ICF’s estimates for jobs, labor income, GSP, and output in disadvantaged communities throughout New York State. As shown in Table 8, the economic impact of the GJGNY program in 2013 to disadvantaged communities includes 272 jobs, \$15.7 million in additional labor income, \$21.4

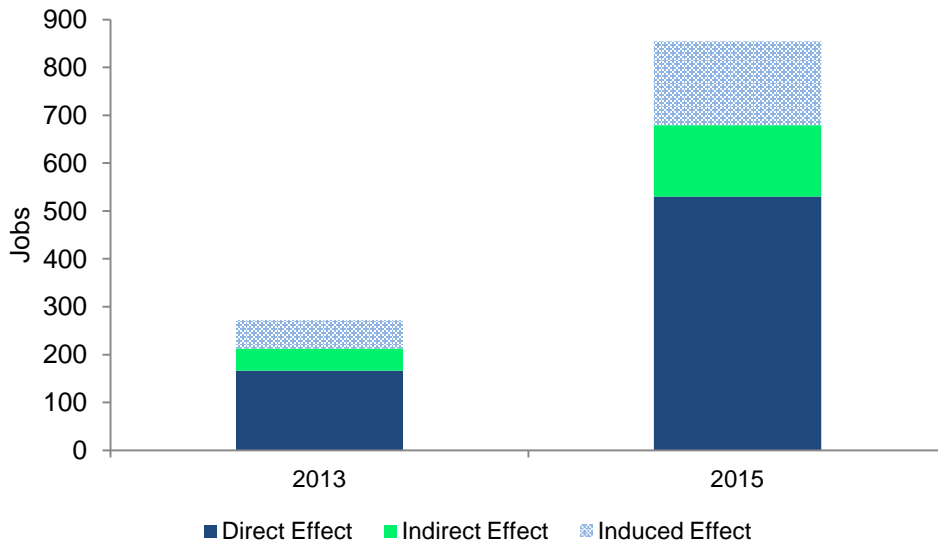
million in GSP, and \$38.3 million in output. In 2015, impacts to disadvantaged communities across all metrics are projected to increase significantly from 2013 levels, with output increasing by 225 percent. Total impacts in 2015 to disadvantaged communities from the GJGNY program include 855 jobs (214 percent increase over 2013), \$46.7 million in additional labor income (197 percent increase), \$66.9 million in GSP (211 percent increase), and \$124.8 million in output. These impacts are presented in Figure 10. Job and GSP impacts are presented graphically in Figure 10 and Figure 11, respectively.

**Table 8. Summary of GJGNY Impacts to Disadvantaged Communities, 2013 and 2015 (Projected)**

Impact Type	Total Impact (Direct, Indirect, Induced)	
	2013	2015
Number of jobs	272	855
Labor income (million 2013\$)	\$15.7	\$46.7
GSP (million 2013\$)	\$21.4	\$66.9
Output (million 2013\$)	\$38.3	\$124.8

*Source: IMPLAN results.*

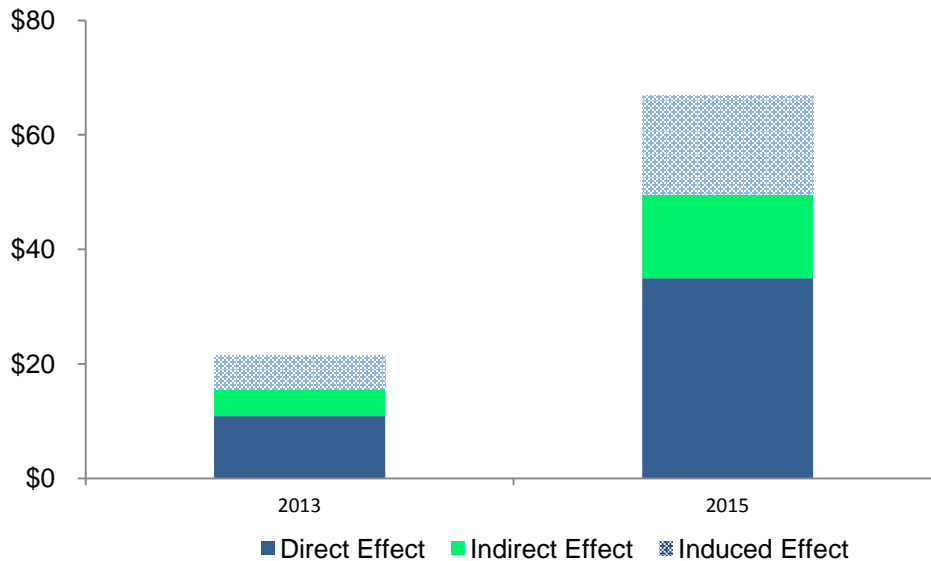
**Figure 10. Job Impacts in Disadvantaged Communities Attributable to GJGNY: 2013 and 2015 (Projected)**



Note: Total job impact is projected to be 272 in 2013 and 855 in 2015.

Source: IMPLAN results.

**Figure 11. GSP Impacts in Disadvantaged Communities Attributable to GJGNY: 2013 and 2015 (Projected)**



Note: Total GSP impact is projected to be \$21.4 million in 2013 and \$66.9 million in 2015.

Source: IMPLAN results.

## Section 4: Wage Comparison of Up-skilled and Up-waged Jobs

---

This section presents a wage comparison of the average annual wage difference between up-skilled and up-waged workers prior to and after being up-skilled. ICF's findings indicate that the average annual wage across all sectors increases roughly \$11,300, or 18 percent due to up-skilling. In 2013, GJGNY program up-skilling spurred \$2.5 million in direct up-skilled and up-waged labor income to New York State.

Table 9 shows the previous wage (before up-skilling) and the current annual wage (after up-skilling) for each industry. The final two columns of Figure 23 present the absolute (i.e., dollars) and relative (i.e., percent) increase in the wage as a result of GJGNY-related up-skilling. Five of the affected industries are above the average increase in wage levels, most notably: residential remodelers (38 percent); drywall and insulation contractors (28 percent); and plumbing, heating and air -conditioning contractors (27 percent), and engineering services (21 percent). Four industries have a less than average wage percentage difference, including: other management consulting services (ten percent) and other social advocacy organizations (13 percent). Nearly half of all sectors fell in line with the average increase (18 percent).

**Table 9. 2013 Up-skilled and Up-waged Jobs by Sector, Ranked by Percentage Wage Increase**

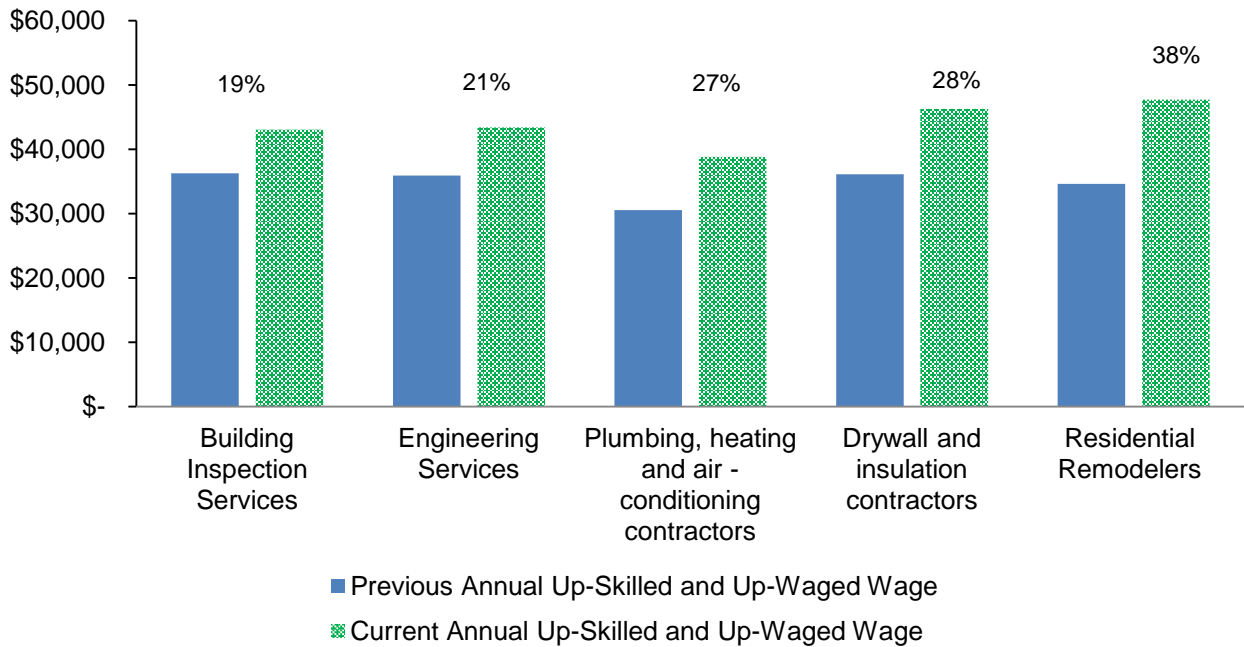
NAICS Code	NAICS Description	Previous Average Wage	Current Average Wage	Change in Average Wage	
				Average Increase (\$)	Percent Increase
236118	Residential Remodelers	\$34,635	\$47,680	\$13,045	38%
238310	Drywall and Insulation Contractors	\$36,095	\$46,273	\$10,178	28%
238220	Plumbing, Heating and Air - conditioning Contractors	\$30,551	\$38,787	\$8,235	27%
541330	Engineering Services	\$35,898	\$43,368	\$7,470	21%
541350	Building Inspection Services	\$36,266	\$43,017	\$6,751	19%
624190	Community Development and Non-profit	\$46,526	\$55,058	\$8,533	18%
541611	Administrative Management and General Management Consulting Services	\$102,263	\$121,018	\$18,754	18%
611310	Colleges, Universities, and Professional Schools	\$104,000	\$123,073	\$19,073	18%
611710	Educational Support Services	\$104,000	\$123,073	\$19,073	18%
813990	Other Similar Organizations (except Business, Professional, Labor, and Political Organizations)	\$98,800	\$116,919	\$18,119	18%
236116	New Multifamily Housing Construction	\$62,747	\$74,254	\$11,507	18%
531311	Residential Property Managers	\$50,613	\$59,896	\$9,282	18%
236115	New Single-family Housing Construction	\$39,914	\$46,659	\$6,746	17%
813312	Environment, Conservation and Wildlife Organizations	\$46,212	\$52,978	\$6,765	15%
813319	Other Social Advocacy Organizations	\$77,990	\$88,379	\$10,390	13%
541618	Other Management Consulting Services	\$82,793	\$90,302	\$7,510	9%
	<b>Average</b>	<b>\$61,831</b>	<b>\$73,171</b>	<b>\$11,339</b>	<b>18%</b>

Note: Figures are reported unrounded.

Source: ICF International analysis of survey data collected by NMR in Phase I.

The above discussion does not account for how many actual jobs are impacted by the wage increase. Figure 12 includes only the top 5 industries in terms of job count and presents the wage differential and percentage of wage increase for these select industries. For these industries only, the average annual wage difference between the previous and current wage for up-skilled and up-waged workers is roughly \$9,100, which is lower than the industry-wide average of \$11,300. That said, these industries had more significant growth in terms of percentage increase from previous to current wage, 26 percent versus the 18 percent average. Residential remodelers, drywall and insulation contractors, and plumbing, heating and air conditioning contractors—all industries with significant direct jobs—have above average wage increases and experienced more significant wage increases due to up-skilling.

**Figure 12. Wage Differential and Percent Increase in Wages for Up-skilled and Up-waged Jobs, Top 5 Industries**



Source: IMPLAN results.

## Conclusion

---

GJGNY program-related activity generates a significant economic impact throughout New York State. The total statewide 2013 job impact of the GJGNY program is 1,585 jobs, and is expected to increase 176 by 2015 to 4,363 jobs. The GJGNY program similarly contributed \$124.9 million to New York State's GSP in 2013; by 2015, the program's contribution to the State's GSP is expected to increase 173 percent to \$341.5 million by 2015. The construction sector is the largest beneficiary of the program. The sector, which includes sub-sectors such as HVAC installers, plumbing, new building, and renovation services, accounted for 20 to 25 percent of the jobs, labor income, GSP, and output associated with the program in 2013, with each metric growing significantly by 2015—reaching 41 percent of total jobs, 36 percent of labor income, 35 percent of GSP, and 43 percent of output associated with the program by 2015. The Finger Lakes region has benefited the most from the program, with jobs and GSP in the Finger Lakes region attributable to the program (389 jobs and \$30.7 million in GSP) in 2013 totaling roughly one-quarter of the program's impact. Finally, the economic impact to disadvantaged communities in 2013 includes 272 jobs, \$15.7 million in labor income, \$21.4 million in GSP, and \$38.3 million in output.

## Appendix A: Overview of the IMPLAN Model

---

The IMPLAN model is a proprietary, static input-output framework used to analyze the effects of an economic stimulus on a pre-specified economic region (in this case, New York State). IMPLAN is considered static because the impacts calculated for any scenario by the model are estimates of the indirect and induced impacts annually.

The modeling framework in IMPLAN consists of two components: the descriptive model and the predictive model. The descriptive model defines the local economy in the specified modeling region, and includes accounting tables that trace the “flow of dollars from purchasers to producers within the region.”<sup>12</sup> It also includes the trade flows that describe the movement of goods and services, both inside and outside the modeling region (i.e., regional exports and imports with the outside region).

In addition, IMPLAN includes the Social Accounting Matrices (SAM) that traces the flow of money between institutions, such as transfer payments from governments to businesses and households, and taxes paid by households and businesses to governments.

The predictive model consists of a set of “local-level multipliers” that can be used to analyze the changes in final demand and their ripple effects throughout the local economy. IMPLAN Version 3.0 uses 2008 data and improves on previous versions of the model by implementing a new method for estimating regional imports and exports. This new method of estimating imports looks at annual trade flow information between economic regions, thereby allowing more sophisticated estimation of imports and exports than the traditional econometric estimate used by Version 2. Additionally, this new modeling method allows for multi-regional modeling functions, in which IMPLAN tracks imports and exports between selected models allowing the users to assess how the impact in one region can impact additional regional economies.

The IMPLAN model is based on the input-output data from the U.S. National Income and Product Accounts (NIPA) from the Bureau of Economic Analysis. The model includes 440 industry sectors based on the North American Industry Classification System (NAICS). (See Appendix B for the IMPLAN industry sector – NAICS code crosswalk table.) The model uses state-specific multipliers to trace and calculate the flow of dollars from the industries that originate the impact to supplier industries. These multipliers are coefficients that “describe the response of the economy to a stimulus (a change in demand or production).”<sup>13</sup>

It should also be noted that IMPLAN does not distinguish between full-time and part-time employment. Therefore, impacts presented in this report equate to the actual number of “bodies” employed, rather than the amount of full-

---

<sup>12</sup> IMPLAN Pro User Guide.

<sup>13</sup> IMPLAN Pro User Guide.



time employment activity generated. To ensure that only GJGNY jobs (or partial jobs) were attributed to the program's impact, ICF relied on FTE estimates reported in the survey conducted by NMR in Phase I to estimate the IMPLAN inputs.

# Appendix B: Additional Detail on Preparing the Data and Modeling Framework

---

This appendix includes additional technical details about ICF’s approach to converting the survey data collected by NMR in Phase I into IMPLAN modeling inputs, including a discussion of the NAICS codes to IMPLAN industry codes crosswalk, converting FTE to worker “bodies” and estimating wage data that was not provided in the survey.

## **NAICS to IMPLAN Crosswalk**

First, ICF reviewed and analyzed the industry sectors associated with the direct jobs reported in the survey. ICF mapped each direct job from the NAICS code to the respective IMPLAN industry code. In some cases, the IMPLAN codes were less granular than their cross-walked NAICS codes. For example, IMPLAN suggests that all construction activities (e.g., electrical, plumbing and HVAC installation, residential remodelers) be assigned to a general construction code. ICF believes the best approach to account for any sub-industry characteristics that may be lost in the NAICS-IMPLAN crosswalk is through labor income calibration.

The NAICS Code – IMPLAN Crosswalk is presented in Table 10. Of particular note is the fact that the IMPLAN construction sector aggregates many NAICS codes. Because of this aggregation, ICF’s discussion of direct and total industry impacts in Phase II will differ from NMR’s discussion of direct FTE by NAICS code in Phase I.

**Table 10. NAICS Code – IMPLAN Crosswalk**

NAICS	NAICS Description	IMPLAN Sector	IMPLAN Sector Description
236115	New Single-family housing construction	37	Construction of new residential permanent site single- and multi-family structures
236116	New Multifamily Housing Construction (Building multi-family residential buildings for others as general contractors)		
236117	New Housing Operative Builders		
236118	Residential Remodelers		
238150	Glass and glazing contractors, windows		
238220	Plumbing, heating and air -conditioning contractors		
238310	Drywall and insulation contractors		
237210	Land Subdivision	369	Architectural, engineering, and related services
238210	Electrical Contractor		
541330	Engineering Services		
541350	Building Inspection Services		
423610	Electrical Apparatus & Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	319	Wholesale trade
444190	Other Building Material Dealers	323	Retail - Building material and garden supply
522390	Loan Servicing	355	Nondepository credit intermediation and related activities
524127	Direct Title Insurance Carriers	357	Insurance Carriers
531110	Lessors of Residential Buildings and Dwellings	360	Real estate
531210	Offices of Real Estate Agents and Brokers		
531311	Res. property managers (Establishments primarily engaged in managing res. real estate for others)		
541611	Administrative Management and General Management Consulting Services	374	Management, scientific, and technical consulting services
541618	Other Management Consulting Services		
541690	Other Scientific and Technical Consulting Services	375	Environmental and other technical consulting services
611310	Colleges, Universities, and Professional Schools	392	Junior colleges, colleges, universities, and professional schools
611710	Educational support services	393	Other educational services
624190	Community development a non-profit	400	Individual and family services
811412	Appliance Repair and Maintenance	418	Personal and household goods repair and maintenance
813311	Human Rights Organizations	424	Grant making, giving, and social advocacy organizations
813312	Environment, Conservation & Wildlife Organizations		
813319	Other Social Advocacy Organizations		
813410	Civic and Social Organizations	425	Civic, social, professional, and similar organizations
813910	Business Associations		
813930	Labor unions and other similar labor organizations		
813990	Other Similar Organizations (except Business, Professional, Labor, and Political Organizations)		
999300	Local government excluding schools or hospitals	437	Employment and payroll for SL Government Non-Education

Source: NMR and ICF International.

## FTE to “Bodies” Conversion

The IMPLAN model accounts for employment in terms of the number of “bodies” who are employed. That is, one part-time worker and one full-time worker are each considered to be one “body.” However, the definition of direct employment used by the survey conducted by NMR in Phase I was designed to more conservatively account for proportions of jobs that are supported by GJGNY, and thus the survey assessed GJGNY-related FTE employment and not jobs (see the survey methodology provided by NMR). To allow the model to accommodate the more specific employment inputs provided by NMR, ICF converted the direct FTE data obtained from the survey into job figures that the model could assess. ICF used the conversion tool provided by IMPLAN<sup>14</sup>, which provides FTE-to-job ratios for each IMPLAN sector code. The conversion factors are simply the percent of jobs in an industry that are full-time (calculated as full-time workers divided by all workers). Therefore, the number of “bodies” will always be equal (in the case that 100 percent of jobs in the sector are full-time) or greater (when not all jobs in the sector are full-time) than the number of FTE.

To convert the FTE data inputs to “bodies,” ICF divided the number of FTEs by the conversion factor (or alternatively, by the percentage of jobs that are full-time), as outlined by IMPLAN. ICF did this for both new and retained jobs.

The labor income entered into the IMPLAN model was calculated directly from the wages and FTE collected by the survey conducted by NMR in Phase I. To calculate the annual income associated with all jobs in a sector, ICF multiplied the hourly wage by 2,080 hours (the number of full-time hours in a year), and then multiplied that figure by the number of jobs in the sector. The wages reported in the survey were directly associated with their respective FTEs in the survey and therefore the wages and annual labor income associated with those jobs were also directly associated with whatever the equivalent number of IMPLAN bodies was for that sector. That is, regardless of the employment metric (i.e., IMPLAN bodies or FTE), the total wages were held constant.

## Estimating Wage Data Not Provided by Survey Data

If wage data was not provided by the survey conducted by NMR in Phase I for a given industry, wages were estimated by ICF using averages of other survey data or using industry specific wage data reported in the 2012 Quarterly Census of Employment and Wages (QCEW) dataset from the New York State Department of Labor<sup>15</sup>.

---

<sup>14</sup> MIG. IMPLAN to FTE Conversion.

[http://implan.com/v4/index.php?option=com\\_multicategories&view=article&id=628:628&Itemid=10](http://implan.com/v4/index.php?option=com_multicategories&view=article&id=628:628&Itemid=10).

<sup>15</sup> The Quarterly Census of Employment and Wages (QCEW), a cooperative program of the New York State Department of Labor and the U.S. Bureau of Labor Statistics, collects employment and wage data from employers covered by New York State's Unemployment Insurance (UI). QCEW data cover approximately 97 percent of New York's nonfarm employment, providing a virtual universe of employment and wage data, by industry, for private-sector employees as well as state, county, and municipal government employees insured under the New York State Unemployment Insurance (UI) Act. Employee categories not covered by UI include some agricultural workers, railroad workers, private household workers, student workers, the self-employed, and unpaid family workers. Open New York. *Quarterly*

Specifically, for industries in which the survey provided no wage data, ICF estimated the wage using industry specific wages reported in the 2012 QCEW dataset for New York State. For an industry in which survey data were available for new workers only, ICF multiplied the survey-provided new worker wage by the average (across all industries) percent wage increase between new and retained workers to estimate the wage associated with retained workers for that industry. For an industry in which survey wage data were available for both new and retained workers but not available for up-skilled and up-waged workers, ICF multiplied the survey-provided new worker wage by the average (across all industries) percent wage increase due to up-skilling to estimate the up-skilled wage for that industry.

## Tables of Model Inputs

**Table 11. IMPLAN Inputs for Jobs and Labor Income: 2013**

	<b>New Jobs</b>	<b>Direct New Job Labor Income</b>	<b>Retained Jobs</b>	<b>Direct Retained Job Labor Income</b>
Construction (e.g., HVAC)	272	\$8,318,900	95	\$3,604,413
Architecture & Engineering Services	246	\$9,064,456	209	\$9,794,447
Grant Making & Social Advocacy	35	\$1,364,143	18	\$750,255
Management, Scientific, and Technical Consulting	12	\$989,314	9	\$740,148
State & Local Government (Non-Education)	8	\$315,245	-	-
Individual & Family Services	8	\$318,435	11	\$476,099
Real Estate	5	\$212,747	3	\$164,801
Civic and Social Organizations	4	\$217,368	17	\$919,315
Colleges & Universities	3	\$302,900	7	\$668,850
Educational Support Services	1	\$118,300	2	\$224,664
Electrical Equipment Wholesale	1	\$24,960	-	-
Environment and Other Technical Consulting	Less than 1	\$42,297	Less than 1	\$35,413
Retail, Building Material/Gardening Supply	Less than 1	\$19,216	Less than 1	\$28,907
Appliance Repair and Maintenance	Less than 1	\$2,643	Less than 1	\$2,213

Source: ICF International.

**Table 12. IMPLAN Inputs for Jobs and Labor Income: 2015**

	<b>New Jobs</b>	<b>Direct New Job Labor Income</b>
Construction (e.g., HVAC, plumbing, new building and renovation)	1410	\$43,289,335
Architect. & Engineering (e.g., inspection services, electrical contracting)	204	\$7,828,592
Grant making & Social Advocacy	58	\$2,242,108
State & Local Government (non-education)	25	\$982,582
Community Development Organizations	14	\$573,869
Civic, Social and Business Organizations	7	\$322,709
Residential Property Managers	7	\$342,537
Colleges & Universities	3	\$292,500
Management, Scientific, and Technical Consulting	2	\$70,064
Retail, Build Material/Garden Supply	2	\$158,281
Educational Support Services	1	\$97,500
Electrical Equipment Wholesale	1	\$24,960
Environment and Other Technical Consulting	1	\$64,086
Appliance Repair and Maintenance	less than 1	\$4,005

*Source: ICF International.*

## Appendix C: Output Summary Tables

---

**Table 13. Summary of Impacts: 2013**

Impact Type	Jobs	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	969	\$54,104,000	\$63,380,000	\$130,295,000	1.64	1.97
Indirect Effect	268	\$17,628,000	\$27,035,000	\$40,590,000		
Induced Effect	348	\$19,464,000	\$34,443,000	\$52,361,000		
Total Effect	1,585	\$91,196,000	\$124,858,000	\$223,246,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: IMPLAN results.

**Table 14. Summary of Incremental Impacts: 2015**

Impact Type	Jobs	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	1,736	\$86,295,000	\$115,333,000	\$257,155,000	1.60	1.88
Indirect Effect	496	\$30,339,000	\$47,187,000	\$74,393,000		
Induced Effect	546	\$30,588,000	\$54,122,000	\$82,283,000		
Total Effect	2,778	\$147,222,000	\$216,641,000	\$413,831,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: IMPLAN results.

**Table 15. Summary of Impacts: 2015**

<b>Impact Type</b>	<b>Jobs</b>	<b>Labor Income</b>	<b>GSP</b>	<b>Output</b>	<b>Jobs Multiplier</b>	<b>GSP Multiplier</b>
Direct Effect	2,705	\$140,399,000	\$178,713,000	\$387,450,000	1.61	1.91
Indirect Effect	764	\$47,967,000	\$74,222,000	\$114,983,000		
Induced Effect	894	\$50,052,000	\$88,564,000	\$134,645,000		
Total Effect	4,363	\$238,419,000	\$341,499,000	\$637,077,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: *IMPLAN results.*



## Appendix D: Detailed Output Tables

**Table 16. New Job Impacts: 2013**

Impact Type	Employment	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	596	\$30,974,000	\$37,551,000	\$82,310,000	1.61	1.97
Indirect Effect	169	\$10,980,000	\$16,829,000	\$25,473,000		
Induced Effect	197	\$11,003,000	\$19,470,000	\$29,601,000		
Total Effect	962	\$52,957,000	\$73,851,000	\$137,383,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: IMPLAN results.

**Table 17. Retained Job Impacts: 2013**

Impact Type	Employment	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	373	\$23,130,000	\$25,829,000	\$47,985,000	1.64	1.93
Indirect Effect	99	\$6,649,000	\$10,206,000	\$15,117,000		
Induced Effect	139	\$7,805,000	\$13,811,000	\$20,996,000		
Total Effect	611	\$37,583,000	\$49,846,000	\$84,098,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: IMPLAN results.

**Table 18. Up-skilled and Up-waged Job Impacts: 2013**

Impact Type	Employment	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	0	\$0	\$0	\$0	N/A	N/A
Indirect Effect	0	\$0	\$0	\$0		
Induced Effect	12	\$656,000	\$1,161,000	\$1,764,000		
Total Effect	12	\$656,000	\$1,161,000	\$1,764,000		

Notes:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

The 12 induced jobs are estimated to be generated as a result of incremental up-waged income associated with the existing 282 jobs that received up-skilling through the GJGNY program.

Multipliers are not provided for up-skilled and up-waged workers because no direct jobs are associated with this job type.

Source: *IMPLAN results.*

**Table 19. New Job Impacts: 2015**

Impact Type	Jobs	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	2,332	\$117,269,000	\$152,884,000	\$339,465,000	1.60	1.90
Indirect Effect	665	\$41,319,000	\$64,016,000	\$99,866,000		
Induced Effect	743	\$41,591,000	\$73,592,000	\$111,884,000		
Total Effect	3,740	\$200,180,000	\$290,492,000	\$551,214,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: *IMPLAN results.*

**Table 20. Retained Job Impacts: 2015**

Impact Type	Employment	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	373	\$23,130,000	\$25,829,000	\$47,985,000	1.64	1.93
Indirect Effect	99	\$6,649,000	\$10,206,000	\$15,117,000		
Induced Effect	139	\$7,805,000	\$13,811,000	\$20,996,000		
Total Effect	611	\$37,583,000	\$49,846,000	\$84,098,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Source: IMPLAN results.

**Table 21. Up-skilled and Up-waged Job Impacts: 2015**

Impact Type	Employment	Labor Income	GSP	Output	Jobs Multiplier	GSP Multiplier
Direct Effect	0	\$0	\$0	\$0	N/A	N/A
Indirect Effect	0	\$0	\$0	\$0		
Induced Effect	12	\$656,000	\$1,161,000	\$1,764,000		
Total Effect	12	\$656,000	\$1,161,000	\$1,764,000		

Note:

Dollar figures rounded to the nearest thousands; jobs rounded to the nearest whole job. Totals may not sum due to independent rounding.

Multipliers are not provided for up-skilled and up-waged workers because no direct jobs are associated with this job type.

The 12 induced jobs are estimated to be generated as a result of incremental up-waged income associated with the existing 282 jobs that received up-skilling through the GJGNY program.

Source: IMPLAN results.