



CONSTRUCTING A GREENER NEW YORK, BUILDING BY BUILDING

**Mandating Energy Efficiency
in Large Buildings will create
over 23,627 jobs per year**

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Summary: Constructing a Greener New York, Building by Building: Intro 1253 will create or sustain more than 23,627 jobs per year as NYC's large buildings reduce their emissions.

The New York City Council is considering vital legislation, Introduction 1253, to transform the built environment and grow the energy efficiency industry in New York City by requiring existing large buildings to dramatically reduce their pollution, specifically greenhouse gases, over the next decades leading to 2050. Intro 1253's mandate will provide a guaranteed 30 years' worth of work in energy efficiency, creating thousands of new jobs for workers and opportunities for emerging businesses in New York's green economy.

How Many Jobs?

Every year between now and 2030 Intro 1253 will create or sustain:

23,627 construction jobs

These are direct construction jobs created or supported per year to implement the retrofits.

16,995 indirect jobs

These are jobs created or supported by retrofit investments, including building operation and maintenance jobs, those along the supply chain, manufacturing and professional services.

This is the first job creation estimate based on the requirements of Intro 1253. This jobs boom will reduce energy use, including significant waste, that not only means good construction and operations jobs, but also reduced energy bills for occupants and owners, making space more affordable and allowing property owners and residents to invest in other areas. Additionally, improved efficiency means reduced local pollution and extreme heat which helps reduce illness, hospitalization, and missed work and school days.

Introduction

The New York City Council is considering vital legislation to transform the built environment and grow the energy efficiency industry in New York City by requiring existing large buildings to dramatically reduce their pollution, specifically greenhouse gases, over the next decades leading to 2050.

Roughly 70% percent of New York City emissions come from buildings; no other policy the city can enact will, on its own, drive emission reductions as much and as fast as **Introduction 1253C of 2019: [A Local Law to amend the New York city charter and the administrative code of the city of New York, in relation to the commitment to achieve certain reductions in greenhouse gas emissions by 2050](#)** (hereafter “Intro 1253”). In addition to cutting pollution, a strong energy efficiency and emissions reductions mandate on large buildings will create thousands of jobs, both gross and net.

Saving Energy Creates Jobs

Energy Efficiency (EE) is a particularly good driver of local job creation, and a significant potential job creation engine for New York City. Energy efficiency doesn’t just require spending money to repair, upgrade, or implement new building systems, but redirects funds from less labor intensive industries and keeps it in our community.¹ This means that money that was previously leaving New York City to pay for fossil fuels and energy delivery is kept locally and reinvested to improve buildings. NYC can turn wasted energy into good jobs.

Intro 1253 would ramp up the scale of energy efficiency investments creating thousands of jobs. The broader legislative package offers additional tools, including PACE financing, a simple proven financing tool, to significantly expand the existing industry by limiting the burden of up front capital costs while still capturing the benefit of lower energy bills.



Reducing energy use, including significant waste, not only means good construction and operations jobs, but also results in utility savings that allow property owners and residents to invest in other areas. Additionally, reducing local pollution and extreme heat helps reduce illness, hospitalization, and missed work and school days.

¹ <https://aceee.org/files/pdf/fact-sheet/ee-job-creation.pdf>

Energy efficiency is already the leading source of clean energy jobs in New York State. In 2016, according to the latest data available, 110,582 New Yorkers worked in the energy efficiency industry, performing research, manufacturing, installation, and other tasks.²

How Many Jobs?

Estimates show that retrofitting all of the City's buildings would create thousands of jobs per year. The proposed bill to mandate efficiency for buildings 25,000 square feet is a key to reducing New York City's massive climate footprint and jump-starting the market by creating roughly 23,627 jobs per year in the construction sector, with additional jobs in building maintenance, operations, and professional services.

Our estimate, based on national experts' models (see technical appendix) of job creation, found that retrofitting all private sector buildings over 25,000 square feet would create an increase in employment across sectors:

23,627 direct construction jobs created or supported per year implementing the retrofits, and

16,995 indirect jobs created or supported per year including building operation and maintenance jobs, those along the supply chain such as supplies manufacturing and professional services

There would also be an additional 22,632 induced in the broader New York City Economy as a result of expanded economic activity as workers pay their rent and spend their salary on goods and services.

These evaluations are higher than prior estimates prepared before the details of Intro 1253 were known. As the effects of climate change worsen and pressure grew on City Council to enact bolder legislation. Intro 1253 has broader coverage, regulating buildings 25,000 square feet and above, and requires deeper cuts in climate pollution before 2030. The revised job creation numbers represent this scaled up scope and ambition of the legislation.

² [New York Clean Energy Industry Report - NYSERDA 2017](#)

Estimated job creation from Intro 1253

There are roughly 1 million buildings in New York City, most of which must be upgraded to improve energy efficiency, public health, and meet the city's stated climate goals outlined in OneNYC of an 80% reduction in emissions by 2050. This offers an unprecedented opportunity to introduce a comprehensive economic and jobs package for the city of New York. Reducing energy use would generate billions of dollars in utility bill savings - keeping that money in our communities and paying for the upgrade work in just a few years. **Intro 1253's mandate through 2050 will:**



- Send a strong market signal to building owners, energy auditors and contractors that New York will have a robust and growing market for energy efficiency retrofits.
- Provide a long-term timeline for owners to incorporate deep, energy efficiency upgrades into their capitalization cycles, ensuring that work is done more frequently and requires a larger, and more highly-skilled construction workforce.
- Provide a guaranteed 30 years' worth of work in energy efficiency, creating jobs for workers and opportunities for emerging businesses.

Our estimate, based on national experts' models of job creation, found that retrofitting all private sector buildings over 25,000 square feet covered by Intro 1253 would create a net increase in employment across sectors:³

23,627 direct construction jobs created or supported per year implementing the retrofits.

16,995 indirect jobs created or supported per year including building operation and maintenance jobs, those along the supply chain such as supplies manufacturing and professional services.

There would also be an additional 16,166 induced jobs in the broader New York City economy as a result of expanded economic activity: e.g., workers buying lunch and paying their rent.

³ More about the technique used for developing these numbers is available in the Appendix on page 12.

For further discussion of direct, indirect, and induced employment impacts see the attached technical appendix or [Understanding the True Benefits of Both Energy Efficiency and Job Creation* Casey J. Bell \(ACEEE\)](#).⁴

These estimates are in line with other prior studies that show that retrofitting all of New York City's privately-owned buildings could create thousands of jobs per year. Money that is currently leaving New York City to pay for fossil fuels and energy delivery will be kept locally and reinvested to improve buildings. Two studies that use input-output models to estimate job creation reached similar conclusions:

Achieving 80x50: Reducing Energy Use, Creating Jobs, and Phasing Out Carbon Emissions in New York City's Buildings by Edward Mazria has a specific assessment of the job creation from large commercial sector that is based on both an input-output economic model and the technicians own estimation of the cost of retrofitting NYC's large commercial buildings - they estimated 32,855 direct jobs in construction, and an additional 49,925 induced and indirect jobs created by the investment level needed to implement the mandate on all large commercial buildings per year.

Climate Works for All: A Platform for Reducing Emissions, Protecting Our Communities, and Creating Good Jobs for New Yorkers estimates that investing sufficiently to retrofit New York City's largest buildings for energy efficiency to meet the retrofit mandate with adequate City and State Support would create 16,700 jobs each year.⁵ This study calculated the cost of upgrading every building over 50,000 square feet in New York City and training one maintenance worker per building. Intro 1253 covers buildings over 25,000 square feet and includes targets for city-owned and New York City Housing Authority (NYCHA) properties as well, so the per annum job creation is likely to exceed the reports estimates. For example, that same report showed that just replacing NYCHA's 509 existing boilers would create 1,900 jobs in manufacture and installation.⁶



⁴ [Understanding the True Benefits of Both Energy Efficiency and Job Creation* Casey J. Bell \(ACEEE\)](#)

⁵ [Climate Works for All: A Platform for Reducing Emissions, Protecting Our Communities, and Creating Good Jobs for New Yorkers.](#)

⁶ *ibid*

These evaluations are estimates prepared before the details of Intro 1253 were known. As a result of growing pressure on the City to enact stronger requirements, Intro 1253 has broader coverage, regulating buildings 25,000 square feet and above, and requires deeper cuts in climate pollution before 2030. The revised job creation numbers represent this scaled up scope and ambition of the legislation.

Transforming the Market for Energy Efficiency

If New York had the same number of efficiency jobs per capita as Massachusetts, it would have roughly 130,000 additional clean energy jobs, nearly double what it actually has. Adopting strong energy efficiency targets is one key reason Massachusetts outperforms New York on energy efficiency, and can provide the impetus needed to create more clean energy employment.⁷ While New York can and should continue to set ambitious targets for emission reduction and invest state and utility monies in energy efficiency, the most promising path to catch New York up to national market leaders will be a mandate (Intro 1253) to require all large, privately-owned buildings in the state's largest City to upgrade for efficiency. This will ensure that the market for retrofits is not left to the vagaries of incentive programs and voluntary participation, but instead driven by an enforceable signal to owners to upgrade and retrofit buildings on a rolling compliance schedule. The employment effect of this approach is a signal to contractors and firms to adequately hire and train a robust workforce to meet the needs of Intro 1253's requirements for building owners. Ancillary to this construction workforce is a host of vendors, manufacturers, salesforce, auditors, designers and project managers that will benefit from a steady stream of retrofit projects on existing buildings between now and 2050.

New York City's Energy Efficiency Industry and Its Workforce

Energy Efficiency as an industry includes a large cross-section of the construction trades which will benefit from the mandate in Intro 1253. It is helpful in evaluating the potential impact to look at the baseline of this often-ignored industrial sector. Energy efficiency is already the leading source of clean energy jobs in New York State. An estimated 82,221 employees currently work in skilled trades retrofitting buildings and homes in the New York Metro area⁸.

Retrofit Work

In a NYC Labor Market Information Service study of "green jobs," significant clusters with a green energy efficiency component were found in the Construction Trades, Building Services,

⁷ <https://www.nrdc.org/sites/default/files/more-energy-efficiency-new-york-fs.pdf>

⁸ [NYC LMIS Study on Green Jobs](#)

Component Manufacturing, and Professional Services.⁹ There are more than 40 green firms in Component Manufacturing in New York City already involved in energy efficiency.¹⁰ Key construction trades that are involved in energy efficiency retrofits include:¹¹

<p>Construction:</p> <ul style="list-style-type: none"> ● Heating and Air Conditioning Mechanics and Installers ● Carpenters ● Plumbers, Pipefitters & Steamfitters ● Electricians ● Insulation workers 	<p>Professional services:</p> <ul style="list-style-type: none"> ● Architects ● Mechanical Engineers ● Drafters ● Civil Engineers 	<p>Building Services:</p> <ul style="list-style-type: none"> ● Stationary Engineers & Boiler Operators ● General & Operations Managers ● General Maintenance & Repair Workers ● Janitors, Cleaners & Porters
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Operations and Maintenance Work

Building Service Workers across the city are already “greening,” and leaders like 32BJ’s training fund are helping translate that increased workload and special training into improved standards.

Job categories involved in “green” building services will increase as a result of the passage of Intro 1253. Energy efficiency as an industry encompasses an array of trades and professional categories. Workers focused primarily on energy efficiency include those who:¹²

- Manufacture and install high efficiency systems, windows, and insulation in existing & new homes, commercial & industrial buildings
- Upgrade and repair heating, air conditioning and ventilation (HVAC) and water heating equipment
- Install energy-saving LED lighting



⁹ <https://www.labor.ny.gov/stats/green/newyorkcity.pdf>

¹⁰

https://www.gc.cuny.edu/CUNY_GC/media/365-Images/Uploads%20for%20LMIS/Reports%20and%20Briefs/Green%20Jobs/ENAL-CHAPTER-3-Employer-Demand-in-Green-Construction.pdf

¹¹ [NYC Labor Market Information Service study of “green jobs”](#)

¹² <https://e4thefuture.org/wp-content/uploads/2018/09/EE-Jobs-in-America-2018.pdf>

- Manufacture and install ENERGY STAR-certified appliances, lighting, ceiling fans, commercial cooking equipment, refrigerators, boilers

These are just a sample of the kinds of work in energy efficiency that will be stimulated by Intro 1253.¹³

Hypothetical Case Study

A hypothetical average 160,000 SF 18 story post-war commercial building has a variety of paths to meet the mandate’s goal over the next 30 years.¹⁴

However a building chooses to comply with the mandate’s requirement, achieving deep emission reductions and energy efficiency improvements requires improving building systems, reducing energy waste and gradually replacing mechanical systems with more efficient alternatives as existing equipment depreciates. In combination with a greening energy grid, retrofits allow buildings to meet the mandate while reducing operating costs and improving tenant comfort.



In the first decades, upgrades to the existing steam heat system mean jobs for boilermakers, heat and frost insulators, plumbers, HVAC workers and electricians.

In addition to these larger capital upgrades and replacements of building systems tied to domestic heating, cooling and water, building owners can also hit energy efficiency targets by making interior and exterior alterations to reduce energy waste and improve the livability for tenants. Insulation and air-sealing, triple-glazed windows, sunshades on south-facing windows, and the installation of green roofs are a variety of energy efficiency upgrades that will employ carpenters, painters, glaziers, laborers, insulators and roofers.

As time passes the building will need to do deeper work involving re-cladding and electrification of building systems that would create work for bricklayers or masons, iron workers, glaziers, carpenters, laborers, electricians, plumbers, and others.

Job Quality

A core goal of the Climate Works For All coalition is that the jobs created should be high-road, family-sustaining, union jobs accessible to those who need meaningful employment the most. Intro 1253 does not require particular labor standards because it is a mandate on the private sector. However, there is a strong opportunity to induce a positive externality in New York City’s construction industry--particularly the unionized construction sector.

¹³ [Learn more about energy efficiency work](#)

¹⁴ http://www.nyc.gov/html/gbee/downloads/pdf/TWGREport_2ndEdition_sm.pdf, page 96

Currently, employment in the construction sector is largely sustained by new construction. Retrofits and upgrades to existing buildings, already a significant employment sector if it is counted as one, is shaped by state, federal and utility incentive programs as well as the price of energy and tenant comfort demands. Intro 1253 would dramatically grow that market, just as New York City is experiencing early signs of a downturn in the construction market.



The mandate offers an opportunity to counter a downturn in new large-scale commercial and residential construction with a robust market for retrofits, upgrades and repairs on the existing building stock. Different reports and methodologies offer varying projections on the exact number of construction jobs, but one fact is certain: many buildings will require numerous capital improvements to meet the outlined mandates on the policy's timetable; many of the implicated buildings fall within a range of square footage where agreements are reached with organized labor, allowing building trade unions to expand their apprenticeship ranks and increase the size of the skilled workforce.

Other Employment Benefits of Energy Efficiency Policy

Energy efficiency is a particularly good driver of local job creation, and a significant potential job creation engine for New York City. Energy efficiency doesn't just require spending money to repair, upgrade, or implement new building systems, but redirects funds from less labor intensive industries and keeps them in our community.¹⁵ This means that money that was previously leaving New York City to pay for fossil fuels and energy delivery is kept locally and reinvested to improve buildings. NYC can turn wasted energy into good jobs.

¹⁵ <https://aceee.org/files/pdf/fact-sheet/ee-job-creation.pdf>

Both the initial investment to retrofit a building and the “re-spending” of energy savings produce jobs in our community.¹⁶ Energy efficiency benefits communities even before measures have paid for themselves by shifting spending from energy bills to spending in the local economy.¹⁷ Indirect jobs are generated in the supply chain and supporting industries, including the sale and manufacturing of equipment and materials as well as public sector jobs in compliance and enforcement.¹⁸

New York City and State are ramping up their efforts to address polluting emissions, with the State focused on greening the electric grid and, increasingly, on energy efficiency in commercial, residential and industrial sectors. The number of jobs in the “green” sector is growing rapidly. New York’s Clean Energy Standard requires the state to meet 70 percent of demand with electricity generated from renewable energy and to reduce greenhouse gas (GHG) emissions from the energy sector. The greening of the grid, as well as State and Utility investments, open new opportunities for cost-effective energy use and deep emissions reductions in New York City.

¹⁶ [Understanding the True Benefits of Both Energy Efficiency and Job Creation* Casey J. Bell \(ACEEE\)](#)

¹⁷ https://www.frbsf.org/community-development/files/cdir_vol10issue1-Understanding-the-True-Benefits-of-Energy-Efficiency-and-Job-Creation.pdf

¹⁸ https://www.frbsf.org/community-development/files/cdir_vol10issue1-Understanding-the-True-Benefits-of-Energy-Efficiency-and-Job-Creation.pdf

Technical Appendix:

This estimate was arrived at by using established models for employment creation and existing research on the construction and energy efficiency industry in New York. We determined the square footage of regulated real estate under Intro 1253 and average investment and employment generation based on published data and modelling.

Jobs created or sustained each year through 2030	Construction Jobs	Indirect employment, including operations and maintenance	Total annual employment increase
	23,627	16,995	40,622

	Square Footage of Buildings under Regulation	Average Cost/Sq Ft	Investment level	Multiplier per Million Dollars Spent	Total Jobs over Ten Years	Jobs Created or Sustained Annually
Direct	1,658,022,222	\$25	\$41,450,555,550	5.7	236,268	23,627
Indirect	1,658,022,222	\$25	\$41,450,555,550	4.1	169,947	16,995
Induced	1,658,022,222	\$25	\$41,450,555,550	3.9	161,657	16,166
					Total	56,787
<i>Note:</i>	<i>1</i>	<i>2 and 3</i>		<i>4</i>		

1) Square Footage

The number of buildings and square footage was estimated using data from the Mayor's Office of Sustainability's analysis of Introduction 1253 using NYC Local Law 84 benchmarking data, which estimated that in 2030:

- **1,658,022,222 square feet of space would need to be retrofitted to meet the emissions limit.**

This data counted reported and estimated square footage in private buildings over 25,000 with emissions greater than the 2030 limit by sector. In assessing the data provided, we looked at published sources on commercial and residential sectors, specifically the Urban Green Council's '90 x 50'¹⁹ and 'Blueprint for Energy Efficiency.'²⁰

2) Costs per square foot

While construction costs vary significantly, we used a credible reported average from The Rocky Mountain Institute case study²¹, which used a \$25 per square foot figure to assess the required investment.

- **Total Investment: 1,658,022,222 sq. ft. x \$25 = \$41,450,555,550**

3) Investment levels

These levels are comparable to the Architecture 2030 estimates and the New York City Mayor's Office of Sustainability's projections. Implementing these measures in all relevant buildings would result in a 29 percent reduction in current building-based GHG emissions in New York City, and a 19 percent reduction in citywide emissions from 2005 levels. This would lead to an estimated \$2.4 billion in energy cost-savings for New Yorkers and create 7,600 direct construction-related jobs."²²

4) Job creation multipliers

After reviewing published jobs estimates and comparable analysis we used the estimated job multipliers from the University of Massachusetts Political Economy Research Institute. Further discussion and the source of these multipliers can be found in: [Robert Polin and Jeannette Wicks-Lim, Job Opportunities for the Green Economy: A Stateby-State Picture of Occupations that Gain from Green Investments \(Amherst: Political Economy Research Institute, 2008\)](#)

¹⁹ <https://www.urbangreencouncil.org/content/projects/90-50>

²⁰ <https://www.urbangreencouncil.org/content/projects/blueprint-efficiency-80x50-buildings-partnership-report>

²¹ https://rmi.org/wp-content/uploads/2017/04/Pathways-to-Zero_Bldg-Case-for-Deep-Retrofits_Report_2012.pdf

²² http://www.nyc.gov/html/gbee/downloads/pdf/TWGREport_2ndEdition_sm.pdf, page 6

Additional analysis of published retrofit multiplier models is available here: [Energy Efficiency Program Job Creation Metric Review](#).

We used the weighted average across energy efficiency related trades:

- 5.7 direct employment per \$1million (construction)
- 4.1 indirect employment per million
- 3.9 induced employment per million

Spending \$1 million on the manufacture and installation of each of these technologies results in the following employment impacts:

Table 1

<i>EE technology group</i>	<i>Direct employment per \$1 million</i>	<i>Indirect employment per \$1 million</i>	<i>Induced employment per \$1 million</i>	<i>Total employment per \$1 million</i>
Lighting	5.1	4.2	3.7	12.9
HVAC	5.3	4.2	3.8	13.3
Motors and drives	4.5	3.9	3.4	11.9
Water heating	5.0	4.1	3.6	12.6
Office equipment	3.8	3.7	3.0	10.5
Environmental controls	5.0	4.3	3.7	13.0
Envelope improvements	7.7	3.9	4.7	16.3
<i>Straight average</i>	5.1	4.0	3.7	12.8
<i>Weighted average</i>	5.7	4.1	3.9	13.6

5) Defining a job

A job as we are using it is sometimes called a full-time equivalency or job years. A job is “a metric that is equivalent to the resources required to employ 1 person for 12 months (or 2 people for 6 months each, or 3 people for 4 months each.) Can be full- or part-time.”²³ These may be truly new full-time jobs, they may be supporting existing workers in their existing position, or they may be part time allotments to workers to do the retrofit.

Direct construction jobs are an estimation of the work that is actually done to implement retrofit construction projects in buildings to meet the required emissions cap. This includes HVAC technicians, insulators, carpenters, laborers, electricians, auditors, plumbers, painters, glaziers, and a host of other construction and building trades.

Indirect jobs are those jobs created or sustained related to but not directly from spending on the retrofit construction. For example, as systems are improved, additional building operation and

²³ [Understanding the True Benefits of Both Energy Efficiency and Job Creation](#) by Casey J. Bell of The American Council for an Energy-Efficient Economy (ACEE)

maintenance staff, including engineers, will be needed; architecture and design services, manufacturing and sales of materials and energy efficiency products will also be areas of job growth that will benefit from added spending on energy efficiency.

Induced jobs are those one step further removed as the retrofit costs are re-spent across a wide variety of services and retail industries throughout the economy. For example workers buy lunch, pay their rent with gained wages, and materials suppliers restock their stores to meet demand.

Table 1. Common Terms Used in Jobs Analysis

Job	A metric that is equivalent to the resources required to employ 1 person for 12 months (or 2 people for 6 months each, or 3 people for 4 months each. Can be full- or part-time.
Gross Jobs	The total number of jobs supported by an industry and its supply chain.
Net Jobs	The number of jobs supported by an industry and its supply chain beyond a "business as usual" reference case.
Direct Jobs	Jobs generated directly from a change in spending patterns resulting from an expenditure or effort.
Indirect Jobs	Jobs generated in the supply chain and supporting industries of an industry that is directly impacted by an expenditure or effort.
Induced Jobs	Jobs generated by the re-spending of received income resulting from direct and indirect job creation.
Labor Intensity	The proportion of labor capital required to produce goods and services.

(Source: [Understanding the True Benefits of Both Energy Efficiency and Job Creation](#))

Photos throughout are used with appreciation [from the Energy Efficiency Image Database](#)