

GROWING GREEN COLLAR JOBS



A report by
Urban Agenda
for
The NYC
Apollo Alliance



Energy Efficiency

This report was prepared by Jack Dafoe, Urban Agenda.

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Executive Summary

An environmentally sustainable New York City brings with it the prospect of economic benefits and good jobs: green collar jobs. For sustainability to generate widespread prosperity, a green collar job must be more than simply a job in an environmental field. Green collar jobs must provide family sustaining wages, safe working conditions, and chances for advancement.

Green collar jobs present a new paradigm for equitable economic development. They allow workers to contribute to the health of their communities. And because the bulk of green collar jobs in New York City would involve transitioning existing infrastructure to greater sustainability, they cannot easily be outsourced.

Growing Green Collar Jobs is a series of reports that builds on recent environmental initiatives, such as PlaNYC 2030, New York City's bold long-term plan for a greener city. With adequate job training, these initiatives can produce thousands of green collar jobs for the existing workforce and offer jobless New Yorkers pathways out of poverty. Each report in the series will provide a ground's eye view of the jobs that already exist, opportunities for job growth, and factors limiting development in green sectors.

These reports are prepared by Urban Agenda for the New York City Apollo Alliance. NYC Apollo is part of a national network of business, labor, environmental justice, and community leaders working together to link job creation and environmental sustainability. Urban Agenda, which convenes the NYC Apollo Alliance, is an action-oriented research and policy organization.

This first report, ***Growing Green Collar Jobs: Energy Efficiency***, focuses on green collar opportunities in one of the largest, fastest growing, and most promising green sectors for New York City: improving energy efficiency in existing buildings.

Over two-thirds of the city's energy is used in buildings. Buildings are also responsible for 79 percent of the City's greenhouse gas emissions. With the addition of a projected one million new residents over the next 20 years,

New York City's demand for energy will rise. Increasing the energy efficiency of the city's buildings is therefore critical to mitigating future energy demand and reducing greenhouse gas emissions — key contributors to climate change.

Currently, New York City's substantial energy efficiency potential is limited by significant underinvestment and is largely untapped. Policies that will jumpstart investment, like PlaNYC 2030, could produce an estimated \$10 billion in economic activity and thousands of new jobs for New York City.

This report examines three strategies for increasing energy efficiency in existing buildings:

- Energy Efficiency Upgrades,
- Efficient Building Operations, and
- Energy Management.

Many energy efficiency jobs require similar skills to those in construction or building maintenance, with some additional training. A number offer new or enhanced career opportunities, one example being energy auditors who evaluate a building's energy use and assess the potential of an efficiency upgrade.

The report discusses the energy efficiency marketplace and the types of new companies, such as energy service companies (ESCOs), that develop, install, and finance projects to increase efficiency and lower maintenance costs. It also explores the considerations that may influence a building owner or tenant's decision to invest in energy efficiency.

If New York City goes green without expanding opportunities for all New Yorkers, the greatest potential of PlaNYC 2030, and initiatives like it, will not be realized. The report recommends the creation of a ***Green Collar Jobs Taskforce***. It also outlines additional steps the City Council, Mayor, and city agencies can take to foster the green economy, develop a skilled green-collar workforce, and create and retain green collar jobs. These steps will help ensure a truly sustainable future — thriving, green, and just — for New York City.

Introduction



Over the next two decades, New York City will become home to an anticipated one million new residents. But New York City's stretched and aging infrastructure, overburdened electrical grid, and limited open space are not even meeting current needs. The likely effects of global warming could put further

strain on these resources, seriously affecting how New Yorkers live and work, and how the City operates. At the same time, long-standing problems — income inequality, lack of affordable housing, poor air quality, the growth of low-wage jobs, and joblessness — are intensifying.¹

These challenges do not exist in isolation. Economic inequality and environmental degradation are interconnected and require a coordinated response. In fact, as we address environmental problems, there exists a tremendous opportunity to create good jobs and shared prosperity across all five boroughs.

The City is already considering a number of farsighted legislative and policy initiatives that could help make this potential a reality. On Earth Day, Mayor Bloomberg announced PlaNYC 2030, a set of 127 separate initiatives designed to meet ten major goals, from ensuring that every New Yorker lives within a ten-minute walk of a park to reducing greenhouse gas emissions 30 percent by 2030.² Created with input from a diverse group of civic leaders, PlaNYC builds upon prior initiatives like Local Law 86, the recently revised building code, and decades of community-based advocacy.

To fully realize PlaNYC 2030's motto of a "greener, greater New York" and truly capitalize on going green, New York City must make certain that the jobs created by PlaNYC 2030 are "green collar jobs."

A green collar job is more than simply a job in an environmental field. It also provides a family sustaining wage, safe working conditions, and chances for career advancement. Only by creating green

PlaNYC 2030

Released in April 2007, PlaNYC 2030 is Mayor Bloomberg's blueprint for ensuring the sustainability of New York City's environment and infrastructure as the City welcomes one million new residents over the next two decades.³ The initiatives outlined in the Plan were crafted by the Mayor's . . .

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Local Law 86

Local Law 86, passed in 2005, mandates that all new construction and significant renovations receiving \$2 million or more in City capital funds be built to meet environmental standards.⁹ The measure used is the nationally recognized U.S. Green Building Council (USGBC) Leadership in . . .

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collar jobs can the City truly confront both its environmental and economic challenges.

Whether as retooled existing jobs or new professional categories, green collar jobs present a new paradigm for equitable economic development. Green collar jobs are accessible both to current workers and to those New Yorkers often shut out of the job market — youth, people of color, and the court-involved. With adequate training and strong job standards, green collar jobs can offer pathways out of poverty for New York City’s growing number of jobless and underemployed, as well as opportunities for existing workers to advance in their professions.¹³

Green collar jobs allow workers to contribute to the health of their communities. And because the

bulk of green collar jobs in New York City would involve transitioning existing infrastructure to greater sustainability, they are not outsourceable. Improving the energy efficiency of an existing building in New York City, replanting an

urban park, or cleaning up a contaminated piece of land simply cannot be done elsewhere.

Many green collar jobs build on the skill base of the existing workforce. For example, improving a building’s energy efficiency may require new techniques and new technology, but the jobs involved are rooted in existing engineering and construction skills.

Without a trained green collar workforce, greening New York City’s infrastructure and building local, green industries will be difficult. In addition, with many skilled workers nearing retirement, a new generation of skilled workers needs to be trained. It is imperative that these workers have the cutting-edge, sustainable job skills of the future.¹⁷

The vision of prosperity through sustainability motivates the New York City Apollo Alliance, a coalition of labor, business, environmental protection, environmental justice, and civic leaders convened by Urban Agenda. NYC Apollo has developed *Growing Green Collar Jobs*, a series of reports that will provide a ground’s eye view of the jobs that already

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Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people, regardless of background or status, in the development, implementation, and enforcement of environmental laws, regulations, and policies. The environmental justice movement responds to the reality that power plants, landfills and other environmental hazards are often sited in low-income communities and communities of color without their participation in the decision-making process.¹⁴

Environmental justice has also come to mean the equitable distribution of the benefits of the green economy: green collar jobs, community reinvestment, and clean technology.¹⁵ Organizations like the Ella Baker Center in Oakland, Strategic Concepts in Organizing and Policy Education (SCOPE) in LA, Sustainable South Bronx, the United Puerto Rican Organization of Sunset Park (UPROSE), and Urban Agenda recognize that green collar jobs can help redress past injustice while creating economic opportunity.¹⁶

exist, the opportunities for job growth, and factors currently limiting green collar development in

- Energy efficiency and energy management for existing buildings;
- Automotive retrofits;
- Landscaping, urban forestry, waterfront restoration, and green roofs;
- Clean energy: renewable energy systems (solar photovoltaic, solar thermal, geothermal, small wind, landfill gas, anaerobic digesters, and tidal power), biofuel production, and cogeneration;
- Recycling;
- Deconstruction, recycling of building construction waste, and reuse of building materials; and
- Brownfield remediation.¹⁸

This report, ***Growing Green Collar Jobs: Energy Efficiency***, is the first in this series. It focuses specifically on green collar opportunities in one of the largest, fastest growing, and most promising green industries for New York City: improving the energy efficiency of existing buildings.

Ultimately, the key to growing green collar jobs will be leadership from all sectors — government, business, labor, and civil society — in supporting green industry development and ensuring that green jobs are good jobs. *Growing Green Collar Jobs* calls on the City Council and the Administration to embrace this opportunity and make the creation of green collar jobs a cornerstone of New York City's sustainable future.



Miroslav Salon is the maintenance supervisor of The Solaire, the first green apartment building in New York City. He began work as a porter, advanced to handyman, and then to his present position. His goal is to become a building manager.

Miroslav has licenses or certificates for basic electrical work, plumbing, computers, boiler maintenance, air conditioning, refrigeration, and air pollution prevention — and he is continuing his education through classes at 32BJ's Thomas Shortman Program.

Now, Miroslav is educating others by passing on his knowledge to The Solaire's tenants. He explains the ventilation system which recycles air; the solar panels that generate five percent of the building's electricity; and the green roof that insulates, keeping the building cool in the summer and warm in the winter, while conserving electricity.

Green Collar Jobs in Energy Efficiency

In New York City, energy efficiency is one of the largest and fastest growing areas for green collar jobs. Based on a national jobs study, the NYC Apollo Alliance estimates that increased energy efficiency could result in as much as \$9.82 billion in economic activity in New York City. PlaNYC 2030 predicts that its initiatives to improve the energy efficiency of municipal buildings could result in five thousand new jobs.²⁰ Since energy efficiency work generally focuses on existing buildings that otherwise would not have been improved, it creates new job opportunities, along with entirely new specializations. Jobs in energy efficiency are also, by necessity, local jobs, since they deal with “end-use solutions” — reducing energy use at the site of consumption.

Energy efficiency decreases the energy inputs — electricity, heat, or fuel — needed to produce lighting, heating, and cooling, or to run mechanical operations. Greater efficiency is achieved when, for example, changes to mechanical systems, materials, or practices reduce energy waste, or when existing energy-using systems operate at their maximum efficiency.²¹

Peak Demand

Peak demand is the period in time when demand for electric power is at its highest. At this point, the electricity distribution grid is most stressed and prone to technical failure. Peak demand usually occurs on hot summer days. The combination of excessive electricity demand, and an aging network of power lines and substations is one factor behind large-scale service disruptions, like the 2006 Queens blackout.²⁴



Far from stifling economic development, communities can drive job growth and reinvestment by taking measures to increase energy efficiency. The economic, social, and environmental benefits of efficiency include:

Cost Savings. Efficiency saves money for businesses and individuals by reducing energy bills. Lowered demand for energy also lessens the need for new, expensive energy production, generation, and distribution systems. Energy efficiency investments currently save U.S. consumers and businesses \$650 billion per year in avoided energy costs — savings that can be “recycled” and used to fund future efficiency projects.²² Cost savings for energy-intensive businesses, especially manufacturers and heavy industry, often allow them to expand and create new jobs.²³

Environmental Benefits. Increasing efficiency reduces greenhouse gas emissions and other pollutants by decreasing reliance on fossil fuels. Reducing energy use also diminishes the need for new, fossil fuel-based power plants designed to meet periods of peak energy demand.

Affordability. Low-income people spend a disproportionate percentage of their earnings on energy.²⁵ Reducing these costs helps to keep housing affordable.

Reinvestment. National studies have connected energy efficiency cost savings to business reinvestment, economic growth, and community-wide impacts, a phenomenon known as the multiplier effect. An American Council for an Energy-Efficient Economy (ACEEE) study found, for example, that reducing natural gas demand by four percent through efficiency would reduce gas prices, putting over \$100 billion back into the U.S. economy, and helping to recover some manufacturing jobs lost to overseas factories.²⁶

Industry Development. Efficiency relies on a broad array of evolving industries — from the manufacturing of efficient appliances and controls to the research and development of efficient building materials. These industries will be examined in subsequent installments of *Growing Green Collar Jobs*.

Above all, energy efficiency can be a powerful engine for job creation. This report explores how energy efficiency jobs can be created in New York City.



Energy Efficiency in New York City

Energy efficiency is an especially important tool for New York City. The City is a “load pocket,” which means that during times of peak usage, it needs more electricity than it can import through transmission lines. In fact, by regulation, 80 percent of New York City’s peak load must come from in-city sources.²⁷ New York City’s demand for electricity will rise as its population increases. Yet, the City cannot rely on building new power plants in-city because of high costs, land constraints, and community opposition.

New York City’s energy efficiency potential, on the other hand, is substantial and, to this point, largely untapped. Over two-thirds of the City’s energy — electricity and fuel — is used in existing buildings. Even by 2030, the bulk of energy usage and carbon emissions will come from buildings that exist today.²⁸ Reducing the energy use of these buildings now — in other words, increasing efficiency — presents an opportunity to manage future energy demand without building new power generation systems.

Recent Energy Initiatives

In April 2007, New York State Governor Eliot Spitzer launched a comprehensive State energy plan, **15 x 15**, focusing on energy efficiency, conservation, and renewable energy. Its goal is to reduce projected statewide electricity consumption by 15 percent, by the year 2015. The plan proposes standards for energy-intensive appliances like boilers, fast-tracks next generation power plant construction and . . .

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In 2004, the New York City Economic Development Corporation's Energy Policy Taskforce (NYCEPT) announced that the City was in danger of not meeting its future energy needs, and that New York City's economic vitality would be threatened if electricity was not "reliable, affordable, and clean." The NYCEPT's report, *New York City Energy Policy: An Electricity Resource Roadmap*, estimated that energy efficiency alone could cover over half of New York City's projected new energy needs. Three years later, energy efficiency remains a key strategy for the City.²⁹

PlaNYC 2030 emphasizes increasing the efficiency of existing buildings by establishing a funding source for upgrading City buildings and for incentivizing building renovations in the private sector. Since Mayor Bloomberg announced the Plan this past spring, a number of ambitious initiatives have been proposed that will promote energy efficiency in New York City. At the same time, a host of other City-based initiatives, and State-based incentives and loan programs are fueling demand for energy efficiency products and services.

Jobs in Energy Efficiency

Energy efficiency is already having an impact on New York State's workforce. The New York State Energy Research and Development Authority (NYSERDA) projects that its statewide energy efficiency and alternative energy programs will create and sustain, on average, more than 8,600 jobs over a 19-year period.³⁴ Governor Eliot Spitzer, in his April 2007 address launching the **15 x 15** energy efficiency initiative, predicted that this initiative will create 41,000 jobs statewide.³⁵

Energy efficiency projects and jobs are diverse, but in general, increasing efficiency in existing buildings involves some or all of the following types of workers:

- Engineers,
- Designers,
- Buildings trades and construction professionals,
- Building maintenance and operations staff, and
- IT (information technology) specialists.

The following sections describe the types of green collar jobs, the skills required, and the opportunities and barriers to growing jobs in three major areas: **energy efficiency upgrades**, **efficient building operations**, and **energy management**.

Jobs in Energy Upgrades

Many techniques and technologies help improve an existing building's energy efficiency. Building owners often implement multiple upgrade measures following an analysis, or "audit," of the building's energy use.³⁶ Measures implemented in these comprehensive building upgrades — known as retrofits — vary from project to project. Many projects, especially in larger buildings, involve replacing, rebuilding, or installing new energy-using systems. Other projects, particularly in smaller buildings and homes, may focus on repairs and improvements to the building's shell — sometimes referred to as its envelope — and other basic measures. In general, upgrades can include:

- replacing boilers,
- installing air-conditioning chillers,
- improving indoor air circulation systems (including duct work, blowers, and fans),
- improving electrical systems (including installing light sensors and thermostat controls),
- installing renewable energy systems (including solar photovoltaic power, solar heating, and geothermal systems),
- installing new roofs (including green roofs or cool roofs),
- replacing lighting fixtures,
- adding or replacing insulation (including insulating pipes),
- replacing windows with insulated glass,
- replacing appliances with Energy Star energy-efficient appliances,
- caulking around windows,
- replacing light bulbs (replacing incandescents with compact fluorescents), and
- replacing doors and adding sweeps under doors to minimize heating and cooling loss.

Energy Star®

Energy Star is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). It certifies appliances as energy-efficient (the Energy Star label), provides energy-efficiency planning tools to businesses, and assists local companies and organizations in improving the energy efficiency of the building stock.³⁷

In New York State, for example, the New York State Energy Research and Development Authority (NYSERDA) Energy Smart Homes Program supports the construction of Energy Star labeled houses that are 30 percent more efficient than conventional structures.³⁸ Energy Star estimates that its activities — primarily the appliance certifications — have helped people save \$14 billion on their utility bills.³⁹

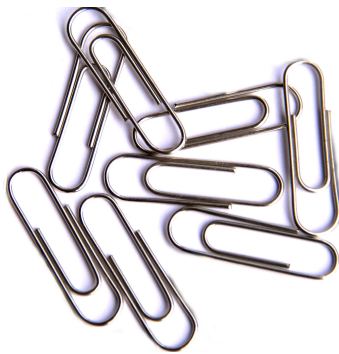


Stages

Regardless of project size or scope, a building energy upgrade is usually a three-stage process:

- Stage 1: Auditing/Assessment
- Stage 2: Pre-Construction
- Stage 3: Construction

Efficiency upgrades involve a number of skilled professionals and construction trade workers. The majority of new jobs created are similar to existing jobs. They require general construction or engineering knowledge, plus some additional skills. In contrast, building auditing is a relatively new field with emerging titles, qualifications, and career pathways.



Stage 1: Auditing/Assessment

Auditors inspect a property prior to an efficiency upgrade. They collect data on building energy use and system performance, carry out testing, and feed the gathered information into computer modeling software. Based on the results of this assessment, either the auditor or a project engineer then recommends the most cost-effective improvements to the building owner.

The experience level and skill set required of the auditor depends on the size and complexity of the building. Providing an energy-use assessment for larger buildings is generally more complex than auditing smaller buildings and homes. However, a multifamily building auditor cannot necessarily audit a small home, and the converse is true for small building auditors and larger buildings. Each

“Efficiency upgrades involve a number of skilled professionals and construction trade workers.”

segment of the building stock requires familiarity with specific methods.

For example, auditing smaller buildings and 1–4 family homes requires knowledge of applicable auditing tools — blower doors to test air and heat flow, manometers to measure fluid pressure, and infrared photography to examine insulation — as well as familiarity with energy modeling software like the industry standard Targeted Residential Energy Analysis Tools (TREAT).⁴⁰

NYSERDA

The New York State Energy Research and Development Authority was established by the State legislature as a public benefits corporation in 1975. Public benefits corporations are chartered to perform a specific public service, often with regulatory power. NYSERDA’s mission is to support “research into energy supply and efficiency, as well as energy-related environmental issues.”⁴² It administers the Energy \$mart program, which provides loans to businesses and consumers to . . .

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At 32, Ancil “Buddy” Goorahoo has been an electrician for 14 years. For the past four years, he has worked at Genergy, an energy management service company. Buddy installs meters and wiring, and provides communications and troubleshooting services. “I love my job, especially installations, because each installation is a challenge. My job varies every day,” he says.

Both Buddy and his wife are members of the International Brotherhood of Electrical Workers (IBEW) Local 3. His union job is considerably better than his previous job. Between a pay increase of three percent and improved benefits, he effectively added 30 percent to his salary.

Buddy notes, “Metering saves money and electricity. I’m part of a revolution

Auditing a larger building requires an analytical understanding of, and familiarity with, the controls for complex systems, such as large heating plants. In particular, auditors assessing New York City’s tall, boiler-heated buildings must have an understanding of boiler combustion efficiencies, heat and steam distribution systems, and large building airflow — also known as the stack effect. For projects of any size, an understanding of basic building science — how air and heat flows — is essential.

In addition to the technical prerequisites, auditors must also prepare reports and make presentations of their findings and recommendations to building owners, management companies, and maintenance staff. Dean Zias is the Associate Project Manager of the New York State Energy Research and Development Authority (NYSERDA) Small Homes Program. He explains that without an informed assessment of a building’s health, most building owners “will take the knee jerk reaction,” embracing familiar measures which may be more costly or less effective. For example, installing insulated windows is not the most strategic investment if an inefficient heating system overheats the building, forcing people to constantly open them.

The creation of standardized job titles and skill requirements is in progress as the auditing field develops. At the moment, NYSERDA is leading the process. NYSERDA has developed a suite of energy efficiency incentive programs for existing buildings, and requires building owners to hire NYSERDA-approved auditors in order to receive incentives under the Multifamily Building Performance Program. (See page 32.)⁴¹

NYSERDA Senior Project Manager Michael Colgrove explains, “The trick has been...getting a defined, qualified professional that a building owner can have the confidence of contracting.” To this end, NYSERDA has actively developed or partnered with training and certification programs for auditors. To audit 1–4 family or multifamily building projects receiving NYSERDA funds, auditors need to be certified as a Building Analyst or Multifamily Building Analyst, respectively, by the Building Performance Institute (BPI).⁴⁹ Having at least one certified staff member makes a firm eligible for partnering with NYSERDA. The majority of certified auditors are on the staff of engineering firms.



BPI

The Building Performance Institute (BPI) was founded in 1993 to create “a resource for independent, third-party verification of worker skills in the weatherization industry and building trades.” (See “Weatherization” on page 37.) Their original mission has expanded, and today BPI certifies individuals and accredits organizations in auditing, efficient building operation, efficient heating system design, and related areas.⁵¹ Working closely with the New York State Energy Research and Development Authority (NYSERDA), the Association for Energy Affordability (AEA), and community colleges across the state, BPI approves curricula for training programs, writes the certification tests, and provides quality assurance and technical standards assistance to high performance building programs.⁵²

NYSERDA currently finances between 75 and 100 percent of the cost of participating in training programs that prepare for BPI Building Analyst certification, including the Association for Energy Affordability’s (AEA) five-day courses for 1–4 family and multifamily auditors. Reducing the cost of Building Analyst training — from \$1,175 to zero in many cases — has helped broaden access to this emerging field.⁵⁰

AEA

The Association for Energy Affordability (AEA), a nonprofit training and technical services organization, is a leader in preparing workers for careers in energy efficiency. At its facilities in Manhattan and the Bronx, AEA provides hands-on training in building auditing, existing building energy upgrade work, and the maintenance and operation of energy-efficient building systems. Among its other roles, AEA is a local service provider for the State Weatherization . . .

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Asit Patel, Chief of Training and Engineering Services at AEA, notes that its Building Analyst training programs have prepared a wide spectrum of workers, including “experienced engineers, interested construction workers with no building science background, contractors looking for new business opportunities, and people entering the field out of college.” Currently, most workers entering the auditing field have some background in construction or engineering. Greater market expansion and the further development of training programs may reveal the extent to which new workers can enter the auditing field through existing pathways.

Stage 2: Pre-Construction

Once the audit is complete, and the building owner or manager decides to proceed, the retrofit process is similar to any construction project. *Engineers* determine the scope of work for the retrofit based on the auditor’s analysis, *estimators* determine project costs, and the *project manager* puts it out for contractor bids.⁵⁶

Stage 3: Construction

The construction phase of a retrofit produces numerous opportunities for green collar jobs requiring building trades or general construction skills. Based on the targeted improvements, building owners or project managers contract out the work to either a general construction firm with retrofit experience, or to specialists. In most retrofits, energy efficiency improvements include work that draws on a broad swath of the construction trades.

An extensive study of municipal building retrofits in Canada, conducted by the Federation of Canadian Municipalities, estimated that every \$1 million invested in building retrofits creates 20 person-years of employment, mainly in the construction phase.⁵⁷ The duration, specific job types, and job numbers in the construction phase vary widely from project to project. Depending on the project, the specific areas of work and job types in this stage could include:

- **Heating, ventilation, and air-conditioning (HVAC).** HVAC work engages *pipe fitters, sheet metal workers, HVAC technicians, engineers, and electricians* (for powering units).



Since graduating from high school, Meghan Whalen has served in the U.S. Army, worked as a cashier at Home Depot, and assisted an engineer at Random House. After completing the three-year apprenticeship training program with Local 94 of the International Union of Operating Engineers (IUOE), she became one of six licensed female operating engineers in New York City.

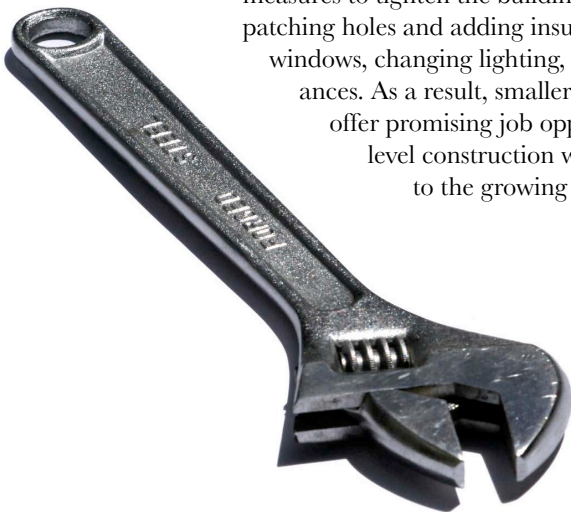
Meghan has worked at the MetroTech Center in Brooklyn for seven years. Getting into the union, earning her license, and getting her job “felt good.” And, she says, “My bank account liked it, too.”

She loves her job: “I have a family here. The guys who work here are like my brothers. There’s a different job to do every day, so it never becomes mundane. We just finished an electrical upgrade, and I was constantly learning new things.”

Reducing energy use is a big part of Meghan’s job. In the MetroTech complex, lights are on timers or automatic sensors. Temperatures are set at comfortable levels. While Meghan is new to environmental issues, she knows that conservation of resources is important to the present and future. “We have to keep the world big, blue, and green.”

- **Lighting.** Lighting projects range from bulb replacement to major rewiring, fixture replacement, and the installation of control systems. Many, like bulb replacement, require little formal training and may be performed by existing *buildings operations staff*. More complex tasks require licensed *electricians*.
- **Motors.** Motors are used in a variety of applications, ranging from conveyor belts to driving industrial heating and cooling systems. Over- and under-sized motors are a key source of wasted energy and capital across the country. Motor replacement is done by licensed *electricians*.
- **Efficient windows.** Window installation is performed by glaziers or general construction workers.
- **Efficient showerheads.** Water-conserving showerheads are installed by *custodial* or *general construction workers*.
- **Efficient insulation.** In general, installation of efficient insulation does not require specialized skill and can be performed by *general construction workers*. For higher-level projects, such as installing top-of-the-line cellulose insulation, installers might need new equipment (for blowing insulation into the wall space), and additional training in new techniques.⁵⁸

Despite the diversity of efficiency upgrades, all share some common traits. Upgrades of smaller buildings, like 1–4 family homes, use basic techniques closely related to the skill sets many construction workers possess. These techniques include measures to tighten the building envelope, such as patching holes and adding insulation, putting in new windows, changing lighting, and replacing appliances. As a result, smaller building retrofits offer promising job opportunities for entry-level construction workers, and on-ramps to the growing efficiency industry.



The Energy Efficiency Upgrade Market

The major determinant for the scope of an energy upgrade is the **Savings to Investment Ratio (SIR)**. The SIR calculates which measures will produce the greatest reduction in energy use and result in the shortest return on investment, or payback, for the building owner. The financial advantage of energy efficiency can be sizable. Comprehensive energy upgrades can reduce a building’s energy costs by 20 percent or more.⁵⁹ Energy efficiency measures have a wide range of Savings to Investment Ratios, making some measures less palatable to many building owners.

“Nobody asks what the payback period is for a marble lobby.”

Paybacks on individual measures can vary “from one to three years for some lighting replacements, to over 20 years for some envelope improvements,” says Laurie Kerr, Senior Policy Advisor at the Office of Long Term Planning and Sustainability. She characterizes the retrofit payback as “a financial decision on the part of the building owner or lender...not a technical given,” adding that payback horizons on projects usually range from two to ten years.

Entities with large capital plans are often more willing to pay for expensive improvements that may take longer to provide a return on investment, but that support substantial long-term energy use reductions. For example, Kerr points out that the City “is intending to use a long horizon of ten years [for municipal retrofits] in order to achieve deep reductions in energy consumption.”

Despite its great potential, there is significant underinvestment in energy efficiency. This underinvestment spurs a negative feedback loop that has curbed the growth of green collar jobs. A lack of projects has slowed the adoption of energy efficiency

skills by workforce development programs. The slow development of the energy efficiency workforce, especially in more specialized areas like auditing and energy engineering, has in turn reinforced the slow growth of energy efficiency projects. New York City's diverse network of existing training providers could ramp up efforts to prepare the workforce; but first, they need to see the promise of efficiency translated into job opportunities. Barriers to efficiency investments, however, are complex and cut across the building stock.

Upfront Costs

Many building owners remain leery of energy efficiency investments due to cost. NYSERDA's Michael Colgrove believes that, "The biggest barrier to efficiency is the initial cost...whether or not a building has the cash to lay out for a boiler replacement [or other improvement]." Despite short payback periods for many energy efficiency improvements, the upfront costs can seem daunting if owners do not weigh long-term savings against routine replacement costs, or don't incorporate the costs into existing renovation plans. Colgrove sees a systemic problem, where the large building owners or management companies that could easily benefit from efficiency simply do not integrate it into their capital plans.

A recent *New York Times* article highlighted the problem. Despite demonstrated energy savings, many large building owners view efficiency upgrades differently than other building improvements. As Natural Resources Defense Council (NRDC) Air and Energy Program Director, Ashok Gupta, notes in the article, "Nobody asks what the payback period is for a marble lobby."⁶⁰

Split Incentives

Another roadblock is the problem of split incentives. Split incentives arise when the person who has to pay for an efficiency measure is not the same person who will benefit from the reduced energy costs or recoup the long-term savings. This is a very common problem due to the nature of tenancy in New York City.

Almost seventy percent of New Yorkers are renters.⁶¹ Many renters, both commercial and residential, do not pay directly for their energy use. Instead, their electric bill is folded into the monthly

rent as a flat rate; and the landlord pays one utility bill on behalf of all tenants in the building. Under this system, there is little incentive for individual tenants to invest in energy efficiency improvements like efficient lighting or appliances, as they are charged the same amount regardless of consumption.

Conversely, when renters do pay directly for energy and would benefit from larger efficiency improvements like window or boiler replacement, building owners have little incentive to invest in these measures. The owner would not capture the savings, but would have to incur the costs.

Commercial tenants, who pay for their own energy use and may have large energy-using systems on-site, have little incentive to invest in improvements with paybacks that may be longer than the term of their lease. Finally, in the municipal sector, many issues have discouraged efficiency. To give one example, City agencies historically have had little incentive to increase energy efficiency, because there was no guarantee that money saved would go to the agency rather than into the general fund.⁶²

Investment in energy efficiency is increasing, however. The following sections briefly survey the levels of investment in different sectors and their implications for the growth of green collar jobs.

Public Sector Investment

The public sector has developed several energy efficiency programs for existing buildings. The New York Power Authority's (NYPA) Energy Cost Reduction (ENCORE) program performs retrofits for City agencies, working with the Office of Energy Conservation (OEC) in the Department of Citywide Administrative Services (DCAS). As of 2003, ENCORE had completed energy improvements at 164 City buildings resulting in energy savings of 55,000 megawatts and savings of \$14 million per year.

ENCORE's effectiveness has been questioned, but it continues to finance and perform energy upgrades for city agencies.⁶³ Additionally, the Department of Design and Construction (DDC) energy

efficiency training programs have exposed City employees to energy-efficient techniques.⁶⁴

Local Law 86, the green building law, will require increasing knowledge of high performance building practices, including efficiency, in the public workforce. And, PlaNYC's commitment of 10 percent of the annual City energy budget to fund municipal building upgrades (\$81.2 million for 2007) will keep City government in the vanguard of efforts to increase energy efficiency and support green collar job opportunities.⁶⁵

Commercial, Industrial, and Institutional Investment

In the private sector, large management companies, building owners, and developers who contract with larger firms are leading the industry and workforce towards energy efficiency. These entities are more likely to undertake comprehensive efficiency improvements, because they stand to see the greatest savings from replacing energy-intensive equipment such as heating, ventilation, and air-conditioning (HVAC) systems, or industrial machinery. The median *Standard Payback Time (SPT)* for the average retrofit is now seven years for institutional facilities, four years for hospitals, and just three years for commercial, industrial, and office buildings.⁶⁶

In the experience of Louisa Plotnick, NYSERDA Associate Project Manager in charge of the commercial and industrial programs, the “trend towards maximizing energy efficiency and reducing [your] carbon footprint” is being embraced not only by the largest end users, such as the Durst Organization and Bank of America, but also by smaller customers. For some industrial consumers, reducing energy expenditure is a strategy for survival, as land prices and zoning changes put pressure on New York City manufacturers. For other companies, increasing energy efficiency is a way to burnish their image as a good corporate citizen.

There are other incentives for large users to pursue energy efficiency. Large corporations and institutions have entered utility and government-sponsored peak demand reduction and demand response programs. For example, NYSERDA, working with ConEdison, will pay \$600 per kilowatt of permanently reduced electricity demand (demand reduction). The New York Independent System Operator (NYISO), the nonprofit corporation that manages New York State's electric grid, pays large consumers to be on notice and, when called upon, to curtail their power use during times of peak demand

Industrial Retention

In New York City, manufacturers face enormous pressure to keep costs down to remain competitive. Reducing operating costs and energy use through energy upgrades, retro-commissioning, or improved fuel efficiency is an environmentally sound strategy for maintaining a competitive edge without layoffs or reductions in worker benefits.

The New York Industrial Retention Network (NYIRN), with City funding, is assisting local businesses in embracing energy efficiency. Their North Brooklyn Energy Grant Program aims to “help manufacturing companies reduce and stabilize energy costs through the use of simple, inexpensive energy conservation measures.” To date, NYIRN has helped 21 companies . . .

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Residential Investment

On the residential side, large market-rate building owners and managers in Manhattan are most likely to pursue comprehensive efficiency upgrades. Outside Manhattan, where the bulk of development is in smaller buildings and homes, and construction and management is largely non-unionized, the growth of the energy efficiency market is hampered by a lack of contractor awareness, a highly competitive market, and the absence of union training and education programs that can identify emerging trends.

NYSERDA is playing a role in this market through its energy efficiency incentive programs for existing buildings, the Multifamily Building Performance Program for larger residential buildings, and the Home Performance with Energy Star program for 1–4 family homes.

Both programs provide incentives to building owners, connect them with low-interest loans, and offer additional financial assistance to owners making less than 80 percent of the state median income (\$67,857 for a four-person family).⁷⁰ The programs partner with construction and engineering firms to perform the subsidized work, support regional training programs, and help cover the cost of staff development for the program partners.

The Multifamily Building Performance Program offers participating buildings incentives and an official designation as an Energy Star Building. In addition to the cost savings, NYSERDA anticipates that many large market-rate building owners will pursue the Energy Star label to distinguish their buildings in a crowded real estate market.

To receive the Multifamily Building Performance Program incentives and Energy Star designation, owners must use NYSERDA-approved auditors who set the project's energy reduction goal. Participants can assign the construction phase of the retrofit to a contractor not directly affiliated with NYSERDA.

(demand response).⁶⁹ Taken together, the rapid payback for energy efficiency improvements and the demand-side management markets have made energy efficiency attractive to many of New York City's large facilities and corporations.

Large construction firms are also increasingly aware of the opportunities presented by the energy efficiency market. Hank Kita, Senior Vice President of the Building Trades Employers Association (BTEA), which includes New York City construction trade associations and their corporate members, has seen this growing awareness firsthand.

"The Contractors Association of Greater New York (CAGNY) recently held a seminar on green building and sustainability," he relates, "and they had about one hundred attendees." That number, and the involvement of industry leaders like Turner Construction, suggests to Kita that momentum is building. He says of Turner, "I think they have a corporate philosophy that results in an awareness of what is going on in green construction technologies, and they are consequently educating and training their employees in this area."

Michael Colgrove estimates that there could be demand for fifty to seventy-five firms to partner with NYSERDA's large residential building program. But he cautions that the market will flourish only if demand swells as fast as supply: "You never want to get into a situation where you have so many partners, and none of them are getting business."

In light of this concern, NYSERDA is trying to cultivate the market for efficiency upgrades in the residential sector.

Through outreach to building owners, assistance designing capital plans, and expansion of existing training programs, the goal is to strike the delicate balance between increasing supply and increasing demand.

"If everyone wanted to [retrofit] tomorrow," Colgrove admits, "there wouldn't be enough qualified people to do it." But as the market demand increases, so too will the movement of firms and workers into

this sector.

NYSERDA's Home Performance with Energy Star program for smaller residential buildings has an especially difficult task in New York City. Fifty-four percent of New York City's building stock is 1-4 family homes, particularly in the outer boroughs.⁷¹ But smaller residential building owners are generally more financially constrained and less aware of energy efficiency benefits than their large building counterparts.

Dean Zias of NYSERDA sees home owner awareness—a demand side issue—as the number one short-term challenge. "People aren't sensitized to the economics, the technological tools that are available, and the incentives." The average home owner simply isn't aware, for example, that the NYSERDA program can help pay for measures resulting in energy savings of over \$700.⁷² To address this barrier, NYSERDA is attempting to boost awareness through advertising and public outreach.

CEC

Community-based organizations can promote energy efficiency while creating green collar job opportunities that are accessible to all New Yorkers. For thirteen years, the Community Environmental Center (CEC), based in Queens, has done this. Under President and CEO Richard M. Cherry, CEC has become the largest . . .

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Bill

At 59, Bill Aristovulos has been a building superintendent for 28 years. He is a physical plant manager and an SEIU Local 32BJ member. In his position, he supervises nine workers, schedules repairs and preventive maintenance, and oversees private contractors working in the building. Born in Greece, and raised in New York, Bill is concerned about our dwindling energy resources. "We have lived on the dream of unlimited energy," he points out. "That's going to end." Bill believes that conserving energy is more important than finding ways to create new energy.

Bill's real passion is teaching what he knows to building workers at the 32BJ Thomas Shortman Training Program. "The guys I teach are the mechanics, the maintainers. They have to know how to do it right."

For Bill, "The gem of this union is having a school of this caliber. I wish more of our members would take advantage of it."

Unlike the Multifamily Building Performance program, the Home Performance program requires building owners to choose NYSERDA-approved contractors for the assessment *and* construction phases of the upgrade. Thus, the program depends on reaching out to a broad range of providers: from engineering firms to the small construction and home remodeling companies that have traditionally served 1–4 family home owners in the outer boroughs.

Zias characterizes the construction industry in New York City as “very fragmented,” and observes that convincing some of the stakeholders to enter the energy efficiency market is easier than convincing others. Without centralized associations for spreading information, or larger industry leaders to pave the way, NYSERDA’s outreach efforts to small contractors are difficult.

On one level, outreach simply involves informing New York City’s small contractors that NYSERDA will subsidize worker training, finance new equipment purchases, and connect them with clients. On another level, however, it involves, in the words of Zias, “changing the way work is done here.” He explains, “You’ve got these contractors that are doing [renovations]...they are putting in over-sized boilers because their fathers did it that way... [and] they say, ‘Don’t tell me, I’ve been doing

it for twenty years this way.’” As an accredited green building expert, Chris Garvin, American Institute of Architects LEED AP Associate at Cook + Fox Architects, is familiar with the friction between contractors and new practices. He worries that the concept of retraining is at odds with the culture of small construction firms. For smaller non-union contractors, the response to taking the day off to learn about green building would be “you’ve gotta be kidding.” Garvin explains, “It’s a tough market, and they have enough to be worried about.” As long as home owner demand for energy efficiency

services is low, and the construction market remains relatively strong, small firms will have little incentive to pursue new methods and retraining.

New York City lags behind the rest of the State in implementing residential efficiency projects. To date, for example, the NYSERDA small homes pro-

“They’re putting in over-sized boilers because their fathers did it that way.”

gram has completed over 14,000 projects statewide, as opposed to 267 completed projects in New York City.⁷³

The Buffalo region now has between 50 and 60 NYSERDA-approved contractors doing home energy efficiency work.⁷⁴ Robert Gardella of Conservation Services Group (CSG), the project implementer for the small homes program in New York City, explains that the mature market for efficiency projects in Buffalo and other upstate communities is compelling more contractors there to learn the needed skills. “If they don’t offer energy efficiency services, they won’t get the jobs,” he explains.

With time and effort, Gardella expects similar results in New York City. To increase the program’s reach, CSG is working to promote the NYSERDA program to potential participating contractors. The goal is to mature the market and attract more contractors who will in turn retrain their workers, enter the efficiency market, create new job opportunities, and spread energy efficiency awareness to New York City’s home and residential building owners. In this effort, key support will come from community-based energy service providers, such as the Community Environmental Center, who have already been doing some of this work in New York City.

Lack of Auditors

The greater number of construction jobs created by energy upgrades is dependent on a smaller number of technical, more specialized auditing and engineering positions. As interest in existing building efficiency increases, there is a growing concern that the pool of qualified workers is not deep enough.

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Affordable Housing

Low-income housing might be the segment of the market where tenants could benefit the most from reduced energy expenditures. But, NYSERDA's Colgrove explains that the biggest bottleneck for these developments is project financing. "It takes just forever to get HUD [Housing & Urban Development] or whoever to release the reserves they need to get to the bank and apply for a loan." It makes sense that financing projects in affordable housing would be especially challenging. A building owner cannot simply pass the costs along by placing a premium on the tenants' rents. Yet, increasing energy efficiency in affordable housing has profound economic and social justice implications.

Affordable Housing

High energy costs have a disproportionate impact on low-income New Yorkers. New York's aging building stock, combined with a climate of temperature extremes, make heating and cooling inefficient and expensive. An analysis by the Oak Ridge National Laboratory found that the amount of fuel used to heat the . . .

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Weatherization

Weatherization reduces a building's heating and cooling needs by protecting it from the elements. The term is now commonly used as shorthand for the Department of Energy (DOE) National Weatherization Assistance Program (WAP). WAP reduces energy costs for low-income residents by improving the energy . . .

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Jobs in Efficient Building Operations

Ensuring that building maintenance and operations staff can operate and maintain a building at peak efficiency is a necessary corollary to the energy upgrade process. Reid Strieby, Ph.D., a CUNY professor and a leading expert on energy efficiency technology, organizes training for the operations staff of large, energy-intensive facilities that are trying to save money by using new technologies and expanding staff skill-sets. “There is a tremendous need for

“Energy-efficient building operation is grounded in the existing knowledge base of building maintenance and operations personnel.”

retraining [facilities managers] because the guys who have been around have a lot of knowledge in certain things, but they may not be familiar with new building systems or controls.” Asit Patel of AEA agrees that preparing building staff to operate energy-efficient equipment is critical. In his experience, lack of preparation often leads to “staff overriding the controls, manually operating systems, and canceling out energy savings.”

Efficient maintenance requires proper operation of new, energy-efficient equipment and systems. But it also involves applying basic techniques to operate existing equipment efficiently, as well as instituting low-cost upgrades. Replacing incandescent bulbs with compact fluorescents is a good example of energy-efficient maintenance that does not depend on an intensive retrofit process.

Energy-efficient building operation is grounded in the existing knowledge base of building maintenance and operations personnel, including:

- Building cleaners,
- Porters,
- Maintenance workers,
- Window cleaners,
- Superintendents, and
- Stationary engineers (building staff engineers who oversee the day-to-day operation and maintenance of building mechanical systems from HVAC to on-site power generation).

As owners and management companies have come to realize that properly trained operations staff can help buildings save money, they have shown greater interest in retooling building maintenance jobs.

Chris Garvin from Cook + Fox notes a “growing trend towards building maintenance engineers who have a greater depth of knowledge in sustainability.”

NYSERDA’s Multifamily Building Program now requires that all building maintenance and operations staff receive certification as Energy Efficient Building Operations Specialists, through the Building Performance Institute. AEA offers a five-day training for this certification as a central part of their mission.

According to Executive Director David Hepinstall, AEA was founded with the vision of helping “porters and handymen rise up the maintenance career ladder to better paying jobs.” His experience has shown that there are good careers in efficient maintenance. Eight years ago, for example, AEA developed a new position for New York City Housing Authority (NYCHA) maintenance personnel, the Advanced Heating Plant Technician. Incumbent workers were trained in the efficient operation of



heating systems and received pay raises of \$6,500 or more. In general, Hepinstall believes that there is a need among private sector building owners and managers for staff with efficient maintenance training—with the possibility of 60 to 100 new jobs in the short term.

AEA frequently trains building superintendents and facilities managers sent by their employers. At a recent Building Operators training, 20 out of 45 trainees were from one company, a senior housing corporation. Patel notes that the company, mindful of high fuel prices and water rates, “sent the build-

ing staff because they realized the importance of having them understand energy efficiency and water conservation.”

At Bronx Community College, Reid Strieby is working with Montefiore Medical Center, the largest single private employer in the Bronx, to train their facilities managers in the maintenance and operation of energy-efficient equipment, such as combined heat & power (CHP) systems.¹⁰³

What is good for building owners seeking to cut energy costs can be good for workers’ career development. Indeed, upgrading the skills of building operations and maintenance staff reaffirms the relevance of this workforce, increases job security, and

paves the way for expanded, quality green collar job opportunities.

Howard Styles, Director of Training, International Union of Operating Engineers (IUOE) Local 94, embraces the new focus on energy efficiency. For him, having his members, the City’s building operating engineers, trained in

high performance, energy-efficient building operation means “raising up our skills and raising up our value.” The result is more employable and better-compensated members. For example, Styles believes that better building maintenance will translate into more lease renewals in New York City’s large, commercial buildings, increasing job security and employment opportunities.¹⁰⁴ Local 94 is integrating energy efficiency into its in-house training, and has encouraged its members to participate in courses covering the fundamentals of efficient building operations through CUNY’s Building Performance Lab.¹⁰⁵

SEIU 32BJ, the building service workers union, is also actively embracing these opportunities, and transforming its workforce in the process. As part of its joint labor-management funded Thomas Shortman Training Program, 32BJ partnered with

NYSERDA to offer a suite of green maintenance courses from “Energy Efficiency Measures” to “Techniques for Water Use Reduction.” To date, these seminars have introduced two hundred 32BJ members to efficient maintenance techniques.¹⁰⁶

Retro-Commissioning

Commissioning involves the assessment, testing, and balancing of building systems and controls after installation in a new building. Systems are commissioned to maximize efficiency, to meet design parameters, and to ensure that controls are working optimally. Heating, ventilation, and air-conditioning (HVAC) systems are good candidates for commissioning because they are energy-intensive and operated by complex controls.¹⁰⁷

A recent study by Lawrence Berkeley Labs found that commissioning can pay for itself in one year largely by reducing equipment reorders and catching faulty equipment during the warranty period.¹⁰⁸ Laurie Kerr, Senior Policy Advisor for the Office of Long Term Planning and Sustainability, notes that commissioning “pays for itself every five years . . .

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Jobs in Energy Management

Energy Management includes the broad range of services that help a building reduce and strategically manage its energy use over time. Large energy users typically contract with energy service companies (ESCOs) to develop, install, and finance projects designed to improve the energy efficiency and lower maintenance costs for facilities over a seven to ten-year period — from basic audit/upgrades to retro-commissioning or the installation of on-site energy generation.¹¹⁶

Traditionally, ESCOs have been distinguished by their use of performance contracting that guarantees energy savings to a client before embarking on energy efficiency improvements. This assumption of risk by ESCOs was an initial spur to growth in this sector, negating some of the upfront cost issues. Over time, the industry has developed a proven track record.¹²⁰ A national analysis found that ESCO-designed building upgrades now routinely achieve substantial energy savings.¹²¹

NYSERDA “support[s] the development and expansion of the [ESCO] industry.”¹²² While NYSERDA does not directly partner with or accredit firms, its Enhanced Commercial/Industrial Performance Program (ECIPP) pays ESCOs for demonstrating long-term energy use reductions through their customer efficiency projects.

Beyond conventional ESCOs, energy management is a diverse sector with an array of entry-level, technical and professional green collar job opportunities. These include:

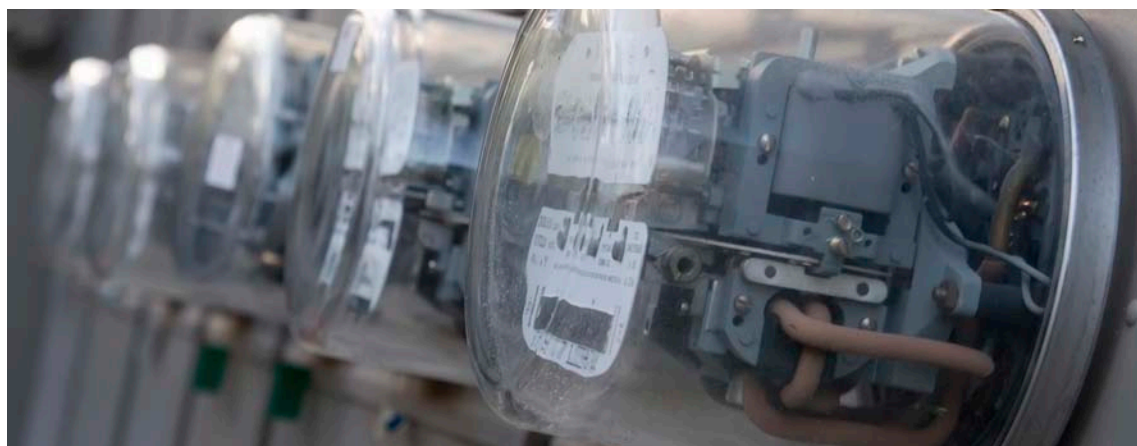
- Energy managers
- Energy analysts
- Client account managers
- Auditors
- Engineers
- Meter installers
- Construction professionals

Distributed Generation

The electricity distribution grid is one of the most critical pieces of New York City’s infrastructure. Despite its status as the most reliable in the country, the City’s grid is aging and increasingly strained. Its slow deterioration, along with increasing electricity demand, requires direct capital investment in its modernization.¹¹⁷ But, the modernization process will be lengthy and extremely costly.

A cost-effective way to reduce strain on the grid now is through deployment of distributed generation. Distributed generation (DG) refers to any system that generates electricity at, or close to, the place it will be used. These systems usually remain connected to the existing grid. This allows facilities using DG to access supplemental or backup . . .

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The following section provides some examples of jobs in this field by surveying two types of energy management companies operating in New York City, meter service providers and strategic energy asset managers.

Meter Service Providers

Meter Service Providers (MSPs) precisely map and monitor a building's energy use through advanced metering technology. These companies install, monitor, and service interval electricity meters that record

electricity use in small increments of time. With detailed knowledge of when a building uses the most electricity, the company can design a plan for strategically reducing energy use and avoiding utility overage fees.¹²³ Advanced interval meters, known as smart meters,

can display the price of electricity from minute to minute, allowing a building to reduce energy use when it is most expensive. Jobs in the metering service field include:

- *Meter installers.* Meter installation is performed by licensed electricians.
- *Meter readers.* Meter readers service client meters and record data.
- *Analysts, Billers, Accountants.* Analysts and billers interface with clients, provide the link between the metering service company's engineers and the client, and remotely track building energy use.
- *Metering technicians, IT professionals, Engineers, and Project managers.* These more technical positions involve analyzing client needs and developing the tools to track and reduce energy use.

“If they show promise, we would start having them become an analyst or specialist.”

The potential market for companies providing metering services is currently limited by a variety of statewide regulations. For example, most residential units are not allowed to own smart meters, and electricity distribution utilities, like ConEdison, have resisted offering real-time electricity pricing information, perhaps due to concerns about a resultant drop in power usage. Despite these barriers, some meter service providers in New York City, like Genergy, are actively preparing for an expanded market and additional workforce needs.

Genergy uses smart meters, real-time pricing, and sophisticated mapping tools to pinpoint when and how their clients use energy. They then combine the relevant data into a user-friendly interface, which can be accessed on-site by the clients' facilities managers, or remotely monitored by Genergy.

With a clear and constantly updated picture of the client's energy use, Genergy assists in creating energy management plans that help reduce energy consumption or shift the energy load away from peak pricing times, saving the client money while improving systemwide power reliability. Genergy's clients include some of the largest energy users, corporations, and building management companies in New York City, from the Port Authority of New York & New Jersey to Citicorp to Vornado Realty Trust.¹²⁴

Genergy's staff includes meter readers, analysts, billers, accountants, electricians, metering technicians, IT professionals, engineers, and project managers. The meter reader position is the first rung on a green collar career ladder. Genergy's Executive Vice-President, Mark Williams, says that for this position they are looking for people with good communication skills, but there are not any education

Demand Response

Demand Response means neutralizing spikes in demand by strategically reducing power consumption. Utilities and government agencies often run demand response programs that pay large power consumers for reducing their demand during peak demand periods. Demand response methods can be highly technical, or as simple as turning off lights and office machines. Whatever the method, these programs are an effective way of reducing stress on the electrical grid, encouraging businesses to save money, and obviating the need for additional power generation.

requirements. He explains, “We’re looking for someone who can eventually grow.... If they show promise, we would start having them become an analyst or specialist.”

Analysts and specialists are well-paying positions that involve interfacing with clients and managing their accounts. “The promotion is all in-house, the training is all in-house...a lot of it is just experience...and trying to solve problems.” Williams believes that these kinds of opportunities for workforce entry and advancement will only grow as the energy management market develops.

Genergy already works closely with licensed electricians, with whom they contract to perform the actual installation of client meters. Williams is encouraging the International Brotherhood of Electrical Workers (IBEW) Local 3 electricians to develop a metering division that could connect an existing skilled workforce to an emerging industry. Thus, an expanded metering service market may not only

create new green collar jobs, but also provide green collar opportunities for workers transitioning out of traditional occupations in decline—like conventional meter reading—as technology advances.

Strategic Energy Asset Management

Companies in the emerging field of strategic energy asset management can help large power consumers tap into government demand-response programs by reducing their reliance on power from the grid at times of peak system usage, and collecting the targeted government subsidies.

Strategic energy asset managers may approach large energy users and “buy” their ability to reduce or shift their energy use as a resource. The asset manager would then implement energy efficiency and conservation measures for the client in exchange for a cut of any incentives from government demand-response or demand-reduction programs.

While energy asset managers may help their clients install advanced meters or subcontract basic efficiency upgrades, these companies are primarily involved in pioneering a new field called optimization. *Optimization* uses advanced control technologies to effectively manage how and when a facility uses energy. For example, a control system could be designed that automatically cycles window air-conditioning units, cooling the entire building with less wasted electricity.¹²⁵ Jobs in strategic energy asset management include:

- *Account managers.* Account managers work with client facilities managers to design the energy management program.
- *Energy analysts.* Energy Analysts advise clients on how to tap into market-based opportunities, such as carbon trading or renewable energy credits.

ConsumerPowerline (CPLN) is one example of a company working in this emerging field. A regional leader and the nation’s third largest “demand-response provider,” CPLN manages over four percent of the entire electricity load for New York City through its work with clients like Morgan Stanley, Macy’s, and Forest City Ratner Corporation. CPLN helps its clients cut costs by optimizing energy use, creating energy efficiency plans based on state-of-the-art energy tracking systems, and “shedding loads” — reducing or shifting peak electricity consumption to save money and receive government incentives.

CPLN’s work is especially ripe for expansion. It offers a partial solution to the societal problems of grid instability and the pollution produced by inefficient power plants solely operated to create power at

times of peak consumption. For example, CPLN has advanced the concept of “virtual micro-power plants.”¹²⁶ An energy user becomes a “virtual micro-power plant” when CPLN can help it reduce energy at the times when the electricity grid is most over-taxed.

PlaNYC acknowledges the importance of demand response by setting a target to increase demand-response participation. As energy use grows, the importance of efficiency is recognized, and companies catch on to the opportunities for being paid to reduce energy use, the strategic energy asset market will undoubtedly expand.

The jobs created in an energy asset management company itself are just a part of the equation. Jobs are also being created in the managed facilities themselves. Through her work, Chelle Izzi, Director of Asset Services at ConsumerPowerline, has also witnessed a new job category emerge in New York City’s large facilities. Five percent of ConsumerPowerline’s clients now have *Energy Managers* who are responsible for overseeing their building’s energy use, and work directly with companies like ConsumerPowerline.¹²⁷ Energy managers are often people with backgrounds in facilities management, procurement, finance, or engineering.

At the moment, Izzi says, only “big management companies have this position, like a Fortune 500 company or a big facility.” But, since “people who are building managers are being increasingly asked to take on energy management responsibilities,” there is tremendous potential for growth in this green collar field. Supporting industries, from meter and building controls manufacturing to cogeneration installation, are also certain to benefit from an increasing focus on energy management, as will be discussed in subsequent installments of this series.

The energy management industry is restricted by regulatory barriers to new technologies, like advanced metering and distributed generation, and by enduring cost concerns. Izzi explains that even the largest energy consumers “need a three-year pay-back to get [them] excited.” Split incentives are also a persistent barrier. In 2006, for example, ConsumerPowerline launched an Energy Innovation Challenge that would pay \$5,000 to anyone “who presents viable energy-related lease language that resolves incentive misalignments between building owners, managers and tenants.”¹²⁸

Yet, the biggest hurdle to growing green collar jobs in this field may be the skill levels required for some positions. While ConsumerPowerline has been

able to recruit qualified meter installers from the telecommunications industry and utility companies, they have had more difficulty finding staff members who possess the requisite level of engineering, energy, or finance experience to be managers or analysts. Izzi explains, “A lot of these jobs aren’t established within a career services office....[Many people] might not have the track record for doing what we want to do.” Making these exciting green collar opportunities more accessible to New Yorkers with diverse skill backgrounds will be a necessity as energy management goes mainstream.



Recommendations

Green practices have been adopted in many traditional industries in New York City, while entire new green industries have begun to emerge. New York City's leaders must continue to play a major role in supporting and shaping this growth. Some green sectors are long on promise but short on the financial investment, policy support, or workforce preparation that will drive market expansion and thus create jobs. Above all, the city's leaders must ensure that the nascent green economy promotes high-road economic development and high-quality jobs.

Significant underinvestment in energy efficiency stifles the potential growth of green collar jobs and discourages green collar workforce development. It is therefore imperative that we simultaneously foster New York's green economy *and* train workers in green collar skills. While we cannot rely on training to grow the market, we cannot neglect the opportunity to prepare New Yorkers for emerging careers.

At this historic moment of long-term planning and bold ideas, the implementation of PlaNYC 2030 must be linked to a coordinated strategy for growing green collar jobs. Creating and retaining good jobs, advancing economic justice, and reducing joblessness will strengthen PlaNYC, enabling New York City to achieve the Plan's goals while also addressing long-standing economic challenges. Such an effort is not unprecedented. The Parks Opportunity Program (POP), although not perfect, has shown that the public sector can meet its goals while spurring new job creation.

In this spirit, the NYC Apollo Alliance calls on the City Council and the Administration to develop a Green Collar Jobs Taskforce that would explore strategies such as:

Working with the Workforce Investment Board (WIB) to collect workforce, employer, training, and education data in emerging green industries.

Creating a Green Workforce Career Center to:

- identify and address barriers to industry and workforce growth;
- develop green collar employment and training programs, including sector specific training and advanced training for technical and professional jobs;
- support green technology R&D and expose workers to new technology and skills;
- create referral, placement, and job retention services in partnership with labor and the public and private sectors; and
- support the creation of green collar career ladders in growth industries.¹²⁹

Developing a Green Collar Jobs Corps to help New Yorkers succeed in the City's expanding green economy. A Green Collar Jobs Corps would:

- identify and recruit New York City's structurally unemployed and underemployed;
- develop comprehensive training and education programs to prepare entry-level, incumbent, and transitional workers for permanent green collar employment;
- provide paid green collar work experience at prevailing wages;
- work with unions and the private sector to develop placement and referral services for Corps graduates;
- involve New York City's existing support services, training, and job placement programs; and
- ensure that Corps participants do not displace existing workers.

The NYC Apollo Alliance also proposes the following steps to grow green collar jobs beyond PlaNYC 2030.

Foster New York City's Green Economy

Codify the goals of reducing carbon emissions from City government 30% within 10 years, and reducing citywide emissions 30% by 2030.

Mandate energy efficiency measures in all market-rate residential buildings of 50+ units and commercial/industrial properties over 100,000 square feet.

Authorize the benchmarking of all residential buildings of 50+ units, and commercial and industrial properties over 100,000 square feet by 2015, and encourage making this information publicly available. (Benchmarking is a “tool that estimates energy use per square foot of building space... [It] allow[s] comparisons with other buildings of the same type and location and... building performance [tracking] over time.”)¹³⁰

Require cost-effective residential energy improvements at point of sale, or significant renovation. Require disclosure of energy costs at point of sale.

Direct Housing Preservation and Development (HPD) to **integrate energy efficiency** into all grants, Requests for Proposals (RFPs), and development programs.

Green the New York City housing maintenance code to encourage energy efficiency. Direct HPD to enforce energy efficiency as a landlord obligation.

Advocate for the **expansion of Weatherization Assistance Program** (WAP) funding, eligibility, and targeted outreach.

Amend the City Environmental Quality Review (CEQR) process to better **analyze the impact of development projects** on energy use and grid stability.

Support expanded submetering, smart metering, net metering and real-time pricing.¹³¹

Remove barriers to interconnection between on-site electricity generation (distributed generation) and the ConEdison grid:

- Advocate for a third-party analysis of the electric grid's ability to handle interconnected systems, and
- Strongly encourage the State Public Service Commission (PSC) to adopt standardized interconnection requirements and remove barriers to clean, distributed generation.

Commission a study to identify how the New York State Energy Research and Development Authority (NYSERDA) could better serve New York City businesses and residents. Encourage NYSERDA to **incorporate job standards** into its programs, where feasible.

Support New York City's green businesses and manufacturers, through:

- Expanded sales and marketing assistance,
- Green product and process development assistance,
- Connecting firms to existing incentives and creating a tax credit for purchasing new, green equipment,
- Facilitating green product research and development, and
- Reducing product certification fees to increase global competitiveness.

Establish pro-urban manufacturing policies by:

- Adding local manufacturing criteria to Local Law 86 regulations, and
- Strengthening zoning in designated industrial areas.¹³²

Create and Retain Green Collar Jobs for All New Yorkers and Develop a Skilled Workforce

In addition to the NYC Apollo Alliance’s call for a Green Collar Jobs Taskforce, the following recommendations are offered to help develop a skilled green workforce and create green collar opportunities for all New Yorkers:

Require that owners of large facilities **cover the cost of efficient building operations training** for their facilities managers.

Incorporate energy efficiency in the Housing Preservation and Development (HPD) job description of “**certified superintendent**,” and enforce this definition.

Support the Department of Youth and Community Development (DYCD), the Administration for Children’s Services (ACS), and Small Business Services (SBS) in **developing pathways to green collar jobs for at-risk youth**.

Increase City staff development by:

- Providing **skills training** in emerging fields such as sustainable construction, energy efficiency, and renewable energy and
- Setting targets for **increased staff certification or accreditation**.

If New York City goes green without expanding opportunities for all New Yorkers, the greatest potential of PlaNYC 2030 and initiatives like it will not be realized. *Growing Green Collar Jobs* challenges the City Council and the Administration to tackle quality job training and development as an integral part of any plan for economic growth or environmental sustainability.

If we can foster green collar industries and expand economic opportunity, a truly sustainable future — thriving, green, and just — is possible for New York City.

Sidebar Continuations

PlaNYC 2030

From page 3

Released in April 2007, PlaNYC 2030 is Mayor Bloomberg's blueprint for ensuring the sustainability of New York City's environment and infrastructure as the City welcomes one million new residents over the next two decades.³ The initiatives outlined in the Plan were crafted by the Mayor's Office of Long Term Planning and Sustainability and the Mayor's Sustainability Advisory Board, an advisory council that includes City Council representation, as well as labor, business, civic, and community leaders.⁴ Additional input came from thousands of New Yorkers through town hall meetings, online feedback, and community presentations.

An important subset of initiatives focuses on maximizing energy efficiency as a strategy for ensuring that the City's future energy needs are met in a clean, cost-effective, and reliable manner. PlaNYC outlines steps to:

- reduce energy consumption by City government;
- strengthen energy and building codes;
- create an energy efficiency authority for New York City;
- prioritize five key areas for targeted, private sector energy efficiency incentives;
- expand peak load management program participation (See "Peak Demand" on page 6.); and
- launch an energy awareness and training campaign.⁵

If all of the PlaNYC 2030 efficiency initiatives are implemented, the City projects a 14 to 15 percent reduction in energy consumption citywide by 2015.⁶

While many of these initiatives require the approval of outside entities, including the State legislature, the groundwork for a new commitment to efficiency has already been laid. Ten percent of the 2007 municipal energy budget—\$81.2 million—has been earmarked for municipal building energy-efficiency improvements, and the Plan proposes making this annual allotment permanent.⁷

Considering that City operations account for 6.5 percent of New York City's total energy consumption, a municipal energy-efficiency program is an important opportunity to capture energy savings and raise awareness within the public sector workforce.⁸

Local Law 86

From page 3

Local Law 86, passed in 2005, mandates that all new construction and significant renovations receiving \$2 million or more in City capital funds be built to meet environmental standards.⁹ The measure used is the nationally recognized U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) standards. LEED awards a building project points based on how many environmental considerations are incorporated in its design and construction. The number of points determines whether a building is designated LEED-Certified, Silver, Gold, or Platinum. Under Local Law 86, schools and hospitals must achieve the LEED Certified rating, while all other projects must meet LEED Silver requirements.¹⁰

Some of the largest City-funded projects must also meet additional energy and water use reduction targets. Local Law 86 covers approximately \$12 billion in new construction and renovation under the City's capital plan, making this one of the most encompassing green building laws in the nation.

In general, ensuring that green initiatives like Local Law 86 or PlaNYC 2030 have a lasting impact depends, in the words of Jon Forster, First Vice President Local 375, District Council 37, of the American Federation of State, County and Municipal Employees (AFSCME), on "maintaining a continuity and institutional knowledge of design initiatives...through the preservation of a skilled in-house workforce."¹¹ This will require training Local 375 members, the City's staff engineers, architects, scientists, and construction project managers, in new green building techniques, including LEED certification training. Successful implementation of Local Law 86 could well become a model for how to maintain a skilled and versatile workforce, well-versed in new, green techniques, in both the public and private sectors.¹²



Recent Efficiency Initiatives

From page 8

In April 2007, New York State Governor Eliot Spitzer launched a comprehensive State energy plan, *15 x 15*, focusing on energy efficiency, conservation, and renewable energy. Its goal is to reduce projected statewide electricity consumption by 15 percent, by the year 2015. The plan proposes standards for energy-intensive appliances like boilers, fast-tracks next generation power plant construction, and increases government investment in existing building efficiency.³⁰

The State Public Service Commission (PSC) is currently designing a plan for the electric and natural gas utilities to reach the 15 percent efficiency target, the Energy Efficiency Portfolio Standard (EPS).³¹ The seemingly modest efficiency goal will require a lot of work. New York City's official comment on the PSC proceedings notes that achieving the 15 percent reduction will require significantly ramping up the New York State Energy Research and Development Authority (NYSERDA) efficiency programs.³²

Announced in May 2007, the *Clinton Climate Initiative's Energy Efficiency Building Retrofit Program* is a public-private partnership supplying technical assistance and funding to 16 cities, including New York City, with the aim of reducing energy use in existing buildings. Through this program, the four largest energy service companies in the world will scale up their capacity to accommodate projects in these cities and provide performance guarantees on their work. Five major global financial institutions will provide \$1 billion *each* to a revolving loan fund that will help "cities and private building owners ... undertake these retrofits at no net cost."³³

NYSERDA

From page 10

The New York State Energy Research and Development Authority was established by the State legislature as a public benefits corporation in 1975. Public benefits corporations are chartered to perform a specific public service, often with regulatory power. NYSERDA's mission is to support "research into energy supply and efficiency, as well as energy-related environmental issues."⁴² It administers the Energy \$mart program, which provides loans to businesses and consumers to defray the costs of energy improvements and the development of new energy technologies. In addition to Energy \$mart, NYSERDA offers dozens of incentive programs to encourage residential, commercial, industrial, and transportation-related energy efficiency projects. NYSERDA also provides a slate of renewable energy programs and incentives under the Power Naturally banner.⁴³

Since 1998, NYSERDA has administered *System Benefits Charge (SBC)* funds. The New York Public Service Commission (PSC) created the SBC when the State electricity markets were deregulated in order to fund "public policy initiatives not expected to be adequately addressed by New York's competitive electricity markets."⁴⁴ The SBC is a small monthly surcharge on many New Yorkers' utility bills. In New York City, ConEdison includes the charge. Non-participating utilities, like the Long Island Power Authority (LIPA) and the New York Power Authority (NYPA), make voluntary contributions to the SBC fund. Only utility customers who pay into the SBC are eligible to receive funds from NYSERDA.

With \$175 million in annual funding from the SBC and other sources, NYSERDA has been a major player in supporting energy efficiency and renewable energy statewide. NYSERDA's programs have

- saved more than 2,360 GWh (gigawatt-hours) of electricity annually;
- reduced participant energy costs by more than \$340 million, annually;
- served over 60,000 low-income households, with average household energy bill reductions of \$220 per year;
- created and retained approximately 3,700 jobs.⁴⁵

In general, NYSERDA supports new markets rather than fully subsidizing efficiency improve-

ments. Its goal — market transformation — is to increase demand for efficiency services and products to the point where multiple providers enter the market, manufacturers dedicate production to efficiency products, costs fall, and government support is no longer necessary.

To this end, NYSERDA builds public-private partnerships by approving firms to perform subsidized work. It also supports business development, and product research and development (R&D), through its Commercial/Industrial incentive programs and the Program Opportunity Notice (PON) process. PONs alert businesses to funding opportunities for advanced equipment purchases, facility upgrades, or technology trials. Private or public organizations, individuals, or businesses are eligible to respond to the PONs. Recent PONs have ranged from a contract to manage clean-fuel bus purchases for New York City, to grants supporting the installation of distributed generation systems.⁴⁶ (See "Distributed Generation" on page 39.)

Despite these opportunities, however, there are persistent concerns in the business community that NYSERDA's programs, developed to serve all of New York State, do not address the unique challenges of New York City. In general, many small businesses find NYSERDA's grants and centralized support services difficult to access. Larger business groups, like the Partnership for New York City, have characterized NYSERDA's general approach to business development as flawed. For example, NYSERDA does not require that businesses receiving grants be headquartered in New York State, meaning that in-state projects by out-of-state companies may be funded at the expense of local businesses who pay the SBC.⁴⁷

NYSERDA works with training providers like the Association for Energy Affordability (AEA), and plays a central role in green workforce development. In September 2007, NYSERDA announced a partnership with Hudson Valley Community College (HVCC). The Training and Education Center for Semiconductor Manufacturing and Alternative and Renewable Technologies (TEC-SMART) at HVCC plans to train 500 to 600 technicians in the next five to ten years in new energy skills, including energy efficiency work.⁴⁸ This regional training center could provide a model for building on-ramps into the energy efficiency industry and pathways to auditing and engineering careers.

Association for Energy Affordability (AEA)

From page 12

The Association for Energy Affordability (AEA), a nonprofit training and technical services organization, is a leader in preparing workers for careers in energy efficiency. At its facilities in Manhattan and the Bronx, AEA provides hands-on training in building auditing, existing building energy upgrade work, and the maintenance and operation of energy-efficient building systems. Among its other roles, AEA is a local service provider for the State Weatherization Assistance Program (WAP) (See “Weatherization” on page 37.), holds annual trainings for WAP staff, conducts energy audits, develops building control systems, and offers energy engineering assistance.⁵³

One of AEA’s important regional roles is preparing workers to receive an array of Building Performance Institute (BPI) certifications. These certifications are standard entry-points into the energy efficiency field.⁵⁴ For example, the Energy Efficient Building Operations Specialist certification is increasingly in demand, and gives existing maintenance workers an opportunity to expand their skills and advance their careers.

AEA has not focused on job placement. In fact, many of its training programs are used by entities like Housing Preservation and Development (HPD) that want to give their existing workforce new skills. But, AEA’s depth of knowledge and connections with employers makes them a crucial partner for identifying industry needs and crafting green collar workforce development programs.

AEA is currently teaming with the Manhattan Comprehensive Night and Day High School to create a training and placement program for building auditors, as well as working with Bronx Community College/CUNY to form a local “learning center” for building performance skills. They have also begun to identify existing positions that are open to high schools graduates and can lead to careers in energy efficiency.⁵⁵



Industrial Retention

From page 16

In New York City, manufacturers face enormous pressure to keep costs down to remain competitive. Reducing operating costs and energy use through energy upgrades, retro-commissioning, or improved fuel efficiency is an environmentally sound strategy for maintaining a competitive edge without layoffs or reductions in worker benefits.

The *New York Industrial Retention Network (NYIRN)*, with City funding, is assisting local businesses in embracing energy efficiency. Their North Brooklyn Energy Grant Program aims to “help manufacturing companies reduce and stabilize energy costs through the use of simple, inexpensive energy conservation measures.” To date, NYIRN has helped 21 companies employing close to 1,400 people reduce their energy consumption and costs by 10 to 15 percent, while reducing demand on the electric grid by 2.1 megawatts.⁶⁷

In their broader efforts to reach out to the manufacturing community, NYIRN has successfully partnered with the *Industrial + Technology Assistance Corporation (ITAC)*, another leader in helping New York City’s businesses increase their sustainability. ITAC provides technical assistance to manufacturers seeking to green their products and operations through workshops and in-house training. The work of organizations like NYIRN and ITAC are models for growing the energy efficiency market while fostering a vibrant manufacturing base in New York City.⁶⁸

Community Environmental Center (CEC)

From page 18

Community-based organizations can promote energy efficiency while creating green collar job opportunities that are accessible to all New Yorkers. For thirteen years, the Community Environmental Center (CEC), based in Queens, has done this. Under President and CEO Richard M. Cherry, CEC has become the largest nonprofit home energy conservation contractor in New York State.⁷⁵

Its staff includes energy engineers, green building professionals, auditors, construction workers, and

administrators. CEC provides energy efficiency services to existing buildings, consults on new construction projects, and helps connect clients to funding, from NYSERDA incentives to Weatherization funds. It is an accredited Building Performance Institute (BPI) Home Energy Contractor, a NYSERDA program partner in the Multifamily and Homes programs, and a Weatherization provider under WAP. To date, CEC has served over 200,000 New Yorkers, displacing \$2.5 million in energy costs and over 100,000 tons of greenhouse gas emissions.⁷⁶

CEC also drives environmental education and new industry creation. Their efforts have included the creation of a seminal manual on green building for affordable housing, *Affordably Green in NYC*; the founding of the solar power education centers, Solar One and Two; and the creation of Build it Green!, New York City’s only building material reuse center.⁷⁷

Though not explicitly a workforce development organization, CEC has experience preparing workers with diverse skill backgrounds for energy efficiency jobs. CEC employs fifteen people on its retrofit crews, which can perform most aspects of a small building upgrade. According to Cherry, “We have hired directly from the ‘street’.... Most of [the workers] had some prior familiarity with plumbing, masonry or electrical work; but they have acquired some specialized skills, like blowing insulation, through working with us.”

In his experience, a small building upgrade can employ three or four people for one to two days in the construction phase. Because these smaller projects privilege basic techniques closely related to the existing construction trades skill-base, they offer potential on-ramps to the energy efficiency industry for workers who possess construction skills, but not necessarily energy efficiency knowledge. CEC has even trained the most capable and computer-savvy members of the retrofit crews to be auditors.

Lack of Auditors

From page 19

The greater number of construction jobs created by energy upgrades is dependent on a smaller number of technical, more specialized auditing and engineering positions. As interest in existing building efficiency increases, there is a growing concern that the pool of qualified workers is not deep enough.

Richard Cherry, President and CEO of the Community Environmental Center (CEC), sees the lack of qualified auditors and engineers as “the major bottleneck” in growing the energy efficiency market. “No one is coming out of schools trained in energy auditing work,” he explains. Yet, CEC Green Building Specialist Katherine Carredu notes, “There is a great demand for people with computer skills and building mechanical-system knowledge who can perform the energy modeling analyses for new and existing buildings of all types.” Organizations like CEC are competing for the same workers with engineering firms and corporation who can pay larger salaries.⁷⁸

Chelle Izzi, Director of Asset Services for the energy management company ConsumerPowerline, also sees a problem with finding qualified technical workers. In her case, the problem is engineers. For energy management companies, “there’s a gap in the market.... There are a lot of seasoned engineers, or young engineers with no experience.” With high demand for engineers, “a good, junior energy engineer with knowledge of how things work in a facility is hard to find.”

The New York State Energy Research and Development Authority (NYSERDA) is currently attempting to preemptively address any shortage in technical workers through programs like Hudson

Valley Community College’s (HVCC) TEC-SMART. The hope is that the combined impact of NYSERDA’s incentives, new training programs, and City energy efficiency initiatives will have a catalytic impact on this segment of the green collar workforce.

NYSERDA Senior Project Manager Michael Colgrove predicts a chain reaction: “If contractors are getting so many calls they can’t handle...and they can’t hire enough technicians to service those people, they’re going to start paying more.” “People who are in college or thinking about college...will think about going to a technical trade school [for energy engineering],” producing a larger pool of qualified engineers.

In the meantime, both CEC and the Association for Energy Affordability (AEA) have had success preparing auditors in-house. For example, David Hepinstall, AEA’s Executive Director, notes that they recently trained four entry-level employees to be weatherization workers and, eventually, auditors. He recounts, “It didn’t happen overnight, but we started them with simple assessment of lighting systems and worked them up to building audits.”⁷⁹ CEC is currently training three engineers out of college with the expectation that they will be auditors in six months time.

Affordable Housing

From page 20



High energy costs have a disproportionate impact on low-income New Yorkers. New York’s aging building stock, combined with a climate of temperature extremes, make heating and cooling inefficient and expensive. An analysis by the Oak Ridge National Laboratory found that the amount of fuel used to heat the average apartment in New York City is “startlingly large” even by regional standards.⁸⁰ Many low-income New York City residents live in rapidly aging multifamily buildings as renters, and pay for expensive electric heat. They are especially impacted when high utility bills are added to skyrocketing rents. Statewide, low-income people spend, on average, up to 15 percent of their monthly income on energy. Eighty percent of these expenditures leave low-income communities, going to power companies rather than local businesses.⁸¹

Recognizing that “housing isn’t really affordable if tenants and landlords can’t pay their energy bills,”

several state and city-based programs focus on increasing energy efficiency in low-income housing.⁸² Besides the Weatherization Assistance Program (See “Weatherization” on page 37.) these programs include:

Housing Preservation and Development (HPD) Programs

The New York City Department of Housing Preservation and Development (HPD) is “the largest municipal developer of affordable housing in the nation...support[ing] the repair, rehabilitation and new construction of hundreds of thousands of units of housing.” HPD incorporates energy efficiency into many of its programs. Recently, it has begun developing potential agency-wide green building standards that will cover new construction and renovation of affordable housing.

In the past two years, HPD has issued six Requests for Proposals (RFPs) that preference green building practices, including energy efficiency, to housing developers. Its Partnership New Homes Program helped develop the City’s first Leadership in Energy and Environmental Design (LEED)-certified affordable housing project. The first phase of Morrisania Homes in the Bronx, which is 30 percent more energy efficient than conventional new construction, was recently unveiled to much fanfare.⁸³

Most significantly, HPD’s High Performance Housing Initiative is carrying out energy-efficient gut rehabilitations of 5,000 New York City units, joining forces with other City energy efficiency players. Community Environmental Center (CEC) helped update the contractor specifications to include energy efficiency measures like high efficiency boilers, compact fluorescent lighting, energy-efficient appliances, and cellulose insulation. The New York State Energy Research and Development Authority (NYSERDA) is providing \$7.5 million in funding.⁸⁴

The High Performance Housing Initiative expects to “save \$6 million annually for building owners and tenants—reducing owner operating expenses by about \$1,000 per unit each year and tenant utility bills by as much as \$200 per year.”⁸⁵ The program hopes to eventually lower the incremental cost of many measures by increasing demand and encouraging manufacturers to dedicate more of their production to energy efficiency products. According to CEC’s Senior Manager and Director of Technical

Services, Thelma Arceo, this is already happening. The project’s per unit \$800 incremental cost is already half of what was initially estimated.⁸⁶

Although HPD’s programs provide tremendous opportunity, in order to reach their full potential, critical long-standing issues of construction quality must be rectified.⁸⁷

NYSERDA Programs

NYSERDA runs several programs to increase energy efficiency for low-income New Yorkers. The Assisted Multifamily and Assisted 1-4 Family Home Performance programs offer deep subsidies and financial planning assistance to building owners making less than 80 percent of the median state income. Income-eligible building owners with income eligible tenants are entitled to the most money—up to \$10,000 for 2-4 family buildings.⁸⁸ Multifamily buildings receive project oversight and technical assistance for three years after project completion, ensuring that equipment and systems are properly maintained. Building owners are also eligible for low-interest Energy Smart Loans, as well as various rebates and targeted subsidies like low-cost audits.

NYSERDA also offers various energy efficiency programs for 1-4 family building occupants. These include the EmPower program, which performs cost-effective measures like lighting and appliance replacement for income-eligible New Yorkers. NYSERDA also works with others to pool knowledge and resources—many Weatherization Assistance Program projects, for example, are co-financed by NYSERDA.

New York City Housing Authority (NYCHA) Programs

The New York City Housing Authority administers the City’s public housing developments as well as the Section 8 housing voucher program. NYCHA’s 344 aging developments—some sixty years old—house 412,281 low-income New Yorkers, 5 percent of the City’s total population.⁸⁹ NYCHA’s developments provide housing opportunities for working families in increasingly unaffordable neighborhoods. However, a lack of funding on the federal, state, and city levels; budget woes; and declining services threaten this important civic resource.

NYCHA’s utility costs currently account for approximately 20 percent of the operating budget and

have increased over 42 percent in the last few years.⁹⁰ In this context, energy efficiency programs that lower the costs of operating NYCHA housing are especially important.

Building on successes, such as a systemwide refrigerator replacement program completed in 2003, NYCHA has set a goal of achieving \$10 million in energy savings in 2008 and 2009. The Authority has replaced old boilers with more efficient water heaters and installed a Computerized Heating Automated System (CHAS). CHAS helps facilities managers remotely monitor and operate NYCHA's 195 central heating plants, allowing for quicker repairs and helping to ensure that individual heating systems operate at optimal efficiency. As part of PlaNYC, two NYCHA developments are installing 12,000 energy-



efficient compact fluorescent (CFL) bulbs.⁹¹

These initiatives are important, but more can be done. Based on the 2006 NYCHA energy budget, NYC Apollo estimates that a comprehensive energy efficiency upgrade program could reduce NYCHA energy costs by 20 percent, producing savings of \$105 million.⁹² Unfortunately, NYCHA's financial difficulties would complicate this kind of initiative. As noted elsewhere, even projects supported by out-

side players like NYSERDA are stymied by delays in securing Housing and Urban Development (HUD) approval for using capital funds.

While the initiatives described above are crucial first steps towards harnessing the power of energy efficiency to reduce poverty, expanded and long-term projects, independent of temporary funding sources, are needed. A sustained focus should also include connecting housing tenants with green collar job opportunities that improve the efficiency of their neighborhoods. Coordination between NYCHA's Resident Employment Services (RES) program and energy efficiency initiatives could reduce energy expenditures, involve local businesses, and prepare housing residents for green collar employment.

Weatherization

From page 20

Weatherization reduces a building's heating and cooling needs by protecting it from the elements. The term is now commonly used as shorthand for the Department of Energy (DOE) National Weatherization Assistance Program (WAP). WAP reduces energy costs for low-income residents by improving the energy efficiency of their homes while protecting their health and safety.⁹³ Building owners or tenants must make less than 60 percent of state median income to qualify. Non income-eligible landlords contribute a percentage of the project cost when the units of income-eligible tenants are weatherized.⁹⁴

The DOE estimates that for every \$1 invested in weatherization there is a combined return of \$3.70 in energy-related benefits, such as reduced bills, and non-energy benefits, like improved air quality and community reinvestment. Households served by the New York State Weatherization Assistance Program reduce average energy use by 25 percent, achieving combined savings of more than \$9 million a year.⁹⁵

Local providers carry out the weatherization auditing and construction work. The approximately 14 weatherization providers in New York City are mostly nonprofit community-based housing development organizations.⁹⁶ The Association for Energy Affordability (AEA) provides required annual training for weatherization program staff, organizes bulk purchasing of weatherization equipment, and administers the program regionally.

The New York State Division of Housing and Community Renewal (DHCR) oversees the program at the state level, contracts with local providers, and

divides program funds. Regional allocations are based on a formula that takes into account the number of income-eligible units as well as local heating and cooling needs. New York (Manhattan), Bronx, Queens, and Kings (Brooklyn) counties are the top four recipients of funding.⁹⁷

Jobs in Weatherization

Weatherization is essentially an energy upgrade program for low-income households. (See page 14 for the job types and skills this work requires.) Weatherization projects vary within each region and may involve replacing or adding insulation; patching holes; replacing windows, lighting, and appliances; and repairing, replacing, or insulating heating systems.⁹⁸ Specific measures are based on an on-site audit.

WAP pays for measures with a Savings to Investment Ratio of 1:1. This means that the energy savings over the life of the measure must be equal to the upfront costs. According to Thelma Arceo, Senior Manager and Director of Technical Services at the Community Environmental Center (CEC), weatherization work in New York City can include installing weather-stripping and door sweeps, replacing or repairing doors and windows, replacing light bulbs with compact fluorescent lights (CFLs), replacing or upgrading building heating systems, cleaning ducts and upgrading ventilation, insulating pipes, and installing low-flow water devices.⁹⁹

On average, weatherization creates 52 direct jobs and 23 indirect jobs for every \$1 million invested.¹⁰⁰ CEC has seven staff members working on 800-1,000 units in multifamily buildings per year. For multifamily buildings, the staff handles auditing, technical assistance and construction management. Twenty staff members work on 130 to 250 1-4 family homes per year, handling the same aspects as in multifamily buildings plus the bulk of the actual construction work.

Entry-level workers have had some success capturing weatherization opportunities. For example, the Project HIRE construction training program at Bronx Community College has placed graduates of its Building Trades Property Maintenance course as weatherization workers with the Association for Energy Affordability (AEA). Arceo notes, “Manual construction workers and general contractors are easily available for WAP work. It is the technical staff that requires a certain educational background, certification, training and expertise...which is not often available in the workforce.”

To meet demand, weatherization programs could grow exponentially. Since 1977, WAP has weatherized 5.6 million homes in all 50 states, with 50 percent of multifamily projects occurring in New York City alone. Yet, there are still 870,000 income-eligible households in the City.¹⁰¹ A major barrier to expansion is simply a lack of funding. The 2007 projected budget allotment for New York State—\$53.4 million covering 10,840 units—is actually a decrease from 2006.¹⁰²

Expanding the Weatherization Assistance Program in New York City would substantially increase energy savings in low-income communities and create green collar job opportunities. Without additional funding at the federal, state, or city levels, however, weatherization will remain an important, but constricted, avenue for growing green collar jobs.

Retro-Commissioning

From page 22

Commissioning involves the assessment, testing, and balancing of building systems and controls after installation in a new building. Systems are commissioned to maximize efficiency, to meet design parameters, and to ensure that controls are working optimally. Heating, ventilation, and air-conditioning (HVAC) systems are good candidates for commissioning because they are energy-intensive and operated by complex controls.¹⁰⁷

A recent study by Lawrence Berkeley Labs found that commissioning can pay for itself in one year largely by reducing equipment reorders and catching faulty equipment during the warranty period.¹⁰⁸ Laurie Kerr, Senior Policy Advisor for the Office of Long Term Planning and Sustainability, notes that commissioning also “pays for itself every five years in terms of decreased energy consumption.”

Retro-Commissioning is the term used to describe the testing and balancing of both older systems and newly installed systems in an existing building. Building systems require periodic monitoring and assessment to maintain peak energy efficiency. Retro-commissioning is closely related to a building’s general operation and maintenance. For example, if a building’s staff caulks windows, the heat loss characteristics of the building may change, necessitating

adjustments to the heating system to ensure efficient operation.¹⁰⁹

Retro-commissioning can lead to average energy savings of 5 percent to 15 percent, and paybacks of less than two years.¹¹⁰ Both commissioning and retro-commissioning are most cost-effective for large facilities with energy-intensive systems because the energy savings resulting from small adjustments can be enormous.

Jobs in Retro-Commissioning

While retro-commissioning is becoming a standard practice, the job category of commissioner is still being defined. To Chris Garvin of Cook + Fox, commissioning “is an engineer’s job...you have to understand the concepts behind the mechanical systems...it’s the intersection of the conceptual and the nuts and bolts.”

For Asit Patel of the Association for Energy Affordability, “The best commissioner is probably the person who designed the building’s systems or wrote the specifications.” When it is not possible to have the system designer perform the periodic adjustments, an engineer specializing in heating systems might be a good candidate for this work. Currently, most commissioners in New York City are engineers on staff at engineering firms or energy management companies offering other building energy efficiency services.

The Sheetmetal Workers Union saw the potential for energy efficiency jobs in the 1980s. In response, they developed a commissioning career-track for their members. They have prepared and certified members for energy efficiency work—including general building commissioning, and commissioning and balancing of HVAC systems—through their National Energy Management Institute (NEMI) research association, the Testing, Adjusting, and Balancing Bureau (TABB) certification organization, and the International Training Institute (ITT) regional training centers. Becoming a certified commissioner through the Sheetmetal Workers program requires two years of training.¹¹¹

In the experience of Erik Emblem, Administrator of NEMI, there is high demand from engineering firms and energy service companies for workers certified in commissioning through TABB. In New York City, TABB-certified commissioners command high wages. Unfortunately, the closest training facilities are in upstate New York and Philadelphia.¹¹²

Brian Mullins, Assistant Director of Training, International Union of Operating Engineers Local

30 explains, however, that many of the skills involved in retro-commissioning are already included in the training he provides his members. Local 30’s three-year apprenticeship program trains novices to be licensed HVAC mechanics and stationary engineers in New York City. The program includes units on auditing and the testing and balancing of building systems. At the moment, there are 150 full-time apprentices and 60 people in skill-improvement.

While many of Local 30’s members have worked with next generation building systems, like the cogeneration plant at Starrett City, Mullins sees continuity in his profession. “Energy auditing and retro-commissioning have always been a function of our trade...before it was a buzzword, efficient operation was standard routine procedure for us. The more money we save building owners, the better we do.”¹¹³

Retro-Commissioning opportunities are growing. Large building owners are recognizing its value because they quickly see the cost savings associated with tuning their building systems. These larger energy users often have long-term relationships with energy service companies that are well-versed in the benefits of retro-commissioning and can recommend the practice. Retro-Commissioning is a pure labor cost, however, presenting a major hurdle for smaller building owners who are unaware of the potential savings, or cannot fold the cost into a large operating budget or capital plan.¹¹⁴

Some PlaNYC 2030 initiatives would advance retro-commissioning. These include proposals to retro-commission City buildings, provide incentives for large commercial and industrial energy users to do so, and mandate retro-commissioning in the private sector by 2015.¹¹⁵ In the short term, an analysis of the current training landscape will be needed to determine if there are adequate entry points into this exciting, if technical, green collar position.

Distributed Generation

From page 23

The electricity distribution grid is one of the most critical pieces of New York City’s infrastructure. Despite its status as the most reliable in the country, the City’s grid is aging and increasingly strained. Its slow deterioration, along with increasing electricity

demand, necessitates direct capital investment in its modernization.¹¹⁷ But, the modernization process will be lengthy and extremely costly.

A cost-effective way to reduce strain on the grid now is through deployment of distributed generation. Distributed generation (DG) refers to any system that generates electricity at, or close to, the place it will be used. These systems usually remain connected to the existing grid. This allows facilities using DG to access supplemental or backup power from the grid. It also opens up exciting possibilities like *Net Metering*—selling power generated on-site back to the utility.

DG can be more efficient than other forms of electricity generation because it reduces “line loss.” Line loss is the electricity lost as heat and electromagnetic energy when power travels longer distances. DG helps relieve stress on the grid by removing electrical load from transmission lines. And it can be a cleaner source of energy. Solar photovoltaic (PV) panels, Combined Heat and Power systems (known as CHP or cogeneration), and small wind turbines, are just a few examples of distributed generation systems.¹¹⁸

While many forms of DG, particularly Solar PV and CHP, have great potential for deployment in New York City, there are barriers that need to be resolved before New Yorkers can capitalize on them. These include technical questions surrounding connecting these systems to the grid (interconnection), an opaque permitting process, and insufficient subsidies to help cover capital costs. These barriers are not insurmountable. Overcoming them, however, will require adequate policy support and a commitment from ConEdison to fully cooperate in streamlining interconnection.¹¹⁹ The jobs and skills associated with DG systems will be discussed in a subsequent *Growing Green Collar Jobs* report.

Notes

1. For the projected effects of global warming on New York City, see Frumhoff, Peter C., et. al. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*. Synthesis report of the Northeast Climate Impacts Assessment (NECIA), Union of Concerned Scientists (UCS), 2007, www.climatechoices.org/assets/documents/climatechoices/confronting-climate-change-in-the-u-s-northeast.pdf.
- For joblessness, unemployment and the affordability crisis, see Levitan, Mark. *Unemployment and Joblessness in New York City, 2005*. Community Service Society, www.cssny.org/pdfs/UnemploymentInNYC2005.pdf; McGeehan, Patrick, "Cost of Living Is Going Up At Fast Pace In New York," *The New York Times*, June 15, 2006; Stoler, Michael, "The City's 'Affordable' Housing Crisis," *The New York Sun*, June 8, 2006; *New York City's Affordable Housing Crisis: What Can Be Done?* Women's City Club of New York, www.wccny.org/advocacy/H&PReport04.pdf; Bowles, Jonathan and Joel Kotkin. *Engine Failure: With Economic Woes That Go Well Beyond 9/11, New York Needs a Bold New Vision To Renew the City's Economy*. Center for an Urban Future, 2003, www.joelkotkin.com/Urban_Affairs/Rockefeller.v11.100%25.pdf.
2. "PlaNYC: A Greener, Greater New York. Climate Change," 2007, www.nyc.gov/html/planyc2030/downloads/pdf/report_climate_change.pdf (6-7 of 12). The goal, based on 2005 emission levels, is closer to a 57% reduction when the projected increase in emissions up to 2030 is taken into account. The Plan also includes an accelerated target of reducing emissions from City government operations 30% by 2017; For NYC's greenhouse gas emissions, see *Inventory of New York City Greenhouse Gas Emissions*. Mayor's Office of Operations, Office of Long Term Planning and Sustainability, 2007, www.nyc.gov/html/om/pdf/ccp_report041007.pdf.
3. Population projection from Department of City Planning, cf. "PlaNYC: A Greener, Greater New York. Introduction," www.nyc.gov/html/planyc2030/downloads/pdf/report_introduction.pdf (3-4 of 12).
4. For a full list of MSAB participants, see "Mayor Bloomberg Announces Creation of Office of Long-Term Planning and Sustainability," City of New York Press Release, September 21, 2006.
5. "Case No. 07-M-0548- Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard: Responses of the City of New York to Department of Public Service Staff Questions," 2007, www.dps.state.ny.us/07M0548/07M0548_City_of_NewYork_comments.pdf (5 of 23).
6. Ibid. (2 of 23).
7. *PlaNYC: A Greener, Greater New York*. "Energy," www.nyc.gov/html/planyc2030/downloads/pdf/report_energy.pdf (6 of 18).
8. Ibid. (9 of 18). Figure includes electricity, natural gas, and heating oil.
9. See Local Law 86 rules at www.nyc.gov/html/occ/html/sustain/ll86.shtml.
10. Ibid.
11. Based on correspondence between Urban Agenda and Mr. Forster, September 10, 2007.
12. See Note 11.
13. See Note 1.
14. See the U.S. Environmental Protection Agency (EPA) Environmental Justice Advisory Council definition, www.epa.gov/compliance/resources/faqs/cj/index.html#faq2.
15. Roberts, David, "A Van with a Plan: An interview with Van Jones, advocate for social justice and shared green prosperity," *Grist*, March 20, 2007, www.grist.org/news/maindish/2007/03/20/vanjonnes/index.html.
16. For more information about these organizations see www.scopela.org/index.html (SCOPE), ellabakercenter.org/page.php?pageid=1 (Ella Baker Center), www.ssbx.org (Sustainable South Bronx), and www.uprosc.org (UPROSE).
17. Reiss, Jeremy, Bonnie Potter, and David Jason Fischer. *Keeping New York State Competitive and Creating Opportunity For All New Yorkers*. NYC Employment and Training Coalition, 2007, www.nycetc.org/pdf/SPITZER_WHITE_PAPER_1_07.pdf (4 of 16).
18. "Automotive retrofits" are the installation of emissions-reducing, fuel-switching and fuel-saving technologies in existing vehicles (cars, trucks, buses, construction equipment etc.) "Brownfield remediation" is the clean-up of polluted commercial or industrial sites that are abandoned, idle, or under-used, to the point where these sites can be safely redeveloped as parks, schools, housing, and new commercial or industrial properties.
19. Figure based on the projected, cumulative ten-year impact of a \$62 billion National "Apollo project" for renewable energy and energy efficiency, www.apolloalliance.org/jobs/index.cfm and projected State-level impacts, www.apolloalliance.org/state_and_local/New_York/index.cfm#Benefits_to_New_York_State; The percentage of projected economic activity in New York City is based on 65% of economic output for New York State coming from New York City, see "The Role of Metro Areas in the U.S. Economy," 2006, www.usmayors.org/74thWinterMeeting/metroconreport_January2006.pdf. Though the calculations include large-scale renewable energy development that is unlikely to happen in New York City, the greater amount of investment in existing building efficiency should make up for this discrepancy.
20. "PlaNYC: A Greener, Greater New York. Energy," www.nyc.gov/html/planyc2030/downloads/pdf/report_energy.pdf (18 of 18). Figure based on retrofit and retro-commissioning initiatives proposed in the Plan.
21. See Testimony of William Prindle, Acting Executive Director of the American Council for an Energy-Efficient Economy (ACEEE) before the Senate Committee on Commerce, Science and Transportation, Science, Technology, and Innovation Subcommittee, March 20, 2007, www.aceee.org/tstimony/0703Senatecommerce.pdf
22. Prindle Testimony (3 of 13).
23. Ibid.
24. *Report of the New York State Assembly Queens Power Outage Task Force*. 2007, assembly.state.ny.us/member_files/036/20070130/.
25. "Improving the Economies of Low-Income Communities," U.S. Department of Energy Weatherization Assistance Program, www.cerc.energy.gov/weatherization/improving.html.
26. Elliot, R. Neal and Anna Monis Shipley. *Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets: Updated and Expanded Analysis*. American Council for an Energy-Efficient Economy (ACEEE), 2005, aceee.org/pubs/e052full.pdf?CFID=2763071&CFTOKEN=79259657 (7 of 42).
27. *New York City Energy Policy: An Electricity Resource Roadmap*. New York City Energy Policy Task Force, 2004, www.nyc.gov/html/om/pdf/energy_task_force.pdf (17 of 65).
28. *PlaNYC: A Greener, Greater New York*. "Energy," www.nyc.gov/html/planyc2030/downloads/pdf/report_energy.pdf (9 of 18). The fact that "by 2030, at least 85% of our energy usage and carbon emissions will come from buildings that already exist today" suggests that guaranteeing the efficiency of new buildings alone will not help us reach the Plan's emissions reduction and efficiency targets.
29. *New York City Energy Policy: An Electricity Resource Roadmap*. New York City Energy Policy Task Force, 2004, www.nyc.gov/html/om/pdf/energy_task_force.pdf (9 of 65). NYCEPT's energy demand projections have been modified, but the key insight that we cannot meet future demand solely through new generation remains.

30. "15 x 15: A Clean Energy Strategy for New York," April 19, 2007, www.ny.gov/governor/keydocs/0419071_speech.html.
31. See "Case 07-M-0548 - Energy Efficiency Portfolio Standard," New York State Public Service Commission, www.dps.state.ny.us/Case_07-M-0548.htm.
32. "Case No. 07-M-0548- Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard: Responses of the City of New York to Department of Public Service Staff Questions," 2007, www.dps.state.ny.us/07M0548/07M0548_City_of_NewYork_comments.pdf (2 of 23).
33. "President Clinton Announces Landmark Program to Reduce Energy Use in Buildings Worldwide," William J. Clinton Foundation, May 16, 2007.
34. *New York Energy Smart Program Evaluation and Status Report*. New York State Energy Research and Development Authority (NYSERDA), 2007, www.nyserd.org/publications/SBC_Evaluation_Report_web.pdf (16 of 199).
35. "15 x 15: A Clean Energy Strategy for New York." Spitzer's estimate uses a NYSEDA metric for determining number of jobs created and retained per gigawatt-hour of power saved.
36. The following discussion of auditing and energy upgrades is based, in particular, on conversations with NYSEDA, Community Environmental Center (CEC), and Association for Energy Affordability (AEA) personnel, as well as presentations by Steve Cowell, Conservation Services Group, and Donald Gilligan, National Association of Energy Service Companies (NAESCO), at the National Apollo Alliance Summit, February, 2007. Also see Gordon, Kate, Jeremy Hays, Leon Sompolinsky, Elizabeth Tan, and Jackie Tsou. *Community Jobs in the Green Economy*. Apollo Alliance and Urban Habitat, 2007, available for download at www.apolloalliance.org.
37. See www.energystar.gov.
38. "What is a New York Energy Star Labeled Home?" New York Energy Smart promotional flyer, www.getenergysmart.org/Files/New%20Homes/WHatisESHHomeLR.pdf.
39. "About Energy Star," www.energystar.gov/index.cfm?c=about.ab_index.
40. For more information on TREAT, see www.treatsoftware.com. Other systems are also used regionally, one example being the Weatherization Program's Energy Audit Using the Queens Information Package (EA-QUIP).
41. See www.getenergysmart.org/buildingowners/existingmultifamily/overview.asp.
42. "What is NYSEDA?" www.nyserd.org/About/about_faqs.asp.
43. For a complete list of NYSEDA programs, see www.nyserd.org/programs/Default.asp.
44. "System Benefits Charge," New York State Public Service Commission, www.dps.state.ny.us/sbc.htm.
45. *New York Energy Smart Program Evaluation and Status Report*. New York State Energy Research and Development Authority (NYSEDA), 2007, www.nyserd.org/publications/SBC_Evaluation_Report_web.pdf (42 of 199). Job numbers are current as of the end of 2006.
46. For a list of recent PONs, see www.nyserd.org/funding/funding.asp?i=4.
47. For critiques of NYSEDA from a business development perspective, see *Manufacturing Green: Producing a Sustainable NYC*. New York Industrial Retention Network (NYIRN) and Industrial + Technology Assistance Corporation (ITAC), 2006, nyirn.org/GreenManuftr2006web2.pdf (13-14, 17 of 21). Also see *Cleantech: A New Engine of Economic Growth for New York State*. New York City Investment Fund, 2007, www.nycif.org/pdfs/CleantechReport.pdf (39 of 79).
48. "Senator Bruno Announces Funds for TEC-SMART Facility in Saratoga Technology and Energy Park." September 13, 2007, www.hvcc.edu/news_events/tecsmart-bruno.pdf. For more information on TEC-SMART, see www.hvcc.edu/news_events/newsstory.php?id=5025.
49. In addition to this baseline certification, NYSEDA partners performing auditing and retrofit work must also have staff with Building Envelope and/or Mechanical (HVAC system) certifications, depending on the firm's specialization. Firms with one certified staff member can become program partners. See www.getenergysmart.org/buildingowners/existingmultifamily/overview.asp for multifamily building performance program and www.getenergysmart.org/WhereYouLive/HomePerformance/overview.asp for home performance with Energy Star.
50. This is a 36-hour training, with class-work and field experience components, that prepares trainees to take the BPI test.
51. "Introduction to BPI," www.bpi.org/about.htm.
52. For a full list of BPI certifications, see www.bpi.org/contractor/types.htm.
53. See www.aacnyc.org/site/c.dhJJTOzFoH/b.1676935/k.593E/Weatherization_Assistance_Program.htm.
54. See Note 52.
55. Burner mechanic is one example of an in-demand, entry-level position. Burner mechanics service specific components of boiler systems, like the pilot. The position requires no experience with energy systems and can be accessed through basic training and some learning of electrical circuitry. AEA believes that there is significant and growing demand for this position as the last generation of burner mechanics retires.
56. An estimator calculates the project and material costs based on contract specifications.
57. *Municipal Building Retrofits: The Business Case*. Federation of Canadian Municipalities, Centre for Sustainable Community Development, sustainablecommunities.fcm.ca/files/Capacity_Building_-_MBRG/MBRG_thebusiness_case_En.pdf (2 of 9).
58. Community Environmental Center (CEC), for example, has championed the use of highly-efficient, recycled cellulose or mineral wool insulation, which is sprayed wet into building cavities and effectively prevents air infiltration, reducing heating and cooling needs. They have pioneered the technique in Housing Preservation and Development (HPD) gut rehabilitation pilot projects and hope to advocate for citywide use of this energy efficient building product.
59. *Municipal Building Retrofits: The Business Case*. (1 of 9); *The Business Case for Sustainable Design in Federal Facilities*. U.S. Department of Energy, Federal Energy Management Program, 2003, www.eere.energy.gov/femp/pdfs/bcsddoc.pdf.
60. Tarquinio, J. Alex, "The Cost of Saving Energy," *The New York Times*, July 15, 2007, www.nytimes.com/2007/07/15/realestate/15cov.html. NYSEDA is trying to counteract the "marble lobby" imbalance by offering designations to energy efficient buildings, which building owners can use to attract tenants. LEED certification is often sought partially to attract tenants interested in the ethics and prestige of "green."
61. Wha Lee, Dr. Moon. *Selected Findings of the 2005 New York City Housing and Vacancy Survey*. New York City Department of Housing Preservation and Development, 2006, www.housingnyc.com/downloads/research/hvs05/05summary.pdf.
62. For an overview of the host of issues historically affecting municipal efficiency, see *Wasting Our Lights In Vain: Recommendations for Energy Conservation by*

- Municipal Agencies.* Citizens Budget Commission, 2002, www.cbcny.org/energy.pdf.
63. *New York City Energy Policy: An Electricity Resource Roadmap.* New York City Energy Policy Task Force, 2004, www.nyc.gov/html/om/pdf/energy_task_force.pdf (57 of 65); For background on ENCORE, see *Office of Energy Conservation: Fiscal Year 2003 Annual Report.* Department of Citywide Administrative Services, 2003, www.nyc.gov/html/dcas/downloads/pdf/misc/oec_annualreport03.pdf; For ENCORE's recent projects, see www.nyc.gov/html/dcas/html/resources/dcas_oec.shtml; For a critique of ENCORE's effectiveness, see *Audit Report on Citywide Energy Conservation Efforts by the Department of Citywide Administrative Services.* City of New York, Office of the Comptroller, Bureau of Financial Audit, 2005, www.comptroller.nyc.gov/bureaus/audit/PDF_FILES/FR04_089A.pdf.
64. See www.ci.nyc.ny.us/html/ddc/html/ddcgreen/trainings.html.
65. See Note 7.
66. For an overview of ESCOs see Goldman, Charles A. et. al. *Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database Project.* Lawrence Berkeley National Laboratory, 2002, www.naesco.org/industry/highlights/Market_Trends_in_the_ESCO_Industry_2002.pdf; Hopper, Nicole and Charles Goldman. *A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006.* Lawrence Berkeley National Laboratory, 2007, www.naesco.org/industry/news/2007-05.pdf.
67. See "North Brooklyn Energy Grant Program Overview," www.nyirm.org/NBEG.pdf.
68. See www.itac.org/initiatives/Initiatives.htm.
69. For NYSERDA peak load reduction incentives, see www.nyserdera.org/programs/peakload/demandreduc.asp;
- For the NYISO program, see www.enernoc.com/resources/EnerNOC_NY_ICAPSCR_FAQ.pdf.
70. "New York State Median Income for FFY 2007," liheap.ncat.org/profiles/povertytables/FFY2007/nysmi.htm.
71. *American Housing Survey for the New York-Nassau-Suffolk-Orange Metropolitan Area: 2003.* U.S. Department of Housing and Urban Development, 2004, www.census.gov/prod/2004pubs/h170-03-53.pdf (25 of 359). Figure does not include pre-fabricated and mobile homes.
72. "New York Energy Star for Homes: Exhibit 7, Summary Statistics for Home Performance with Energy Star," in NYSERDA 2007 program report. Savings figure is \$726.70 "per household per year, first year estimated savings. Most measures last 15+ years."
73. Ibid. For the NYC total projects figure, see "New York Energy Star for Homes: Exhibit 13A, Home Performance with Energy Star Quality Assurance/Quality Control Inspection Summary by Project Type and Region," in NYSERDA 2007 program report.
74. Figure based on interview with Robert Gardella. For a directory of BPI-certified Home Performance Contractors by county, see www.getenergysmart.org/resource/HPContr.asp.
75. Finn, Robin, "A Contractor Who Was Green Before Green Was Cool," *The New York Times*, July 20, 2007, www.nytimes.com/2007/07/20/nyregion/20lives.html?_r=1&oref=slogin.
76. "A Letter from CEC President & CEO, Richard M. Cherry," www.cccenter.org/?page_id=20.
77. See www.solar1.org and www.bignyc.org. The City's second reuse center, a project of Green Worker Cooperatives in the Bronx, is under development, www.greenworker.coop/website_j; "Affordably Green" can be accessed at www.cccenter.org/?page_id=27.
78. Also see Note 112.
79. Based on conversation with NYC Apollo, September 13, 2007.
80. Berry, Linda G. et. al. *Progress Report of the National Weatherization Assistance Program.* Oak Ridge National Laboratory, 1997, www.eere.energy.gov/weatherization/pdfs/con450.pdf (19 of 82).
81. See Note 25.
82. Greer, Diane, "Affordably Green: N.Y.C. Housing Agency Pursues Energy-Efficient Rehabs," *New York Construction*, January 2007, newyork.construction.com/features/archive/2007/01_coverG.asp.
83. See "Greening HPD: Agency Wide Kick-Off," May 2006, www.nyc.gov/html/hpd/html/home/home.shtml; "Mayor Bloomberg and Governor Spitzer Open First Green Affordable Housing Residential Development in New York," August 15, 2007, home2.nyc.gov/html/hpd/html/pr2007/pr-08-15-07.shtml; For an example of a green HPD RFP, see "Fulton Street and Ashland Place, BAM Cultural District, Brooklyn: Request for Proposals," February 2007 (pp. 134-137).
84. See Note 82.
85. Ibid.
86. Ibid.
87. See www.urbanagenda.org/housingjustice.htm.
88. See www.getenergysmart.org/WhereYouLive/AssistedHomePerformance/overview.asp. The Assisted Multifamily Program (AMP) has been officially phased out and replaced with targeted financial assistance for income-eligible multifamily projects.
89. See www.nyc.gov/html/nycha/html/about/factsheet.shtml.
90. Based on calculations from NYCHA 2001-2006 budgets, Urban Agenda, 2006.
91. See *New York City Housing Authority Agency Report 2003-2005* at www.nyc.gov/html/nycha/downloads/pdf/agency_report_2003_2005.pdf.
92. Based on New York City Apollo Alliance analysis of NYCHA FY 2007 – FY 2010 Financial Plan assuming that major renovation projects could result in 20% reductions in energy costs.
93. "Weatherization Works!" U.S. Department of Energy Weatherization Assistance Program, www.eere.energy.gov/weatherization/pdfs/30639.pdf (1 of 2).
94. See *Weatherization Policy and Procedures Manual.* New York State Division of Housing and Community Renewal (DHCR), www.dhcr.state.ny.us/ocd/pubs/html/wappm00.htm.
95. Schweitzer, Martin and Bruce Tonn. *Nonenergy Benefits from the Weatherization Assistance Program: A Summary of Findings from the Recent Literature.* Oak Ridge National Laboratory, 2002, weatherization.ornl.gov/download_files/Con-484-april02.pdf (31-32 of 41); *Weatherization Assistance Program State Plan – Program Year 2006.* New York State Division of Housing and Community Renewal (DHCR), www.dhcr.state.ny.us/ocd/pubs/html/wsp06.htm.
96. "Weatherization Assistance Providers," New York State Division of Housing and Community Renewal (DHCR), www.dhcr.state.ny.us/ocd/apps/profiles/profile_WAPcnty.asp.
97. *Weatherization Assistance Program State Plan – Program Year 2007.* New York State Division of Housing and Community Renewal (DHCR), www.dhcr.state.ny.us/ocd/pubs/html/wsp07.htm (47-48 of 50); "Weatherization Assistance Program: Improving the Economies of Low-Income Communities," U.S. Department of Energy, www.eere.energy.gov/weatherization/improvinghtml.
98. See Note 94. Health and safety measures, like carbon monoxide monitors, are installed as part of

every weatherization project, and are not considered in the savings to investment calculations.

99. Ibid.

100. "Weatherization Assistance Program: Improving the Economics of Low-Income Communities," U.S. Department of Energy, www.eere.energy.gov/weatherization/improving.html; "Weatherization Assistance Program Overview," Weatherization Assistance Program Technical Assistance Center (WAPTAC), www.waptac.org/sp.asp?id=1437.

101. See "Weatherization Assistance Program Overview"; Berry, Linda G. et al. *Progress Report of the National Weatherization Assistance Program*. Oak Ridge National Laboratory, 1997, www.eere.energy.gov/weatherization/pdfs/con450.pdf (19 of 82); *Weatherization Assistance Program State Plan – Program Year 2007*. (47-48 of 50).

102. *Weatherization Assistance Program State Plan – Program Year 2007*. (10 of 50).

103. For a review of Combined Heat & Power in New York City, see *CHP in NYC: A Viability Assessment*. Center for Energy, Marine Transportation and Public Policy, Columbia University, 2007. Distributed generation systems, and the jobs involved in their manufacturing, sale, installation and maintenance, will be discussed in a forthcoming installment of *Growing Green Collar Jobs*.

104. From Howard Styles' presentation at the NYC Apollo Alliance Community Forum on PlaNYC 2030, held at SEIU 32BJ on June 6th, 2007.

105. See zicklin.baruch.cuny.edu/newman/research/energy-lab.

106. See www.seiu32bj.org/shortman/RealShortCatV2_7_08.pdf.

107. Mills, Evan. *The Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction*. Lawrence Berkeley National Laboratory, 2004, eetd.lbl.gov/Emills/PUBS/Cx-Costs-Benefits.html.

108. Ibid.

109. Ibid.

110. *Guideline to the Commissioning Process for Existing Buildings, or 'Retro-Commissioning'*. NYSERDA and Portland Energy Conservation, Inc. (PECI), www.nyserdera.org/programs/pdfs/retrocxhandbookfinal040704.pdf (14 of 85); For NYSERDA retro-commissioning incentives and programs, visit www.nyserdera.org.

111. For more information about this program, see www.nemionline.org/certification/index.html.

112. See www.tabbcertified.org for more information on certification.

113. Based on correspondence between Urban Agenda and Mr. Mullins, September 27, 2007.

114. This discussion is informed by Urban Agenda conversations with Michael Bobker, CUNY Institute for Urban Systems.

115. *PlaNYC: A Greener, Greater New York*. "Energy," www.nyc.gov/html/planyc2030/downloads/pdf/report_energy.pdf (11 of 18).

116. "What is an ESCO?" National Association of Energy Service Companies, www.naESCO.org/about/ESCO.htm.

117. See Note 24.

118. See Note 103. For Solar PV, small wind, and other renewable energy systems, see *Powering Forward: Incorporating Renewable Energy into New York City's Energy Future*. Center for Energy, Marine Transportation and Public Policy, Columbia University, 2006.

119. For a good discussion of grid interconnection barriers with a focus on Solar PV, see Case, Tria et. al. *New York City's Solar Energy Future: Part II: Solar Energy Policies and Barriers in New York City*. The Center for Sustainable Energy at Bronx Community College, CUNY, 2006.

120. See Note 66.

121. Ibid.

122. "Enhanced Commercial/Industrial Performance Program," www.nyserdera.org/programs/Commercial_Industrial/cipp.asp.

123. Overage fees are charges for exceeding your typical energy use in a given billing period.

124. See www.genergy.com/About/client_list.html.

125. This example of optimization was actually engineered by ConsumerPowerline for a client.

126. "ConsumerPowerline Helps New York City Avoid Summer Blackouts with Virtual Micro-Power Plants," ConsumerPowerline Press Release, March 2006, rismedia.com/wp/2006-03-30/consumerpowerline-helps-new-york-city-avoid-summer-blackouts-with-virtual-micro-power-plants.

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129. For municipal Green Collar Jobs Corps initiatives see ellabakercenter.org/page.php?pageid=32 for Oakland, CA,

and www.americanprogress.org/issues/2007/09/green_jobs.html for Washington D.C.; For Federal Green Collar Jobs Corps legislation see *HR 3221, the New Direction for Energy Independence, National Security, and Consumer Protection Act*, 2007, speaker.gov/pdf/energy73007.pdf, "House Passes Solis' Green Jobs Bill," solis.house.gov/list/press/ca32_solis/wida6/greenjobsaug4.shtml; *HR 6, the Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007* in the U.S. Senate has similar green jobs language. The two bills will likely be reconciled and come to a vote during the fall 2007 legislative session.

130. *Intro No. 476: A Local Law to amend the administrative code of the city of New York, in relation to benchmarking the energy and water efficiency of buildings*. New York City Council, 2006, webdocs.nycouncil.info/textfiles/Int%200476-2006.htm?CFID=276277&CFTOKEN=47124203.

131. See *Repowering Gotham: State Action to Build New York City's New Energy Economy*. Urban Agenda for the New York City Apollo Alliance, 2007, www.urbanagenda.org/pdf/repoweringgotham.pdf, for more information on metering and links to further resources.

132. These recommendations are adapted from *Manufacturing Green: Producing a Sustainable NYC*. New York Industrial Retention Network (NYIRN) and Industrial + Technology Assistance Corporation (ITAC), 2006, nyirn.org/GreenManuftr2006web2.pdf.

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