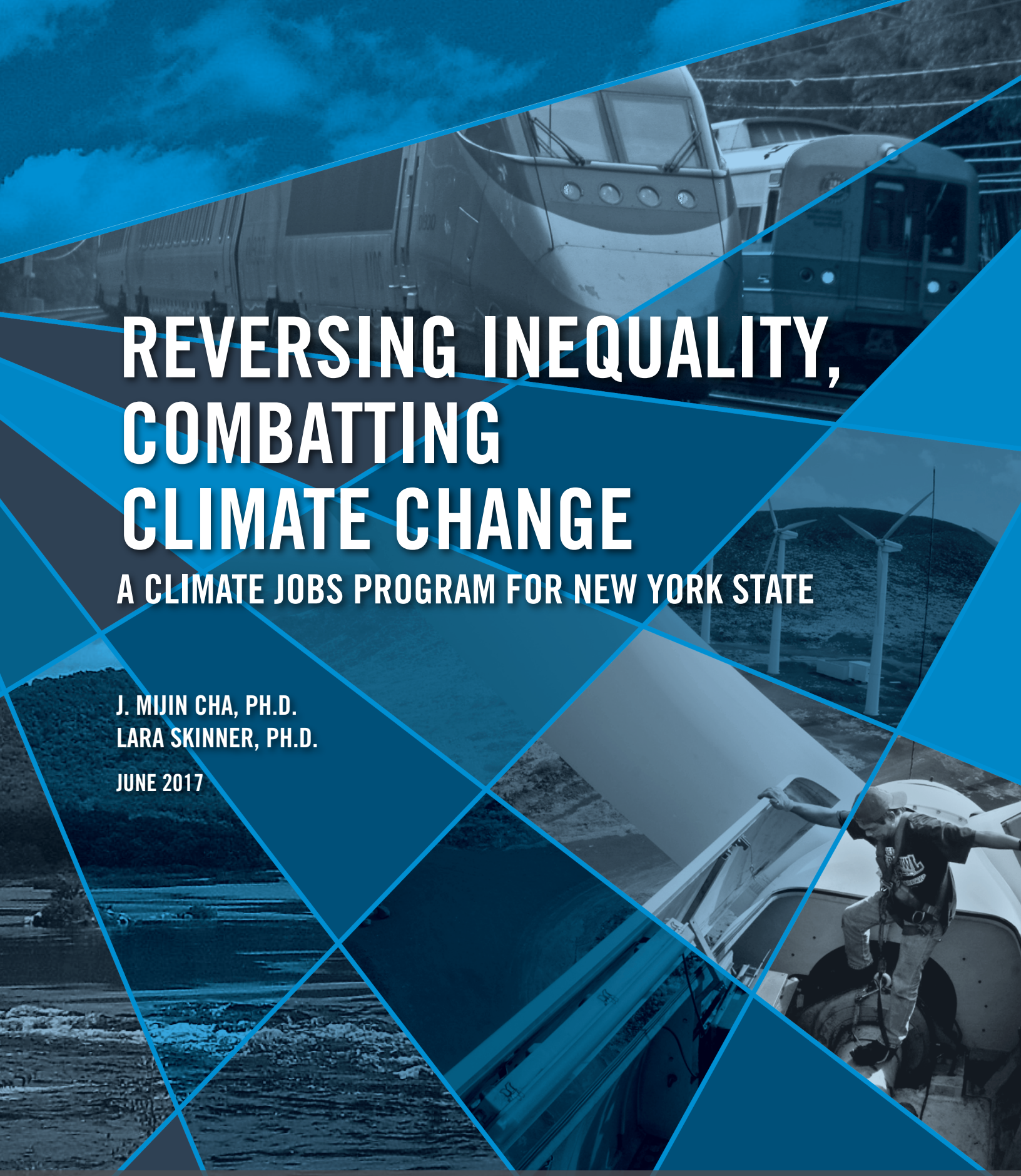

REVERSING INEQUALITY, COMBATTING CLIMATE CHANGE

A CLIMATE JOBS PROGRAM FOR NEW YORK STATE

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INTRODUCTION

Economic inequality in New York is rising. Currently, the state has the second highest level of economic inequality in the country.[1] Unequal job growth across the state and stagnant wages in several sectors are two of the main contributors to rising inequality. While the state overall has seen several years of employment growth, there are stronger employment gains in New York City than in other parts of the state still suffering from job losses and stagnant employment levels.[2] Additionally, in many sectors, such as construction and manufacturing, wages are not increasing at the same pace as inflation, leaving many workers with paychecks that fail to cover basic household costs.[3]

At the same time, New York is falling far short of its necessary greenhouse gas pollution reductions. To stop catastrophic climate change, global greenhouse gas emissions must be reduced at least 80 percent below 1990 levels by 2050, which would require four times the current annual emissions reduction rate.[4] By 2050, New York State's emissions must be only a fraction of what they are now to meet the United Nations' Intergovernmental Panel on Climate Change's targets set to prevent irreversible damage.[5] We are far from that target. In the transportation sector, emissions are actually increasing and energy sector emissions may also be increasing given likely underestimation of methane emissions from natural gas.[6]

New York State can take action now to protect New Yorkers from the worst effects of climate change, and do our part in reducing global emissions, while also fighting against growing economic inequality. Extreme weather, such as Hurricanes Irene and Sandy, is predicted to become more the norm, not the exception. These recent extreme weather events highlighted New York's deep inequality: some could afford to leave the city or move into hotels when their residences flooded while others were left stranded.[7]

Adopting a bold and aggressive plan to invest in climate-addressing infrastructure can be an important step towards simultaneously addressing the crises of inequality and climate change head on and position New York as a national leader in charting the path to a low-carbon, equitable economy. The recommendations presented below aim to create good, high-road jobs that provide family-sustaining wages and benefits for communities across the state. These proposals could also result in meaningful emissions reductions and put New York on the path to building an equitable clean-energy economy that can work for all New Yorkers. The authors hope this report helps spark additional research and policy development on how to simultaneously reduce greenhouse gas emissions and reverse inequality by protecting workers and creating good, family-sustaining jobs in new low-carbon sectors. Future research, in particular, could perform a detailed analysis of the cost of job creation strategies in low-carbon sectors, how to finance these strategies, and a cost-benefit analysis that includes the cost of potential job loss and reduced economic activity in high-carbon sectors.

FROM GREEN JOBS 'RHETORIC TO REALITY'

Numerous studies have shown that there is major job creation potential from tackling the climate crisis, reducing greenhouse gas emissions, and transitioning to a low-carbon, sustainable economy. Moving toward a low-carbon or zero-carbon economy requires substantial improvement and expansion of public transportation systems, the manufacture and deployment of renewable energy sources like solar and wind, modernization of electricity, water and gas infrastructure, comprehensive energy efficiency retrofits of residential, commercial and industrial buildings, and the development of more sustainable food, waste, and agricultural systems.[8]

However, the U.S. has not succeeded in moving green economy jobs from "rhetoric to reality," although job losses in fossil fuel sectors, particularly coal, are already occurring. The scale of renewable energy, building retrofits, public transit expansion and other aspects of a low-carbon economy remain marginal. As a result, green job creation and emissions reductions in the U.S. remain marginal, too. The overall lack of jobs in the green economy and the prevalence of non-union jobs in the limited existing green sectors, such as solar and residential retrofitting, have dampened enthusiasm for the long-promised "clean, green economy" among workers and labor organizations that are anxious to address the climate crisis and build a pro-worker, equitable green economy.

A bold, ambitious, and equitable climate jobs program can overcome barriers to a vibrant green economy. The following principles are key to delivering green jobs from rhetoric to reality:

PRINCIPLE 1
MORE AMBITION, MORE JOBS = CLIMATE JOBS

To deliver major job creation from low-carbon sectors, climate protection policy must be sufficiently ambitious to address the scale of the climate crisis and drive investment in low-carbon sectors. To date, climate policy at all levels has not been ambitious enough to significantly reduce emissions, create many jobs and address the loss of jobs that will occur eventually in high-carbon sectors.

The proposals in this report focus on job creation strategies that can drastically reduce New York State's emissions and deliver substantial job creation through public investments. "Green jobs" may improve environmental sustainability but "climate jobs" specifically take aim at tackling the climate crisis based on ambitious, science-based climate protection policy.

PRINCIPLE 2

WORKER PROTECTIONS + HIGH-QUALITY JOBS = REVERSING ECONOMIC INEQUALITY AND A JUST TRANSITION

To deliver substantial job creation from low-carbon sectors, climate protection policy must sufficiently address the scale of the climate crisis and drive investment in low-carbon sectors. At the same time, many of the industries that produce the highest levels of carbon dioxide – extraction of coal, oil, and natural gas and carbon intensive manufacturing– have higher rates of unionization than renewable energy sectors.[9] These unionized, family-sustaining jobs help anchor the economies of communities throughout New York State and the U.S. Without smart and deliberate policies, the much-needed transition to a low-carbon economy could undermine or eliminate existing, good union jobs.

To ensure that new climate jobs are high-road jobs that reverse economic inequality in New York State, strong job and training quality standards are needed. Depending on the funding mechanism for the job creation programs, these standards include prevailing wage, state-approved apprenticeship job training requirements, project labor agreements, and best value contracting.

In addition, local community members need to have a stake in economic development projects. Also, depending on the funding mechanism, standards should establish a targeted local hire program mandating that a certain portion of the work goes to local community members who are disadvantaged (long-term unemployed, formerly incarcerated, low-income, etc.). A functioning jobs pipeline could ensure that these local workers have a path to career employment by offering access to training programs such as direct-entry pre-apprenticeship programs and other skill-building opportunities. These job and training quality standards could be central to all "climate jobs" proposals.

To accurately estimate the level of investment needed to transition to a low-carbon economy, further examination of the cost of training programs are needed. It will be possible to get these estimates as more green and climate workforce training programs are implemented. For example, the City of New York recently announced a cutting-edge Green Jobs Corps that will put 3,000 workers through a pre-apprenticeship program and prepare them for the City's $2.6 billion investment in municipal building retrofits.[10] Specific estimates for the cost of this training program should be available soon.

Finally, climate efforts should include funding and guaranteed protection for workers and communities who are displaced or negatively affected by the transition to a low-carbon economy. Long-term and purposeful planning of the impact from the retirement of certain power plants and developing new renewable generation could help achieve this goal and make sure no groups are left behind in the transition. An approach to energy transition that includes protections for workers and communities is commonly referred to as a "just transition" or "just transition" assistance. Tony Mazzocchi, leader of the Oil, Chemical and Atomic Workers International Union (OCAW), coined the concept of "just transition," saying "if there can be a superfund for dirt, there can be a superfund for workers."[11] The AFL-CIO has developed strong policy proposals for protecting workers who are impacted by climate protection policy.[12] These proposals include 70 percent wage replacement and 80 percent health benefit replacement for up to three years, as well as "bridge to retirement" funding for workers who are near retirement (the average age of miners in the U.S. is 55 years old).[13] A "just transition" program

should also include re-training and education funds for workers who would like to shift to other sectors.

An example of a community-based just transition program emerged from the NYS 2016 legislative session. The Western NY Area Labor Federation, in partnership with the Clean Air Coalition, secured $30 million over five years to support the Town of Tonawanda's alternative economic development plans after the Huntley coal-fired power plant was shutdown.[14]

AN AUDACIOUS CLIMATE JOBS AGENDA

Adopting a bold and aggressive plan in New York State that addresses the crises of inequality and climate change head-on would demonstrate how an economy could transition to a clean energy economy that significantly reduces greenhouse gas emissions while creating good, family-sustaining jobs. The ideas presented in this report provide an actionable New York State agenda for leading the fight against climate change and rising inequality by meaningfully taking steps towards reducing emissions and investing in a robust job creation program. If implemented, and with significant financial investment, these recommendations could benefit workers, residents, and communities all across the state.

Our recommendations fall into three sectors: buildings, energy, and transportation. These sectors were selected because they represent the majority of both the greenhouse gas emissions in New York State and present positive possibilities for improving the lives of New Yorkers. Their selection does not diminish the importance of emissions reductions and equity improvements in other sectors, such as agriculture or manufacturing, but will demonstrate how a full-scale transition to a clean energy economy could begin.

Starting with these three sectors, we can achieve meaningful emissions reductions while creating thousands of good, family-sustaining jobs that can make communities more equitable, sustainable and energy independent.

This report provides detailed analysis and a set of recommendations for the buildings, energy, and transportation sectors. In each chapter, a landscape analysis of current efforts and targets will be presented. Each chapter also presents the job creation and emissions reduction numbers recommended for each sector. The report begins with an overview of the state of greenhouse gas emissions in these sectors, as well as the target reduction levels. A brief overview of job creation potential is then discussed, followed by recommendations for a just transition for fossil fuel industry workers. An in-depth discussion of the buildings, energy, and transportation sectors is then presented.

These recommendations build off the knowledge of labor, environmental, and community experts around the state and can provide a just, yet ambitious, pathway to a clean energy economy, bringing New York State to the forefront in the fight against rising sea levels and rising inequality. Our recommendations are not meant to be the end-all-and-be-all of climate policy. Certainly there are other strategies which can be used to good effect in reaching our goals. These recommendations are a first step in building a comprehensive climate jobs program that substantially reduces carbon emissions and reverses inequality by creating good, family-sustaining jobs. We intend to continue our research and analysis to come up with additional recommendations in the future which can build on the success of any implemented recommendations.

CLIMATE JOBS RECOMMENDATIONS

BUILDING SECTOR

- Retrofit all public schools in New York State to reach 100 percent of their energy efficiency potential by 2025
- Reduce energy use in all public buildings by 40 percent by 2025
- Streamline and expand access to residential retrofit programs

ENERGY SECTOR

- Install 2 GW of solar energy on public schools by 2025
- Install an additional 2 GW of utility-scale solar projects
- Install 7.5 GW of offshore wind by 2050

TRANSPORTATION SECTOR

- Bring New York City public transit to a state of good repair and expand service
- Establish a Bus Rapid Transit (BRT) program in New York State
  - › Upstate New York: Conduct a Feasibility study of upstate BRT routes
  - › New York City: Add two new BRTs in New York City – Bush Terminal to JFK and East Bronx to East Harlem
- Construct and improve Adirondack and Empire high-speed passenger rail corridor between Albany and Buffalo and between New York City and Montreal

JUST TRANSITION RECOMMENDATION

- Establish a Just Transition Task Force in New York State that can ensure a fair and equitable transition to a new, clean energy economy. This task force would focus on identifying the need to support workers and communities negatively impacted by the transition as well as examining the job and training quality standards that will ensure that jobs created in the new, low-carbon economy are good, high-road jobs.

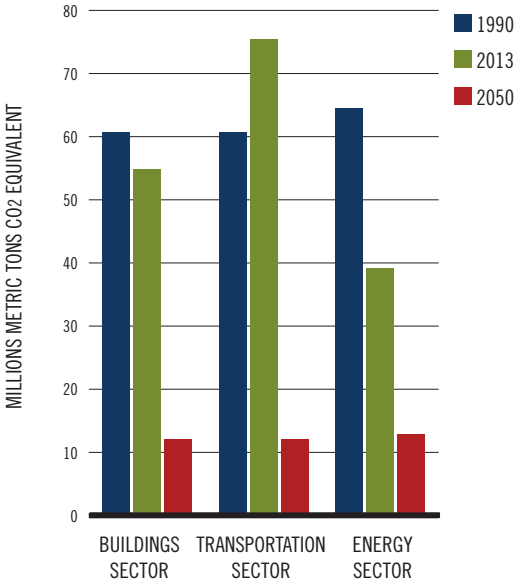
EMISSIONS SOURCES AND REDUCTION TARGETS

Greenhouse gas emissions in New York State come primarily from three sectors: residential and commercial buildings, transportation, and energy.

In the chart below, the blue column represents emissions in each sector in 1990, the green column represents emissions in 2013, and the red column represents the target emissions level for 2050. The transportation sector is the only sector in which emissions have risen since 1990. However, even though emissions have decreased in the building and energy sectors, they are decreasing at only a fraction of the level needed. In 2013, carbon dioxide emissions totaled million metric tons of CO_2 equivalent ($MMtCO_2e$). Research shows that methane emissions from natural gas production have been significantly underestimated, which likely negates any decrease in emissions accounting.[15] The charts below show the emissions totals for the state and for each sector.[16]

To prevent large-scale, irreversible damage to the climate and communities around the world, the scientific consensus is that global warming must be limited to 1.5 or 2 degrees Celsius.[17] So far, the earth's temperature has increased 0.85 degrees Celsius and the impact has been far worse than scientists expected. Limiting global warming to two degrees Celsius requires carbon emissions to be reduced 80 percent below 1990 levels by 2050. In order for New York State to meet its share of responsibility for this goal, each sector must reduce its emissions at several times the rate of current efforts, as the table below shows. Implementing bold, forward-thinking climate job policies can meet our emissions reductions targets, as well as create good jobs that provide benefits and family sustaining wages.

NYS EMISSIONS REDUCTIONS TARGET



New York State Energy Research Development Agency (2017, February). New York State Greenhouse Gas Inventory: 1990-2014, Final Report.

NYS EMISSIONS REDUCTIONS TARGET BY SECTOR

YEAR	TOTAL EMISSIONS (MMtCO2e)	RESIDENTIAL EMISSIONS	COMMERCIAL EMISSIONS	TRANSIT EMISSIONS	POWER SUPPLY AND DELIVERY EMISSIONS
1990	206.1	34.2	26.5	60.8	64.6
2013	180.1	32.3	22.6	75.4	39.2
2050 TARGET	41.22	6.84	5.3	12.16	12.92
TOTAL REDUCTION NEEDED TO MEET 2050 TARGET	138.88	25.46	17.3	63.24	26.28
ANNUAL REDUCTION NEEDED FROM 2016–2050	4.09	0.75	0.51	1.86	0.77

New York State Energy Research Development Agency (2017, February). New York State Greenhouse Gas Inventory: 1990-2014, Final Report.

ECONOMIC BENEFITS OF CLIMATE INVESTMENTS

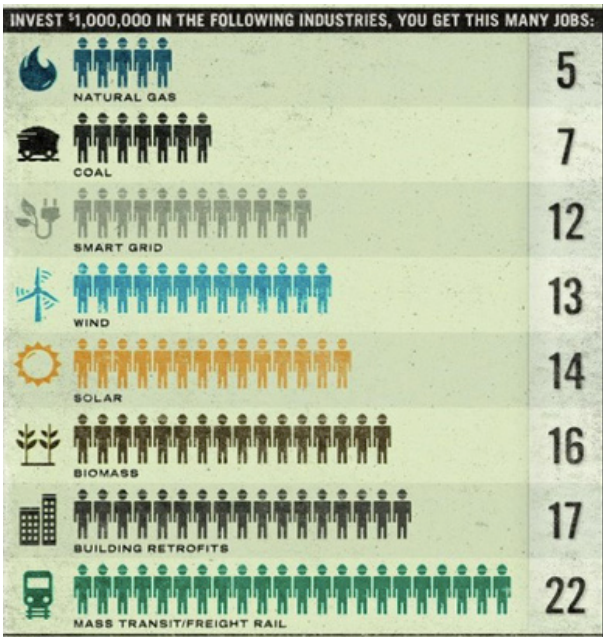
Beyond the climate benefits, investments in policies that decrease greenhouse gas emissions can be smart from an economic standpoint. Investments in energy efficiency, for example, can create jobs and also result in energy cost savings.[18] Job creation estimates are a combination of direct, indirect, and induced job numbers.[A] Adding to these economic benefits, the money saved from lower energy bills is then put back into the economy and stimulates ongoing job creation.[19]

Such economic benefits can be forecast from investments in clean energy and mass public transportation as well, remembering that industry-specific job creation ignores any resulting job destruction in competing industries.

Estimates by Pollin, Garrett-Peltier, Heintz and Hendricks (see graphic to the right) are that every $1 million invested in mass transit creates more than four times the jobs as the same investment in natural gas. Renewable energy investments create, on average, more than twice the number of jobs as investments in natural gas and coal. Fossil fuel extraction is typically mechanized and capital intensive while renewable energy production is more labor-intensive, which creates more jobs.[20] In addition, fossil fuel infrastructure is already mature while investments in renewable energy expands renewable energy's generation capacity.

There will inevitably be job losses in existing fossil fuel and other high carbon sectors and protecting and transitioning those workers to new employment is fundamental to ensuring an equitable clean energy future, as the following section details.[21]

JOB CREATION PER MILLION INVESTED BY SELECT INDUSTRY



Includes direct, indirect and inducted jobs.

Pollin, R., Garrett-Peltier, H., Heinz, J., and Hendricks, B. (2014, September). Green Growth: A U.S. Program for Controlling Climate Change and Expanding Job Opportunities.

[A] Direct job creation is the employment that results from implementing climate policies, such as workers employed to retrofit buildings or build solar thermal energy plants. Indirect job creation is the employment that arises from providing intermediate goods for these measures, such as the lumber or steel needed for retrofit work or wind turbines. Induced job creation refers to the jobs that are created as a result of the money spent by workers on other products or services. Unless stated otherwise, the job creation estimates in this report will be a combination of direct, indirect, and induced.

NEW YORK STATE "JUST TRANSITION" TASK FORCE

RECOMMENDATIONS

In building a strong, fair economy based on clean energy, New York State should give special attention to workers and communities negatively impacted by the transition away from high-carbon industries and sectors. Thousands of workers are currently employed in these sectors in high-paying jobs that support their families and communities. The development of new low-carbon economic sectors provides an opportunity to link low-income communities to good jobs and address historic, long-term economic inequities in the investment and development patterns of New York State. In building a new and just green economy, both the needs of workers currently employed in high-carbon sectors and the needs of communities that have been excluded from jobs and prosperity for decades should be considered.

A climate-focused infrastructure investment program for New York State that includes the establishment of a "Just Transition" Task Force with the requisite "teeth" could help ensure a fair and equitable transition to a new, clean energy economy. The Task Force could help design and establish needed support for affected workers and communities including wage and health benefit replacements, "bridge to retirement" funding for workers near retirement age, re-training and education support for workers who would like to shift to other sectors, and alternative economic development support for communities. This Task Force could also examine the job and training quality standards that are necessary to ensure jobs in the new, low-carbon economy are good, high-road jobs that help address growing inequality, rather than exacerbate it. These standards include prevailing wage, state-approved apprenticeship job training requirements, project labor agreements, best value contracting, and targeted local hire programs.

A number of studies have shown that more jobs can be created in low-carbon sectors than currently exist in high-carbon sectors like the fossil fuel industry in absolute numbers. Building energy efficiency, renewable power generation, and public transportation are all more labor-intensive than capital-intensive sectors such as oil, coal, and gas. Moreover, major improvements need to be made to New York State's electricity, gas, and water infrastructure to stop leaks and improve efficiencies. These infrastructure upgrades are another source of many good jobs.

However, climate policy could be implemented in a way that replaces union jobs with lower-wage, non-union jobs. Businesses could move to regions with weaker climate protection policy. Polluting industries could be concentrated in low-income neighborhoods. And, higher energy costs could disproportionately impact low-income families.

A Just Transition Task Force is key to ensuring the new low-carbon economy is equitable. With a coordinated, state-wide approach, the Task Force can identify and provide the support workers and communities need in this transition. The Task Force can also build in mechanisms that ensure the clean energy transition helps to reverse inequality in the state by creating good, high-road jobs.

BUILDING SECTOR

RECOMMENDATION HIGHLIGHTS

- Retrofit all public schools in the state to reach 100 percent of their energy efficiency potential by 2025
- Reduce energy use in all public buildings by 40 percent by 2025
- Streamline and expand access to residential retrofit programs

In New York, buildings produce nearly half of all emissions. Meaningful emissions reductions will not occur without retrofitting buildings so they are more energy-efficient. Making buildings more efficient also saves money by lowering energy costs. At a time when families are still struggling to recover from the Great Recession and often forced to choose between heat or food, energy efficient homes help reduce household costs.

Retrofitting buildings creates a wide array of jobs. In particular, jobs would be created for boilermakers, HVAC and refrigeration mechanics, plumbers, pipefitters and steamfitters, insulators, sheet metal workers, electricians, cement masons, control system technicians, roofers, glaziers, and construction truck drivers. In addition, many projects would need hazardous material removal workers, construction equipment operators, architects, and mechanical and electrical engineers.

The amount of carbon savings depends on the depth of the retrofit. Worldwide, buildings account for approximately 40 percent of the world's energy use and simple fixes, such as tuning existing heating and cooling systems or mechanical insulation, would generally improve building energy efficiency by at least 20 percent.[22] A deep building retrofit that analyzes the whole building and adopts more substantial system changes, such as replacing heating and cooling systems, could reduce energy use by up to 50 percent.[23]

Building retrofits can be grouped into three categories: municipal, commercial, and residential. Among the roughly 8.6 million buildings in New York State, an estimated 8.1 million are residential, 502,727 are commercial, and 16,000 are municipal.[24] The following sections present an overview of the building stock, current programs, and potential energy and cost savings.

MUNICIPAL BUILDINGS

Retrofitting municipal buildings is a fundamental pillar of a statewide buildings retrofit plan. First, mandates for public buildings are easier to pass legislatively than mandates for private buildings. Second, the energy savings from building retrofits provide much-needed relief for budget-conscious municipalities. Finally, public sector retrofits can provide the example and leadership for private sector efforts to follow.

Recognizing the importance of energy efficiency in municipal buildings, Governor Andrew Cuomo signed Executive Order 88 mandating a 20 percent improvement in energy efficiency above 2011 levels in State government buildings by 2020.[25] Given that New York State owns approximately 212 million square feet of real estate, the Executive Order is an ambitious plan. The chart on the right shows the six largest government entities.[26] Note that while CUNY is a state-owned entity, CUNY buildings are not covered by the Executive Order because CUNY community colleges are regulated by local governments.

In the first annual progress report, the state reduced its Energy Use Intensity (EUI) by 4.9 percent, resulting in $50 to $60 million in energy cost savings and 130 to 180 thousand tons of greenhouse gas emissions avoided.[27]

While an excellent start, the scale of municipal retrofits must be greatly increased and expanded. Local municipal buildings must also be a part of a statewide retrofit plan which includes CUNY campuses and public schools. There are approximately 4,530 public schools across the state, adding millions of building square footage that can be retrofitted.[28]

NYS'S LARGEST GOVERNMENT ENTITIES WITH BUILDING SQUARE FOOTAGE

AGENCY/AUTHORITY	ACRONYM	GROSS SQ. FT.	% OF TOTAL
STATE UNIVERSITY OF NEW YORK*	SUNY	85,555,406	40.4%
DEPARTMENT OF CORRECTIONS & COMMUNITY SUPERVISION	DOCCS	38,098,538	18.0%
CITY UNIVERSITY OF NEW YORK*	CUNY	19,701,393	9.3%
OFFICE OF MENTAL HEALTH	OMH	19,025,432	9.0%
METROPOLITAN TRANSPORTATION AUTHORITY	MTA	10,574,220	5.0%
ALL OTHER STATE AGENCY FACILITIES		19,703,793	9.3%
TOTAL		**211,616,880**	**100.0%**

New York Power Authority and New York State Energy and Research Development Agency (2013, August). Build Smart NY: Baseline Energy Performance of New York State

COMMERCIAL BUILDINGS

Half the national building stock is on track to be retrofitted by 2030.[29] However, the carbon savings from these retrofits is estimated to be only 13.5 million metric tons versus the 179 million metric tons experts recommend.[30] To meet the United Nations' Intergovernmental Panel on Climate Change recommended reduction target, either more building square footage must be retrofit or the space that is retrofitted must achieve significantly higher energy savings.[31]

In New York State, commercial buildings account for nearly 14 percent of carbon emissions. To meet the commercial building emissions reduction target of 17.3 million metric tons of CO_2 equivalent by 2050, both the square footage that is being retrofit and the intensity of the retrofits across all buildings would need to increase.

Estimates are that investing in a large-scale building retrofit plan both decreases carbon emissions and creates more jobs than similar investments in fossil fuel industries. On average, investing $1 million in commercial building retrofits creates 13–17 direct, indirect, and induced jobs.[32] It has been estimated that in the case of the Empire State Building retrofit of 2012, 19 jobs were created for every $1 million spent on retrofitting. In contrast, only five jobs are created with $1 million investment in natural gas and only seven jobs are created with $1 million investment in coal.[33]

The chart below shows the job creation average for a $1 million investment in various retrofit items for commercial buildings in the U.S.[34]

JOB CREATION PER MILLION INVESTED IN COMMERCIAL BUILDING ENERGY EFFICIENCY RETROFITS

EE TECHNOLOGY GROUP	DIRECT EMPLOYMENT PER $1 MILLION	INDIRECT EMPLOYMENT PER $1 MILLION	INDUCED EMPLOYMENT PER $1 MILLION	TOTAL EMPLOYMENT PER $1 MILLION
LIGHTING	5.1	4.2	3.7	12.9
HVAC	5.3	4.2	3.8	13.3
MOTORS AND DRIVERS	4.5	3.9	3.4	11.9
WATER HEATING	5.0	4.1	3.6	12.6
OFFICE EQUIPMENT	3.8	3.7	3.0	10.5
ENVIRONMENTAL CONTROLS	5.0	4.3	3.7	13.0
ENVELOPE IMPROVEMENTS	7.7	3.9	4.7	16.3

Separate estimates for direct, indirect and induced job creation.

Garrett-Peltier, H. (2011). Employment Estimates for Energy Efficiency Retrofits of Commercial Buildings.

RESIDENTIAL BUILDINGS

The vast majority of the state's building stock is residential buildings. Of the 8.6 million buildings in the state, 8.1 million are residential. Residential buildings account for nearly 20 percent of all carbon emissions in the state. Retrofitting residential units not only reduces carbon emissions, it also lowers household energy costs over time.

There are unique challenges to implementing a wide-scale residential retrofit. On the finance side, securing capital for residential retrofits can be difficult, and with rental stock, the cost of the retrofit is borne by the homeowner while the cost savings are realized by whoever pays the energy bill, usually the renter.[35] In addition, a lack of information leaves homeowners uncertain as to which retrofit measures they should adopt.

For contractors, the scale of an individual residential retrofit can be financially unappealing.[36] Sparse contractor infrastructure makes large-scale residential retrofits challenging.[37] These factors make residential retrofits a more risky business model than basic home improvements.[38]

Residential retrofits have similar job creation numbers to commercial building retrofits.

A comprehensive report from the Rockefeller Foundation and Deutsche Bank Climate Change Advisors estimates that roughly 11.9 direct and indirect job years are created for every $1 million spent on residential energy efficiency retrofit measures.[39]

CLIMATE JOBS PROPOSAL FOR THE BUILDING SECTOR

RECOMMENDATIONS

1 RETROFIT ALL PUBLIC SCHOOLS AROUND THE STATE TO REACH 100 PERCENT OF THEIR ENERGY EFFICIENCY POTENTIAL BY 2025

Retrofitting schools is an easy way to reduce energy use and create good, family-sustaining jobs. Schools are often hubs within communities and making them as energy-efficient as possible is good for students, families, and communities. Energy use in public schools can be reduced by 500-1,200 gigawatt hours (GWh), which would remove 1.4 million metric tons of CO_2 and create between 12,800-18,400 jobs.[40]

The New York Power Authority (NYPA) is already retrofitting schools. To date, NYPA has completed 641 total retrofit and solar projects in 1,286 primary and secondary schools installing 330 kW of solar capacity.[41] These projects have saved nearly $37 million annually with project costs of $404 million.

However, the potential for energy savings is much greater than what has been accomplished to date and efforts must be drastically scaled up to meet our carbon emissions and job creation goals. By NYPA's own calculations, an additional 500-1,200 GWh of additional energy efficiency savings could be realized through a large-scale school retrofit plan.[42]

Annually, 1.4 million metric tons of CO_2 equivalent could be removed, the equivalent of removing 300,000 cars from the road and reaching the amount of CO_2 emissions reductions needed for the entire commercial sector.[43]

NYPA estimates that between 12,800 and 18,400 jobs could be created by pursuing 100 percent of the energy efficiency potential. To meet these job creation targets, any cap on the number of public sector employees must be expanded or lifted to prevent energy efficiency and solar installation work from being sub-contracted. Using public employees would keep expertise and experience in these fields in-house and ensure a trained and ready workforce is able to complete future work more quickly and efficiently. In addition, a set number of new staff must be dedicated to energy efficiency work. The total cost for reaching 100 percent of the energy efficiency potential would be between $1.1 and $1.5 billion. This is approximately one third of what the state spends per year on school utility costs, according to the U.S. Department of Energy.

2 REDUCE ENERGY USE IN ALL PUBLIC BUILDINGS BY 40 PERCENT BY 2025

To reach New York State's carbon emissions reduction target, all buildings, public and private, must be retrofit within a short time period. Governor Cuomo's Executive Order 88 calls for a 20 percent improvement in energy efficiency in all State Executive government buildings by 2020.[44] This proposal doubles the Governor's target and aims to achieve a 40 percent reduction in energy use by 2020 in all public K-12 schools.

Currently, the Build Smart NY program requires public buildings to reduce their energy use by 20 percent below 2011 levels by 2020.[45] The cost of the retrofits will depend on building type and can be based off the state's comprehensive energy audit. Ultimately, the retrofits can be a cost savings measure as they decrease the state's electricity costs, currently $500 million annually.[46] A 40 percent reduction would save the state $200 million annually. State-owned buildings consume 3,000 GWh per year, which should be reduced by 1,200 GWh by 2020.[47]

In one fiscal year, the state reduced its energy use-intensity by 4.7 percent, which saved $50-$60 million and cut 130-180 thousand tons of greenhouse gas emissions.[48] By accelerating the rate of energy reduction, the state can easily reduce overall energy use in public buildings by 40 percent below 2011 levels by 2020. In addition, the state would save hundreds of millions of dollars in energy costs, create over 12,000 jobs, and reduce the level of greenhouse gas emissions by over 16 million tons.[49]

3 STREAMLINE AND EXPAND ACCESS TO RESIDENTIAL RETROFIT PROGRAMS

Retrofitting just half of New York City's small homes would save homeowners $255 million annually and create 1,500 jobs.[50] However, the complexity of residential retrofits prevents wide-scale adoption of retrofit programs and measures. Programs like Pratt Center's Retrofit Standardization Initiative bundle efficiency work and provide a simple package of five energy efficiency measures that can be implemented in hundreds of thousands of similar small homes. Such packages minimize cost, time, and complications, achieving the scale of emissions reductions necessary to address the climate crisis.[51]

For New York City, the starter retrofit package was estimated to cost on average $3,312, which would result in a 14 percent annual utility savings. A similar package should be adopted for homes in upstate New York to achieve statewide residential retrofits. The housing stock in upstate New York is different from that of New York City, therefore cost estimates will have to be adjusted accordingly.

CASE STUDY

EMPIRE STATE BUILDING RETROFIT IN 2012: SMALL STEPS LEAD TO BIG SAVINGS

The Empire State Building is an iconic part of the New York City skyline. It also recently completed a substantial energy efficiency retrofit that reduces the building's energy use by 38 percent and saves $4.4 million every year.[52]

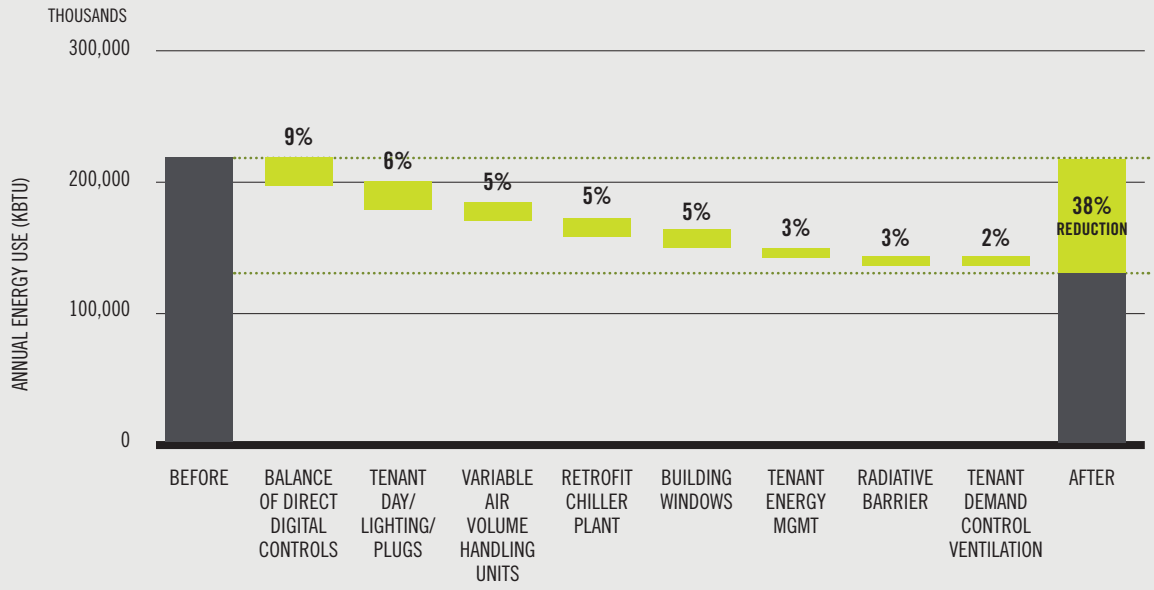
The Empire State Building was already being renovated so the energy efficiency retrofits could be implemented alongside other building improvements. Undertaking the energy efficiency retrofits alongside other renovations kept costs low. The retrofit was completed for $13.2 million, which can be recouped through utility savings in just three years.[53] In addition to energy savings, the retrofits could reduce the building's carbon emissions by 105,000 metric tons over the next 15 years and create 252 jobs in the process.[54]

This retrofit included upgrading windows, installing radiative barriers (insulation), upgrading and replacing lighting systems, retrofitting the chiller plant, installing variable air volume (VAV) air handling units, installing direct digital controls for various building systems, upgrading demand control ventilation, and focusing on tenant energy management.[55]

The chart below shows the level of energy reduction by retrofit measure.

The Empire State Building retrofit example shows how little steps can add up to significant cost and carbon savings.

EMPIRE STATE BUILDINGS ANNUAL ENERGY SAVINGS BY MEASURE



Clinton Climate Initiative, Clinton Foundation, Johnson Controls, Jones Lang LaSalle, and Rocky Mountain Institute (2012). Empire State Building Case Study. Cost Effective Greenhouse Gas Cost Reductions via Whole-Building Retrofits: Process, Outcomes, and What is Needed Next.

ENERGY SECTOR

RECOMMENDATION HIGHLIGHTS

- Install 2 GW of solar energy on 100 million square feet of public school rooftops by 2025
- Install an additional 2 GW of utility and commercial-scale solar projects
- Install 7.5 GW of offshore wind by 2050

New York State has a tremendous economic and social opportunity. The state's great capacity for renewable energy generation remains largely untapped. A meaningful switch to renewable energy will allow New York to meet the emissions reductions targets needed for the power sector and create thousands of good, climate jobs. In addition, ensuring that renewable energy is affordable and available to all New Yorkers could transition the state to a clean energy future more quickly and equitably.

Power supply and delivery emits the most greenhouse gases of any single sector. While emissions seem to be decreasing largely due to an increase in natural gas use, the electricity sector must still reduce emissions by over 1.5 $MMtCO_2e$ every year. In addition, as stated earlier, methane emissions from natural gas production have been significantly underestimated, which likely negates any decrease in emissions accounting. Moving forward, natural gas use should be curtailed to avoid the environmental damage caused by hydraulic fracking, which undermines long-term climate change and environmental protection goals.[56]

Currently, New York State is not living up to its renewable energy potential. In 2014, New York installed only 147.4 MW of solar energy.[57] In comparison, California installed 4.3 GW of solar energy in the same year – nearly 30 times more solar than New York installed.[58] California is leading the U.S. in transitioning to a clean energy future and, worldwide, several countries have shown that being powered by renewable energy is not only rhetoric but a reality. Portugal had all of its electricity demand met by renewable energy for four straight days in May 2016 and Denmark and Germany have also seen days where much, if not all, of their electricity needs were met solely with renewable sources.[59]

If New York produced just 20 percent of its total electricity from solar power, it would reduce carbon emissions by 14 million metric tons by 2025—the equivalent of removing 3 million cars from our roads.[60] In fact, with ambitious and aggressive scaling, New York State could be completely powered by renewables—wind, water, and solar—by 2050.[61]

We have a choice to transition to a clean energy future now, when there is still a chance to stave off the worst impacts of climate change, or we can be forced to transition when all of the worst effects of climate change have already been realized. The time to make this decision is running out—2016 was the warmest year on record globally.[62]

Investing in a clean energy future would create jobs for an array of sectors, including: electricians, solar PV installers, construction truck drivers, architects, and mechanical and electrical engineers. On-shore and off-shore wind projects will need cement workers, steelworkers, manufacturers, construction workers, electricians, architects, and general operation and maintenance workers.

Transitioning to renewable sources would drastically reduce carbon emissions. Greenhouse gas emissions from producing and using renewable energy sources are a fraction of emissions from fossil fuel use.[63] In some electricity markets across the country, solar is at grid parity with natural gas.[64] In other words, solar energy produces electricity for the same cost to ratepayers as natural gas.

Finally, as we build a new clean energy future, we must ensure that renewable resources are available to all New Yorkers, regardless of race or class. Privatizing renewable energy development puts vulnerable New Yorkers at risk of being completely excluded from access to renewable resources. Numerous studies on energy liberalization and privatization by the Public Services International Research Unit at University of Greenwich show that investor-owned utilities (IOUs) are often focused on short-term profits and securing the greatest return on investment, rather than making the necessary investments and improvements to provide reliable, responsive and affordable electric service.[65] For example, in response to IOUs not prioritizing renewable energy generation or high-quality service, 60 new public utilities were set up in Germany between 2007 and 2012.[66] Similar public power models could be explored for potential adoption in the U.S.

Similarly, programs focused only on benefits to home-owners leave renters and those who cannot afford to own behind. Renewable energy should be a public good and developing renewable energy through the public sector ensures access for all New Yorkers.

RENEWABLE ENERGY DEVELOPMENT LANDSCAPE

The recent Clean Power Plant ruling provides the ideal time for New York to transition to a renewable future. As the chart below shows, the plan requires carbon dioxide emissions to be reduced by roughly 3 million tons by 2030.[67] These reductions are in line with other estimates of the level of reductions needed in the power sector each year in order to meet overall greenhouse gas reduction targets.

Submitting an ambitious state plan to reduce greenhouse gas emissions from power plants could jump-start robust renewable energy development and provide an opportunity for New York to lead the nation in renewable energy production.

In addition, New York State is currently undergoing a significant restructuring of clean energy development. The "Reforming the Energy Vision" (REV) process is looking to transform the retail electricity market and overhaul the state's energy efficiency and renewable energy programs.[68] REV has ambitious goals of generating 50 percent of the state's electricity demand from renewable energy by 2030, reducing greenhouse gas emissions 40 percent below 1990 levels, and decreasing energy consumption in buildings 23 percent below 2012 levels.[69] The goals of REV are well in-line with a broader climate jobs program. However, how these goals are met is as important as the actual goals.

While streamlining programs and upgrading infrastructure are smart steps that can help bring the state's energy infrastructure up to date, who does the clean energy development and greenhouse gas reduction efforts should be considered broadly. Currently, the development and ownership of renewable energy, in New York State and globally, is largely done through the private sector or public-private parternships.[70] Public options, are less common but deserve greater exploration. The REV process, for example, could include incentives and programs for renewable energy development and greenhouse gas reduction that focus on community and public sector projects as a path for further examination. Building pathways for communities to own their own renewable energy generation and large-scale renewable projects should be considered. Renewable energy, it can be argued, has characteristics for the public good which would support access to it not being restricted through ownership by an individual or corporation.

NYS'S INTERIM (2022-2029) AND FINAL EMISSIONS REDUCTION GOALS (2030) UNDER THE CLEAN POWER PLAN

NEW YORK			
	CO_2 RATE (LBS/NET MWH)	CO_2 EMISSIONS (SHORT TONS)	
2012 HISTORIC	1,140	34,596,456	
2020 PROJECTION (WITHOUT CPP)	902	28,314,559	
	RATE-BASED GOAL	MASS-BASED GOAL, (ANNUAL AVERAGE CO_2 EMISSIONS IN SHORT TONS)	MASS GOAL (EXISTING & NEW SOURCE COMPLEMENT)
INTERIM PERIOD 2022-2029	**1,025**	**33,595,329**	**34,117,555**
INTERIM STEP 1 PERIOD 2022-2024	1,095	35,493,488	35,707,786
INTERIM STEP 2 PERIOD 2025-2027	1,005	32,932,763	33,655,705
INTERIM STEP 3 PERIOD 2028-2029	948	31,741,940	32,424,984
FINAL GOAL 2030 AND BEYOND	**918**	**31,257,409**	**31,117,555**

U.S. Environmental Protection Agency (2015, August). Clean Power Plan: State at a Glance. New York.

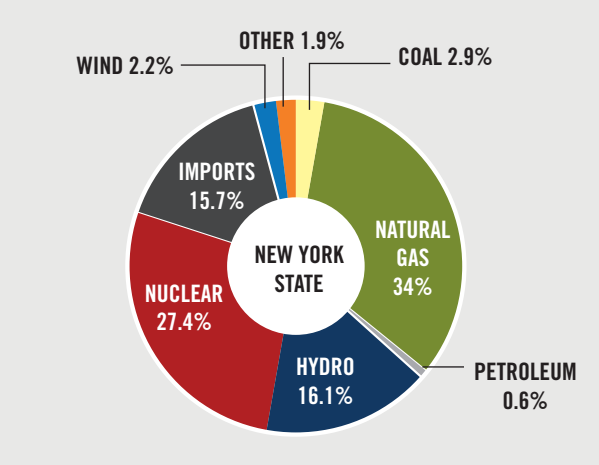
NEW YORK'S ENERGY MIX

As presented below, the overwhelming majority of power in New York State is currently generated from non-renewable sources, namely natural gas, nuclear, petroleum and coal.[71] In 2013, less than 20 percent of overall power generation came from renewable sources like hydro, wind and solar.[72]

The chart below tracks the amount of electricity generated In New York State from 1999-2013 by source, showing that renewable energy production has remained stagnant. While the amount of coal-generated power has decreased significantly, natural gas production has increased substantially.

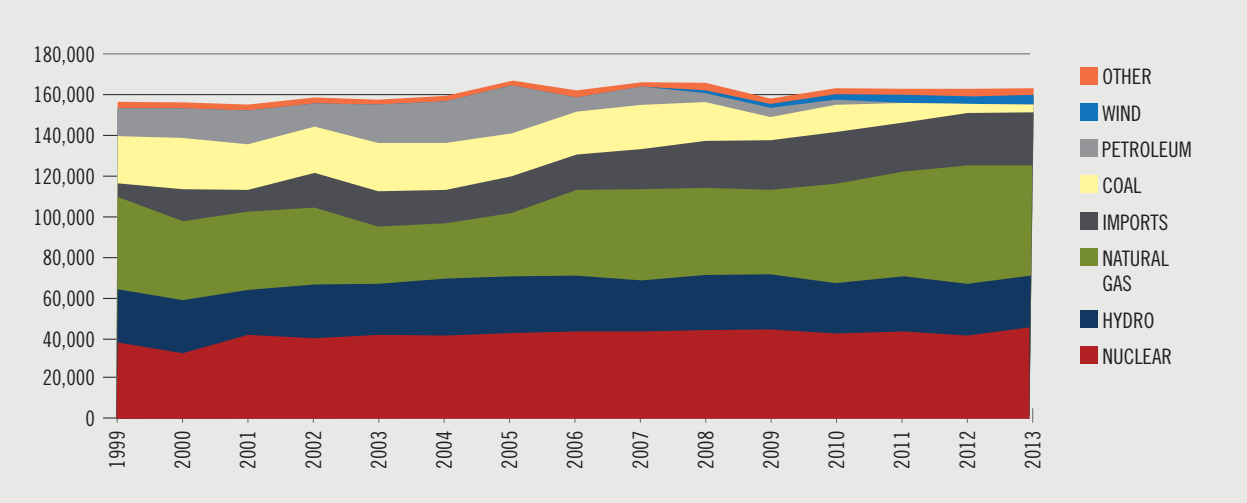
The amount of renewable energy produced currently is insufficient to meet New York State's greenhouse gas reduction target. Without significant policy changes, it will remain insufficient. The charts to the right and below show the amount of energy generated by source in GWh and the average annual growth in production of each energy source.[73] The "other" category includes any energy generated from solar, wind, wood, landfill gas, and waste. The decrease in the use of polluting fuels, such as coal

NYS'S ELECTRICITY GENERATION BY FUEL TYPE, 2014



New York State Energy and Research Development Agency (2016, October). Patterns and Trends: New York State Energy Profiles, 2000-2014

NYS'S ELECTRICITY GENERATION BY SOURCE, 1999-2013



New York State Energy and Research Development Agency (2016, October). Patterns and Trends: New York State Energy Profiles, 2000-2014.

and petroleum, going forward through 2030 is a step in the right direction. However, if these energy predictions come true and the bulk of energy is produced from natural gas and nuclear energy, New York will have lost out on a tremendous economic and social opportunity to shift away from polluting energy sources and will fall far behind its emissions reductions target.

Based on the chart below, the amount of energy produced from renewable sources (hydropower + "other") by 2030 will be roughly 22 percent of the total energy produced. While this is a slight increase from the current energy mix, it falls far short of where New York must be in 2030. For meaningful emissions reductions, New York must be completely powered by renewables by 2050. To ensure this, at least half of our electricity must come from renewable sources by 2030.

NYS'S ENERGY SOURCE PROJECTIONS AND ANNUAL GROWTH IN GWh, 1990-2030

ENERGY SOURCE	1990	2010	2030	AVERAGE % ANNUAL GROWTH 1990–2011	ANNUAL GROWTH 2011–2030
COAL	25,913	9,426	8,864	-4.70	-0.32
NATURAL GAS	22,724	50,805	73,391	3.91	1.95
PETROLEUM	33,885	1,189	502	-14.74	-4.44
HYDROPOWER	28,188	28,355	27,750	0.03	-0.11
NUCLEAR	23,623	42,695	42,622	2.86	-0.11
NET IMPORTS OF ELECTRICITY	4,59	25,202	22,523	8.53	-0.59
OTHER	0	5,651	12,083	NA	4.08
TOTAL	**138,853**	**163,323**	**187,735**	1.49	0.74

New York State Energy Research and Development Agency (2016, October). Patterns and Trends: New York State Energy Profiles, 2000-2014.

JOB CREATION POTENTIAL AND THE RENEWABLE ENERGY FUTURE

Transitioning to a clean energy economy is not just important for climate reasons. A vibrant clean energy economy presents an opportunity to reduce inequality by creating thousands of good-paying, family-sustaining jobs. Without attention to the quality of jobs created in the low-carbon economy, this transition could exacerbate inequality through the creation of low-road jobs in low-carbon sectors. As shown earlier, investments in renewable energy create at least twice as many jobs per million dollars as fossil fuel investments.

Currently, roughly 20 percent of New York State's electricity comes from renewable sources. The remaining 80 percent of our energy could be comprised of a mix of several renewable energy sources, including rooftop solar (PV and solar thermal), commercial and utility-scale PV and solar thermal plants, onshore and offshore wind generation, and geothermal energy.

In 2012, New York State's retail electricity demand was 16.34 GW.[74] Subtracting the current renewable production, to be completely powered by renewable sources we would need to produce 13 GW of renewable energy per year. This estimate errs on the side of more electricity production than may be necessary, as it does not take into consideration any reduction in energy use that would occur as a result of more ambitious energy efficiency measures or reduction in energy use to meet a 100 percent renewable production mandate.

While some previous analyses predicted that solar would not provide a cost effective energy source at the scale needed, the most credible estimates indicate that solar energy could provide a significant percentage of the renewable production needed to power the state.[75]

NYPA is already undertaking solar production, but, to date, NYPA has installed only 4.1 MW of solar. However, NYPA estimates that the solar production potential from solar installations solely on the top of schools is significant, possibly 3,000 MW (3GW).[76] Assuming 14 jobs are created for every $1 million spent on solar energy installation,[77] between 72,100 and 210,000 jobs would be created in the construction and installation of solar. In addition, for every $1 million spent on solar, 5.5 jobs are created in operation and maintenance.[78]

Utility-scale solar thermal or solar PV installations could generate an additional 2 GW of solar production. An additional 48,000 to 140,000 jobs could be created through utility-scale solar production. These job estimates include direct, indirect, and induced employment.

The remaining balance of renewable energy needed for a 100 percent clean energy economy could come from a combination of onshore wind, offshore wind, and residential solar installations. Over 61,300 full-time jobs would be created from the development of onshore wind with nearly $4 billion in earnings in wages, services, and supply-chain impacts during construction.[79] After construction, the onshore wind production could create 2,260 annual full-time jobs and $162 million from wages, local revenue, and local supply chain impacts. Offshore wind could create nearly five times that much with 320,000 full-time jobs and $21.4 billion in earnings during construction. Post-construction, 7,140 annual full-time jobs and $514 million in annual earnings can be generated.

CLIMATE JOBS PROPOSAL FOR THE ENERGY SECTOR

RECOMMENDATIONS

1 INSTALL 2 GW OF SOLAR ENERGY ON 100 MILLION SQUARE FEET OF PUBLIC SCHOOL ROOFTOPS BY 2025

The New York Power Authority (NYPA) is already undertaking solar production, but, to date, NYPA has installed only 4.1 MW of solar.[80] Significantly expanding programs like the K-Solar program, which creates a purchasing pool and uses the large scale of work to increase cost efficiency, would save school districts money and reduce greenhouse gas emissions.[81]

Assuming 14 jobs are created for every $1 million spent on solar energy installation,[82] at least 72,100 jobs would be created, with the potential for over 200,000 more in ten years.

Any additional electricity generated through the installations could be sold to utilities across the state.

2 INSTALL AN ADDITIONAL 2GW OF UTILITY AND COMMERCIAL-SCALE SOLAR PROJECTS

To match California's efforts, New York State could install 2 GW of solar energy in addition to the solar energy generated on top of public schools within ten years for a total of 4.1 GW, which is roughly one quarter of all electricity demand in the state.[83] In addition to on-site building solar installations, New York State would need utility-scale solar arrays or solar thermal plants to meet the state's energy needs. Large solar arrays or solar thermal plants could be installed throughout the state.

It's important to note that the cost of utility-scale solar installations has fallen by 50 percent in the last three years.[84] An estimated 24,000-67,000 jobs could be created by an additional gigawatt of solar power in the state.[85]

3 INSTALL 7.5 GW OF OFFSHORE WIND BY 2050

The Atlantic Ocean off the coast of New York State has the potential to support up to 38 GW of clean, wind-driven energy.[86] The Long Island offshore wind project could generate 700 MW at a cost of $821 million and prevent 1.08 million tons of CO_2 from being released annually.[87] The 700 MW project is estimated to create 17,000 job-years, which equals one year of one job, and $1 billion in wages.[88] A ten-fold increase in offshore wind generated would result in 7 GW of electricity, nearly half of New York State's annual electricity demand and result in the creation of 170,000 job-years and $10 billion in wages.

With the 25 percent of additional solar generated, the existing 20 percent of renewable energy currently being generated, and 7.5 GW of offshore wind, New York State would be almost completely powered by renewable energy by 2050. Onshore wind production and residential solar installation could provide the remaining 1.3 GW needed for a 100 percent clean energy-fueled economy.

CASE STUDY

GOOD DAY, SUNSHINE: HOW CALIFORNIA LEADS THE NATION IN SOLAR PRODUCTION

When it comes to solar production, California is setting the bar high for the rest of the nation. The scale of solar generation in California is remarkable: in 2014, the state produced more utility-scale solar than all other states combined.[89] As of March 2016, the state had installed nearly 500,000 solar projects and generated 3.8 GW of electricity.[90] The majority of solar energy produced in California is through utility-scale solar plants[91] and last year California became the first state to generate more than 5 percent of its annual electricity from utility-scale solar power.[92]

California is a model for how smart, ambitious policy and investment from the labor movement can create good jobs and reduce greenhouse gas emissions. Several forward-thinking policies help increase demand for solar.[93] The boldest measure is an increase in the state's Renewable Portfolio Standard (RPS) to 50 percent by 2030, which means utilities in the state must purchase at least 50 percent of their electricity from renewable sources.[94] California's electricity demand is currently around 30 GW annually.[95] To meet the RPS, California would need to substantially increase its purchase of renewables, leading to further demand for solar and other renewables.

In addition, most of the utility-scale solar construction was organized under collectively bargained contracts or project labor agreements.[96] As a result, the 10,200 construction jobs created were good jobs with family-sustaining wages, on average $78,000 annual income, and health and pension benefits.[97] The 136 permanent operations and maintenance jobs created also paid a family- sustaining wage, on average $69,000 per year, and usually had health benefit packages as well.[98] On top of the direct job creation, about 1,600 jobs were created to handle increased business along the supply chain and other new business activities associated with the solar projects.[99] And, with workers making a family-sustaining wage, consumer spending increased and over 3,700 additional jobs were created to meet increased consumer demand.[100] In total, the solar farm construction boom between 2009-2014 created over 15,000 new jobs.

The International Brotherhood of Electrical Workers (IBEW) has long seen the potential for solar installation, and Local 569 in California established a solar training course back in 1999.[101] In addition to training hundreds of new members from the local community, Local 569 maintained strategic partnerships with electrical contractors and traditional environmental organizations, such as the Sierra Club.[102] Moreover, locals up and down the state strongly advocated for the RPS expansion.[103] As a result of increased solar demand, membership in locals around the state increased. Local 569, in San Diego and Imperial County, saw its membership increase from 2,100 in 2011 to 3,300 in 2013.[104] Local 440 in Riverside saw its membership increase nearly 50 percent since 2011 with nearly 60 percent of their work in recent years being solar.[105] In Bakersfield, Local 428 grew more than 40 percent in six years and since 2013, more than half of its membership has been working on a single 580 MW plant.[106]

The story of solar in California shows the power of labor-environment partnerships and challenges the myth that family-sustaining wages dampen job creation. California shows that ambitious climate policy can create family-sustaining jobs, decreasing inequality and strengthening communities while at the same time staving off the worst impacts of climate change.

TRANSPORTATION SECTOR

RECOMMENDATION HIGHLIGHTS

- Bring New York City public transit to a state of good repair and enhance and expand service
- Construct and improve Adirondack and Empire West high-speed passenger rail corridor between Albany and Buffalo, and between New York City and Montreal
- Establish a bus rapid transit program in New York State

New York State has a major opportunity to lead the nation in reducing emissions and addressing growing inequality by making significant and bold investments in public transit across the state. These investments could give most New York State residents access to efficient, reliable and extensive public transit networks, create many good jobs, and provide transit-dependent communities access to jobs and more.

Emissions produced by the transportation sector in New York State are quickly increasing, now making up 42 percent of New York State's total greenhouse gas emissions.[107] Cars and trucks produce the majority of these emissions. Reducing emissions from New York State's transportation sector requires a significant shift from private vehicle use to public transit. The following section describes how major improvements and expansion of public transit can dramatically reduce emissions, create many good jobs, improve public health, and provide low- and middle-income communities a lifeline to jobs, education, and more.

Major improvements to and expansion of New York State's public transportation system would be expensive; however, benefits including the creation of family-sustaining jobs, improved public health, safety, mobility, and climate improvements should be included in a full cost-benefit tally. The state's current transit infrastructure is worth protecting and upgrading. Plus, New York State, through a mix of public and private funds, currently spends $26.7 billion in fuel costs each year.[108] With a major mode shift from private vehicles to public transportation, a large portion of the amount currently spent on fueling cars and trucks can be applied to expanding and enhancing our transit systems.

Moreover, if we do not act quickly to reduce emissions and avoid the worst effects of climate change, we will incur major costs to our current transportation infrastructure: more frequent and serious coastal flooding of transport facilities due to sea level rise and storm surge; increased downtime of transit services because of more intense inland and urban storms; additional stress on materials from increased temperatures and precipitation; damage to infrastructure from saltwater exposure; and more.

Hurricane Sandy alone cost the New York City Metropolitan Transit Authority over $573 million.[109] The cost from Hurricane Sandy includes restoring and repairing many subway cars, stations, tracks, line equipment, signals and communication equipment, tunnels, depots, and shops and yards damaged by flooding and salt water exposure. The MTA also expects to spend $7.3 billion to prepare the system for future extreme weather events.[110] The cost of this repair, restoration, and future adaptation work goes a long way in covering the total costs of the proposed climate jobs recommendations in this report, and these climate jobs proposals would put New York State on track to tackle the climate crisis in a way that avoids its worst impacts.

There are numerous technological advancements and improvements that can be made to the transport sector to reduce emissions, including electric and hybrid vehicles, solar-powered planes, and the like. Indeed, a lot of attention has been given to these efforts, in New York State as well as nationally and internationally. In New York State, the ChargeNY initiative aims to build a market for electric vehicles and Clean Fleets NY is a pilot program to ensure at least 50 percent of new, administrative-use vehicles will be zero-emissions vehicles. Programs to improve the fuel and energy efficiency of private vehicles are particularly helpful for rural regions, like many parts of upstate New York, because the population density is not high enough to support expansive public transit systems.

The climate jobs recommendations in this report, however, focus on improving and expanding public transit in New York State to address the climate crisis. To date, this approach has been overlooked in New York State's efforts to reduce transport emissions, especially given its related advantages and benefits, explained in greater detail below: investment in public transit is an excellent way to create many good jobs and extensive transit networks help link low- and middle- income communities to job opportunities. Both are outcomes that help reverse inequality. As mentioned previously, a major modal shift from private vehicles to public transit would also have significant public health benefits.

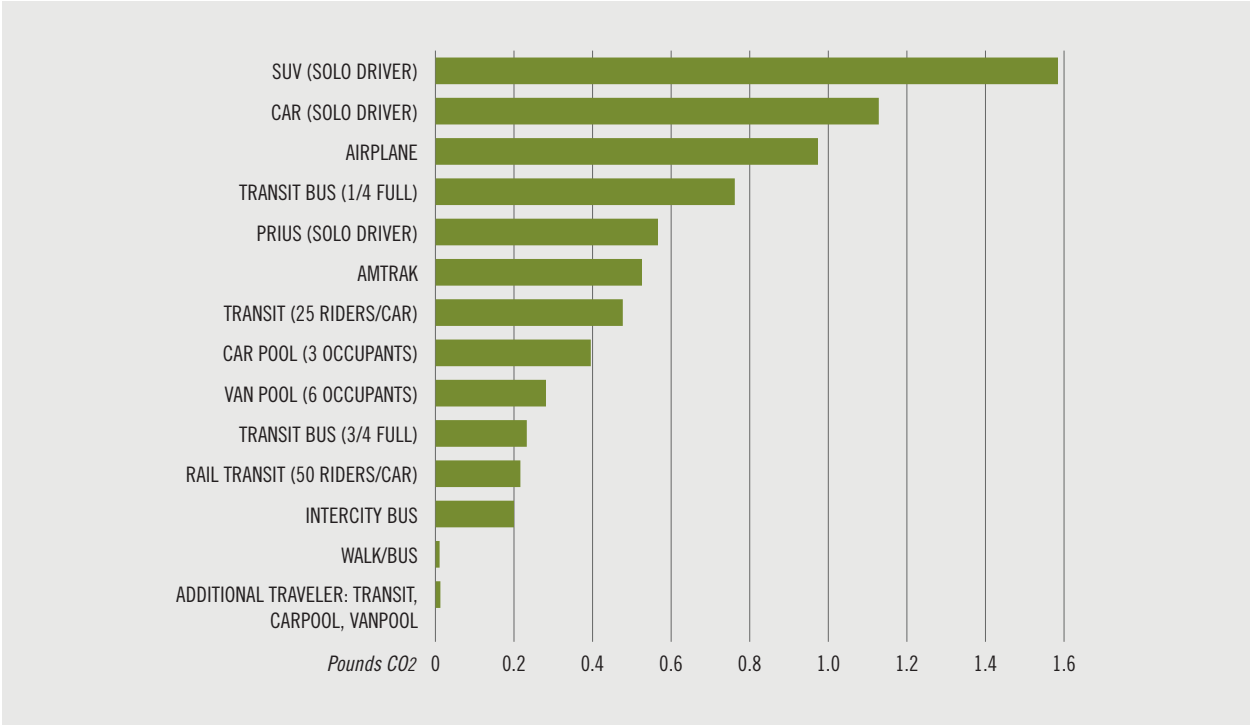
PUBLIC TRANSIT REDUCES GREENHOUSE GAS EMISSIONS AND POLLUTION

Meaningful emissions reductions cannot occur in the transport sector without a massive improvement and expansion of public transit. Heavy rail transit, such as subways, produce approximately 76 percent less greenhouse gas emissions per passenger mile than an average single-occupancy vehicle.[111] Bus and light rail systems are also much more energy-efficient than cars and trucks, producing 33 percent and 62 percent less greenhouse gas emissions per passenger mile than an average single-occupancy vehicle, respectively.[112]

The important role public transit can play in tackling the climate crisis is particularly evident in New York City. New York City's public transit system is one of the most extensive in the world, serving over 8 million people on an average day, reducing the region's carbon footprint by 17 million tons annually, and providing transport that is twice as energy efficient as advanced hybrid cars.[113] Outside New York City, transit systems in smaller cities play an important role in providing an alternative to private vehicles, especially for members of these communities who do not drive, like the young, elderly and disabled.

Still, much more can be done to improve and expand New York City's transit system to better serve residents. New York City is home to more than two

GHG EMISSIONS OF TRANSPORTATION OPTIONS



Sightline Institute. How Low-Carbon Can You Go: The Green Travel Ranking.

million vehicles that accounted for nearly a quarter of the city's total emissions in 2013.[114] Slowing vehicle ownership rates, drastically reducing "vehicle miles traveled" (VMT — the total number of miles traveled by vehicles in New York State annually) and shifting people from private vehicles to public transit is essential to tackling the climate crisis and reducing pollution. This shift can only happen when public transit is an attractive, viable alternative to making trips by private vehicle. In addition to expanding the system to areas currently underserved by public transit, the system also requires improvements. These improvements include "short waits for trains, trains that arrive regularly and reliably, a chance for a seat on the train, clean subways, trains and buses, and clear and understandable announcements that tell commuters what they need to know," according to the New York State Public Interest Research Group State of the Subway report.[115] A lack of funds limits the efficiency and reliability of the system and the subway breakdown rate worsened from 2013 to 2014.[116]

Transit is also important to reducing global warming pollution because it helps facilitate high-density, compact development, conserving land and reducing the distance citizens need to travel to reach destinations.[117] As more and more individuals switch from cars to transit, there is less traffic congestion, which means there are less emissions and pollution from cars stuck in traffic. Congestion is also a major quality-of-life issue and consumes hundreds of hours of New Yorkers' time each year and undermines community safety.[118]

The energy and fuel efficiency of public transit over private vehicles is even greater when public transit is powered by low-carbon sources—e.g. electric trains powered by solar and wind energy.[119] Up until 1959, the New York City Transit Authority (NYCTA) owned and operated its own power generating facilities at 59th and 74th streets.[120] Rather than depending on private, investor-owned utilities to develop renewable power to support public transit systems, the Metropolitan Transit Authority (MTA) could develop and direct its own renewable power generation to power its trains and buses or collaborate with New York State's public power authority, NYPA. This would increase the self-sufficiency of the transit system's power generation as well as reduce costs, which could be reinvested into improving and expanding New York City's transit system.

JOB CREATION POTENTIAL FROM PUBLIC TRANSPORTATION EXPANSION

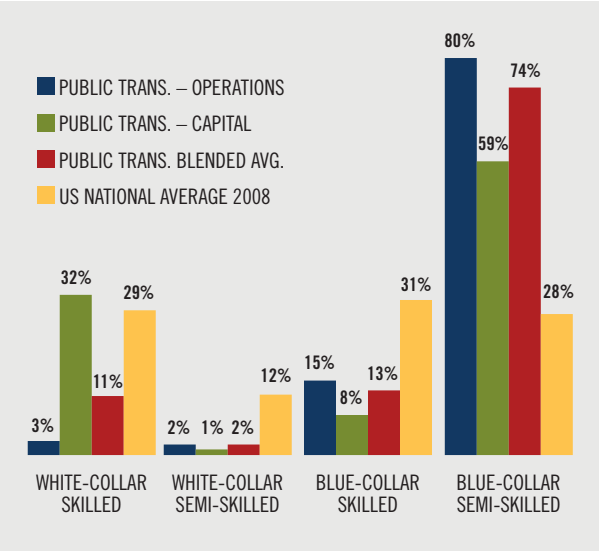
Tackling the climate crisis through a dramatic expansion of public transit can create many good, family-sustaining jobs. Public transit in New York State currently employs 67,445 workers.[121] In general, investment in the operations of public transit creates 21 jobs for every $1 million spent annually.[122] In fact, investment in public transportation creates more jobs per million spent than any other green economy sector.[123]

A study by Smart Growth America found that investment in public transit produces 31 percent more jobs per dollar invested than constructing new roads and bridges.[124] A recent study by the Transportation Equity Network found that if 20 U.S. metropolitan areas shifted 50 percent of their highway funds to transit, it would generate 1,123,674 new transit jobs over a five-year period. In New York City, this shift would create 155,824 new transit jobs.[125] Plus, compared to other industries, the jobs created through transportation investments are about 40 percent more likely to be unionized, making investment in public transportation an excellent way to create good jobs and spur economic development in the state.[126]

Investment in public transit creates a wide array of jobs in manufacturing, construction, and the operations, maintenance and repair of public transit systems. Specifically, jobs would be created for bus and train operators, operating engineers and other construction equipment operators, structural iron and steel workers, elevator installers and repairers, electricians, mechanics, purchasing agents, carpenters, heating, air conditioning, and refrigeration mechanics and installers, construction laborers, brickmasons, blockmasons, and stonemasons, bus drivers, housekeeping and janitorial workers, ticket agents, and in the manufacturing of train and bus bodies as well as component parts. Indeed, major investment in public transit in New York State could revitalize transportation manufacturing and construction in the state.[127]

Important to addressing growing inequality in New York State, investment in public transit is particularly successful at creating blue-collar, semi-skilled jobs because more jobs in transportation go to workers without a college degree and tend to pay better than average.[128] The chart below shows the type of jobs generated by public transit spending. The average hourly wage for transit and intercity bus drivers, for example, was $24.97 in 2015, well above minimum wage.[129] Expanded job creation in public transit would directly address the growing wage and employment gap between workers with and without a college education, a gap that has grown significantly for the millennial generation.[130]

PERCENT OF DIRECT JOB CREATION BY U.S. PUBLIC TRANSIT SPENDING IN TRANSIT OPERATIONS AND CAPITAL EXPENSES



Source: American Public Transportation Association, 2009

PUBLIC TRANSPORTATION IMPROVES PUBLIC HEALTH

Emissions from transportation have major public health effects. Each year, the U.S. spends $40 to $64 billion on illnesses arising from exposure to these gases and particulate matter.[131] In New York State, fossil fuel combustion from the transportation sector contributes to one in 11 residents having asthma (1.3 million adults and 475,000 children) and cardiovascular disease.[132] Plus, a large burden of the impacts of air pollution falls on poor communities, the elderly, and people of color.[133] In New York City, air pollution is a significant environmental threat– 6 percent of deaths annually are attributed to it.[134] Modest improvements in air pollution levels could prevent hundreds of deaths, hospital admissions and emergency department visits.[135]

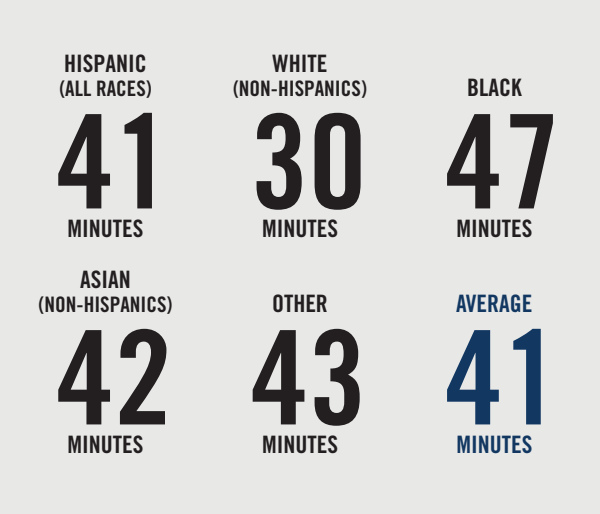
The overreliance of New York State residents on private vehicles rather than public transit is also a major safety concern. Motor vehicle traffic crashes are the leading cause of injury-related death for residents of New York State.[136] Motor vehicle traffic accidents in the state cause 1,430 deaths, 15,251 hospitalizations and 143,611 emergency department visits annually.[137]

TRANSPORTATION EQUITY: PUBLIC TRANSIT IS A LIFELINE TO JOBS, EDUCATION, AND MORE

From an equity perspective, in parts of New York City with no nearby subway line, 44 percent of households do not have access to a private vehicle to travel to work, school, and other basic necessities. As a result, the Pratt Center for Community Development Transportation Equity research shows that many New Yorkers commute more than an hour each way, and nearly 500,000 of them make less than $35,000 a year. The lack of good transit options hits communities of color hardest with black New Yorkers facing commutes 25 percent longer than white New Yorkers. The charts below show the inequity of New York City commute times by race and income.[138]

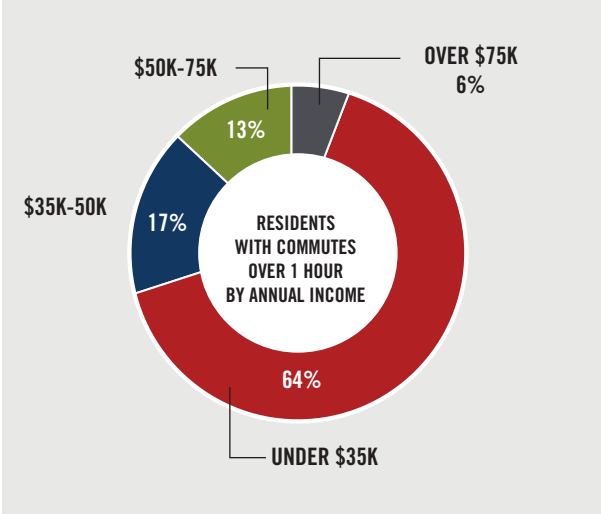
Major improvements and expansions in public transit are also necessary in upstate New York. Nationwide, 5 percent of Americans use public transit to get to work, and, outside of metropolitan areas, this number falls to 1.2 percent.[140] In 2015, it was estimated that 15 million elderly people in the U.S. did not have access to public transportation, severely limiting their ability to participate in society.[141] Indeed, the need to enhance and expand public transit systems is reinforced by the fact, discussed on the next page, that transit ridership is on the rise across New York State and demand for service is growing quickly.

COMMUTE TIME OF NYC RESIDENTS BY RACE



Pratt Center for Community Development (2010, September). Transportation Equity Atlas.[139]

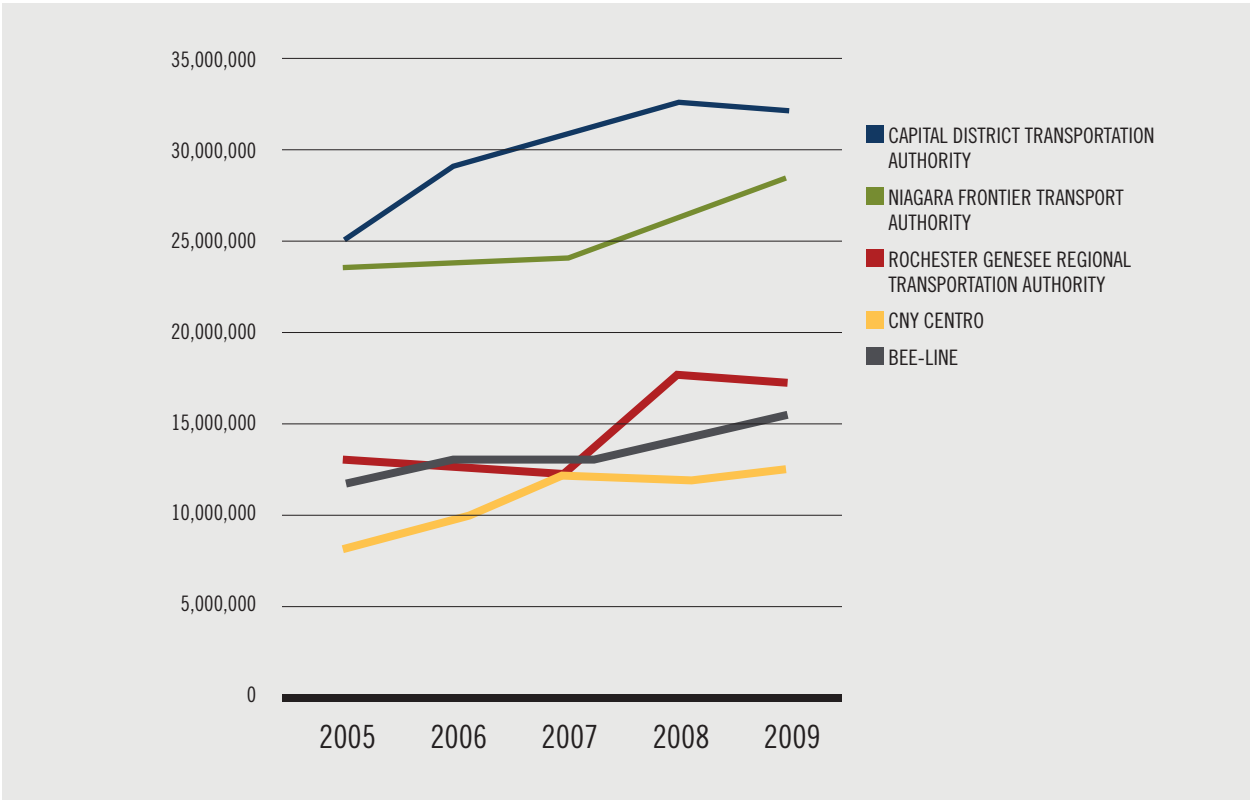
NYC RESIDENTS WITH COMMUTES OVER ONE HOUR BY ANNUAL INCOME



TRANSIT RIDERSHIP IS INCREASING

Over the last decade, transit ridership levels have soared to historic highs. U.S. residents took 10.8 billion trips on public transit in 2014, representing a 39 percent increase since 1995.[142] In New York City, subway ridership grew 4 percent in 2014.[143] Transit ridership in upstate New York communities is on the rise, too – the chart below shows the increase in transit ridership in five Upstate New York transit districts. Bus ridership in Ithaca has set record highs for the last seven years and is growing at 6 percent.[144] In Albany, the Capital District, new record highs were set in 2014 and 2015 and ridership is up 4 percent.[145] Ridership has increased by 3 percent in both Rochester and Syracuse, and other regions across New York State are seeing increases as well.[146] Now is the time to significantly improve and expand New York State's public transit systems to meet this growing demand and drive a shift from private vehicles to pubic transit.

TOTAL ANNUAL RIDERSHIP FOR FIVE UPSTATE NY TRANSIT SYSTEMS, 2005 – 2009



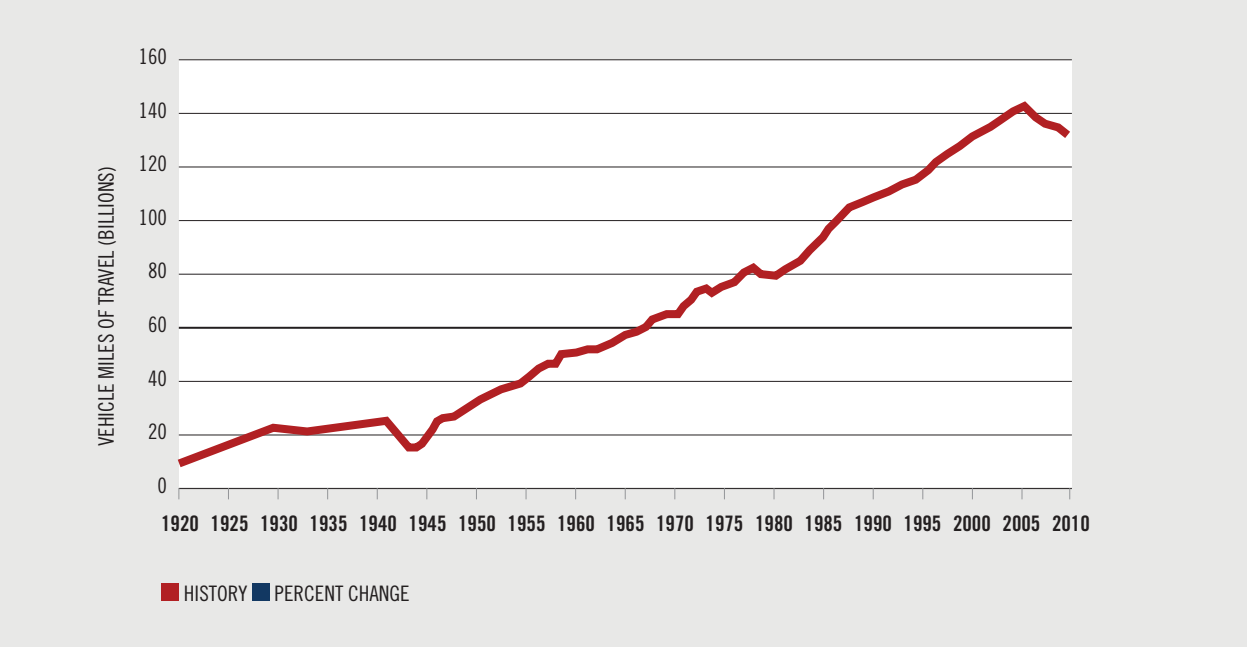
AARP and Tri-State Transportation Campaign (2012, May). Stuck at Home: How Cuts to Public Transit Disproportionately Hurt Seniors and Low-Income New Yorkers

REDUCING EMISSIONS IN NEW YORK STATE'S TRANSPORTATION SECTOR

Emissions produced by the transportation sector in New York State are quickly increasing, now making up 42 percent of New York State's total greenhouse gas emissions.[147] While emissions from other sectors have slowed, emissions from New York State's transportation sector have grown 14 million metric tons (MMT) in the last two decades to 75.4 MMT in 2013.[148] Emissions from this sector are more than the total emissions of some countries, including those of Norway, New Zealand, Greece or Bangladesh.[149]

Cars and trucks produce about two-thirds of New York State's transportation emissions. A steady increase in "vehicle miles traveled" (VMT) is largely responsible for the continued surge in New York State's transport emissions.[150] Even with a greater share of efficient, electric, and hybrid vehicles on the road, the current and projected increase in New York State's VMT from population growth and greater economic activity outpaces these efficiencies, causing transport emissions to rise. New York State's total VMT increased from 49.78 billion per year in 1960 to 131.25 billion in 2010.[151] The chart below shows the increase in NYS VMT from 1920 to 2010. A typical passenger vehicle creates about 8,887 grams of CO_2 for every gallon of gas burned and 4.7 metric tons of CO_2 per year.[152]

TOTAL NUMBER OF MILES TRAVELED BY VEHICLES IN NEW YORK STATE ANNUALLY, 1920-2010



New York State Department of Transportation.

Without a major shift in policy and investment, New York State's transportation emissions are expected to grow to 99 MMT by 2030 – a rate of growth that could help lock-in catastrophic climate change.[153] New York State's transportation emissions need to level off and decrease to 12 MMT by 2050 to meet science-based emissions reduction targets.

Investing in the maintenance, enhancement, and expansion of New York State's approximately 130 public transit systems is key to reducing VMTs and global warming pollution. Efficient, affordable and high-quality public transit provides an attractive alternative to private vehicle use. As previously explained, public transit is also a lifeline to jobs, education, healthcare, and other basic necessities for low- and middle-income communities that cannot afford the financial burden of a car. Additionally, investment in public transit creates many good jobs – more jobs per dollar invested than most other sectors of the economy.[154]

CASE STUDY

TRANSPORT WORKERS UNION LOCAL 100 ORGANIZES LOW-CARBON, CITI BIKE SERVICE

As demand for public transit has spiked in the last decade, demand for another form of low-carbon transport – "bike share" programs that provide bicycle use for short periods of time - has also increased. Bike share programs provide a zero-carbon mode of transport in urban areas and help fill gaps in public transit networks, often solving "the last mile" problem for people trying to access public transit or other destinations.

New York City's bike share program, Citi Bike, has been improved recently by the unionization of Citi Bike workers with Transport Workers Union Local 100. The first collective bargaining contract was signed in July 2015, covering 200 workers employed by New York City BS-Motivate, the operator of New York City's bike share program and others across North American cities.[155] TWU Local 100 represents mechanics, technicians, call center agents, and the workers who supply stations with bicycles, called "re-balancers."[156]

The four-and-a-half year contract provides workers with a 20 percent wage increase over the contract period, eight weeks of paid parental leave, paid annual vacation, medical benefits as well as predictable and stable schedules, and a seniority-based work assignment system.[157] An empowered Workers' Council was also created that meets regularly with New York City BS-Motivate management to propose operational changes and resolve workplace problems.[158]

Citi Bike was launched in May 2013.[159] This system contains thousands of bikes at hundreds of stations throughout New York City. To date, over 20 million miles have been traveled through the Citi Bike system.[160] Citi Bike is a public-private partnership between the New York State Department of Transportation, Citibank, MasterCard and Motivate, a private bike share operator.[161] Publicly-owned and operated bike share programs can be a better way to protect workers' rights, offer affordable (or free) short-term bike access, and meet the common good of reducing emissions. Public bike share programs provide successful, effective service in a number of other U.S. and international cities, like Hangzhou, China, where the public transit system invested $26 million to develop a system with over 60,000 bikes and nearly 3,000 stations.[162]

CLIMATE JOBS PROPOSAL FOR THE TRANSPORATION SECTOR

RECOMMENDATIONS

1 BRING NEW YORK CITY PUBLIC TRANSIT TO A STATE OF GOOD REPAIR AND EXPAND SERVICE

Maintaining and updating America's largest transit system reduces automobile use and global warming pollution while providing 15 million people in the New York metropolitan area with quick, safe, and efficient access to jobs, schools, hospitals and other basic needs.[163] The city and state would need to make a $20 billion investment to bring the system to a "state of good repair" and keep it safe and reliable.[164] Investment in the operations of public transit creates 21 jobs per million dollars spent, making a major investment in our public transit system an excellent way to tackle the climate crisis and create many high-quality jobs.[165]

The MTA also needs to quickly expand public transit service to accommodate growing ridership and overcome current constraints in the system.[166] These expansions include additional track capacity, signal upgrades, greater flexibility and integration of various modes of transit and additional select bus service routes in the greater New York metropolitan region.[167]

2 CONSTRUCT AND IMPROVE ADIRONDACK AND EMPIRE HIGH-SPEED PASSENGER RAIL CORRIDOR BETWEEN ALBANY AND BUFFALO AND BETWEEN NEW YORK CITY AND MONTREAL

Construct a 247-mile passenger rail corridor between Albany and Buffalo and improve the section from New York City through Albany to Montreal.[168] With these improvements and expansions, the Adirondack and Empire corridors' annual projected ridership would increase from 1.4 million to 4.3 million people. This project would cost approximately $14.71 billion and create approximately 297,000 jobs during the ten-year construction phase. Operation and maintenance of the Empire West Corridor, from Albany to Buffalo, is expected to cost $304 million annually and support 13,530 permanent transit jobs. The construction and improvements to the Adirondack and Empire corridors could reduce CO_2 emissions by 37.9 MMt of CO_2, more than half of the total emissions reduction required in the transport sector by 2050.[169]

Improving and expanding the state's transportation infrastructure to meet climate and job creation goals will take major financial investments. In the proposals above, we provide detail where available for estimates of project costs, emissions reduction potential and job creation. It is important to note that full cost estimates of many investments proposed are not readily available. As state officials make consequential decisions about transportation and other infrastructure investments, the cost of new and improved transportation infrastructure, focused on meeting important climate and job creation goals, will need to be weighed alongside existing needs and commitments.

3 ESTABLISH A BUS RAPID TRANSIT PROGRAM IN NEW YORK STATE

Bus Rapid Transit (BRT), also known as a "surface subway," provides faster and more efficient service than an ordinary bus, costing far less than building an above ground railroad. Establishing and expanding BRT routes throughout New York State is an effective way to shift people from cars to mass transit and reduce New York State's growing transport emissions. One person shifting a 20-mile automobile roundtrip commute to existing public transportation reduces their annual CO_2 emissions by 4,800 pounds per year, or 10 percent a year for a typical two-adult, two-car household.

UPSTATE NEW YORK: CONDUCT A FEASIBILITY STUDY OF UPSTATE BRT ROUTES

A feasibility study of BRT routes upstate could prioritize routes that link low- and middle-income neighborhoods, currently underserved by transportation options, to job opportunities. BRT can also help rejuvenate local economies and encourage high-density development near bus routes, which also helps to reduce energy consumption and emissions.[170]

NEW YORK CITY: ADD TWO NEW BUS RAPID TRANSIT ROUTES IN NEW YORK CITY-BUSH TERMINAL TO JFK AND EAST BRONX TO EAST HARLEM

New York City could expand BRT service from Bush Terminal to JFK Airport and the East Bronx to East Harlem. Building, maintaining, and operating these BRT routes would create approximately 400 permanent transit jobs and connect workers along the route with access to an estimated 40,000 jobs.[171] In total, these two BRT routes would reduce CO_2 emissions by 106,166 tons per year.

The Pratt Center for Community Development has identified six additional BRT routes that would have a significant impact in terms of emissions reductions, job creation and connecting low- and middle-income communities to jobs.[172] These routes are LaGuardia to New Haven and Rockaway; Hunts Point to Flushing and Jamaica; Staten Island's North Shore; Far Rockaway to Jamaica; Sunset Park to JFK; and Mid-Staten Island to Manhattan.[173]

WHERE ACTION COULD START

PUBLIC POWER = A PUBLIC-SECTOR APPROACH TO REVERSING INEQUALITY AND COMBATTING CLIMATE CHANGE

Reducing emissions through the development of solar and wind, building retrofits, and much more, is a public good – the well-being of all people depends on reducing emissions to avoid the worst impacts of climate change.

Among legislated and governmental climate initiatives, private-sector, pro-market approaches to reducing emissions (tax incentives, cap-and-trade systems, carbon taxes) have been widely-used and considered. Public sector approaches, where low-carbon activities are directed, funded and even developed through public entities, can be utilized, too, and may be a very effective and efficient way to meet climate and job creation goals.[174]

The following section puts forth for discussion one tactical and implementable approach for launching into action ideas from the preceding report. Namely, focusing on how the recommendations for the energy sector and one for the building sector, might be implemented through New York's public power agency, the New York Power Authority (NYPA). We focus on implementing climate jobs policies through the public sector as one approach to help ensure the creation of good climate jobs, while keeping renewable energy production and distribution as a public good. A key objective is accessibility to all New Yorkers, especially low-income and communities of color who typically are among the least able to absorb increased energy costs and have poor access to alternative energy sources.[175] A motivation for presenting a public-sector approach is to encourage further study and analysis, giving it the attention that many private sector approaches have already received. A full exploration and examination of other public and private sector approaches are beyond the scope of this report and left for future discussion.

CLIMATE JOBS PROPOSAL FOR THE ENERGY SECTOR

1 INSTALL 2 GW OF SOLAR ENERGY ON 100 MILLION SQUARE FEET OF PUBLIC SCHOOL ROOFTOPS BY 2025 THROUGH THE NEW YORK POWER AUTHORITY, THE PUBLIC POWER UTILITY

The New York Power Authority (NYPA) is already undertaking solar production but, to date, NYPA has installed only 4.1 MW of solar.[176] Significantly expanding programs like the K-Solar program, which creates a purchasing pool and uses the large scale of work to increase cost efficiency, would save school districts money and reduce greenhouse gas emissions.[177]

Assuming 14 jobs are created for every $1 million spent on solar energy installation,[178] at least 72,100 jobs would be created, with the potential for over 200,000 more in ten years.

Any additional electricity generated through NYPA's installations could be sold to utilities across the state. NYPA, or the appropriate managing agency, could ensure that the solar installation work is done by public employees with proper oversight and accountability.

2 INSTALL AN ADDITIONAL 2 GW OF UTILITY AND COMMERCIAL-SCALE SOLAR PROJECTS THROUGH THE NEW YORK POWER AUTHORITY

To match California's efforts, NYPA could install 2 GW of solar energy in addition to the solar energy generated on top of public schools within ten years for a total of 4.1 GW, which is roughly one quarter of all electricity demand in the state.[179] In addition to on-site building solar installations, New York State would need utility-scale solar arrays or solar thermal plants to meet the state's energy needs. NYPA can install large solar arrays or build large solar thermal plants throughout the state. The cost of utility-scale solar installations has fallen by 50 percent.[180] An estimated 24,000-67,000 jobs could be created.[181]

3 INSTALL 7.5 GW OF OFFSHORE WIND BY 2050 THROUGH THE NEW YORK POWER AUTHORITY

The Atlantic Ocean off the coast of New York State has the potential to support up to 38 GW of clean, wind-driven energy.[182] The Long Island offshore wind project could generate 700 MW at a cost of $821 million and prevent 1.08 million tons of CO_2 from being released annually.[183] The 700 MW project is estimated to create 17,000 job-years, which equals one year of one job, and $1 billion in wages. A ten-fold increase in offshore wind generated would result in 7 GW of electricity, nearly half of New York State's annual electricity demand and result in the creation of 170,000 job-years and $10 billion in wages.

With the 25 percent of additional solar generated from NYPA, the existing 20 percent of renewable energy currently being generated, and 7.5 GW of offshore wind, New York State would be almost completely powered by renewable energy by 2050. Onshore wind production and residential solar installation could provide the remaining 1.3 GW needed for a 100 percent clean energy-fueled economy.

CLIMATE JOBS PROPOSAL FOR THE BUILDING SECTOR

1 RETROFIT ALL PUBLIC SCHOOLS AROUND THE STATE TO REACH 100 PERCENT OF THEIR ENERGY EFFICIENCY POTENTIAL BY 2025

Retrofitting schools is an easy way to reduce energy use and create good, family-sustaining jobs. Schools are often hubs within communities and making them as energy-efficient as possible is good for students, families, and communities. Energy use in public schools can be reduced by 500–1,200 giga-watt hours (GWh), which would remove 1.4 million metric tons of CO_2 and create between 12,800–18,400 jobs.

The New York Power Authority (NYPA) is already retrofitting schools. To date, NYPA has completed 641 total retrofit and solar projects in 1,286 primary and secondary schools installing 330 kW of solar capacity.[184] These projects have saved nearly $37 million annually with a project cost of $404 million.

However, the potential for energy savings is much greater than what has been accomplished to date and efforts must be drastically scaled up to meet our carbon emissions and job creation goals. By NYPA's own calculations, an additional 500–1,200 GWh of additional energy efficiency savings could be realized through a large-scale school retrofit plan.[185] Annually, 1.4 million metric tons of CO_2 equivalent could be removed, the equivalent of removing 300,000 cars from the road and reaching the amount of CO_2 emissions reductions needed for the entire commercial sector.[186]

NYPA estimates that between 12,800-18,400 jobs could be created by pursuing 100 percent of the energy efficiency potential. To meet these job creation targets, any caps on the number of public sector employees must be expanded or lifted to prevent energy efficiency and solar installation work from being sub-contracted. Using public employees would keep expertise and experience in-house and ensure a trained and ready workforce able to complete future work quickly and efficiently. In addition, a set number of new staff must be dedicated to energy efficiency work. The total cost for reaching 100 percent of the energy efficiency potential is estimated at between $1.1 and $1.5 billion.

NYPA is the ideal entity to pay for and oversee public schools retrofit and solar installation work (with actual installation done through NYPA or contracted separately). Addressing the climate crisis and reducing emissions and pollution is a common good, necessary for the health and well-being of all New Yorkers. Therefore, this work could be done through the public sector, with citizen oversight and direction, so the assets of energy efficiency and solar power can be held collectively, not privately. NYPA also has the ability to raise its own funds by issuing low-interest bonds.

While alternatives to driving these energy and building recommendations through the NYPA do exist, we leave discussion of those alternatives, as well as a detailed cost and benefit analysis, to future consideration.

2 REDUCE ENERGY USE IN ALL PUBLIC BUILDINGS BY 40 PERCENT BY 2025

To reach New York State's carbon emissions reduction target, all buildings, public and private, must be retrofit within a short time period. Governor Cuomo's Executive Order 88 calls for a 20 percent improvement in energy efficiency in all State Executive government buildings by 2020.[187] This proposal doubles the Governor's target and aims to achieve a 40 percent reduction in energy use by 2020 in all public K-12 schools.

Currently, the Build Smart NY program requires public buildings to reduce their energy use by 20 percent below 2011 levels by 2020.[188] The cost of the retrofits will depend on building type and can be based off the state's comprehensive energy audit. Ultimately, the retrofits can be a cost savings measure as they decrease the state's electricity costs. The state spends $500 million annually on electricity costs.[189] A 40 percent reduction would save the state $200 million annually. State-owned buildings consume 3,000 GWh per year, which should be reduced by 1,200 GWh by 2020.[190]

In one fiscal year, the state reduced its energy use-intensity by 4.7 percent, which saved $50-$60 million and cut 130-180 thousand tons of greenhouse gas emissions.[191] By accelerating the rate of energy reduction, the state can easily reduce overall energy use in public buildings by 40 percent below 2011 levels by 2020. In addition, the state would save hundreds of millions of dollars in energy costs, create over 12,000 jobs, and reduce the level of greenhouse gas emissions by over 16 million tons.[192]

3 STREAMLINE AND EXPAND ACCESS TO RESIDENTIAL RETROFIT PROGRAMS

Retrofitting just half of New York City's small homes would save homeowners $255 million annually and create 1,500 jobs.[193] However, the complexity of residential retrofits prevents wide-scale adoption of retrofit programs and measures. Programs like Pratt Center's Retrofit Standardization Initiative bundle efficiency work and provide a simple package of five energy efficiency measures that can be implemented in hundreds of thousands of similar small homes. Such packages minimize cost, time, and complications, achieving the scale of emissions reductions necessary to address the climate crisis.[194]

For New York City, the starter retrofit packages was estimated to cost on average $3,312, which would result in a 14 percent annual utility savings. A similar package should be adopted for homes in upstate New York to achieve statewide residential retrofits. The housing stock in upstate New York is different from that of New York City, therefore cost estimates will have to be adjusted accordingly.

CLIMATE JOBS PROPOSAL FOR THE TRANSPORTATION SECTOR

1 BRING NEW YORK CITY PUBLIC TRANSIT TO A STATE OF GOOD REPAIR AND EXPAND SERVICE

Maintaining and updating America's largest transit system reduces automobile use and global warming pollution while providing 15 million people in the New York metropolitan area with quick, safe, and efficient access to jobs, schools, hospitals and other basic needs.[195] The city and state would need to make a $20 billion investment to bring the system to a "state of good repair" and keep it safe and reliable.[196] Investment in the operations of public transit creates 21 jobs per million dollars spent, making a major investment in our public transit system an excellent way to tackle the climate crisis and create many high-quality jobs.[197]

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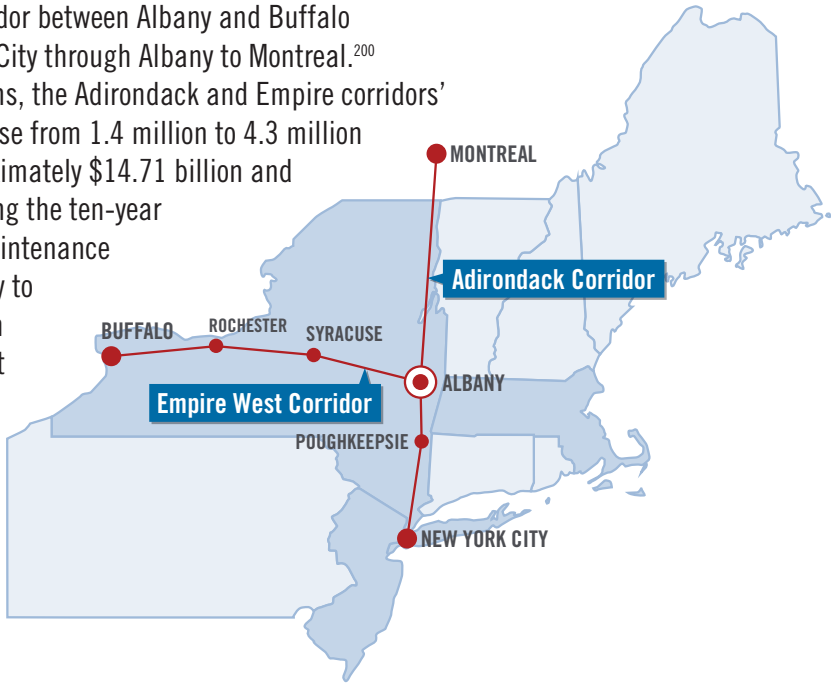

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New York City should expand BRT service from Bush Terminal to JFK Airport and the East Bronx to East Harlem. Building, maintaining, and operating these BRT routes would create approximately 400 permanent transit jobs and connect workers along the route with access to an estimated 40,000 jobs.[206] In total, these two BRT routes would create 400 new, permanent jobs and reduce CO_2 emissions by 106,166 tons per year. [207]

The Pratt Center for Community Development has identified six additional BRT routes that would have a significant impact in terms of emissions reductions, job creation and connecting low- and middle-income communities to jobs.[208] These routes are LaGuardia to New Haven and Rockaway; Hunts Point to Flushing and Jamaica; Staten Island's North Shore; Far Rockaway to Jamaica; Sunset Park to JFK; and Mid-Staten Island to Manhattan.[209]

CONCLUSION

New York has the opportunity to lead the nation in creating a clean energy future powered by high-road climate jobs. The crises of climate change and inequality call for a bold, audacious response if we are to drastically reduce pollution and emissions, create many good jobs, and build more resilient and equitable NY communities.

To begin the difficult conversations necessary to take such bold action, The Worker Institute at Cornell ILR undertook a three-year process convened through its Labor Leading on Climate Initiative (more information about this initiative is included at the back of the report). The Worker Institute brought together nearly twenty unions in the building, energy and transport sectors to explore and develop a new vision and approach for simultaneously addressing climate change and inequality. This report represents a first-step in this process and in outlining a new approach and strategy to building an equitable low-carbon economy in New York State.

The ideas in this report are one path New York could take to lead nationally and internationally in implementing a fair, ambitious and equitable approach to climate change.

Building on the proposals presented here, New York State could expand a climate jobs program to other important sectors like food, waste and agricultural systems, manufacturing, resiliency measures, and more. To advance policy development related to climate protection and job creation, future studies should undertake a robust cost-benefit analysis of this report's recommendations in comparison to other potential high-impact strategies.

Though there are many ways to attempt to make these types of changes, the proposals presented in this report can reduce New York State's greenhouse gas emissions and create good climate jobs that provide family-sustaining wages and benefits to address rising income inequality. Implementing an audacious climate jobs program would require substantial investment from the state, labor unions, communities, and climate advocates across the state. But, it is an investment well worth the cost to combat climate change and provide new, meaningful job opportunities to the citizens of New York State.

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203. Assumes a 20 mile commute reduces CO2 emissions by 4,800 pounds of CO2. Take half of the 237 mile Adirondack and Empire Corridor commute (123 miles) times 4,800 pounds equals 28,800 times 2.9 annual ridership equals 83,520 divided by 2,200 pounds of CO2 equals 37.9 MMt emissions reduced. American Public Transportation Association. (2008, February). Public Transportation Reduces Greenhouse Gases and Conserves Energy. [Brochure] Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/greenhouse_brochure.pdf

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THE WORKER INSTITUTE

NEW YORK STATE PROJECTS

BUILDING A FAIR ECONOMY THAT WORKS FOR NEW YORK

ABOUT THE REPORT AND THE LABOR LEADING ON CLIMATE INITIATIVE

In April 2013, the Labor Leading on Climate initiative began a multi-year, multi-dimensional research, education and policy project to develop a vision and framework for simultaneously addressing climate change and inequality in New York State through high-impact job creation strategies.

Over the past three years, Lara Skinner has conducted statewide outreach to over 75 leaders of the labor and environmental movements as well as policymakers and experts in the climate, energy and labor fields to better understand the challenges and opportunities that climate change and climate protection efforts present to New York workers and unions. Building on these one-on-one conversations, The Worker Institute has also regularly convened and facilitated high-level roundtable discussions among labor leaders to help broaden and deepen their understanding and engagement in climate and energy issues.

Because the debates around climate change are often defined as "jobs versus the environment" or "workers against environmentalists," this initiative represents a historic breakthrough in that it reframes the public debate on climate change to forge a link between worker protections, growing inequality and climate change. It also successfully brings together unions that have not traditionally been engaged in climate protection efforts.

This report has been informed by the institute's three year initiative and is the first in a series of reports that the institute expects to produce as part of the broader Labor Leading on Climate initiative. The recommendations in this report draw on the best available data on job creation and greenhouse gas reduction metrics and the research supporting the data is cited throughout the report.

For more information about this initiative, please contact Lara Skinner at lrs95@cornell.edu.

This initiative is possible because of the support of the State of New York. The opinions, findings and/or interpretations of data contained herein are the responsibility of the authors and do not necessarily represent the opinions, interpretations or policy of the State of New York or of the ILR School, Cornell University.

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The authors, of course, take full responsibility for any shortcomings of the report.

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THE WORKER INSTITUTE

ADVANCING WORKER RIGHTS AND COLLECTIVE REPRESENTATION

The Worker Institute at Cornell, an institute of the ILR School, engages in research and education on contemporary labor issues, to generate innovative thinking and solutions to problems related to work, economy and society. The institute brings together researchers, educators and students with practitioners in labor, business and policymaking to confront growing economic and social inequalities, in the interests of working people and their families. A core value of The Worker Institute is that worker rights and collective representation are vital to a fair economy, robust democracy and just society.

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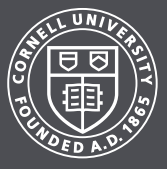

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