RESTART SOLAR

How NYC Can Renew Its Solar Program To Benefit Workers & Community

A Report by the Climate Works for All Coalition

CLIMATE WORKS FOR ALL

ABOUT THIS REPORT

About the Climate Works for All Coalition:

Climate Works for All is a broad coalition of labor, environmental justice, community, faith and environmental groups united to ensure that efforts to address climate change in New York City also create good, career-track jobs and prioritize low-income, climate-vulnerable communities. Climate change present immense challenges, yet also offers the opportunity to pursue policies that will have the biggest impact – both environmental and economic – on our communities. We believe New York City can continue to elevate the voices of residents and communities on the front-lines of a growing movement for climate justice, and in the process, become the national leader on climate jobs and resiliency. In December 2014, the coalition released Climate Works for All: A Platform for Reducing Emissions, Protecting Our Communities, and Creating Good Jobs for New Yorkers. This agenda offered a roadmap for reducing New York City's greenhouse gas emissions 80 percent by 2050, and reducing inequality.

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Executive Summary

New York City intends to install 100 MW of solar on the rooftops of public buildings by 2025. Over the next nine years, this upgrading of public infrastructure could provide significant benefits for New Yorkers, and not just in terms of reducing emissions. These solar installations, impacting over 300 public buildings, can create thousands of good, union jobs for New York residents, and significantly reduce the City's electricity bill, freeing up funds for new and innovative programs that generate wealth in our communities. Despite the clear opportunities for leveraging this solar program to the benefit of communities and workers, this report finds that New York City's public rooftop solar energy initiative can do more to address the needs of our City's low-income communities and workers.

We urge the City to restart its solar program with stronger equity provisions that we believe will more effectively meet the principles articulated in its sustainability plan, OneNYC.

> OneNYC states:
>
> "We have made equity an explicit guiding principle—a lens through which we view all of our planning, policymaking, and governing. Equity means we ensure that every New Yorker has equal access to opportunities to reach his or her full potential and to succeed."[i]

Fortunately, the City's solar program is just now ramping up, and the City has time to address these concerns in future program design.

Placing equity at the center of the City's solar program means requiring high-road labor standards. High-road standards include good jobs, and local hiring programs targeted to low income communities, communities of color, and women, offering them opportunities to become an important part of our City's climate workforce. Placing equity at the center also means investing in environmental justice and low-income communities. Energy savings derived from the transition to renewable energy should be used to fund critical services and programs benefitting communities impacted by environmental pollution, public disinvestment, and climate change.

Finally, the report examines the Power Purchase Agreement model used by the City to implement its public solar initiative, and urges the City to assess a full range of options, including public financing, public control, and public ownership of solar power projects. The City should utilize the financing tools and strategies that provide maximum benefits to the City and its residents.

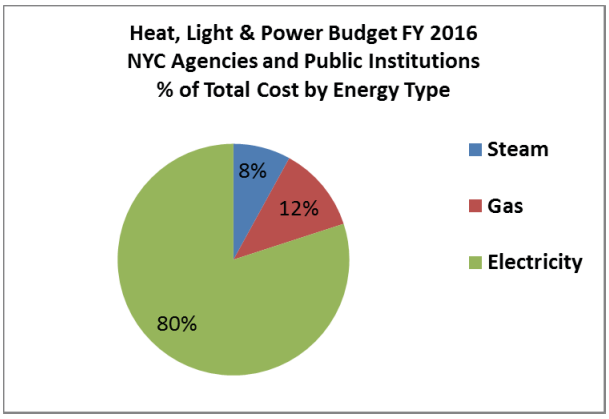
Solar Installation: Bronx Lab School
Location: 800 East Gun Hill Road, Bronx, NY
System Completion Date: January 2016
System Size: 132 kW

Introduction

In 2014, as part of its overarching legislative mandate to reduce City emissions 80% by 2050 (known as 80x50), New York City committed to installing 100 MW of solar energy on public buildings by 2025.[ii] In order to achieve this 100 MW goal, the City will be required to install solar panels on over 300 public buildings over the next decade. These 300 buildings are a small fraction of the over 4,000 City owned and leased properties in New York City, so there is still great potential to do more.[iii] The City currently has 8.8 MW of solar energy generation capacity and is expected to have an installed capacity of 25 MW by 2019.[iv] In order to successfully meet its 100 MW goal by the 2025 deadline, the City will have to rapidly ramp up installations to complete the remaining three-quarters of its overall goal, or 75 MW, in just six years.

These solar projects will not only reduce greenhouse gas emissions; they also present an opportunity for the City to use climate investments to mitigate deep socio-economic inequalities in our City. OneNYC expresses a commitment to utilizing the City's climate change investments to lift New Yorkers out of poverty (see sidebar, below).[v] Our City's municipal rooftop solar installations offer the perfect opportunity to create good, career-path jobs for New Yorkers who have been left behind by our current economy, and to train a new generation of "climate workers" who will be at the forefront of building a truly sustainable New York.

These investments in our communities are essential given that New York City is one of the most unequal municipalities in the United States.[vi] Harsh environmental and economic realities shape the everyday experiences of New York City residents. New Yorkers had first-hand experience of the catastrophic impacts of climate change through Hurricane Sandy, and face increasingly extreme weather and rising seas.[vii] Bold investments in renewable energy are an opportunity for the City to reduce emissions, build more resilient neighborhoods, and create good local jobs.



Generating 100MW of solar energy will decrease the City's staggering energy bill and free up these funds for much-needed programs and services in our City. In FY 2016, the City budgeted $744 million to pay for heat, light and power in City-owned buildings. Electricity expenditures make up 80% of this budget; steam and gas comprise the remainder.[viii] Rooftop solar and other renewable energy installations will reduce electricity demand and should play a key role in driving down the City's utility budget.

New York City's municipal rooftop solar program offers an opportunity to set the gold standard for linking solutions to climate change and inequality. This report explores the opportunities and challenges inherent in the City's current rooftop solar plan. Solar should only be the beginning, part of a broader strategy to meet ambitious emission goals, create good jobs, and generate long run, substantive cost savings for the City that can be reinvested into programs and services for our communities.

Excerpts from OneNYC, NYC's 80x50 plan, on inequality and climate change:

"We have made equity an explicit guiding principle—a lens through which we view all of our planning, policymaking, and governing. Equity means we ensure that every New Yorker has equal access to opportunities to reach his or her full potential and to succeed."

"The City can leverage its purchasing power and investments to train and employ New Yorkers, including those investments envisioned by OneNYC. Each year, the City spends billions of dollars on infrastructure, goods, and services. We can promote targeted hiring to employ and train New Yorkers of all skill levels and qualifications, including those who experience the greatest challenges to stable employment. [. . .] In addition, the City will support the use of Project Labor Agreements to increase the number of New York City residents that have access to middle-class jobs in the unionized construction industry."[ix]

In practice, however, the City's solar program has not always resulted in the creation of good, local jobs or maximized benefits to low-income communities. There is still time to change course, since the City's transition to renewable energy has only just begun. As the City completes its solar assessment under Local Law 24 at the end of this year, and turns to create a more comprehensive roadmap of rooftop solar on public buildings to reach 100 MW by 2025,[x] the City must give equal focus to achieving equity as it does to maximizing its solar power capacities.

Ensuring that the City's Public Solar Initiative Benefits Workers and Communities

While the City's goal to install solar on our public buildings is commendable, New York City needs more than just solar panels. New York City should leverage these investments to create good, local jobs, and to expand funding for environmental justice and low-income communities.

Placing equity at the center of renewable energy projects on public land means that the City will:

- **Create a robust targeted local hire program** and pathways to apprenticeship and civil service titles, lifting up communities, and creating well-paying jobs for residents.
- **Protect the public interest and ensure good and safe working conditions for workers** by making all installations subject to a project labor agreement. This is irrespective of whether the project is financed publicly or privately.
- **Conduct comprehensive and transparent cost/benefit analyses** of different financing mechanisms for renewable energy projects to secure the best deal for the City. Private funding should only be chosen when the City can demonstrate there are both short- and long-run benefits to utilizing them instead of direct public funding.
- **Share the savings from solar installations** with the communities and/or sites in which the projects occur; this can mean investing in solar vocational training programs for youth, investing in deep retrofits for energy efficiency in existing buildings, and more, but should be determined with community stakeholder input and participation.

Addressing Environmental Justice from the Outset - Planning for Equitable Investments

The rooftop solar energy initiative on public buildings is an opportunity to address the inequitable burdens facing environmental justice communities. Low-income neighborhoods and communities of color in New York City deal with the siting and clustering of polluting fossil fuel-based energy infrastructure that emit high levels of greenhouse gases and co-pollutants that cause many public health issues. Environmental justice communities are also the most vulnerable to climate change impacts – including extreme heat. The NYC Climate Justice Agenda highlights that heat-related deaths are more likely to occur in these vulnerable communities. Some neighborhoods in Brooklyn have a particularly high heat vulnerability index, and also fall into Con Edison's Brooklyn Queens Demand Management program area that has a projected energy demand shortfall within the next few years. This limited energy infrastructure capacity in communities most vulnerable to heat will be exacerbated by increased energy demands due to the need for cooling during heat waves. For a successful and equitable solar energy initiative in New York City, environmental justice communities must be at the forefront of the transition to a renewable energy economy.[xi] *The need for equitable solar siting and investments in environmental justice communities will be discussed in a follow up report to be released later this year.*

Solar Installations on Public Property Should Create Good, Local Jobs

Infrastructure projects on public land, typically referred to as public works, are almost always subject to quality jobs standards in New York City, such as prevailing wage requirements and project labor agreements. Prevailing wage requirements ensure workers are paid a fair wage for their work, while project labor agreements (PLAs) ensure these projects create good, union jobs with adequate training and safety measures. However, the City's last two contracts for solar rooftop installations, while they have been subject to the prevailing wage law, have not been subject to the City Agency PLA.[xii]

PLAs typically ensure that all workers on the job have access to the benefits of a unionized workplace, including career-track jobs, health benefits, pensions, good training through apprenticeship programs, and safe working conditions. These safety provisions are especially important given that most construction fatalities occur at non-union worksites. In fact, a recent study noted that 79% of construction fatalities in New York City were at non-union worksites.[xiv]

Making sure these worker protections and standards are in place through the PLA is critical, given that future public solar installations will create a significant number of jobs. So far, the City has invested around $100 million through its PPA contracts to install or begin installation of about 25 MW of solar energy. Extrapolating out this expense, it will likely cost a total of $400 million to achieve the 100 MW goal by 2025. According to industry metrics for job creation, $400 million should create nearly 4,000 jobs in New York City.[xv] Most of these jobs will be created over the next nine years, between 2016 and 2025, meaning there should be nearly 500 workers employed each year as the result of municipal rooftop solar installations.

Why Are Projects Labor Agreements Valuable?

"PLAs…maximize project stability, efficiency and productivity and minimize the risks and inconvenience to the public that often accompany public works projects…Project Labor Agreements make sense for public works projects because they promote a planned approach to labor relations, allow contractors to more accurately predict labor costs and schedule production timetables, reduce the risks of shoddy work and costly disruptions, and encourage greater efficiency and productivity."

In addition, PLAs "are consistent with the underlying purpose of New York State's competitive bidding laws: to protect public funds by obtaining the best possible work at the lowest possible price, and to prevent favoritism, improvidence, fraud and corruption in the awarding of public contracts."[xiii]

Installing solar power does not just impact electrical workers, it also implicates the following job categories: electrical engineers, industrial machinery mechanics, welders, metal fabricators, electrical equipment assemblers, construction equipment operators, installation helpers, laborers, construction project managers, engineers and architects.[xvi] Some of this workforce, such as construction project managers, engineers and architects, currently work in unionized, public sector jobs. It is important and beneficial for the City to support internal staff training and development so public sector workers can develop the necessary skills enabling the City to implement renewable energy projects with its own workforce.

Solar Installation: The Kathleen Grimm School for Leadership and Sustainability
644 Bloomingdale Road, Staten Island, NY
System Completion Date: September 2005
System Size: 600 kW

As good jobs are created from these important investments, the City must ensure equitable access to good solar jobs for workers in our City, particularly low-income people, people of color, and women. Quality workforce development programs are a primary way disadvantaged workers can access good, safe, career track jobs. Yet the most recent solar projects have not been tied to workforce development programs, even though there are several workforce development programs in New York City that are ready to fill this need.[xvii]

Setting local hiring requirements are also critical to ensure a certain percentage of new hires come from disadvantaged communities in the vicinity of the project.[xviii] Assuming a 30% local hire target (which is common across the U.S.[xix]), the City's solar installations could result in upwards of 1,200 jobs created for low-income New Yorkers over the next nine years. Preparing for this employment boom would necessitate a well-planned and executed jobs pipeline, creating a link between individual residents, local community organizations, job recruitment and referral centers, and soft- and hard-skills training programs (e.g. pre-apprenticeship and apprenticeship programs). Most of the infrastructure for this jobs pipeline is already in place in New York City and simply needs a clear mandate, and demand, to kick into high gear. New York City has the power to set the gold standard for good job creation in the renewable energy economy, and workers and low-income communities can't afford to wait any longer. The time is now for the City to make good career-track jobs in the solar industry a permanent reality.

P.S. 62 in Staten Island and Good Job Creation

The Kathleen Grimm School for Leadership and Sustainability at Sandy Ground, or P.S. 62 in Staten Island offers a case study in how to build solar right. P.S. 62 is a net-zero energy building — it generates as much energy each year as it consumes – and it is the City's first. Funded directly by the City, rather than through a PPA, it was subject to the City Agency Project Labor Agreement, used union labor (IBEW Local 3), created good jobs, and trained new workers through a state of the art training program.[xx] The project's one downside was the lack of public sector workers used on the project, even though the School Construction Authority has in-house skilled workers able to manage aspects of this work. This public sector workforce should be included on future projects.

Allison Ziogas of IBEW Local 3 was the Solar PV foreman on P.S. 62. Ziogas credited the GPRO Electrical Systems course she took during her training at Local 3 for her familiarity with sustainable energy systems. She now works for one of the City's top solar installers and is proud of union-built sustainability projects, which she says demonstrates that we "can create not only green jobs, but solid, union jobs. And we can keep the workforce we already have instead of adding new low-wage labor."[xxi]

Solar Installations on Public Property Should Maximize Public Benefits

Currently, there is no plan to use the funds saved by solar installations for new and innovative projects that address the needs and priorities of low-income communities in New York City. We urge the City to assess the opportunities for reinvesting these savings in the communities that need it most.

With a budget of $744 million for heat, light and power, the City is sinking an enormous amount of money into utilities for its public buildings.[xxii] Investments in solar energy and other renewables that reduce our energy budget can provide funding for programs that address climate change and inequality in New York City. For example, savings can be used to create vocational training opportunities for high school students to learn how to build, install and maintain solar panels. Savings could also be reinvested in additional renewable energy or energy efficiency projects, creating a positive feedback loop for the climate and government coffers. Unfortunately, there is no benefit-sharing program attached to these solar installations, and projects have not been intentionally targeted in communities that need it most.[xxiii]

The City should also seek to maximize the savings from these solar installations. Power Purchase Agreements ("PPA"), which are discussed in detail below, are the current mechanisms used by the City to implement solar installations. One concern with the PPA model is it shifts most of the savings from the solar installation to the private solar developer, reducing the City's ability to reinvest these savings back into the community. Generally, most solar PPAs result in just two to five percent savings on energy costs for the consumer.[xxiv] If the City directly financed the solar installations through bond sales, it could potentially collect a larger share of the utility bill reduction. To ensure the City maximizes its savings from these installations, it should conduct a comprehensive cost-benefit analysis of a full range of financing strategies at its disposal, including direct City funding.[xxv]

Solar Installation: Hillcrest High School
Location: 160-05 Highland Avenue, Queens, NY 11432
System Completion Date: April 2016
System Size: 362 kW

Power Purchase Agreements Jeopardize OneNYC's Equity Goals

New York City's primary mechanism for financing solar panels on public buildings is the Power Purchase Agreement (PPA).[xxvi] PPAs for public solar power are essentially contracts between governments and private-sector businesses to finance, construct, and maintain solar electricity generation on public buildings in which the public entity provides no upfront capital for the project. Instead, the private solar developer finances, constructs, owns, operates and maintains the systems on public property, selling the power generated to the public at a profit. The payments the City makes to the solar developer are used to repay the debt incurred for the solar installation and maintenance. These PPAs usually last 20 years, and typically result in two to five percent savings on the building's electricity bill.[xxvii]

PPAs are appealing to municipalities because, in this era of decreasing government spending, they allow the public sector to move towards renewable energy goals without paying any money upfront. The lack of upfront capital is commonly cited as the primary rationale for entering into a PPA.[xxviii] PPAs are very common in New York State, with more than 50% of solar installations (including those in private residences) owned by a third party.[xxix] However, there are several issues with PPAs that should give New York City pause as it looks to financing its public solar program going forward.

According to certain solar industry insiders, direct ownership, rather than PPAs, are in the best interest of the building owner. This is in part because a solar developer typically collects 80% of the financial benefits from the system. One CEO in the solar industry commented, "Even if consumers borrow money to pay for a solar system instead of buying one outright, they'll still reap 40% to 80% of the cost savings while paying off the loan."[xxx] This is compared to two to five percent commonly saved through a PPA.

The Origins of PPAs, and Concerns with Long-Term Reliability

SunEdison and MMA Renewable Ventures pioneered the use of PPAs in 2006, and PPAs quickly became the dominant financing model in the industry.[xxxi] It is notable that one of the two pioneers in the PPA model for distributed generation projects, SunEdison, went bankrupt in 2016.

SunEdison was a "so-called hedge fund hotel, with more than 160 hedge funds in the stock."[xxxii] The company had racked up $16 billion in debt by September of 2015, in part due to its breakneck expansion in an attempt to control the solar market.[xxxiii] At the same time SunEdison was under active investigation by the Securities and Exchange Commission and the U.S. Department of Justice, and was defending itself against dozens of lawsuits brought by other solar developers, investors, creditors and the company's own subsidiary.[xxxiv] Also, according to public filings, SunEdison's stock had fallen 99% from June 2015 and the company was cutting jobs in early 2016.[xxxv]

The PPA model may prove to be unsustainable for solar developers: "Solar installers, which have based their business models on rapid growth through customer-friendly leasing deals that impose high up-front costs on the companies, now find themselves in a somewhat vicious cycle: to keep funding new installations they must keep raising money. And to keep raising money they must keep signing up new customers."[xxxvi]

PPAs are often cited as cheaper than direct financing because there are tax credits for installations that are only available to private sector vendors. These tax credits are even available when the solar is installed on a public building, as long as it is owned by a private sector entity.[xxxvii] However, the reduction in project cost achieved through a PPA is largely an illusion, as higher borrowing costs in the private market, as well as required profit margins for private solar developers, remove most of

the financial benefit gained by the tax credit. Also, these tax credits reduce government revenue, meaning tax payers themselves are paying to reduce the cost of the project – this is not a net saving for governments.

It has been argued that private investment in public infrastructure projects frees up public funding for additional projects, but evidence suggests that private finance selects a small number of the most profitable public infrastructure projects (like solar), invests in these, and leaves the more costly and complex work to the public sector. This removes potential for cross-subsidization of infrastructure projects, wherein certain projects like publicly-funded solar installations could provide much-needed revenue for other infrastructure investments.[xxxviii] In addition, many governments provide financial guarantees to privately funded projects, shifting the financial risk of the project back onto the government, despite most of the benefits accruing to the private entity.[xxxix]

Solar Installation: Port Richmond Wastewater Treatment Plant
Location: 1801 Richmond Terrace, Staten Island, NY
System Completion Date: June 2014
System Size: 1,264 kW

Furthermore, these privately financed projects are often "off-budget," despite the fact that they are a form of public debt. Their cost is often not registered as an expense, which means that the cost of the project is largely hidden.[xl] Also, there are often ripple effects for other public sector investment as a result of these privatization deals: Because governments are locked into contract payments with a private entity, governments lack flexibility to shift funding elsewhere as needed.[xli]

Lastly, there is a significant impact on workers from the use of PPAs. Work that may have been or could have been done by public sector workers, such as engineering, architectural design, construction project supervision, and operations and maintenance are shifted to the private sector. These private sector jobs are often more precarious, lower-paying, and offer fewer benefits. While in the short run this may seem like a money-saver, it may ultimately push the government to pay twice – once for the contract and a second time for social services like food stamps and Medicaid for a precarious workforce.

If the goal in New York City is to maximize the public benefit of these installations so they can be reinvested towards achieving equity, then there should be a commitment to assessing and utilizing a wide range of financing tools, including direct public financing through bond sales. For example, partnership flips with tax equity investors allow a government to work with private entities to access the tax credits while maintaining public ownership. These are common agreements in use around the U.S.[xlii] However, if PPAs are chosen as the best financial tool for specific public solar installations, then the City must incorporate stronger standards that help improve some of the problematic aspects of PPAs, including PLA application, local hire requirements, and negotiating for more savings to be returned to public coffers and reinvested in low-income communities.

The Path Forward

There are a number of short and long-run policy options the Administration and City Council can enact to tackle climate change and inequality through municipal solar installations.

Implementing Solar Equity

Placing equity at the center of renewable energy projects on public land means that the City will:

- Create a robust targeted local hire program and pathways to apprenticeship and civil service titles, lifting up communities, and creating well-paying jobs for residents.
- Protect the public interest and ensure good and safe working conditions for workers by making all installations subject to a project labor agreement. This is irrespective of whether the project is financed publicly or privately.
- Conduct comprehensive and transparent cost/benefit analyses of different financing mechanisms for renewable energy projects to secure the best deal for the City. Private funding should only be chosen when the City can demonstrate there are both short- and long-run benefits to utilizing them instead of direct public funding.
- Share the savings from solar installations with the communities and/or sites in which the projects occur; this can mean investing in solar vocational training programs for youth, investing in deep retrofits for energy efficiency in existing buildings, and more, but should be determined with community stakeholder input and participation.

Planning for Solar Equity

- Budget for a comprehensive renewable energy assessment of all public buildings: The Administration and City Council should require a comprehensive audit and assessment of the energy efficiency and all renewable energy opportunities throughout the entire public building stock, conducted by public sector workers.
- Prioritize climate-vulnerable and low-income communities in siting public renewables, and invest in the most prudent, efficient, and renewable resource for the community.

ENDNOTES

[i] OneNYC: The Plan for Strong and Just City, The City of New York, Pg 5, at http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf

[ii] The 100MW goal is not legislated, but is stated as a goal in the City's sustainability plan, known as OneNYC. OneNYC: The Plan for Strong and Just City, The City of New York, at http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf; One City Built to Last, at http://www1.nyc.gov/office-of-the-mayor/news/451-14/mayor-de-blasio-commits-80-percent-reduction-greenhouse-gas-emissions-2050-starting-with/#/0

[iii] NYC Open Data, City-Owned and Leased Property, at https://data.cityofnewyork.us/City-Government/City-owned-and-Leased-Property/4e2n-s75z/data

[iv] http://www.nyc.gov/html/dem/html/Programs_and_Projects/renewable.shtml

[v] OneNYC, Workforce Development, Pg 58 and 61, at http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf

[vi] The Gini coefficient is a measure of economic inequality from 0, perfect equality, to 1, perfect inequality. New York has one of the highest gini coefficients in the nation (.5049,) the largest of any urban area. Governing, "Income Inequality Data for Metro Areas", at http://www.governing.com/gov-data/economy-finance/Metro-Area-Gini-Index-Map.html

[vii] Mayor de Blasio Releases NPCC 2015 Report, Providing Climate Projections Through 2100 for the First Time, NYC office of the Mayor, 2/17/15, at http://www1.nyc.gov/office-of-the-mayor/news/122-15/mayor-de-blasio-releases-npcc-2015-report-providing-climate-projections-2100-the-first

[viii] New York City Department of Citywide Administrative Services, Municipal Energy Use, FY 2016, at the Wayback Machine, at https://web.archive.org/web/20150908010211/http://www.nyc.gov/html/dem/html/municipal/municipal.shtml. FY 2017 estimates are available at DCAS, at http://www.nyc.gov/html/dem/html/municipal/municipal.shtml

[ix] OneNYC, Workforce Development, at http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf

[x] New York City Council, Local Law No. 24 of 2016, Council Int. No. 478-A of 2014

[xi] See the New York City Climate Justice Agenda: Strengthening the Mayor's OneNYC Plan, pg 12, at http://nyc-eja.org/public/publications/NYC_ClimateJusticeAgenda.pdf

[xii] The most recent contract has not yet been registered, as of Sept. 13, 2016.

[xiii] Project Labor Agreements in New York State: In the Public Interest, Kotler, Cornell University, March 2009, at http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1021&context=reports

[xiv] Worker Safety Advocates Unveil Alarming Findings in "Price of Life: 2015 Report on Construction Fatalities in NYC", NYCOSH, 5/11/15, at http://nycosh.org/2015/05/worker-safety-advocates-unveil-alarming-findings-in-price-of-life-2015-report-on-construction-fatalities-in-nyc/

[xv] 9.8 direct and indirect jobs are per $1 million invested in solar energy (5.4 job are direct, 4.4 are indirect). The Economic Benefits of Investing in Clean Energy, CAP/PERI, p. 28-29, June 2009. http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/economic_benefits/economic_benefits.PDF

[xvi] Job Opportunities for the Green Economy: A State-By-State Picture of Occupations that Gain From Green Investments, Polin and Wicks-Lim, Political Economy Research Institute, University of Massachusetts, Amherst, June 2008, at http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/Green_Jobs_PERI.pdf

[xvii] See for example, HireNYC, at http://www1.nyc.gov/site/mocs/resources/HireNYC.page; Non-Traditional Employment for Women (NEW), at http://www.new-nyc.org/; Helmets to Hardhats, https://www.helmetstohardhats.org/.

[xviii] See for example, NYC Build It Back, Workforce Development, at http://www.nyc.gov/html/recovery/html/workforce-development/workforce-development.shtml; U.S. Department of Housing and Urban Development, Section 3 Program, at http://portal.hud.gov/hudportal/HUD?src=/program_offices/fair_housing_equal_opp/section3/section3; San Francisco Office of Economic and Workforce Development, Local Hire Program, at http://oewd.org/local-hire

[xix] See for example, NYC Build It Back, Workforce Development, at http://www.nyc.gov/html/recovery/html/workforce-development/workforce-development.shtml; U.S. Department of Housing and Urban Development, Section 3 Program, at http://portal.hud.gov/hudportal/HUD?src=/program_offices/fair_housing_equal_opp/section3/section3; San Francisco Office of Economic and Workforce Development, Local Hire Program, at http://oewd.org/local-hire

[xx] The Making of New York's Greenest School: An education in building a sustainable urban future, April 20, 2016, at https://medium.com/@SOM/the-making-of-new-york-s-greenest-school-93dc20322ac4#.yq2nz4wpk; Behind the Solar Array of NYC's First Net-Zero Public School, April 13, 2016, Rena Lee, Urban Green Council, at http://urbangreencouncil.org/content/news/behind-solar-array-nycs-first-net-zero-public-school

[xxi] Behind the Solar Array of NYC's First Net-Zero Public School, April 13, 2016, Rena Lee, Urban Green Council, at http://urbangreencouncil.org/content/news/behind-solar-array-nycs-first-net-zero-public-school#sthash.I5x0jZ9N.dpuf

[xxii] New York City Department of Citywide Administrative Services, Municipal Energy Use, FY 2016, at the Wayback Machine, at https://web.archive.org/web/20150908010211/http://www.nyc.gov/html/dem/html/municipal/municipal.shtml.

[xxiii] Criteria for site selection of current and proposed solar projects are limited to technical criteria (roof age, solar access, etc). There appears to be no social criteria taken into account, such as prioritizing Sandy-impacted communities or low-income communities. See negative FOIL response from DCAS to ALIGN, on file with ALIGN.

[xxiv] Solar Power Purchase Agreements, Solar Energy Industries Associations (SEIA), at http://www.seia.org/research-resources/solar-power-purchase-agreements

[xxv] ALIGN requested this analysis from DCAS through a FOIL request and the City was non-responsive to the request.

[xxvi] See Hearing Notice on Power Purchase Agreement between Tangent Energy Solutions and City of New York Department of Citywide Administrative Services, 7/1/2016, at https://a856-cityrecord.nyc.gov/RequestDetail/20160624113

[xxvii] Request for Proposal Bid Extension: Large Scale Rooftop Solar Electricity on Public Buildings, 10/26/15, at https://a856-cityrecord.nyc.gov/RequestDetail/20151026014. See also Solar Energy Industries Association, Solar Power Purchase Agreements, at http://www.seia.org/research-resources/solar-power-purchase-agreements.

[xxviii] Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners, National Energy Renewable Laboratory, Speer, Cory and Kollins, February 2010, at http://www.nrel.gov/docs/fy10osti/46723.pdf

[xxix] Solar Energy Industries Association, Third-Party Solar Financing, at http://www.seia.org/policy/finance-tax/third-party-financing

[xxx] Solar shift: Falling costs make owning better than leasing, Lucas Mearian, Computer World, 5/3/16, at http://www.computerworld.com/article/3063727/sustainable-it/solar-shift-falling-costs-make-owning-better-than-leasing.html; see also The Real Cost of Leasing vs. Buying Solar Panels, Consumer Reports, Josh Garskof, 6/30/16, at http://www.consumerreports.org/energy-saving/real-cost-of-leasing-vs-buying-solar-panels/

[xxxi] Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners, National Energy Renewable Laboratory, Speer, Cory and Kollins, February 2010, at http://www.nrel.gov/docs/fy10osti/46723.pdf

[xxxii] Under Pressure, SunEdison Gives David Einhorn's Fund a Board Seat, New York Times, January 27, 2016, at http://www.nytimes.com/2016/01/28/business/dealbook/david-einhorn-gets-a-seat-on-sunedison-board.html?_r=0; SunEdison Files for Chapter 11 Bankruptcy Protection, April 21, 2016, New York Times, at http://www.nytimes.com/2016/04/22/business/energy-environment/sunedison-files-for-bankruptcy-protection.html?_r=1

[xxxiii] Hedge Funds Biggest Losers in SunEdison's 'Magic Money Machine', Bloomberg News, April 21, 2016, at http://www.bloomberg.com/news/articles/2016-04-21/hedge-funds-biggest-losers-in-sunedison-s-magic-money-machine

[xxxiv] SunEdison Files for Chapter 11 Bankruptcy Protection, April 21, 2016, New York Times, at http://www.nytimes.com/2016/04/22/business/energy-environment/sunedison-files-for-bankruptcy-protection.html?_r=1; SunEdison Sued by TerraForm Global for Misappropriation of $231 Million, Real Money, April 4 2016, at http://realmoney.thestreet.com/articles/04/04/2016/sunedison-sued-terraform-global-misappropriation-231-million

[xxxv] Hedge Funds Biggest Losers in SunEdison's 'Magic Money Machine', Bloomberg News, April 21, 2016, at http://www.bloomberg.com/news/articles/2016-04-21/hedge-funds-biggest-losers-in-sunedison-s-magic-money-machine; Under Pressure, SunEdison Gives David Einhorn's Fund a Board Seat, New York Times, January 27, 2016, at http://www.nytimes.com/2016/01/28/business/dealbook/david-einhorn-gets-a-seat-on-sunedison-board.html?_r=0

[xxxvi] Watching SunEdison's Collapse, Solar Industry Resets, Richard Martin, 4/11/16, MIT Technology Review, at https://www.technologyreview.com/s/601217/watching-sunedisons-collapse-solar-industry-resets/

[xxxvii] Solar Energy Industries Association, Solar Investment Tax Credit (ITC), at http://www.seia.org/policy/finance-tax/solar-investment-tax-credit

[xxxviii] Why Public-Private Partnerships Don't Work: The many advantages of the public alternative, David Hall, Public Services International, February 2015, at http://www.world-psi.org/sites/default/files/documents/research/rapport_eng_56pages_a4_lr_0.pdf. Note that Sweden has explicitly decided against making use of public private partnerships for public infrastructure projects.

[xxxix] Why Public-Private Partnerships Don't Work: The many advantages of the public alternative, David Hall, Public Services International, February 2015, at http://www.world-psi.org/sites/default/files/documents/research/rapport_eng_56pages_a4_lr_0.pdf

[xl] What Lies Beneath: A critical assessment of PPPs and their impact on sustainable development, Public Services International, April 2015, at http://www.world-psi.org/sites/default/files/documents/research/eurodad_-_what_lies_beneath.pdf

[xli] Why Public-Private Partnerships Don't Work: The many advantages of the public alternative, David Hall, Public Services International, February 2015, at http://www.world-psi.org/sites/default/files/documents/research/rapport_eng_56pages_a4_lr_0.pdf

[xlii] Tax Equity 101: Structures, Woodlawn Associates, 3/8/13, at https://woodlawnassociates.com/tax-equity-101/

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