



# ***Creating Green, Healthy Schools***

***An Equitable Action Plan for the  
Next Mayor of New York City***



**Report, June 2021**

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## **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 presents 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 the next mayor to reduce New York City's greenhouse gas emissions and create green, healthy schools in our time for recovery.

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# Executive Summary

New York City public schools were among the institutions hit hardest by COVID. The shut-down of schools disrupted the lives of countless families, students, teachers, and parents.

What happens with public schools in the coming months and years will significantly shape recovery after COVID, especially in low-income communities of color ravaged by the pandemic.

This report offers the next mayor of New York City an action plan for how to create Green, Healthy Schools for all. It's the first report to show how the **installation of solar energy and air control systems will enhance equity and safety in K-12 public schools, while creating good-paying jobs that help the city achieve its climate goals.**

Installing solar and air control systems like HVAC in public schools will allow the next mayor to foster more resilient neighborhoods and ensure the benefits of renewable energy reach low-income New Yorkers of color who are most impacted by COVID and climate change.

With over 1,800 school buildings, New York City has one of the largest school districts in the country.<sup>1</sup> K-12 public schools account for one-quarter of all city-owned buildings, and they are also among the biggest climate polluters.<sup>2</sup>

Many of those buildings are large with expansive rooftops that are suitable for solar energy, and can provide 23.2 megawatts of solar energy to the City.<sup>3</sup> Since the City published its Solar 100 report, it recognized the Department of Education (DOE) as an integral partner in achieving its solar energy goals. Beyond the solar-ready capabilities that DOE's buildings provide, K-12 schools are a large portion of the City's highest carbon emitters in its public buildings portfolio. According to a September 2020 report by The Solar Foundation, only 2.4 percent of New York City schools have installed solar.



Under the next mayor, New York City needs to do more and move faster on the installation of solar. The City has already worked with unions to successfully build Green, Healthy Schools such as PS 62, also known as the Kathleen Grimm School for Leadership in Staten Island. PS 62 is the first net-zero school in New York City, one of the first of its kind in the world, and it harvests as much renewable energy as it uses annually.

Created in partnership with IBEW Local 3, the 60,000 square foot PS 62 building has solar panels on the roof and its south facing walls to take advantage of the sunlight throughout the day, allowing the building to optimize the amount of solar energy it can collect. It is complete with a high-performance building envelope, day-lit corridors, a geothermal well field, energy recovery ventilators and demand-control ventilation, as well as solar thermal panels to provide hot water and supplement the heating system.<sup>4</sup> Other features include low-energy kitchen equipment, a greenhouse, and a vegetable garden. All New York City public schools, including existing schools, deserve this kind of healthy and sustainable environment. The next mayor can and should implement energy efficiency and renewable energy projects in K-12 public schools in all five boroughs, using PS 62 as a proven model.



*PS 62: Kathleen Grimm School for Leadership and Sustainability. Source: Architectural Record*

This investment in creating Green, Healthy Schools can create good-paying, clean energy jobs for New Yorkers across the city, including many women, immigrants, and people of color. Successful pre-apprenticeships and apprenticeship programs can train workers for these jobs, along with other long-term skills that are essential to maintaining sustainable careers in clean energy.

As New York City moves toward full reopening of schools by September, 1.1 million public school students, teachers, and staff must also have daily, equitable access to clean air and feel safer breathing in their classrooms. Improving air quality control through HVAC systems will be crucial, especially as questions remain about the durability of vaccines against new variants of COVID-19.





Indeed, evidence strongly suggests that the installation of HVAC systems, along with **reliable indoor air quality monitoring, can reduce the airborne spread of COVID-19. At the same time, HVAC systems will enhance daily life in K-12 public schools, and support student performance, engagement, and classroom behavior.**

This work can, and should, begin in Mayor de Blasio's final months in office, but it will fall to the next mayoral administration to sustain investments in air quality control systems in schools and solar energy, starting in communities hit the hardest by COVID and climate change.

These clean energy infrastructure projects can and should incorporate project labor agreements, community hiring practices, and other contractual mechanisms that raise labor standards, to offer a pathway toward well-paid career-building jobs for both new-entry workers and workers transitioning into the climate industry, across ages and genders. The Political Economy Research Institute (UMass-Amherst) estimates for every \$1 million spent on renewable energy projects and energy efficiency retrofit projects, 7.1 and 8.7 direct and indirect jobs would be created respectively.<sup>5</sup> These jobs will not only put people back to work, but help them secure more stable, well-paid positions that can become fulfilling careers in the near future.

The Department of Citywide Administrative Services (DCAS) – the city agency in charge of energy management – already has \$3.8 billion allocated for energy efficiency and renewable energy measures for public buildings over ten years in the capital budget. But allocation is not the same as active investment. This \$3.8 billion is just sitting there, waiting to be used.

We have calculated that installing solar and HVACS in schools would cost \$1.5 billion. In his final months in office, Mayor de Blasio should begin the process of investing \$1.5 billion in solar panels and HVAC systems for New York City's public schools. Such action would leave the next mayoral administration in a strong position to finish the job and invest the remaining \$2.3 billion toward energy efficiency projects on other public city-owned buildings. That full investment of \$1.5 billion would be enough to install solar panels and HVAC systems in every New York City public school.



## Key Findings and Highlights of this Report:

- As of 2019, the City has already allocated \$3.8 billion into renewable energy and energy efficiency projects. In his final months in office, Mayor de Blasio should work with city agencies to immediately install solar and HVAC systems in K-12 public schools over the next ten years. The next incoming mayor must continue this effort to create Green, Healthy Schools as part of recovery after COVID.
- All New York City public schools, including existing schools, should be healthy and sustainable environments. The next mayor can and should create Green, Healthy Schools in all five boroughs, using PS 62 in Staten Island as a proven model.
- It will cost the City \$460 million over the next four years to install solar panels on all K-12 public schools, and another \$1.08 billion over the next 13 years to install HVAC systems and other necessary energy efficiency upgrades. These solar panels and HVAC systems in public schools will make it easier for the city to meet its sustainability goals of reducing greenhouse emissions by 2035 as defined in Local Law 97.
- Public schools are among the worst climate polluters and largest emitters of greenhouse gases in the city.<sup>6</sup> That's why the installation of solar panels on public schools will allow the City to make aggressive progress toward reducing climate pollution and energy usage in buildings, and achieving the goal of 100 megawatts (MW) of solar energy on public buildings by 2025.
- The city should start implementing energy efficiency projects by focusing on installing HVAC systems in schools. Poor air quality not only impacts student and staff health, but it also can also undermine learning by negatively affecting student attendance, comfort, and performance.







## Introduction

Decades of divestment from Black, Indigenous, and communities of color has resulted in crumbling infrastructure, outsized job loss, and increased chronic health issues. These environmental justice communities – low-income neighborhoods that have historically been more vulnerable to climate degradation and inequitable resource distribution – are left especially vulnerable to getting sick and dying from COVID-19.<sup>7</sup> Environmental justice communities are also battling an unemployment crisis, with Black (16.6 percent) and Latinx (13.9 percent) residents having higher unemployment rates than the average New Yorker (12.9 percent) since March 2020.<sup>8</sup> Nationally, women are suffering from the majority of pandemic-related job losses, losing almost 5.4 million net jobs since February 2020.<sup>9</sup>

Economic injustice, environmental racism, and public health disparities will only worsen as the climate crisis progresses in the midst of the pandemic. Now more than ever, it is critical that the City focuses on reducing emissions and pollutants, creating good jobs, and ensuring an equitable recovery for all.

Mayor de Blasio can learn from the COVID-19 crisis and take aggressive, bold action in his final months in office to drive an equitable recovery and tackle root causes of the climate change and COVID-19 crisis. Reducing the city's greenhouse gas emissions, while improving indoor and outdoor air quality for frontline communities can have consequential positive health outcomes and save lives, especially as clinical research attributes high mortality rates from COVID-19 to longstanding environmental degradation.<sup>10</sup>



Focusing on reducing emissions from New York City's public school buildings will help the city make aggressive progress towards its goals of reducing climate pollution and increasing energy efficiency. K-12 schools rank among the top three most numerous city building types, and are among the top-emitting public buildings in New York City.<sup>11</sup> Installing solar panels and air control systems like HVAC in public schools will allow Mayor de Blasio, and the next incoming mayor, to foster more resilient neighborhoods and ensure the benefits of renewable energy reach low-income New Yorkers of color who are most impacted by the pandemic and climate change.

Installing solar panels on schools will reduce emissions, pollutants, and our dependence on fossil fuels. Further, installing HVAC systems – in tandem with reliable indoor air quality monitoring – will mitigate the airborne transmission of COVID-19 in schools and make inroads to addressing chronic health disparities. The City has already successfully worked with unions to build sustainable schools such as Public School 62, also known as the Kathleen Grimm School for Leadership in Staten Island. Built in partnership with Climate Works for All Coalition member IBEW Local 3, PS 62 is the first net-zero school in New York City, one of the first of its kind in the world, and it harvests as much renewable energy as it uses annually— a model that should be replicated at schools across the city.

Immediate investment in the creation of Green, Healthy Schools will help solidify Mayor de Blasio's legacy as a progressive climate leader and set up the next mayor for success in achieving the city's climate goals. The installation of solar panels on public schools will allow the city to make aggressive progress toward reducing climate pollution and energy usage in buildings, and achieving the goal of 100 megawatts (MW) of solar energy on public buildings by 2025.

Green Healthy Schools will create sustainable, clean energy jobs in renewable energy and energy efficiency projects across New York City K-12 public schools. These jobs are in addition to the thousands of jobs that will be created by the greater [Community Mobilization Act](#). This also aligns with the [Climate Leadership and Community Protections Act](#), which sets the stage for the city to build regenerative economies that address renewable energy generation, food security, water, transportation, and sustainable manufacturing .

Green Healthy Schools will set a clear standard for what other public and private buildings must do to meet the goals outlined in Local Law 97 of 2019— the city's landmark building emissions legislation.

The Climate Works for All coalition is calling for Mayor de Blasio to swiftly implement Local Law 97 by ensuring \$1.5 billion of the capital funding already committed to renewable energy and energy efficiency projects go toward the creation of Green Healthy Schools, with priority given to those located in environmental justice communities.

In his final months in office, Mayor de Blasio should play an active role in ensuring that the Department of Citywide Administrative Services (DCAS), the School Construction Authority (SCA), and the Department of Education (DOE) have a plan to access and spend the capital funding already allocated to ensure the city meets its climate goals. It will be up to the next incoming mayor to ensure the continued implementation of Local Law 97, and expanded capital funding necessary for additional renewable energy and energy efficiency projects.





Our analysis references an average cost range of \$3.30 - \$5 per watt installed, which includes the cost of materials and labor.<sup>12</sup> To date, the city has only installed 8.2 MW of solar energy in 42 schools.<sup>13</sup> It will cost the City \$460 million over the next four years to install the remaining 91.8 MW needed to meet the 100 MW by 2025 goal. Another \$1.08 billion over the next 13 years will be needed to install HVAC systems and other energy efficiency upgrades to meet the city's 2035 emissions goals defined by Local Law 97.

The city already has the resources to get this done. Due to the Climate Works for All coalition's leadership, the City reinforced its commitment to climate resiliency by allocating \$3.8 billion for renewable energy and energy efficiency projects. But none of this funding has been actively invested since its allocation. New York can no longer afford to push off these investments. Mayor Bill de Blasio must take action now and ensure that these capital funds are immediately made available for solar panels and HVAC system installation in public schools. After Mayor de Blasio leaves office, the next incoming mayor must ensure the continued implementation of these renewable energy and energy efficiency projects, especially in the communities hit hardest by the pandemic and climate change.

Now is the time to deeply invest in job creation strategies that support journeypersons, apprentices, and new entry workers who are still grappling with unemployment caused by the pandemic. Mayor de Blasio should invest in proven pre-apprenticeship and apprenticeship programs that train workers on the skills needed for a sustainable career across the clean energy sector. Green Healthy Schools will bring jobs back to the city and support women, low-income New Yorkers, and other traditionally underrepresented workers on their paths to attaining good, union-track jobs.

“I am currently a Journeywoman Electrician in the International Brotherhood of Electrical Workers (IBEW) Local Union # 3. I would never have imagined that I would have become an Electrician in one of the most powerful labor unions in America as an adult. But nine years into my career, I still believe it is one of my most significant decisions. I would not have made it into the union without NEW's (Nontraditional Employment for Women) guidance with their pre-apprenticeship program specializing in preparing womxn for careers in the blue-collar field.”

**Shauna Irving, Local 3, IBEW  
'A' Construction Journeywoman**



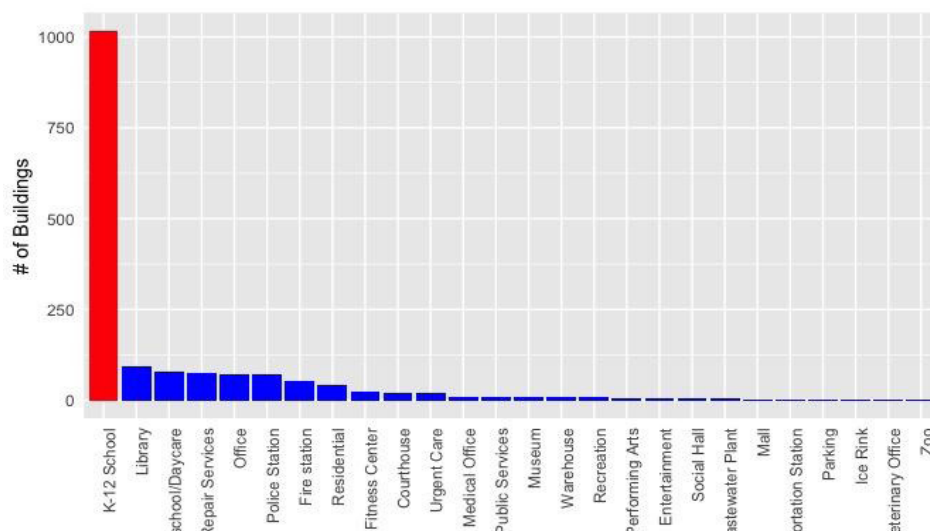
There are already successful workforce development models the city can look to for further expansion. IBEW Local 3 has successfully built an education program model that supports both incoming apprentices and journeypersons in the electrical sector. Their apprenticeship program works with pre-apprenticeship programs to directly place workers into union-track jobs. This program model ensures women, low-income New Yorkers, and other traditionally underrepresented workers have access to support programs that prepare and train them for careers in clean energy—a rapidly growing sector of the economy. New York City should build on this model, among other proven workforce development programs, to ensure all New Yorkers have access to an equitable recovery.

New York City is already seeing the devastating impacts of climate change, and communities across the city are still reeling from the overlapping crises brought on by the COVID-19 pandemic. Air quality control remains a vital short-term priority that also produces long-term benefits to public health and student performance. We owe it to New York's more than 1.1 million students, teachers, staff, and their communities to provide clean air in schools and create more resilient communities that will withstand the next pandemic, or catastrophic climate event.

## Why New York City Public Schools?

According to Environment America, though ranking 6th in installed solar capacity, New York City ranks 37th in installed solar per capita.<sup>14</sup> To date, New York City has only installed 8.88 megawatts (MW) of solar energy.<sup>15</sup> The Department of Citywide Administrative Services' (DCAS) [Solar 100](#) report outlines the city's progress in meeting its goal of 100 MW of solar energy on public buildings by 2025. The report found that out of 2,008 buildings assessed, 429 buildings were ready for solar installations and had a combined capacity of 30.35 MW. This is in addition to the 1,000 MW by 2035 goal for public and private buildings as outlined by the city's 80X50 plan.<sup>16</sup> To achieve it's 100 MW by 2025 goal, DCAS must install nearly 23 MW per year; to achieve the 2035 goal, it must install nearly 67 MW per year moving forward. Now with Local Law 97 – the City's landmark building emissions legislation – the city must ensure buildings also meet carbon emissions caps for their energy use.

**Figure 1: Public schools make up the largest share of City buildings over the LL 97 2035 emissions cap.**



Number of City buildings over the LL 97 2035 emissions cap by primary property use type. (Used 2019 LL 84 benchmarking data)





**Figure 2: K-12 schools are among the top-emitting public buildings in New York City.**

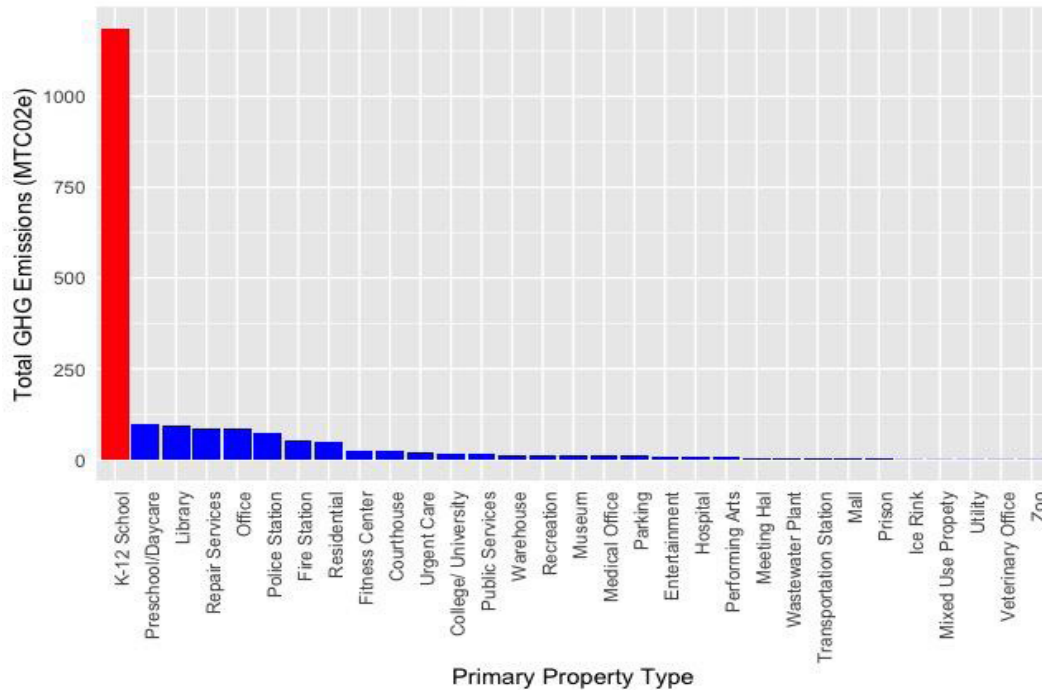


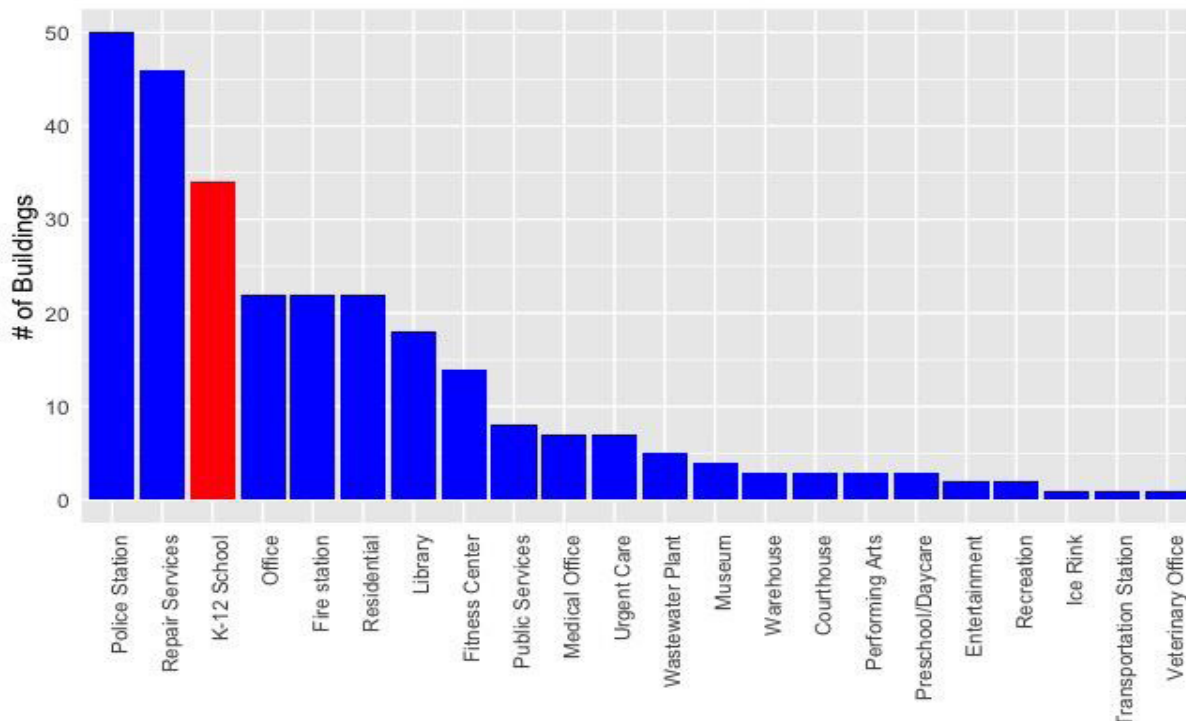
Figure shows total emissions by property type as reported in 2019 LL 84 benchmarking data.

Focused implementation of Local Law 97 on K-12 public schools will allow Mayor de Blasio to make significant progress towards the city's 100 MW solar energy goals. K-12 public schools are among the top-emitting public buildings in New York City and rank among the top three most numerous City building types (see figures 1 and 2).<sup>17</sup> With over 1,800 school buildings, New York City has one of the largest school districts in the country.<sup>18</sup> Much of the Department of Education's (DOE) building stock features large, expansive rooftops that are suitable for solar energy. The City estimates DOE buildings have the potential to provide 23.2 megawatts of solar energy to the City.<sup>19</sup> Beyond the solar-ready capabilities that DOE's buildings provide, K-12 schools are a large portion of the City's highest carbon emitters in its public buildings portfolio. According to a September 2020 report by The Solar Foundation, only 2.4 percent of New York City schools have installed solar.

Based on public DCAS data, the city has identified a total of 1,055 schools that are larger than 10,000 square feet and where solar could be installed. As of 2020, the city has installed 8.2 MW of solar energy in 42 schools, 24 of which are in environmental justice communities.<sup>20</sup> DCAS is currently working on installing solar PV systems in 143 schools, of which 93 are located in environmental justice zones— adding an estimated capacity of 27.3 MW to the city. A total of 109 schools, of which 71 are in environmental justice zones, have roofs that are ready for solar installations. If these projects were to materialize they would add an estimated capacity of 10.5 MW to the City. Finally, there are 890 schools that have undergone roof assessments. While it's still unclear if these buildings are solar ready, 625 of these schools are in fair to good condition and 243 are in less than fair to poor condition.

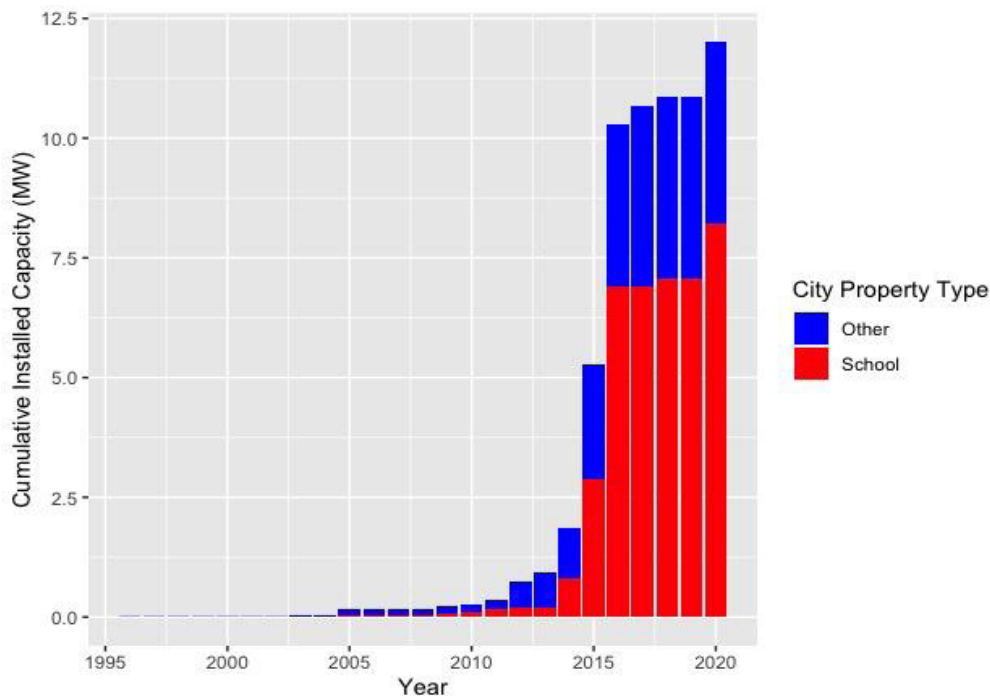


**Figure 3: By 2035 LL 97 emission caps, schools will become the top-emitting public building in New York City and significantly outrank other building types.**



*Number of City buildings over the LL 97 2030 emissions cap by primary property use type.*

**Figure 4: Since 2016, more than half of DCAS' solar projects have been in public schools.**



*New York City's solar installation progress cumulatively by year and property type.  
(Used 2020 LL 24 data from DCAS)*





New York City needs to do more and move faster. The City has already worked with unions to successfully build Green, Healthy Schools such as Public School 62, also known as the Kathleen Grimm School for Leadership in Staten Island. PS 62 is the first net-zero school in NYC, one of the first of its kind in the world, and it harvests as much renewable energy as it uses annually. Built in partnership with IBEW, the 60,000 square foot building has solar panels on the roof and its south facing walls to take advantage of the sunlight throughout the day, allowing the building to optimize the amount of solar energy it can collect. PS 62 is complete with a high-performance building envelope, day-lit corridors, a geothermal well field, energy recovery ventilators and demand-control ventilation, as well as solar thermal panels to provide hot water and supplement the heating system.<sup>21</sup> Other features include low-energy kitchen equipment, a greenhouse, and a vegetable garden. All New York City public schools, including existing schools, deserve this kind of healthy and sustainable environment.



**“The success of PS 62R is the perfect example of what highly skilled qualified tradespeople bring to the table. The school, which features a photovoltaic exoskeleton, a wind turbine, energy generating exercise bikes, a geothermal heating and cooling system and a highly efficient LED lighting system with daylight harvesting and dimming capabilities, will serve as a pilot site for schools across the country.”**

**Local 3 Business Manager  
Christopher Erikson**



Most mitigation measures since the onset of the COVID-19 pandemic have focused on hygiene, physical distancing and contact tracing, despite experts expressing the importance of ventilation. Typical sources of indoor air pollution come from outdoor sources, building equipment, furnishings, among other sources. The Environmental Protection Agency found that failing to prevent, or respond to, indoor air quality can increase long- and short-term health effects for students and staff including coughing, headaches, and respiratory illnesses like aggravated asthma.<sup>22</sup> Nationally, the EPA found that nearly 1 in 13 children of school-age are already diagnosed with asthma.<sup>23</sup> In the Bronx, approximately 15.5 percent of 4–5-year-old children have asthma, compared to 9.2 percent of New York City students overall and 8.9 percent of US children 2 to 17 years of age.<sup>24</sup> Air quality control in schools continues to be a highlighted mitigation strategy by the EPA—a recommendation that demands more attention especially in the wake of the pandemic.

Poor air quality not only impacts student and staff health, research also shows it can impact student attendance, comfort, and performance.<sup>25</sup> The National Bureau of Economic Research found inhaling car and truck fumes can lead to long-term respiratory issues, and children in schools closer to highly-polluting infrastructure – like highways – performed worse than their peers in less polluted areas.<sup>26</sup> Other impacts include reduced student, teacher, and staff performance; increased potential for school closings or relocation; and strained relationships among school administration, parents, staff, and community members.

As schools fully reopen in September, Mayor de Blasio must ensure New York’s over 1.1 million students, their communities, teachers, and staff have access to clean air and feel safer breathing in their classrooms. Air quality control remains a vital short-term priority that also produces long-term benefits to public health and student performance. It is critical that the city install air quality control systems for schools in the communities hit hardest by historic climate degradation as part of its COVID-19 recovery efforts.

Focusing on schools within environmental justice communities will help mitigate the current COVID-19 crises, and also make inroads to addressing the root causes which allowed for the foundation of their existence.





## City-wide Implementation of Solar and Energy Efficiency in K-12 Public Schools

New York City is simply not making the progress it needs in energy efficiency and renewable energy to meet its climate goals. Local Law 97 implementation must happen comprehensively to meet the needs of communities still reeling from the COVID-19 pandemic. Implementing renewable energy and energy efficiency projects will allow the city to meet its climate goals and ensure well paying jobs are put back into its most impacted communities. The city can start this work by prioritizing the installation of solar and HVAC systems on K-12 public schools.

### Solar in K-12 Public Schools

As a starting point, **the Climate Works for All coalition is calling for New York City to swiftly implement Local Law 97 by ensuring \$460 million of the capital funding already committed to renewable energy to go toward the installation of solar PV systems in K-12 public schools, starting with those located in environmental justice communities.**

Our analysis references an average cost range of \$3.30 - \$5 per watt installed, which includes the cost of materials and labor.<sup>27</sup> To date, the city has only installed 8.2 MW of solar energy in 42 schools.<sup>28</sup> It will cost the City \$460 million over the next four years to install the remaining 91.8 MW needed to meet the 100 MW by 2025 goal. That is, the city must spend at least \$115 million every year for the next four years to meet its 100 MW solar goals.



*Stephen A Halsey JHS 157 in Queens.*





My career with IBEW local 3 has provided me with opportunities beyond a great salary, pension, college degree, and job security. From the time I started in the pre-apprentice program "Construction Skills" I was encouraged to pursue a variety of my interests within the union including community involvement, mentorship programs, and now helping to advocate for the use of alternative energy, which will ultimately promote the growth of jobs for the community and new members into our union to have the same opportunities as myself."

**Manny Yllescas, Local 3 IBEW,  
'A' Construction Journeyman**



In our current climate reality, it is crucial that cities move towards sustainable and resilient energy sources that improve our outdoor air quality at the local level. We need to move quickly because we're running out of time to avoid the looming threat of warming the planet by two degrees Celsius, and we need to stop harming frontline and environmental justice communities with localized emissions. Solar power generation emits 96 percent less greenhouse gases than electricity from coal,<sup>29</sup> and 91 percent fewer than electricity from natural gas.<sup>30</sup> Calculations from the National Renewable Energy Laboratory show that most emissions from solar energy occur during the raw material extraction, and during the manufacturing and installation of solar panels. In other words, if we change the way we extract resources and produce products, solar PV systems can materialize further emissions reductions.

Environmental justice advocates have long alerted the general public about the links between local, hazardous environmental conditions and the health of New Yorkers. The pandemic has made that link undeniable. New York communities that have lived with long-term air pollution have some of the highest rates of COVID-19.<sup>31</sup> A nationwide study from Harvard University found that an increase of one microgram PM2.5 is associated with an eight percent increase in the death rate from COVID-19.<sup>32</sup> That is, a small increase in long-term exposure to pollution can cause a large increase in the probability of dying from COVID-19. Solar energy can help reduce and avoid the air pollutants that have continuously harmed communities and has tangible benefits on the environment. For example, a 71.3 kW solar PV system – which is the average potential size of a City solar project<sup>33</sup> – that receives an average of 4.58 kWh/m<sup>2</sup>/day of solar radiation, and could produce approxi-





mately 93,630 kWh of electricity in one year of operation.<sup>34</sup> That translates into 39 tons<sup>35</sup> of annual avoided carbon dioxide emissions—the equivalent of avoiding more than 4,300 gallons of gasoline and the amount of carbon sequestered by nearly 51 acres of U.S. forests in one year.<sup>36</sup>

Solar PV systems produce most of their energy when it is sunny with potentially high temperatures, which are also the times of day when energy demands tend to increase. On a hot and sunny day, people turn on their air conditioners and drive up energy demand—this is precisely when peaker plants are needed. If large buildings—like schools—had solar panels installed, energy from that system could be used to replace power from peaker plants, especially if the system is bolstered by energy storage.<sup>37</sup> Most New York City peaker plants were constructed between the 1960s and 1970s, and were only supposed to be in operation for occasional usage. However, in the last 20 years peakers have become part of the city's permanent energy infrastructure, and are used constantly.<sup>38</sup> Moreover, given that they emit twice as much carbon dioxide per unit of electricity and emit 20 times as much nitrogen dioxide as compared to regular power plants,<sup>39</sup> the City's peaker plants are another contributor to respiratory health problems.<sup>40</sup> There's been local momentum building around reducing the city's reliance on peaker plants, as indicated by the PEAK coalition's work to replace peaker power plants with renewable energy and energy storage alternatives. Installing solar PV systems in schools will permit the city to shift to cleaner, renewable energy sources especially in communities that have historically battled with environmental injustice.

When solar panels are bolstered by battery systems that can be used as onsite energy storage, schools can serve as public centers that respond to climate emergencies and can increase the resiliency of the school itself and the surrounding community. A report by the National Renewable Energy Laboratory (NREL) and the City University of New York (CUNY) modeled the economic benefit of installing PV systems supported by battery storage in multiple locations across the City. Susan Wagner High School was identified as one of the sites that could support such a system and become a climate resiliency resource for its surrounding community. In 2012, during Hurricane Sandy, the school was used as an emergency shelter, and diesel generators were needed to provide energy when power was cut. A solar PV system with battery storage could have provided power for the school, and reduced or eliminated the need for a generator during the aftermath of Hurricane Sandy. According to the NREL and CUNY report, PV systems can be used as alternatives to existing forms of backup energy like generators and, at the very least, can reduce the amount of fuel used by generators by 9 to 36 percent.<sup>41</sup> Expanding the city's solar network will help create more resilient neighborhoods that are better prepared to tackle the next catastrophic climate event.

If onsite solar energy is embedded into a school's curriculum, the PV system could be used to teach students about broad ideas related to climate change and climate sustainability and resiliency. It can also provide an incredible opportunity to dive deeper into STEM subjects as well as solar power, energy systems and markets, and electrical systems. The New York City Department of Education and the nonprofit Solar One are currently partnering on a climate change and renewable energy curriculum for 3-12th graders.<sup>42</sup> The curriculum is designed to provide hands-on learning on installing solar panels.<sup>43</sup> If most schools had solar panels installed, these systems could be an excellent opportunity to not only focus on STEM subjects, but could also encourage workforce development programs to guide students into well-paying green jobs out of high school.





“ Participating in 'Construction Skills' was an opportunity I will always be grateful for. It gave me a mindset of unity to make changes that will benefit everyone. As a working-class member, it helped me see the opportunity beyond what's presented.”

Saudia Khan, Local 3 IBEW,  
'A' Construction Journeywoman

According to the U.S. Department of Energy, “K–12 schools spend more than \$8 billion on energy annually, making energy the second highest operating expenditure for schools after personnel costs.”<sup>44</sup> Solar energy can help schools reduce operating costs and focus funds on other priorities that directly help teachers and students. For example, the Tucson Arizona School District – the third largest school district in Arizona – recently installed 23.8 MW in 80 schools. The district will save over \$43 million over 20 years. A limited solar installation project for seven schools in Arkansas is saving \$2.4 million over 20 years. The school district has decided to use some of those savings to retain teachers by raising salaries at an average increase of \$2,000 to \$3,000 per year.<sup>45</sup> New York City should look to the installation of solar as a source of long-term cost-savings for schools as part of its recovery plan, especially as the schools fully reopen in September.

## Effective Energy Efficiency in K-12 Public Schools

To ensure the spirit of the Local Law is upheld by the private sector and to reduce greenhouse gas emissions by 40 percent by 2030, New York City must lead by example and retrofit public buildings with the urgency the issue deserves. As a starting point, **the Climate Works for All coalition is calling for New York City to swiftly implement Local Law 97 by ensuring \$1.08 billion goes toward energy efficiency projects dedicated to air quality control.** Prioritizing energy efficiency projects dedicated to air quality control will help the city mitigate the airborne transmission of COVID-19 in schools, and also produce long-term benefits to public health and student performance. The coalition recommends for \$1.08 billion of the capital funding allocated for energy efficiency projects to go towards installing air control systems like HVAC in schools that are currently emitting above 2030 - 2034 standards, starting with those located in environmental justice communities.



Approximately 1,132 K-12 schools with a total of 143,869,137 square feet, are emitting at levels beyond LL 97's 2030 - 2034 period of compliance. At an average cost of \$7.55 per square foot to retrofit buildings, the city would need over \$1.08 billion throughout the next 13 years to meet LL97 emission targets. That is, the City needs about \$80 million every year for the next 13 years to meet its LL 97 2030 emissions goals.

Research shows the COVID-19 virus can remain airborne for longer periods of time and for further distances than originally thought. In fact, SARS-CoV-2 viral particles actually spread between people more readily indoors than outdoors.<sup>48</sup> When indoors, ventilation helps offset and reduce the concentration of viral particles in the air. The lower concentration of particles there are in the air, the less likely they are to enter someone's system through inhalation, or by making contact with the eyes, nose, and mouth; and the less likely that the virus accumulates on surfaces.<sup>49</sup> Research shows sealed buildings with appropriately designed and maintained HVAC systems can provide better indoor air quality than a building with operable windows.<sup>50</sup> The EPA recommends increased ventilation, with outdoor air and air filtration, as important components of a larger strategy that includes social distancing, wearing face masks, surface cleaning and disinfecting, hand washing, and other precautions.<sup>51</sup> HVAC systems will help mitigate the airborne spread of COVID-19, and help students and staff feel safer to breathe the air in their classrooms.

Highly-polluting infrastructure such as power plants, landfills, and highways are often in environmental justice communities. This results in increased rates of asthma and increased chances of mortality from COVID-19 concentrated in these communities.<sup>52</sup> In fact, nearly 1 in 13 school-age children have asthma.<sup>53</sup> A 2019 study found almost 250 New York public schools were located within 500 feet of a highway or major roadway—a distance which the EPA says pollution risk is at its highest.<sup>54</sup> Academic research shows that when properly installed and maintained, HVAC systems significantly improve indoor air quality and air ventilation in schools. Scientific data also suggests that inflammation, respiratory infections, asthma symptoms and short-term sick leave increase with lower ventilation rates.<sup>55</sup> With HVAC, every classroom can have access to a system that cleans and cools air, which is critical for protecting the health and well-being of students and teachers during hot weather (which is expected to become more frequent and severe as a result of the climate change).

In 2019, The National Bureau of Economic Research conducted a study that found exposure to pollution negatively impacts student performance, classroom behavior, and attendance.<sup>56</sup> The study found students in the school with higher exposure to localized pollution had lower test scores, missed more school time, and were more likely to develop behavioral issues than their peers. Researchers noted the impacts are even greater in areas with heavily-trafficked roads – like highways – and the effects appear to persist after the student moves away from the highly-polluted area.<sup>57</sup>

It is clear that the installation of solar and HVAC systems in K-12 public schools will help New York City drive an equitable recovery, and tackle root causes of climate change and the COVID-19 crisis. Mayor de Blasio must work with DCAS, SCA, and the DOE to ensure the city is actively utilizing the \$3.8 billion of capital funding it's already set aside for this work, and it will be up to the next incoming mayor to continue to invest in long term infrastructure projects that to continue this effort across all other New York City buildings.





"The way that I got connected to my union's apprenticeship program was through Non-Traditional Employment for Women (NEW), a pre-apprenticeship program that prepares and places women in careers in skilled construction. After completing NEW's pre-apprenticeship and IBEW Local 3's electrical apprenticeship, I became a Sub-foreman, then Foreman, and finally General Foreman on some of the most iconic projects in NYC. I've worked on the tracks of our subway system, I've rehabilitated NYCHA housing, energy efficiency systems at 3 World Trade Center, and PS62R in Staten Island—the first net-zero energy school in the Northeast. Words cannot express the immeasurable amount of pride I feel as an IBEW tradeswoman having contributed to a stronger, greener, and more resilient New York City."

Allison Ziogas, Local 3 IBEW,  
'A' Construction Journeywoman



## An Equitable Recovery for All

Communities across New York City are still battling an unemployment crisis brought on by the COVID-19 pandemic. Since March 2020, unemployment rates among Black (16.6 percent) and Latinx (13.9 percent) New Yorkers have been higher than the general city average (12.9 percent).<sup>58</sup> Research shows women suffered the majority of pandemic-related job losses, losing 5.4 million net jobs during the pandemic—almost 1 million more than men.<sup>59</sup> Green Healthy Schools can offer the city a plan to put good, public sector jobs back into Black and brown environmental justice communities. By investing in clean energy infrastructure projects that incorporate project labor agreements, community hiring practices, and other contractual mechanisms that raise labor standards, New York City would offer a pathway to well-paid career-building jobs for both new-entry workers and workers transitioning into the climate industry, across ages and genders.

The Political Economy Research Institute (PERI) estimates for every \$1 million spent on renewable energy projects 7.1 direct and indirect jobs would be created.<sup>60</sup> The average cost of solar PV systems in New York City is \$3.50 per watt.<sup>61</sup> However, industry experts say including prevailing wages in the solar industry would increase this cost to \$5 per watt. To install 6,124 kW in schools that are solar-ready, it would cost the city \$30,620,750. The city would need over \$460 million over the next four years to reach 100 megawatts of solar energy in public



schools. Alternatively, though the average cost of HVAC systems vary by type and size, PERI estimates for every \$1 million spent on energy efficiency retrofit projects, up to 8.7 direct and indirect jobs will be created.<sup>62</sup> These careers can include positions in manufacturing such as process control technicians, quality assurance specialists, electronics technicians, and advanced manufacturing technicians. It can also include installation and operations jobs such as solar assemblers and basic installers, as well as HVAC technicians, roofers, plumbers with solar expertise, in addition to sheet metal workers, heat and frost insulators, and bricklayers.<sup>63</sup>



## Nontraditional Employment for Women

Hard Hats. Strong Women. Building the Future.

**Nontraditional Employment for Women (NEW) is a training program that prepares women to participate in the construction, utility and maintenance trades in New York City. NEW's goal is to provide paths to fields of employment that have been traditionally harder to access for women, increasing the number of women employed in the construction trades. NEW has placed over 3,000 women into trades careers in the last ten years. The average starting wage of a NEW graduate is 19 dollars an hour.**

As of 2021, the City is now mandated to incorporate project labor agreements in publicly-funded renewable energy projects. These rigorous labor standards ensure the creation of good quality, career-track jobs. When PLAs do not apply, the City must ensure projects pay prevailing wages and include other contractual agreements that further workers' rights. PLAs and prevailing wages can make the difference between a low-wage job and a sustaining long-term career. Contractors should also prioritize implementing community hiring practices, such as explicitly employing local low-income residents, residents of NYCHA, women, and long-term unemployed New Yorkers in new hiring opportunities.

Now is the time to deeply invest in job creation strategies that support journeypersons, apprentices, and new entry workers who've suffered pandemic-related job losses. The mayor should invest in proven pre-apprenticeship and apprenticeship programs that train workers on the skills needed for a sustainable career across the clean energy sector. Green Healthy Schools will bring jobs back to the city and support women, low-income New Yorkers, and other traditionally underrepresented workers on their paths to attaining good, union-track jobs.





There are already successful workforce development models the city can look to for further expansion. Climate Works for All coalition member IBEW Local 3 has successfully built an education program model that supports both incoming apprentices and journeypersons in the electrical sector. Their apprenticeship program works with pre-apprenticeship programs to directly place workers into union-track jobs. This program model ensures women, low-income New Yorkers, and other traditionally underrepresented workers have access to support programs that prepare and train them for the sustainability sector. New York City can and should build on this model, to ensure all New Yorkers have access to an equitable recovery. New York City should adopt the Federal government's supportive services framework to ensure that up to 1.5 percent of funding appropriated to city renewable energy projects go directly to pre-apprenticeship programs that train new entry workers how to properly install and maintain solar PV and HVAC systems, some of which include:

- [Nontraditional Employment for Women \(NEW\)](#) places women in careers in the skilled construction, utility and maintenance trades.
- [Pathways 2 Apprenticeship](#) assists people from low-income communities to access union construction apprenticeships, striving to serve justice involved individuals, residents of public housing, and the under-employed.
- [The Edward J. Malloy Initiative for Construction Skills](#) supports adults and young people of color interested in securing a career in the unionized construction industry. They work closely with the New York City Department of Small Business Services and the City Workforce One.
- [Consortium for Worker Education \(CWE\)](#) partners with 35 unions and 40 community-based organizations to provide workforce preparation, industry specific training, and employment services to over 60,000 New York City workers annually.
- [Helmets to Hard Hats](#)'s New York chapter helps veterans to get back to work.

The job creation strategies outlined in this report offer the city a plan to put good, public sector jobs back into Black and brown environmental justice communities. New York City should invest in certification training programs in addition to apprenticeship programs across all sectors to fully support the growing clean energy industry. Some training programs that the city and other renewable sectors can look to model include:

- [32BJ's Green Building Training Program](#)
- [Green City Force](#)
- [Association for Energy Affordability, Inc. \(AEA\)](#)
- [CUNY Building Performance Lab](#)
- [The Hope Program](#)
- [Solar One](#)





## A Look Ahead

The main financing models that cities use to install solar energy in schools are direct purchase, land leasing through cash, grants, donations, or bonds, and third party ownership. Under the direct purchase model the city pays for the solar energy system, which includes construction, installation, operations, and maintenance. Under the third party ownership model – the most common – cities purchase solar energy for a portion of their electricity needs through a long-term contract, often a power purchase agreement or PPA. Under this model a private sector company owns the energy system and is responsible for installation, operations and maintenance. DCAS should use this opportunity to reevaluate its PPAs and consider alternative financing models that will offer communities a larger share of the economic benefits tied to solar.

According to The Solar Foundation, 79 percent of solar installed in schools is financed through third party ownership using PPAs. Only 14 percent is financed through bonds, loans, or cash, and seven percent is financed through grants or donations. New York City schools follow a similar trend. Between 2005 and 2018, most school solar projects were completed using capital funds. However, 79 percent of projects that are currently in progress are being financed through PPAs (see Figure 5).

**Figure 5: A majority of the City's current solar projects are being financed by Power Purchasing Agreements.**

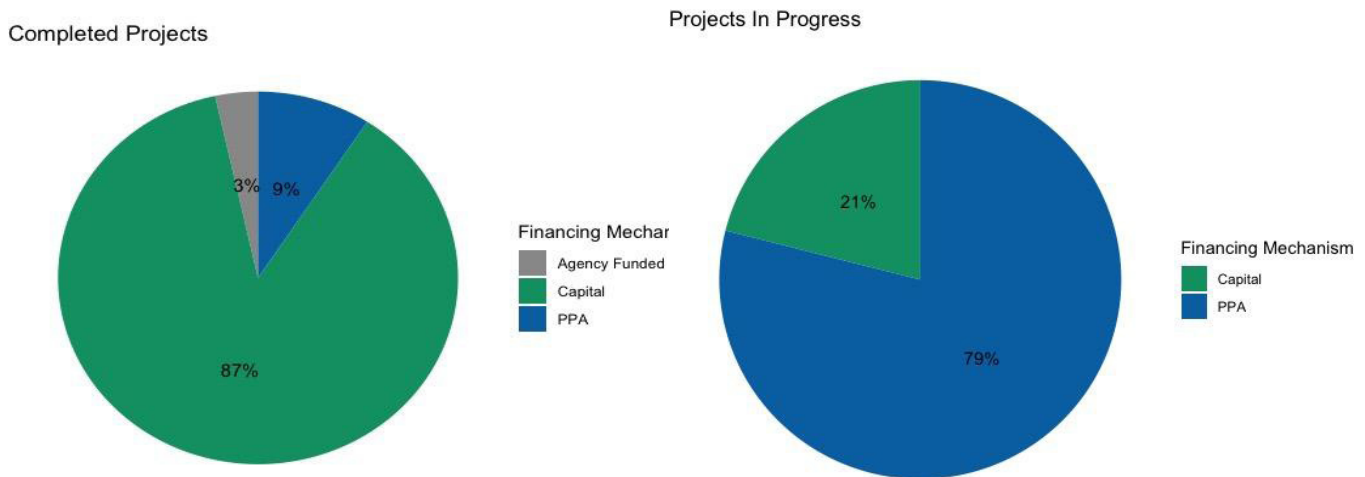


Figure shows percentage of New York City solar projects completed by various financing mechanisms. (Used 2020 LL 24 data from DCAS)

Financing solar through PPAs poses a myriad of equity, economic development, and workforce development issues. Implementing solar energy through PPAs with private sector companies does not maximize the public benefit that such a large infrastructure investment in New York City could have. Solar installation and other public works projects are typically subject to quality jobs standards, such as prevailing wage, health and safety standards, and other benefits to the project's workforce. These job standards are safeguarded through PLAs. Currently, solar energy in public buildings financed through PPAs are not subject to PLAs.



Instead, they follow labor practices that are below quality job standards. For example, it is common for private sector companies working on renewable energy to hire and lay off workers within three months to avoid paying unemployment benefits as required by law. Reaching climate goals will cost millions of dollars; taxpayer funds should be used to solve both the climate crisis, and to tackle inequality highlighted by COVID-19 as well.

In previous reports and in its advocacy work, the Climate Works for All coalition has urged the City to assess the full range of financing options that include public financing, control, and ownership of solar power projects so that equity issues can be tackled through the implementation of these projects. PPAs do not maximize the potential savings from solar.<sup>64</sup> Rather, they shift most of the cost savings that come from solar energy to private solar developers, thereby reducing the City's ability to reinvest in communities hit hardest by climate change. The City should not move forward with PPAs for solar installation to ensure more savings to be returned to public funds and low-income communities. Only by focusing on how we implement climate initiatives can we make progress on economic equity and focus resources on frontline and environmental justice communities.





## Conclusion

As New York City moves toward full reopening of schools in September, all public schools need and deserve daily, equitable access to clean air in their classrooms.

Improving air quality control through HVAC systems will be crucial, especially as questions remain about the durability of vaccines against new variants of COVID-19.

As New York City moves toward full reopening of schools in September, all public schools need and deserve daily, equitable access to clean air in their classrooms.

Mayor de Blasio should use his final months in office to begin investing \$1.5 billion in HVAC systems and solar panels for New York City's public schools.

Such a move by de Blasio would put the next mayoral administration in a strong position to finish the job of creating net-zero schools across the city. The full investment of \$1.5 billion would be enough for the next Mayor to install solar panels and HVAC systems in every New York City public school. And that would still leave a remaining \$2.3 billion to be invested in necessary energy efficiency projects on other city-owned public buildings.

The next Mayor can and should create net-zero schools in all five boroughs, using PS 62 as a proven model. This investment in net-zero schools can create good-paying, clean energy jobs for New Yorkers across the city, including many women, immigrants, and people of color.

Installing solar panels and air control systems like HVAC in public schools will allow the next Mayor to foster more resilient neighborhoods and ensure the benefits of renewable energy reach low-income New Yorkers of color most impacted by COVID-19 and climate change.





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