



THE CITY OF PHILADELPHIA
— OFFICE OF —
SUSTAINABILITY

2020 PROGRESS UPDATE

MUNICIPAL ENERGY MASTER PLAN FOR THE BUILT ENVIRONMENT





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ON THE COVER: Elizabethtown Solar (picture courtesy of Community Energy Inc.)



Mayor Kenney speaks on a panel about climate at the C40 World Mayor's Summit in Copenhagen.



Letter from the Office of Sustainability

Dear Friends,

On September 27, 2017, we stood together on the steps of the Philadelphia Museum of Art to announce a bold plan for how city government can lead by example in the fight against climate change. Buildings account for almost 80% of Philadelphia's carbon footprint, and it's critical that the City reduce emissions from our own facilities. This work will stabilize our energy costs and increase the health of our buildings for employees and visitors. Since that time, we've implemented projects and programs that demonstrate our commitment to the goals set forth in the Municipal Energy Master Plan for the Built Environment.

This report provides an update on progress toward achieving the goals of the Municipal Energy Master Plan and highlights key successes. For example, we're nearing completion of a major energy retrofit of the Philadelphia Museum of Art, worked to install LED lighting and building control systems throughout dozens of City buildings and finalized a contract for what will be the largest solar project in the Commonwealth of Pennsylvania. More action will be needed to reach our goals and we're excited to continue this important work.

Sincerely,

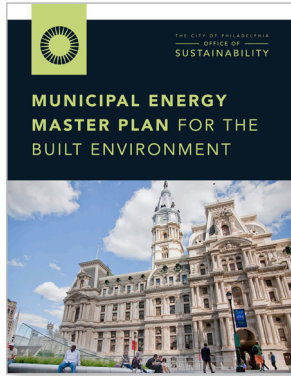
Philadelphia's Office of Sustainability



The City of Philadelphia released the Municipal Energy Master Plan for the Built Environment at the Philadelphia Museum of Art in September 2017.



Municipal Energy Master Plan Overview and Progress




Released in 2017, the City's first Municipal Energy Master Plan identified two broad strategies to achieving Philadelphia's clean energy goals for municipal buildings:

- 1. Lower Energy Use in City Operations**
- 2. Clean the City's Energy Supply**


The plan outlined eight opportunities that would bring the City closer to cutting carbon emissions, reducing energy waste, and meeting its financial and environmental goals. The impact of achieving each of the eight opportunity areas is quantified as the following four long term goals for the City's municipal buildings and streetlighting:

◀ The complete Municipal Energy Master Plan for the Built Environment can be found at: bit.ly/PhilaEMP


The plan outlines four goals for the City's municipal buildings and streetlighting:



Reduce greenhouse gas emissions from City operations 50 percent by 2030,



Reduce City operations' energy use 20 percent by 2030,



Generate or purchase 100 percent of all electricity for City operations from renewable resources by 2030, and



Maintain or reduce the City's operational cost of energy.



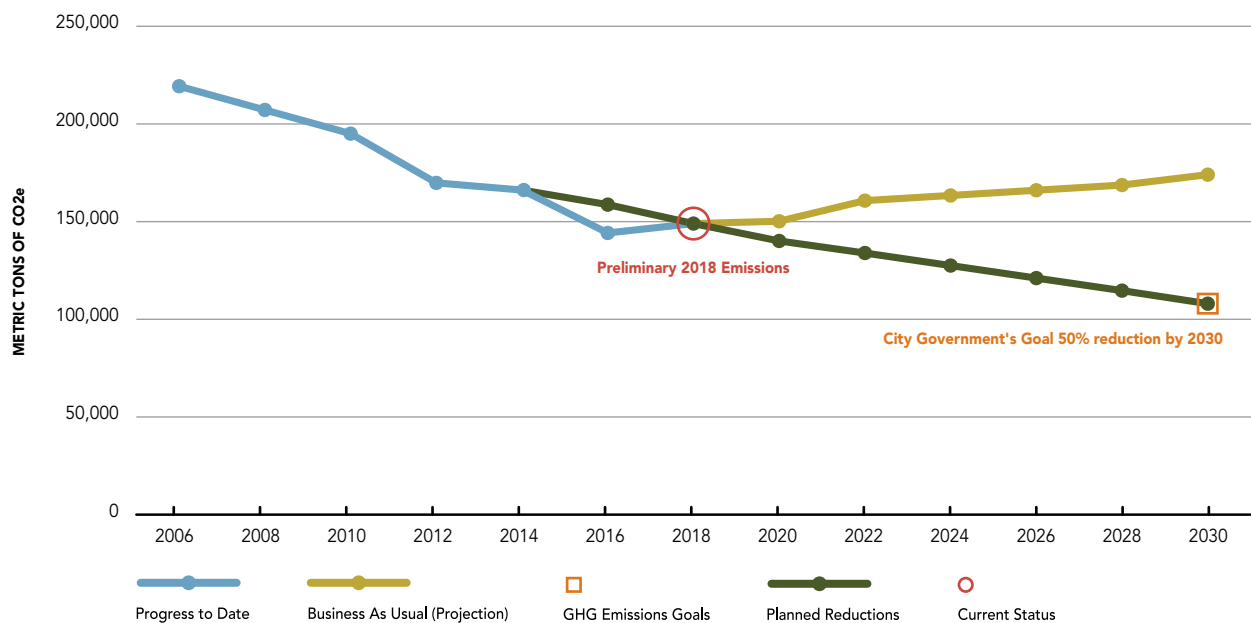
Progress on Goals

The City has made significant progress in meeting each of the four long term goals for municipal buildings and street lighting. The City's preliminary emissions inventory show a 33 percent decrease in carbon emissions from their 2006 baseline. As the energy retrofit of the Philadelphia Museum of Art and other investments in municipally-owned facilities are completed, electricity is expected to decline in line with the Energy Master Plan goals. Similarly, the City will make significant progress toward its renewable electricity goal as the solar energy project in Adams County begins operation. Much of this progress has been possible due to strong partnerships with other City agencies, like Public Property, the Office of the Finance Director, the City Treasurer's Office, the Law Department, Philadelphia City Council, and the Philadelphia Energy Authority. As implementation continues, the City's progress should continue to be evaluated and additional resources may be needed should the City fall behind planned progress.

	Baseline	Progress	2030 Goal	Status
GREENHOUSE GAS EMISSIONS	219,306 MT of CO ₂ e (2006)	148,000 (2018)*	109,700	➔ On Track
ELECTRICITY CONSUMPTION	281,300 Weather Normalized MWh (2016)	290,000 (2018)	225,000	⬆ Needs improvement
PRIMARY HEATING CONSUMPTION	828,500 Weather Normalized MMBTU (2016)	814,000 (2018)	662,800	➔ On Track
RENEWABLE ELECTRICITY	6% (FY16)	7% (FY19)	100%	➔ On Track
TOTAL COST OF ENERGY	\$42.4 Million	\$35.2 Million (FY19)	< \$42.4 Million	➔ On Track

*Preliminary Carbon Emissions

Projected Greenhouse Gas Emissions for the City of Philadelphia's Built Environment



Philadelphia municipal government greenhouse gas emissions are on track toward 2030 emissions reduction goals. In this graph, the blue represents progress to date, the yellow line represents business as usual, and the green line represents planned reductions.



STRATEGY 1: Lower Energy Use

OPPORTUNITY: IMPROVE OPERATION PRACTICES

Progress: Establish Departmental Accountability for Energy Usage

In 2012 the City's Energy Office created a shared savings program called the Energy Efficiency Incentive Program. Five departments participated in the program and as these departments achieved energy savings, a percentage of the associated savings was returned to their department budget. The program saw varying degrees of success among departments, with the Department of Parks and Recreation achieving the most impact through a policy mandating field lights be shut off when not in use.

This program was relaunched in 2017 as the Energy Reduction Challenge and is currently being run in The Free Library of Philadelphia. Through the Challenge, the Free Library employees have been trained as energy stewards. The library energy stewards participate in monthly calls and bring energy information to other branches to help reduce energy use. Library leaders are also working to explain the energy related capital improvements that are being installed in the buildings so that employees and occupants better understand the building's capabilities. This program has been successful, and the Free Library expects to achieve a 1% reduction in energy use, equivalent to 66 MT of carbon.



Energy Office Staff member Mardi Ditze meets with Library employees to instruct them about City programs and how they can reduce energy at work and home.



OPPORTUNITY: LARGE-SCALE ENERGY PERFORMANCE CONTRACTS

Progress: Energy Performance Contracting at the Philadelphia Museum of Art

Through a unique private/public partnership, the Philadelphia Museum of Art Energy Project brings Philadelphia closer to its energy and climate goals. The large retrofit at the Philadelphia Museum of Art is nearing completion, and includes LED bulb and fixture lighting replacements, upgrades to heating systems, and new chilled water systems, among other major investments. The project creates 191 jobs over the term of construction, with Minority and Women-owned businesses performing more than 40% of the work on the project.

The City with its partners the Philadelphia Energy Authority, the Philadelphia Museum of Art and Johnson Controls Inc. expect full construction of the project to be complete in early 2020. The total cost of the project is \$11.4 million dollars and the project will be paid for with the savings it generates. The project will boost the City's Municipal Energy Master Plan goals by reducing carbon emissions by about 2,400 MT of CO₂e, reducing electricity use 4.8 million kWh, and lowering steam use by nearly 18,400 MMBTU.



Workers outside the Philadelphia Museum of Art lift a new high efficiency chiller off the delivery truck.

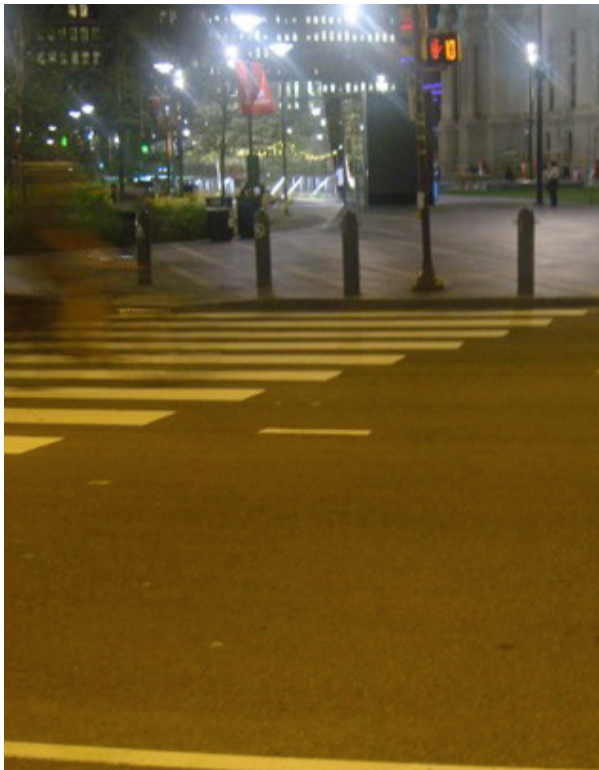


OPPORTUNITY: LED STREET LIGHTING

Progress: PECO Rate changes to enable Citywide LED Streetlighting + Issued Request for Qualifications

Converting the city's more than 100,000 streetlights to LED lighting remains the single largest carbon reducing energy efficiency project that City government can complete. Over the past year, the Energy Office has worked with PECO to ensure that an LED streetlighting project works for both City government and the utility. In PECO's most recent distribution rate case with the Pennsylvania Public Utility Commission (PA PUC), the company proposed a new current rate for Smart Street Lighting, which the City and PECO developed together. Now, with final approval by the PA PUC, this new rate will benefit the City by allowing new LED Streetlights to be metered and controlled remotely, while reducing costs to City government.

With the new rate in place, the Energy Office together with the Philadelphia Energy Authority, Streets Department and Office of Innovation and Technology have begun the procurement for a Citywide LED Streetlighting and controls project. A Request for Qualifications defining the City's interest in this project can be found at www.philaenergy.org/public-bids.



Area around City Hall before LED retrofit (left) and after (right).



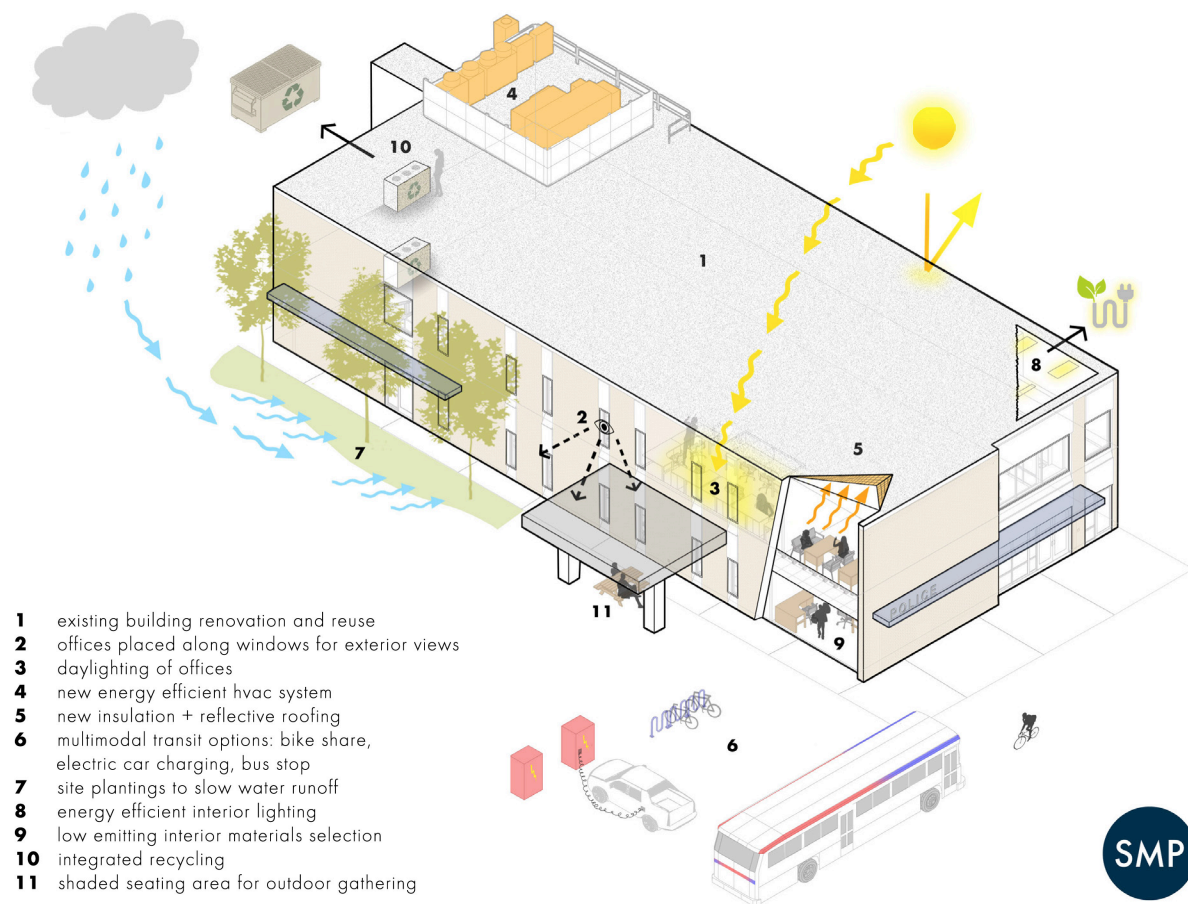
OPPORTUNITY: CAPITAL AND REBUILD PROJECTS

Progress: LEED Certified and Energy Efficient Public Safety Facilities

Large capital projects are required to meet LEED Silver sustainability standards and in the coming years, the City of Philadelphia will open several new LEED Certified Public Safety Facilities:

- A new 22nd Police District Building at 21st St. and Diamond St.
- An expansion and renovation of Engine 37 at West Highland Ave. and Shawnee St.
- A renovation of an existing building, which will house the 2nd Police District at Cottman Ave. and Castor Ave.
- A renovation of the existing 2nd/15th Police District Building for the 15th District at Levick St. and Harbison Ave.
- A new Police Headquarters and Health Department facility at Broad St. and Callowhill St.

Throughout the designs, the Department of Public Property (DPP) and Rebuild staff have taken care to ensure that all buildings use energy-efficient equipment and LED lighting. The Energy Office has worked as part of the team with project managers and engineers to review and make recommendations to the systems and spaces. As an example of the projects, the 2nd Police District building's current plans include a Variable Refrigerant Flow (VRF) system to heat and cool the space efficiently. The Energy Office will continue to coordinate with DPP and Rebuild, as outlined in the What's Next section on page 14.



Rendering of sustainability related items for the planned 2nd Police District. (picture courtesy of SMP Architects).



OPPORTUNITY: GREENWORKS SUSTAINABILITY FUND

Progress: Energy Retrofit at Greenland Nursery

The Greenworks Sustainability Fund (GSF) offers funding to departments on a competitive basis to support the implementation of energy efficiency and sustainability-based projects within City-owned facilities. Since its start in 2012 the Fund has generated \$2.5 million in savings from energy and utility costs. Investments have been made in LED lighting and HVAC control investments across dozens of buildings, including recreation centers, correctional facilities, and police and fire stations. Since 2017 GSF projects have cut the City's carbon footprint by 436 Metric tons.

In 2019 the Energy Office finalized a GSF project with Philadelphia Parks & Recreation (PPR) to weatherize, electrify, and upgrade Fairmount Park's Greenland Nursery. The nursery had a failing fuel oil boiler which was needed to heat the two greenhouses containing tens of thousands of plants and more than 100 species which are planted throughout Fairmount Park. Instead of just replacing the fuel oil boiler, the Energy Office and PPR committed to a whole-building retrofit, replacing the oil-burning boiler with electric heat, installing insulation, and replacing lighting with efficient LEDs.



Pictures of Greenland Nursery after Greenworks Sustainability Fund Investments.



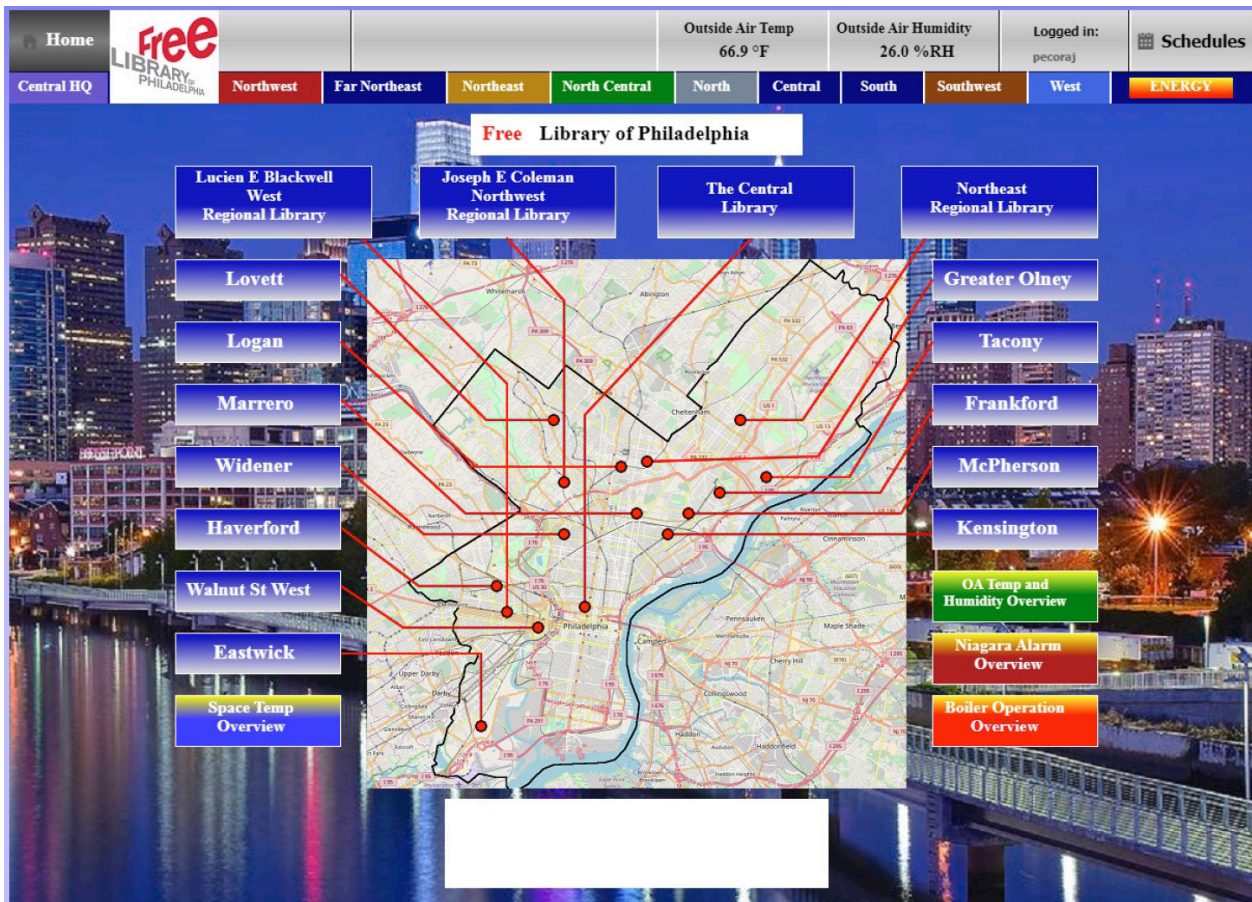
OPPORTUNITY: SMARTCITYPHL ENERGY

Progress: Incorporate Sustainability into Smart City Initiative

In February 2019 the Office of Innovation and Technology (OIT) released the SmartCityPHL Roadmap, outlining key strategies to spur innovation and collaboration around Smart City projects. Energy Office projects such as building monitoring and an indoor air quality pilot are featured in the report. Additionally, OOS Director, Christine Knapp, was appointed as one of four City officials to serve on the SmartCityPHL Advisory Committee, which had its first meeting in April 2019.

The Energy Office is contributing to the SmartCityPHL initiative by working towards making the City's municipal buildings smarter. In partnership with OIT, the Energy Office released a Request for Proposals (RFP) for building monitoring software in January 2019. The goal of the building monitoring software is to provide data and analytics on specific building operations. These analytics will help operators run buildings more efficiently, use less energy, and improve tenant comfort.

To gather data and develop analytics on key energy-consuming equipment such as heating, ventilation, and air conditioning (HVAC) equipment, the Building Automation Systems (BAS) that control that equipment need to be up-to-date and centrally connected. While working on building monitoring systems, the Energy Office has been simultaneously working to ensure that all BASs are running on the latest version of software and connected to a central server. By upgrading these systems, City departments will be able to manage multiple systems concurrently and improve user management while increasing energy efficiency and occupancy comfort.



Building Automation System Graphics showing the Library Main Operations page.



Strategy 2: Clean Energy Supply

OPPORTUNITY: PURCHASING CLEAN ENERGY

Progress: Power Purchase Agreement for Solar Energy

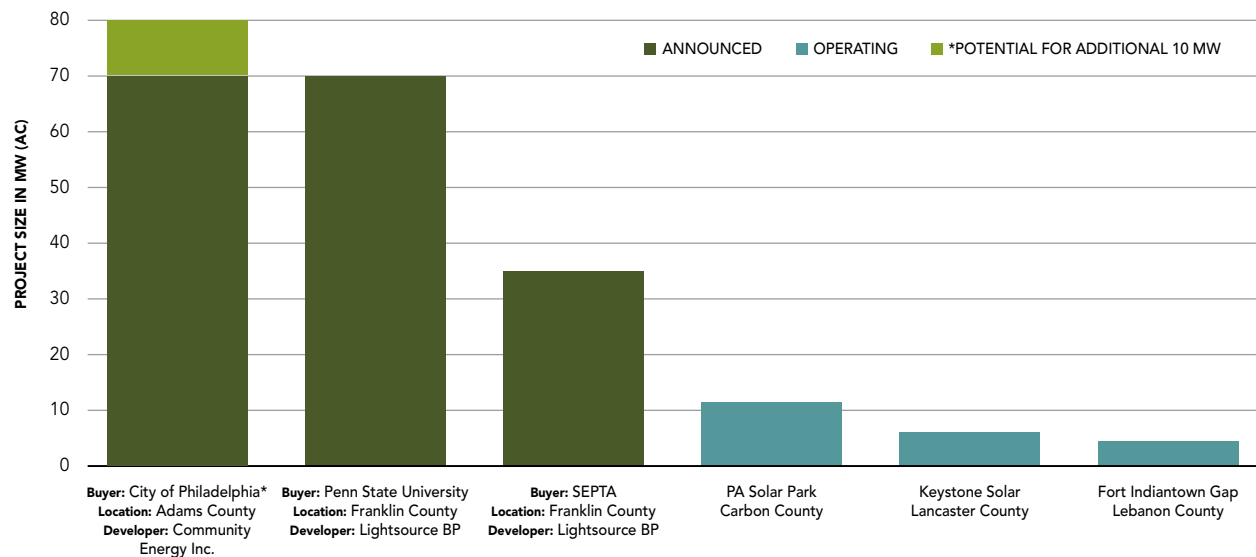
In September 2018 the City and the Philadelphia Energy Authority released a request for proposals seeking a power purchase agreement with a renewable energy developer. After receiving and evaluating more than 25 proposals, Adams Solar LLC, a project of Community Energy, was selected as the preferred vendor. City Council approved the legislation approving the contract, which was signed by Mayor Kenney in December 2018.

This project will result in the construction of at least a 70 MW solar photovoltaic power plant in Adams County, PA (with the potential for an additional 10 MW of capacity). The project will provide up to 22% of the City government’s electricity, making this the largest solar power purchase agreement by a municipality in U.S. history. Buying renewable energy from a regional source will ensure a reduction in local greenhouse gas emissions and support the development of additional renewable energy in Pennsylvania and related jobs. A successful power purchase agreement will help mitigate risk associated with the City’s electricity costs by providing stable long-term energy prices to City government.

In addition to the large increase in renewable energy, the project prioritized creating benefits for Philadelphians. The contract’s Economic Opportunity Plan requires the project developer to make best and good faith efforts to work with Philadelphia businesses, with specific emphasis on diverse businesses and workers, in the construction of the project. The developer has agreed to partner with the Philadelphia Energy Authority’s solar training program with the School District of Philadelphia, allowing 10 to 15 students to participate in the construction of the new solar plant.

In October 2019, the City of Philadelphia, Philadelphia Energy Authority and representatives from Adams Solar LLC signed the power purchase agreement. The solar farm will be owned, developed and run by ENGIE, the largest independent power producer in the world. The project will break ground in the first half of 2020 and is scheduled to be operational in 2021.

Largest Announced and Operating Solar Projects in Pennsylvania



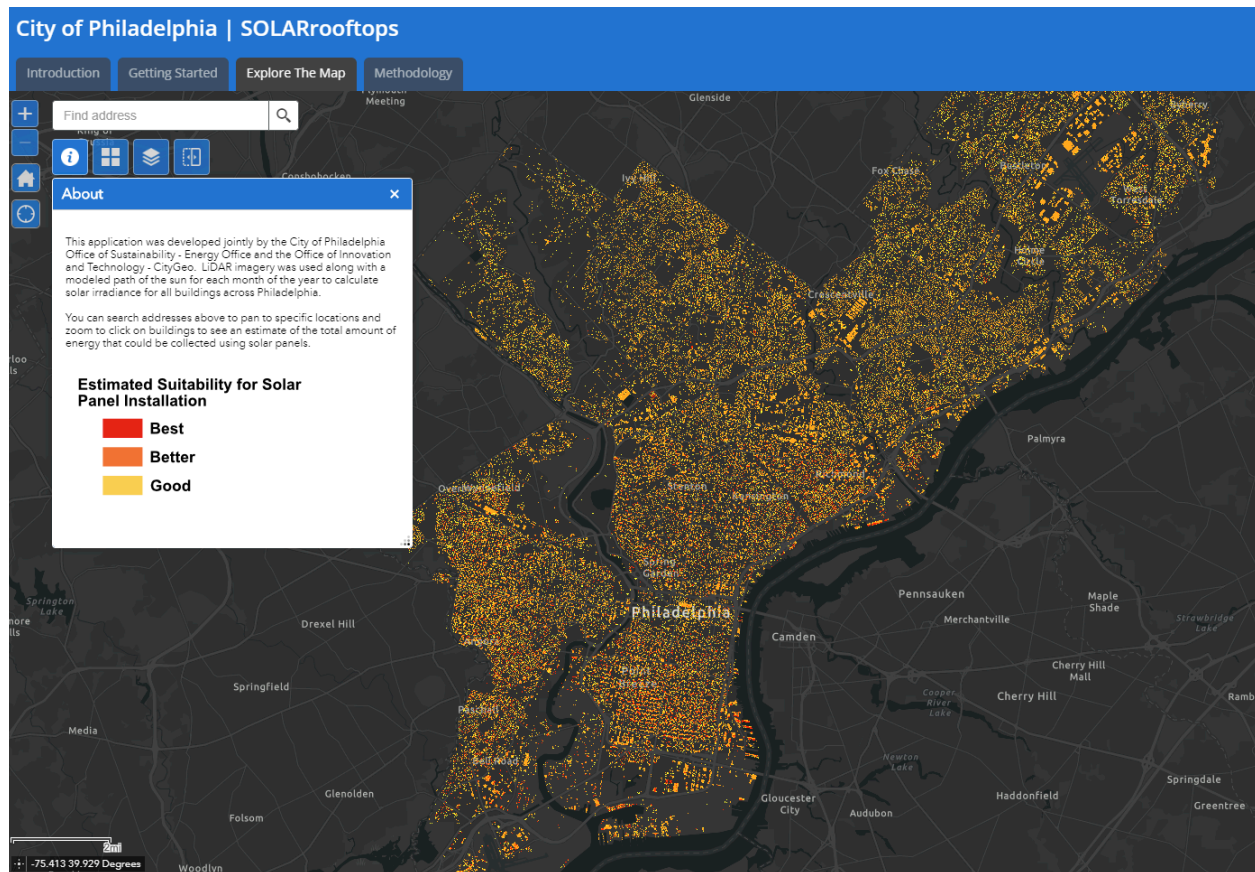


OPPORTUNITY: ON-SITE CLEAN ENERGY GENERATION

Progress: Mapping Opportunities for Solar Photovoltaic Energy Generation

The Energy Office partnered with the Office of Innovation and Technology (OIT) to develop a map of solar potential production on Philadelphia’s rooftops. The map launched in September 2018 and can be found at www.phila.gov/solarmap. The map allows residents and businesses to see a conservative estimate of potential electricity production from installed solar panels for their building(s). Building owners can use this map to inform their decision about pursuing a solar installation.

The City’s Energy Office is using the map to target municipal buildings and buildings the City is renting in order to identify good candidates for solar photovoltaic installations. When suitable buildings are identified, the Energy Office plans to develop a Request for Proposals (RFP) for solar PV installations on those identified buildings.



Screenshot of SOLARrooftops, a tool developed by the Energy Office and the Office of Innovation and Technology



What's Next

Building Energy Performance Policy: Philadelphia City Council has passed and the mayor has signed a building energy performance policy (Bill #190600) to require all non-residential buildings 50,000 square feet and larger to achieve to a high-performance standard or complete a building tune-up once every five years, beginning in 2021. The City of Philadelphia will ensure that City buildings comply with this policy and support partners throughout Philadelphia by sharing best practices on building maintenance and operations.

Educational Stewards: In addition to the Energy Reduction Challenge (see page 6), the Energy Office is planning to expand the scope of educational programming to include broader sustainability training including resource conservation and other environmental impacts.

Fire Administration Building Renovation: In early 2020, the Energy Office and Department of Public Property will begin construction on a major \$1.5 million Heating, Ventilation and Air Conditioning (HVAC) Retrofit at the Fire Administration Building at 240 Spring Garden St.



Workers installing a new energy efficient chiller at the Philadelphia Museum of Art.



Greenworks Sustainability Fund Investments: To ensure continued investment through the Greenworks Sustainability Fund, the Office of Sustainability worked with the Office of the Finance Director, the Budget Director, and Councilmember Derek Green's Office to establish a replenishing source of funding for the Greenworks Sustainability Fund. Beginning in Fiscal Year 2020, the Office of Sustainability will be able to capture a portion of the revenue generated through energy programs, such as demand response proceeds and utility rebates. It is expected that an average of \$250,000 will be generated for the Fund and leveraged to further achieve the goals of the EMP.

Open Data: The Energy Office is committed to providing meaningful access to energy data to City employees and residents. In a first step towards sharing data, a dashboard linked to the City's energy management database has been created and is available at bit.ly/philamunienergyuse. Going forward, the City will work to build more dashboards to better communicate information.

Rebuild Investments: As the City's Rebuild program continues to make investments in recreation centers, parks and libraries, the Energy Office supports the team by ensuring that high efficiency lighting, and HVAC improvements are implemented throughout investments. In 2020 the Energy Office plans to install the first LED field lighting at recreation centers.



Opening of a new play area at Fishtown Recreation Center, a project funded by Rebuild (photo by Jared Pipor/PHL Council).



GREENWORKS

PHILADELPHIA

PRIMARY AUTHORS

Adam Agalloco

Mardi Ditze

Richard Freeh


Dominic McGraw

Amanda Warwood

DESIGNED BY

WFGD Studio

www.phila.gov/green

 [FACEBOOK.COM/GREENWORKSPHILA](https://www.facebook.com/greenworkspbila)

 [TWITTER.COM/GREENWORKSPHILA](https://twitter.com/greenworkspbila)