U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Challenges and Successes on the Path toward a Solar-Powered Community

Solar in Action

Pittsburgh, Pennsylvania

Includes case studies on:

- Solar Web Portal
- Simulation Tool for Evaluating Solar Installation Options on City Property
- Solar Ambassador Fellowship

SOLAR AMERICA CITIES

Part of the Solar America Communities program

October 2011

An installer puts a solar hot water system on Pittsburgh Truck House No. 34. *Photo from City of Pittsburgh, NREL/PIX 18412*

Cover photos from iStock/3558097, View of the City of Pittsburgh.

About the U.S. Department of Energy's Solar America Communities program:

The U.S. Department of Energy (DOE) designated 13 Solar America Cities in 2007 and an additional 12 cities in 2008 to develop comprehensive approaches to urban solar energy use that can serve as a model for cities around the nation. DOE recognized that cities, as centers of population and electricity loads, have an important role to play in accelerating solar energy adoption. As a result of widespread success in the 25 Solar America Cities, DOE expanded the program in 2010 by launching a national outreach effort, the Solar America Communities Outreach Partnership. As the Solar America Cities program evolved to include this new outreach effort, the program was renamed Solar America Communities to reflect DOE's commitment to supporting solar initiatives in all types of local jurisdictions, including cities and counties. Visit Solar America Communities online at www.solaramericacommunities.energy.gov.

Pittsburgh's Starting Point

Pittsburgh was designated by the U.S. Department of Energy (DOE) on June 20, 2007, as a Solar America City. Since the 1950s, the city and the private sector have consistently worked together to affect the city's transformation with respect to the environment and business. The first major joint project was led by Mayor David Lawrence and renowned banker and philanthropist Richard Mellon to clean the air and water, redefining the city's industrial image to that of a model for remediation of pollution and restoration of natural beauty.

Since 2000, as the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system has emerged, Pittsburgh has led the nation in LEED-certified commercial buildings and square footage of LEED-certified structures for seven of those years.

In June 2007, DOE announced that Pittsburgh was one of 13 cities to be awarded a Solar America Cities grant to increase the use of solar power. With its 330,000 residents and incoming daily workforce of more than 144,000, Pittsburgh continues to serve as the commercial, cultural, medical, and educational core of a major metropolitan region. Pittsburgh is striving to develop a reputation as a national leader in green practices. In October 2006, the city demonstrated its commitment to being a national leader in environmentally responsible practices by joining ICLEI-Local Governments for Sustainability, an international association with more than 815 local government members committed to reducing greenhouse gas emissions and supporting sustainable development.

Through its membership with ICLEI–Local Governments for Sustainability, the City of Pittsburgh committed its government, businesses, and citizens to implementing programs to reduce community-wide emissions of greenhouse gases. Pittsburgh formed a Green Government Task Force (GGTF) to assist in creating a plan for reducing the city's energy consumption and greenhouse gas emissions. The GGTF includes Carnegie Mellon University and the Green Building Alliance, a local nonprofit that has gained national recognition for its successful promotion of green building practices in the city and throughout the region. This GGTF serves as a convener and point of contact for all sectors participating in Pittsburgh's Solar America Cities effort. The group developed Pittsburgh's Climate Action Plan, which includes the city's long-term goals for solar energy.

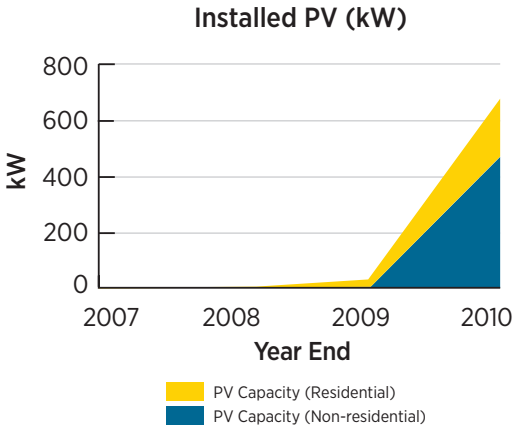
Building Partnerships and Setting Goals

Pittsburgh's partnerships include universities, nonprofit organizations, businesses, labor organizations, and local community groups. The city plans to transform the local solar energy market and stimulate adoption of solar technologies to show that solar can work in the Northeast.

Pittsburgh's long-term goal for solar energy is to transform the energy marketplace through a program called the Pittsburgh Solar Initiative, converting 0.5% of all electrical energy generation to solar by 2021. This goal conforms to the Commonwealth of Pennsylvania's Alternative Energy Portfolio Standard (AEPS), signed into law in late 2004. AEPS mandates that 18% of all energy generated in the state will come from clean, efficient sources by 2020. Pennsylvania's utilities will be required to supply 0.5% of all electricity consumption in the state from solar energy sources. Totaling more than 800 megawatts, this is equivalent to powering almost 80,000 typical homes per year in Pennsylvania and constitutes the second-largest, state-level solar mandate in the country.

Installed Capacity

Pittsburgh



Installed PV capacity increase from December 31, 2007, to December 31, 2010

The City of Pittsburgh's Solar America Cities project partners include:

- Carnegie Mellon University
- Duquesne University

A worker measures the orientation of Pittsburgh Truck House No. 34 to determine optimal placement of a solar hot water system. *Photo from City of Pittsburgh, NREL/PIX 18413*

Solar professionals make progress on a PV array on Pittsburgh's public works garage. *Photo from City of Pittsburgh, NREL/PIX 18414*

- Duquesne Light
- Green Building Alliance
- PennFuture
- Conservation Consultants, Inc.

Accomplishments and Highlights

- After Pittsburgh's designation as a Solar America City, former Mayor Luke Ravenstahl created a new Office of Sustainability & Energy Efficiency. The city also received a Green Power Purchaser Award from the U.S. Environmental Protection Agency in 2009.
- Pittsburgh Public Works Department employees have been trained in the installation and operation of solar technologies—both thermal and photovoltaic (PV). The training was part of the technical assistance provided by DOE under the Solar America Cities partnership, and paid immediate benefits. The trainees are now doing solar thermal installations on firehouses in the city.
- Pittsburgh has completed three installations on city-owned property—two on firehouses and one on the general services building. The installations have been deemed successful, both as training tools and as cost-saving measures.
- The firehouse building sites for the thermal installations (solar thermal creates energy from the sun's heat, as opposed to solar PV, which produces electricity from sunlight) represented a significant challenge and learning experience because of its "double Quonset hut" shape—two prefabricated steel structures with semicircular cross-sections. It was a first among the installations supported by the Solar America Cities technical assistance team.
- The solar PV installation, performed on the city's general services repair shop located on Fifth Avenue, is a 3-kilowatt system that will pay off in slightly more than 4 years by using solar panels that were originally located at the Frick Park Nature Center in 1992. Considering the 25-year expected lifetime of a solar panel and the estimated $6,000 per year utility cost savings, the city will realize significant energy cost savings over the expected lifetime of the systems.
- In November 2010, Pittsburgh held its second annual solar power conference. The first conference, held in 2009, was focused on challenges unique to the northeastern United States. The objective of the 2010 conference was to supply officials from Allegheny County municipalities with information and contacts necessary to initiate solar projects. There are 35 municipalities adjacent to Pittsburgh and more than 100 additional municipalities in the greater Pittsburgh area. Fostering the solar market throughout the region will facilitate a robust marketplace and stimulate growth that will benefit the City of Pittsburgh.

Pittsburgh Solar Initiative is developing a Web portal for solar design, procurement, and installation.

Case Studies: Successes and Challenges

Solar Web Portal

To help residents and businesses of Pittsburgh quickly and simply access information—and, thus, facilitate the solar design, purchasing, and installation process—Pittsburgh Solar Initiative is developing a Web portal that will act as a clearinghouse for solar information. It will contain a calculator of PV potential that is also capable of performing a shading analysis and determining the best areas for an installation. Other features of the Web portal include:

- Solar facts for Pittsburgh: This will include total installed capacity citywide, energy production per year, annual savings, and carbon dioxide savings. The values for these variables will be updated as needed. The solar facts may also tie directly to a demonstration system and provide real-time monitoring of the energy being produced as an educational tool for citizens.
- Neighborhood summaries: Some of the existing installations and installed PV capacity will be evaluated and summarized by neighborhood, allowing users to compare PV performance in specific neighborhoods.
- Resources for business and homeowners:
  - Description of financial incentives available to the citizens and businesses in Pittsburgh
  - Links to nonprofit organizations' websites as additional resources
  - List of important questions to ask an installer as a home or business owner
  - Comparison of the estimated output of the potential solar system to the annual home/business energy load
  - Description of the step-by-step process a home or business owner would follow for a solar project.
- Solar news: This portal feature will include a list of courses being offered through local nonprofit organizations and colleges, upcoming events, news items (new legislation, installations, and national news items that are relevant).
- Financial calculator: A financial calculator will be prepared that allows users to estimate the cost and benefits of installing either a solar PV or a solar hot water system. The calculator will evaluate system cost, annual production, and annual savings.
- Mapping: This Web portal will include an in-house mapping function to evaluate the solar potential of city-owned facilities. The mapping technology will be the same as that used by the city.

Simulation Tool for Evaluating Solar Installation Options on City Property

The Roadmapping Simulation Tool, or RooSTer for short, is a program designed to utilize collected building data. It consists of a suite of solar modeling tools and a methodology that can measure various configurations of solar technologies, efficiency measures, and financing mechanisms (i.e., competing solar development scenarios). RooSTer analyzes the collective results of solar technology implementation and evaluates the costs, savings, payback period, carbon footprint impact, and energy portfolio composition (e.g., the percentage of traditional energy used and the percentage of solar). RooSTer will be applied to more than 100 city facilities for which detailed data have been collected.

RooSTer is an important tool in objective decision-making about solar and other upgrades at city facilities. The metrics it produces allow buildings used for similar purposes (e.g., firehouses) to be ranked by energy use, which helps the city appropriately plan solar installations and energy efficiency upgrades.

Solar Ambassador Fellowship

In June 2010, Pittsburgh hired its first Solar Ambassador under a fellowship program designed to assist the city

The unique structure of Pittsburgh Truck House No. 34 did not deter the city from installing a solar hot water system.
Photo from City of Pittsburgh, NREL/PIX 18415

government in the institution and implementation of a comprehensive solar plan. The Solar Ambassador has conducted several useful and well-received solar installation outreach seminars to community groups. Responsibilities of the fellow include:

- Applying for a $400,000 state grant from the Pennsylvania Energy Development Authority (PEDA), necessary to install two 40-kilowatt systems in public buildings. Funding is pending a decision by the PEDA board
- The continued testing of the solar resource (the amount of sunlight received) at city sites with Solar Pathfinder equipment
- The proposal of a "green retrofit" of the Frick Park athletic area, integrating both passive and active solar energy
- A study into the feasibility of solar electric car chargers, taking into account uniquely local factors such as the weather and terrain
- Logistics for the second annual Pittsburgh Solar Conference in November 2010
- Management of the solar Web portal
- Standardizing educational presentations to be kept in stock and utilized upon demand.

Pittsburgh's largest regional park is proposing a "green retrofit," including basketball courts lit by green power, compacting trash cans, and solar cookers.

Top Takeaways

- Because of the lack of qualified trainers in the area, it will remain essential that Public Works employees are trained in the installation and maintenance of solar equipment.
- Having a staff person be the point of contact for the city's solar efforts is essential. Pittsburgh seeks to secure ongoing funding for the Solar Ambassador position to ensure continuity of solar initiatives.
- Upon leaving the position, the Solar Ambassador must have completed thorough documentation that can be used by future fellows and other members of the Pittsburgh Office of Sustainability.

Next Steps

Pittsburgh's Public Works employees are using their training to continue putting solar thermal installations on firehouses. Firehouse No. 3 on Penn Avenue is to receive a solar thermal installation. There are plans to install as many as four other solar thermal systems in the near future.

The Department of City Planning put together a map of publicly owned, south-facing hillsides for consideration as locations for solar. A 15-acre abandoned mine site in the Glen Hazel suburb of Pittsburgh, owned by the Pittsburgh Housing Authority, stood out because the mines beneath make it unsuitable for buildings. The initial feasibility study has been completed with positive results. The solar site assessment is moving to phase 2, with a more detailed geotechnical report being conducted in 2011.

The Office of Sustainability is engaged in the proposal of a "green retrofit" of the athletic area of Frick Park. Frick Park, at 561 acres, is the largest of Pittsburgh's regional parks.

The proposal will include wind/solar hybrid lighting of the basketball courts, solar-powered compacting trash cans, and passive solar cookers in a newly constructed picnic area. If the proposal is accepted, the lighting will serve as an exhibit useful to the general public and attendees of the park.

Additional Resources

- City of Pittsburgh website: www.city.pittsburgh.pa.us/
- Mayor's Green Guide: www.city.pittsburgh.pa.us/pw/assets/green_guide_web.pdf
- PennFuture—Energy: www.pennfuture.org/energy.aspx

Pittsburgh is striving to develop a reputation as a national leader in green practices. *Photo from iStock/3558097*

For more city information, contact:
Jim Sloss, Energy & Utilities Manager, City of Pittsburgh Email: james.sloss@city.pittsburgh.pa.us Telephone: 412-255-2255

For more information on going solar in your community, visit *Solar Powering Your Community: A Guide for Local Governments* at http://solaramericacommunities.energy.gov/resources/guide_for_local_governments/

For more information on individual cities' solar activities, visit www.solaramericacommunities.energy.gov/solaramericacities/action_areas/

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Clockwise from top left: *Photovoltaic system in Philadelphia Center City district (photo from Mercury Solar Solutions); rooftop solar electric system at sunset (photo from SunPower, NREL/PIX 15279); Premier Homes development with building-integrated PV roofing, near Sacramento (photo from Premier Homes, NREL/PIX 15610); PV on Calvin L. Rampton Salt Palace Convention Center in Salt Lake City (photo from Utah Clean Energy); PV on the Denver Museum of Nature and Science (photo from Denver Museum of Nature & Science); and solar parking structure system at the Cal Expo in Sacramento, California (photo from Kyocera Solar, NREL/PIX 09435)*

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