Community Solar Comes to D.C.

Jeff Lesk (left; DC Office Managing Partner, Nixon Peabody) and Herb Stevens (right; Chief Innovation Officer, Nixon Peabody) at the solar energy system on the roof of their firm's DC office (Photo Courtesy: Nixon Peabody LLP)

Winter Solstice (December 21st, 2016), the shortest day of the year, was a special day in Washington DC. At Solar Noon, as sun reached the highest point for that day, a new solar era had been launched in the Capital of the United States of America.

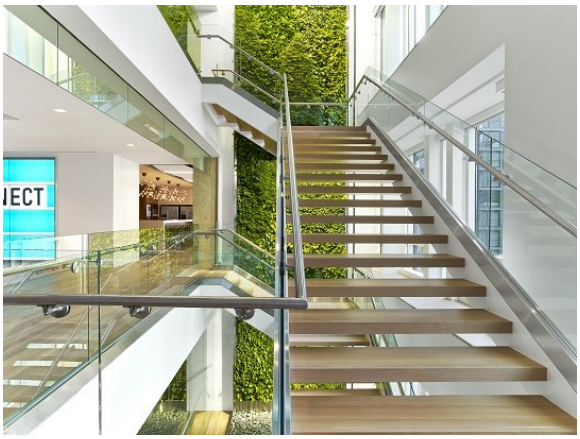
Herbert Stevens, Chief Innovation Officer of Nixon Peabody, one of country's most respected law firms, had been working on a community solar idea for more than two years. On December 21st, 2016, Herb's idea was finally realized when the firm unveiled a not-for-profit community solar installation on the roof of three buildings in downtown DC. This is the first community solar project in DC, and all electricity produced by these solar arrays will be donated to affordable housing residents in the District.

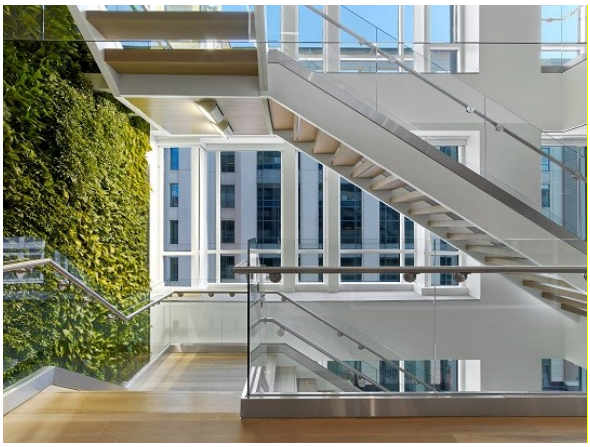
Altogether, this project consists of a 181.5kW of rooftop and façade installed solar photovoltaic (PV) capacity, expected to produce 218 MWh of electric energy annually.

The three roof spaces at 799 9th St. NW, 750 9th St. NW and 77 K St. NE have been donated by Brookfield Properties.

The project is the largest solar installation on a DC commercial property, and the first to take advantage of a DC law passed in 2013 that allows crediting electricity bills of specified subscribers with electricity produced by solar energy systems installed on a site other than their own roof or land.

This pioneering community solar project is, in fact, natural realization of Nixon Peabody's sustainability endeavors as it comes on the heels of Nixon Peabody moving into its new DC office in summer of 2015. It's a unique working environment in the heart of DC and has creative sustainable features. For example, the space features a "Green Wall", a diverse collection of vegetation that is fed by condensate from the HVAC system. Additionally, the offices are sunlit as far as possible, and has welcoming common areas while shunning corner office. It's been described as "Cool, Sleek, and Sustainable at the same time". The bespoke interior was designed by Ken Wilson, Design Principal, Perkins+Will.





The "Green Wall" at Nixon Peabody's DC Office (Photo Courtesy: Nixon Peabody LLP)

"Community Solar"

Community solar allows electricity users to take advantage of clean, renewable solar energy even if their own roofs or land are unsuitable or small to be useful for installing solar energy systems. The electricity produced by the system is fed into the grid. The utility company measures the monetary value of that energy and applies credit to the specified subscribers.

BRINGING THE TEAM TOGETHER

The project development began in the first half of 2015. The sites were surveyed, and a preliminary design was created. That design was shared with Brookfield, who provided practical and pragmatic feedback. For example, location of panels *vis-à-vis* hooks used for supporting the window-cleaner cradles, roof drains, and distance from roof edges had to be taken into account.

Around the same time, the team was interviewing several potential Engineering, Procurement, and Construction (EPC) partners for the project. The selection criteria included ability to deliver a complex project at a fixed price at a high quality and precision.

There were many concerns that had to be resolved in order to work on these 11-story office buildings, such as not having penetrations into the roof membrane. We identified a racking system from SolarDock that could guarantee a fully ballasted yet lightweight design that would require no roof penetrations.

We selected SolarGaines as our engineering, procurement, and construction (EPC) contractor, a Maryland-based solar company. SolarGaines has its origins in the construction contracting in the region and had successfully delivered solar projects.

At this point, we had assembled a full team to deliver the project.

GETTING THE PROJECT DONE

DC has stringent permitting requirements for solar projects. The fact the systems were to be installed on roof of a "Class A" office building owned by Brookfield Properties, nation's premier real estate company, substantially raised the quality, safety, aesthetic, and technical requirements imposed on the project. This combination of local laws and a demanding building owner put very exacting requirements on the project.

DESIGN CHALLENGES

Some of the most significant effect of project requirements was on the layout of panels. The panels had to be laid on the roof in such a manner that they did not cover the roof rain water drains. In addition, the rows of panels were not allowed to cover the hooks used by window cleaning crews for tying their cradles that they suspend from the roofs. And most

unusually, but importantly, the rooftop bee hives (*see box: Brookfield Bees in the City initiative*) had to be taken into account. The bees living there need their hives oriented in a certain way, just like the solar panels need to be oriented a certain way! Coming up with a final design required several rounds of discussions between extended team members. At times the process seemed frustrating, but all realized that quality and accuracy will not be compromised. With sheer persistence, the final designs were ready in about 2.5 months.

CHOICE OF PRODUCTS

Space in urban areas is often limited. Therefore, the design needs to make the most efficient use of the available space. Also, every roof is different, and the design and products need to follow safety and structural constraints imposed by the structure. Aesthetics are important in most situations as well. Keeping in mind all of the project conditions, the following products were chosen:

Modules for the rooftop installation: LG 340W monocrystalline: these state-of-the-art modules were one of the highest capacity available in the market, maximizing the system size. In fact, the modules were changed from 300W when initial designs were created to these high-capacity modules in the final design.

SolarWorld SW275 MONO BLACK modules were installed on the façade. In this case, aesthetics was highly important: The system was required to look good, be structurally sound, and perform as efficiently as possible. Therefore, we chose a completely black module. When installed, the array, provides visual continuity and is aesthetically appealing. Indeed, the installed array was very much liked by all the visitors. The modules are monocrystalline, making them highly efficient as well. The façade array was installed on a matrix of stainless-steel rails, to avoid rust runs on the façade.

- Racking for roof mounted installations: SolarDock fully ballasted, custom designed for each building. The racking reused the stone ballast already on the roofs, thereby avoiding putting too much additional weight on the roofs.
- Inverters: Fronius and Solectria with online, real-time monitoring capability
- Utility grade meter: Locus 320

Schedule

The original project schedule was estimated to be a little over five months for all three sites. However, the design iterations took more time than anticipated. In addition, the final utility interconnection process took a few more weeks than planned. All considering, it took about nine months to design, install, test, interconnect, and energize the three solar arrays.

Construction Phase

The actual construction phase lasted about three months. Two crews of five persons each worked simultaneously on two buildings for installing rooftop and façade arrays. In parallel, the electrical crew laid out the cables, switchgear, conduit, inverters, and other Balance of System (BOS) items.

To the crew's credit, and their adherence to safety procedures laid out specifically for each site before the start of construction, all the projects were completed without any injury to the crew and any damage to any of the buildings.

Special Utility Interconnection Requirements

In Washington DC, the utility interconnection requirements are different for Community Solar projects: the systems need to be directly connected to the utility grid, unlike the usual way of connecting the system to the building's electrical circuits and measuring the energy generated by the solar system using a Net Meter.

This special interconnection requirement made the project more expensive than a normal project as dedicated conductors had to be run 11 stories down to the electrical room where they were interconnected with the utility grid using cables laid by the utility company.

Financial Aspects

The total installation cost for the project was $XXXk. In addition to the grant support that the project received from the DC Department of Energy and Environment (DOEE), the Nixon Peabody attorneys and staff contributed over 300 *pro bono* hours to the project, a significant investment into developing something for the community in which the firm operates.

The system is owned by a special purpose entity that will allow the investors to take advantage of the tax credits offered by the system. No financial benefit accrues to Nixon Peabody.

As a result of this system, 100 low-income families will receive about $25 credit on their electricity bill every month for 15 years, and maybe even 20 years.

INAUGURATION

The system was dedicated on 2016 Winter Solstice (December 21st) at Solar Noon.

In addition to clean energy production and passing on the benefits to affordable housing residents, the project plans to have an effective education and outreach component. As part of installation, real time system and production monitoring is available online.

The last module being installed at Solar Noon on December 21st, 2016 (Photo Courtesy: Nixon Peabody LLP)

Herb Stevens, Chief Innovation Officer, Nixon Peabody, dedicating the solar project (December 21st, 2016) (Photo Courtesy: Nixon Peabody LLP)

Nixon Peabody Partners and project sponsors Jeff Lesk and Herb Stevens have been active in the DC community and beyond sharing the project experience, potential pitfalls, as well as what works in bringing together a wide range of stakeholders from policy, utility, installation, and property owner aspects of the project.

This project is a good example of how a law firm can bring its skills as well as its environmental and community development "missions" bear to solve an important social problem.

WHAT LIES AHEAD?

Until now, due to prohibitive cost and other barriers, low-income residents have not been able to access solar. This project demonstrates how low-income residents of a city can gain access to solar energy, making solar inclusive. The community solar model allows anyone to benefit from solar, even if their own roof is unsuitable for solar.

$20 every month, the amount that 100 low-income families will get every month from

this project, can make a bit, long-term difference in the lives of low-income families. For example, it could mean being able to afford internet at home, helping the kids with their education, and moving up the social ladder. Or it could mean joining a local gym to improve their health. It could even mean a better food, or a decent family dinner in a local restaurant or a movie night for kids.

The Nixon Peabody team, and many other organizations are now working towards replicating this model to creating similar business-community partnerships in DC, rest of the US, and beyond.

Let the sun shine!

Image Courtesy: Lee Godwin, Partner, Nixon Peabody

About the Author

Pranay P. Kohli is a Principal at the Maryland-based energy consulting firm amidus (www.amidus.com) and was solar consultant for the project. Pranay has worked internationally in the clean energy sector for more than 20 years in India, Europe, US, and the Middle East.

COMMUNITY SOLAR IN WASHINGTON DC

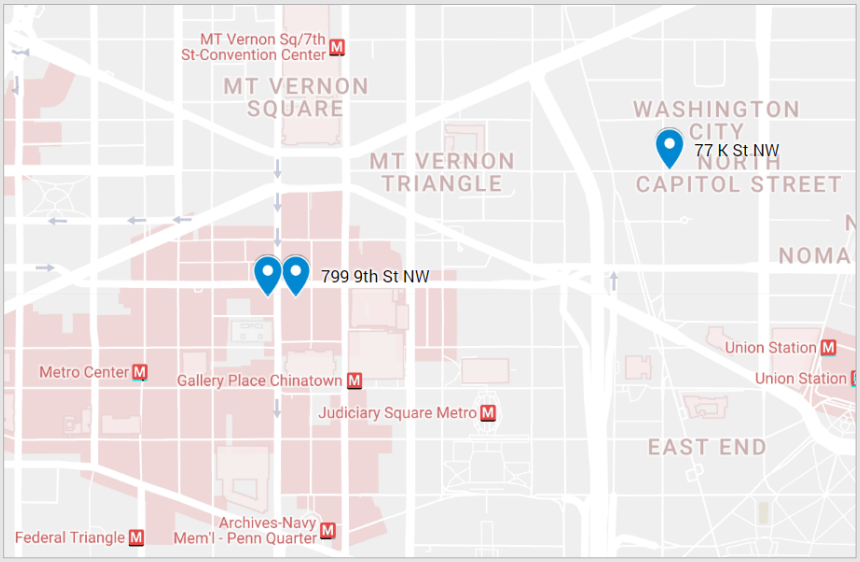
October 1, 2013 – The D.C. Council passed the Community Renewables Energy Act (CREA) of 2013. DC residents whose roofs were not suitable for solar, or who did not have roof access, could now participate in a Community Solar project.

April 2015 – The PSC issued its final ruling for the Community Renewables Energy Act of 2013.

June 2016 – The FY 2017 Budget Support Act amends the Community Renewable Energy Credit Rate Clarification Amendment Act of 2016 (CREA) to partially restore the full retail distribution rate credit for power sent back into the grid from CREFs (Community Renewable Energy Facilities). The tweak to the statute restores full 1:1 credit to residential customer subscribers.

Exhibit 1: History of Community Solar in Washington DC

PROJECT AT A GLANCE



- Installed on roofs of three "Class A" office buildings in downtown DC during 2016
- 181.5kW system size (three buildings); expected to produce 218 MWh of electricity annually
- Includes roof mounted (three buildings) and façade (two buildings) arrays
- Panels: LG Monocrystalline for rooftop installation; SolarWorld for façade arrays
- Racking: SolarDock for rooftop installation (ballasted); custom Stainless-Steel frame for façades.
- No insertions were made in the roof on any of the buildings; existing roof ballast was re-used for solar racks.

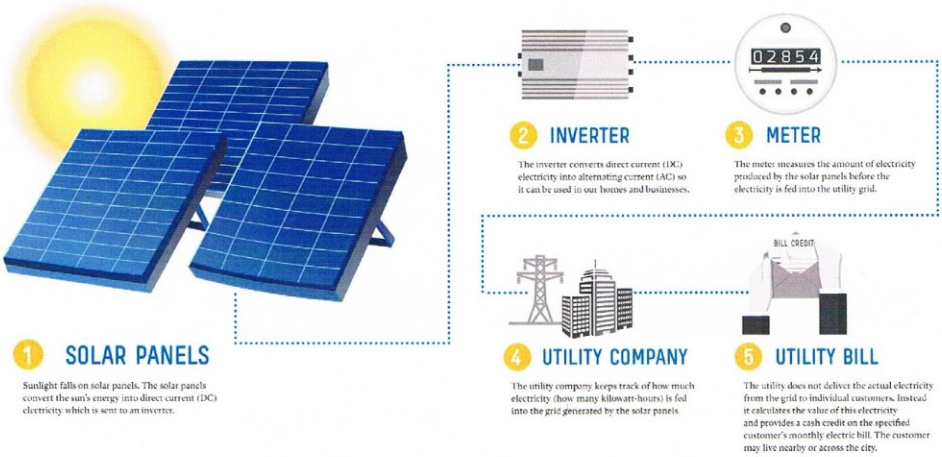
BROOKFIELD DC URBAN BEE INITIATIVE

The DC urban bee project idea was brought to Brookfield by Rich Bradley of the Downtown Business Improvement District (BID) (http://www.downtowndc.org) who was inspired by the London Urban Bee project. Brookfield partnered with the BID and the first hive went up at 650 Massachusetts Avenue. Brookfield now has bees residing at four rooftops throughout the city. In order to increase the bee population in urban and suburban areas, rooftop bee hives have become a sustainable option. Their presence also provides cities with environmental benefits.

The rooftop bee hives create a safe environment for bees since they are away from other animals that could disturb their hives. Also, the pollination process tends to be longer in cities since the city landscaping is maintained year round with seasonal plants and flowers versus rural areas with single-crop farms that only come in season once a year. This food variety tends to make city bees healthier than country bees that may only survive from one crop. Since honeybees are gentle creatures which eat only pollen and nectar, they can, with careful planning and preparation, live side by side with you.

Bees co-existing with Herb (L), Jeff (R) and solar panels in D.C.'s urban environment

ABOUT COMMUNITY SOLAR



How do solar energy systems work?

When the sun's radiation hits the panels, mounted on portions of penthouse walls and on unused roof surfaces, electrons are emitted from atoms in the panel's silicon wafers. The electrons flow toward the positive terminal of the panel, creating an electrical current.

The electrical current produced by solar panels is in the form of Direct Current (DC), which is then converted by an electronic inverter into the more commonly used Alternating Current (AC).

What's unique about community solar systems?

Typically all electricity generated by a solar energy system is fed into the building's electrical circuit, behind the utility's meter, offsetting some or all of the electricity usage in the building. The electricity fed into the building's circuit and drawn from the grid is measured by a "net meter," and the utility subscriber pays only for the portion of electricity drawn from the utility grid.

In a community solar system, like the one here, electricity generated by the solar array is fed directly into the utility grid, not into the building circuit, and the billing credits are directed to consumers elsewhere on the grid.

In this way, consumers whose roofs are not suitable for solar energy systems can still benefit from clean solar energy.

NIXON PEABODY