

Capital Partners Solar Project

Frequently Asked Questions

PROJECT OVERVIEW

What is the Capital Partners Solar Project?

- Initiated and managed by the GW Office of Sustainability and its partners, The Capital Partners Solar Project (CPSP) is a 20-year Power Purchase Agreement (PPA) under which Duke Energy Renewables (DER) will build a 52-megawatt (MW_{AC}) solar photovoltaic (PV) array across three sites in North Carolina and sell the electricity generated to the George Washington University (GW), American University (AU), and the George Washington University Hospital (GWUH).
- Once fully operational, the project is expected to generate about 123 million kilowatt-hours (kWh) of emissions-free electricity in the first year, which averages to about 117 million kWh per year over the life of the agreement due to expected panel degradation over time.
- This electricity is equivalent to about half the electricity needs of GWU and AU, and about 30% of the electricity needs of GWUH. Since the project did not require any upfront capital from the Universities or Hospital and the electricity is expected to cost less than the open market, the institutions could potentially avoid millions of dollars in possible electric rate increases over the life of the project.

Who else is involved?

- CustomerFirst Renewables designed and structured the partnership.
- Duke Energy Renewables (DER), a commercial subsidiary of Duke Energy, will oversee development, construction, and long-term operation of the sites.
- SunEnergy1 is the engineering, procurement, and construction contractor.
- JinkoSolar will manufacture the 92,000 solar panels for the first 20-MW site. The manufacturer of the additional phases will be determined at a future time.
- Dominion Resources Inc. owns transmission assets in North Carolina and Virginia and will interconnect the project to the regional grid.
- PJM Interconnection (PJM) is the grid operator for the Mid-Atlantic region and will oversee transmission of the electricity generated.

How will solar electricity generated in North Carolina reach the partners?

- GW, AU, and GWUH are purchasing the solar power at the point of delivery in North Carolina. The retail electric supplier and an agent are working together to combine the power purchased with the conventional power that the customers are buying to meet their full electricity demand.
- The solar power generated in North Carolina is fed onto the same regional electricity grid to which all CPSP partners are connected. Since electrons are fungible, the power purchased from North Carolina will displace electrons on our regional grid that otherwise would need to be produced by more carbon-intensive generation sources, thereby increasing the share of renewable generation in PJM's regional power supply mix. This fungibility of electrons occurs regardless of generation source, including conventional electricity supply.

- The solar farms were sited within PJM at the buyers' specific request, to ensure that the electrons generated by the CPSP will serve their regional electricity grid and will result in less air pollution and greenhouse gases across the Mid Atlantic. Currently, the majority of electricity generated in PJM comes from fossil fuels, roughly 44% from coal and 17.1% from natural gas.

Why don't the buyers just put solar panels on their own roofs?

- The reality is that the partners' dense urban campuses simply do not have enough rooftop or open space to install the number of solar panels or wind turbines required to meet their ambitious greenhouse gas reduction goals or their approximately 260,000 MWh of combined annual electricity demand.
- It is important to note, however, that on-campus solar installations could still generate a significant level of emission-free electricity, but is generally limited to no more than a small percentage of consumption.

PROJECT SIGNIFICANCE

How does the size of this project compare to other solar farms?

- When announced, the CPSP was the largest non-utility solar PV PPA in the United States in total megawatt-hours (MWh) contracted.
- It is currently the largest non-utility solar project east of the Mississippi.
- The system will utilize nearly a quarter million solar PV panels and, on average, is expected to generate around 117,000 MWh of emission-free electricity per year for GW, AU, and GWUH annually over the 20-year term.

What is unique about this model?

- This partnership pioneered a model that demonstrates how large energy consumers can proactively harness their collective purchasing power to directly source renewable energy to reduce their carbon footprint and electricity costs.
- The partners began a competitive bidding process, and ultimately, it was their 20-year commitment that attracted bidders and allowed the project to be financed. But for the actions of the three buyers, this new mega solar project would not have been built.
- The project also highlighted for Mid-Atlantic electricity providers that solar as a viable generation source. As of the end of October 2014, only about 0.05% of the electricity generated in PJM came from solar power.
- The partnership also provides a model for how large energy consumers in urban areas can still play a role in decarbonizing their regional electricity grids.

How is this project different from other large institutional electricity purchases?

- Under the terms of the contract, the Universities and the Hospital will receive both the electricity generated by the solar farm and the environmental benefits, also known as Renewable Energy Certificates (RECs), associated with the farm's production. Most other renewable energy deals include either the electricity or the environmental benefits, but it is

less common to receive both. Additionally, the project has been structured so that the customers are purchasing the power at the point of delivery directly from the developer. According to an analysis by CustomerFirst Renewables, less than one percent of large electricity consumers are able to manage their off-site renewable energy in this way.

- Another unique aspect of the project is that three separate buyers collaboratively pooled their demand and negotiated the terms of the PPA.

How will the project impact each institution's electricity bill?

- Although the price of the PPA is confidential under terms of the contract, the 20-year agreement produces a total cost that is competitive with today's market prices.
- Cost savings will likely increase over time because market electricity prices are anticipated to rise over the duration of the contract, including a possible future price on carbon.
- The long-term contract also reduces GW's exposure to market volatility through a fixed price for a large portion of the electricity consumed.

PROJECT SPECIFICS

Where will the solar projects be located?

- This project spans three sites in northeast North Carolina near the border of Virginia. All three sites will be within the PJM regional grid and are about 230 miles from the DC-based buyers.
- The first project site will be on agricultural land, three-fourths of which will remain available for farming, in part due to the extra income derived from hosting the solar array.

When will the project start producing electricity?

- Construction of the first phase in Pasquotank County near Elizabeth City is already underway and will begin commercial operations by the beginning of 2015.
- The location of the second and third sites will be finalized by the end of April 2015, and those sites will come online by the start of 2016.

What percentage of each partner's electricity will this project account for?

- The CPSP is expected to generate around 123,000 MWh of electricity in its first year, a rate that is expected to decline on a straight-line basis by 0.5% per year due to PV module degradation.
- The amount of electricity generated from the project will cover about half of GW's and AU's anticipated electricity needs (and about 30% of GWUH's needs).

What panels will be used?

- The contract terms did not require any specific brand or type of photovoltaic panel, although we understand that DER has chosen to use JinkoSolar's JKM300P-72 and JKM305P-72 modules for the first phase of the project, which have an efficiency of 16% and are designed to self-clean, reducing power losses caused from soiling. All JinkoSolar modules use a single-axis tracking system to increase system efficiency and output.

Where were the panels manufactured?

- The panels were manufactured in China where the vast majority of large U.S. projects currently source their solar PV panels. The panels constitute roughly one-third of the project's value with domestic products and services such as racking, inverters, and labor constituting the remaining two-thirds of the project investment.

What environmental impact will this project have?

- The project will displace electricity produced from more polluting sources, reducing GW's, AU's, and GWUH's cumulative emissions of by about 60,000 metric tons of carbon dioxide equivalent (CO₂e) per year, which is roughly equivalent to:
 - removing 12,500 cars off the road;
 - the carbon sequestered by 50,000 acres of U.S. forests annually; or
 - eliminating the emissions from 8,200 U.S. homes' electricity use.

How many jobs will this project create?

- The project is expected to create hundreds of construction jobs at the solar sites in North Carolina communities, with the majority of jobs being filled by local labor from eastern North Carolina counties.

PROJECT SELECTION PROCESS

What were the partners' motivations for developing this project?

- The primary motivation for pursuing this project was to reduce the carbon footprint of the partner institutions, helping to meet their carbon neutrality goals. Reducing GW's exposure to future price volatility was also an important consideration in making the project financially appealing.

How long did the process take?

- About two years end-to-end. The time from the initial discussion to signed contract was roughly one and a half years, and six months later commercial operations begin.
- In the future, the process could probably be completed in significantly less time. One of the CPSP goals is to provide information on lessons learned so that other institutions and potential suppliers can pursue similar arrangements more rapidly.

Who was involved in the process for the buyers?

- Approximately 60 individuals across the three institutions were involved throughout the two-year process. In addition to the executive leaders of each institutions and their Board of Trustees, the parties included representatives from the offices of sustainability, operations, facilities services, investment, planning and administration, procurement, finance, general counsel, and external relations.
- Having such a large and diverse set of stakeholders meant that buy-in from the Institutions leaders and continual communication and consultation were critical to addressing issues before they could become barriers to the project's progress.

Why did you need an outside systems integrator?

- CustomerFirst Renewables provided critical expertise and analytical capabilities to the key decision makers on a large-scale renewable energy market with limited transparency on price and contract structure.
- CustomerFirst Renewables also played a key role facilitating negotiations among the three buying institutions and the developer.

Why did the buyers decide to pursue meeting half of their electricity demand?

- The buyers considered larger and smaller fractions of their electricity needs, but ultimately found that this scale provided the best combination of reducing GW's exposure to the volatility of future market prices while still reaching the scale necessary for the most competitive prices. If the project scale were significantly smaller, the economic benefits would not have been as great. Larger scale projects would have only yielded marginal additional economic benefits.

How did the Request for Proposals (RFP) process work?

- The partners utilized a competitive RFP process to identify the best energy solution. The RFP process was a critical component in that it not only allowed the buyers to solicit competitive bids from a variety of projects, its terms helped ensure that the project met their requirements for it to be:
 - located within their own PJM regional grid;
 - new project allowing the partners to claim legitimately that their actions were resulting in new renewable energy generation; and
 - developed by an experienced developer with the financial strength to ensure project completion and ability to meet the terms of the 20-year contract.
- The partners received 28 bids in response to their RFP, including eight solar projects and 20 wind projects. In terms of capacity, the bids totaled 274 MW of solar capacity and 1,362 MW of wind capacity. Although not all the bids met the full range of RFP criteria (e.g. some were already constructed and were not deemed to be created as a result of the buyers' demand) the high volume of bids and capacity suggests that there are considerable additional renewable energy resources within the PJM grid that the market is able to supply.

Why was the Duke Energy Renewables solar project ultimately selected?

- Ultimately the solar project proposed by DER presented the best opportunity when the partners examined the total delivered cost (including generation, transmission, capacity, etc.) for all of the bids combined with contract provisions desired by the partners and provided project experience. Its financial strength, ability to deliver and standing in the market were also important.

Why did the buyers decide on 20 years?

- Other time horizons were considered, but 20 years provided the best balance between getting the most competitive bids and maintaining flexibility in the event that the electricity sector transforms dramatically over the coming decades.

What were the toughest roadblocks encountered during the process?

- Since these types of deals are relatively new, a great deal of time and effort for education within and across institutions was necessary.
- For example, issues such as the accounting treatment for this type of contract took time to resolve.

Did state incentives play a role in the projects location?

- The state of North Carolina does currently offer a 35% corporate tax credit for renewable energy investments through 2015. However, RFP bids from other neighboring states were also competitive.
- Note the 30% federal investment tax credit also applied and is available in each state through 2016, when it will revert to 10% without further Congressional action.

PROJECT CONTRACT TERMS

Who carries the risk if the project fails to be completed on time?

- The developer would face penalties and would cover any price premium incurred from replacing the expected electricity at market rates.

Do the buying institutions carry any risk related to operations and maintenance?

- No, operations and maintenance of the facility is the developer's responsibility.

Do all the partners have to buy their electricity together now?

- No, each institution still individually selects a retail energy supplier through a competitive process to manage the delivery of the full amount of their electricity needs.

Does the PPA escalate over time?

- No, the PPA price is fixed for the duration of the 20-year contract term.