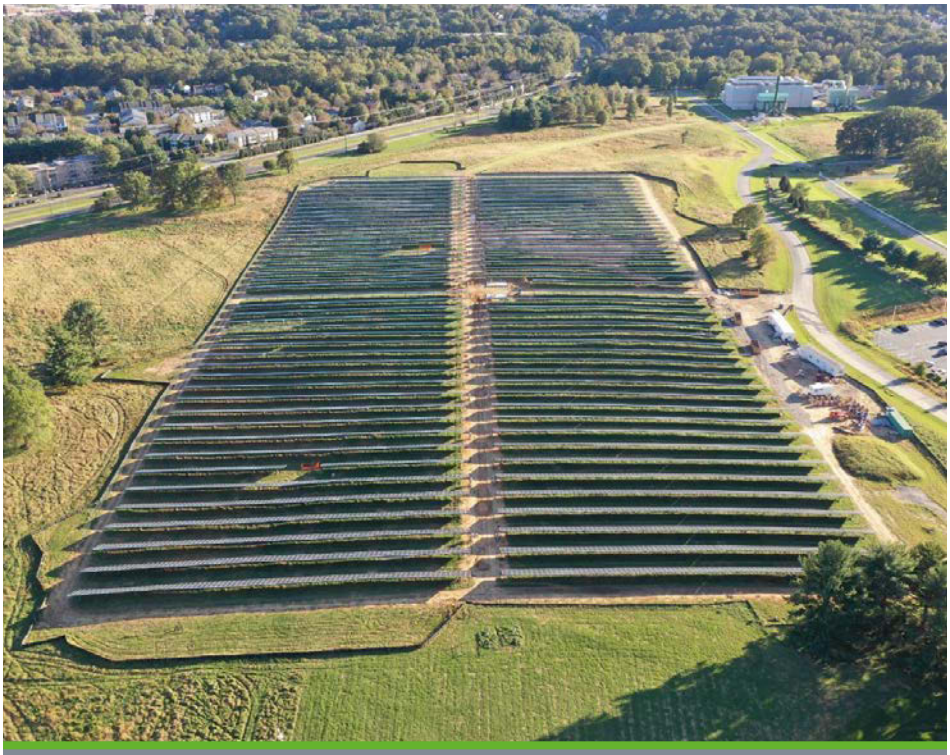
U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

ESPC ESA Case Study: Energy Affordability at the National Institute of Standards and Technology

The U.S. Department of Commerce (DOC) National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, installed a 5 MW-DC photovoltaic (PV) system under an energy savings performance contract energy sales agreement (ESPC ESA).[1] The project was implemented using the U.S. Department of Energy (DOE) ESPC ENABLE contract vehicle.[2] The PV ESA was the only energy conservation measure (ECM) included in the contract.



NIST's 5 MW-DC PV system utilizes 14,724 solar modules (340 watts each) that were manufactured by Hanwha in South Korea and are Trade Agreements Act compliant. The structure covers 15 acres—the equivalent of 11 football fields. The PV system's sizing took into consideration a new 8-MW combined heat and power (CHP) plant, other on-site generation, expected NIST campus load changes, and NIST's restriction against exporting electricity to the serving utility. *Photo courtesy of NIST.*

Project Goals and Accomplishments

NIST pursued this PV project to demonstrate leadership in the area of renewable energy while reducing energy costs and contributing to the federal government's renewable electricity requirement, established in the Energy Policy Act of 2005. They plan to use elements of the solar project for NIST research. "Given our situation as a national research institute with sufficiently available open land, this made NIST ideally suited to pursue the best combination—generate and then fully self-consume all of the solar electricity produced on site at a federal facility," said NIST ESPC program manager John R. Bollinger.

The 5-MW DC fixed-tilt, ground-mounted PV system is estimated to produce 6.1 million kWh (or about 4% of NIST Gaithersburg's total load) during its first year of operation. The ESPC ESA price (unit price per kilowatt-hour) is approximately 30% lower than the current NIST electric utility rate, thus meeting the statutory ESPC cost savings requirement. NIST is projected to save $3.5 million (nominal dollars) over the 20-year contract term.

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Project Development Process

In order to select an energy service company (ESCO), NIST issued a Notice of Opportunity (NOO) to all GSA Federal Supply Schedule 84, SIN 246-53 contract holders requesting qualifications and pricing information. NIST evaluated the NOO responses, with price as the most important evaluation factor, and selected Legatus6 (a service-disabled, veteran-owned small business solar developer) to conduct an investment grade audit and develop a final proposal. The project kicked off in July 2016, was awarded to Legatus6 in May 2018, and became operational in December 2018.

[1] An ESPC ESA is a project structure, similar to a power purchase agreement, that uses the multiyear ESPC authority to implement distributed energy projects—referred to as ESA energy conservation measures (ECMs)—on federal buildings or land. The ESA ECM is initially privately owned for tax incentive purposes and the federal agency purchases the electricity produced with guaranteed cost savings. Learn more about ESPC ESAs at energy.gov/eere/femp/energy-savings-performance-contract-energy-sales-agreements.

[2] Learn more about implementing ESAs using the DOE ESPC ENABLE contract vehicle at energy.gov/eere/femp/downloads/espc-esas-implemented-using-doe-espc-enable-contract-vehicle.

Immediately after award, the contract was novated to Constellation NewEnergy, the financier, who assumed the role of the PV system owner for the 20-year ESPC ESA term. After the novation, Legatus6 continued its responsibility for the engineering, procurement, and construction as Constellation's sub-contractor. Constellation's internal workforce will provide operations and maintenance (O&M) services for the term of the contract.

Other Project Details

The Office of Management and Budget (OMB) requires an agency to retain title to on-site generation equipment by the end of the contract for annual scoring. Title to the PV system will be transferred from the contractor to the government at the end of the contract term at fair market value (FMV), appraised at the time of the title transfer. The total ESPC ESA unit price per kilowatt-hour that the contractor charges the government includes a reserve account payment, and the total amount of funds collected over the 20 years will be used to pay for the FMV title transfer. The reserve account will be held by the ESCO.

An estimate of the future FMV was included in the final proposal, and the FMV will be estimated again at years 5 and 10. The reserve account will be adjusted as needed with the goal of having no end-of-term reserve account surplus or shortfall. An independent, third-party, accredited appraiser will estimate the FMV at the end of year 15 and 12 months prior to the title transfer, with the final FMV confirmed within 30 days of the planned title transfer. All FMV estimates and appraisals will be submitted to NIST for their review.

NIST provides access to the land through a no-cost revocable real estate license agreement. The measurement and verification (M&V) approach uses Option B,[3] with normalization of the annual generation

PV System Highlights Government and Industry Partnership Success

A ribbon-cutting ceremony was held on April 22, 2019, to mark Earth Day, with Federal Energy Management Program (FEMP) Director Rob Ivester and ESPC ENABLE Program Manager Ira Birnbaum joining officials from DOC, NIST, Legatus6, Constellation NewEnergy (Constellation), and Maryland Congressman Dave Trone. "The new solar field shows how NIST and our partners in government and commercial industry are leading the way," said Under Secretary of Commerce for Standards and Technology and NIST Director Walter G. Copan. "With this project, we get it all: cleaner air, lower costs, and stronger support for private industry."

Pictured from left to right are Julie Palakovich Carr, Maryland Delegate; Evan Glass, Montgomery County Council Member; Neil Harris, Gaithersburg City Council Member; Rob Ivester, Federal Energy Management Program Director, Department of Energy; U.S. Rep. David Trone; Walter G. Copan, Under Secretary of Commerce for Standards and Technology and NIST Director; Skip Vaughn, Director of NIST's Office of Facilities and Property Management; Byron Adkins Jr., Director of the Office of Facilities and Environmental Quality, Department of Commerce; John McCann, President of Legatus6 LLC; Brendon Quinlivan, Executive Director of Distributed Energy Origination, Constellation; and Sidney Katz, Montgomery County Council Member. *Photo courtesy of NIST.*

[3] M&V Option B: Retrofit Isolation with All Parameter Measurement—This M&V approach involves measuring the reporting-period energy production using a revenue grade meter.

The NIST project team received a DOC 2019 Energy and Environmental Stewardship Award, in the Contracting category, for going above and beyond to promote energy efficiency and environmental stewardship throughout the department. *Photo courtesy of NIST.*

based on the actual solar insolation, to determine if the annual guaranteed cost savings requirement is met.

NIST will take on the O&M responsibilities after the PV ESA ECM title transfer. The PV system is expected to continue generating electricity for another 10 years after the contract is over, saving NIST an additional $8.3 million, and bringing the total estimated savings to almost $12 million (nominal dollars).

Benefits of Using an ESPC ESA—Private versus Government Ownership

The NIST NOO initially requested that ESCOs provide ESPC ESA prices for a PV system that is government owned. After the IRS issued Revenue Procedure 2017-19 that provides an ESPC ESA safe harbor, NIST requested pricing for a PV system that is privately owned. NIST evaluated both responses and selected the private ownership proposal due to cost savings of 30% compared to the government-owned option.

This project provides a perfect example of the benefits of using an ESPC ESA to reduce project costs and provide the best value to the government. Constellation was able to monetize tax incentives such as the federal investment tax credit (ITC) and Modified Accelerated Cost Recovery System (MACRS). In markets such as Maryland, the solar renewable energy certificates (SRECs) are valuable and can be sold (or used) by the ESCO. Maryland SRECs were worth over $10 per MWh at the time of contract award (compared to national renewable energy certificate [REC] prices of less than $1 per MWh). Because the project's SRECs are being sold, NIST will annually purchase replacement RECs for credit toward the Energy Policy Act of 2005 renewable goal.

Keys to ESPC ESA Project Success

The following elements helped make the NIST ESPC ESA project successful:

- NIST secured senior management support early in the project development process, allowing management to help champion the project.
- The team conducted the appropriate level of due diligence regarding the novation process prior to award, ensuring that contract novation was completed shortly after award.
- NIST had recently negotiated an interconnection agreement with Pepco (the serving utility) for their CHP plant, which helped expedite the interconnection process for the new PV system.

- Legatus6, NIST, and Constellation worked together to ensure that the project completion deadline of December 31, 2018, was met—the Legatus6 project manager kept the project moving and NIST expedited their review and approval process.

In addition, FEMP supported the project with a DOE-approved project facilitator and National Renewable Energy Laboratory staff. They provided expert advice on structuring the NOO and the contract documents, evaluated expressions of interest (non-voting members), participated in the final proposal review, and provided other miscellaneous project facilitation and technical support.

Conclusion

This project demonstrates one of DOE's Office of Energy Efficiency and Renewable Energy's key objectives: energy affordability. The project provides cost savings as well as helps stabilize NIST's electricity costs for the foreseeable future. It also contributes to U.S. energy security by diversifying the sources of energy produced domestically. The project is considered a success by NIST staff, and the NIST project manager stated he would do it again.

Project Considerations and Lessons Learned

Key lessons learned and considerations for agencies implementing an ESPC ESA project are as follows.

Consider PV as an ECM—There are more opportunities for PV now than in the past, due to reduced PV costs and the benefits of the ESPC ESA structure. Federal agencies should consider PV even if it was not economical in the past—for example, PV was not considered economical for an earlier NIST ESPC, but will now provide significant cost savings.

Expedite contract negotiations—Agency staff should expedite negotiations as much as possible in order to maximize the ITC benefit (which begins decreasing in 2020) and minimize the ESPC ESA offered unit price.

Evaluate ownership options—Government and private-ownership options should be evaluated early in the project development process. This evaluation should take into consideration the O&M, repair, and replacement expenses over the life of the contract, which the government needs to provide under the government-owned option; as well as the different administrative requirements under the privately owned option. FEMP can help with this evaluation.

Discuss project priorities—The agency team should discuss project goals and other considerations up front. For example, they should understand site constraints (e.g., future land use) that will impact the project size and ensure that the evaluation factors laid out in the NOO reflect site priorities. If pricing will be evaluated, determine the desired pricing structure. Will an escalation factor be allowed, and if so, what rate will be used? By requesting pricing based on the same escalation factor that will be applied to future utility rates, the team can more easily ensure cost savings in every year of the contract.

Request impacts on pricing—If price is a primary evaluation factor, request that ESCOs include information in their NOO responses explaining how market and other changes (such as SREC prices) will impact the final unit price offered in the investment grade audit.

Federal agencies can benefit from distributed energy at lower costs and achieve federal renewable energy and other goals without any upfront capital for the equipment by utilizing an ESPC ESA. ESPC ESAs can be implemented using the following contract vehicles:

- DOE indefinite delivery/indefinite quantity (IDIQ) ESPC
- DOE ESPC ENABLE
- Site-specific/stand-alone.

The Department of Defense can also use the U.S. Army Corps of Engineers multiple award task order contract (MATOC).

ESPC ESA Project Assistance

To assist federal agencies with project execution, FEMP offers a variety of ESPC ESA resources at energy.gov/eere/femp/energy-savings-performance-contract-energy-sales-agreements, including fact sheets and editable templates.

To get started on an ESPC ESA project, please do one of the following:

- Contact a Federal Project Executive at energy.gov/eere/femp/energy-savings-performance-contract-federal-project-executives-0
- Request assistance through the FEMP Assistance Portal at www7.eere.energy.gov/femp/assistance/. ■

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For more information, visit:
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