WASHINGTON, D.C. SOLAR FOR ALL INSPECTIONS

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ABSTRACT

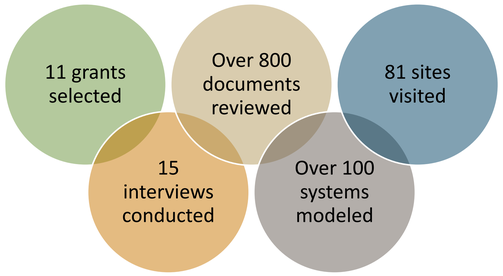
In 2019 and Tetra Tech and Green Powered Technology conducted over eighty QA/QC inspections of solar PV installations across Washington, D.C. in support of the Department of Energy and the Environment's (DOEE's) Solar for All program. The program aimed to provide many of the district's residents with the opportunity to obtain the benefits of solar PV through grants to fund the installation of residential, commercial, and community PV systems. Under the program, PV systems were installed on single family homes, multifamily homes, commercial buildings, and parking canopies. Eleven different grantees oversaw the installation of the systems, each with different installers and equipment.

The inspections included reviews of technical drawings, city permitting documents, utility approvals, energy generation, participant benefits, as well as onsite inspections. During its inspections, our team discovered some commonalities between the different installations and other challenges for a grant program such as this. In our presentation, we will discuss these findings and present an overview of the inspection results, along with photos, lessons learned, and insights into our interactions with installers, district officials, and grantees.

OBJECTIVES

Ensure that the projects funded by the Solar for All program are being executed as expected and that benefits are accruing to the low-income population served by each grantee.

SCOPE



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SOLAR FOR ALL
A PROGRAM OF DC'S DEPARTMENT OF ENERGY AND ENVIRONMENT

DEPARTMENT OF ENERGY & ENVIRONMENT

ONSITE INSPECTIONS

Onsite installation verification found minor areas for improvement with only one needing immediate attention

Needing Immediate Attention

Grounding
- Isolated section of array not connected to overall ground scheme (rare)
- Poses electrical fire risk

Minor

Electrical
- Ground screws not rated for outdoors (rare)
- Cable management (rare)

Monitoring
- Connectivity issues with the monitoring system (rare)
- Residents did not have access to online monitoring (rare)

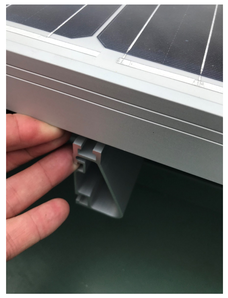
System Design
- Shading (rare)

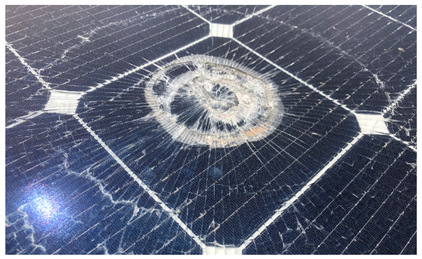
Significant

Racking
- Missing clamps (rare)
- Missing ballasts (rare)
- Potential for system damage from wind

Electrical
- Overcurrent protection device sizing inconsistent with drawings
- Incorrect sizing may be a safety hazard

Modules
- Cracked modules (rare)
- Will result in performance losses





Labeling
Missing labels
Labels written in marker will fade with time (common)

DOCUMENTATION VERIFICATION

Documentation received was completed in a satisfactory manner and was compliant with each DOEE grant agreement

Successes

Quarterly reports provided valuable information on status of the grant
- *These included timeline status, availability of authorization to operate and any challenges encountered*

Processes in place to ensure customers will receive intended benefits
- *Documentation outlines how benefits are distributed or bills are reduced*

All third-party documentation in place to confirm system installation and operation
- *Third-party documentation confirms systems are installed and operating properly*

Opportunities

•Ensure as-built documents reflect actual build
- *Inverters were actually located on roof instead of electric room*
- *Fuse amps varied between electric room and plans*

•Develop templates for grantees to standardize processes
- *Quarterly reports were provided with various levels of information*
- *Outline income eligibility confirmation process in a standalone document*

•Provide guidelines for documentation storage
- *Outline primary document retention requirements*
- *Standardize naming conventions on documents for review purposes*

INSTALLATION BEST PRACTICES

Labeling
- Add missing labels
- Use more permanent labeling process or refresh often

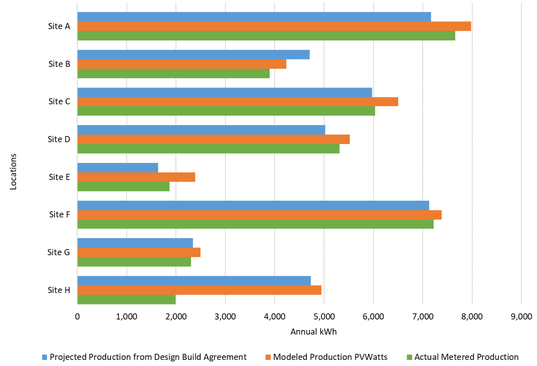
Code Compliance
- Washington, DC adheres to the 2011 NEC
- Designers and installers should monitor any changes to code requirements
- Rapid shutdown best practice

System Design
- Update drawings to reflect actual installation
- Monitor systems with unavoidable low module tilt for ponding and soiling

MODELING VERIFICATION

Modeling suggests production targets will be met and DC income-qualified customers will receive the intended benefits
- *Modeled production compared to designed production ranges from 79% to 138%*
- *Actual production compared to designed production ranges from 81% to 127%*
- *Actual production compared to modeled production ranges from 81% to 100%*

Lower production was due to:
- Changes from design to actual installation
- Shading issues
- Inverter issues or broken modules
- Variabilities experienced during initial operation phase



- *Designed production was based off of the as-built documentation*
- *Grant systems were modeled using PVWatts and data collected while on site*
- *Actual production was from dashboard data provided by each grantee*