



Solar Automated Permit Processing Software for Distributed PV

Cooperative Research and Development Final Report

CRADA Number: CRD-19-00825

NREL Technical Contact: Jeff Cook

**NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
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Contract No. DE-AC36-08GO28308

Technical Report
NREL/TP-6A20-82659
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Cooperative Research and Development Final Report

Report Date: April 14, 2022

In accordance with requirements set forth in the terms of the CRADA agreement, this document is the CRADA final report, including a list of subject inventions, to be forwarded to the DOE Office of Scientific and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

Parties to the Agreement:

- Sunrun, Inc.
- Tesla
- California Solar and Storage Association (CALSSA)
- Solar Energy Industries Association (SEIA)
- Institute for Building Technology and Safety (IBTS)
- SunPower
- Vivint Solar (Vivint Solar merged with Sunrun and no longer exists)

CRADA Number: CRD-19-00825

CRADA Title: Solar Automated Permit Processing Software for Distributed PV

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- Thomas Plagemann, Vivint Solar (Vivint Solar merged with Sunrun and no longer exists)

Sponsoring DOE Program Office(s):

Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO)

Joint Work Statement Funding Table showing DOE commitment:

Estimated Costs	NREL Shared Resources a/k/a Government In-Kind
Previous Values	\$695,000
Modification No. 1	\$225,000
TOTALS	\$920,000.00

In June 2020, in agreement with the Solar Energy Technologies Office, there was an adjustment to scope, funds, and new or modified milestones to Task 4 and 5. The results of both tasks and all related tasks incorporated via the modification are summarized here.

Executive Summary of CRADA Work:

NREL and its project partners built and commercialized the novel Solar Automated Permitting Processing Plus (SolarAPP+) software platform that delivers instant residential rooftop solar permits. The tool provides installers with a standard portal for entering permit information for residential solar systems across all Authorities Having Jurisdiction (AHJs) using SolarAPP+, thereby providing a streamlined plan review form, transparency into permitting timelines, and required specifications. The project has proven to reduce permitting timelines from as many as 20 business days to zero, delivering solar projects faster in the four participating AHJs using the platform. Streamlining permitting timelines, all else equal, results in consumers installing their systems and reducing their electricity bills faster. The continued expansion of SolarAPP+ features and adoption nationwide will expand the benefits of the SolarAPP+ beyond the current user base.

Summary of Research Results:

TASK 1: Permitting Requirements Development, Coding, and Entry Description

NREL and project partners were required to develop a set of standard permitting application and plan set requirements and data fields to include in the SolarAPP+ platform. NREL and the team then was required to identify exceptions to these standard requirements and allow AHJs the ability to adjust SolarAPP+ to accommodate certain unique requirements.

Results:

NREL assembled a workgroup of local governments, code officials, and industry participants to develop a straw set of permitting requirements. These organizations were convened in the SolarAPP+ kickoff event held on December 17th, 2019 (NREL Learning 2019). NREL and the workgroup then distributed a draft set of permitting requirements for widespread feedback in March, 2020. NREL allowed for several key customizations of the software based on AHJs unique characteristics including local high and low temperatures, snow load, and wind speed requirements. NREL then incorporated the additional feedback collected from external parties into a final set of permitting requirements that were incorporated into the SolarAPP+ software that was made available for piloting in August 2020 (NREL Learning 2020a).

Task 2: Software Enhancements for Online Portal Description

NREL was tasked with generating a scalable web-based platform that allows installer and AHJ personnel to securely register and enter the permitting platform. In addition, the software must automatically review inputs for accuracy to confirm that the inputted system follows code requirements, allowing for instantaneous approval to build without AHJ personnel review.

Results:

NREL launched the SolarAPP+ for piloting in August 2020 (NREL Learning 2020a). NREL has published several demonstrations of the software showing the process contractors and AHJs use to securely log-in, input design information, and receive an instant permit after the software performs its code compliance reviews (see Figure 1) (NREL Learning 2020a, 2020b). The SolarAPP+ was launched for widespread adoption July 15, 2021 (US Department of Energy 2021).

SolarAPP+ Flow

1
Installer submits an application with design specifications through SolarAPP+



SolarAPP+ checks the application to ensure the system design is code compliant

3
Code compliant applications are issued a permit instantly after fee payment



Figure 1. General SolarAPP+ Workflow

Prior to the national product launch, SolarAPP+ was piloted with four communities Pima County, Arizona, Tucson Arizona, Pleasant Hill, California, and Menifee, California. Data collected from three pilot communities, showed that SolarAPP+ reduced permitting timelines by as much as 20 business days (see Figure 2) (US Department of Energy 2021).

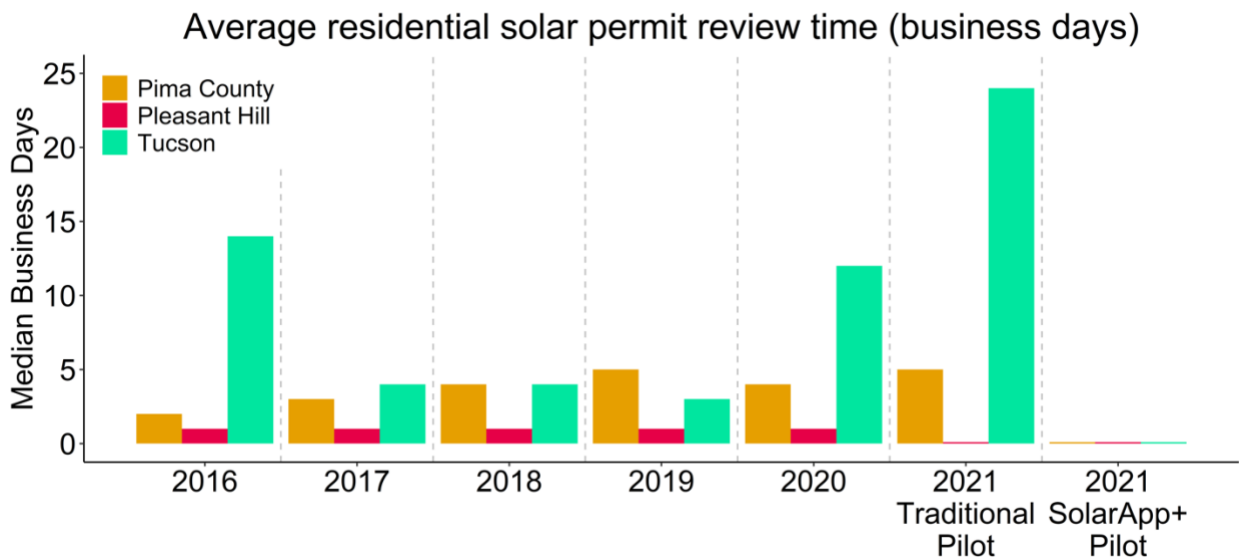


Figure 2. Median residential permit review timelines by piloting community

Reduced permitting timelines also resulted in faster installations of solar projects in all three communities evaluated (see Figure 3). All else equal, this will result in those homeowners’ systems being interconnected faster, thereby providing customers with electricity bill savings faster than would have occurred absent SolarAPP+.

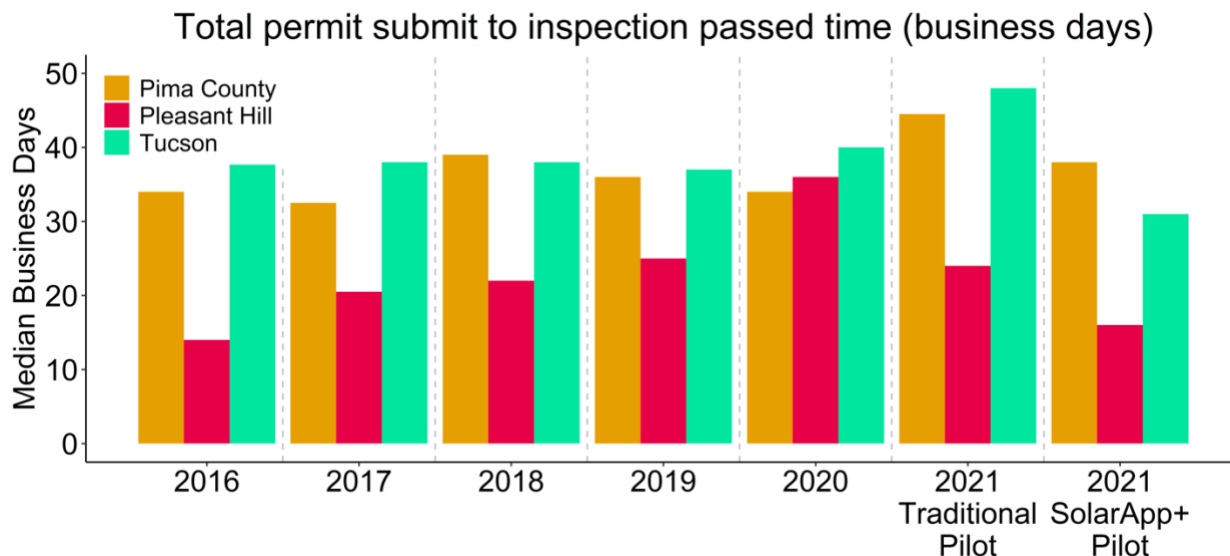


Figure 3. Median residential permit and installation timelines by piloting community

All four communities subsequently adopted the SolarAPP+ for all eligible, residential rooftop systems at or before the national launch (US Department of Energy 2021). As of September, 2021, SolarAPP+ is being piloted in another six communities. Finally, 13 other communities are actively testing SolarAPP+ and considering a pilot (SolarAPP+ Help Center 2021b).

Task 3: Support Interoperability between AHJ Software Systems and SolarAPP Description

NREL was required to develop software that is compatible with AHJ systems, and potentially other solar-related software platforms relating to inspection, industry equipment and contractor licensing, and certification. One pathway to integrate SolarAPP+ with other software’s is via API development. This task was designed to be iterative, with NREL, and AHJs collaborating to accommodate evolving software APIs throughout the industry, thereby limiting future integration challenges.

Results:

The SolarAPP+ is currently compatible with three different AHJ software platforms, allowing for SolarAPP+ to be configured within existing online government permitting software programs used across participating AHJs (Accela 2021, Jones 2020, Welsh 2021). This did not require the development of software APIs. However, NREL is developing an API that can be used by contractors’ design software, government software vendors, and other third-parties to further automate the communication between SolarAPP+ and these other software systems.

Task 4: Software Platform Testing Description

While the NREL web platform was being developed, external partners were required to test the platform and identify bugs in software code and system functionality/interoperability. With feedback from users, NREL was then required to adjust the software and fix software code errors and bugs prior to launching the software for broader commercial release.

Results:

Software testing occurred throughout the piloting phase from August 2020 through July 2021 (US Department of Energy 2021). Software testing continues in association with regular software maintenance and update schedules (SolarAPP+ Help Center 2021a).

Task 5: Software Platform Commercialization Description

Throughout software development, NREL was required to implement its commercialization and sustainability plan via three interrelated subtasks:

1. Identify and Mitigate AHJ Adoption Risks.
2. Identify short and long-term funding/sustainability plan.
3. Identify, Vet, and Select a Long-term Software Manager/Host.
4. Develop Partnership Agreements, License Agreement Stipulations, and Governance Board Materials

Results:

NREL has engaged over 125 communities as a part of United States Department of Energy Secretary Granholm's SolarAPP+ challenge to identify and resolve issues associated with adopting SolarAPP+ (US Department of Energy 2021). NREL has updated the software to incorporate a variety of new features to meet the needs of AHJs, while expanding the scope of the application (SolarAPP+ Help Center 2021a). NREL further evaluated a set of financial and funding models to sustain the application, and ultimately set a \$25 per approved application submitted into the application to meet the short and long-term funding needs of the application (US Department of Energy 2021). As more AHJs adopt the application, the cost per project will decline, but the time table for a reduce fee has not been set. Finally, NREL selected UL as the long-term program manager to carry out the day-to-day activities of the application after NREL's funding period ends in March 2023 (Brewster and Hicks 2021). Finally, NREL has further published partnership related documents and agreements that are frequently updated.¹

¹ The most recent version of all agreements and related information can be found at: <https://solarapp.nrel.gov/>.

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Keywords for Online Search:

Solar; SolarAPP; Automated Permitting Processing; photovoltaic; PV; software; authority having jurisdiction; fee-per-system revenue; long-term; software; platform; permitting; partners; data; tool; analysis;

Partnering Facilities:

Solar: Solar Data, Analysis & Tools

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Subject Inventions Listing:

None

ROI #:

None