



**SolarAPP+ Pilot Results are in: AHJs,
Homeowners, and Contractors Save**



Solar APP+

Agenda

Welcome and Remarks from the Secretary

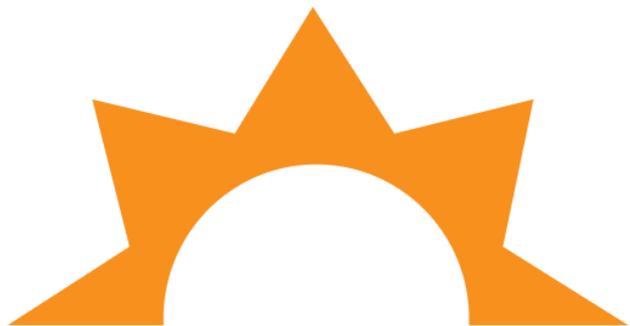
Roundtable Discussion

SolarAPP+ Overview and Results

Solar TRACE: Solar Time-based Residential
Cycle Time Estimator

NREL Permitting, Inspection, and
Interconnection Analysis and Best Practices

Roundtable Discussion



Solar APP+

SolarAPP+
The US Permitting Solution



NREL

Transforming ENERGY



SolarAPP+ is a collaborative effort to accelerate rooftop solar adoption by making it easier for local governments to quickly and safely approve standardized rooftop PV projects for installation using NREL's permitting software.

SolarAPP+ is free for AHJs to adopt and is supported by small admin fees paid by installers.



SolarAPP+ Eligibility

SolarAPP+ can cover standardized systems as defined [here](#).

Current Support Parameters

- Residential PV
- Approved equipment
- NEC 2017 / 2018 i-Codes
- California Electrical Code
- California Residential Code
- Bus <225A
- Service <400A
- Main panel upgrades
- PV systems <4PSF
- Single phase utility supply
- No wood shake roofs
- No metal roofs w >15PSF snow load

Support In Progress

- NEC 2020 (Release in Jan 22)
- 2021 I-Codes (Release in Jan 22)
- Residential storage (Piloting)

Future Roadmap: standalone storage, EV chargers, building integrated solar, and more...



SolarAPP+ Flow

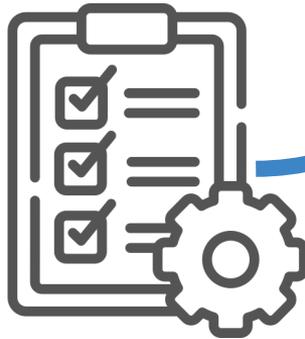
Installer submits an application with design specifications through SolarAPP

1



2

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



3

Code compliant applications are issued a permit instantly after fee payment

[\(Review sample approval docs here\)](#)



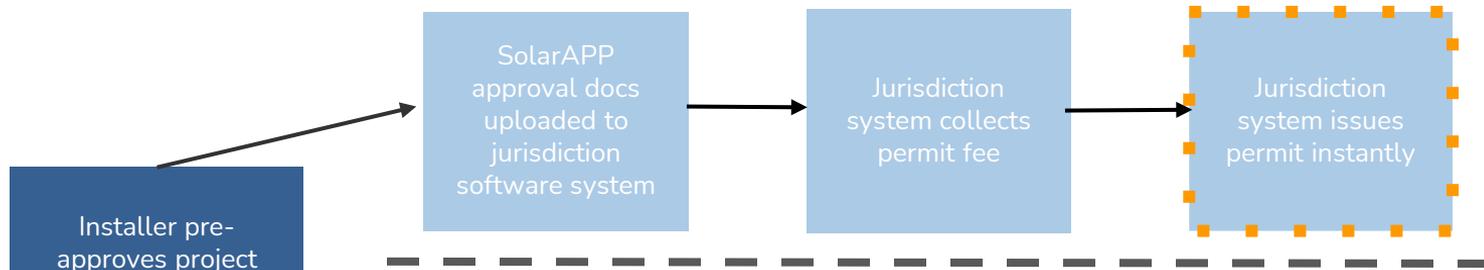
Adoption Options

SolarAPP+
Software

Existing
Software

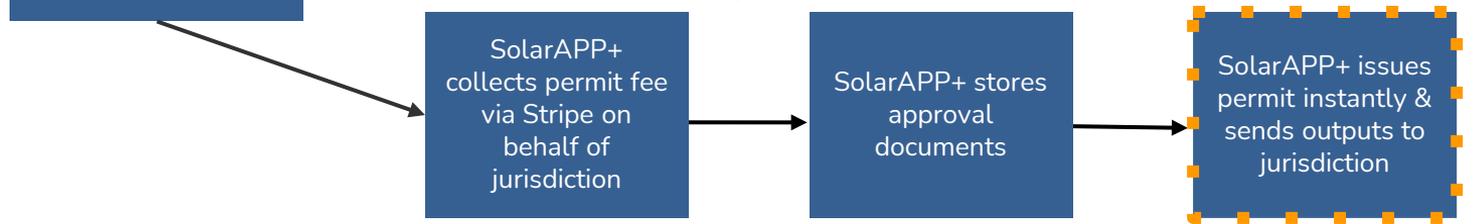
Pathway A: Incorporated into Existing Permitting Software

(For already online jurisdictions)

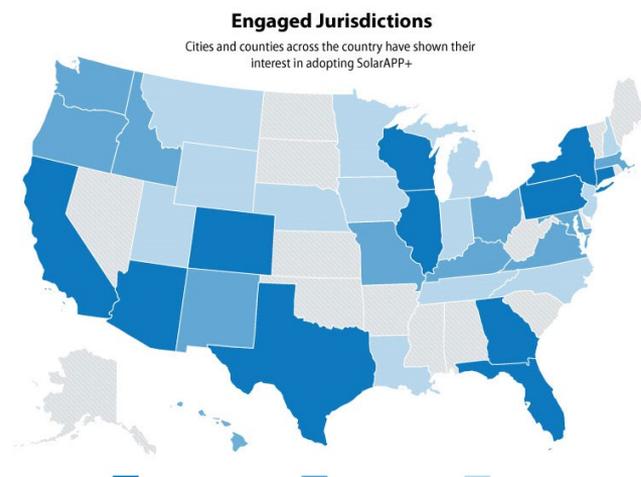


Pathway B: Stand Alone SolarAPP+

(For email and in-person jurisdictions)



Where is SolarAPP+ Available?



Adopted

- Menifee, CA
- Pima County, AZ
- Pleasant Hill, CA
- San Ramon, CA
- Stockton, CA
- Simi Valley, CA
- Sonoma County, CA
- Tucson, AZ

Piloting

- Benicia, CA
- Beaumont, CA
- Modesto, CA

SolarAPP+ Results

4,300+

Residential rooftop PV permits approved to date

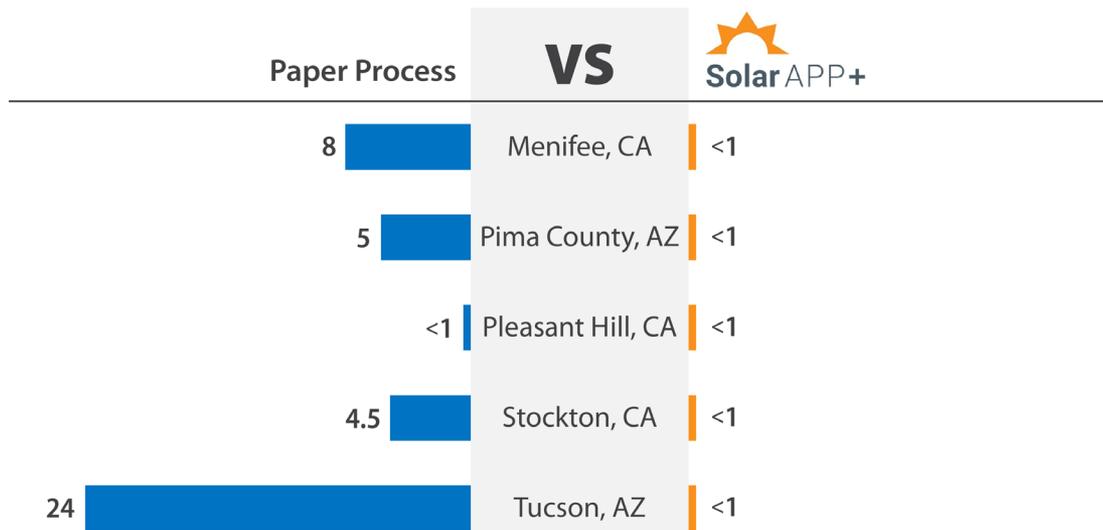
200+

Permits approved to date for Solar+Storage projects

50,000+ days saved

SolarAPP+ has reduced permit times from as many as 24 to 0 days.

Median Business Days for Permit Review

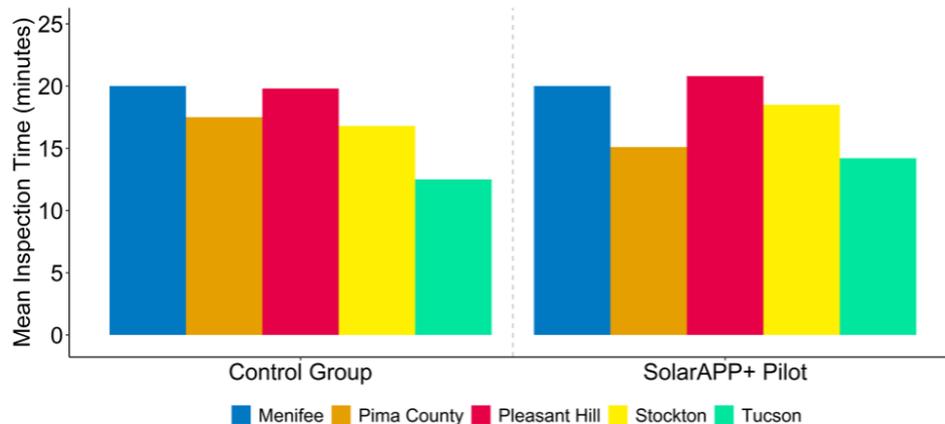


AHJ Time Savings

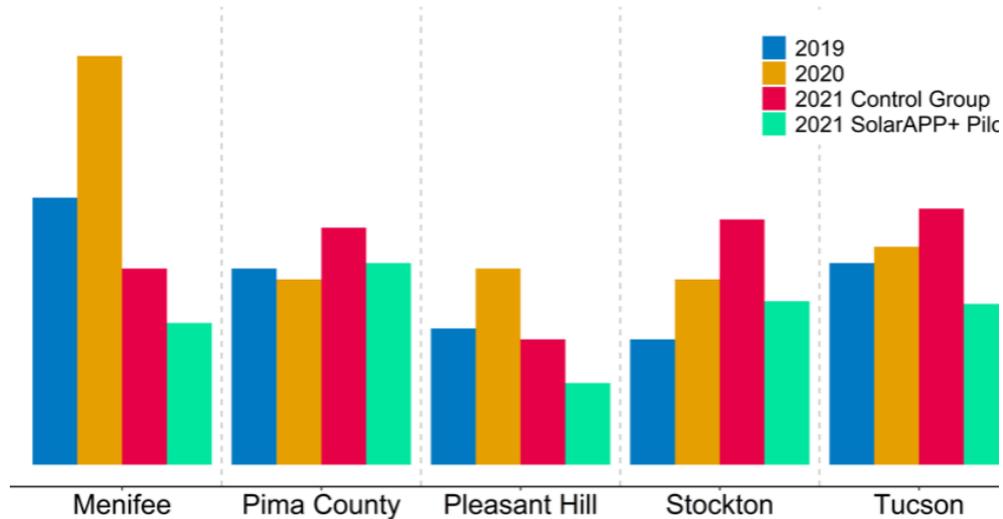
- By providing instantaneous review SolarAPP+ has reduced the average permit review time to **less than 1 day** saving jurisdictional staff over **3,000 hours** in review
- **No time added** to inspections of PV systems in the field, with comparable inspection passage rates to traditional inspections

AHJ	Review Savings per Permit	Permit Review Savings	Revision Savings per Permit	Revision Review Savings	Post-Pilot Total Time Savings^	Cumulative Time Savings
Menifee	0.42	174.3	0.33	39	213	225
Pima County	1	558	0.75	81	639	730
Pleasant Hill	0.25	6.5	0.20	2.4	9	16
Stockton	0.28	16.8	0.25	1.5	18	39
Tucson	1	1,440	0.75	189.75	1,630	1,735
Total	-	2,195.6	-	313.7	2,509	2,745

^Totals may not be exact due to rounding.



SolarAPP+ Reduces Adoption Timelines



Projects submitted through SolarAPP+ were installed and inspected

12 business days faster

on average than projects using the traditional process



Four Steps to Adopting SolarAPP+



Select the Right Integration

- SolarAPP can be set up to:
- *integrate with your existing online permitting software*
 - **stand alone** as a complete online permitting solution



Input Local Settings

- These include:
- Permitting contacts
 - AHJ boundaries
 - Local wind and snow variables
 - Model code years
 - Terms and conditions



Setup Instant Permit Workflow

- Depending on your integration, either:
- Set up an instant permit application in your software
 - Set up permit payments in SolarAPP



Launch

- This involves:
- Inviting 1-3 installers to use your SolarAPP permitting process
 - Opening up SolarAPP+ permitting to all installers

Next Steps

Register your interest at solarapp.nrel.gov/register.

Join us for an upcoming SolarAPP+ demo:

- Tuesday February 22nd, 11 am PT
- March 10th, 10 am PT
- Tuesday March 22nd, 11 am PT

Learn more about SolarAPP+:

- SolarAPP+ Help Center: help.solar-app.org
- Contact Us: team@solar-app.org
- SolarAPP+ Inspection Training: <https://cleanenergytraining.org/products/inspecting-a-solarapp-system>.

SolarTRACE and Related Analysis

<https://solarapp.nrel.gov/solarTRACE>

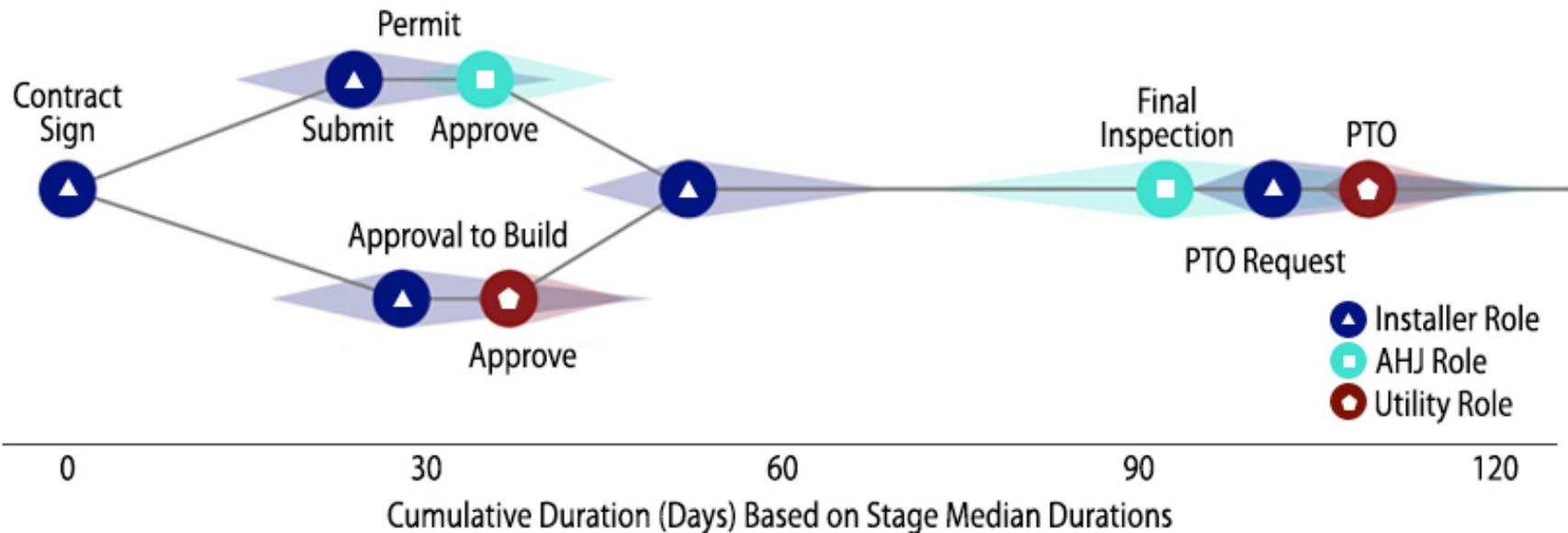


Call to Action

- NREL is actively looking for partners to:
 - Review SolarTRACE and provide feedback/suggestions for functionality and visualization improvements
- Provide project-level data, with an emphasis on:
 - 2021 data to update SolarTRACE
 - PV+Storage projects
 - PV projects installed on new homes
 - PV projects at time of re-roof
 - AHJ permitting data (i.e. code years and online permitting processes)

Introduction to SolarTRACE

- NREL's Solar Time-Based Residential Analytics and Cycle time Estimator (SolarTRACE) allows for timeline comparisons across AHJs and utilities
 - 1,500 AHJs with at least 10 installs, across 140 utilities and 26 states

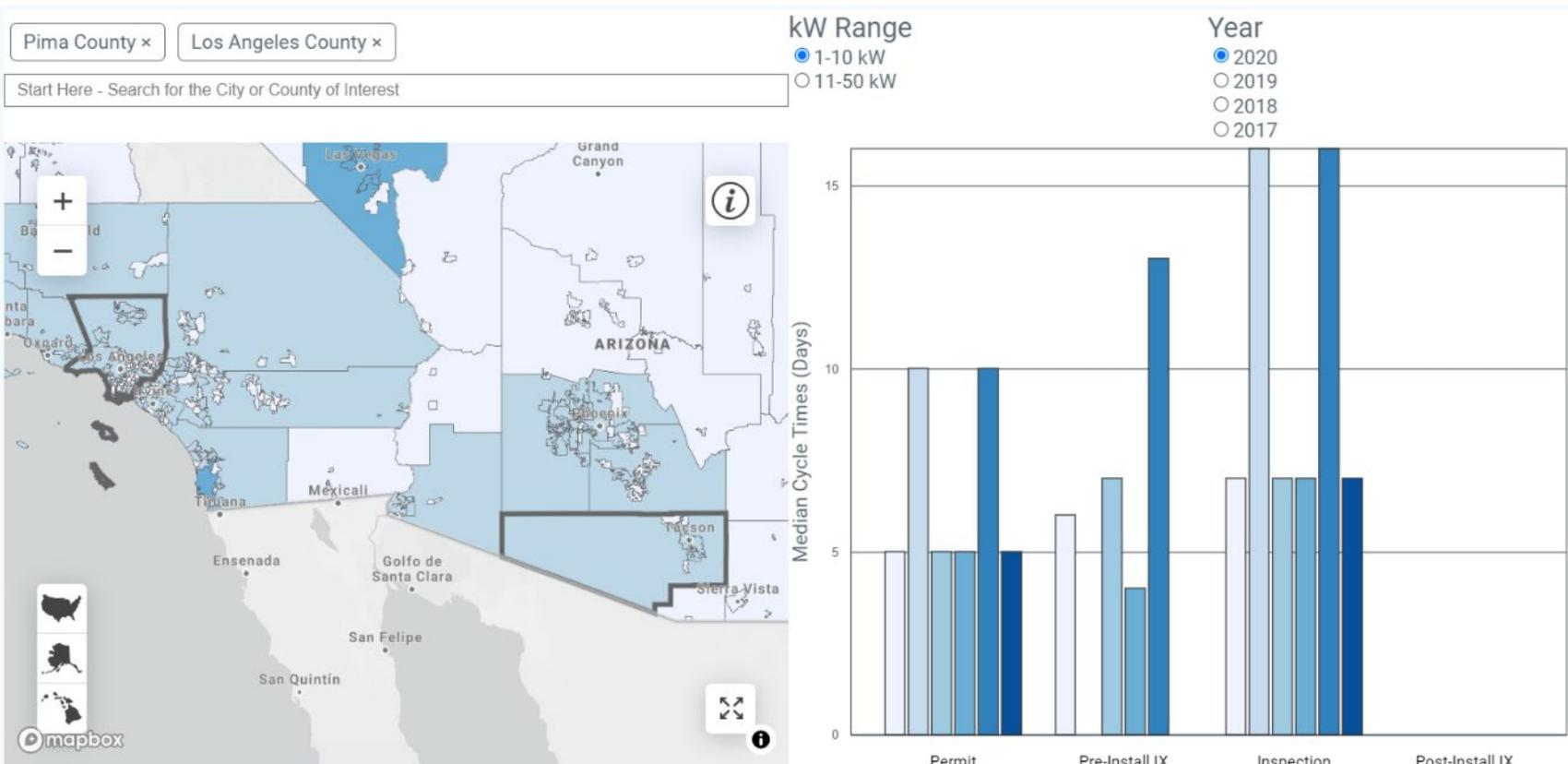


SolarTRACE 2020 Install Data

WA 107	ID 0	MT 0	ND 0	MN 11	WI 17				NY 2,605	VT 415	NH 146	ME 0
OR 76	UT 724	WY 0	SD 0	IA 0	IL 5,945	MI 0	PA 756	NJ 2,933	CT 2,019	MA 5,308		
CA 42,349	NV 5,075	CO 2,866	NE 0	MO 0	IN 0	OH 0	WV 0	MD 1,965	DE 81	RI 208		
	AZ 9,872	NM 1,242	KS 0	AR 0	KY 0	TN 0	VA 578	DC 14	NC 97			
			OK 0	LA 0	MS 0	AL 0	GA 55	SC 597				
AK 0	HI 1,240		TX 4,702					FL 4,310				

2020 data covers:
 ~23% of U.S. installs
 ~up to 48% of installs
 for covered states
 (median 15%)

Using SolarTRACE (Demonstration)



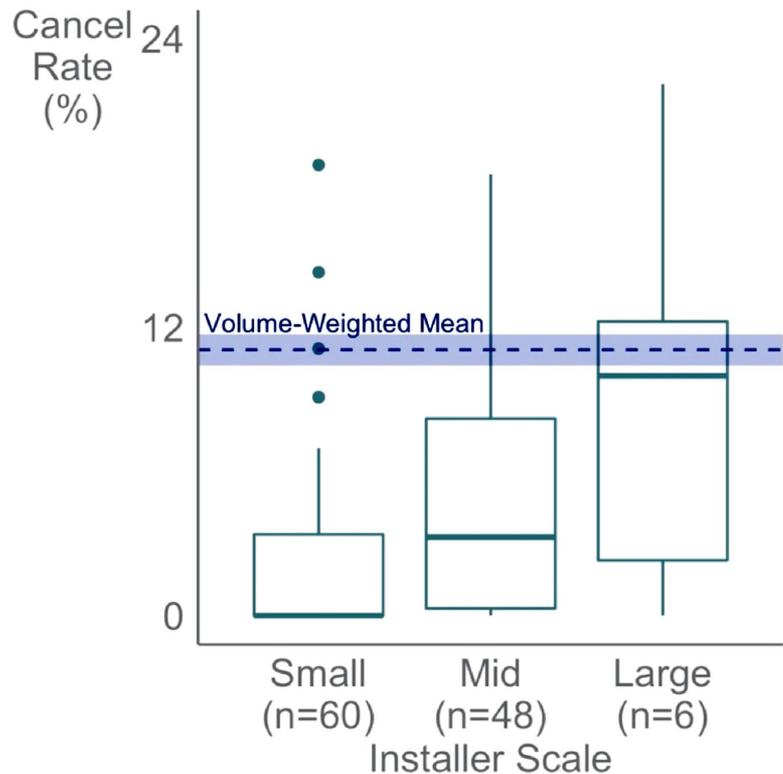
Key Findings

- Key findings from NREL's PII analysis so far include:
 - An average project takes 4 – 4½ months from contract signing to final Permission to Operate
 - 95% of projects are completed in 9 months or less
 - Average times for AHJ permit and utility approval-to-build reviews are 1 week, though they may take up to 6 weeks at the 95th %ile
 - Surveyed installers of all sizes report that PII processes are a major reason for project delays

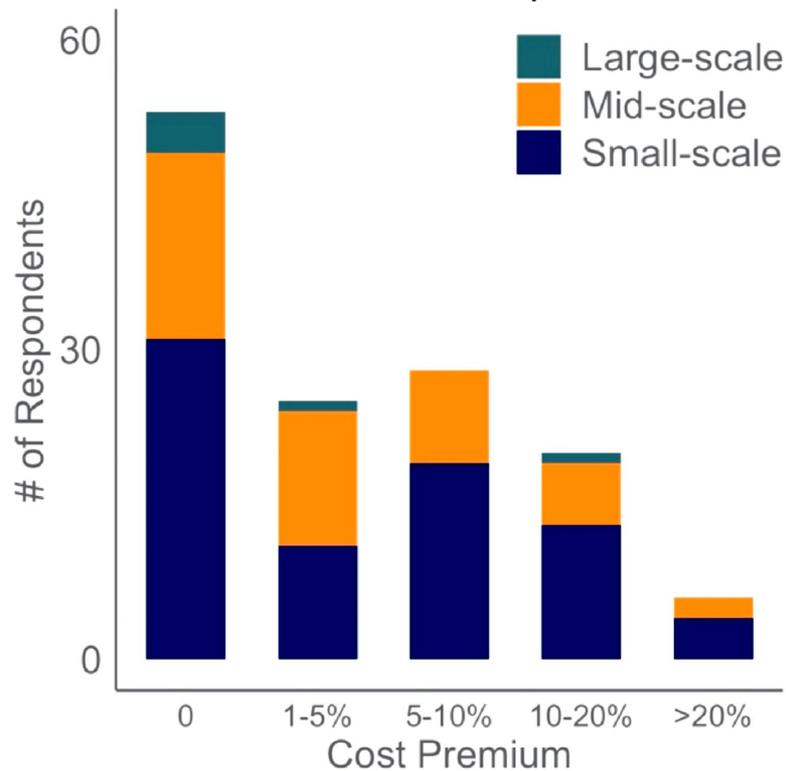
Key Findings: Installer Survey

Results from survey of 136
installers conducted in 2019

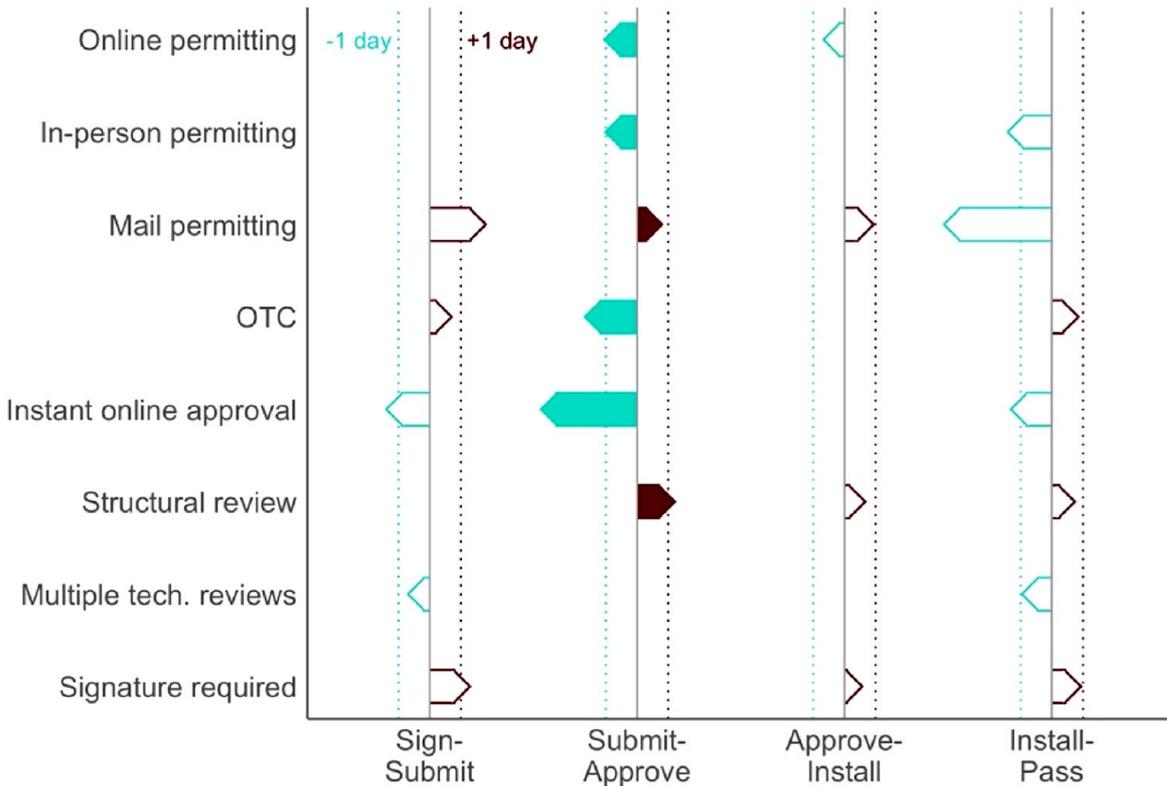
*Installer-reported
cancellation rates*



*Price premium due to
burdensome PII requirements*



Key Findings: PII Requirements Analysis

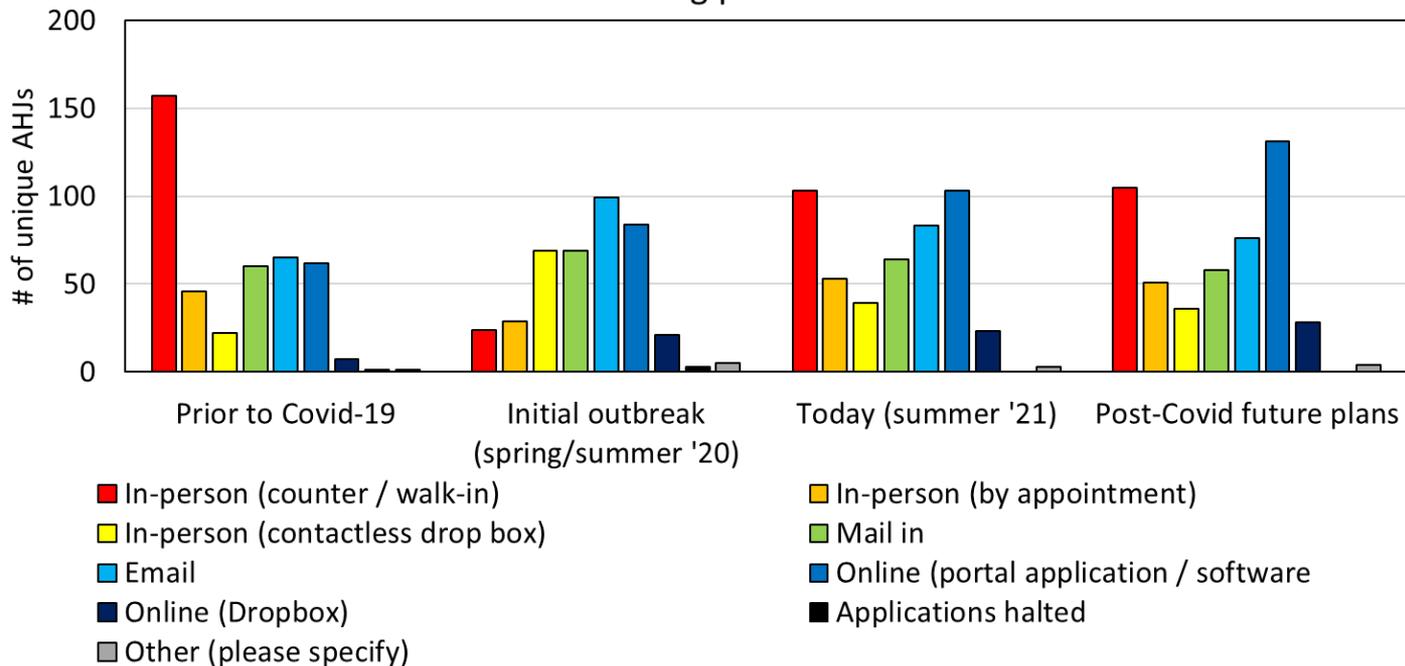


- From analysis of SolarTRACE project-level timeline data and AHJ requirements
- Improvements to pre-install processes (expedited reviews, online or online-instant) are not strongly associated with post-install delays (e.g., problems found at inspection)

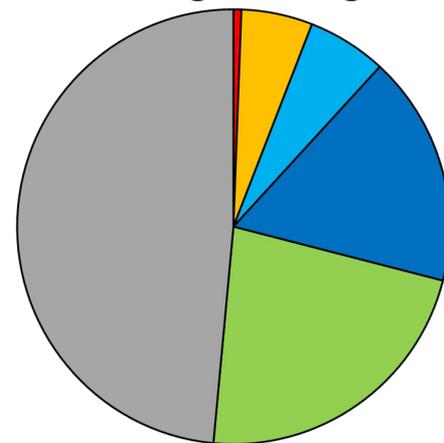
Survey of COVID Impacts on AHJs

- Online survey of 171 AHJs in 16 states conducted summer/fall 2021

Permitting processes



Duration of staffing challenges



- For a few days up to 1 week
- Between 1 week and 1 month
- Between 1 and 3 months
- For longer than 3 months (but challenges have eased)
- Staffing continues to be a challenge
- No major challenges were encountered

Residential Solar Interconnection Timelines

<https://www.nrel.gov/solar/market-research-analysis/permitting-inspection-interconnection-timelines.html>



Pre-Install Application Approval Times (Medians)

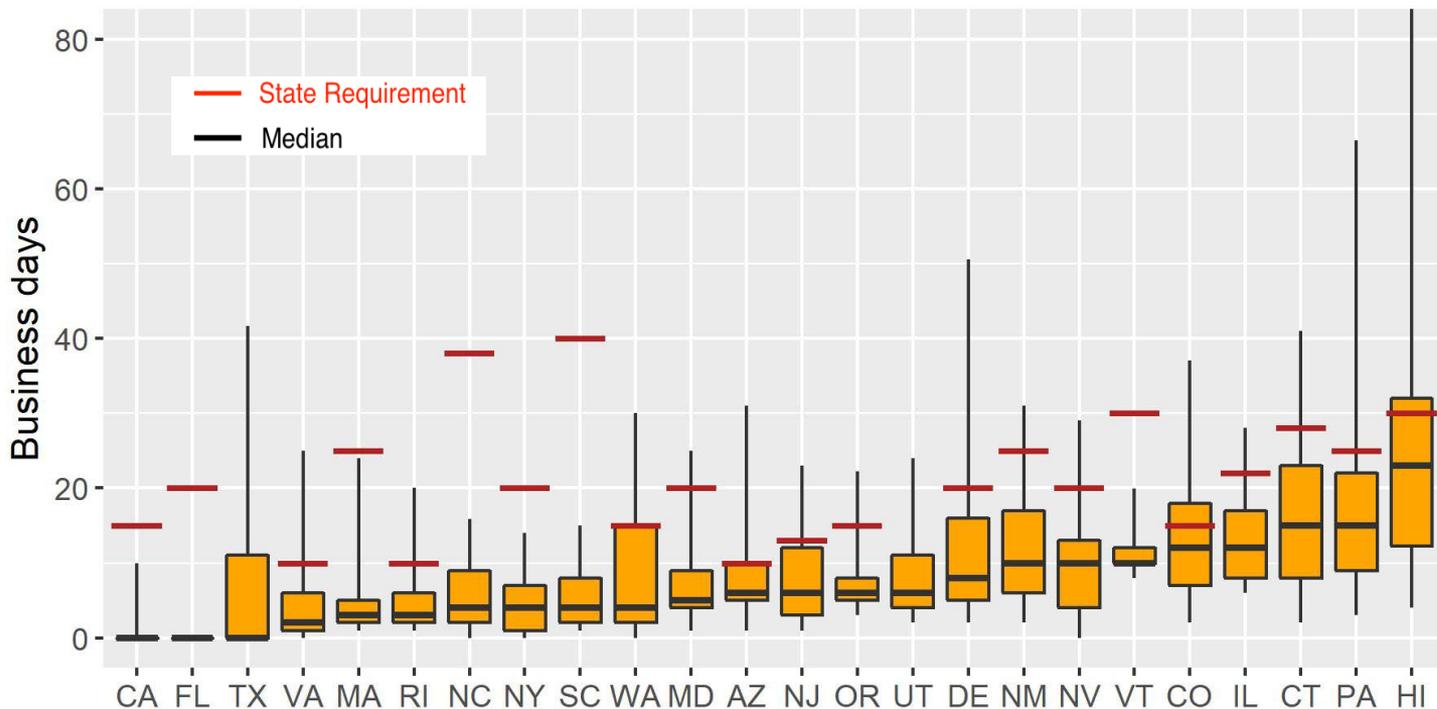
PV-Only | 1-10kW
Installed 2017-2019

WA 4	ID	MT	ND	MN	WI			NY 4	VT 10	NH	ME
OR 6	UT 6	WY	SD	IA	IL 12	MI	PA 15	NJ 6	CT 15	MA 3	
CA 0	NV 10	CO 12	NE	MO	IN	OH	WV	MD 5	DE 8	RI 3	
	AZ 6	NM 10	KS	AR	KY	TN	VA 2	DC	NC 4		
			OK	LA	MS	AL	GA	SC 4			
AK	HI 23		TX 0					FL 0			

“Pre-install Approval” refers to the number of business days from the date a PV installer submits an interconnection application to the utility to the date the installer receives approval from the utility to install the PV system.

Pre-Install Application Approval Times (Medians)

PV-Only | 1-10kW
Installed 2017-2019

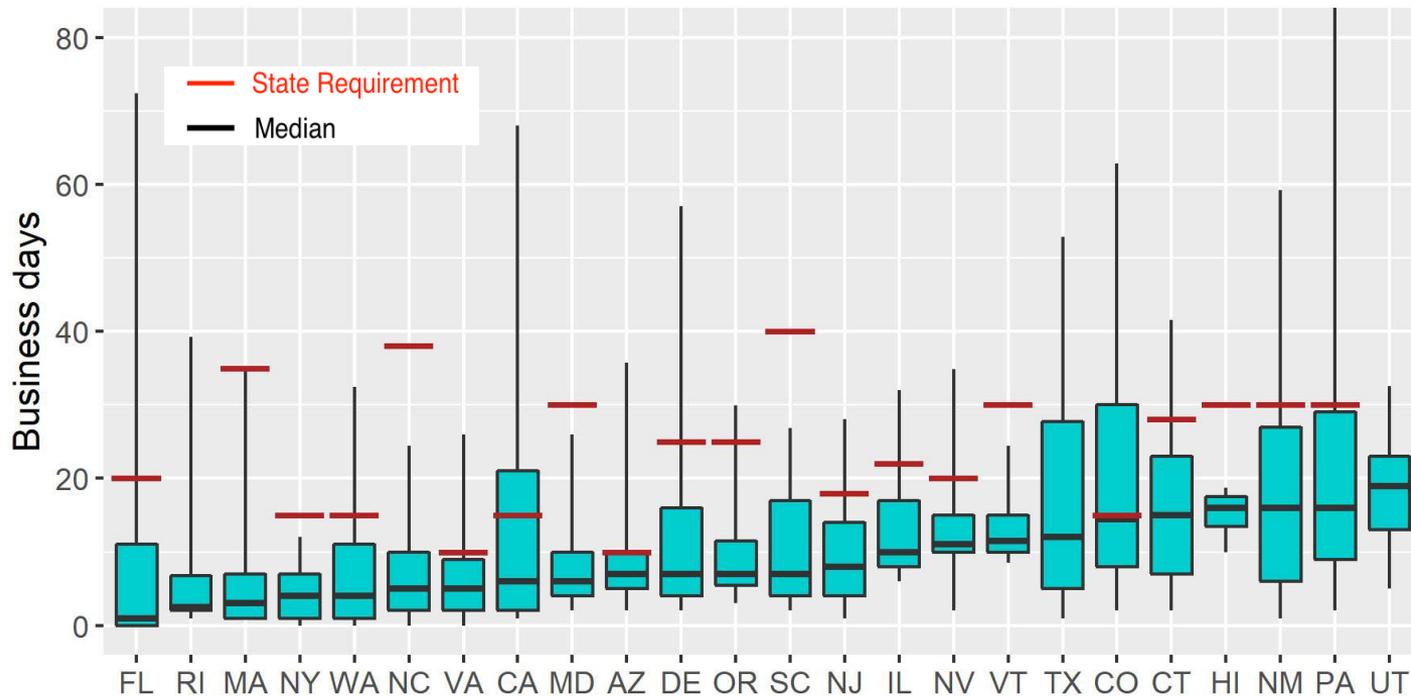


“State Requirement” refers to the state mandated maximum time that utilities may take to complete the pre-install approval phase of the interconnection process



Pre-Install Application Approval Times (Medians)

PV-Only | 11-50kW
Installed 2017-2019



“State Requirement” refers to the state mandated maximum time that utilities may take to complete the pre-install approval phase of the interconnection process



State Timeline Comparison of Pre-Installation Approval Phase (Medians)

PV-Only

Pre-Installation Approval Timeline (Business Days)

System Size	≤10 kW			11–50 kW		
State	2012–2014 Median	2017–2019 Median	% Change	2012–2014 Median	2017–2019 Median	% Change
Arizona	22	6	-73%	22	7	-68%
California	20	0	-100%	23	6	-74%
Colorado	32	12	-63%	25	14.5	-42%
New Jersey	14	6	-57%	15	8	-47%
New York	10	4	-60%	10	4	-60%



Processes to Improve Interconnection Approval Timelines

- Processes suggested by interviewees:
 - The proliferation of online interconnection application submission and/or online fee payment portals
 - Elimination of pre-installation approval application processes
- Other opportunities:
 - Providing trainings to local contractors on interconnection application requirements
 - Streamlining internal and external communications related to interconnection applications



Summary: Key Findings

- Pre-installation approval timeline mandates vary widely by state
- 7 states had 95% or more of projects ≤ 10 kW meet the respective state-mandated maximum timeline requirements
 - 6 states had 95% or more of projects 11–50 kW meet the respective state-mandated maximum timeline requirements
- Short approval timelines do not always occur in states with more stringent timeline mandates, and likewise, the slowest timelines do not necessarily coincide with the least stringent mandates.
- For the five states in the historical analysis, the median timelines have declined by 57%–100% for projects ≤ 10 kW and 44%–74% for projects 11–50 kW.

SolarAPP Outreach Materials

- Website:
 - <https://solarapp.nrel.gov/>
- Pilot Results:
 - <https://www.nrel.gov/docs/fy22osti/81603.pdf>
- Demonstration webinar:
 - <https://www.youtube.com/watch?v=wMDZYo7wf4I&t=1869s>
- Where is SolarAPP+ available?
 - <https://help.solarapp.org/article/108-where-is-solarapp-available>.
- NREL Analysis Homepage:
 - <https://www.nrel.gov/solar/market-research-analysis/permitting-inspection-interconnection-timelines.html>

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

Questions and Thank You!

For more information contact:

solarapp@nrel.gov

team@solar-app.org

www.nrel.gov

