



# Field Performance Forensics Test

2021 Edition





Since 2009, downstream manufacturers, developers, independent engineers, and financiers have trusted RETC to test and vet their modules, inverters, energy storage systems, and racking products.

- Complete Design Review & Support
- Pre-Certification Support
- Certification Testing
- Best-in-Class Turnaround Time
- World Renown Bankability Testing Data
- IE Flexibility
- Global Partnerships
- Close Relationships with Developers/Banks



A2LA ISO / IEC 17025 Accreditation



IEC CBTL  
(Certifying Body Test Laboratory)



UL DAP  
(Data Acceptance Program)



Intertek RTL  
(Recognized Test Laboratory)



TUV Rheinland Partner Laboratory



VDE Qualified Test Laboratory



CALSSA Membership

# Field Performance Forensics Test

A series of **EL tests** & **IV tests** designed to identify damage, degradation, and underperforming PV modules in the field.

It identifies:

- Cracks / Microcracks
- Heat Stress
- Light & Elevated Temperature Degradation (LeTID)
- Potential-Induced Degradation (PID)
- Manufacturing Defects



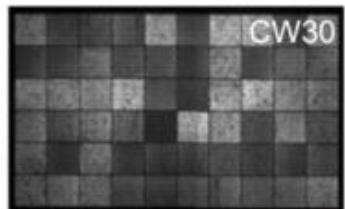
Images: RETC

# WHY DOES **FIELD PERFORMANCE** **FORENSICS TESTING** MATTER?

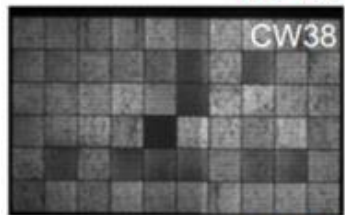


# The Importance of EL Imaging

## Power Loss vs. EL Imaging



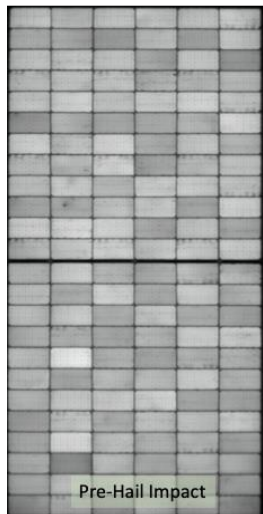
-9.81 %



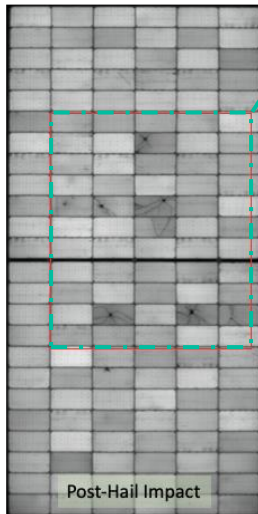
-2.21 %

Power loss is not indicative of the modules' condition. Examining Microcracks visible through EL imaging serves as a better portrayal of the modules current state.

## 3.2mm front glass with backside 45mm hail

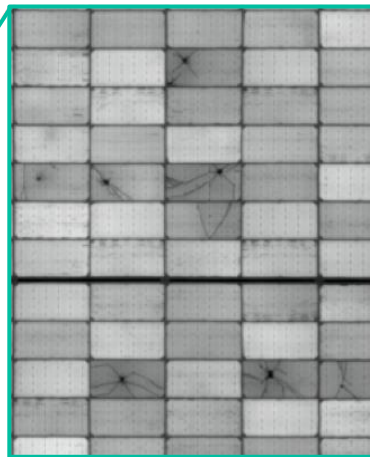


Pre-Hail Impact

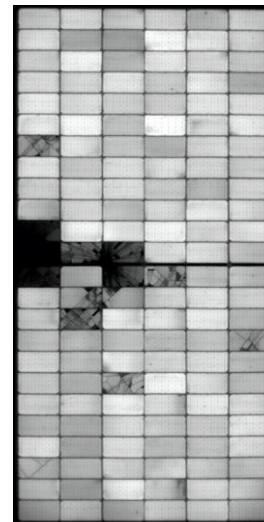


Post-Hail Impact

5X reduction in impact energy required to break the front 3.2mm glass



## 3.2mm front glass impacted by 75mm without breaking



The risk doesn't end in broken glass! When the front glass doesn't break, damage to the cells is the invisible risk

# Daytime EL

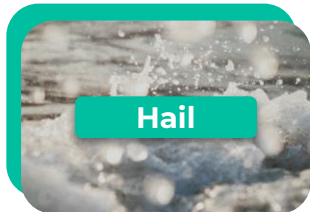
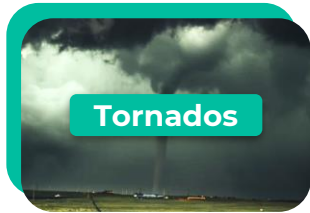
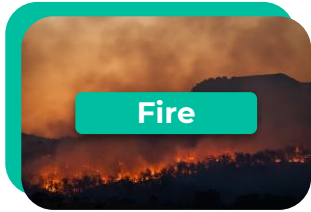
RETC captures **EL images** during the **day time** because:

- It's more dangerous to field test at night
- Less labor on the ground means logistics are more difficult
- Support staff would be doing overtime
- Might not be possible; there may be rules that dictate employees may not do night work unless it's an emergency
- Daytime testing offers much more flexibility



Images: RETC

# Impacts of Extreme Weather Events



In the field, PV modules are exposed to unexpected, **extreme weather** and **high-force events**.

These extreme weather events are all events that can happen post-commissioning of a site.



RETC collaborated with Nexttracker to produce a whitepaper on mitigating extreme weather risk (Source: [Nexttracker](#))

# Baseline Assessment During Commissioning



Why is it important to monitor a project throughout its lifecycle during commissioning?

Investors care about getting an accurate estimation on the financing of solar projects. By doing a proper commissioning process, they set a more accurate baseline for their estimates. This directly relates to the financing needed for the success of a project.



What are some examples of site risks? Do these risks affect sites that have not gone through an event?

*(e.g. extreme weather damage)*

Site risks assessed in field forensics testing include: environmental risks, module quality, installations, system design, and logistics risks. These risks are important to examine even for sites that have yet to experience an event.



# Baseline Assessment During Commissioning

Without **early records** of a **project's health**, asset-managers may be faced with:

- Flawed risk-mitigation
- Missing substantiating evidence via baseline/post-incident images
- Insurance claim problems
- Losing compensation for asset loss



# WHAT WE DELIVER

# Project Deliverables

1

Report summarizing findings of the module conditions at each site

2

Raw EL images

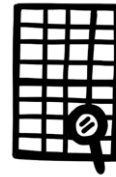
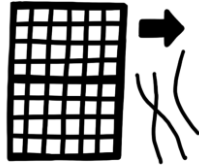
3

Any additional information collected during the inspection

4

Recommendation for additional testing of module(s) at RETC as deemed necessary

# How is it performed?



Disconnecting  
Affected  
**Combiner Boxes**

Disconnecting  
Affected  
**String Fuses**

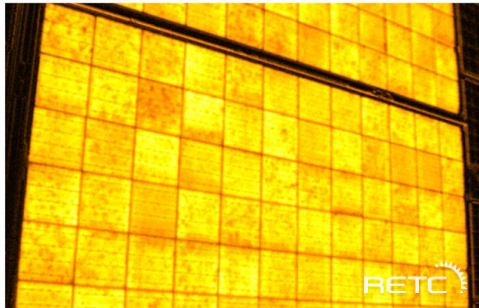
Disconnecting  
**Modules from  
Strings**

Performing **EL  
Imaging** on  
Modules

Performing  
**Additional  
Module Analyses**  
**In-Field** as  
Conditions & Time  
Permits

Summarizing  
**Results &  
Reporting** on  
Module  
Conditions

# RETC In Action



RETC employees out in the field and sampling for Field Performance Forensics (FPF) testing on multiple modules per site.

In these projects, the sites were inspected and dozens of EL images were taken. Drone footage is also taken for site survey.



# Provisions

## RETC Provides



In-field Crew



Test Equipment + Computers



RETC Crew's Lodging,  
Vehicle, Food, Water, &  
Airfare

## Customer Provides



Site As-built Plans



Confirmation a vehicle can be  
driven onsite



Motorized Cart for onsite  
equipment moving (if available\*)



Support staff to aid in disconnecting  
& reconnecting strings

# FOR MORE INFO

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