

# Unspoken Truth

Fires and Safety Risks are Uncomfortably Common



# The Pain of Change

- The status quo is exposing you to serious fire risks that could result in safety incidents
- The rapidly growing solar landscape is complicated and complex and at a time of high scrutiny
- The good news? These risks once identified can be remediated





# **Understanding PV Fire Risk: Is Your Commercial Rooftop Safe?**

Presented by Rogér Balyon

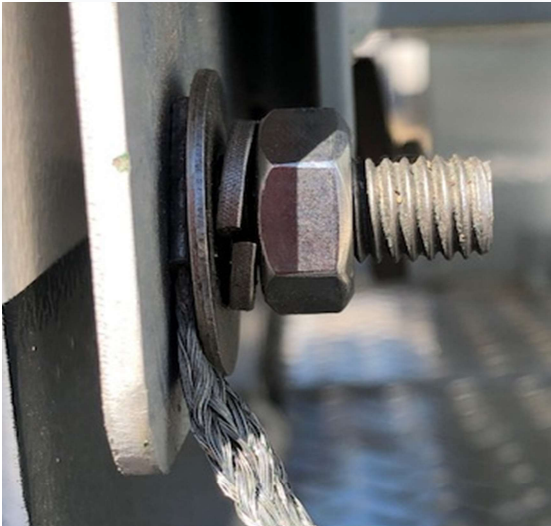


## Agenda

- What Are The Problems?
- Why Do They Happen?
- What Are The Solutions?



## Safety Issues Are Often Difficult to Find



Issues don't fix themselves and can only become BIGGER issues

## Sometimes Safety Risks are Easier to Find



Alerts tell you when something has happened on your site

# The “Greatest Hits” of Safety Risks

Majority of fire risks are a result of the Equipment, Installation, or Maintenance

# The “Greatest Hits” of Safety Risks

Majority of fire risks are a result of the Equipment, Installation, or Maintenance

#3 Wires on Sharp Edges



# The “Greatest Hits” of Safety Risks

Majority of fire risks are a result of the Equipment, Installation, or Maintenance

#3 Wires on Sharp Edges

#2 Wire Terminations

# The “Greatest Hits” of Safety Risks

Majority of fire risks are a result of the Equipment, Installation, or Maintenance

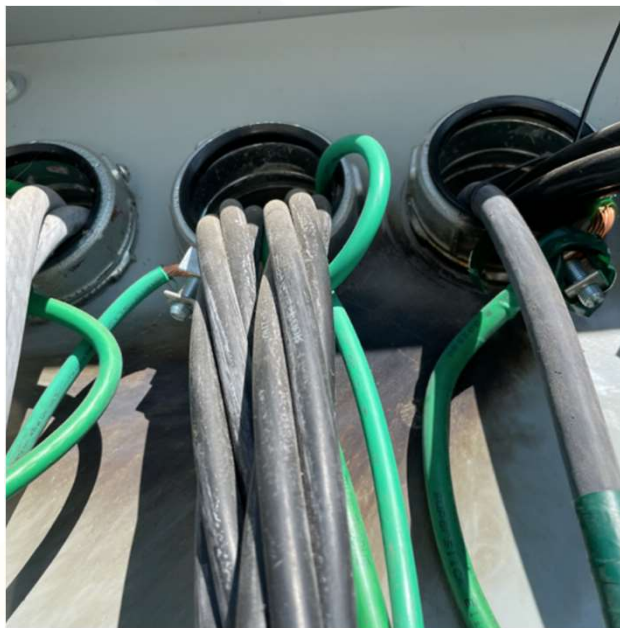
#3 Wires on Sharp Edges

#2 Wire Terminations

#1 Connectors

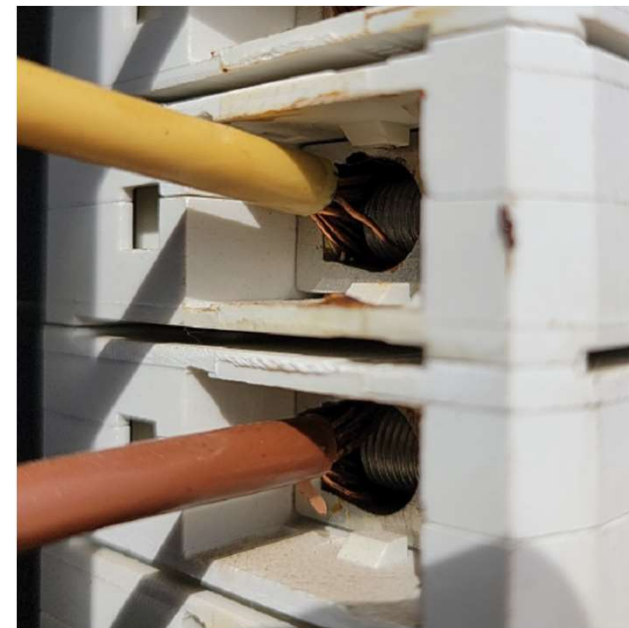
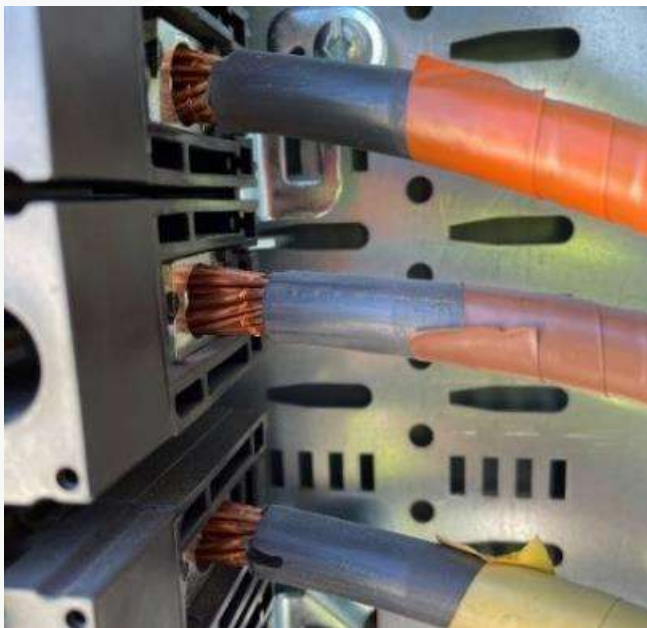
# Installation Findings

## #3 Wires on Sharp Edges



# Installation Findings

## #2 Wire Terminations



# Installation Findings

## #1 Connectors

Majority of failures in PV systems are at the **connectors**

Majority of **connector** failures are from Crossmating (Mismatching) connectors or from improper installation

- Make sure the installation procedure is followed and the correct tools are used
- Failure to do so may void the product warranty and the UL certification



# Connector Findings

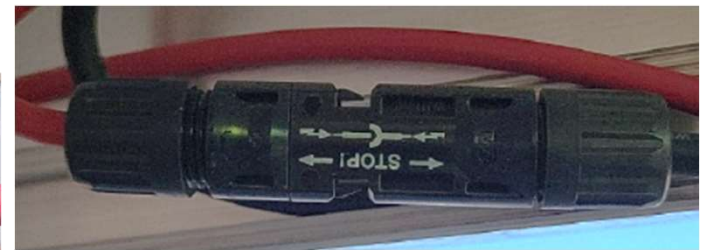
Crossmated or Mismatched Connectors

**DO NOT CROSSMATE or MISMATCH CONNECTOR MANUFACTURERS**



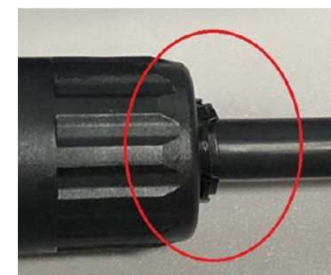
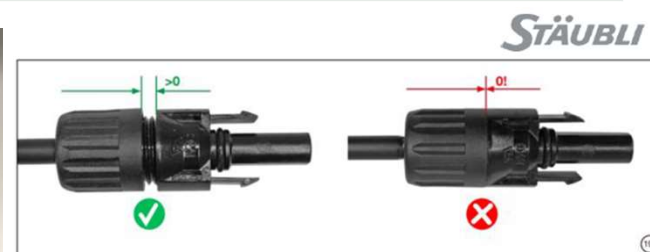
# Connector Findings

Potential Under Torque



# Connector Findings

Over Torqued





# Connector Findings

The 'Others'



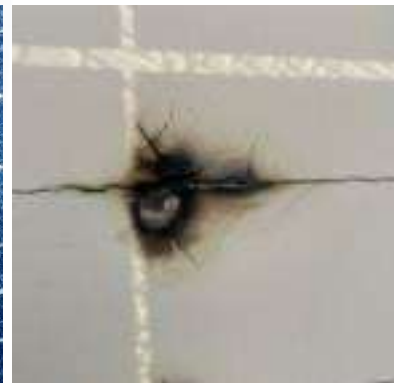
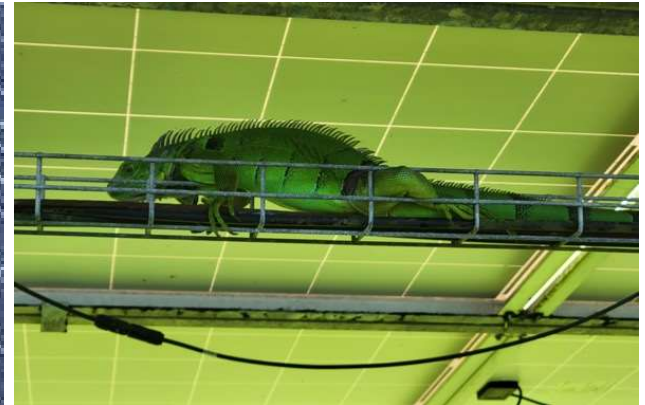
# Expect the Unexpected

Equipment defects

Wildlife

Bullet holes

Boot prints -  
DO NOT step on Modules





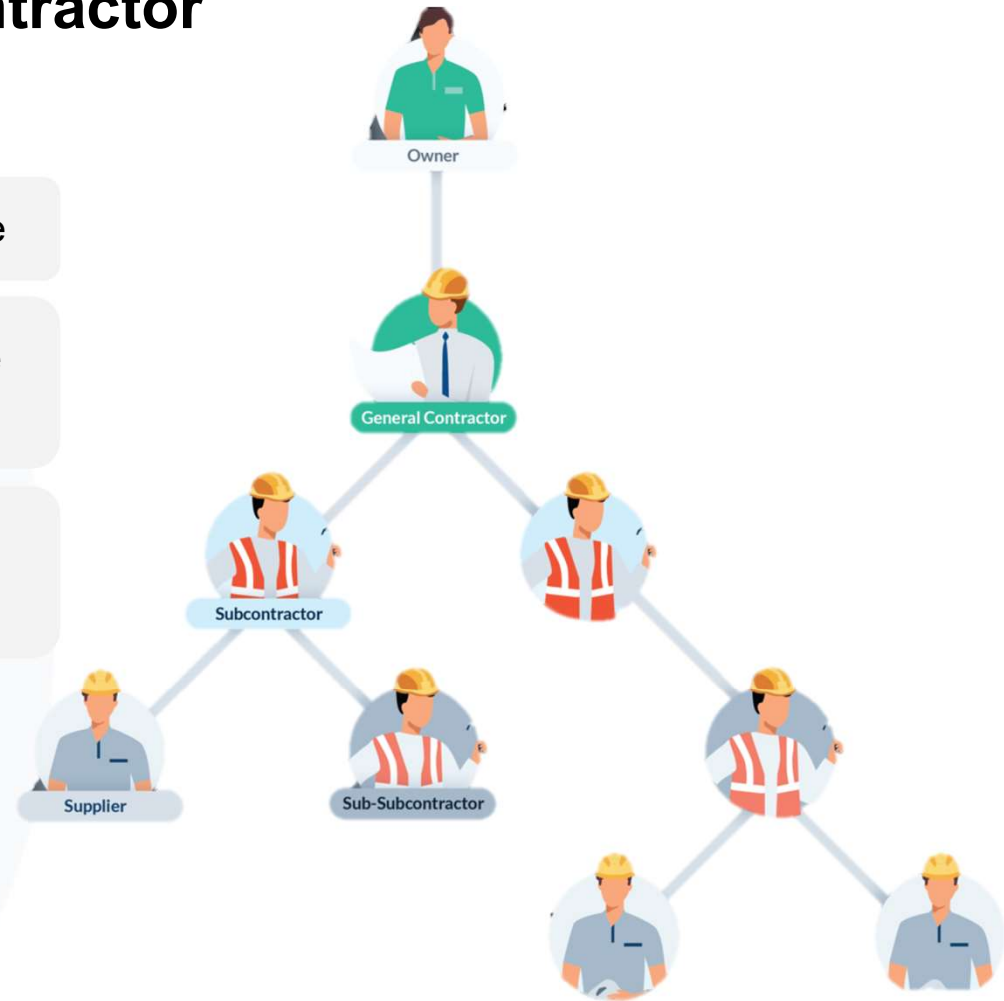
## Agenda

- What Are The Problems?
- Why Do They Happen?
- What Are The Solutions?

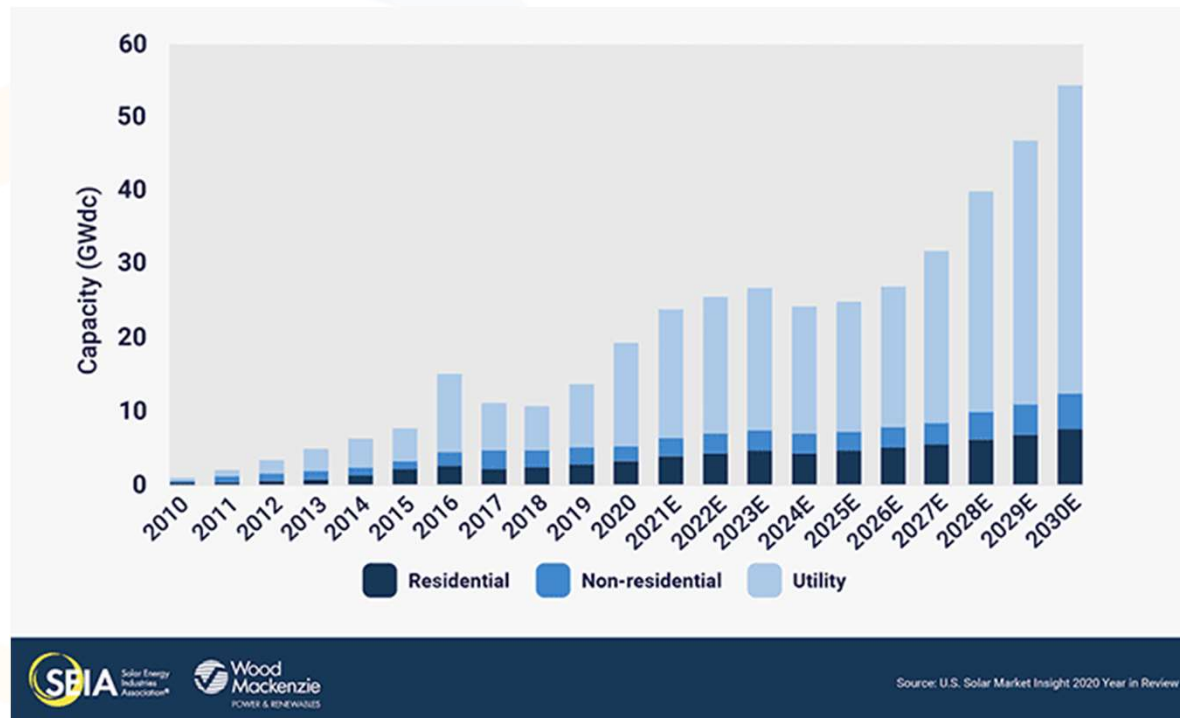
# Your Contractor's Contractor's Contractor

Incentives are typically not aligned...

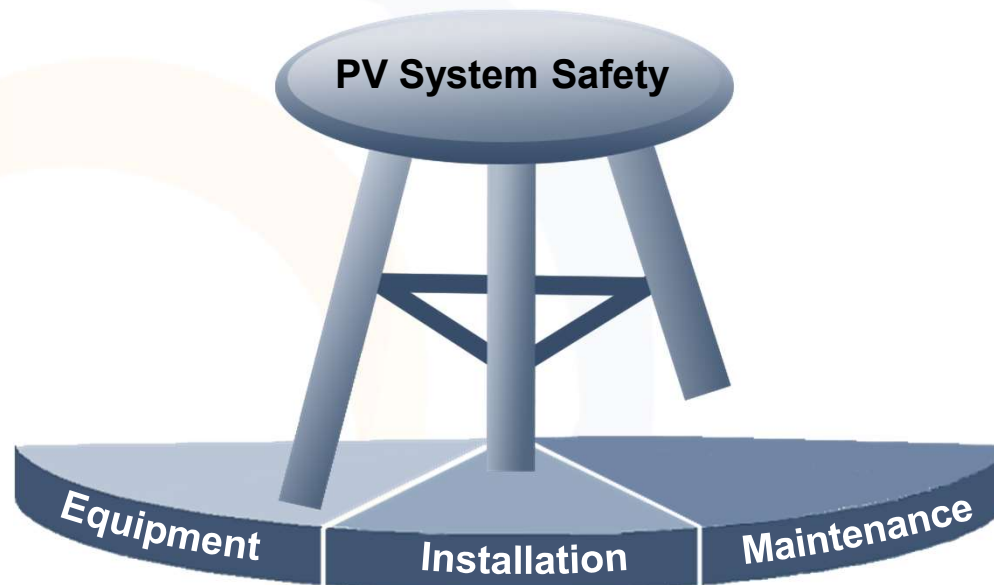
- Pressure to reduce costs and deliver projects on-time
- Does the installation team have a long-term incentive for safety?
- Does the maintenance team look for potential safety risks or only correct issues?



# Rapidly Growing Industry Means Lots Of Inexperienced Installers



# The Status Quo is Exposing You to Serious Fire Risks That Could Result in Safety Incidents



## Agenda

- What Are The Problems?
- Why Do They Happen?
- What Are The Solutions?



# Standards-Based Scalable Inspection Methodology

CEA has inspected over 300 commercial PV systems with many installers and O&M providers on site

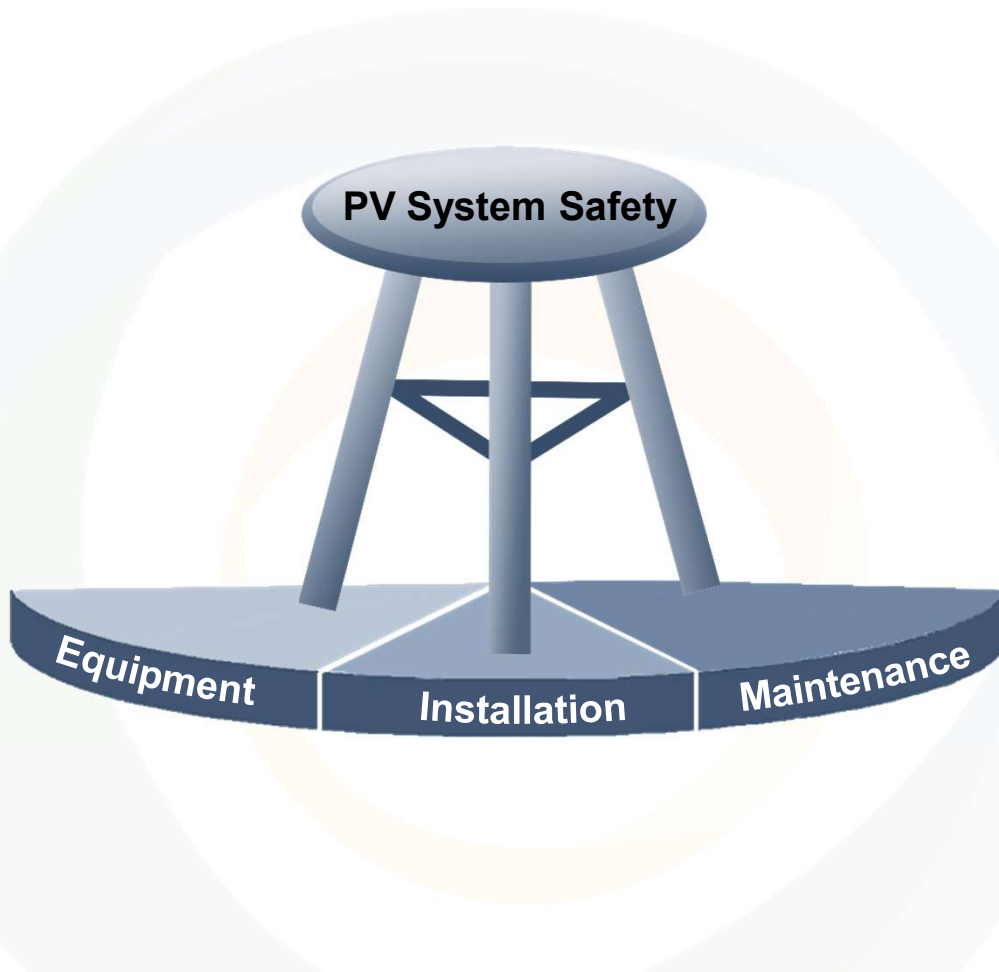
- Level of experience and expertise of installers and O&M providers ranges dramatically

CEA developed a systemic failure mode based issue database for all sites [Severity Rated]

- Adapting and combining FMEA and AQL sampling methodologies

Occurrence		Severity				
		Not Significant	Tolerable	Moderate	Significant	Catastrophic
		1	2	3	4	5
Remote Chance of Event	1	1	2	3	4	5
Very Unlikely Chance of Event	2	2	4	6	8	10
Unlikely Chance of Event	3	3	6	9	12	15
Possible Chance of Event (or systemic)	4	4	8	12	16	20
Likely Chance of Event (or systemic)	5	5	10	15	20	25

# Rethink With Safety



## Equipment

- Quality Assurance / Quality Control
- Modules
- Inverters
- Racking

## Installation

- Owner's / Independent Engineering
- EPC quality control
- Authority Having Jurisdiction (AHJ) approval

## Maintenance

- Annual or Bi-annual inspections
- System monitoring (SCADA)
- Inspection audits by an independent party

# Do You Sleep Well at Night?



- As an owner do you understand the safety risks?
- Do you sleep well at night?

**GOAL:** To Have Safely Operating Solar Assets and Minimize Risks

Understand the reasons for problems

**Yesterday**

Select equipment, suppliers, and O&M strategies to maximize safety

**Tomorrow**

**Today**

Quickly identify and remediate safety risks

***Is safety part of your operational goals?***

## Next Steps

**For more information or to request an audit of your rooftop solar assets**

[www.cea3.com](http://www.cea3.com)  
[info@cea3.com](mailto:info@cea3.com)

# Questions?





# Thank You

Company: Clean Energy Associates

Website: [www.cea3.com](http://www.cea3.com)

Email: [info@cea3.com](mailto:info@cea3.com)

The information herein has been prepared by Clean Energy Associates, LLC ("CEA") solely on a confidential basis and for the exclusive use of recipient, and should not be copied or otherwise distributed, in whole or in part, to any other person without the prior written consent of CEA. No representation, warranty or undertaking, express or implied, is made as to, and no reliance should be placed on, the fairness, accuracy, completeness or correctness of the information or the opinions contained herein. The information herein is under no circumstances intended to be construed as legal, business, investment or tax advice. Neither CEA or any of its affiliates, advisors or representatives will be liable (in negligence or otherwise), directly or indirectly, for any loss howsoever arising from or caused by the understanding and/or any use of this document.