

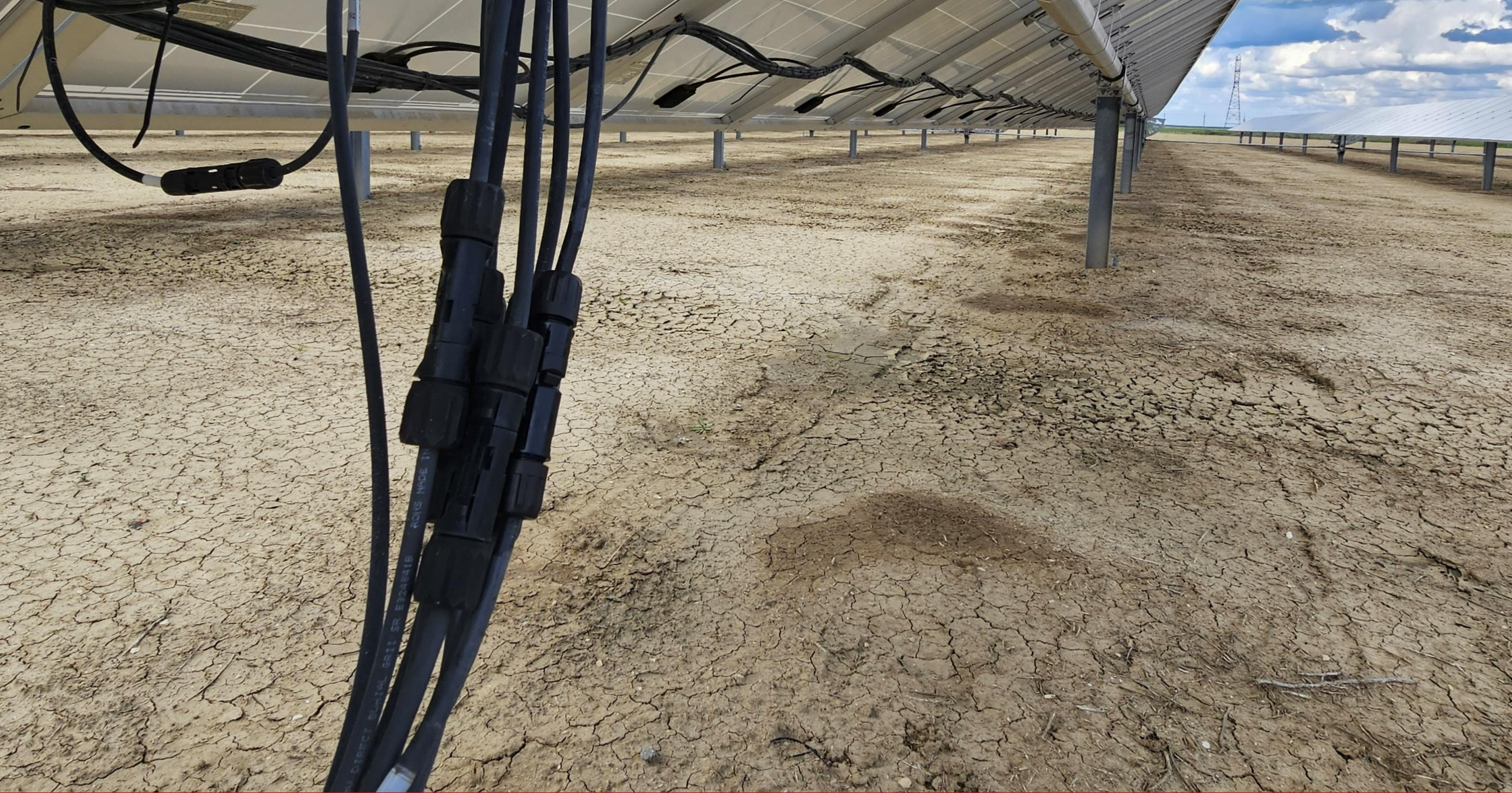
Solar Connectors-  
Tranquillity Solar  
Cantua Creek,  
CA



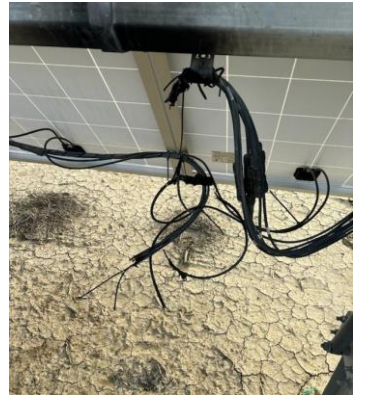
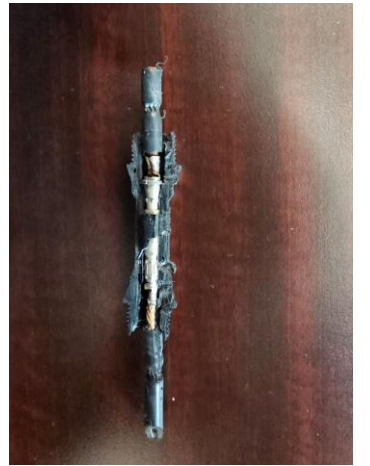
# Tranquillity Solar

- Location: Cantua Creek, CA
- COD: July 2016
- Size: 200 MW, 1894 acres
- OEMs
  - Inverter: TMEIC Samurai 1833
  - MVT: ABB 34.5kV
  - Module: REC Polycrystalline
  - Tracker: ATI
- Team Lead: Glen Parker
- Site Technicians:
  - Ken Wicker
  - Nick Roussin
  - Anthony Munoz
  - Nickolaus Soerjono









# Tranquillity Connectors



# Tranquillity Connectors

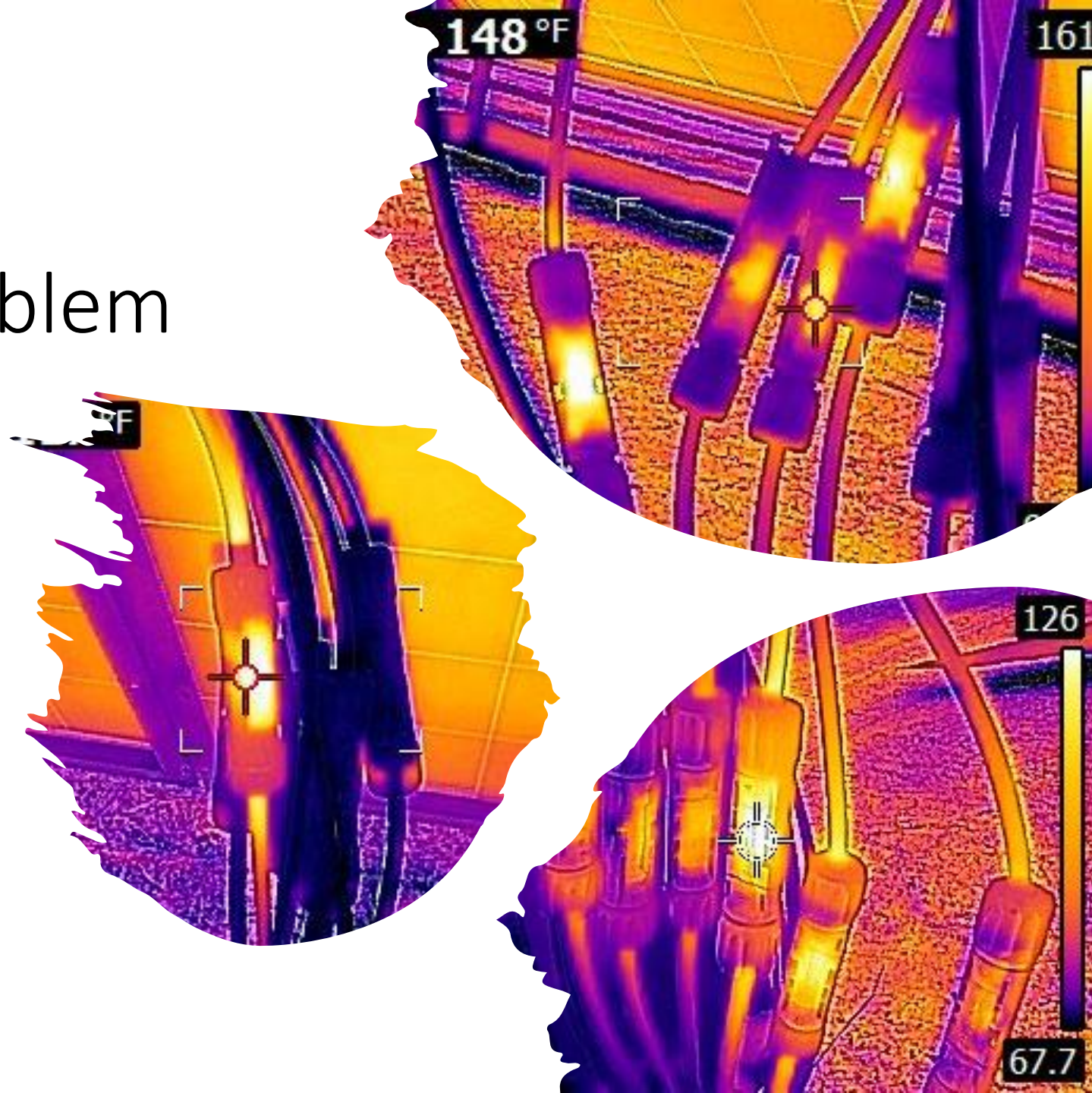


- Amphenol connectors were used in all field made homeruns
- Cross-mated with module to module connectors
- Connectors were poorly assembled by original build crew



# Identifying The Problem

- Thermal imaging under load is the most efficient way to identify problematic connectors
- Visual inspection to identify cross-mated connector types and other issues that may not be highlighted by thermal imaging
- Tranquillity inspections found roughly 40% of connectors to be a problem
- In excess of 60,000 connectors in need of replacement



# Business Case

- Large and expensive project required approval from management and partners
- Impact connectors have on production and profitability proved difficult to quantify
- EU study found that failed connectors were the single largest technical failure impacting the profitability of PV installations, at an estimated loss of €6.60/kWp/year (\$7USD)
- A large variety of failure modes result in a broad range of potential damage and lost production
  - Increased resistance in circuit degrades performance
  - Inverters often trip due to failure
  - Lost production can vary widely based on response time
  - Thermal event may take one connector or all, and could damage modules, fuses, or conductors
  - Major fire risk

# Labor

- 2 Site Technicians and 2 contractors worked overnight, 8-hour shifts
- Each worker replaced 100 connector pairs per night on average
- Weather was the primary hindrance
  - Rain
  - Cold Temperatures
- Crimpers and strippers tended to wear out and break



# Results

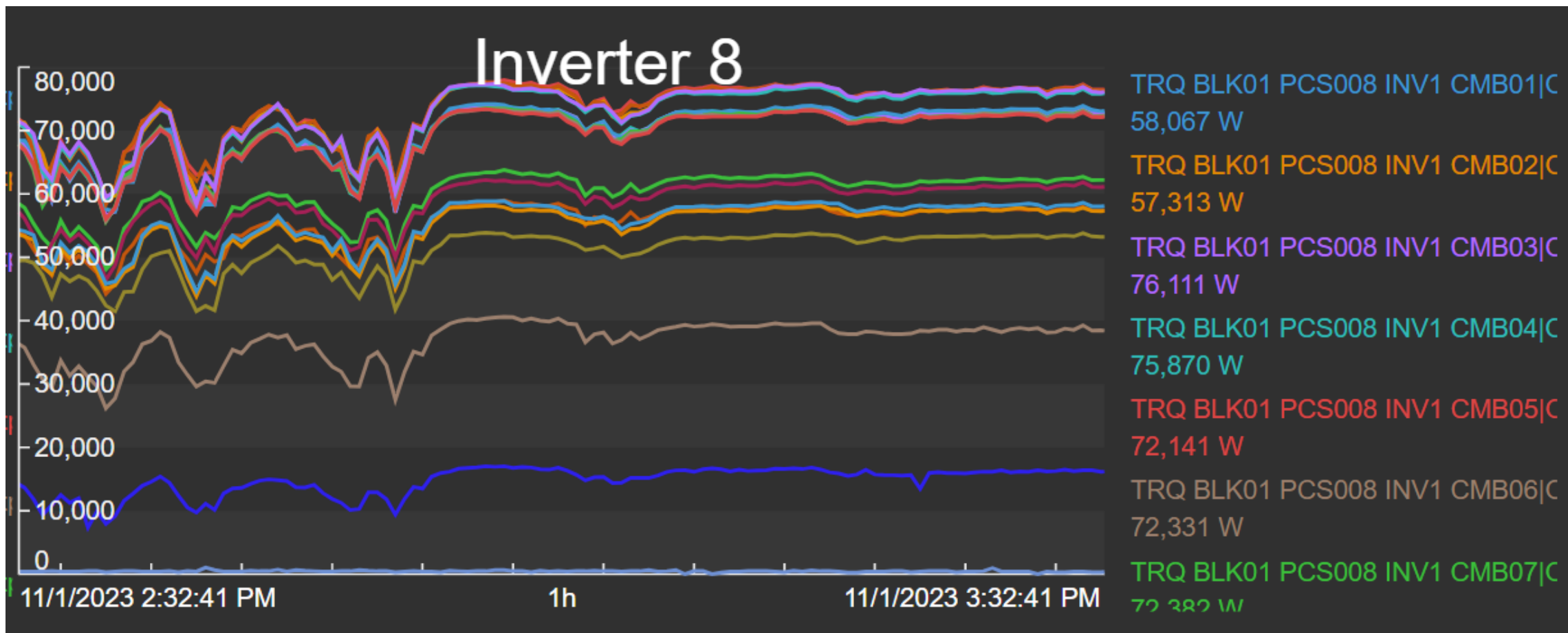
- Over 8000 new MC4 connectors installed
- There have been no new connector failures in the areas that have been remediated
- Modest impact on production
- Improved system reliability with fewer inverter trips and blown fuses





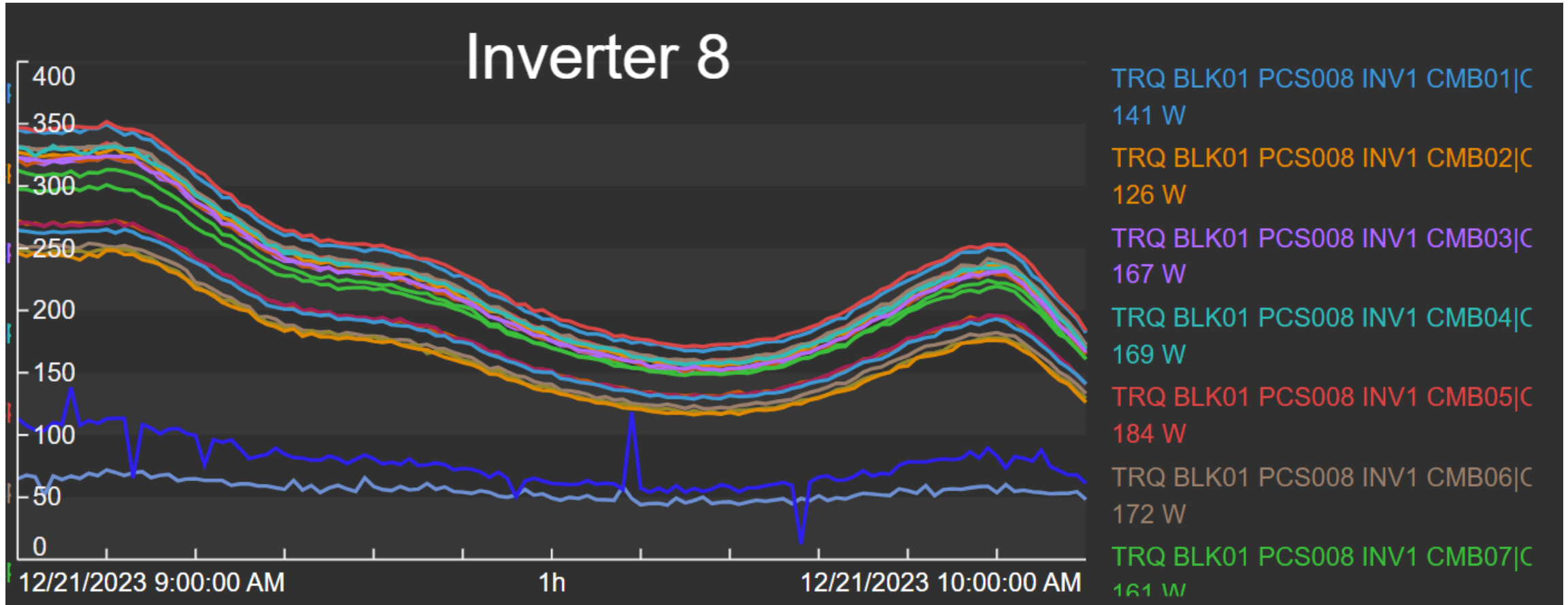


# Before Heliolytics Remediation

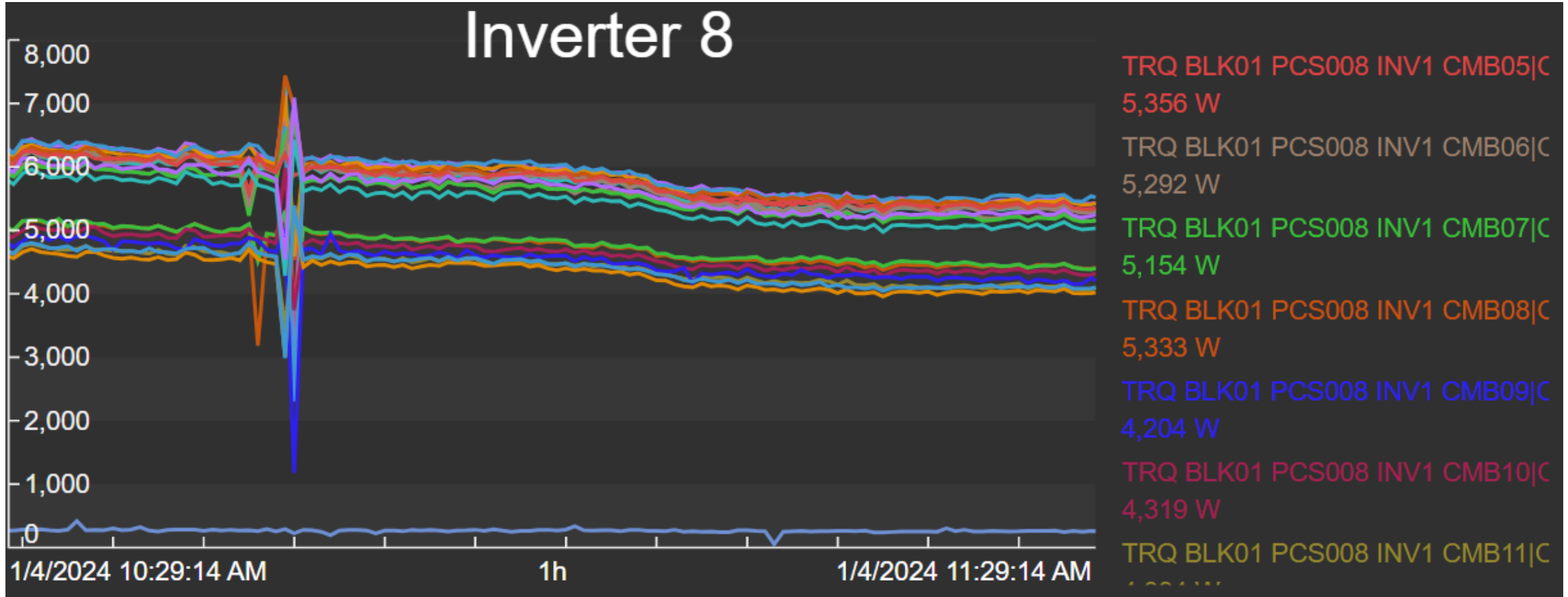




# After Heliolytics Remediation



# After Connector Remediation





# Thank you

Questions?