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SmartHelio

29 May 2024

04:00 pm – 05:00 pm | CEST Berlin, Paris
10:00 am – 11:00 am | EST New York City

pv magazine
webinars

Real-world case study and solar business growth outcomes from predictive analytics



Tristan Rayner
Editor
pv magazine




Govinda Upadhyay
CEO & Founder
SmartHelio



Jasper Graf von Hardenberg
CEO & Founder
DayStar Power Group

Welcome!

Do you have any questions?  

Send them in via the Q&A tab.  We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 

We'll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience.  



SmartHelio⁺

THE DOCTORS OF SOLAR PV PLANTS

**Intelligent Software That Prevents
Downtime In Solar Plants**

Certified



This company meets the
highest standards of social
and environmental impact

Corporation



Combinator

Govinda Upadhyay
CEO & Founder

Lausanne, Switzerland | CA USA | New Delhi, India

AGENDA for today's webinar with **pV magazine**

About SmartHelio

PV plant market &
fault prediction
solutions

Autopilot

Software

Data processing, AI
models & faults
detection

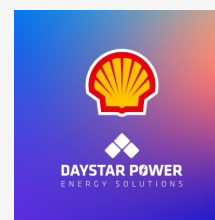
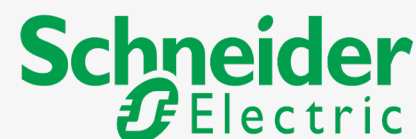
Case Study

Collaboration with
Shell Daystar
Power



About SMARTHELIO

- Autopilot software helps solar developers **predict and prevent plant downtime**
- **No hardware**: it **integrates** with your existing monitoring/SCADA system.
- Team: background in **data, climate and clean energy**
- Offices in Switzerland, USA and India
- Serving **50+ clients** with 50+ GW portfolio



Team expertise: **AI, CLIMATE** and **CLEANTECH**

30+ members | 50% energy industry | 50% researchers



Geeks who want to
solve today's **climate**
challenge using **data**



CHALLENGES with existing solutions

• **Labor-intensive** O&M processes

• Lack of standardized data / **bad quality data**

• **Unknown causes** of underperformance

• Equipment **failures**

WHAT'S YOUR
CHALLENGE?
Drop in the chat



SOLAR PV MARKET

Utility
scale



C&I
rooftop



Software for **proactive O&M**
using **physics & AI**

+10%

Increase **Solar**
Performance

-30%

Decrease
O&M costs

4x

Faster
response time



REAL TIME FAULT PREDICTION software

Prevent downtime in solar PV assets using **Predictive Analytics**

Early fault detection

& prediction

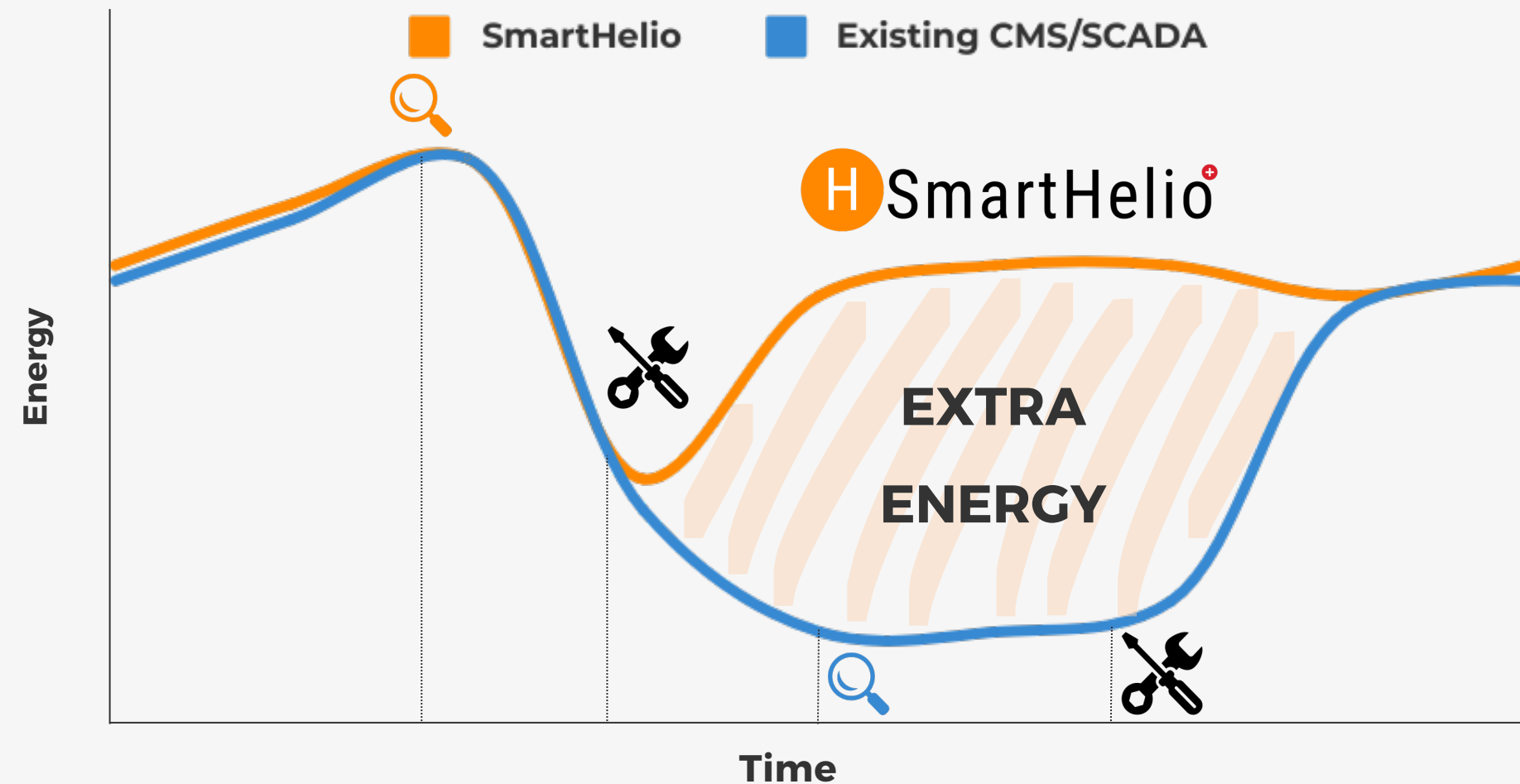
From reactive to
predictive
maintenance

Automation

with AI & ML

More precise &
faster fault
diagnosis

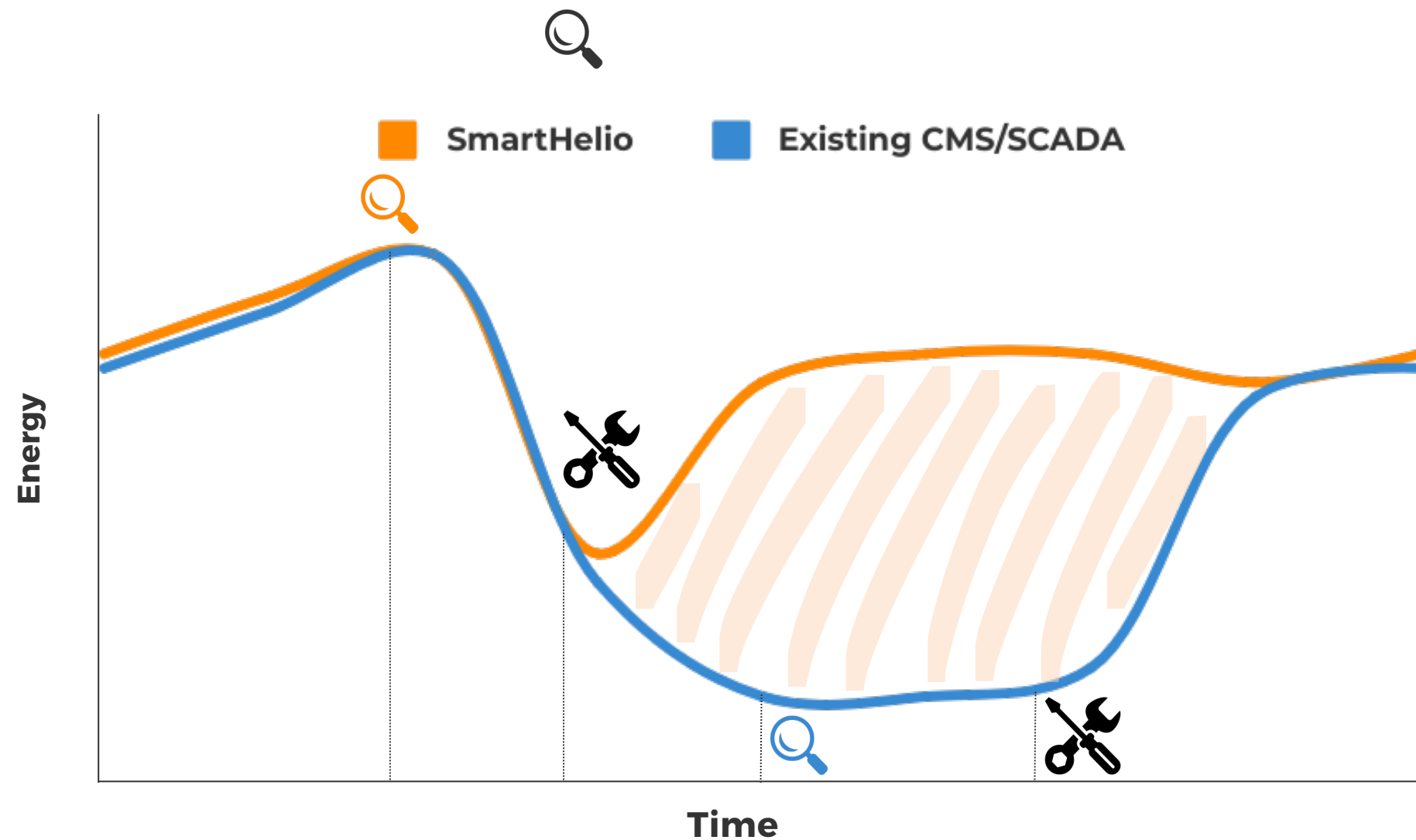
Fault detection



I asked ChatGPT



What does this curve resemble?



**WHAT DO YOU THINK?
Drop in the chat**





Portfolio > Report

Download Report

Portfolio Performance

81.576%

16.08% more than last month

Total Revenue (in EURO)

270,973.271

8.42% less than last month

Total Energy Yield

1,952.153 MWh

4.83% less than last month

Weekly Metrics

Monthly Metrics

Yearly Metrics

Plant Level Performance

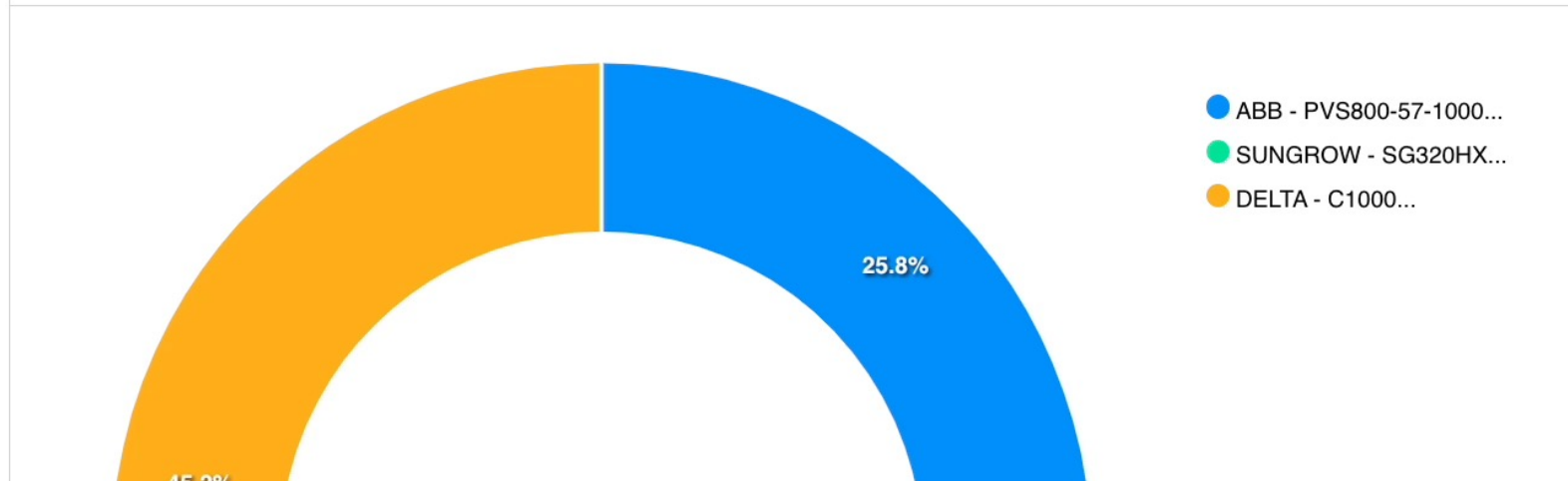
Rooftop Plants Ground Mount Plants Carport Plants

Plant Name	Performance	Losses \$/kWh	Faults
Lerignac, France	78.88%	52818.51 kWh	MPPT issue (2) PV module damage (1) Shading (8)
Garrochais, Portugal	81.71%	80811.09 kWh	Tracker Issue (6) Inverter Failure (1) Disconnected Combiner Box (1)
Maryland, USA	83.22%	6769.62 kWh	Tracker Issue (6) Inverter Shutdown (1) Wakeup Delay (2)
Texas, USA	83.40%	48343.89 kWh	Tracker Issue (6) RISO (2) Tracker Failure (1)

Inverter Comparison

Inverter Level Brand Level

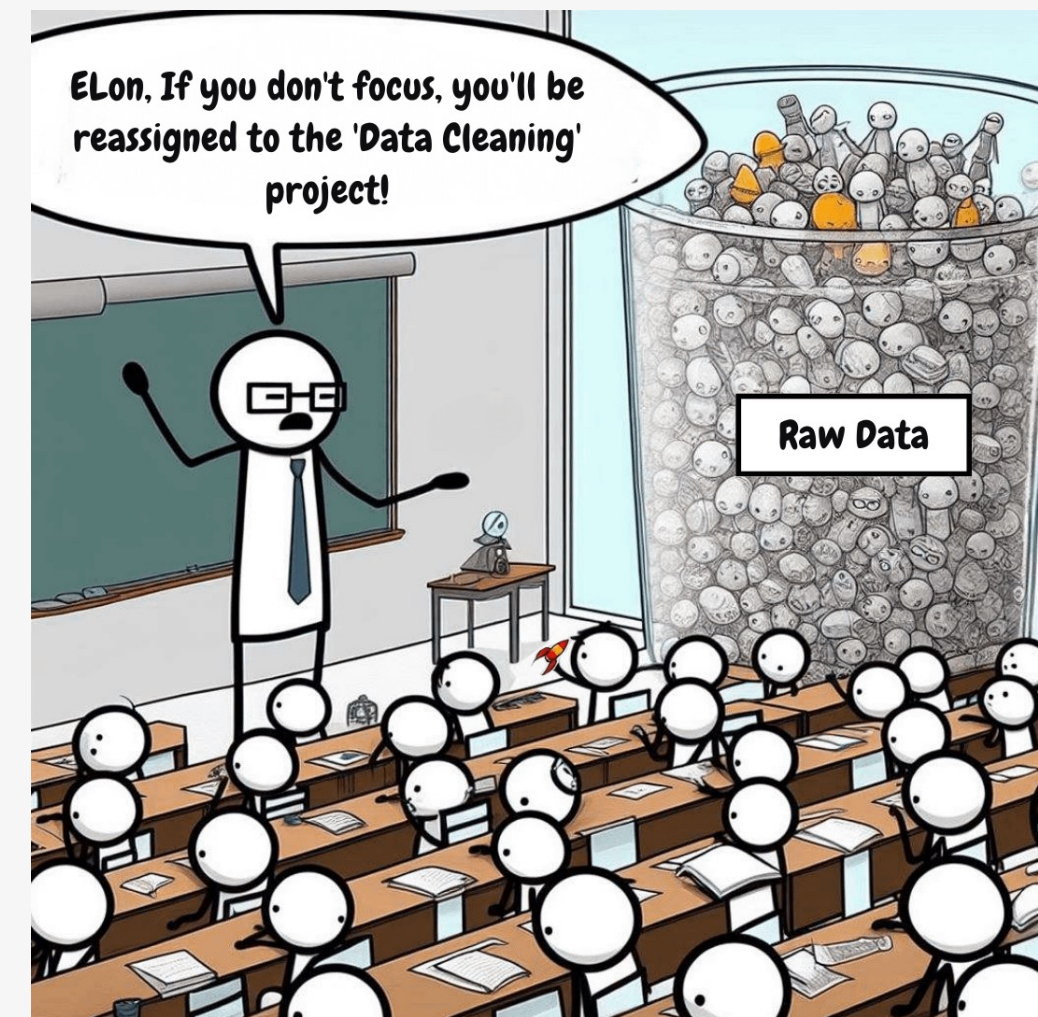
Distribution



Efficiency



Data is 80% of SmartHelio's effort



6 steps DATA SANITIZATION

**Import
Check**

**Availability
of all inputs**

**3rd party
check
(satellites)**

**Quality
Check**

**Data
Sanitization**

**Trans-
formation**



PROPRIETARY ALGORITHMS for data treatment

1. Benchmark

- Automatically check pyranometer data for issues
- Select the **best weather data** for a location using proprietary algorithms

2. Metadata Management

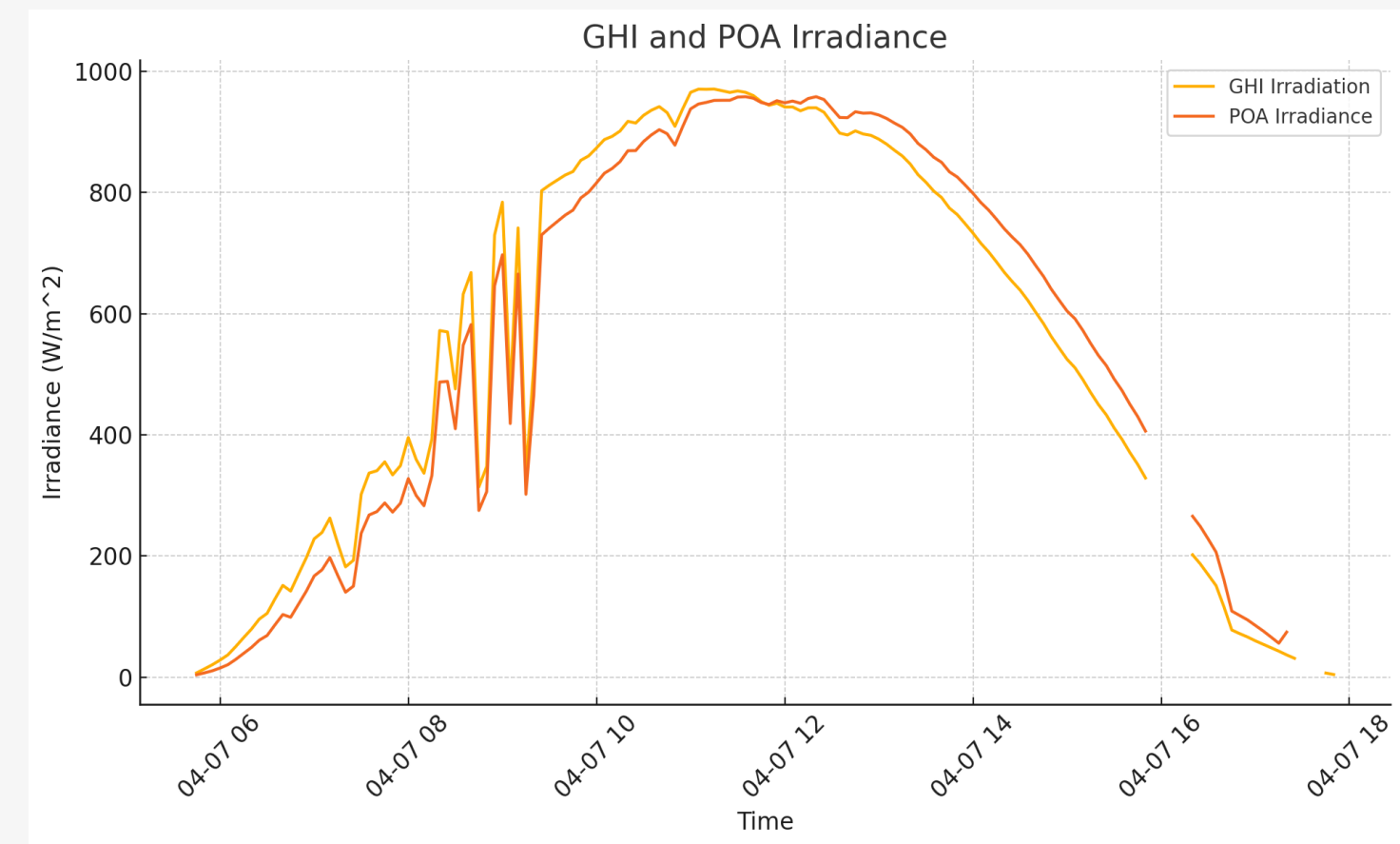
Track and **update changes** in array configurations & equipment replacements

3. Data Backfill

Use deep transformer models with generative AI to **create synthetic data** for missing periods

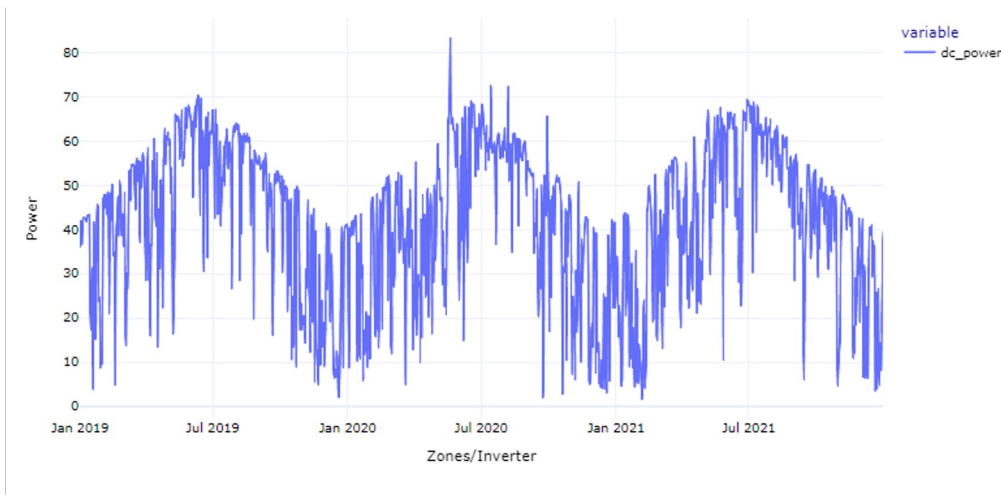


Proprietary Clear Sky model

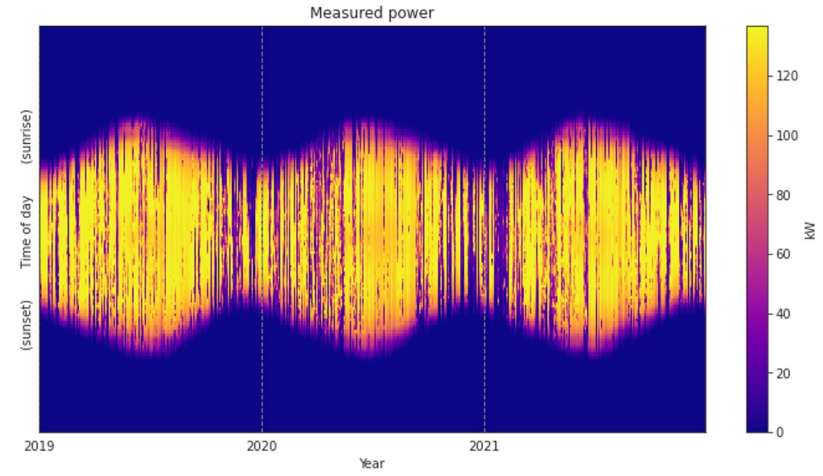


SIGNALS PROCESSING: time series data

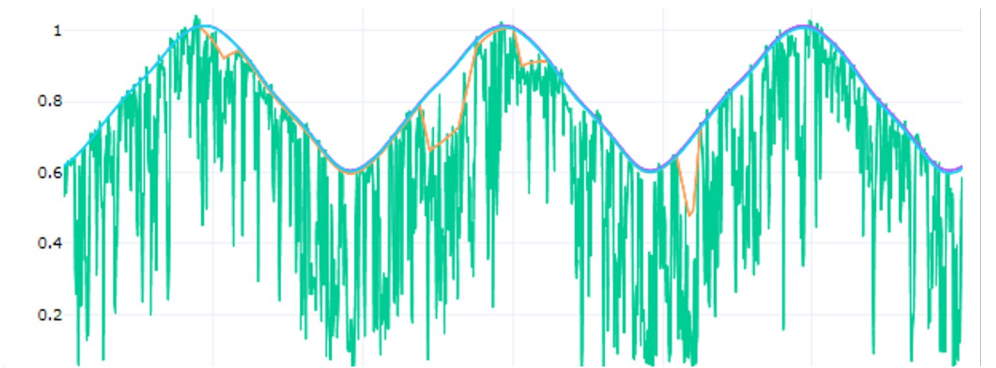
STEPS



Power



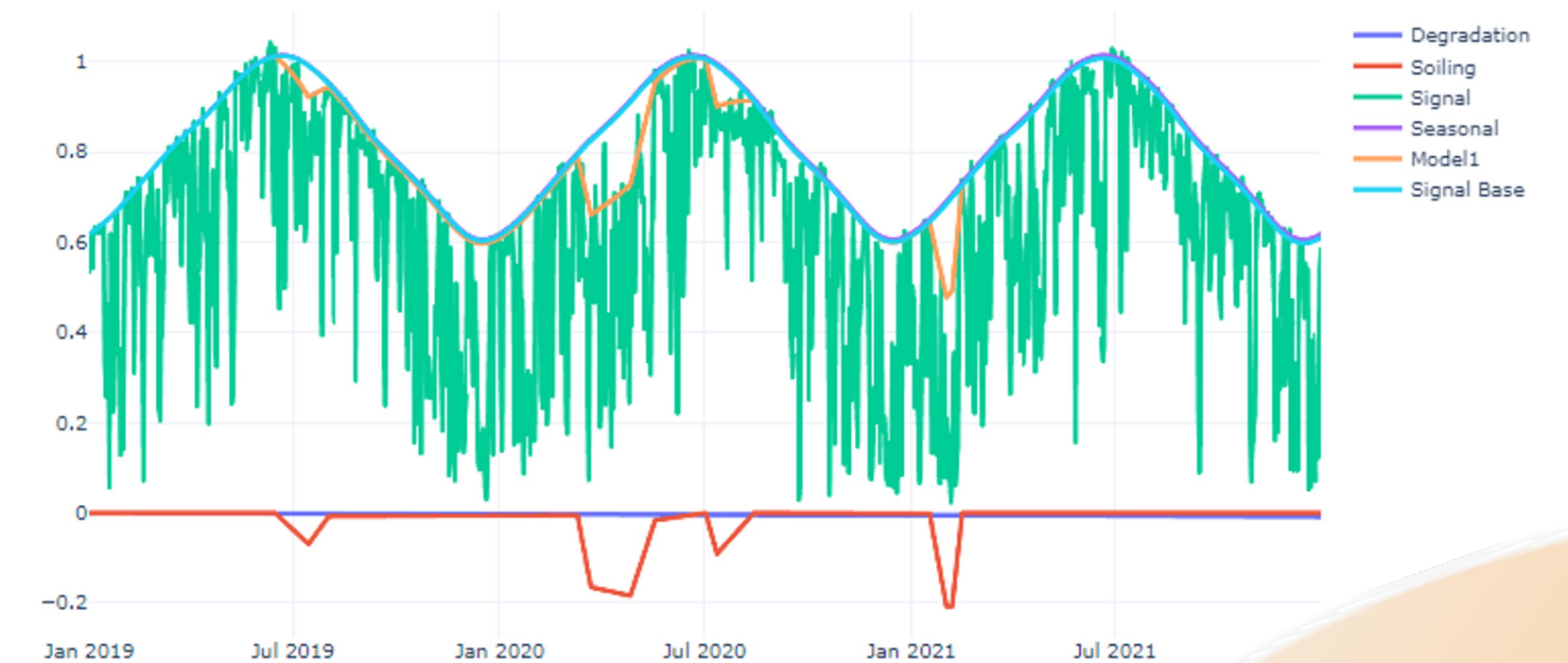
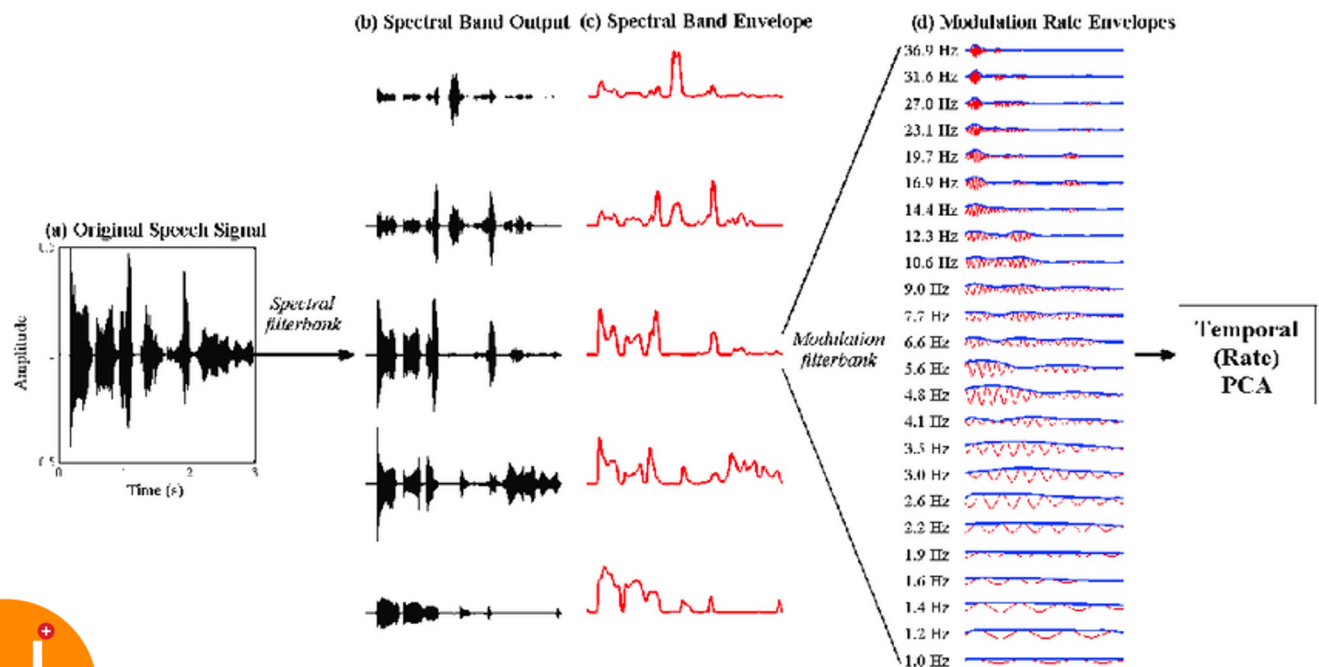
$F(t)$



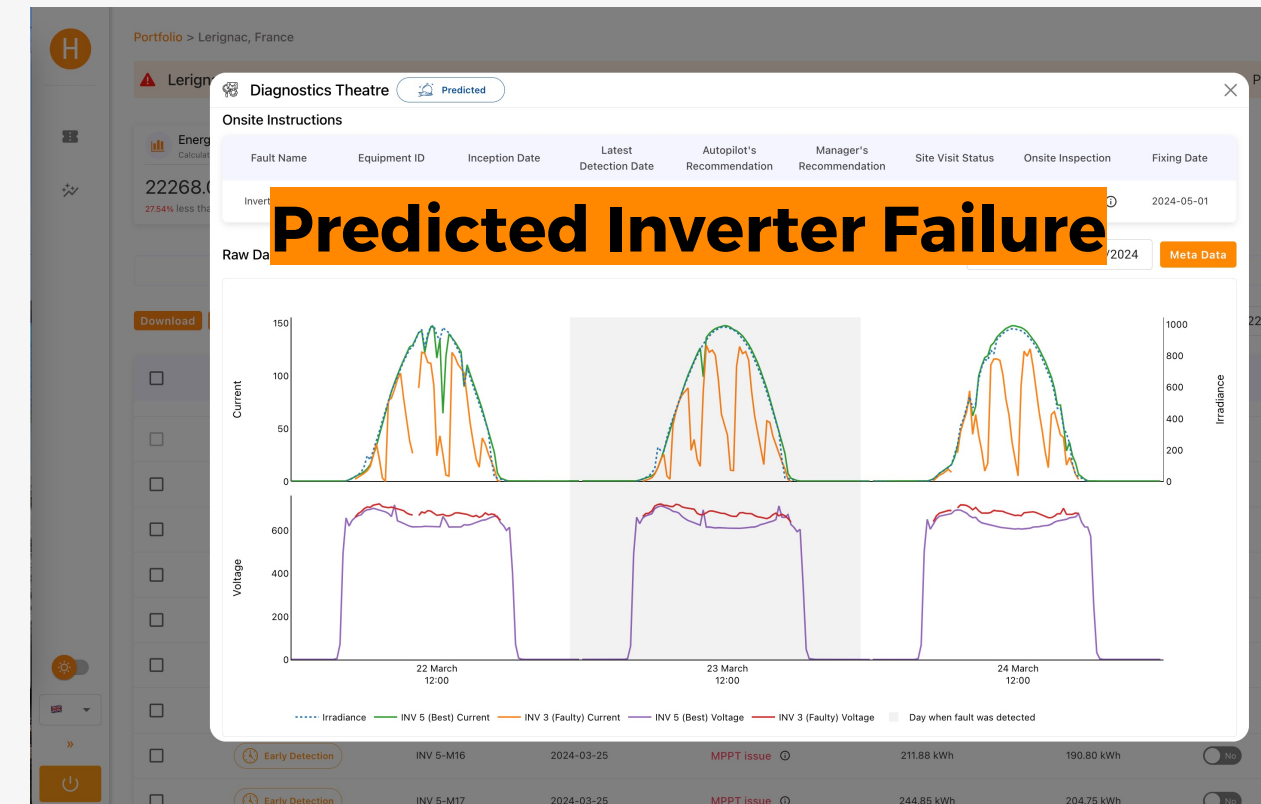
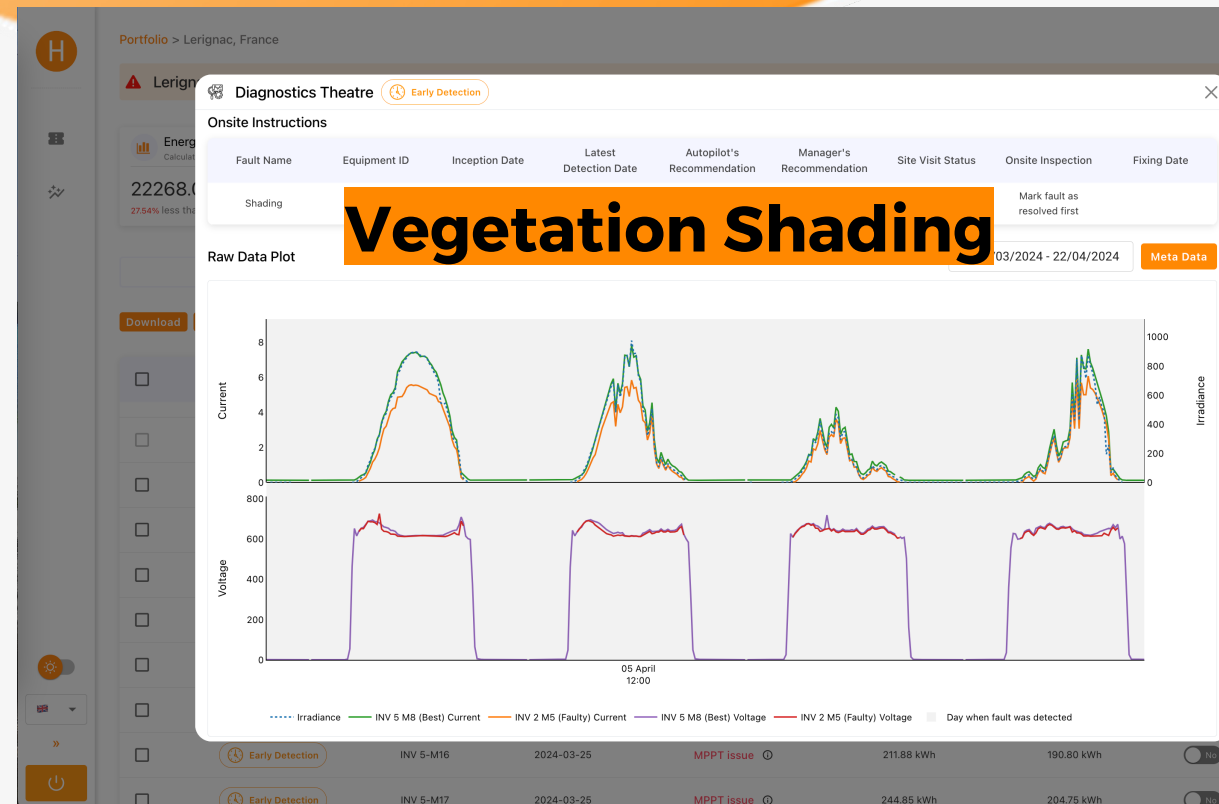
Input Signal

Decompose signals into different harmonics

OUTPUT



PHYSICS-INFORMED AI models



- 50+ Physics-based algorithms require **90% less data** than usual AI systems
- 30+ faults: Inverter failure, module level issues, connector/wiring issues, vegetation growth, tracker issues, shading, string disconnection, bad data, weather data etc.
- Highly scalable. Provide results from day 1. **No Blackbox**



Why detect **EARLY**?

Anomaly

Fault



Existing system

1 anomaly can become **20+ alarms**

Ultimately leading to inverter shutdown, equipment damage (arc), even fire etc.

Benefits with **SmartHelio**

- Increase **safety**
- Increase solar performance & **equipment lifetime**



Australian solar farm hit by grass fire burning under modules

May 11th 2024



Prolonged heatwaves dry out the land, creating perfect conditions for massive fires that can devastate solar farms, **leading to significant loss of life and equipment.**

A small spark or arc from your solar plant can ignite this fire.



Collaboration Success Story



CHALLENGES prior to SmartHelio integration

Lack of intelligence

using existing data

O&M resources scarcity

hampering fast growth

Long response time (6-7 days)

to identify and fix faults

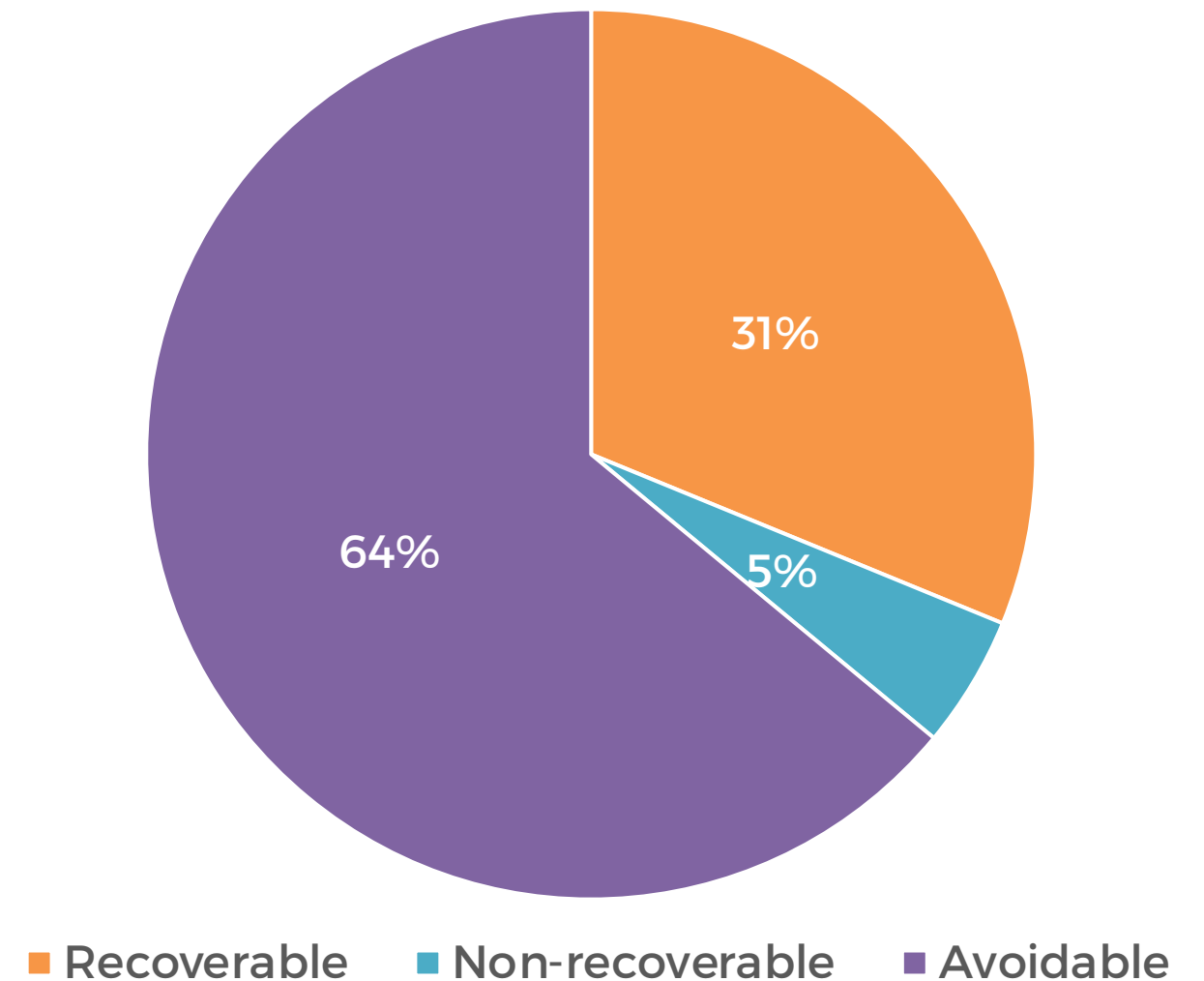
Main issues: Load Shedding/Grid Curtailment (58%) Soiling (18%), Grid Outage (7%), Disconnected Strings (5%)



Impact Numbers: **FAULT AUTOMATION**

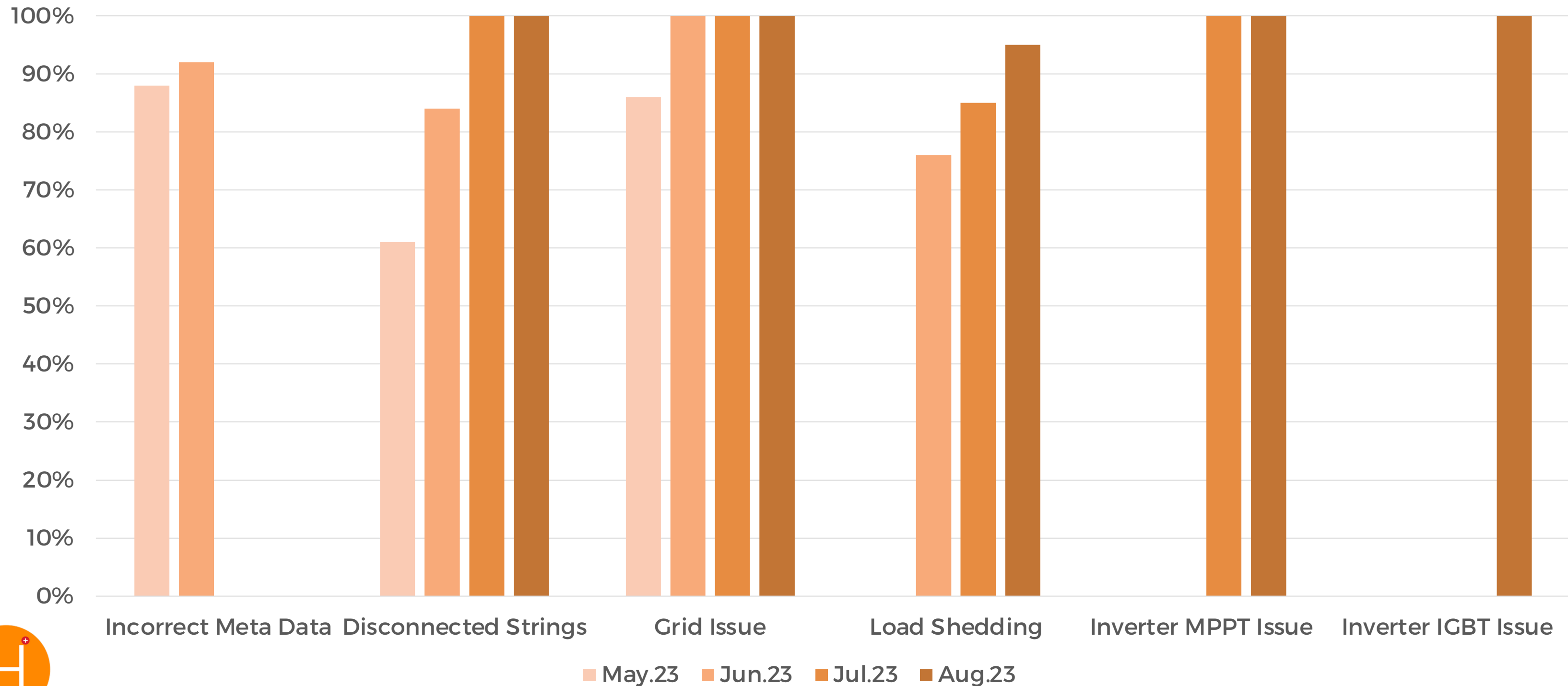
	Selected faults	Pre-SmartHelio	SmartHelio Autopilot
1	Incorrect Meta data	No	Yes
2	Shading	Manual	Yes
3	Pyranometer Data Issue	Manual	Yes
4	Disconnected Strings	Manual	Yes (prediction)
5	PV Module Degradation	No	Yes
6	Inverter Tripped	No	Yes
7	Inverter Shutdown	Via Inverter	Yes (prediction)
8	Inverter Late Wakeup	No	Yes
9	Soiling	Manual	Yes
10	Power Clipping	No	Yes

Category wise Loss Distribution

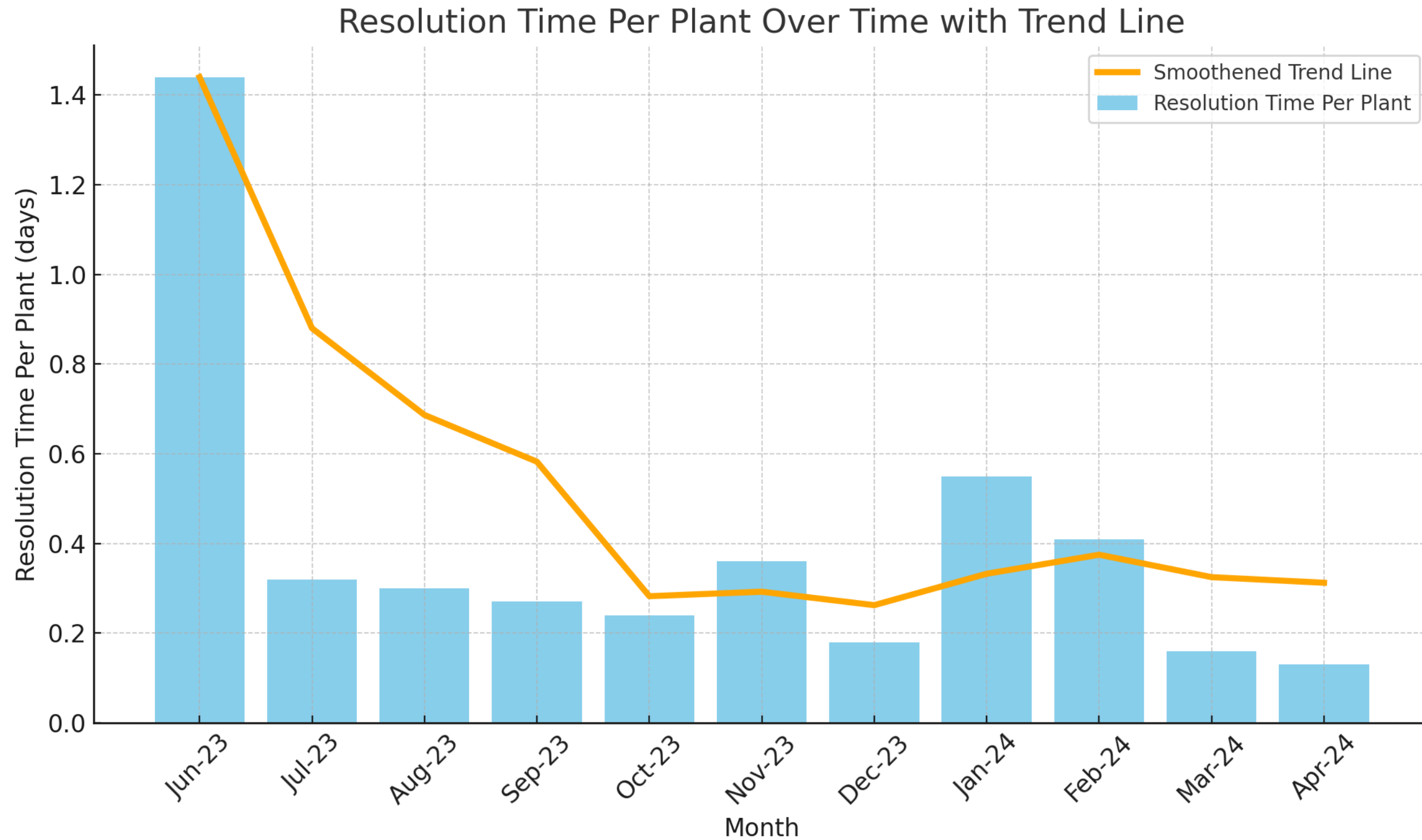


Impact Numbers: **ACCURACY**

Fault accuracy using feedback loop

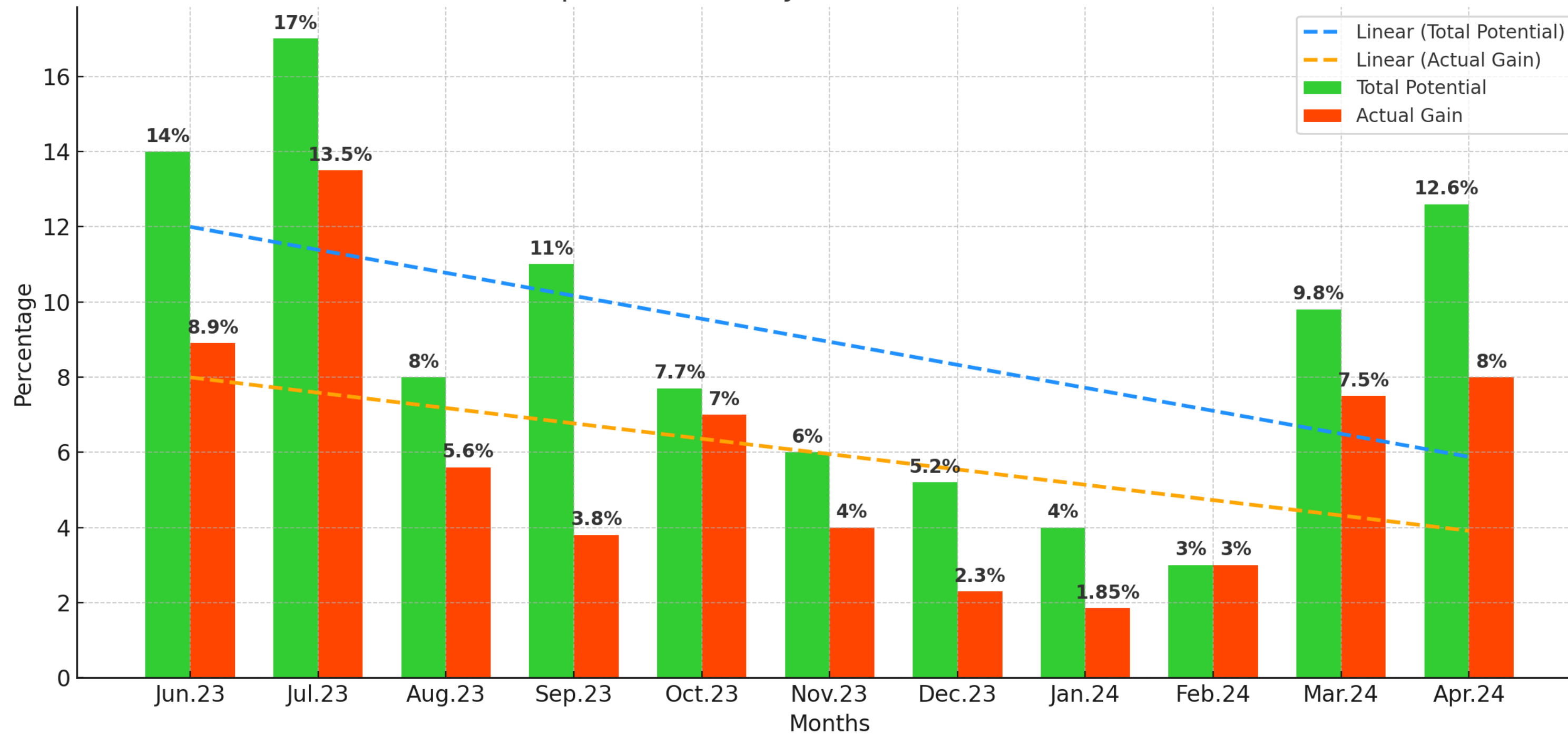


Impact Numbers: **RESOLUTION TIME**



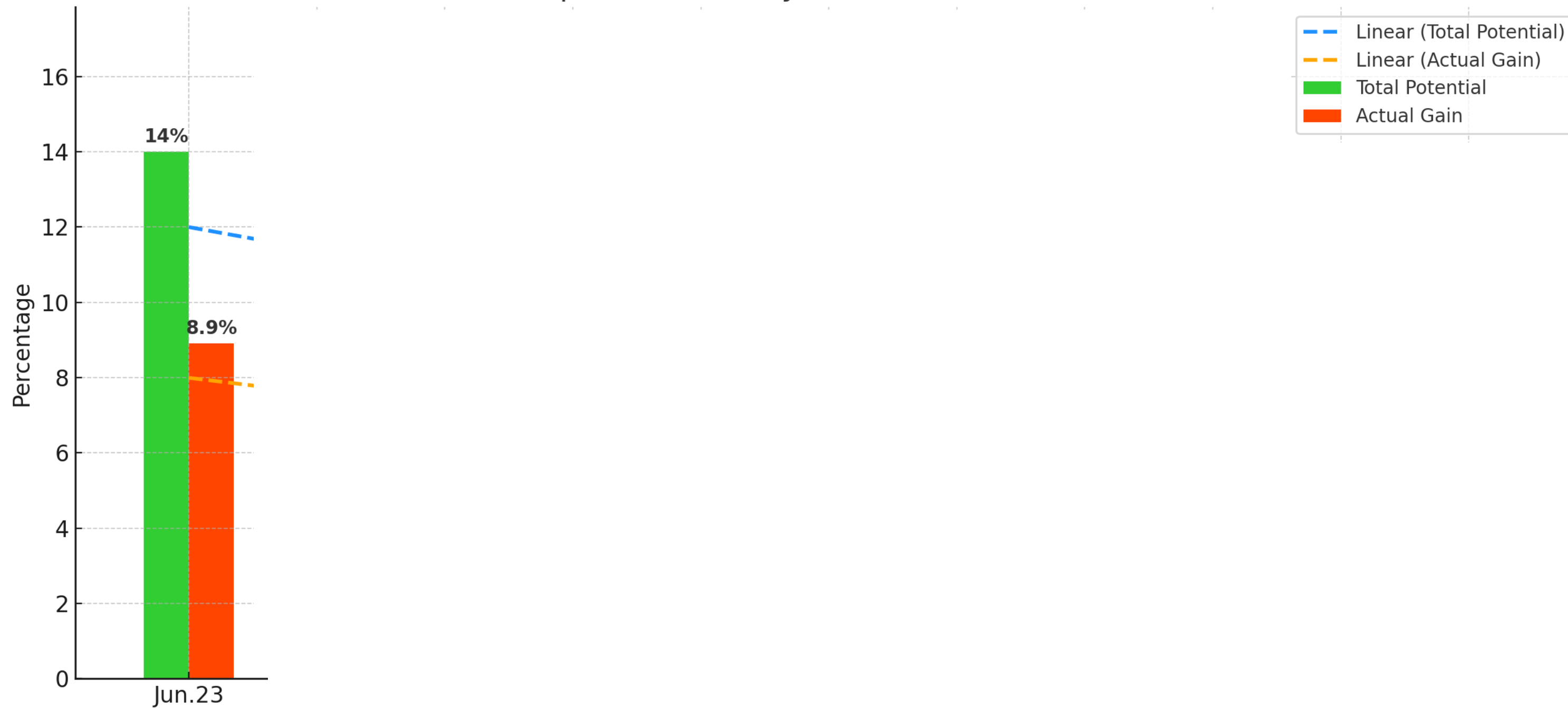
Impact Numbers: **GAINS**

Impact Created by Faster Fault Detection



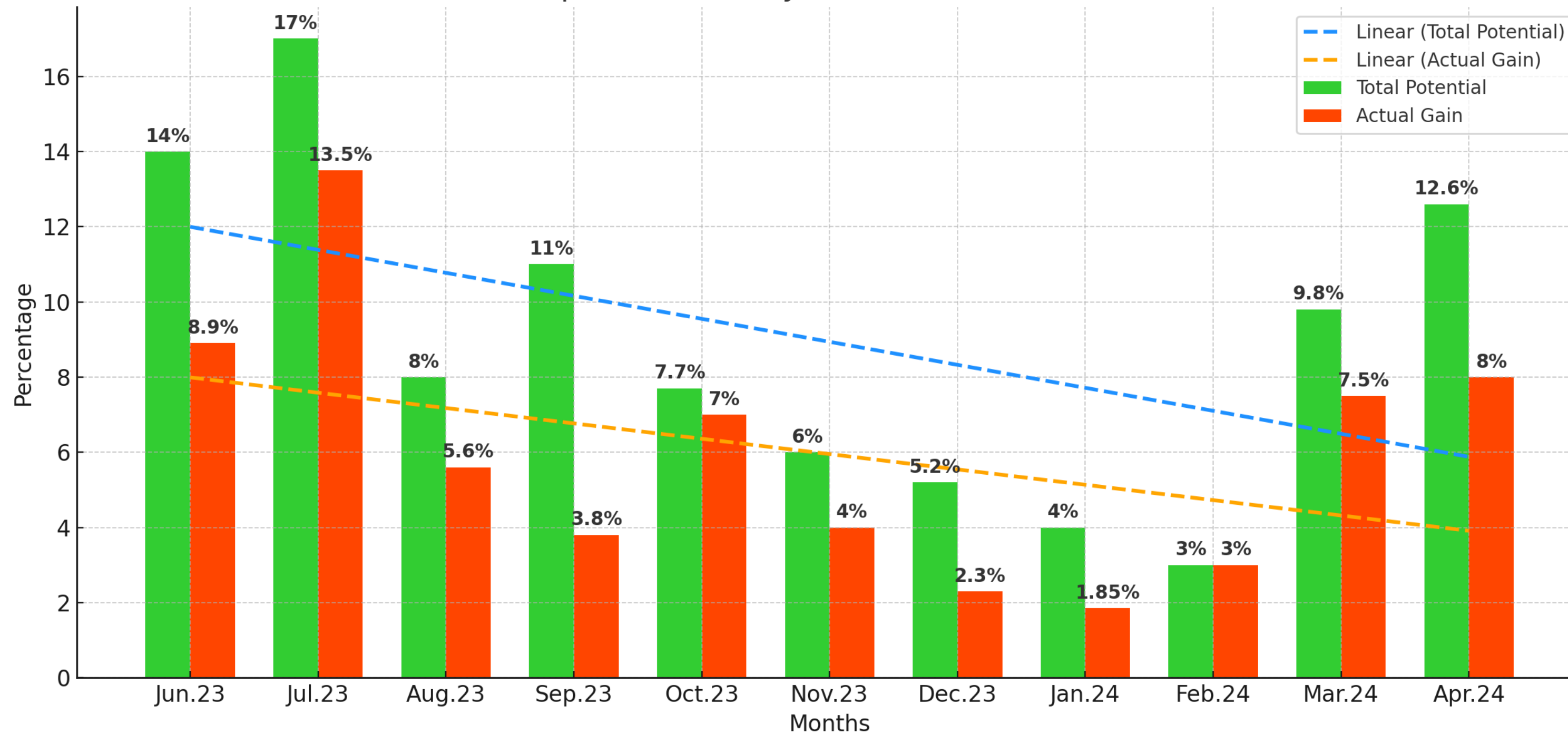
Impact Numbers: Solar Performance **GAINS**

Impact Created by Faster Fault Detection



Impact Numbers: **GAINS**

Impact Created by Faster Fault Detection



Key CHALLENGES

- Team **readiness**
- **Data issue** and how to address them
- Willingness to **adapt to new process**



IMPACT post SmartHelio implementation

2 days to 1min

plant onboarding

4 times

faster fault
resolution

10%

overall generation
increase

50% to 90%

fault accuracy
increased



PRICING Model

Outputs

Report with detailed health status analysis

SaaS

\$500-1000 / MW / yr

Pay Per Fault

\$30 / fault validated

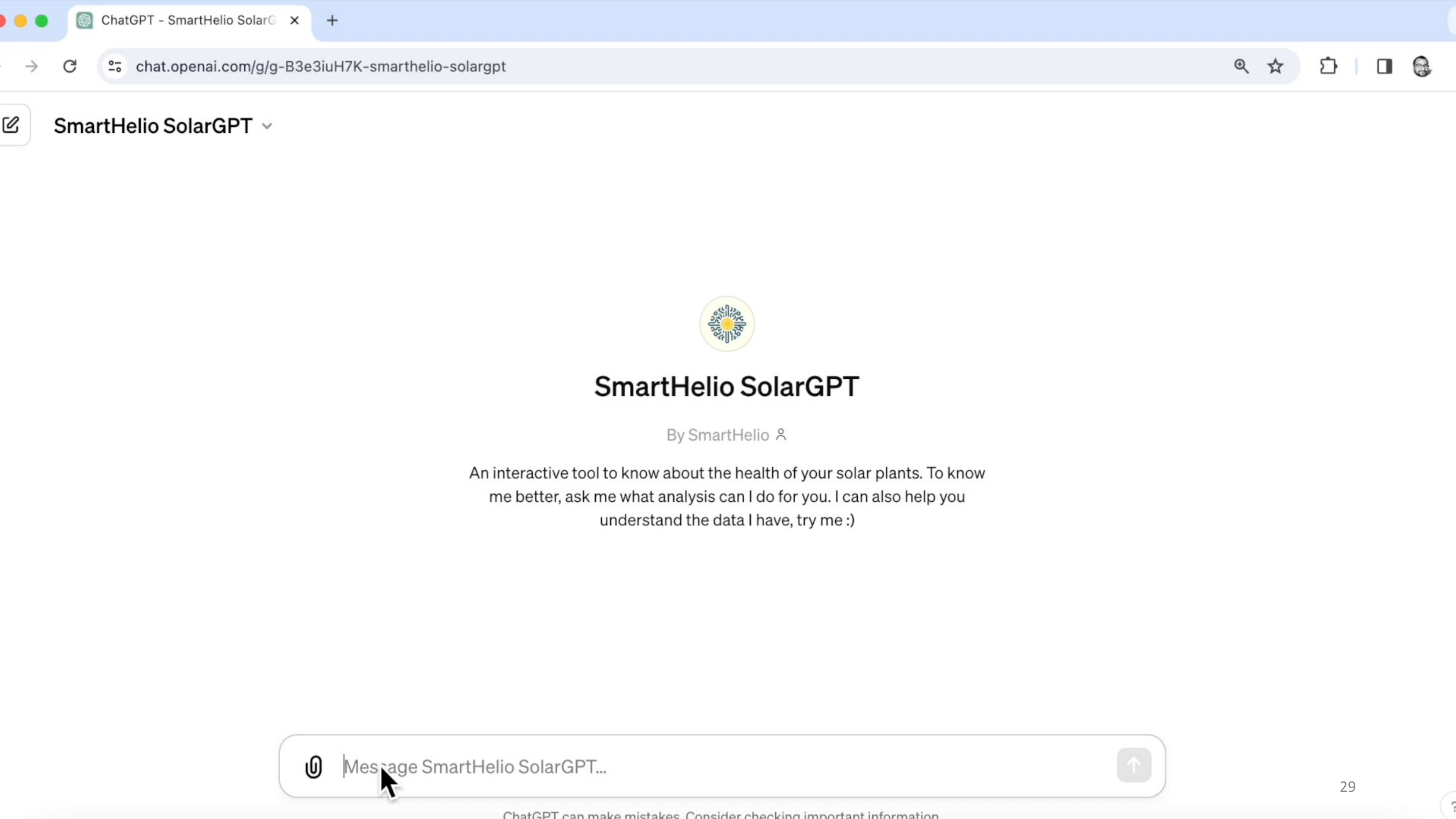
One-Time Health Report

\$250-500 / MW

Output

Autopilot platform (fault table, prediction & Ticketing)





SmartHelio SolarGPT v



SmartHelio SolarGPT

By SmartHelio

An interactive tool to know about the health of your solar plants. To know me better, ask me what analysis can I do for you. I can also help you understand the data I have, try me :)

 | Message SmartHelio SolarGPT... 



Booth: B5.252



**10% discount on Autopilot
CODE: PVmagSH24**

solar@smarthelio.com

Lausanne, Switzerland | CA, USA | New Delhi, India

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Q&A



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Coming up next...

Wednesday, 5. June 2024

10:00 am – 11:00 am PDT, Los Angeles
7:00 pm - 8:00 pm CEST, Berlin

Thursday, 6. June 2024

9:00 am – 10:00 am BST, London
10:00 am - 11:00 am CET, Berlin

Many more to come!

**Procuring bankable PV
and energy storage as
a complete solution**

**Advanced solution for
C&I energy storage**

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FOR FREE**

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Focus on PV Module Quality
Focus on large-scale BESS
Quality

SESSION 2 | GERMAN

Qualität von
Energiemanagementsystemen
für Wohngebäude

JUNE 20, 2024 | MUNICH, GERMANY

@ THE SMARTER E EUROPE, ICM CONFERENCE CENTER

UPCOMING EVENT

PV MAGAZINE FOCUS 2024

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Tristan Rayner
Editor
pV magazine

**Thank you for
joining today!**