



Prediktor

Operating hybrid PV & BESS systems: Lessons from the field

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Before we begin

- This session is moderated by Tristan Rayner, Editor at pv magazine ESS News.
- Please send questions through the chat throughout the webinar; we will pick them up in the panel and Q&A.
- Our flow today is simple: market context, owner-operator lessons from Scatec, and then how trusted data supports margin-aware decisions at scale.



Live questions | Panel discussion | Q&A at the end

Agenda



Prediktor

1

How hybrid plants change operational requirements

2

Lessons from Scatec's hybrid deployments

3

Why trusted data supports performance and scale

4

Panel discussion and live audience Q&A

TGS Prediktor



Prediktor

Empowering energy assets through data-driven insights

- Leading in accurate, timely **operational data**
- Renewable and energy industry solutions for asset and **real-time data management**
- Empower **data-driven decisions**
- Digitalizing some of **the world's largest power productions**

Success you can trust:



30

Years of experience in asset and data management



6

Continents covered by operational systems



>1000

Installations globally



30 TB

of data handled daily



75 Million

tags monitored in real-time



**Dogger Bank
Wind Park**



**Hybrid solar
and BESS
Kenhardt**



**Benban
Solar Park**

Hybrid plants change the operating model



Plant availability

PV, inverter, converter, and battery state all shape whether flexibility is actually usable when the market needs it.



Battery behavior

State of charge, cycling limits, temperature, degradation, and response time make BESS fundamentally different from standalone solar.



Market timing

Revenue value depends on when charge or discharge capacity is available — not just whether the asset is operating.



Control and coordination

Dispatch, EMS, SCADA, and operator workflows must work together across two asset classes at once.



This is why hybrid plants cannot be operated as “solar plus an extra component.” The operating model itself changes.

Trusted data is what turns complexity into decisions



Real-time visibility

See PV and BESS status, availability, limits, alarms, and site context together — not in separate silos.



Data you can act on

Standardized operational data builds confidence in forecasting, dispatch support, and portfolio-level comparison.



Decisions that scale

The stronger the data layer, the easier it becomes to expand hybrid portfolios without adding manual work and hidden losses.

Storage adds flexibility. Trusted operational data is what turns that flexibility into controllable margin.



From market context to field reality



Next: Andreas Størdal | Scatec



Scatec provides renewable energy solutions in emerging markets

- 6.2 GW of renewable capacity in operation and under construction

Scatec in brief



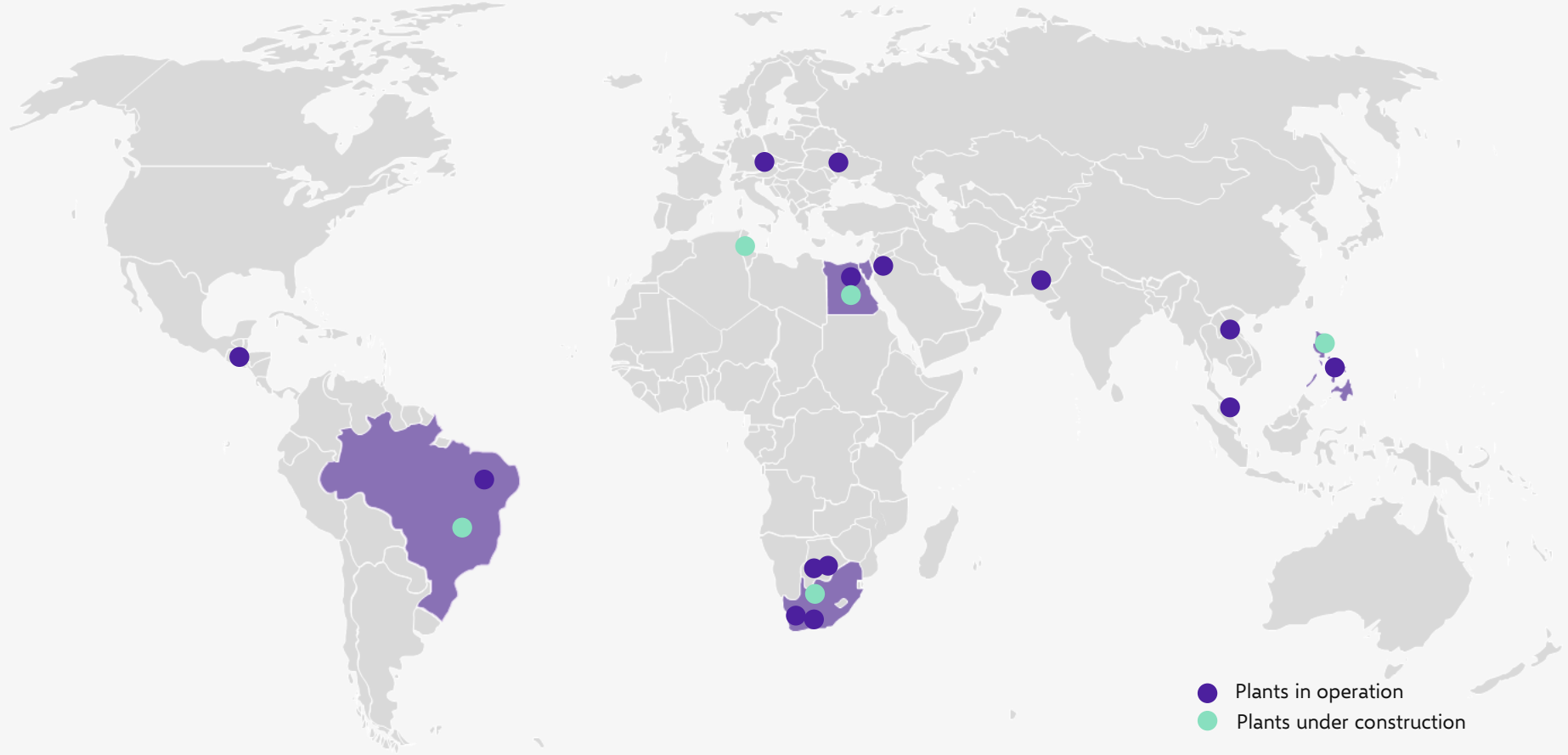
Develop, build, own and operate renewable energy



6.2 GW in operation and under construction



More than 770 employees in 21 countries



● Plants in operation
● Plants under construction



4,583 MW



1,174 MW



553 MW/1898 MWh

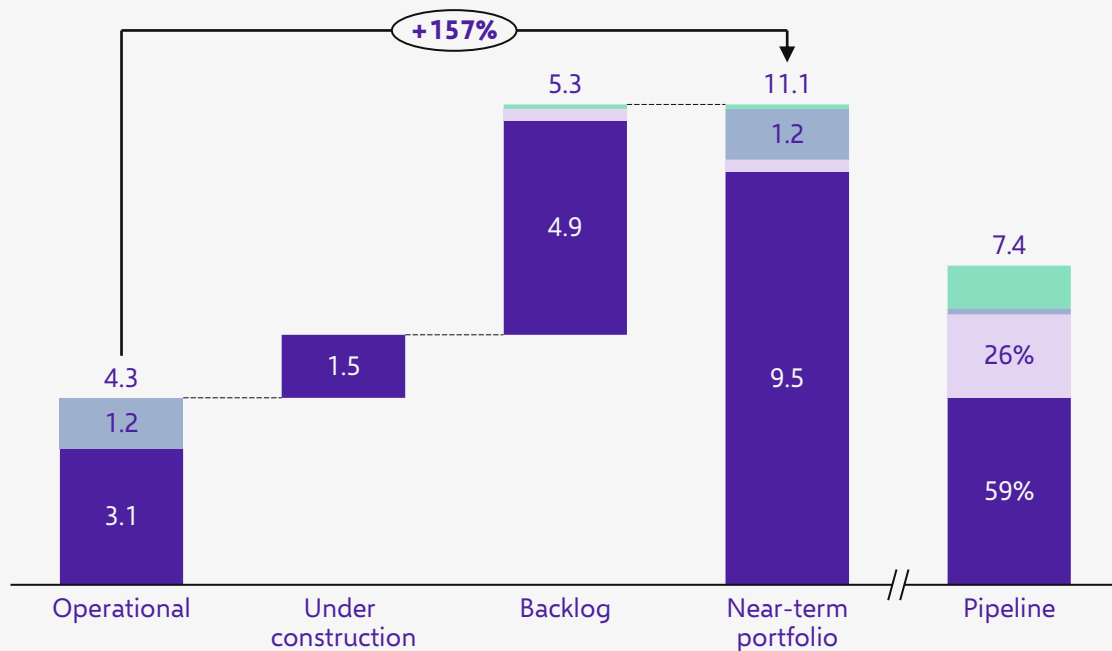


Record high near-term growth portfolio

Growing generation capacity +6.7 GW next few of years..

GW renewable generation capacity¹

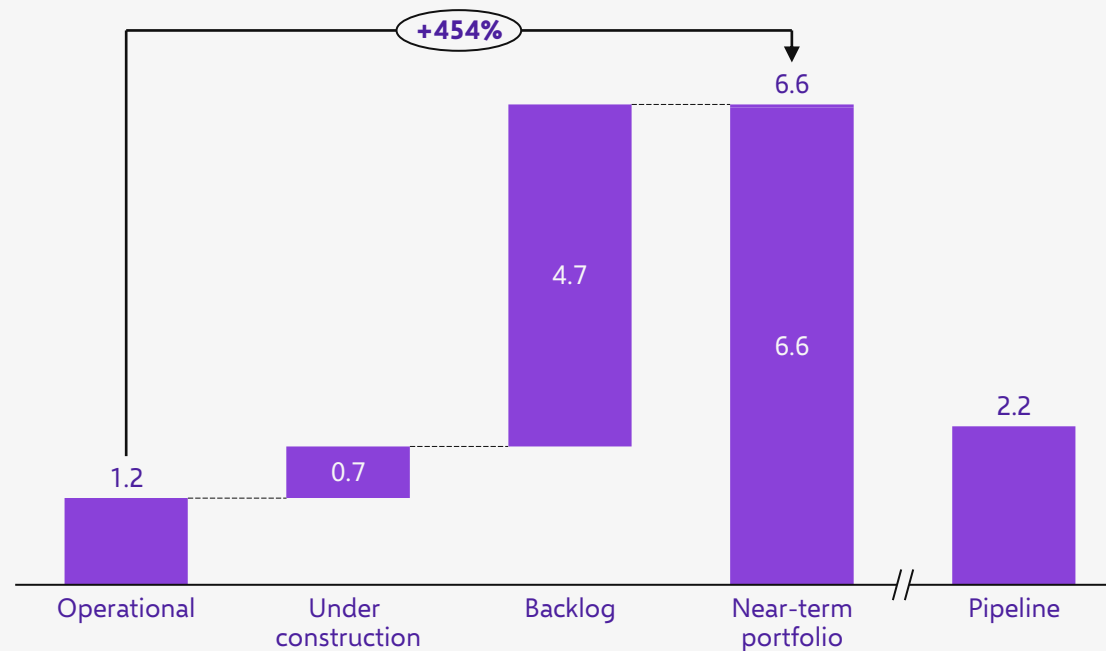
■ Solar
 ■ Wind
 ■ Hydro
 ■ Green H2



..while continuing to expand leading position within storage and hybrids

GWh battery storage capacity

■ Battery storage



How do we efficiently scale hybrid operations?

Kenhardt Hybrid Power Plant

Installed PV Capacity: 540 MW_p

Installed BESS Capacity: 1140 MWh/225 MW

Firm power from 5 am to 9.30 pm, 365 days per year

~150,000 data points sampled on 1-min basis

§ The main production and revenue drivers differ (significantly) between a hybrid plant and a “regular” PV plant



- Technical availability and function of hybrid system and communication systems (EMS, PPC, forecasting etc.) *



- Irradiation conditions (especially longer periods of heavy clouds)



- BESS charging rates and SoC stability *



- Individual equipment availability (battery units, inverters, etc.) *



- PV system efficiency *

(Immediate impact)

Decreasing importance

(Indirect impact, mainly in winter months)

→ * O&M focus areas

Hybrid plants – Key learnings from real deployments

Data quality matters (even) more

Align with suppliers early on telemetry points, naming conventions, data formats and protocols — retrofitting later is complicated and costly.

Accurate forecasting drives returns

Measure forecast accuracy by commercial impact, not only statistical error metrics.

BESS uptime is not enough

A battery can be fully available yet commercially underperforming, so track SoC, degradation, and SoH alongside uptime.

Short-term Optimisation ≠ Long-term value

Avoid dispatch strategies that maximise today's revenues if they accelerate degradation or puts warranties at risk.

Central visibility, local actionability

Use a central control view for fleet prioritisation, while keeping response workflows simple and effective.



From field lessons to technical enablement



Next: Casper Johansen | TGS Prediktor

Hybrid assets add more decision layers

The same megawatt can have very different value depending on timing, mode, and system state.

1 Plant availability

PV output, converter status, meter health, curtailment, and site limits shape what the asset can do right now.

2 Battery state

State of charge, power window, temperature, auxiliary load, degradation, and efficiency influence every action.

3 Market signals

Prices, schedules, dispatch commitments, and revenue windows change the value of each operational choice.

4 Control context

Setpoints, EMS logic and interconnection constraints explain why the plant behaves as it does.



This is why batteries are not just “solar with another meter.”

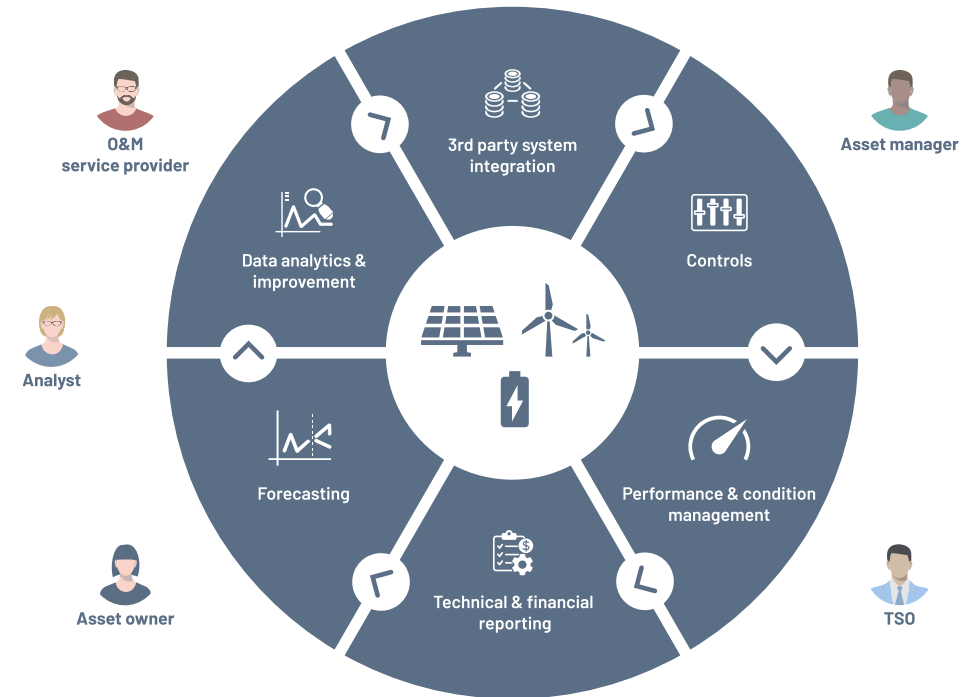
Hybrid Plants - One Commercial Objective

Digitalization

- PV and BESS cannot be managed as separate silos in a hybrid plant
- The operating model follows the commercial objective
- Operators need one live view across assets, controls, and forecasts
- Weak data quality and lack of proper data modeling quickly turns into lost performance and wrong decisions

What must align

- Controllers and setpoints
- Dispatch targets
- Forecasts and grid conditions
- Asset availability



Powering the Kenhardt Hybrid Project

Centralized AM + Plant SCADA for a Hybrid - 540 MWp Solar / 1140 MWh BESS project

PROJECT CONTEXT

The Kenhardt hybrid project presented a unique set of challenges as it was the first of its kind for the operator, combining PV and BESS technologies under a single operational umbrella. The complexity and novelty of the system required a digital solution that could adapt in real-time to evolving operational demands.

QUANTITATIVE HIGHLIGHTS



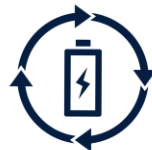
> 95%

Critical events detected remotely



> 10min

Response time to critical events



Increased

Availability during peak seasonal stress



Reduced

On-site personnel through remote monitoring



Improved

Coordination between PV & BESS assets

“The biggest advantage that the Prediktor solution has is its adaptability. The Kenhardt hybrid project had numerous unforeseen challenges and requirements that could not have been foreseen and having a partner with a product that is flexible enough to be adapted and molded to fit the unique requirements for the project was its biggest advantage.”

Global Operations Centre Manager

KEY O&M CHALLENGES ADRESSED

Adaptability to Unforeseen Requirements:

The PowerView platform's flexibility was instrumental in addressing unexpected operational scenarios. Its ability to be tailored to the specific needs of the hybrid setup allowed for seamless integration and rapid response to emerging issues.

Custom KPI Calculation & Visualization:

The system enabled the creation of project-specific KPIs and dashboards, providing actionable insights into plant performance. This allowed the O&M team to proactively manage plant operations and meet stringent performance targets.

Remote Fault Detection & Response:

Over **95% of critical downtime events** were detected remotely, with field teams dispatched based solely on remote diagnostics. All critical events were identified and acted upon within **10 minutes**, significantly reducing Mean Time to Resolution (MTTR).

Energy Storage Optimization:

Despite expected BESS degradation, the solution helped maintain high availability during the most demanding seasonal periods (e.g., winter solstice), ensuring dispatch targets were met.

Operational Efficiency & Workforce Optimization:

The system's clarity in status reporting enabled a reduction in on-site personnel without compromising performance. This was particularly valuable during periods requiring a balance between routine and corrective maintenance.

Data Simplification & Decision-Making:

Prediktor addressed data overload by offering intuitive visuals and high-level KPIs for quick decision-making, while still allowing deep dives into raw data for optimization studies when needed.

Poor data quality turns directly into margin leakage

If teams cannot trust the signal, they either act too late or make the wrong decision.

1 Misaligned timestamps

Events appear in the wrong order, so root cause analysis becomes guesswork and dispatch decisions are delayed.

2 Inconsistent tags, units, and naming

Cross-site comparisons break down and teams spend time reconciling data instead of improving performance.

3 Missing operational context

Without mode, curtailment, limits, or control state, a valid measurement can still lead to the wrong conclusion.



Trusted dashboards only matter if the underlying operational truth is consistent.

Trusted visibility starts with one operational model

The goal is not more dashboards — it is one consistent hybrid truth from site to portfolio level.

1 Collect

Bring in PV, BESS, meter, EMS and auxiliary signals in real time.

2 Standardize

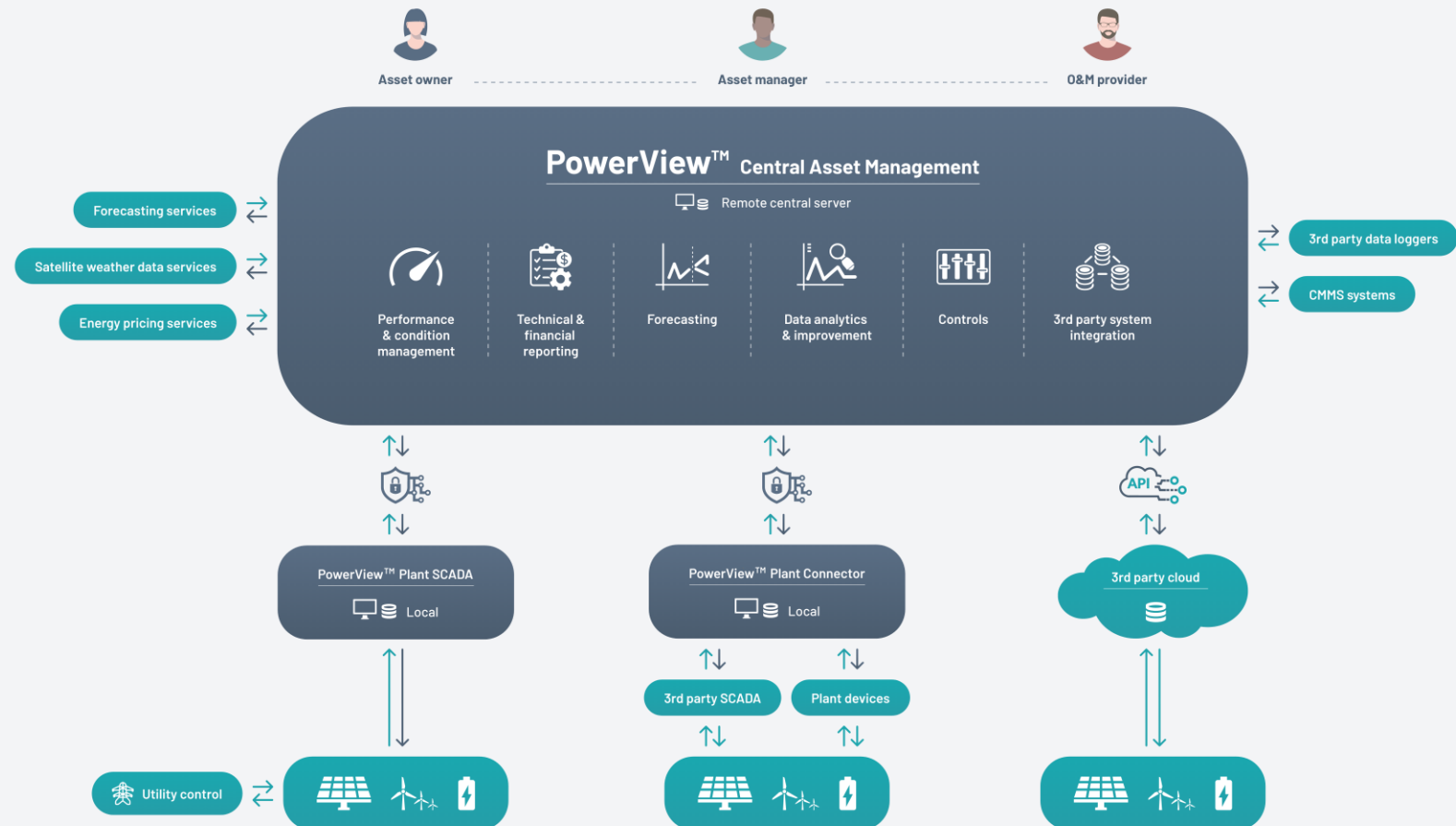
Align timestamps, naming conventions, units and hierarchy across assets.

3 Contextualize

Add operating mode, limits, setpoints, curtailment, alarms and quality flags.

4 Expose

Give each stakeholder a trusted unified view for monitoring, analysis and action.



Once the data is trusted, teams can act faster

The technical win is visibility. The business win is faster, better decisions.

1 Detect hidden operating limits early

See when availability looks acceptable on the surface, but hidden constraints are already eroding value.

2 Separate equipment issues from dispatch issues

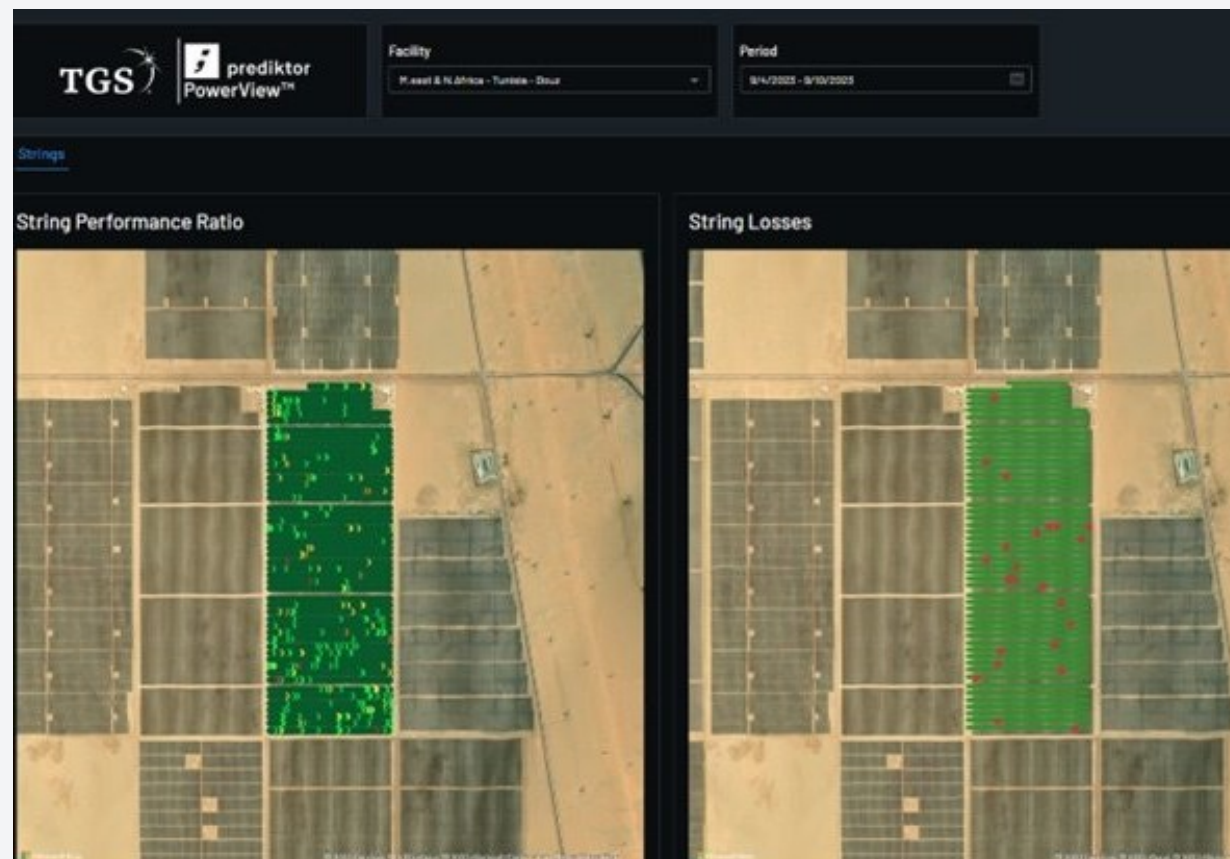
Avoid sending teams down the wrong path when the real driver is control logic, site limits, or market behavior.

3 Monitor efficiency, auxiliaries, and cycling quality

Understand whether the battery is creating the value you expected — not just whether it moved energy.

4 Escalate only the events that affect margin or compliance

Give scarce experts fewer, better alerts so they can focus on the decisions that matter most.



The point is not more alarms — it is better operational judgment.

Scaling hybrid operations without scaling complexity

Centralization matters because hybrid portfolios grow faster than available expert capacity.

Without standardization

- Custom site-by-site screens and local naming
- Alarm floods with little business prioritization
- Manual reconciliation before analysis
- Experts pulled into the same issues repeatedly

With centralized hybrid operations

- One operational model across sites
- Faster drill-down from portfolio to root cause
- Role-based views for different stakeholders
- Better use of scarce technical expertise



Scaling works when expert attention can be applied where it creates the most value.

Forecasting confidence starts with better operational truth

Improved models matter — but clean, contextualized actuals are the real foundation.

1. Clean actuals

Reliable measured production, charge/discharge, availability and losses create a trustworthy performance baseline.

2. Correct context

Mode, curtailment, site limits, dispatch behavior and control actions explain what the asset was truly able to do.

3. Comparable portfolio views

Standardized hybrid data lets teams benchmark sites and improve forecasting faster across the fleet.



Key point

Better forecasting is not only about a smarter model. It starts with knowing what the plant and battery actually did, under the conditions they were really operating in.

That is especially important in hybrid portfolios where performance, availability, control actions, and commercial decisions are tightly linked.

Closing thought

Trusted hybrid data creates better decisions — and better conversations

Operational truth supports margin protection, forecasting confidence, and smarter scaling.

Next: Q&A





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Q&A

Thank you

TGS Prediktor – Scatec – pv magazine



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