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# Improve the **safety,** **availability & performance** of energy storage systems with battery analytics

**TWAICE**  
Predictive Battery Analytics



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# TWAICE

## Unleashing the full potential of battery energy storage systems

De-risking projects by improving safety & availability

[www.twaice.com](http://www.twaice.com)  
Munich, 3/28/24





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# The leading battery analytics company worldwide

TWAICE

140+

Battery & software engineers and data scientists

3

Offices in Munich (HQ), Chicago (US), and Paris (FR)

1

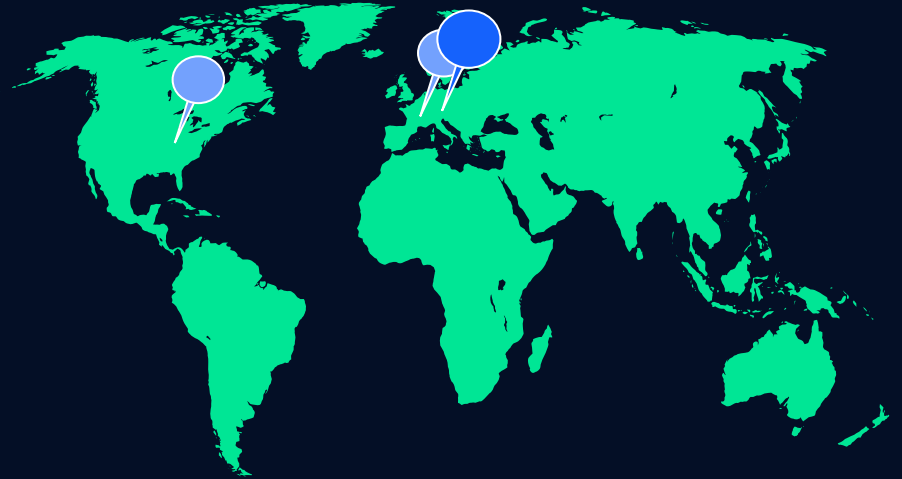
Onsite battery research center

30+

Patents

\$90m

Funding for development





# Selected customers

TWAICE

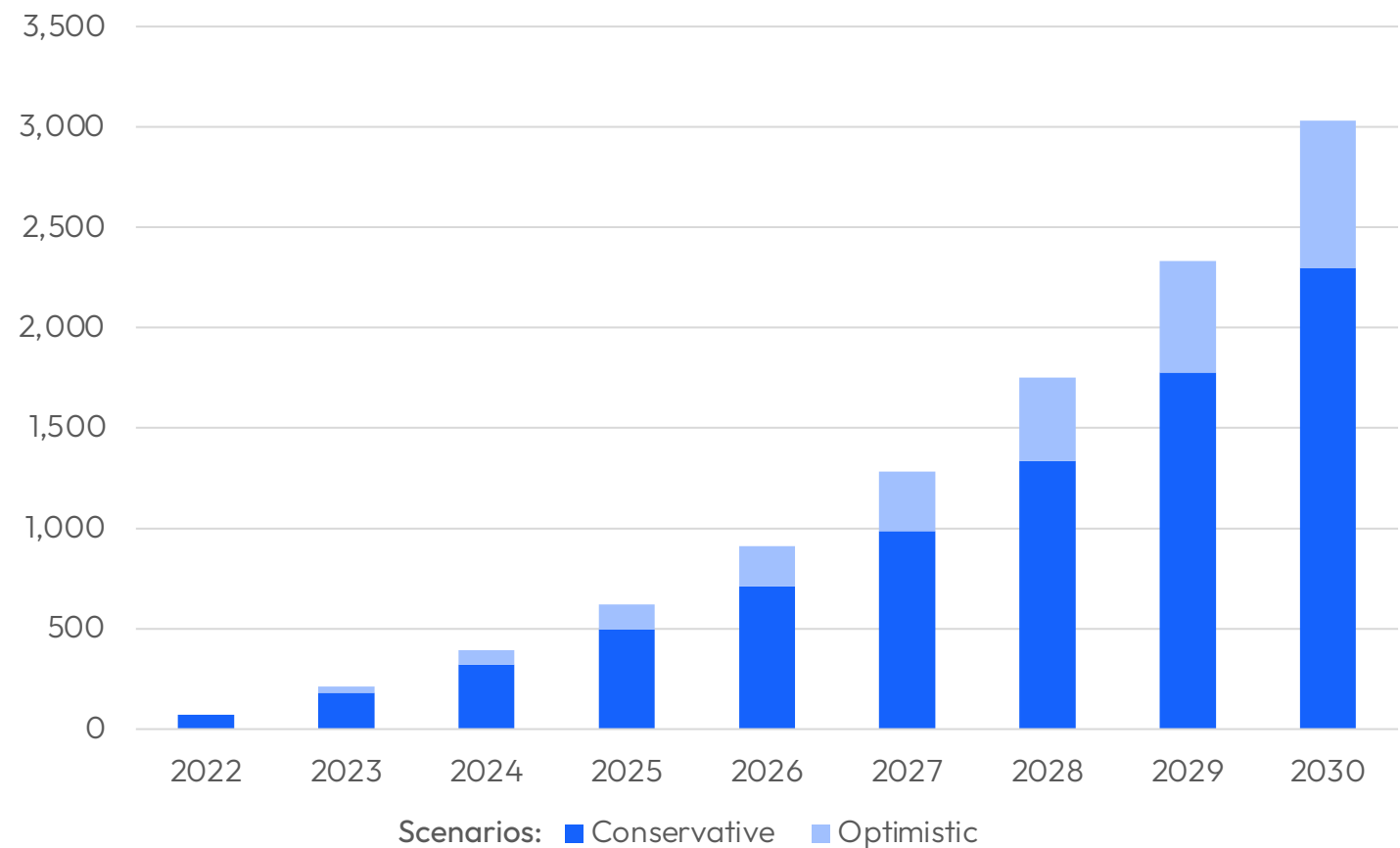


Mercedes-Benz



The battery energy storage system market is growing tenfold until 2030

## Global Cumulative Installed Battery Capacity [GWh]



**2-3 TWh**  
ESS online in 2030

**+29%**  
annual increase in  
capacity deployments



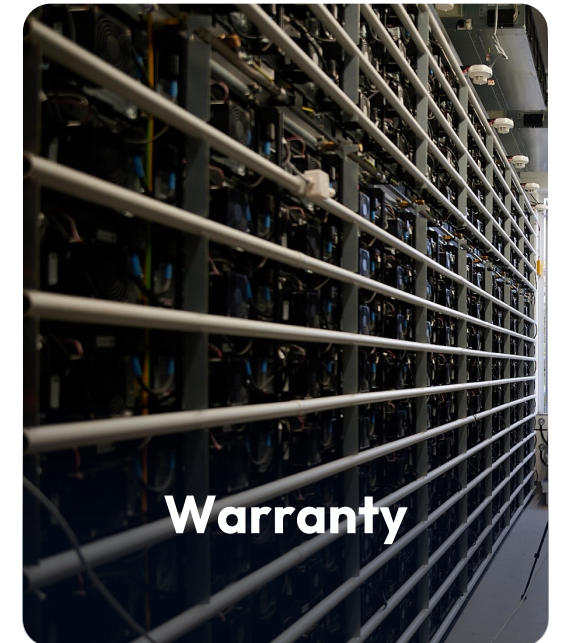
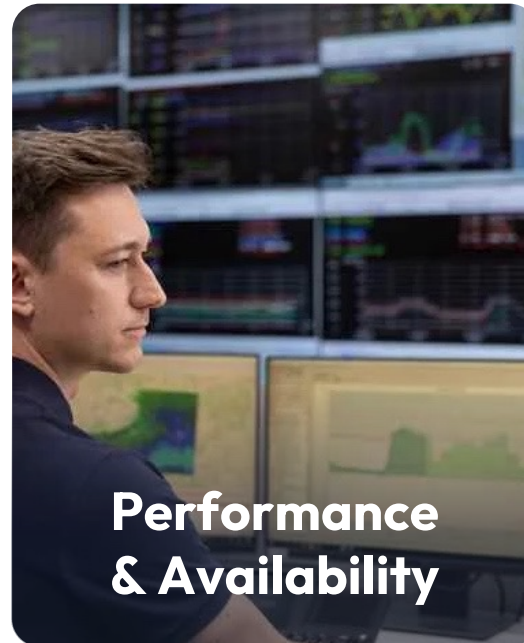
In **one** day  
**one** ESS  
generates  
**18 billion** data points

In **one** day  
**all** ESS in 2030  
will generate  
over **400 trillion** data points



# BESS lifecycle management

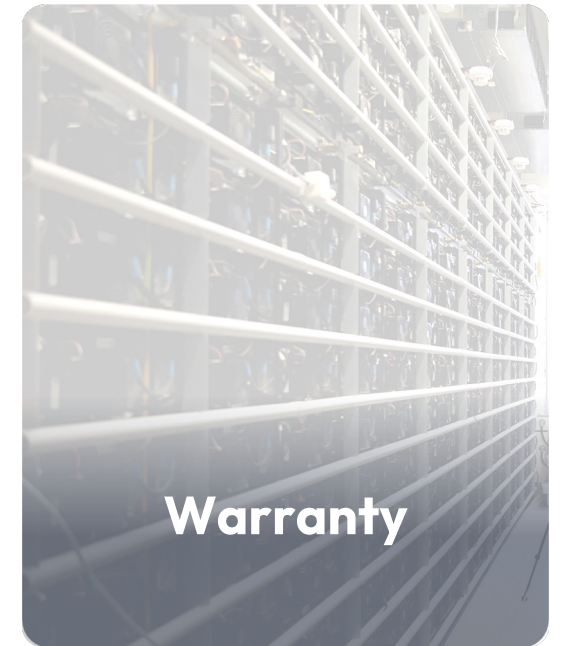
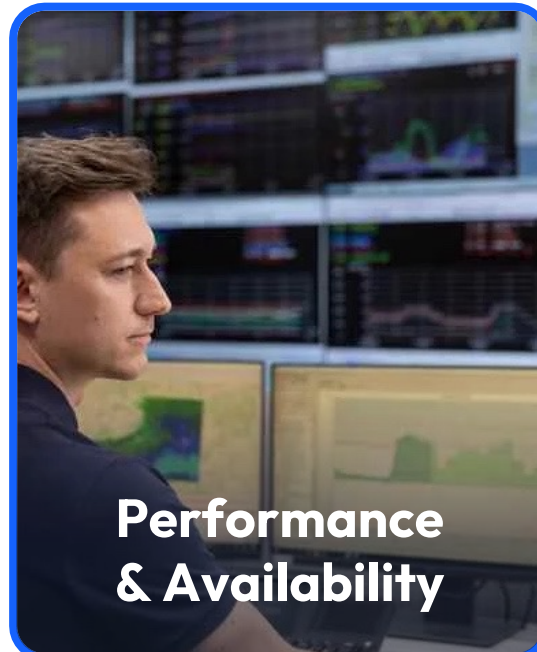
You need to address challenges at every step of the lifecycle





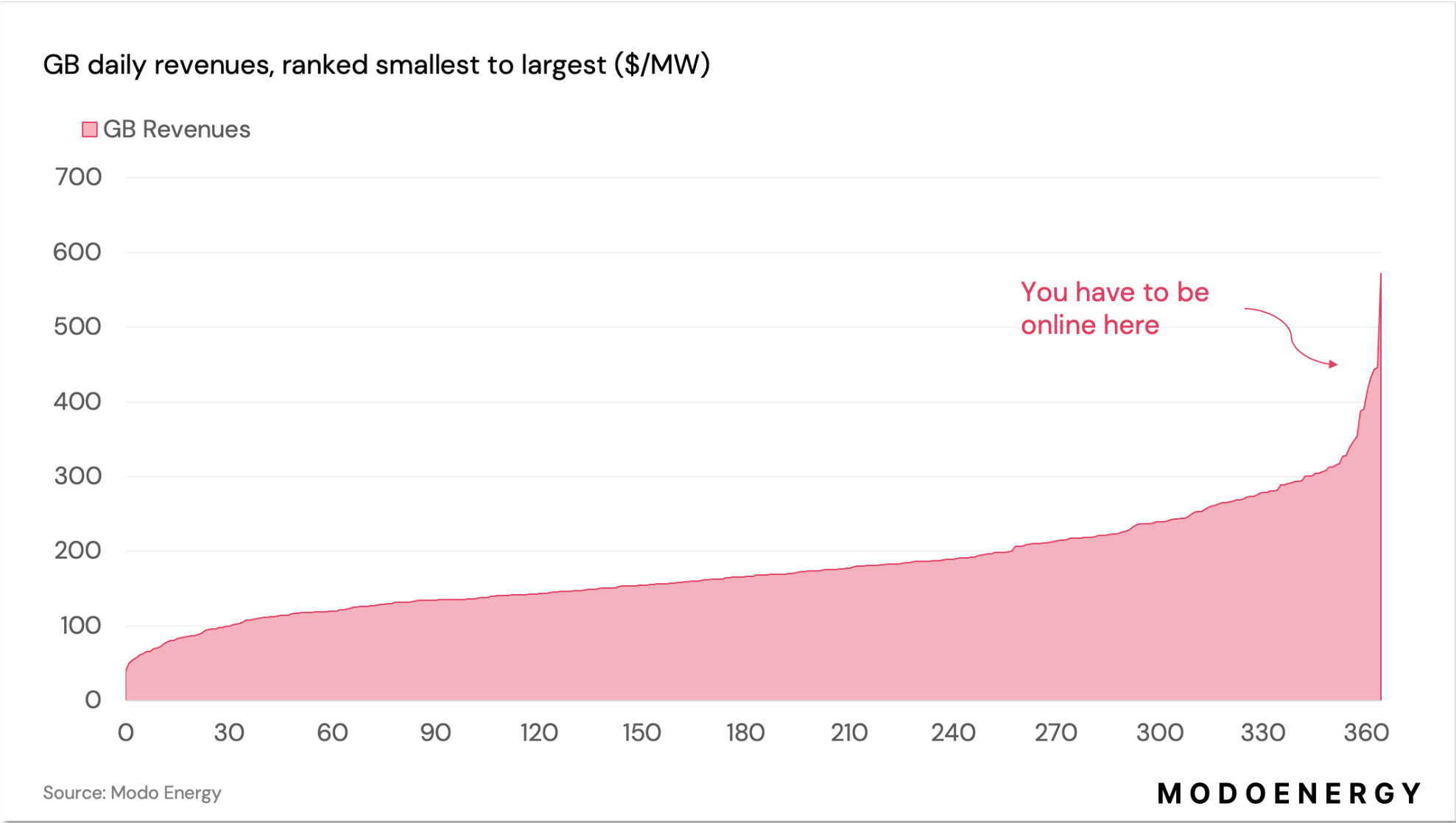
# BESS lifecycle management

Today's focus is on performance & availability





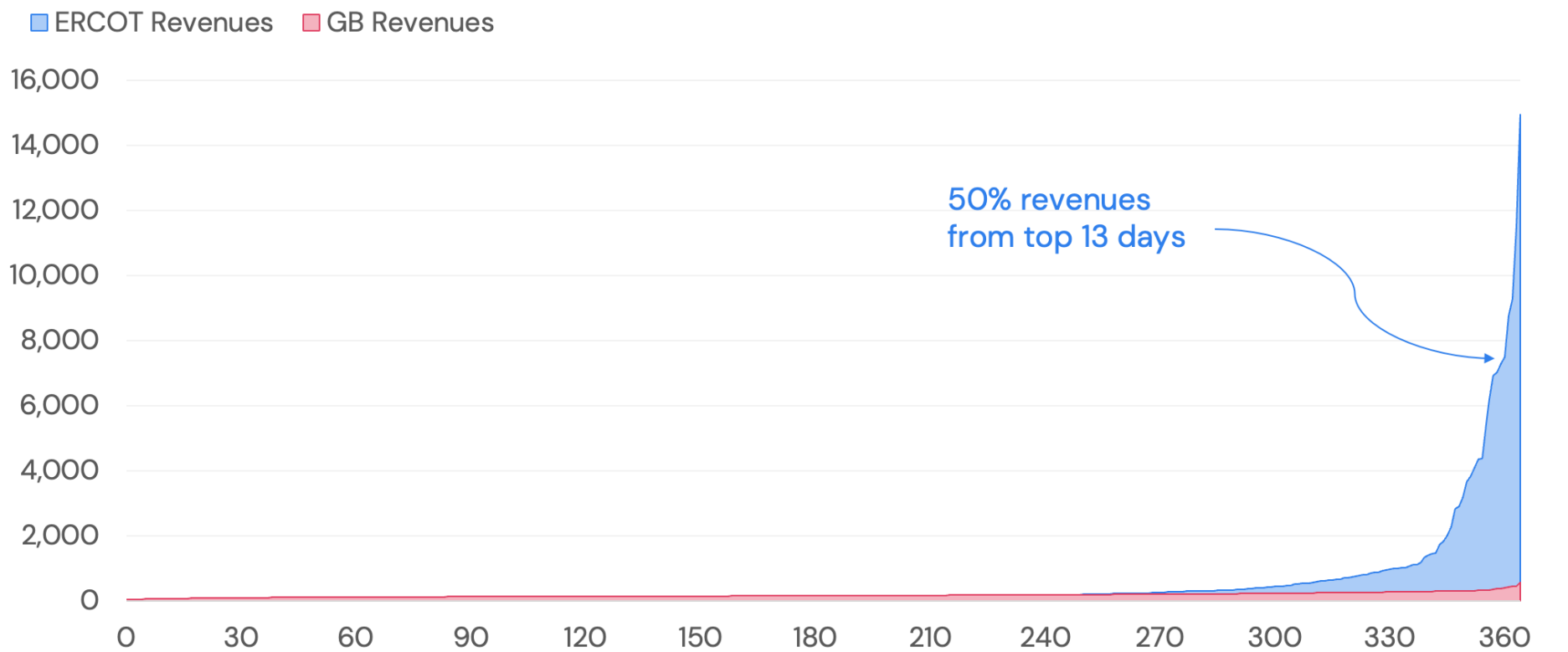






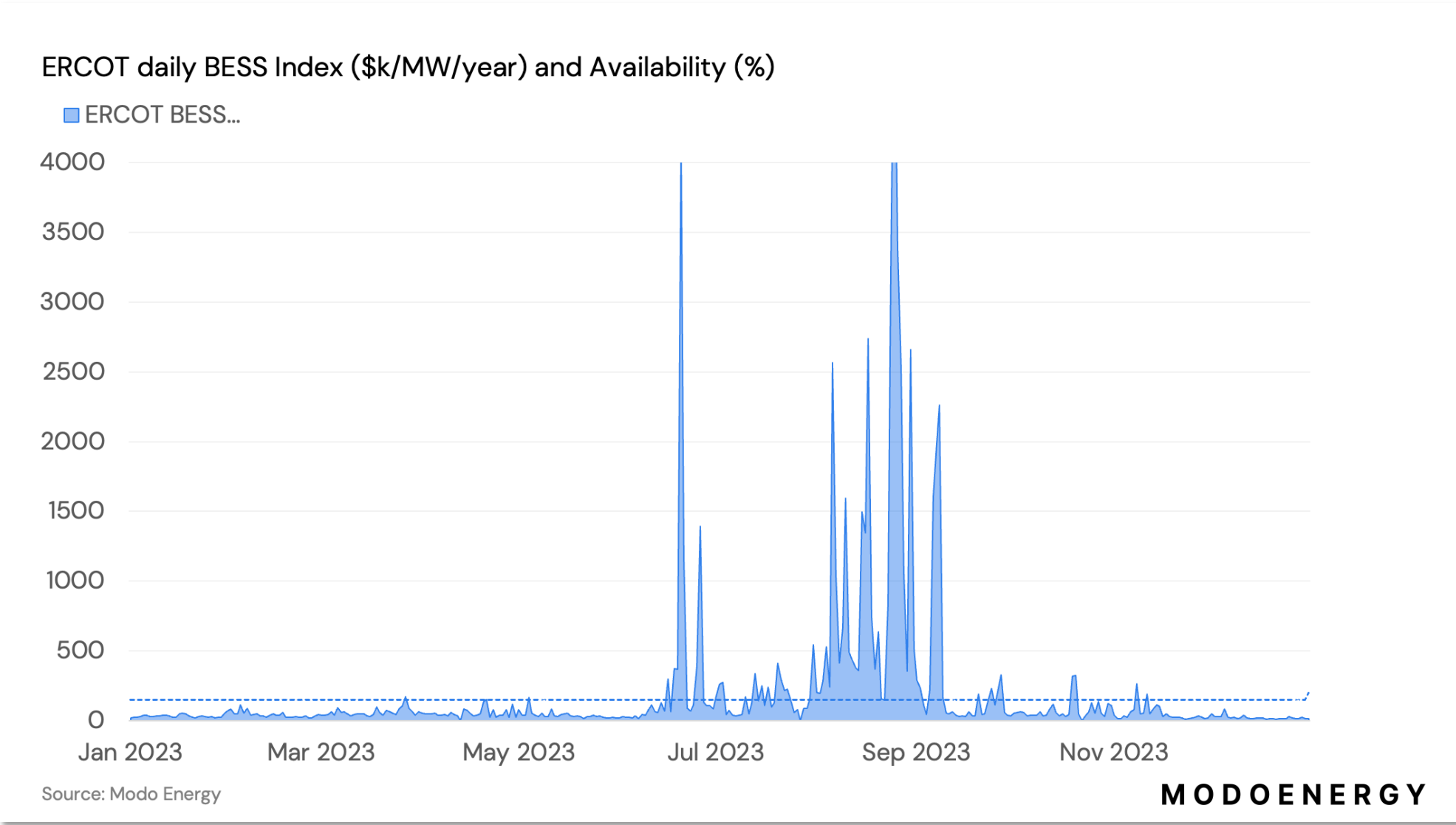
Peak **ERCOT** revenues dwarf **GB** but most days are less lucrative

ERCOT and GB daily revenues, ranked (\$/MW)



Source: Modo Energy

**MODOENERGY**



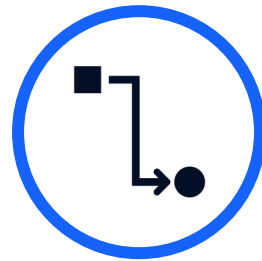
**+1%**  
availability is worth  
**over \$2k/MW/year**

# Challenges of ESS Performance & Availability

The business case after commissioning is driven by the availability, roundtrip efficiency and lifetime of a storage



Maintenance



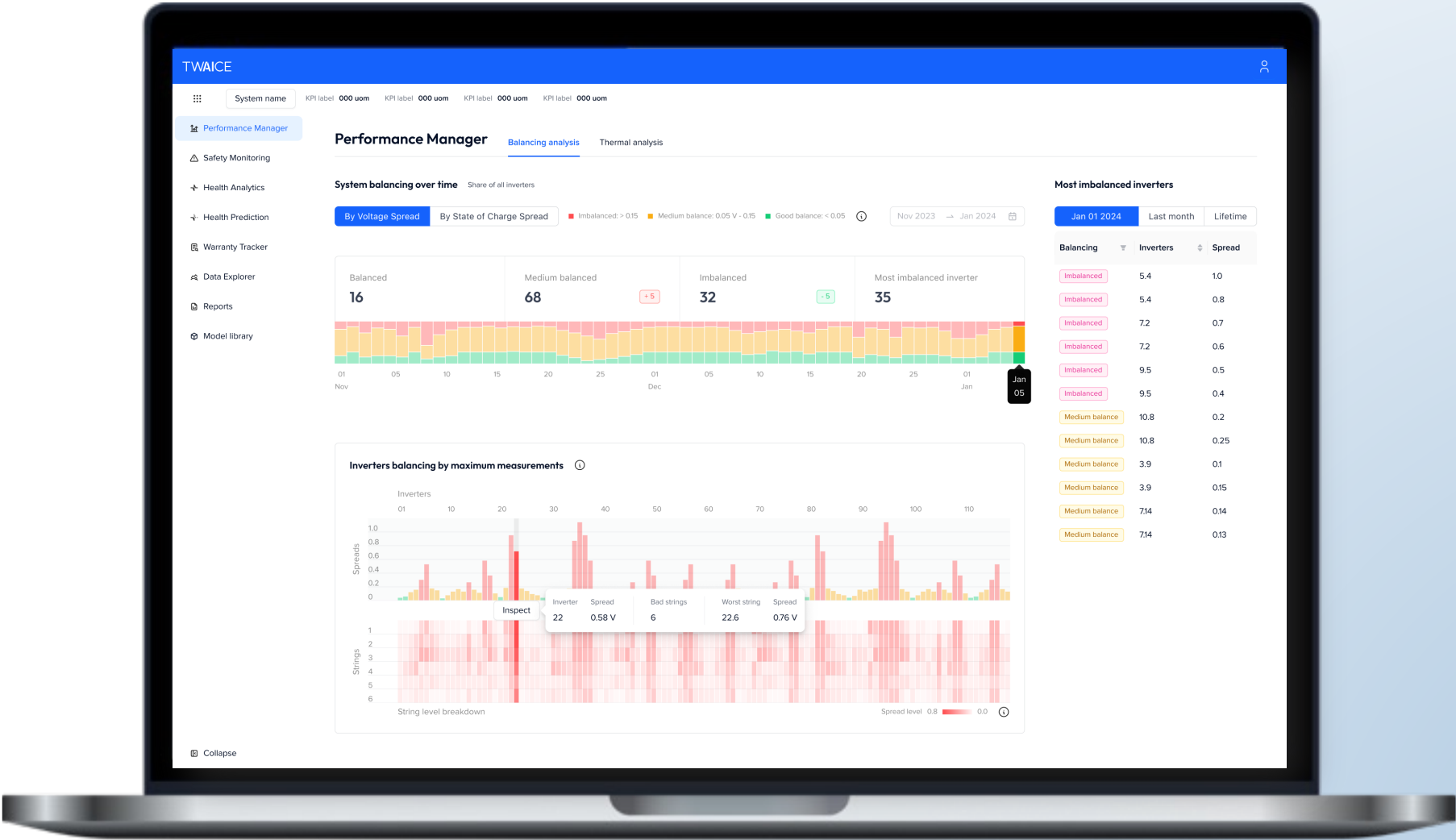
Root Cause Identification



Lifetime

# Improve availability by proactively identifying issues

Get granular insights into your storage system & find where the problems are





## Challenges

- Cells quality varies & weakest cell dictates performance
- Imbalances can cause inverters to trip
- Overcharging can occur → more stress for the cells
- BMS not able to balance properly

## Solution

- Pinpoint imbalances immediately
- Carry out root-cause analysis & solve it
  - E.g. Balance or replace cells

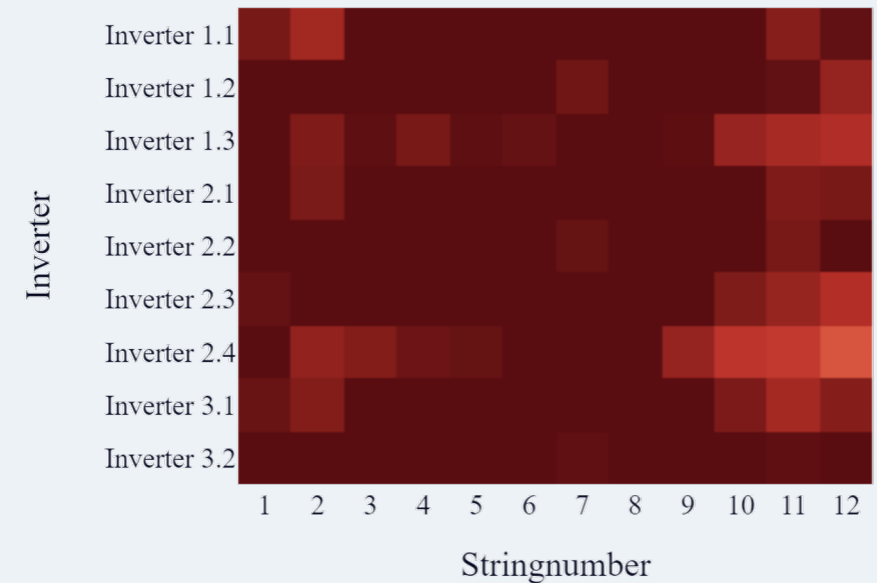


## Challenges

- High temperature is always a major warning sign
- Thermal runaway and system shut-off possible
- No transparency into causes

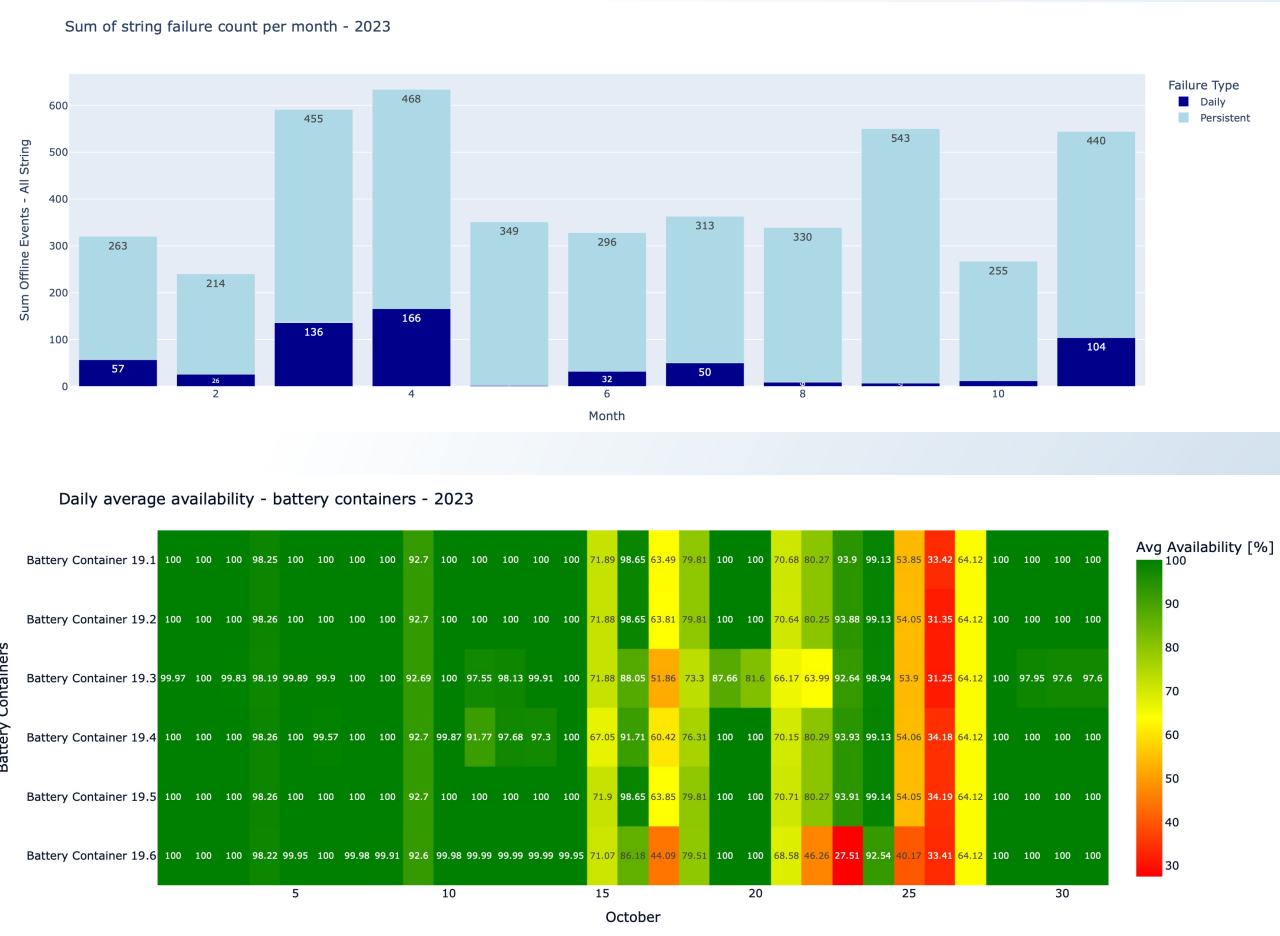
## Solution

- Immediately identify when high temperatures are occurring
- Pinpoint exact location
- Analyze & identify root causes (e.g., cooling system or weak cell)



# Case study: Identifying source of availability issues

400 MWh ESS, \$10M Annual Revenue Forecast, 10% Revenue Miss

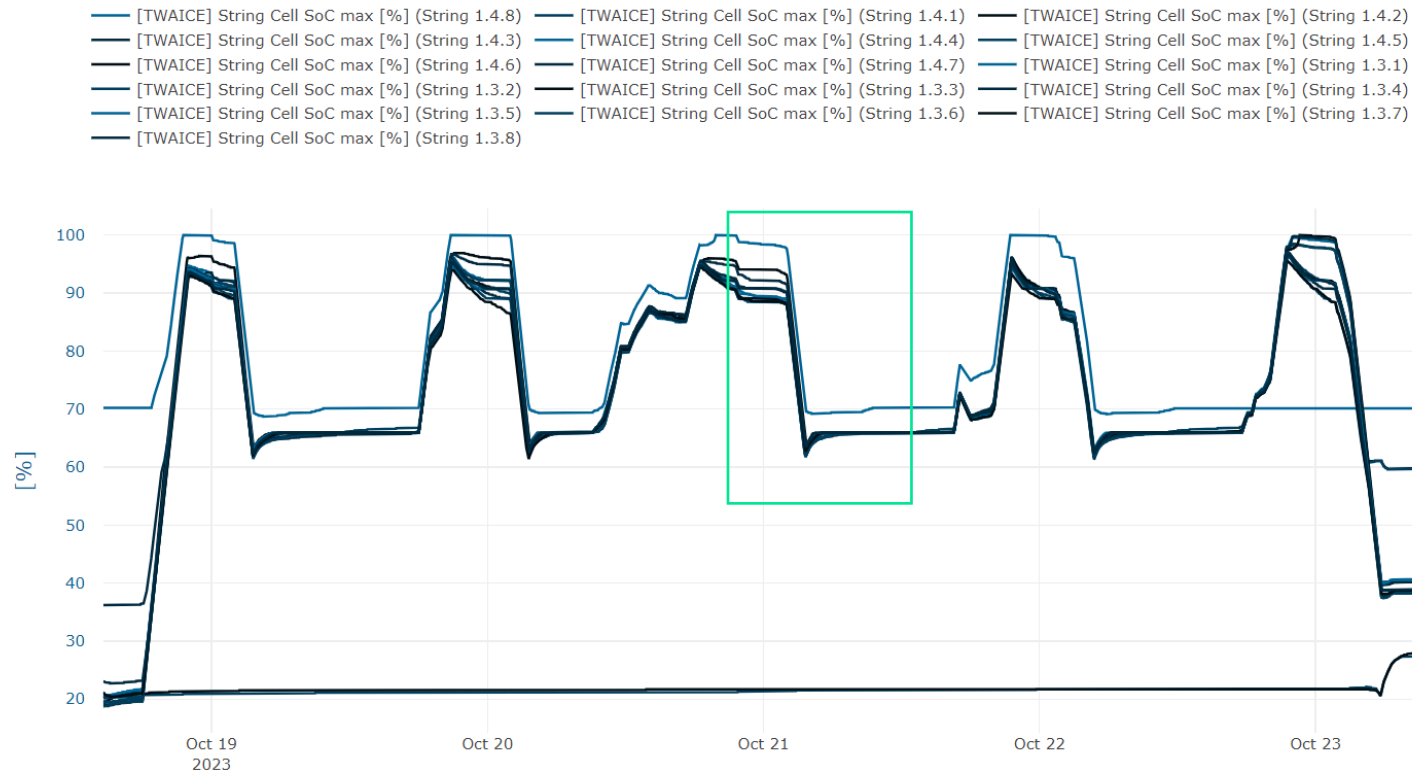


“Availability is critical for us. We see revenues underperforming and the first thing we want to check is availability.”

**- Senior Director of Asset Management**  
**Global Operator of 150 GW of Renewables and Storage**

# Case Study: Cell imbalances causing poor availability

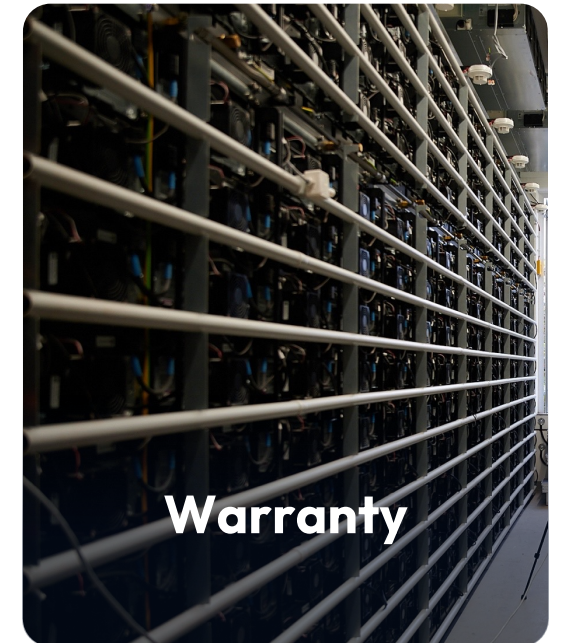
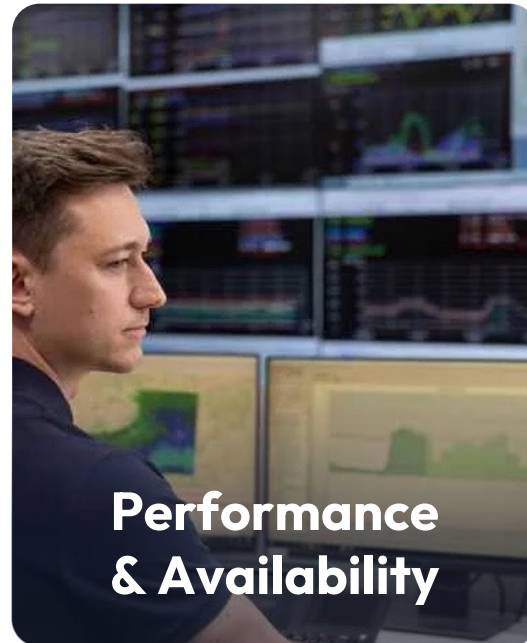
320 MWh (nominal) Energy Storage, LFP, 2 years in operation





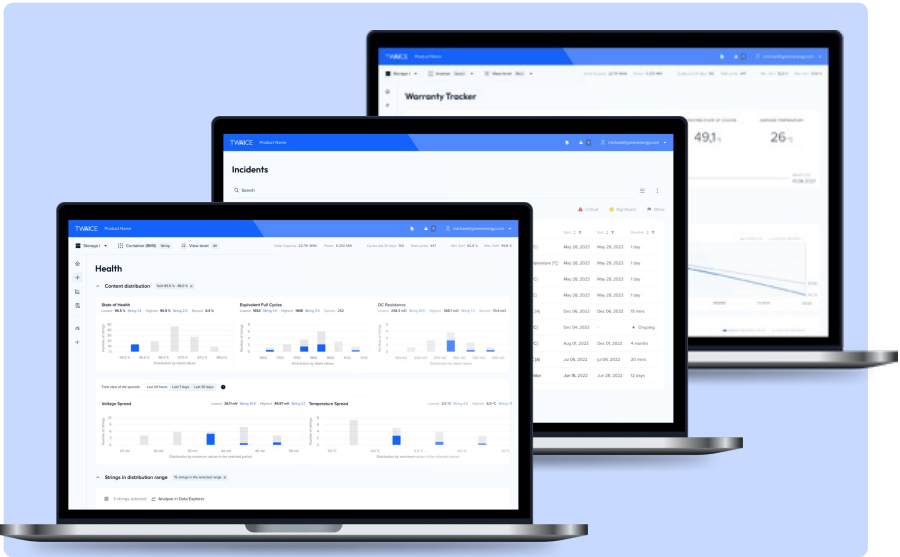
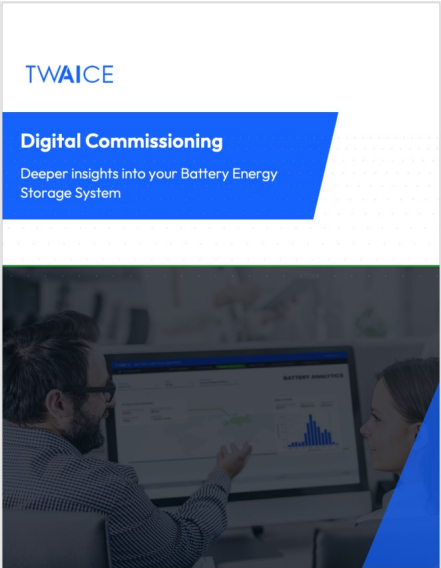
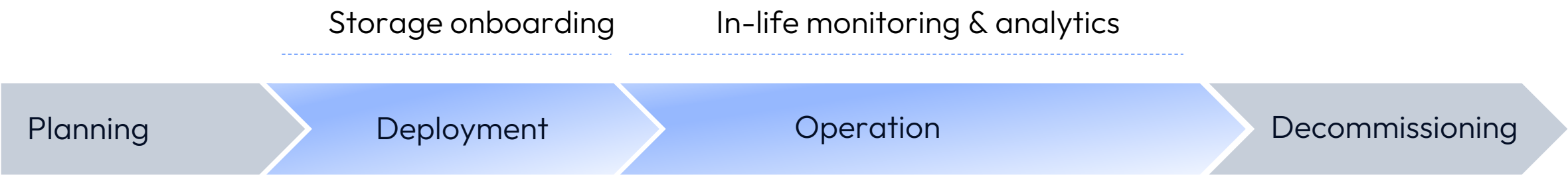
# All in one software

TWAIce

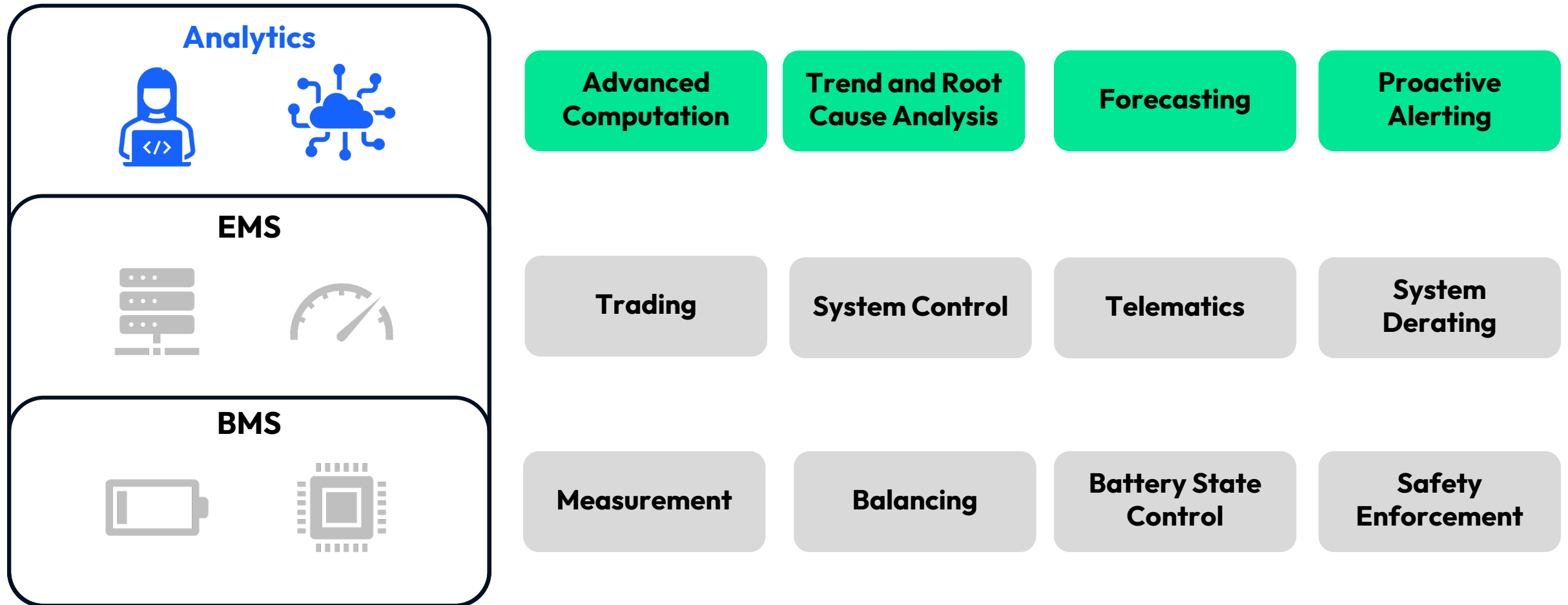


# De-risk BESS deployment & operations

Protect your BESS with a perfect start and a risk-free operation



# Analytics – the layer on top







# Get started

TWAICE

BESS insights and values at your fingertips



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**Get in  
touch  
with us!**