

# POWERINSIGHT BY ADVANCED ENERGY™ DATA ACQUISITION AND ANALYSIS PLATFORM

OPTIMIZE YOUR THIN-FILM PLASMA PROCESS WITH IOT-ENABLED INTELLIGENCE





# **AE's IoT solution provides a window into device and process performance.**

This independent, plug-and-play platform complements existing systems and enables interaction with rich data sets via a web browser.



## PowerInsight by Advanced Energy™ Data Collection and Analysis Platform

Advanced Energy®'s IoT solution for thin-film plasma processes expands data resolution, access, and analysis — enabling improvements to key measures of process success, including stability, cost, throughput, and yield.

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High-resolution data (up to 40 MHz for event capture), historical data recording, browser-based dashboards, customized algorithms, and advanced analytics support provide a window into actual conditions in the plasma system, in real time.

Designed to complement your existing systems, the PowerInsight by Advanced Energy™ solution unlocks AE's decades of domain expertise and service experience to meet your specific process needs.

**COMPREHENSIVE DATA ACQUISITION AND ANALYSIS SOLUTION FOR TODAY'S COMPLEX THIN-FILM PLASMA PROCESSES**

**POWERINSIGHT**  
by Advanced Energy™

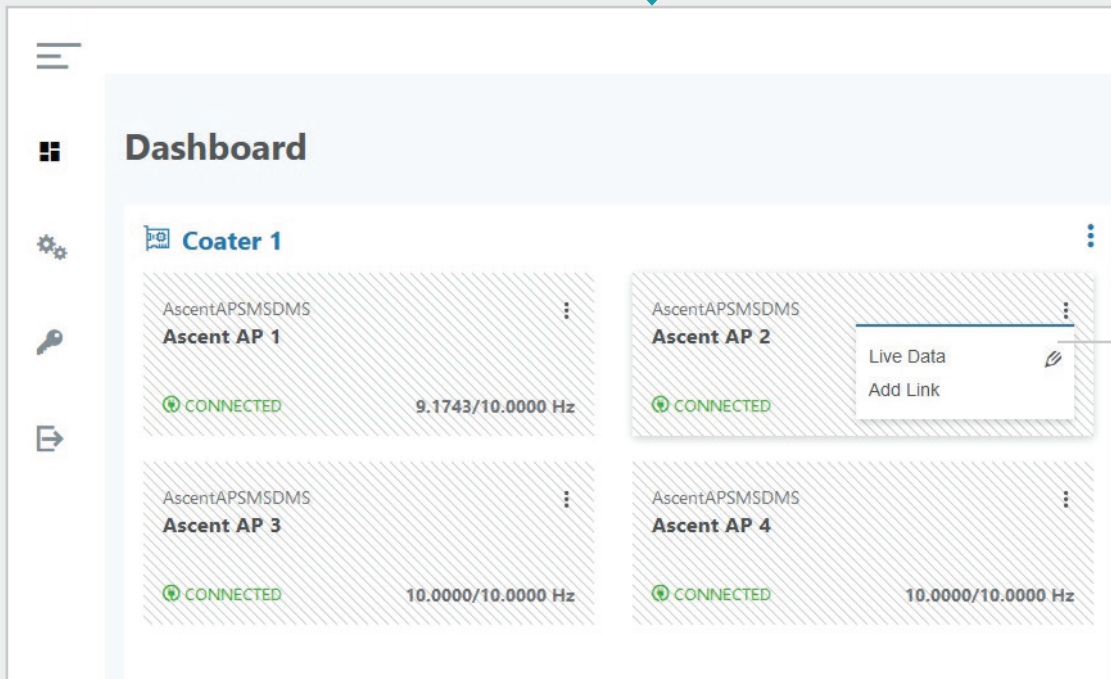
# LANDING PAGE

## WHERE THE USER EXPERIENCE STARTS

- Requires only a web browser
- Enables tool- or chamber-level grouping of devices
- Provides access to advanced options, including data export



Different credentials for viewer, editor, and admin



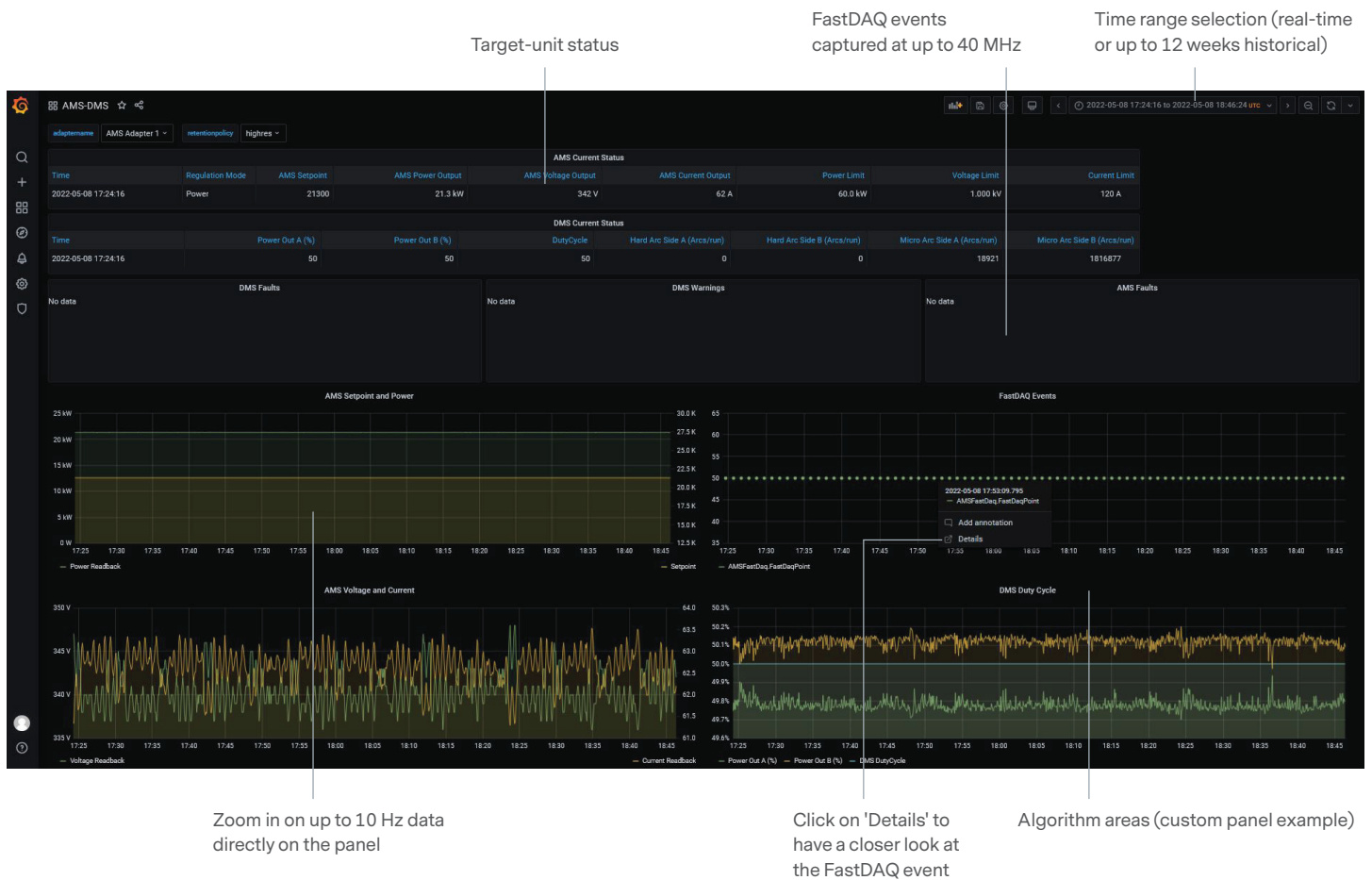
New browser tab shows selected dashboard data

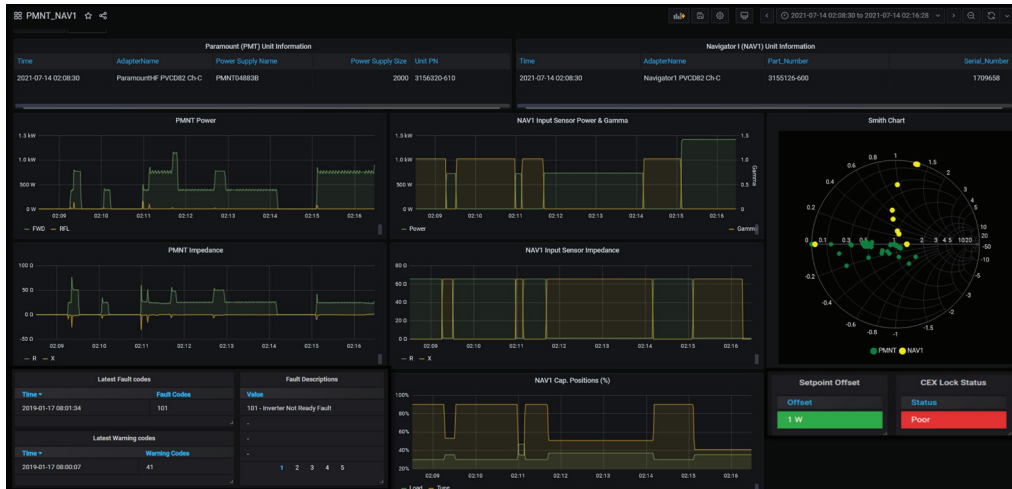
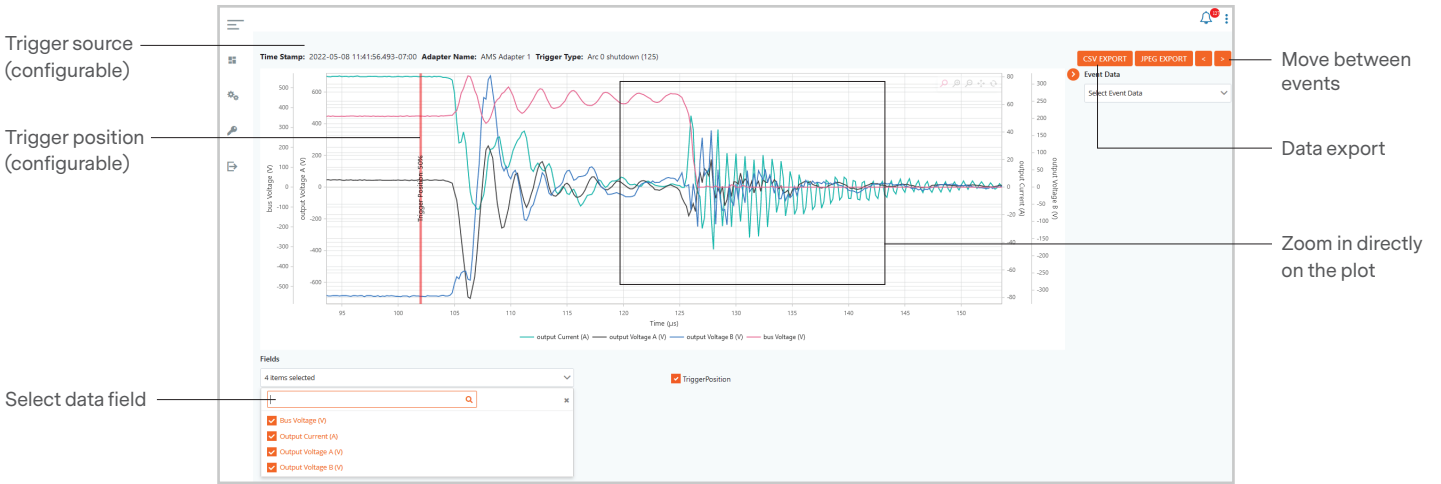
# CUSTOM DASHBOARDS

## DEFINE YOUR OWN WAY TO INTERACT WITH DATA

Securely interact with rich data sets via browser-based custom dashboards:

- 12+ weeks of high-resolution “flight recorder” data
- Up to 40 MHz event visualizer and recorder (FastDAQ™)
- Multiple target-unit connectivity for crew performance monitoring
- Cybersecure data control; various network connection options, including local or remote access
- Independence from OEM’s data acquisition system; complements existing systems
- Customizable monitoring views using interactive query builders
- Customizable alerts for user-defined conditions
- No software installations needed





Example custom dashboard for monitoring match network and RF generator data with Smith chart:

Aggregate data from different target units on the same dashboard for process monitoring, unit-to-unit comparison, and tool-to-tool comparison.



Construct a custom panel via a query builder by selecting data fields, applying filter and mathematic methods, choosing visuals, and more.

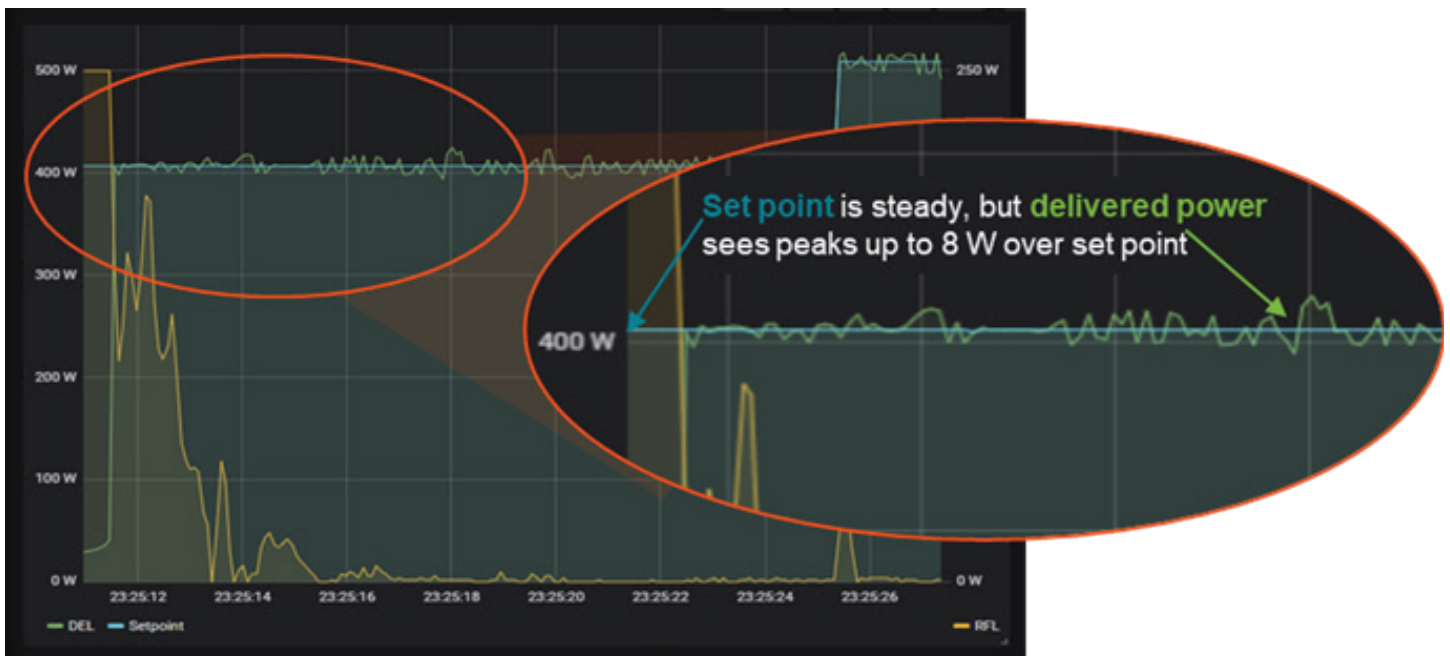
## PowerInsight Troubleshooting and Diagnostics Case

### CHALLENGE

A customer's data monitoring interface indicated a new RF generator's reflected power went beyond defined threshold; however, to accurately find the root cause, the customer needed more critical data.

### SOLUTION

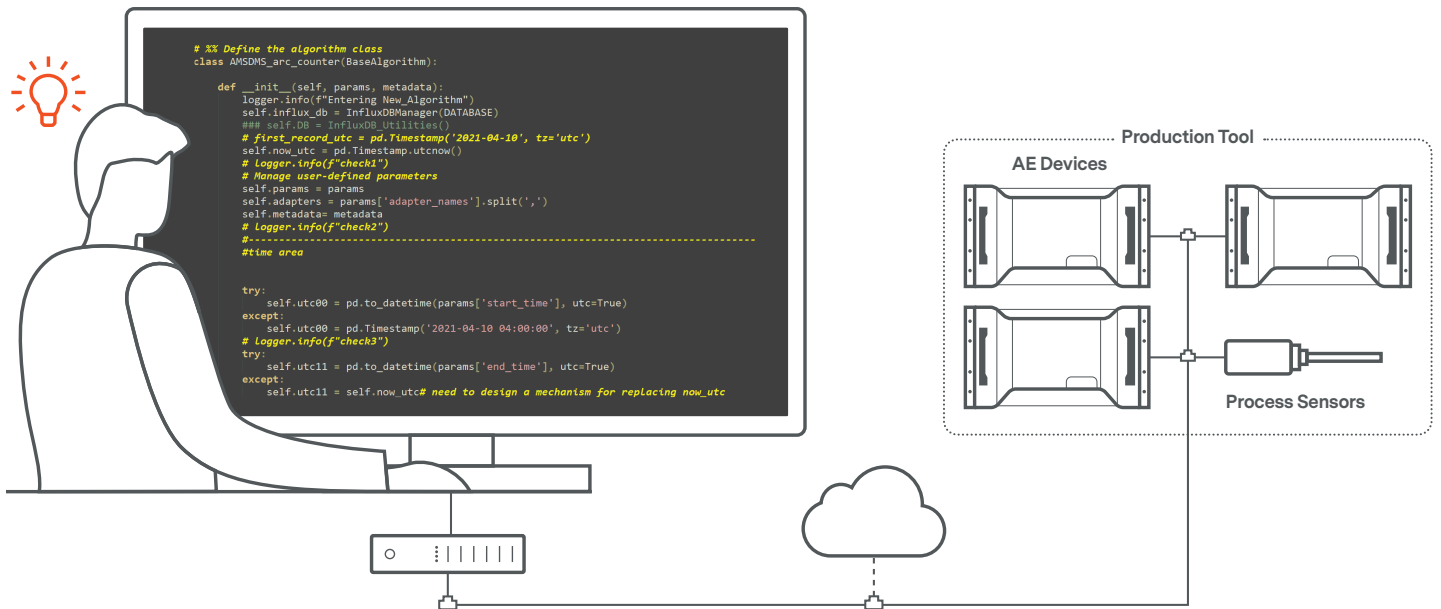
PowerInsight high-resolution data and multi-parameter dashboards show a steady set point but unstable generator output. This level of detail enabled a data-driven decision to adjust firmware settings and reduce noise to bring the new generator's performance within required parameters.



## AVAILABLE DATA ANALYTICS CONSULTING

Transform data into actionable insights by teaming with AE data-scientist consultants who utilize their extensive application experience and expertise to create a customized visualization and analysis ecosystem.

- Apply machine learning, modern data science, and advanced analytics to refine production processes.
- Correlate events for root-cause analysis with recorded long-term data and FastDAQ events.
- Develop health metric and severity calculations.
- Tailor-make algorithms for baselined performance and anomaly detection.
- Predict component and tool failures.
- Access AE researchers, engineers, and technicians.
- Access remote technical support based on recorded data.



Each algorithm is executed through program codes and will be modified periodically based on customer request.

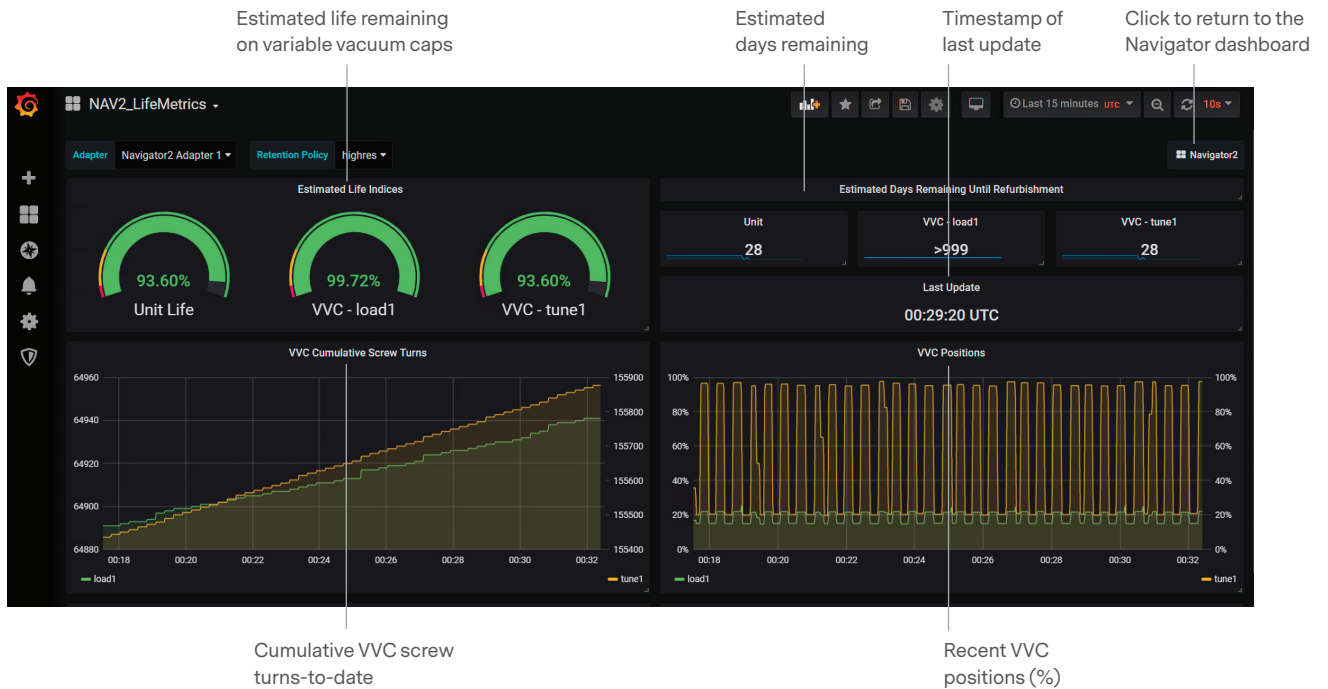


## PowerInsight Algorithm — Predictive Maintenance Case

**CHALLENGE** Vacuum capacitor failures can cause downtime and reduce throughput. The ability to estimate mechanical life consumed/remaining would enable more accurate prediction of required maintenance cycles.

**SOLUTION** PowerInsight data consultants created and embedded an algorithm to estimate the mechanical life consumed and/or remaining for the vacuum capacitors found within AE RF matching networks. The reliability/survival model uses the actual movements of the capacitors as they tune to balance the load as the primary input; small "dithering" movements have little to no impact on vac-cap lifespans over time, whereas large movements (typically exceeding 50% of the range) have a significant, negative impact on lifespan — the relationship is highly non-linear.

The dashboard publishes the estimated life remaining (upper left panel) and projected days remaining until a maintenance service should be performed (upper right panel), assuming the recorded usage patterns continue. The algorithm employs a statistical learning method to adjust its estimates as usage patterns change or evolve.



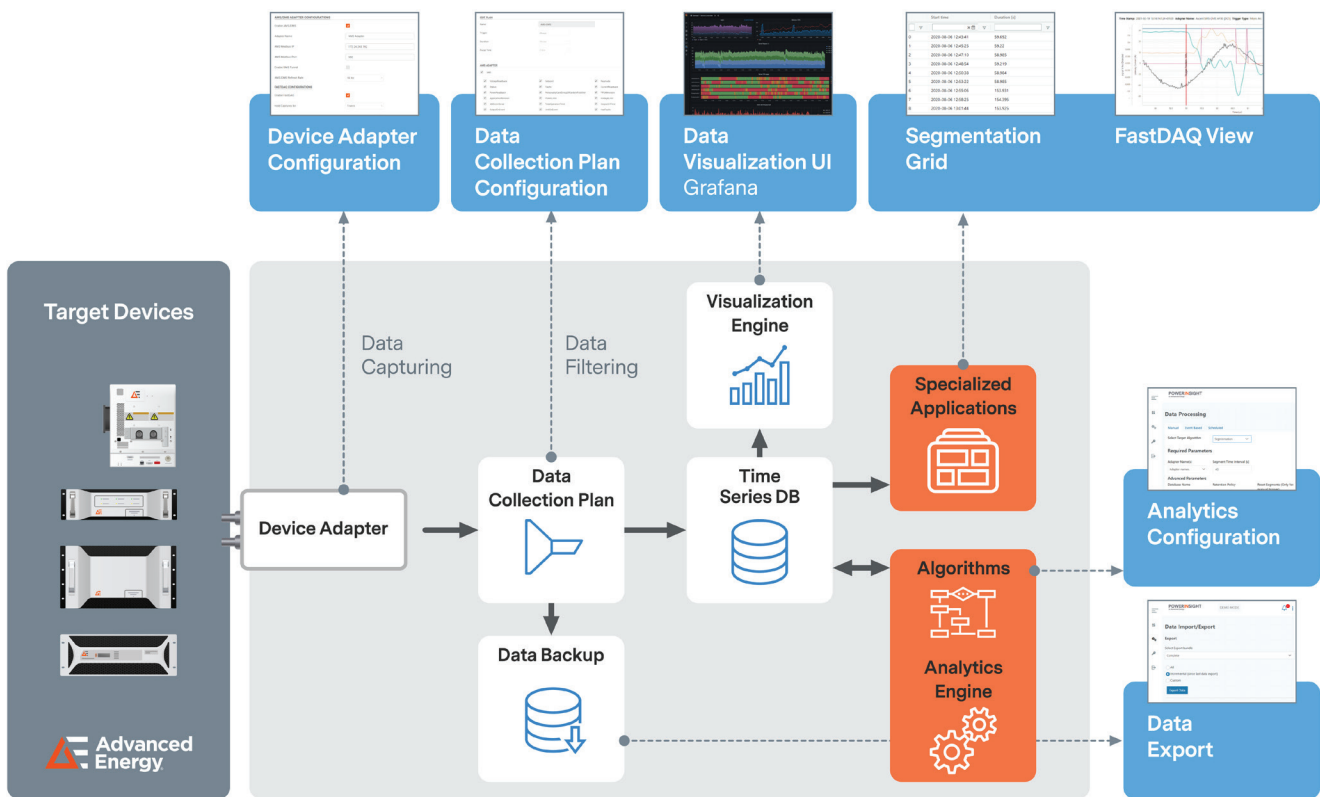
## A CLOSER LOOK AT THE EDGE ECOSYSTEM

PowerInsight Edge hardware consists of an industrial computer running the Linux OS. It hosts all the required software for data collection, time series database management, visualization, and algorithms.

While these functions typically are available only via separate software, the PowerInsight platform integrates them into an ecosystem that better supports data scientists in the creation of custom solutions to meet specific user needs.

This unique architecture:

- Enables access to high-resolution data (default setting 12 weeks).
- Transforms raw data into actionable insights that users can interact with on a browser-based dashboard.
- Provides the ability to customize dashboards with a comprehensive list of data fields.
- Enables users to apply and configure the appropriate data science metrics for their system.
- Ensures that all data is fully cybersecurity.



## SETTING UP YOUR POWERINSIGHT SOLUTION

PowerInsight is compatible with a comprehensive list of AE's power supplies and can be integrated with other platforms, such as PLC, per customer request.

PowerInsight Compatible		Sample Rate	FastDAQ Sample Rate <sup>1</sup>	Onboard Algorithms
DC Power Source Systems	Pinnacle III	10 Hz		Process Segmentation, Arc Monitoring
	Pinnacle II	4 Hz		
	Ascent SMS AP10	10 Hz	40 MHz	Arc Monitoring
	Ascent AMS	10 Hz	40 MHz	Arc Monitoring
	Ascent DMS	10 Hz	40 MHz	Arc Monitoring
	Ascent AP	10 Hz	40 MHz	Arc Monitoring
	Ascent AMS/DC	10 Hz	40 MHz	Arc Monitoring
	Ascent MS	10 Hz		Arc Monitoring
	Crystal	4 Hz		
RF Plasma Generator	Paramount HF	10 Hz		Reflected Power Events Monitoring CEX Unlock Events Detection Excessive Resonator Oscillating Excessive Set Point Changes
	Paramount 5002	10 Hz		
	Paramount VHF	10 Hz		
	Paramount Plus	10 Hz	15 MHz	
	Paramount Plus MLP	10 Hz	15 MHz	
	Apex Refresh	10 Hz		
	HFV8000	4 Hz		
RF Match Network	Navigator I Refresh	4 Hz		Vacuum Capacitor Predictive Maintenance
	Navigator II	10 Hz		
Plasma Abatement	MAXstream	10 Hz		
	Litmas RPS	4 Hz		RPS Chamber Clean
Other Devices	Optical Temperature Sensor (FOT)	20 Hz		
	Analog Input Modbus TCP Module	10 Hz		
	TEGAM RF Power Sensor	1 Hz		

Email [PowerInsight@aei.com](mailto:PowerInsight@aei.com) to set up a free demo!

1

You identify the scope of your target devices.

2

AE installs the PowerInsight demo according to your schedule.

3

You experience an on-site, hands-on training using the PowerInsight dashboard.

4

Start interacting with recorded data on custom dashboards.



For international contact information,  
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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE | TRUST

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