

VAISALA

Lighting the way forward:

How Vaisala solar energy solutions
are advancing renewable energy

Solutions Brochure



An unrivaled resource

Humans have used the sun's energy for thousands of years, but we have only recently developed solar technologies efficient enough to replace fossil fuels. This energy evolution is one of humankind's most important priorities, and it is ongoing today.

Solar energy is becoming increasingly competitive and efficient, but for it to reach its potential and create significant societal change, solar stakeholders need powerful insights from fully integrated renewable energy solutions.

Those insights and solutions come from Vaisala.



Thoughtful evolution

Solar energy is one of the key pathways to a healthier, greener, more innovative future. Vaisala understands the potential – and the stakes – of this evolution, which is why we've put together the most comprehensive set of measurement technologies and digital services available in solar. These solutions are both advanced and practical, each building on the success of the one that preceded it.

Vaisala solar solutions enable stakeholders throughout the solar lifecycle to:



Quantify and reduce uncertainty, protecting profitability



Make informed, data-driven product choices



Optimize performance and maintenance to prevent losses



Efficiently manage and leverage large amounts of data



Contribute to grid resilience and reliability



Avoid unexpected damages and risks

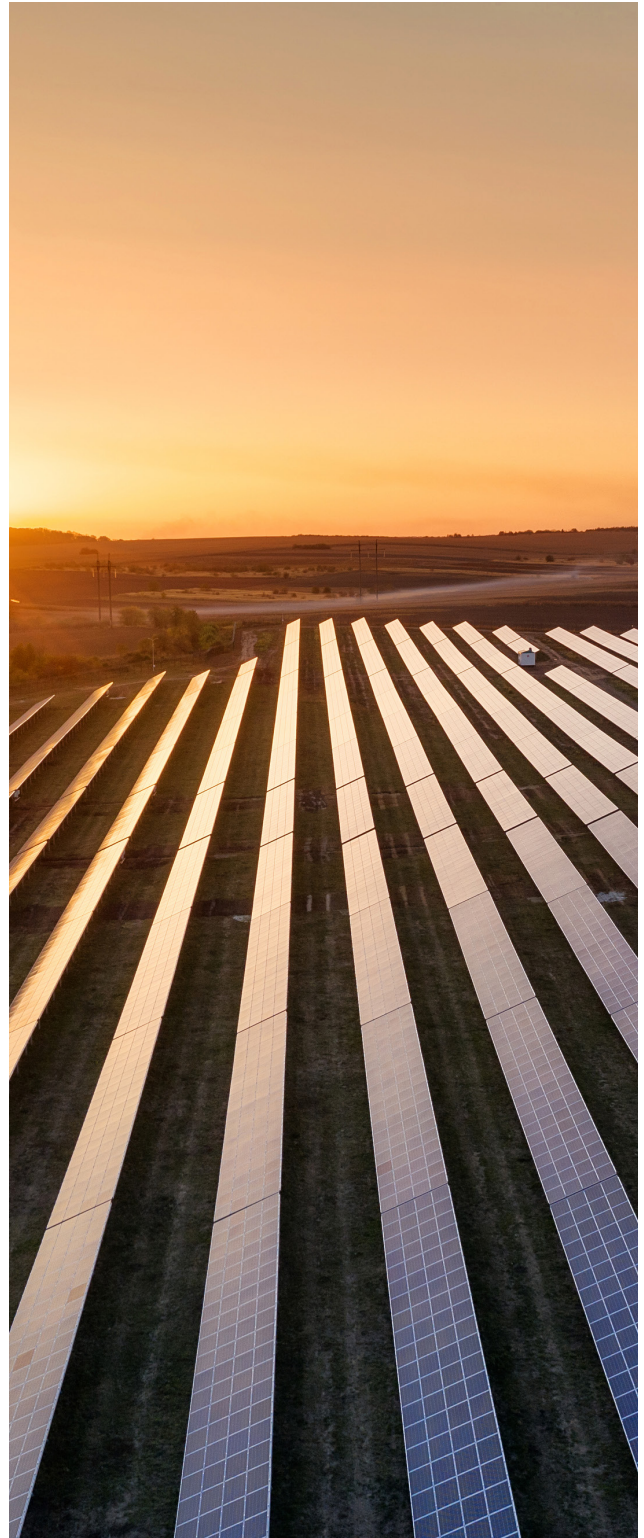


Minimize costs



Gain historical perspective and big-picture visibility

By unlocking new efficiencies and making solar projects more competitive and profitable against competing energy sources, these benefits enable solar stakeholders to meet the most pressing challenges of our time.



Solutions across the solar energy lifecycle

It's no accident that Vaisala has developed its solar portfolio to overlay the most crucial stages in the solar lifecycle. Evolving the solar industry requires integrated, end-to-end solutions that empower stakeholders wherever they are – whether they're developers, funders, manufacturers, EPCs, asset managers, O&M contractors, energy traders, or anyone else.

Accordingly, we organize our solar solutions in several intuitive focus areas:



Development



Construction and commissioning



Operations and life management

Applications that matter most

| | | Prospecting and development | Construction and commissioning | Operations and life management |
|---------------------|--|---|---|---|
| | | <ul style="list-style-type: none"> · Site prospection · Solar resource assessment · PV plant design and technology selection · Repowering | <ul style="list-style-type: none"> · Construction planning · Worker safety · Power performance testing | <ul style="list-style-type: none"> · Power performance monitoring · Asset management and protection · Retrofit and performance increase · O&M planning and worker safety · Minutes/hour/day ahead forecasts · Asset performance analysis · Hail risk forecast and alerts |
| Sensors and systems | All-in one compact weather sensor (WXT536) | | | ● |
| | IEC-compliant weather station for PV plant performance monitoring (AWS810 Solar Edition) | ● | ● | ● |
| Data and software | Historical solar irradiance data | ● | | |
| | Bias correction for historical datasets | ● | | |
| | Real-time solar GHI monitoring | | | ● |
| | Site-specific power forecasts | | | ● |
| | Severe weather alerting (Xweather Protect) | | ● | ● |
| | Lightning data | ● | ● | ● |

Solutions at a glance

Vaisala's measurement technologies and data services are ideally suited to a growing, evolving solar industry. Built on trusted principles and technology, they are validated and continuously used around the world. This, along with our global presence and service network, makes them the most easy-to-implement and reliable technologies available.

Automatic Weather Station AWS810 Solar Edition

Vaisala's AWS810 Solar Edition empowers maximum solar power plant performance with smart solar irradiance measurement and weather intelligence.

The smart, secure and modular AWS810 Solar Edition combines reliable measurements, data collection and processing, and connectivity so you can monitor the impact of weather and improve your solar power plant's performance. High-quality sensor data is included for global, diffuse and reflected solar irradiation including all key weather parameters, plus soiling sensors. The accurate, always-on and long-lasting design is IEC 61724-1 compliant and is built to last the entire lifespan of a solar power plant.

Key benefits:

- The smart, turnkey weather monitoring system includes built-in, comprehensive data security
- Modular design is easy to set up and expand with your needs, while ruggedized design and remote diagnostics ensure low life-cycle costs
- End-to-end weather and solar power measurement data, advanced analytics and actionable digital insights cover the whole solar energy lifecycle





Weather Transmitter WXT536

WXT536 is a compact, all-in-one multi-parameter weather sensor that provides crucial data without adding significant costs or complexity. These weather insights are important for safe construction and operations, as well as performance monitoring of photovoltaic (PV) plants as described in the IEC 61724-1:2021 standard.

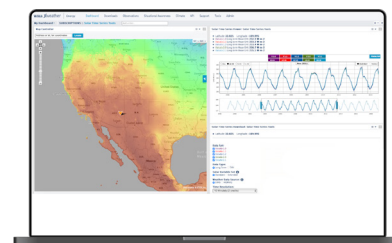
Key benefits:

- Simplicity and efficiency courtesy of a compact, rugged design and proven measurement technology. With low power consumption and optional sensor heating, WXT536 requires almost no maintenance.
- Well-suited to solar operations and compliance needs due to its six measured parameters:
 - Rainfall
 - Wind speed
 - Wind direction
 - Air pressure
 - Temperature
 - Humidity
- Straightforward integration with Automatic Weather Station AWS810 Solar Edition, expansion with a wide range of connectivity options, and simple third-party integration.

Historical solar irradiance data

Unlock the full potential of your solar energy projects with high-resolution solar time series data and standardized Typical Meteorological Year (TMY) datasets. The data sets are based on historical satellite imagery and cutting-edge technology offering over 25 years of hourly GHI, DNI, DIF, and key weather variables. We provide hourly data as well as sub-hourly data at 10, 15, and 30-minute resolution.

Historical Irradiance Data helps you maximize value from solar projects with accurate, bankable time series tools, GIS visualizations, prospecting maps, solar climate variable analyses, and solar performance reconciliations.



Global coverage

Explore solar data for locations with a spatial resolution of 2 arc minutes (~3 km). Xweather provides worldwide coverage from 60° N to 48° S.

High-resolution history

Over 25 years of precise solar and weather parameters at sub-hourly (10, 15, 30 minutes) and hourly resolution for any location.

Complete set of parameters

Industry-standard solar parameters including GHI, DNI, DIF, and albedo plus temperature, wind, humidity, precipitation, and more.

Bias correction for historical solar irradiance data

Accurate solar resource data is critical when assessing sites for development. Xweather bias correction uses short-term on-site measurements from AWS810 Solar Edition weather stations to improve the accuracy of long-term satellite-derived solar radiation data for the location. This process reduces the uncertainty in the long-term resource data by more than 50%, allowing you to predict a project's feasibility and energy yield with more confidence.



Satellite data

Satellite data provides a readily available historical archive of solar resource data for most locations. Single-source satellite data is consistent and reliable, but it comes with $\pm 5\%$ uncertainty on average.

On-site observations

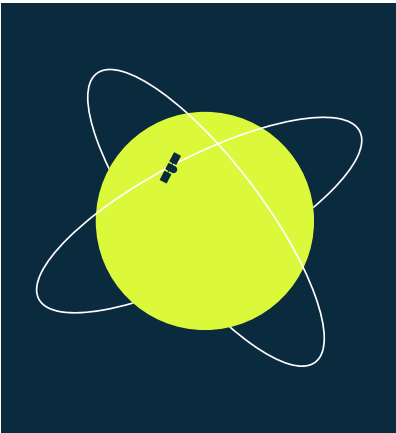
On-site observations from the AWS810 Solar Edition reveal the ground-truth conditions. However, a limited sample of short-term observations might not reflect typical long-term conditions.

MOS-corrected dataset

Combines on-site observations, long-term satellite data, and weather data in a statistical correction called Model Output Statistics (MOS) to produce a site-specific, bias-corrected dataset.

Real-time solar GHI monitoring

Monitor solar irradiation values updated in real-time with time series forecasts until the end of the day. HelioSat 5 is a satellite-derived solar radiation database based on analysis of Meteosat Second Generation satellite images.

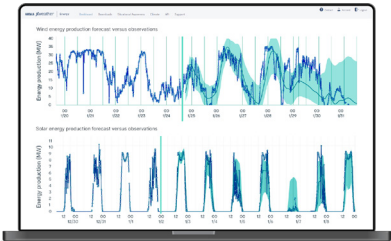


Key features

- Real-time solar irradiation values with forecasts until the end of the day
- Updated every 15 minutes when new satellite images are available
- Time series with time steps ranging from 1 min to 1 day
- Diffuse, direct, reflected, and global radiation components over horizontal, fix-tilted, normal, and any-tracker planes
- 165 countries covered in Europe, Middle East, and Africa, expanding to global coverage in H2 2025

Site-specific solar power forecasts

Unexpected weather puts your operations, investments, and trading strategies at risk. Vaisala Xweather offers more precise sub-hourly, hourly, and daily power predictions, helping PV asset owners, project managers, and energy traders reduce risk and gain a competitive advantage in energy markets.



Precision

- Up to 230 hours ahead, updated every 5 minutes
- $\pm 5\%$ mean absolute error for hour-ahead forecasts, $\pm 8\%$ for day-ahead
- Up to 30% more accurate than ECMWF alone
- Calibrated confidence limits

Parameters

- Project average power MWh
- Potential power
- Key weather parameters
- Icing alerts

Deliverables

- Historical forecasts for evaluation
- Xweather renewable energy portal
- Situational awareness tool
- API support

Xweather Protect

Monitoring severe weather is critical for protecting people, equipment and assets during the construction, commissioning, and operation of solar power projects. Xweather Protect delivers an all-in-one solution for weather risk management, real-time storm monitoring, and alert automation for all your locations worldwide. With real-time alerts, self-managed assets, and flexible notification settings, Xweather Protect ensures you get the right alerts to the right people at the right time.

Wind and gust alerts

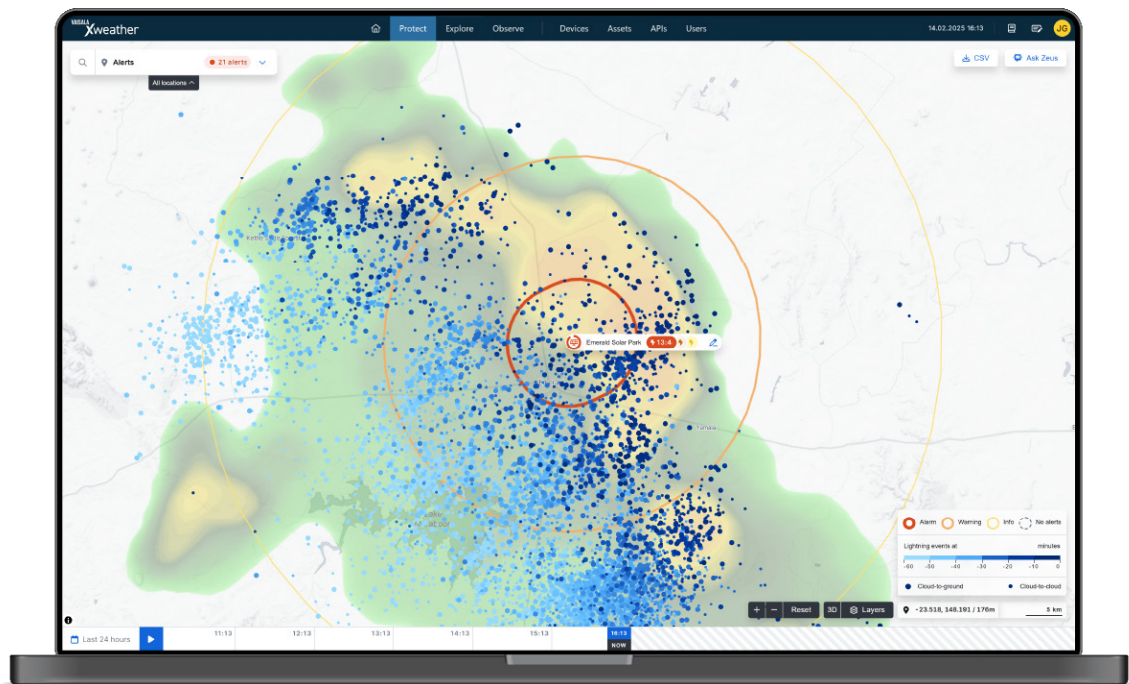
Wind forecast alerts warn you of upcoming threats up to 72 hours in advance. Configure the forecast horizon, wind height, speed thresholds, and notification schedule to create site-specific alerts.

Lightning alerts

Real-time alerts activate when lightning occurs near your asset. Xweather Protect also offers the unique ability to forecast lightning risk up to 60 minutes in advance with Storm ETA alerts.

Hail alerts

Hail alerts, sent up to 60 minutes in advance, give you vital time to stow your panels before the hail hits. Available in the U.S. Canada, Japan, Australia, and Europe (excl. Greece and North Macedonia).



Key benefits:

- Improve site safety and protect technicians during construction, commissioning, and operations with real-time storm tracking and automated alerts for lightning, wind, gusts, and hail.
- Integrate alerts into your systems and safety protocols with the secure API (coming soon). Review the 30-day alert history to prioritize inspections, maintenance and repairs.
- Automatically warn construction crews and technicians with beacons and sirens to stop work and seek shelter. Send all-clear notifications when it is safe to resume work.

Xweather lightning data

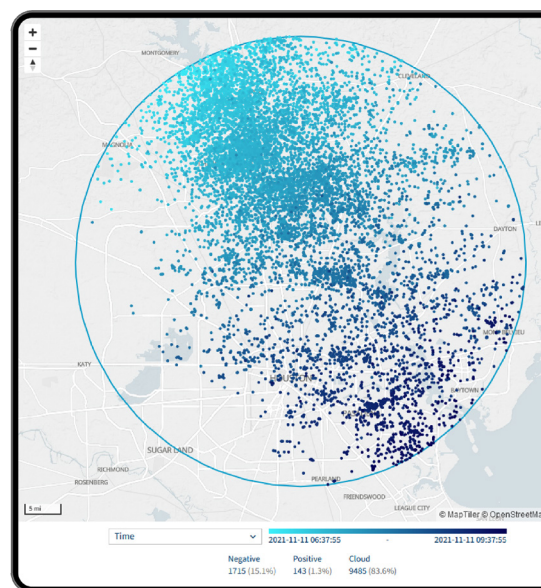
Safety and operational efficiency are critical priorities for the solar energy industry. Xweather lightning data provides fast and easy access to real-time, historical, and predicted lightning data to help energy companies manage lightning risk at every stage in the solar energy lifecycle.

Key benefits:

- Quick and easy access to real-time, historical, and predicted* lightning data for data-driven safety and planning practices, advanced risk assessments, and incident reporting.
- Global coverage and outstanding locational accuracy, even for remote sites beyond the reach of radars and satellites. Data feeds boast greater than 99.99% uptime with a latency of 30 seconds or less.
- Choose from a variety of delivery methods and file types through the Weather API and enterprise lightning offerings for maximum flexibility for data integration.
- Comprehensive data for each lightning event includes event type (cloud-to-ground stroke or in-cloud pulse), date and time with millisecond accuracy, precise latitude and longitude, peak current and polarity, Strike Damage Potential, and more.
- Leave the lightning network to us: Using Xweather lightning data eliminates the need to purchase, install, operate, and maintain your own lightning detection sensors.

Applications:

- Accurately assess a site's lightning risk when prospecting locations for PV plants.
- Protect onsite technicians and avoid costly downtime during the construction, commissioning, and operation of solar power projects.
- Proactively monitor sites with access to lightning threats forecasting data.*
- Improve your incident response, inspection, and maintenance processes by intelligently identifying ground strikes with greater potential to cause damage or start fires.
- Quickly and easily create comprehensive historical lightning reports for management, legal teams, unions, and external stakeholders.



* Lightning Threats available with Xweather Weather API and Maps and Xweather Protect subscriptions.



Why Vaisala?

We are innovators, scientists, and discoverers who are helping fundamentally change how the world is powered. Vaisala elevates wind and solar customers around the globe so they can meet the greatest energy challenges of our time. Our pioneering approach reflects our priorities of thoughtful evolution in a time of change and extending our legacy of leadership.

Vaisala is the only company to offer 360° of weather intelligence for smarter renewable energy, nearly anywhere on the planet. Every solution benefits from our 85+ years of experience, deployments in 170+ countries, and unrivaled thought leadership.

Our innovation story, like the renewable energy story, continues.

