



METEORAGE

Press kit **2026**



MEMBER OF



STAND 10H34

Services designed to support critical decision-making for renewable energy developers, manufacturers, and operators facing **lightning risk**



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Key figures

Thunderstorms and lightning

1 in 5

lightning victims
is an outdoor worker

~ 80%

of insured failures
attributed to lightning
(Arboleda et al., 2003)

Lightning is the #1
cause of unplanned
downtime in wind
turbines

and a leading reason for
insurance claims,
according to DNV.

4 – 8%

of turbines incur
lightning-strike
damage annually

These figures highlight a clear reality:
Lightning directly affects safety, availability,
performance and financial resilience of wind farms.

LIGHTNING REPRESENT A SIGNIFICANT RISK TO THE WIND ENERGY INDUSTRY

As wind fleets expand, turbines grow taller and renewable assets operate in increasingly exposed locations, lightning risk management has become a core operational issue for the wind energy sector. It directly affects people safety, asset availability, operational performance and insurance costs.

Lightning damage following a thunderstorm can be both visible and invisible. It may be structural, mechanical or electrical, resulting in the direct destruction or premature ageing of blades, nacelles, towers or lightning protection components, as well as partial or complete production shutdowns.

Because of its localized, intermittent and sometimes brutal nature, lightning makes operational decisions particularly complex for wind operators:

- Should an operation be suspended?
- Should post-storm inspections be triggered?
- Which turbines or areas should be prioritised after the event?

In this context, post-storm turbine inspections are becoming essential and are explicitly recommended by international standards such as **IEC 62305-3** and **IEC 61400-24**. However, inspection decisions cannot be made reliably without accurate monitoring of thunderstorm activity. Relying solely on the presence of a visible thunderstorm near a wind farm is both inefficient and costly.

Lightning therefore remains a highly localized and difficult-to-interpret hazard, requiring precise, real-time and site-specific tools to support informed and effective operational decisions.



**Don't miss our poster:
WindEurope 2026**

PO193 — From Early Warning to Targeted Inspections: A Before-During-After Framework for Lightning Risk Management in Wind O&M
by **Stéphane SCHMITT**,
Lightning Application Expert, Meteorage

A growing operational risk

Every day, an average of 7 million lightning flashes are detected, 10% of which strike the ground. A lightning flash (an electric discharge of up to 200,000 amperes) always seeks the shortest path between the cloud and the ground. As a result, lightning is more likely to strike pointed, conductive objects.

+ 1.226 million

cloud-to-ground lightning flashes*
detected in Europe in 2025

360

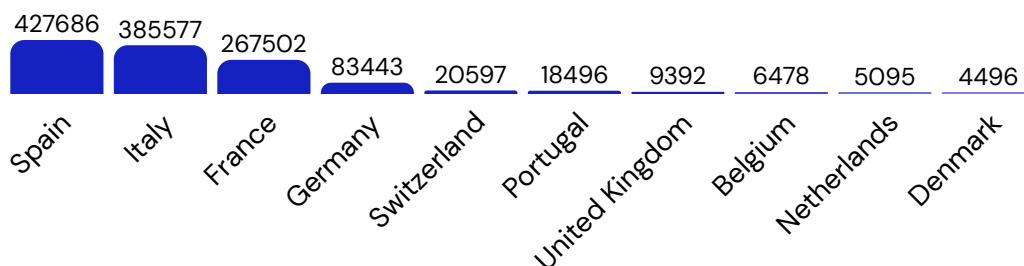
days with thunderstorms*
in Europe in 2025

~ 115 000

Meteorage thunderstorm warnings sent in 2025
enabling our customers to take action to secure their activities
more than 20 million people protected from
lightning-related risks on every thunderstorm day.

TOP 10 MOST LIGHTNING-STRUCK COUNTRIES IN EUROPE IN 2025

● Number of cloud-to-ground (CG) lightning flashes



In a context of climate change, thunderstorms appear to be more severe and the duration of the stormy season longer. Contrary to popular belief, there is also plenty of thunderstorm activity during winter. Lightning flashes with high amplitudes are detected despite a low lightning density.*

* **Lightning flash** : All the current discharges and electrical impulses during a thunderstorm. Lightning flash can occur within a cloud (intra-cloud flash), between a cloud and the ground (CG - cloud-to-ground flash) or between clouds. Lightning can consist of one or more strokes, which are current impulses.

* **Thunderstorm day** : Day on which at least one lightning flash was detected in the area under consideration.

* **Lightning density** : The best current representation of storm activity is lightning density, which is the number of cloud-to-ground (CG) lightning flashes per km² per year.

The wind operators' challenges

All installations on wind farms are highly exposed to thunderstorms and lightning. The risk is all the greater as wind farms are generally installed on open ground or at height. Once installed, turbines and panels become the highest points in the surrounding area, which increases the likelihood of direct impact.

To minimize material damage and avoid endangering teams working outdoors, it is important to address these risks across the entire value chain, from the site design phase to repowering and operation and maintenance (O&M).



Reduced unplanned downtime
→ Maximize asset availability and energy production



Targeted inspections
→ lower maintenance and downtime duration costs.



Enhanced the safety of technicians working at height or outdoors
→ Stop work and resume at the right time.



Providing objective proof of lightning-related events
→ Support maintenance, compliance and insurance processes.

Without reliable lightning detection data:

- operators may inspect too many turbines unnecessarily
- or miss hidden damage on affected assets
- teams are exposed to avoidable field interventions after thunderstorms
- insurance validation becomes slower and less precise

Our solutions

before-during-after every thunderstorm

A structured approach to lightning risk management in operations, to drive operational decisions and enhance safety.

Before - Anticipate



Evaluate exposure to thunderstorms and lightning. Historical analyses and mapping to optimize protection design and investment strategies.

During - Monitor



Be alerted to the arrival and end of thunderstorms. Site-specific alerts and geolocation for field teams. Monitor lightning activity in real time to adapt operations and secure activities.

After - Decide & Optimise



Verify and analyze lightning events after the thunderstorm to optimize inspections, maintenance, and insurance processes.



➔ **Lightning Check Advisor** – Make sure your turbines are working properly every day !

Wind direction	Wind speed (m/s)	Wind direction (°)	Wind speed (m/s)	Wind direction (°)	Wind speed (m/s)
0	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00

Site	Installation	Range	Intensity (kA)
Wind Farm 01	XX	2	20.2
Wind Farm 02	XX	2	20.2
Wind Farm 03	XX	2	20.2

Site	Installation	Equip de intervención	distancia (km)	Intensidad	fecha	latitud	longitud	Intensidad (kA)	Rango
Wind Farm 01	XX	F	0.98	2	20/02/2024 09:42:11	43.3102	-7.2925	20.2	XX
Wind Farm 02	XX	F	0.98	2	20/02/2024 09:42:11	43.3102	-7.2925	20.2	XX
Wind Farm 03	XX	F	0.98	2	20/02/2024 09:42:11	43.3102	-7.2925	20.2	XX

- quickly trigger targeted inspections, rather than systematic checks,
- initiate appropriate preventive or corrective maintenance actions,
- reduce inspection time and unnecessary turbine downtime,
- document lightning events for long-term monitoring and analysis,
- support insurance claims or justify production losses following a lightning incident.

Save time. Smarter maintenance.

Our solutions

before-during-after every thunderstorm

Early warning & alerts

Tiered early warnings from lightning-location systems (LLS) routinely achieve ≥ 20 -minute lead times in Western Europe, enabling safe suspension of high-risk tasks.

Live monitoring of thunderstorm activity near worksites

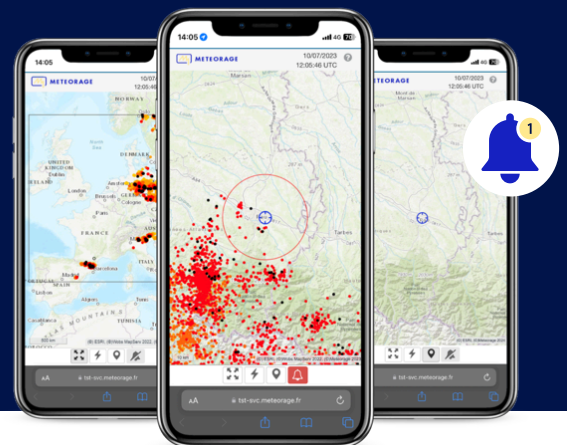
Thunderstorm cell tracking provides real-time direction and speed, while severity is quantified via a lightning-jump proxy.

➔ **Geoflash** – Safety, everywhere, anytime.

Field crews working at height, on towers or inside nacelles are particularly exposed.

Geoflash is Meteorage's mobile lightning & thunderstorm warning solution, designed for teams in the field.

Decision support during operations.



Optimisation of inspection planning

Operators trigger targeted inspections using rules that combine proximity (turbine-scale neighbourhood), peak-current and contextual cues (Scada alarms, work status, historical vulnerability,...) as promoted in maintenance best practice.

COMPLIANT WITH INTERNATIONAL STANDARDS

- IEC 61400-24 (lightning protection for wind turbines)
- IEC 62305- 1,2,3,4 (lightning protection)
- IEC 62793 (Thunderstorm Warning Systems TWSs)
- IEC 62858 (Lightning Location Systems LLSs)

The Meteorage detection network

Until 1987, measuring thunderstorm electrical activity was confined to counting the number of days on which thunder was observed.

With its network of sensors continuously scanning the electromagnetic field and providing dense and homogeneous coverage, Meteorage has developed powerful tools to detect, locate and analyse each flash in real time. In Europe, the company has more than 100 sensors, powerful computers and a data processing system, which allow it to offer a range of services to its customers.

European lightning detection network

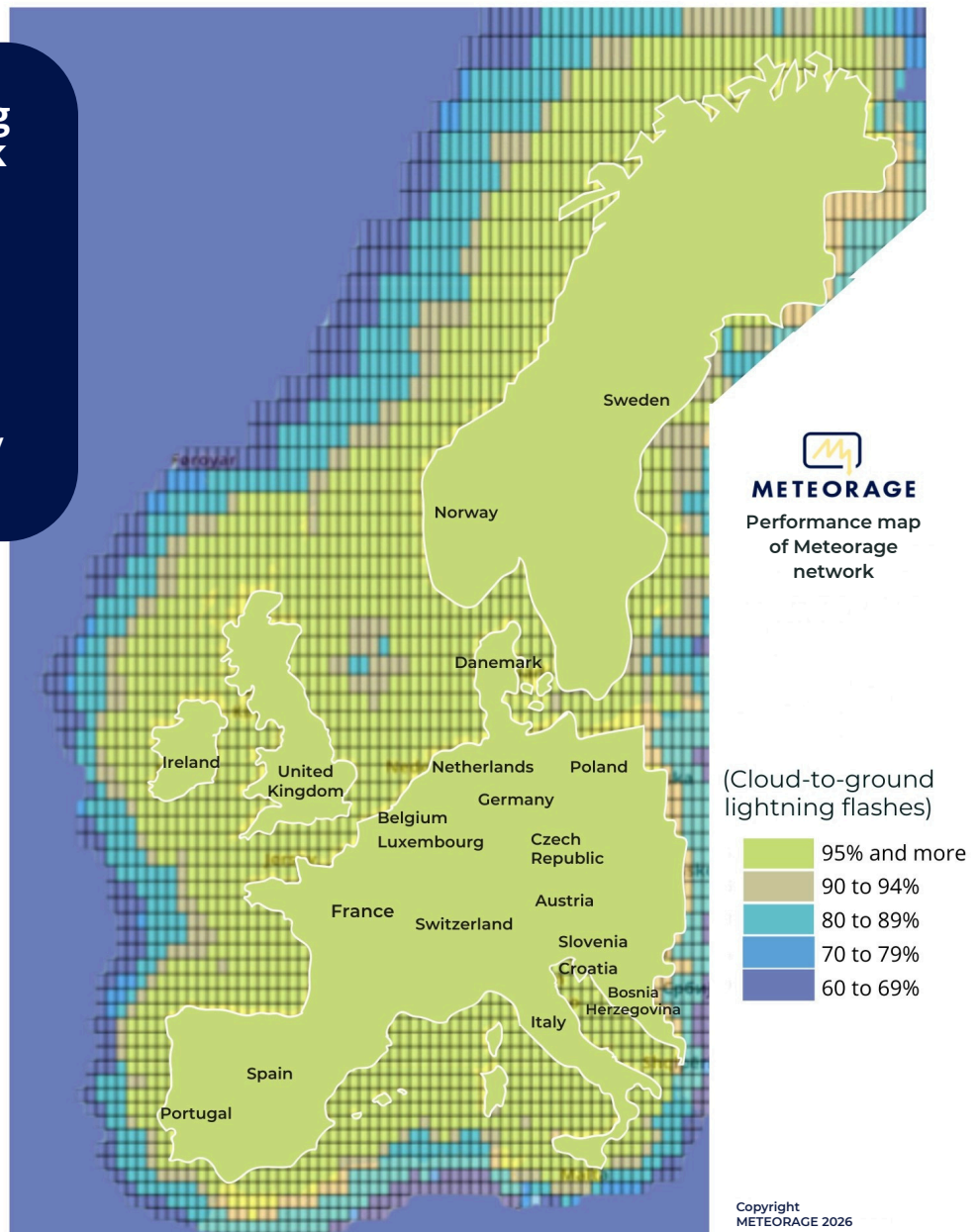
100 m

Location accuracy

> 98 %

Detection efficiency

Our services are managed, developed and supervised entirely in-house by our technical team.



Meteorage

LIGHTNING DETECTION SPECIALIST FOR NEARLY 40 YEARS

**The French company
that has become
a global leader**



4,000+ customers & partners worldwide
98% re-subscription rate

The Meteorage story begins in 1987, when the company was founded. In a pioneering move, it rolled out the first lightning detection network, whose sensors covered the entire French territory.

This network, which was regularly upgraded with the latest technological developments, gradually extended to Europe, including Switzerland, United Kingdom, Ireland, Benelux, Spain, Portugal, Andorra, Italy, Austria, Germany, Scandinavia, etc.

In 2001, Météo-France acquired a 65% controlling stake in Meteorage alongside G.A.I., an American manufacturer of lightning detection sensors. In 2002, the latter was acquired by the Finnish group Vaisala, the largest meteorological equipment maker in the world. Vaisala thus became a 35% shareholder in Meteorage and gave it access to an international lightning detection network, called GLD360.

At the end of 2020, Meteorage acquired acquisition of its Italian counterpart CESI SIRF, the lightning division of the CESI group, world leader in technical services to the energy sector.

Meteorage

LIGHTNING DETECTION SPECIALIST FOR NEARLY 40 YEARS

Based in Pau and with a workforce of 30 employees, Meteorage is today the global leader in its market. It provides lightning risk management services to its customers in Europe and around the world, as well as consulting, engineering and support services relating to the creation of lightning detection systems.

Every day, our data enables our customers to schedule planned stoppages, protect their on-site teams, ensure continuity of service and secure their priority operations.



Prevention for better protection

Because lightning is a widespread natural risk, effective prevention relies on awareness, anticipation and the adoption of appropriate protective measures.

With this in mind, Meteorage helps its customers and partners to protect themselves better, with training, lightning data, and warning, analysis and services. This expertise is also part of a wider mission to disseminate a risk culture through our commitment to standardisation, our international studies and publications, as well as educational initiatives and prevention messages accessible to all.

Scientific and industry recognition

Meteorage actively contributes to:

- IEC standards
- International research programs (CNRS, CNES, ONERA, CIGRÉ)
- Lightning detection and atmospheric electricity conferences (ICLP, ILDC)

Quality, safety and CSR commitments

Our expertise is recognised through independent certifications that reflect the robustness of our processes and our commitment to responsible operations.



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Anticipate.
Monitor.
Decide.

facing lightning and
thunderstorm risks

www.meteorage.com

