

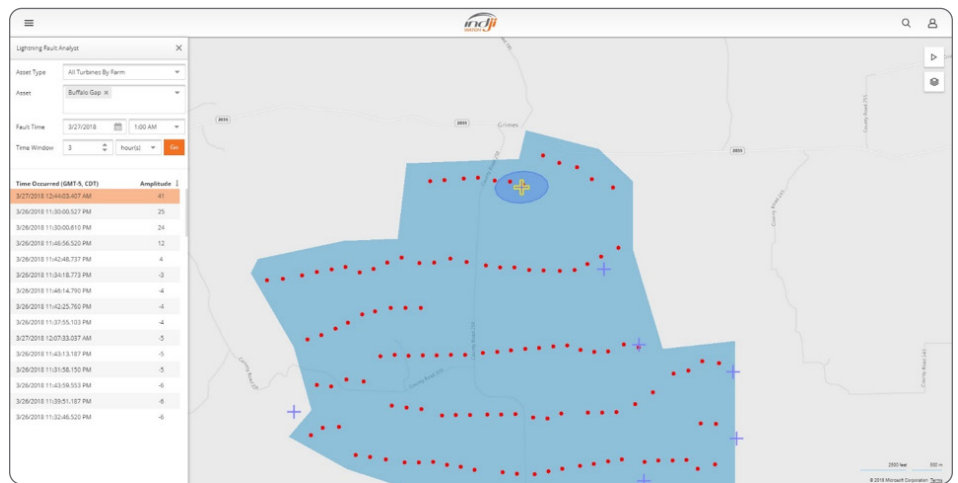


INDUSTRY LEADING LIGHTNING ANALYSIS TOOLS FOR WIND FARMS

Lightning can cause major damage to turbine blades and even weaker, repetitive strikes can lead to blade degradation over time. After a major lightning storm, you want to assess damage quickly to address any issues before minor repairs become major costly repairs. Having a historical record of strikes to each wind turbine will help you detect problem areas and provide data if an insurance claim needs to be filed. Indji Watch for wind farms has three superior tools which provide you with post-storm and historical lightning analysis.

Lightning Damage Analyst

It's Monday morning and significant storms rolled through over the weekend. You need to know if any of your turbines took a direct hit by lightning. Using the Indji Watch Lightning Damage Analyst tool, you can quickly select all your turbines and plot lightning data for the entire weekend. You determine the location of the strikes in relation to your turbines, the power of the strike, along with the polarity of the strike. In seconds you have everything you need to determine if you should schedule inspections now. Early identification of lightning strikes can keep your costs lower by fixing damage when it is minor as opposed to undetected damage that worsens over time, leading to major repairs or even blade replacements.



Lightning Damage Analyst high level view of plotted turbines



Lightning Fault Analyst detail and closeup view of turbines

Daily Lightning Report - ABC Wind Energy
 Date Covered: August 16, 2020
 Report Created: August 17, 2020 03:08:31 AM
 All times are in Chicago (UTC -05:00)

This report shows all cloud-to-ground lightning events that were detected within 500 meters of a wind turbine and where the 99 percentile confidence ellipse for the relevant strike contains the turbine location.

Park	Turbine	Time Stamp	Amplitude [kA]	Distance [m]
Acme Wind Farm	Acme-S16	2020-08-10-19:02:40.693	-15	166
	Acme-S35	2020-08-10-18:19:40.693	-11	50
Power Wind Farm	Power-D-2	2020-08-10-17:15:40.693	34	428
	Power-T078	2020-08-10-19:42:40.693	47	277
	Power-T097	2020-08-10-18:12:40.693	17	405
	Power-L-4	2020-08-10-17:55:40.693	10	326

Indji Watch Daily Lightning Report

Lightning Stand Down Overview Report For Warning Zone
 Month: July, 2019
 Region: Acme Wind Central Region

Site	Working hours in month (24h per day)	Hours of stand down time due to lightning in warning zone	Actual available working hours	Percentage of working hours available
High Wind	744	64	680	91.4%
Waters Edge	744	156	588	79.10%
Dusty Ridge	744	112	632	84.90%
Waving Wheat	744	202	542	72.80%

Indji Watch Lightning Stand Down Overview Report

Daily lightning report

To compliment the Lightning Fault Analyst tool, Indji Watch also offers a daily lightning report that catalogs the last 24 hours of strikes near your turbines. This report is delivered in Excel format each morning to key stake holder's inboxes providing you a hand's-free daily record of lightning threats to your turbines. Archiving the DLR reports will give you a permanent historical record of potential strike damage to all wind turbines that can stretch back several years or more.

Lightning stand down report

Lightning not only damages your turbines, it prevents your staff from completing important turbine maintenance work, due to waiting out lightning delays. Often an entire day of productivity can be lost. Many companies manually track turbine downtime, but Indji Watch can deliver a monthly report of all downtime due to lightning directly to key stake holders. Now you have clear data to back-up missed deadlines and KPIs that otherwise could lead to financial penalties.

An unbeatable lightning solution

The trio of Lightning Fault Analyst, the Daily Lightning Report and the Lightning Stand Down Report give you everything you need to schedule turbine inspections, track historical hotspots for lightning damage and document the impact lightning has on production.