Controlling Lightning Risk

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Images: Lachlan Ross and Matthew Paulson

It was a dark and stormy night...

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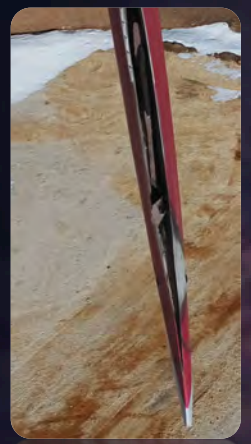
Wind Turbine Blades

... are big, expensive and do fail
... are not in stock
... **get struck by lightning!**

When a blade gets hit

FLASH OVER DAMAGE RELATED TO DAMAGED DOWN CONDUCTOR CABLE

SPLIT TRAILING EDGE



DELAMINATION

FLASH OVER DAMAGE

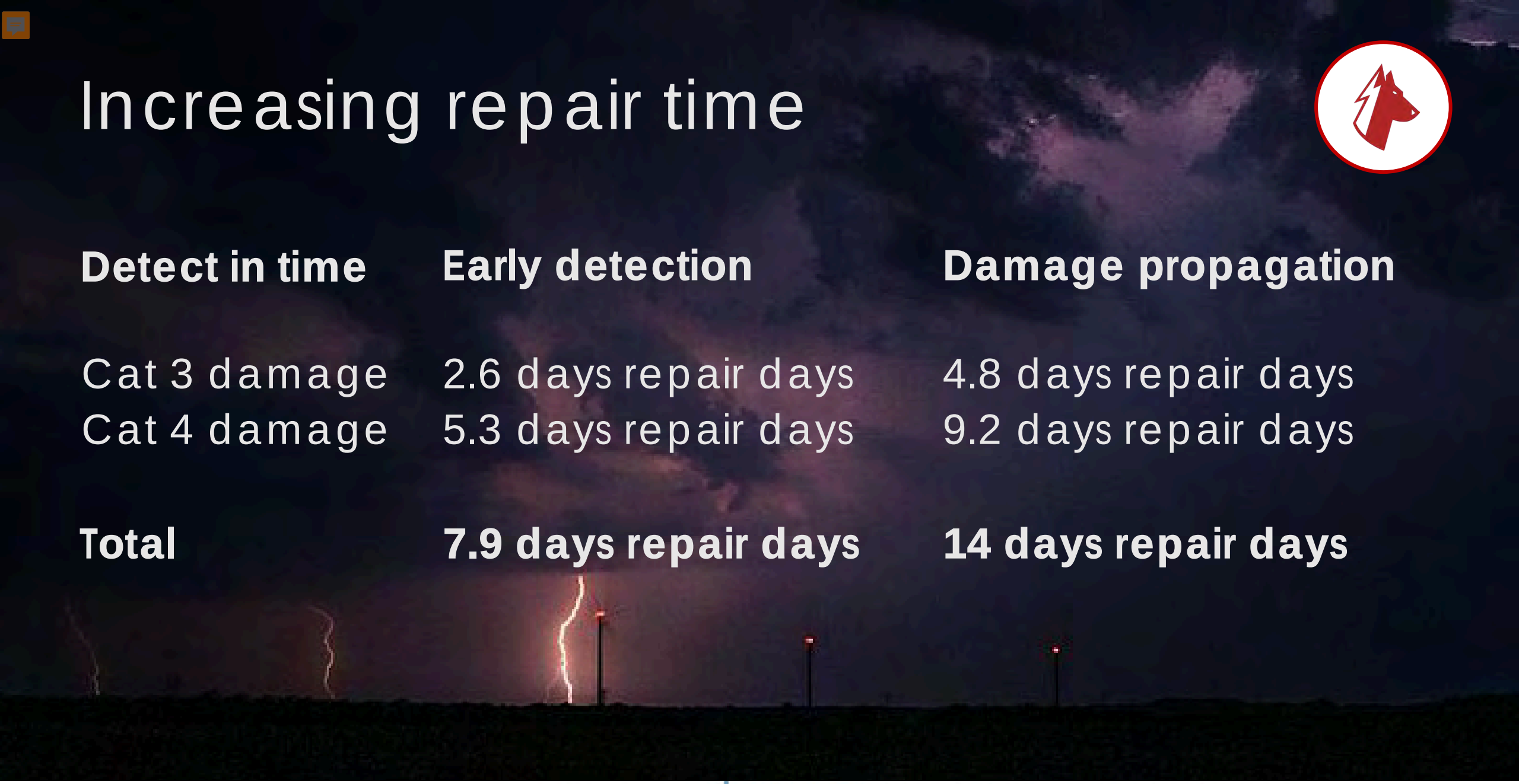
Lightning related blade damages

Cost and Business Interruption

Left unattended these blade damage can progress
- so what? It is expensive!
- For insurers
- For wind farm owners and operators
- All of us as we are relying on green electricity!

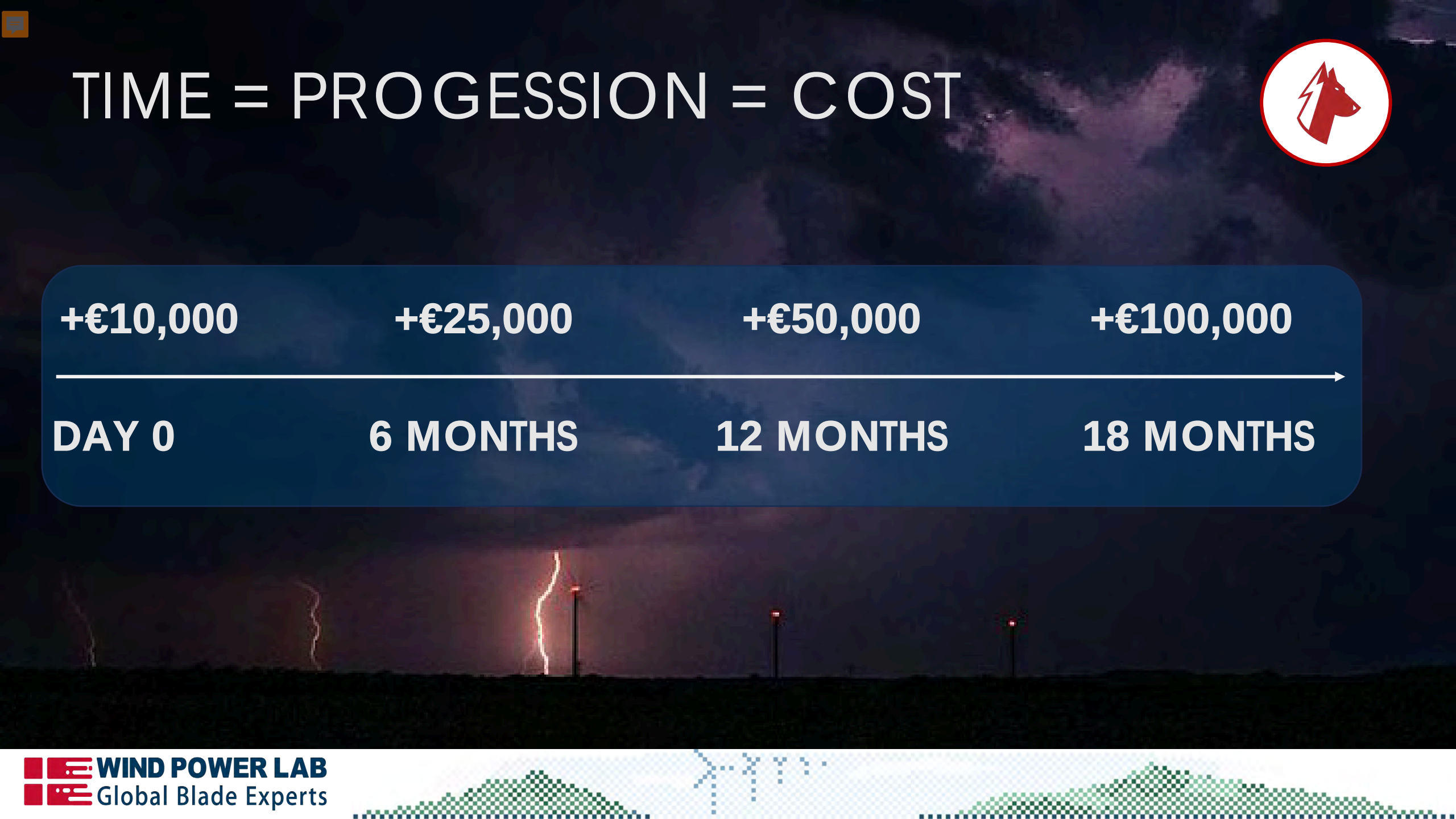
Considerations
- Supply chain issues
- Insurability
- OPEX cost

Increasing repair time



Detect in time	Early detection	Damage propagation
Cat 3 damage	2.6 days repair days	4.8 days repair days
Cat 4 damage	5.3 days repair days	9.2 days repair days
Total	**7.9 days repair days**	**14 days repair days**

TIME = PROGESSION = COST

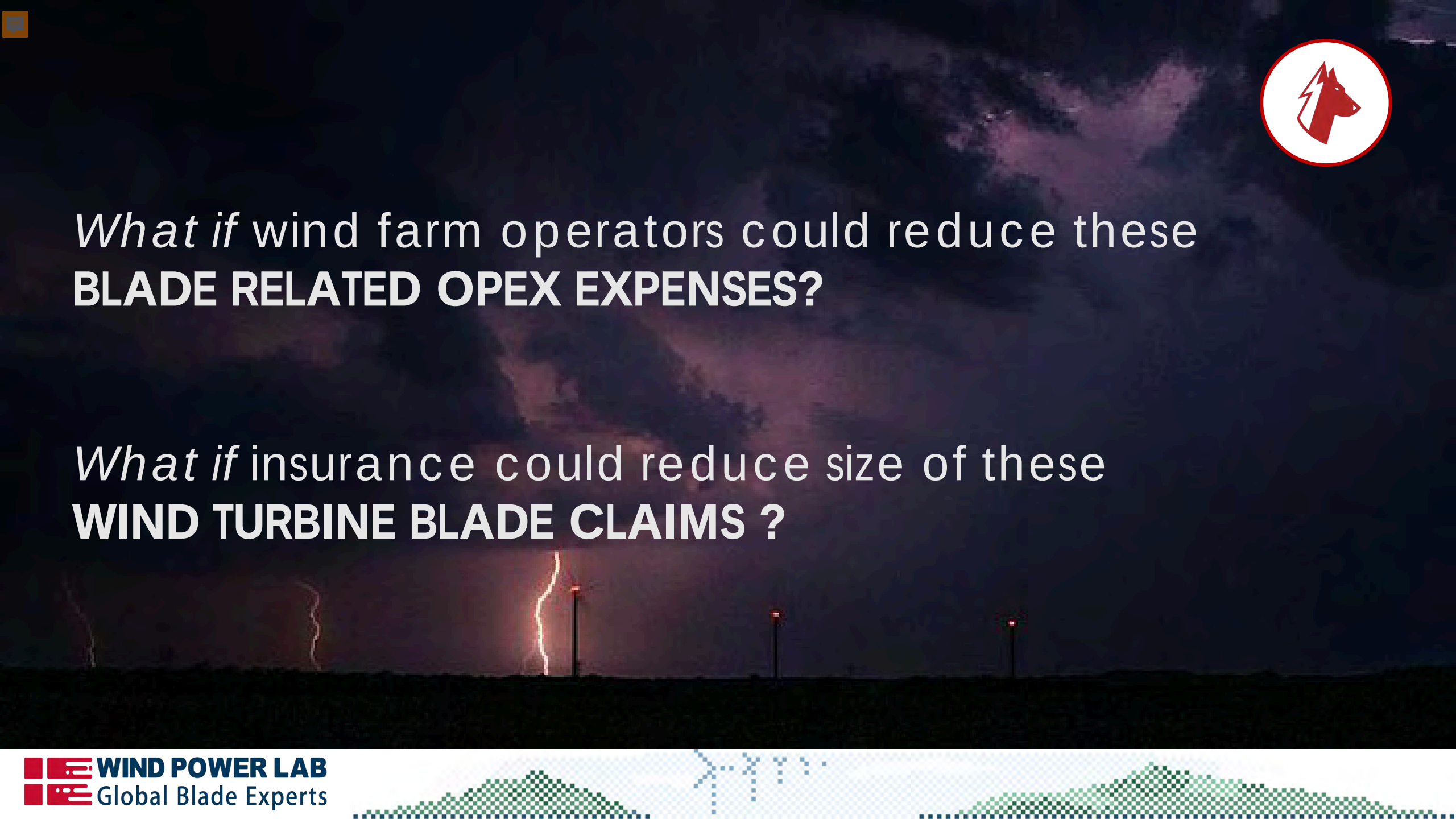


+€10,000	+€25,000	+€50,000	+€100,000
DAY 0	6 MONTHS	12 MONTHS	18 MONTHS

Why this matters for insurers!

Lightning can strike early in the season, just after statuary blade inspections. **The damage it causes will not be seen within your blade damage reports and can go unreported for 12-18 months**.

- 0 months in. Time estimate for a repair:
  1-2 days- total cost of less than **€10k.**
- 6 months in - progression! 4-5 days of work! Both cost wise and risk wise. Still repairable, but **€25-€50k.**
- 12 months in - blade on the ground! Or repairing in 5-25 days.
  Cost increase to **€75-€150k.**


What if wind farm operators could reduce these
BLADE RELATED OPEX EXPENSES?
What if insurance could reduce size of these
WIND TURBINE BLADE CLAIMS ?

Complication

Get lightning sensors on all turbines!

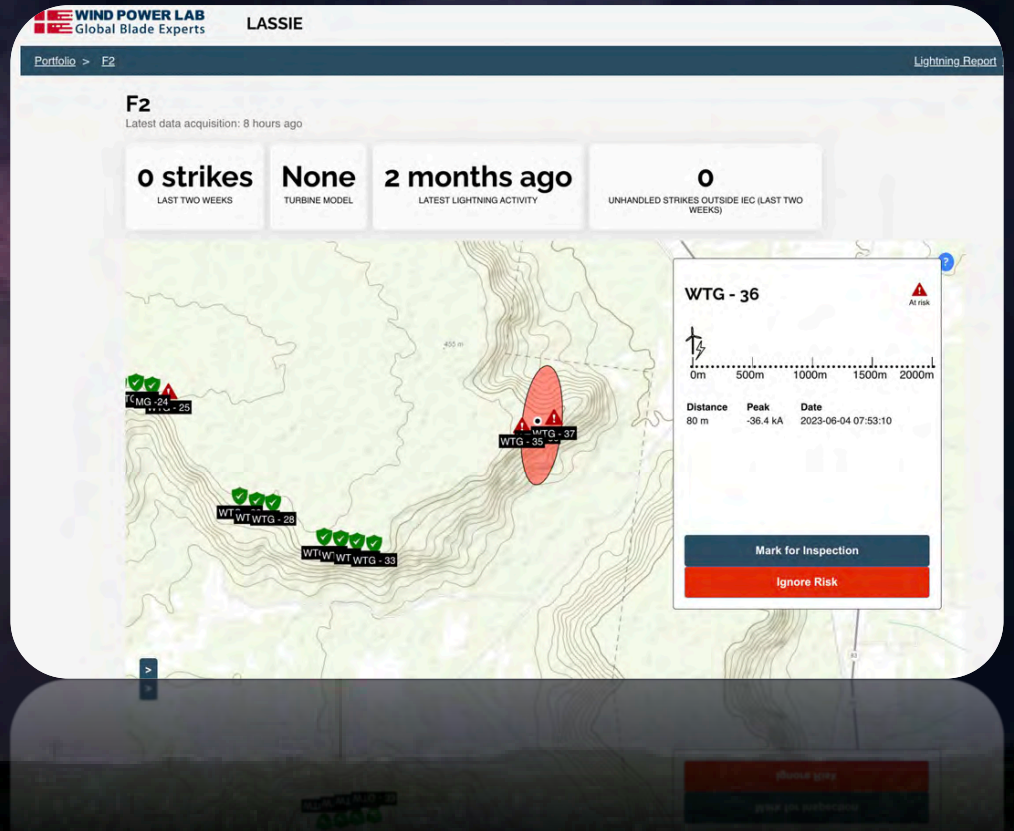
The positive side: know exactly when something got hit.

The negatives... It takes a huge investment in sensors for every turbine, in a business case with no room for this!

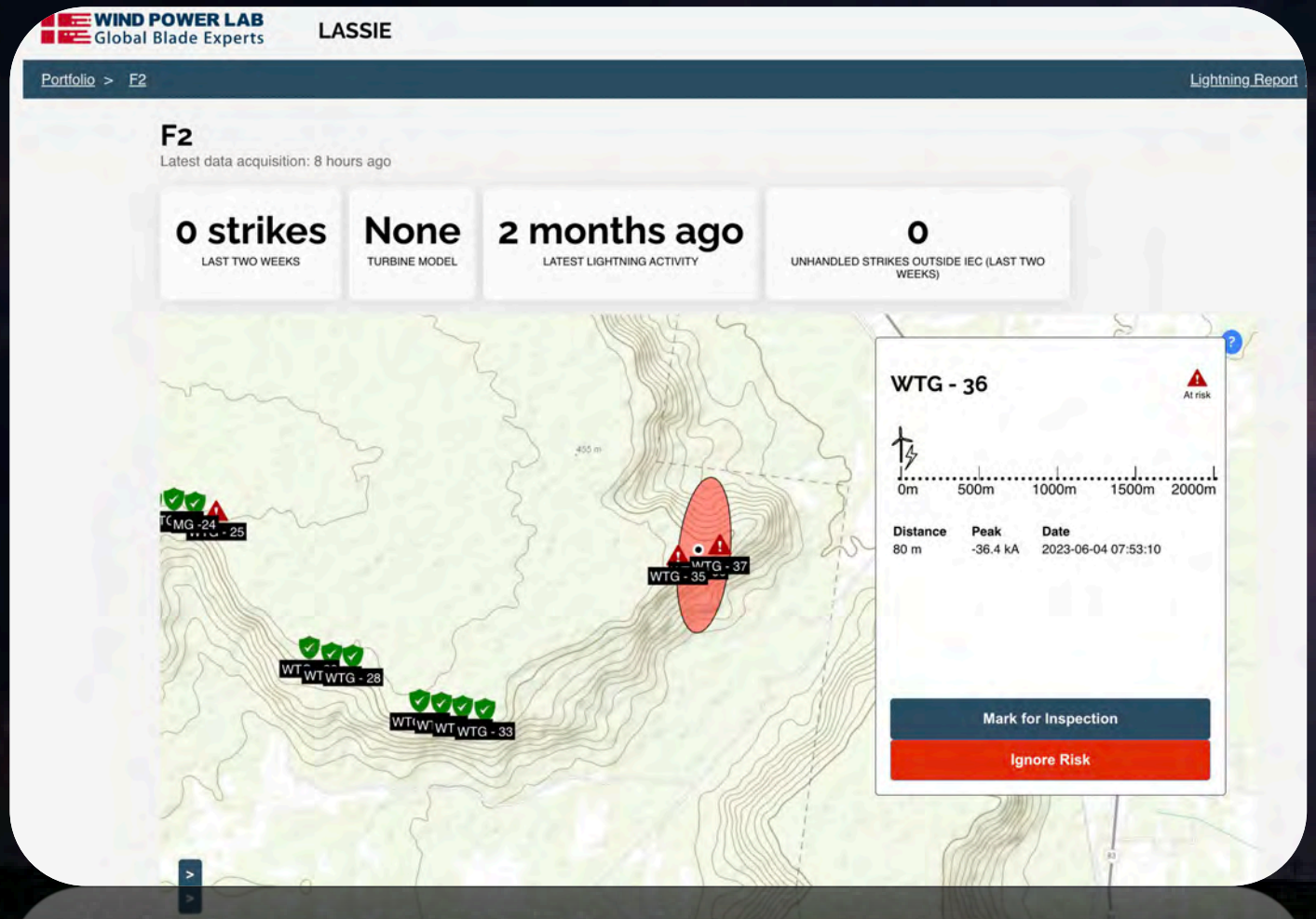
What do we need do instead?

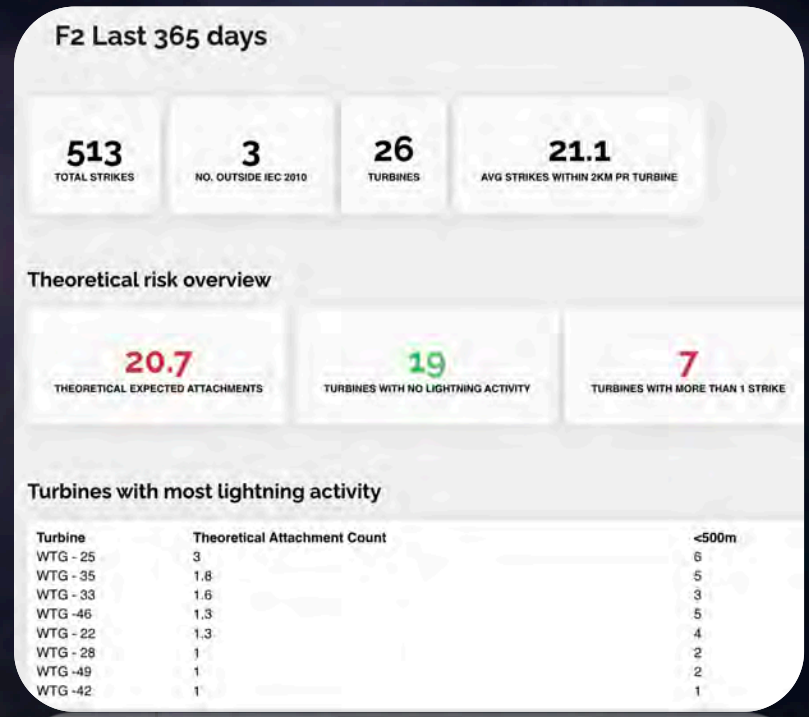
Solution

1. Get low-cost lightning surveillance capabilities without installing sensors
2. Find lightning damages before they progress
3. Save repair cost and limit BI



You get insights to act on:

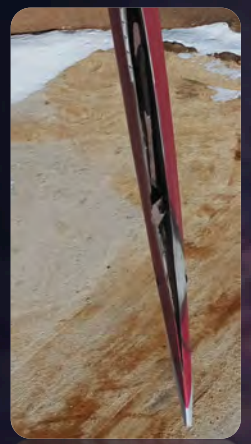




To discover these in time:

FLASH OVER DAMAGE RELATED TO DAMAGED DOWN CONDUCTOR CABLE

SPLIT TRAILING EDGE



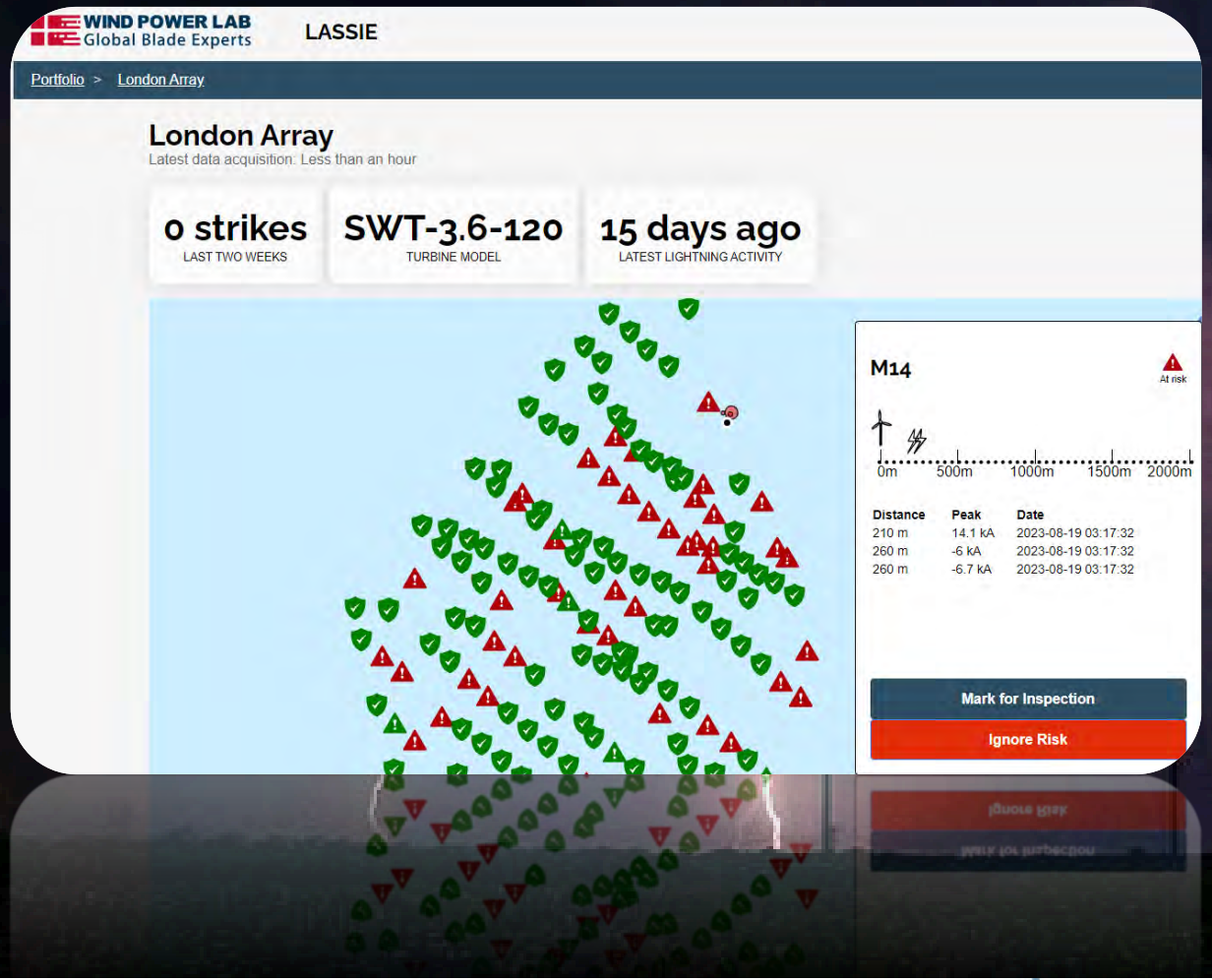
DELAMINATION

FLASH OVER DAMAGE

Repair before progressing into expensive repairs or catastrophic blade claims

ROI?

LASSIE for Owners and Operators



Owners & Operators

- challenge service providers to verify nothing has happened to your asset, based on in field insights
- challenge warranty
- become prudent operators

ROI: saving OPEX cost and keeping assets insurable

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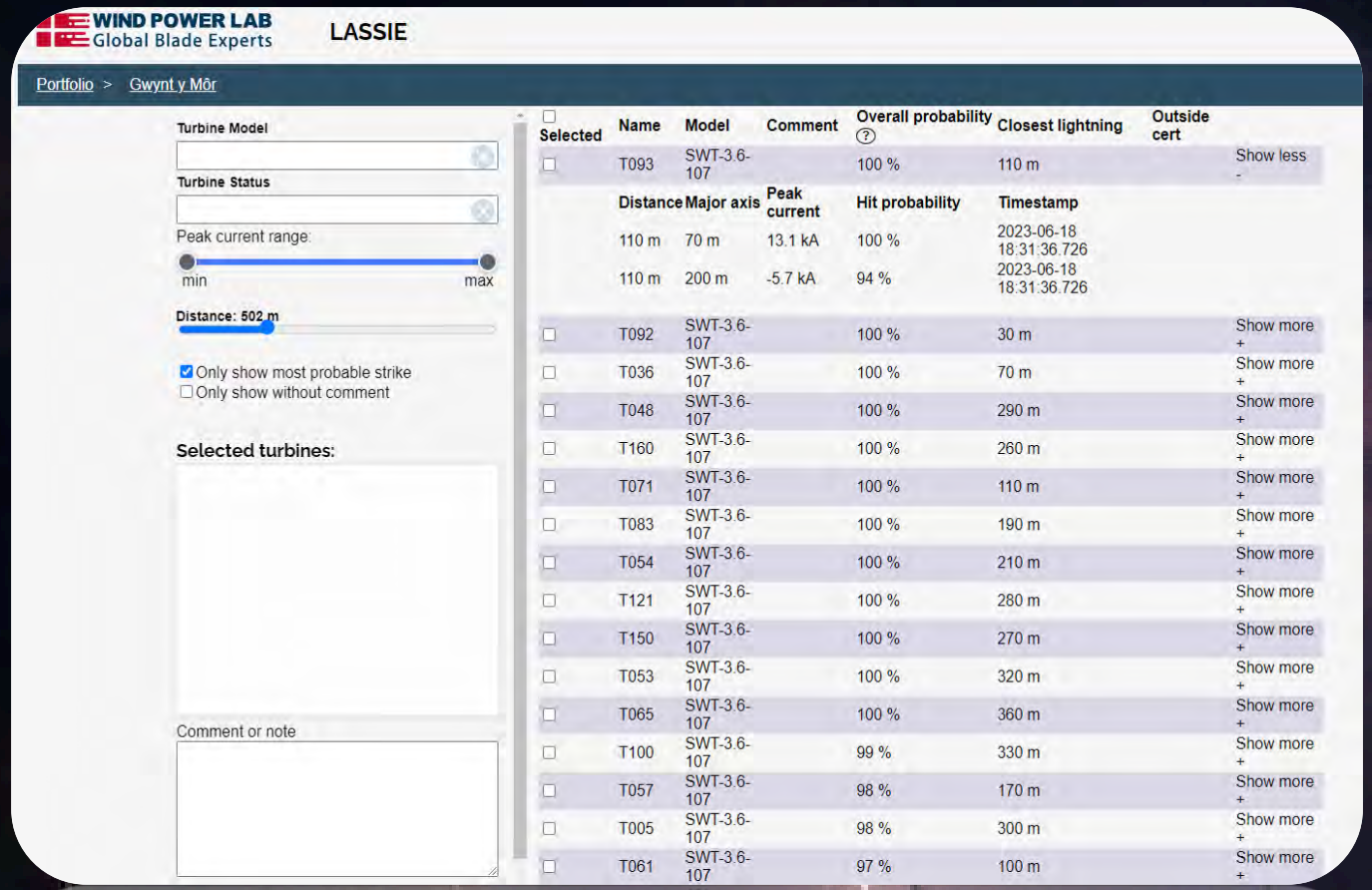
LASSIE for Risk Engineers and Brokers!



Brokers & Risk Engineers!

- True asset risk with respect to lightning, show the real risk as part of broking processes

- this is what your clients should have in place to control lightning risk, without being forced into installing expensive sensors

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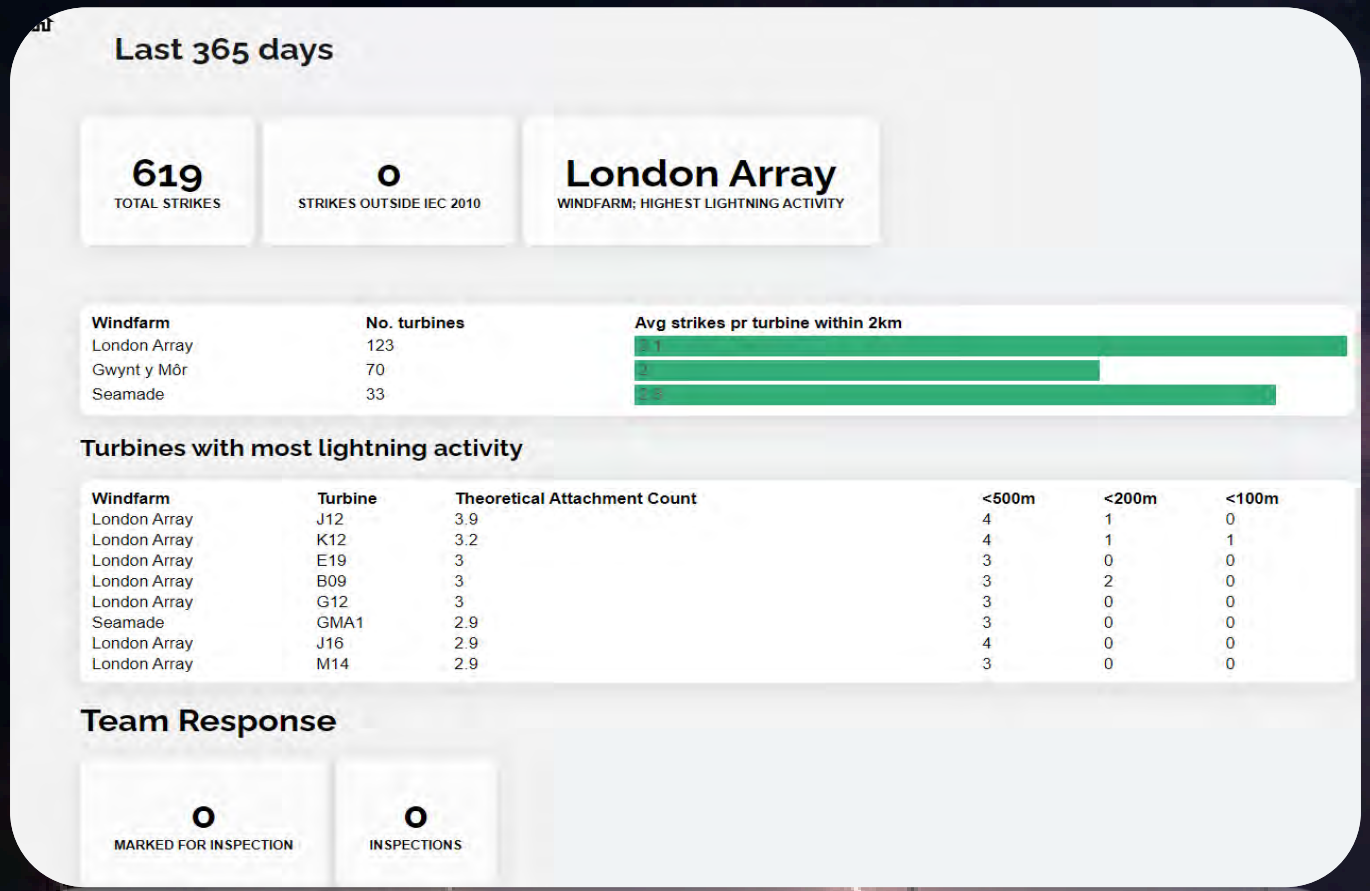
LASSIE for Underwriters!



Last 365 days

619	0	London Array
TOTAL STRIKES	STRIKES OUTSIDE IEC 2010	WINDFARM; HIGHEST LIGHTNING ACTIVITY

Windfarm	No. turbines	Avg strikes pr turbine within 2km
London Array	123	2.1
Gwynt y Môr	70	1
Seamade	33	2.0

Turbines with most lightning activity

Windfarm	Turbine	Theoretical Attachment Count	<500m	<200m	<100m
London Array	J12	3.9	4	1	0
London Array	K12	3.2	4	1	1
London Array	E19	3	3	0	0
London Array	B09	3	3	2	0
London Array	G12	3	3	0	0
Seamade	GMA1	2.9	3	0	0
London Array	J16	2.9	4	0	0
London Array	M14	2.9	3	0	0

Team Response

0	0
MARKED FOR INSPECTION	INSPECTIONS

Underwriters!

- this is your real traffic light validating if this potential client has their lightning risk under control

ROI: quality risk on policy

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True unforeseen events

The IEC standard LPL 1 requirements are expected to be handled by wind turbine blade lightning protection systems as per design
- if not, this is “just” yet another insurance case

This should be challenged – every time – with data and track record

Insurance is for unforeseen events like unexpected lightning damages

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