Efficient Energy Transmission

Webinar 18th of March,
2025

Beyond {data}

a webinar series by Libelium

libelium

grid360

Webinar Agenda

1. Presentation
2. Demo Live
3. Interactive Feedback Session

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Behind the change.
Beyond the challenge.

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Our value

An IoT Solutions for Sustainability creator based on an **horizontal sensors platform connected to the cloud with an E2E complete value proposition**

Our locations

HQ, Factory + Assembly (2006) and Calibration Lab (2022) in **Spain**

Sales Offices in **Germany** (2023), **Saudi Arabia** (2023) and **Colombia** (2022)

19 years of sound business

Our key figures

+9M€ 2023

100% YoY growth

+30% Recurrent clients

+5M non-refundable grants awarded for 2024/ 2025

+140 countries with our solutions

+90 high qualified employees

3+2 Patents granted in 2022 + in progress

7M€ 2024 secured backlog

+200 Air Quality solutions deployed on Smart cities

+170 awarded public tenders

Key Partners

Some key points

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iea

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Energy system Topics Countries Data Reports

Growth in global electricity demand is set to accelerate in the coming years as power-hungry sectors expand

News
14 February 2025

GREEN+

Electricity demand jumps as renewables keep up with growth

Global electricity demand will rise 4% yearly through 2027. Renewables will meet 95% of the surge, led by solar power.

Published on February 17, 2025

NETWORKWORLD

Topics Spotlight: Managing modern risks News

Home • Blogs • Data Center Explorer • AI driving a 165% rise in data center power demand by 2030

by Andy Patrizio

AI driving a 165% rise in data center power demand by 2030

News

abc.net.au/news/2024-08-19/the-ev-boom-is-putting-pressure-on-the-grid/104212982

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Behavorial change needed during infrastructure adaptation

No energy transition without transmission

Blog | 14 Aug 2024

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Blogseries on bridging the energy transition gaps | #1 Transport & infrastructure

lectricity demand and big batteries unity for the power grid

:h EV enthusiast Peter Petrovsky has been driving one for 10 years. *(ABC News: Daniel Mercer)*

Problem identification

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Nowadays the big challenge is to **integrate more energy from renewable sources** and adapt **existing infrastructures** to accommodate the new energy flow.

A considerable **Expansion of Electricity Networks** is required for the Energy Transition

More than 2,000 GW of renewable energy will need to be integrated into our current grid by the year **2040**

Transmission grids to be expanded by **20-50%** to a total length of **0.6-0.8 million km**, and **Distribution by 20-65%** to a total length of **12.4-14.7 million km**

The required buildout needs to jump from 500 to 10,000 km/year at **transmission level (20 times faster)**. **3 times faster for Distribution Level**

Solving the problem

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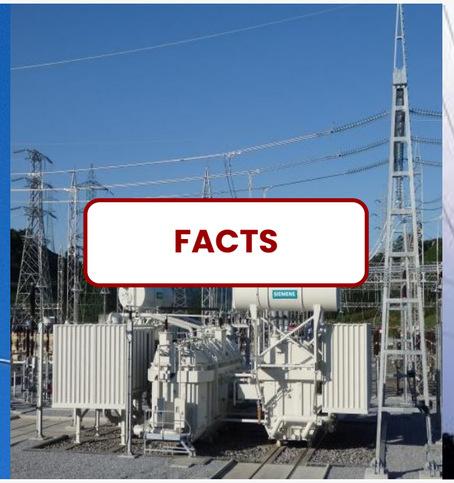
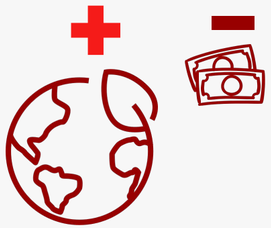
Power companies have various alternatives to **increase the transmission capacity of the power line.**





Order of evaluation according to
Environmental sustainability and economic impact.

NORE – Principle: Network Optimization before Reinforcement and Expansion

DLR: The Key Enabler

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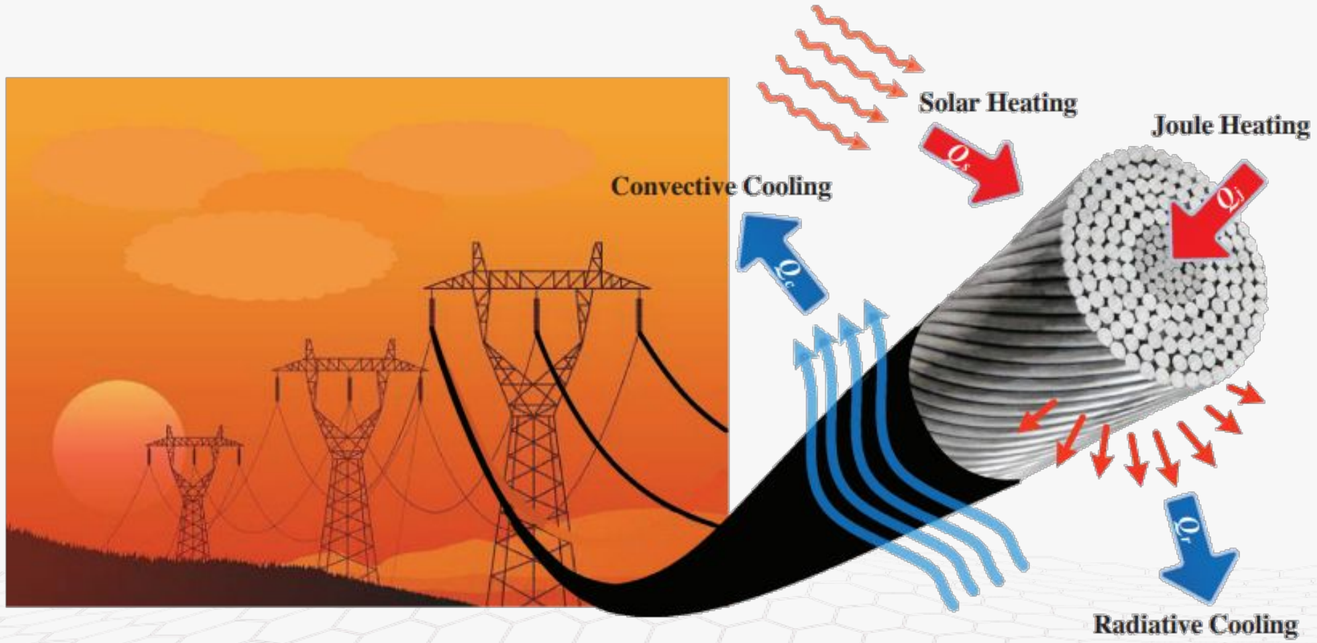

The maximum energy a conductor can bear depends directly on the max temperature it can withstand.

+

The temperature of a conductor depends not only on the current flowing through it but also on environmental conditions

=

Ampacity, or DLR (Dynamic Line Rating), is the maximum capacity of a conductor to transmit energy, considering both factors

DLR: The Key Enabler

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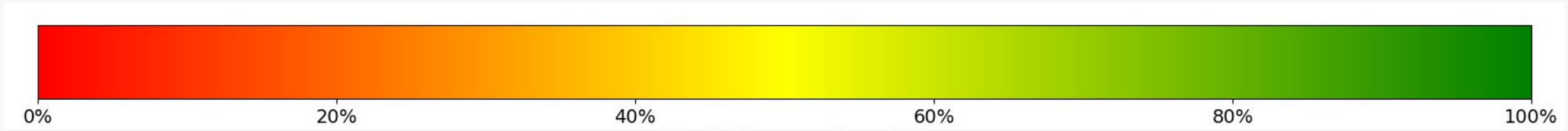
Weather Ampacity Impact



How favorable is transportation?

Most unfavorable situation

Most favorable situation

A 1ºC decrease in ambient temperature results in a 1% increase in transmission capacity.
The impact of radiation is lower, but during a total eclipse, transmission capacity increases by approximately 15%.
A 1 m/s increase in frontal wind to the line leads to a 40% increase in line capacity.

Any **solution** that aims to implement

real-time and forecast-based DLR

must incorporate a high-quality weather measurement system, as **there is no system that provides better measurements with less deviation than one that measures these conditions locally**.

Libelium Environmental Expertise

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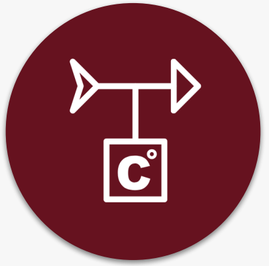
Our experience is backed by nearly **20 years working in the IoT sector**, deploying technology tailored for precise parameter measurement.

This expertise has been built through **more than 80 environmental management projects** we've successfully undertaken.



Our weather measurement technology is present **in over 25 countries, with more than 550 stations deployed** for monitoring environmental parameters.

Our **AI software, featuring Digital Twins,** currently recreates virtual conditions in **more than 10 projects**, where the **decision-making dashboard serves as a vital tool enabling data-driven decisions.**

Our Proposal

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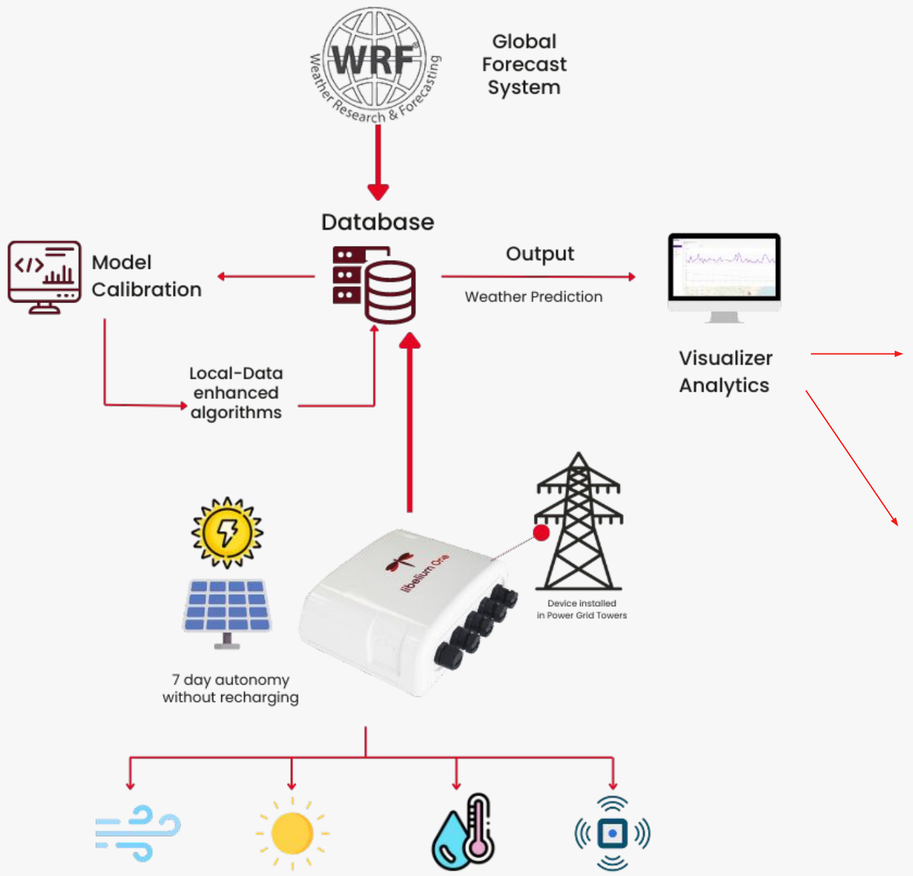
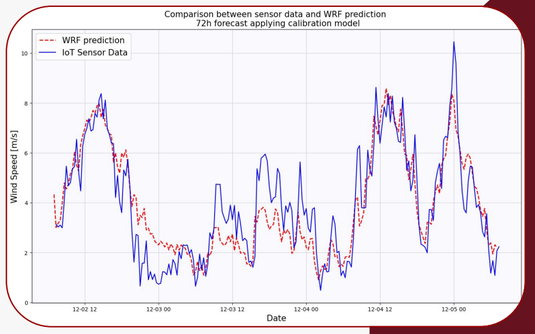
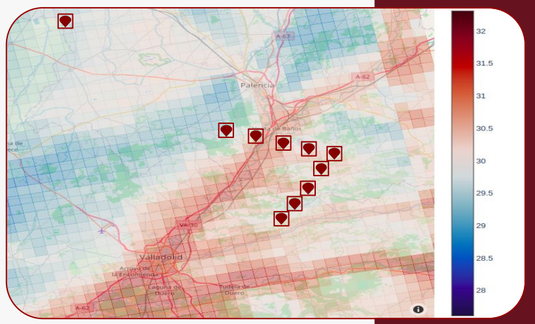
Innovative Approach: Hybrid Solution





Weather Forecasting Over Time



Spatial Weather Forecasting

Monitoring the key parameters to calculate DLR.

Digital Twin Modeling module to generate 96-hour weather data predictions for better planning.

Key Environmental parameters are provided for DLR Calculation, identifying critical spans which determine the maximum rating of the OHL.

Unlocking Energy Transition

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DLR presents itself as one of the most innovative technologies to emerge in recent years, offering a more economical, sustainable, and readily implementable alternative

Increases

DLR allows power companies i**ncreases energy transportation by 30%** and up to 50%.

Speed

The advantages are significant as **improvements can be operational in less than a year**.

Investment

DLR is the **most economical alternative**

Sustainability

DLR increases network capacity by improving its performance, **using the existing infrastructure without the need for new**

Our Proposal

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Competitors Comparison

How do we do it regarding others?	grid360	SW solutions with meteo reference data	Ampacinometer-based solutions	LiDAR-based solutions
No Line Disconnection	✓	✓		✓
Unaltered Line Load	✓	✓		✓
No Impact On Supporting Structures	✓	✓		✓
Easy Installation	✓	✓		
Uninterrupted Supply	✓	✓		✓
Easy Maintenance	✓	✓		
Local Wind Data	✓			
Immediate Operational Check	✓		✓	✓

grid360: Unique Selling Points

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Unique SW Features

- **Accuracy: Enhanced Weather Forecasting** up to 60% better from numerical modelling
- **Local alarms set-up**
- **Identification of most suitable time for on-site maintenance**
- **Easy to Interoperate**
- **Data completion Module**
- **Measurement correction Module**

Operation Features

- **No outages**
- **Anti-tampering detection tool**
- **Automatic erroneous measure HW-detection**
- **Easy Re-allocation**
- **Improvements from 1st minute**
- **Estimates for multiple Parallel Lines**
- **Autonomous** solution: self-configured frequency adjustment

Numerical Models VS grid360 Comparison

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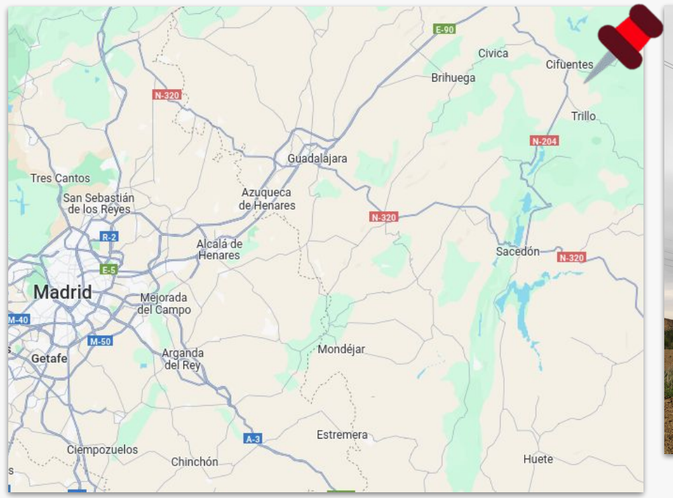

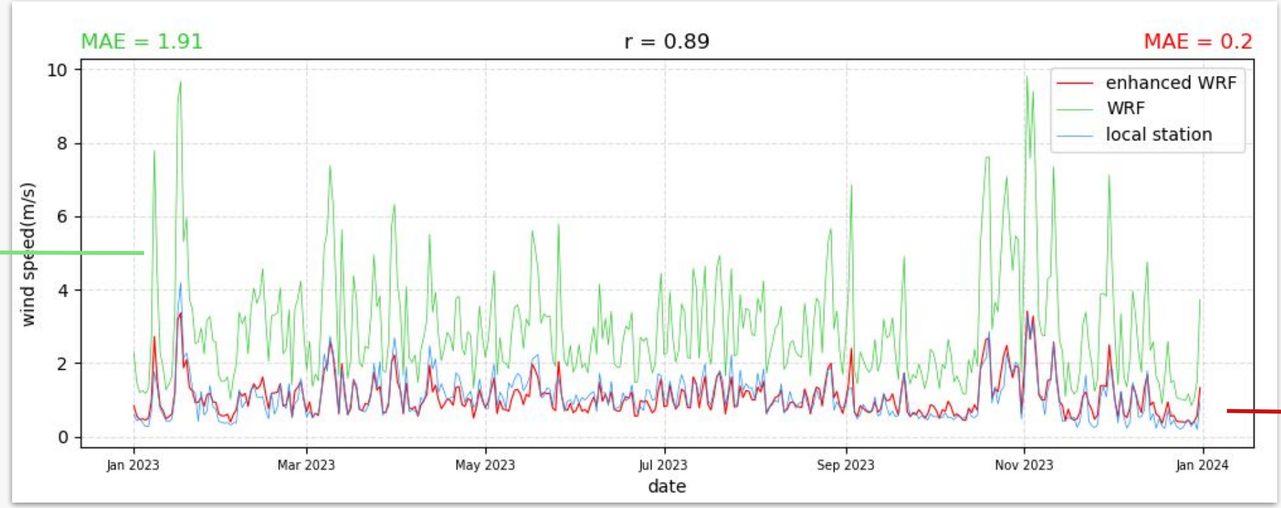

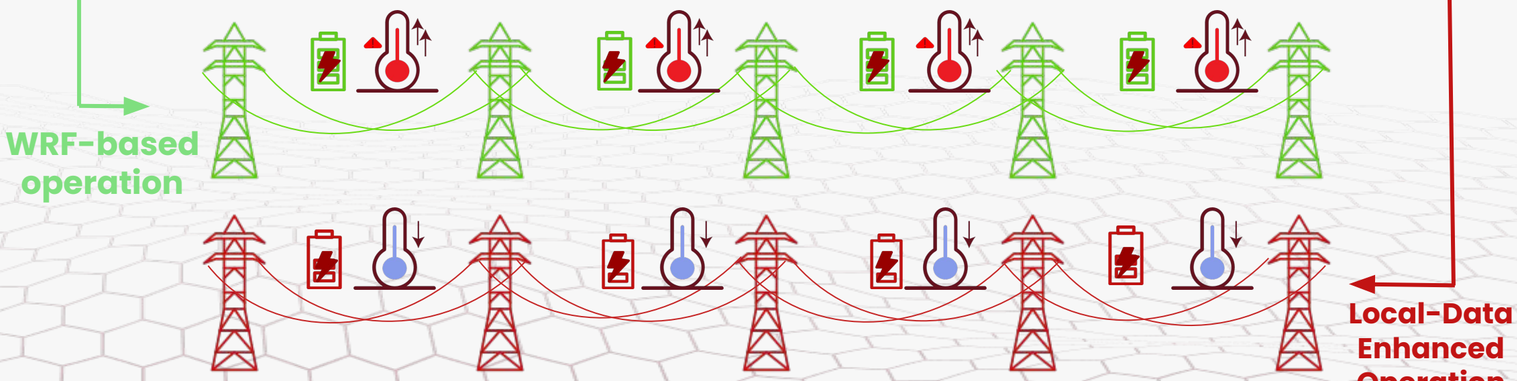

Numerical Models VS grid360 Comparison

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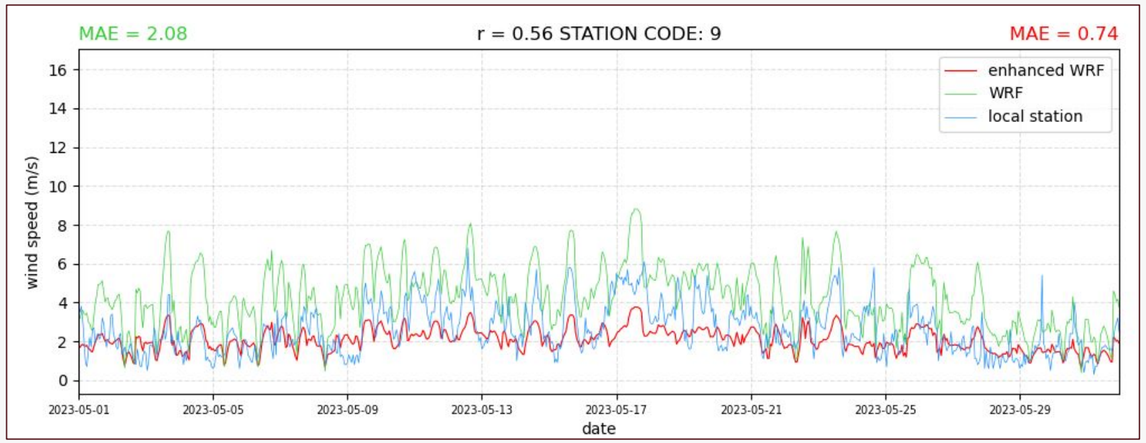

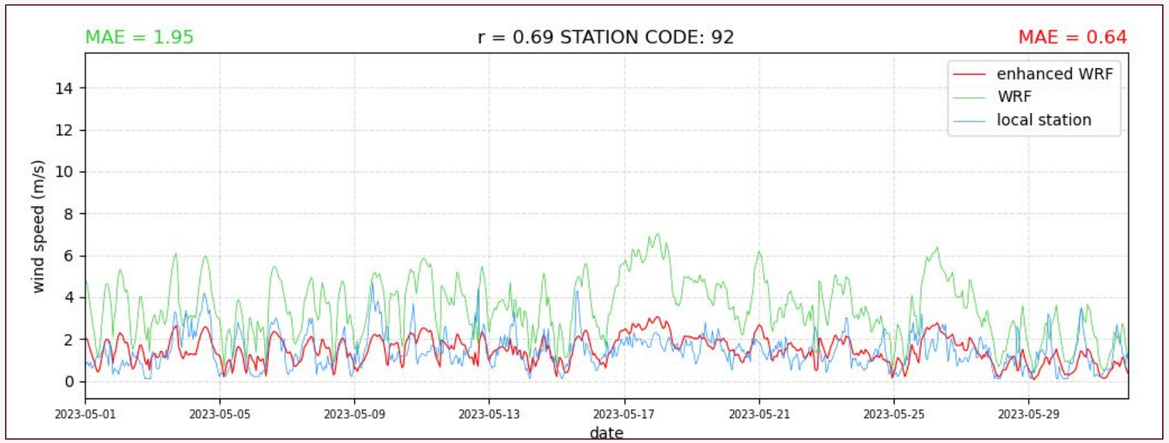

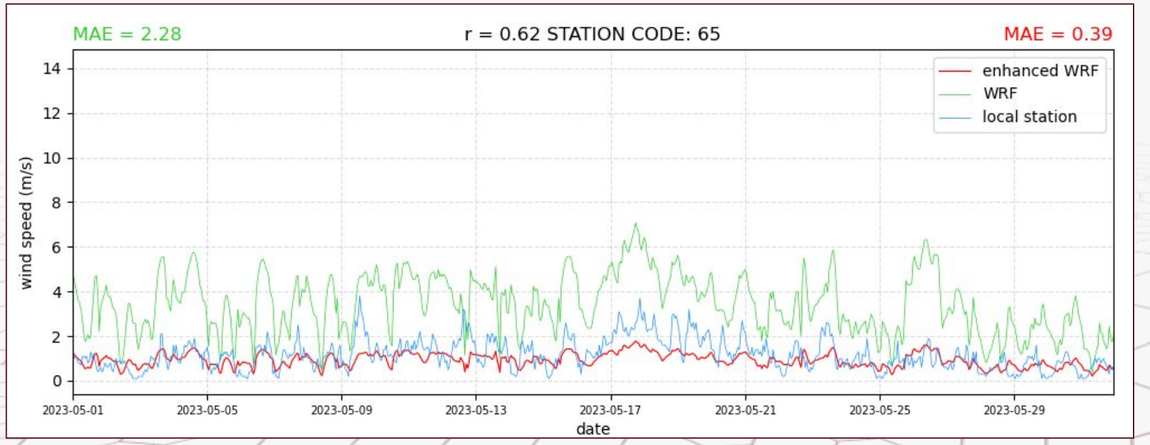

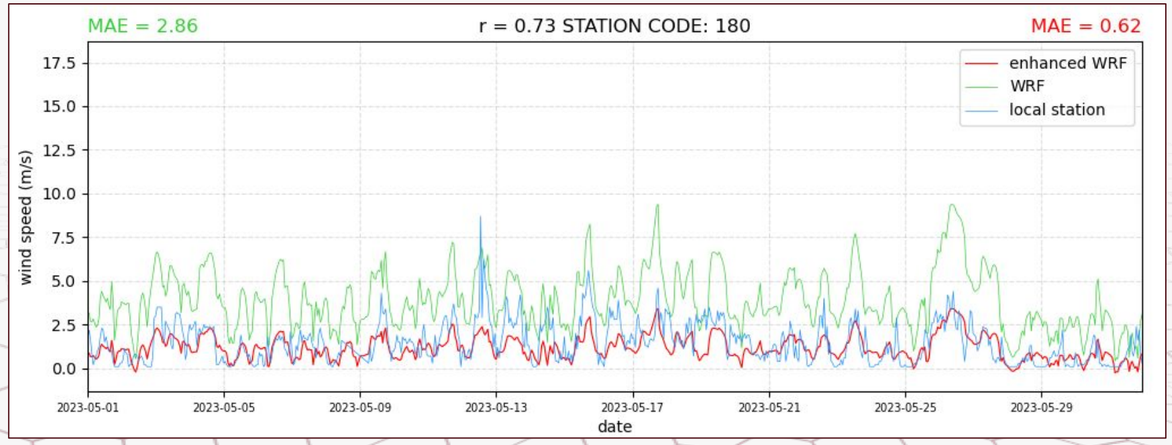

Numerical Models VS grid360 Comparison

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STATISTICAL VALUES FOR WIND SPEED MADRID STUDY				
STATION CODE	WRF	grid360	R2	Improvement Index
5	1.738	0.468	0.622	**73.05%**
6	1.647	0.588	0.712	**64.30%**
7	1.808	0.583	0.726	**67.77%**
9	2.082	0.742	0.562	**64.38%**
13	1.931	0.480	0.720	**75.15%**
14	2.198	0.977	0.632	**55.55%**
16	1.682	1.333	0.326	**20.74%**
45	2.067	0.804	0.570	**61.11%**
47	1.327	0.566	0.667	**57.36%**
49	2.498	0.583	0.609	**76.67%**
58	1.817	0.475	0.673	**73.85%**
65	2.278	0.388	0.619	**82.99%**
67	3.306	0.945	0.219	**71.41%**
74	2.308	0.423	0.688	**81.66%**
80	1.174	0.553	0.728	**52.87%**
92	1.951	0.638	0.688	**67.29%**
120	2.464	0.490	0.524	**80.13%**
123	1.417	0.654	0.690	**53.84%**
133	1.505	0.987	0.552	**34.38%**
148	1.614	0.533	0.595	**66.96%**
161	1.975	0.890	0.672	**54.94%**
171	1.705	0.791	0.560	**53.61%**
180	2.861	0.622	0.735	**78.25%**

	WRF	grid360	R2	Improvement Index
Maximum	**3.31**	**1.33**	**0.73**	**82.99%**
Minimum	**1.17**	**0.39**	**0.22**	**20.74%**
Mean	**1.92**	**0.64**	**0.59**	**61.49%**

- **Average improvement of grid360** graph compared to WRF is **above 60%**
- Under certain circumstances, there are **minimums of 20%** where the model does **not significantly improve WRF forecasts**
- However, most of the time it is **above 50%**, reaching **improvement levels of up to 80%**

Our Experience
Success Case

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+170 weather stations

+500 km of monitored lines

On-Premise Digital Twin

grid360

+200GWh capacity increased

Energy supply to more than 64,000 households

+ 50,000 ton CO2 emissions saved

Beyond {data} a webinar series by libelium

¡GRACIAS!

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Interactive Feedback Session

Join our live questionnaire at menti.com using code 4400 1530, or scan the QR code.

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