Accelerating Wind Development

Diseño de un parque eólico en Chile: Evaluación de la competitividad de escenarios mediante un enfoque holístico y diferentes fuentes de recurso eólico.

Barcelona – Reykjavik
info@youwindrenewables.com
www.youwindrenewables.com

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Renewables

Who we are

Youwind Renewables was established in 2018 by a team of wind industry experts. As a SaaS company, Youwind offers a web-based solution designed to accelerate the initial stages of wind projects.

Vision

We aspire to revolutionize the renewable energy industry by enabling faster, more efficient, and cost-effective project development.

Mission

To provide a cutting-edge SaaS solution that streamlines and optimizes the early phases of wind development globally. By combining advanced financial and engineering models together with data.

Sergi Roma
Business Developer

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Our Company History

2016

The motivation

Founders Edvald and Anna lacking tools and resources back at working for key leaders in offshore wind in Denmark

2018

Company launch

Become **first movers** as SaaS providers to accelerate early-stages of offshore development with Youwind Model, merging engineering and financial modelling in one place

2019

Logistics capabilities

Launch of OptiWindow: Logistics optimization at CAPEX and weather downtime.
First big developers enter our portfolio

2021

Innovation Recognition

Nominated best start-up in Wind Europe and Elia Innovation Challenge.
First big consultancies firms enter our portfolio

2022

Layout and yield accurate calculations

Pixel and Pixel Park Apps launch for GIS constraint analysis and layout optimization for bankable yield assessments

2023

Consolidation and Expansion

Half of top 6 offshore wind developers are recurrent clients.
Relevant increase of clients' portfolio in EU and APAC, being the tool behind more than 10 awarded projects

2024

Usability and extension to onshore

Pixel+ launch, the enhanced Youwind experience launch.
Nominated Best Innovation Solution at Tamarindo Awards.
Release for ONSHORE with first clients

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The Youwind Platform

Accurate Data Handling
+
Advanced Engineering & Financial fast Modelling
+
User Friendliness

Reduce project risks from early phases

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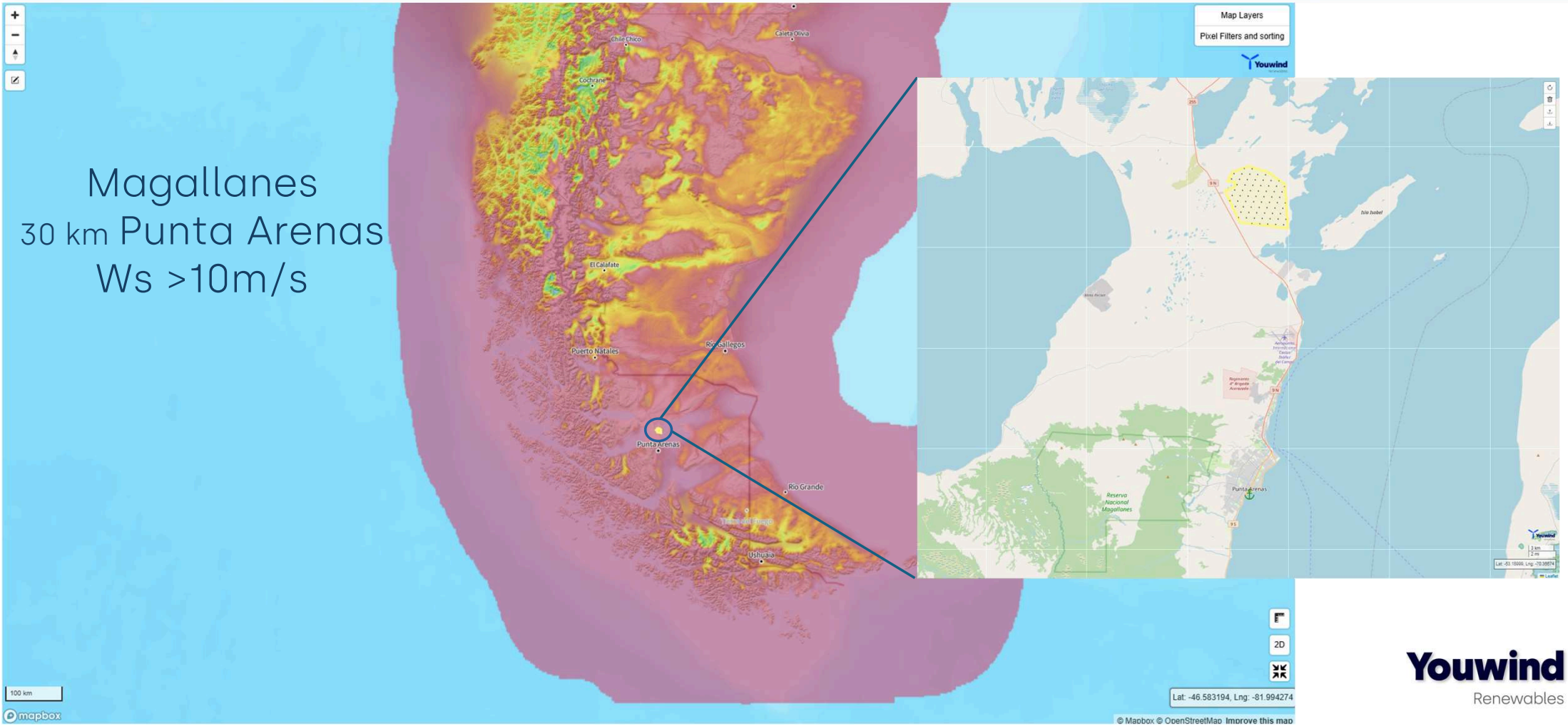
Study case

Magallanes
30 km Punta Arenas
Ws >10m/s



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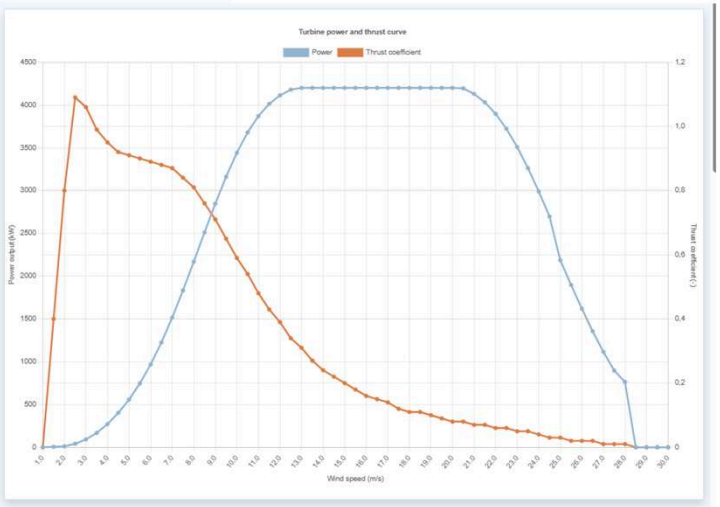
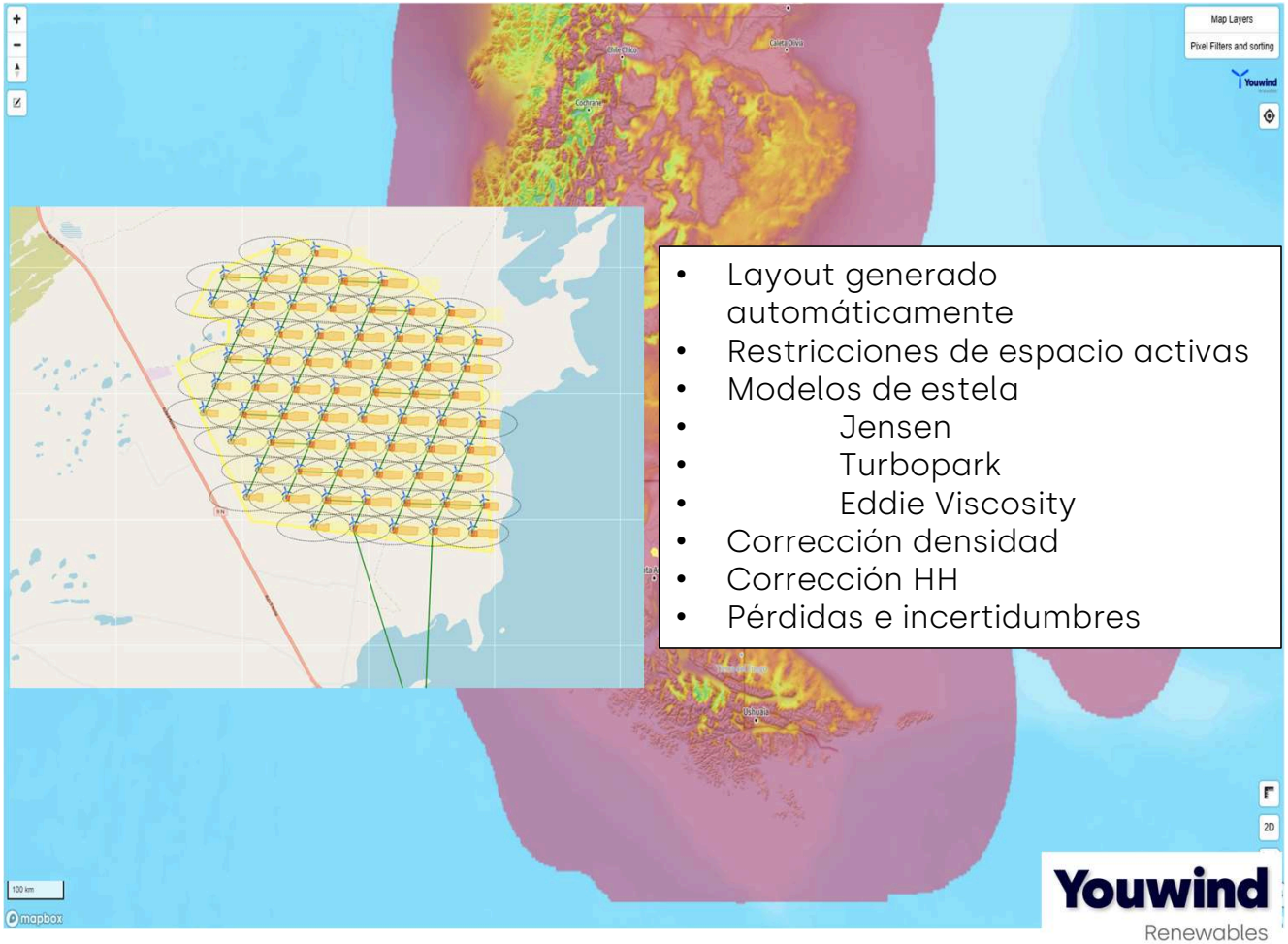
Study case – Descripción y motivación

Consideraciones Layout



- Capacidad ~ 300MW
- 68 x Enercon EP3 - E3 138
- HH 100m
- Subestación en zona industrial Cabo Norte



- Layout generado automáticamente
- Restricciones de espacio activas
- Modelos de estela
  - Jensen
  - Turbopark
  - Eddie Viscosity
- Corrección densidad
- Corrección HH
- Pérdidas e incertidumbres

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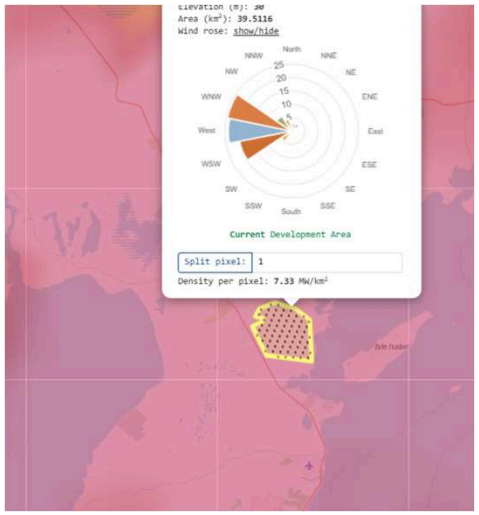
Study case – Recurso a 100m HH

MAPS

Ws = 11.1m/s
A 12.53
K= 2.32



FARM

Wind Resource Grid

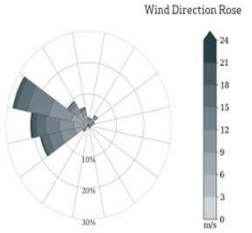
Mean Wind Speed (m/s)	Weibull A	Weibull k	Temperature (°C)	Density (kg/m³)
10.4	11.7	2.6	5.9	1.26

Bin/Sector Ocurrence Table

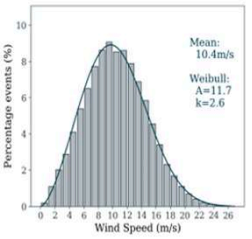
deg → m/s ↓	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	%	TI	STI
0-1	1.9	2.9	1.8	2.4	3.9	1.9	0.0	1.3	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.2		
1-2	7.6	9.8	7.7	7.9	7.8	5.9	4.7	3.9	1.8	2.6	4.2	3.7	8.5	6.1	5.7	7.5	1.1		
2-3	13.7	13.8	16.1	11.4	13.0	9.2	7.8	6.8	2.7	4.5	7.3	11.8	16.0	11.2	15.2	16.6	2.9		
3-4	17.1	17.9	21.9	16.1	13.6	10.3	13.8	8.6	3.8	5.7	11.3	20.4	23.6	20.1	24.8	23.3	2.9	28.7	6.0
4-5	20.4	23.0	32.7	18.2	15.1	11.5	16.8	11.9	5.3	5.0	15.2	33.2	41.6	37.6	40.3	32.7	4.1	15.6	5.3
5-6	24.5	23.8	39.0	16.5	13.4	8.2	14.6	15.0	7.2	3.3	19.2	55.3	61.9	67.2	60.1	43.1	5.4	13.0	4.9
6-7	24.9	23.6	43.0	18.1	10.2	5.3	9.2	14.6	6.5	3.3	22.2	78.3	82.1	97.3	78.2	54.6	6.5	11.6	4.5
7-8	23.4	23.0	42.6	18.5	7.4	4.4	5.0	12.3	4.9	1.4	24.8	111.2	107.3	135.6	93.8	60.8	7.7	10.9	4.3
8-9	23.0	17.4	40.6	17.5	7.7	2.6	2.3	7.7	3.8	0.0	25.1	124.8	134.0	182.7	103.8	62.2	8.6	10.8	4.1
9-10	18.8	13.4	32.3	14.8	4.7	1.5	1.1	6.3	3.7	0.0	21.1	142.4	144.1	234.0	98.5	56.9	9.1	11.0	3.8
10-11	14.8	9.6	23.9	13.2	4.0	1.1	0.0	4.4	2.8	0.0	15.9	146.8	143.5	278.9	81.7	47.2	8.5	11.4	3.2
11-12	10.9	6.3	16.9	10.2	3.5	0.0	0.0	3.6	2.2	0.0	14.5	164.5	155.0	264.1	72.7	39.5	8.6	11.8	2.7
12-13	6.9	4.5	10.3	8.7	3.4	0.0	0.0	1.9	1.6	0.0	11.2	150.8	154.4	253.0	54.0	29.7	7.9	12.2	2.4
13-14	3.8	2.3	6.4	6.1	3.7	0.0	0.0	1.3	0.0	0.0	8.1	131.2	149.0	206.1	36.0	18.6	6.9	12.4	2.1
14-15	2.4	1.7	3.3	4.5	3.1	0.0	0.0	0.0	0.0	0.0	6.0	114.2	141.9	200.5	23.1	11.0	5.8	12.6	1.9
15-16	1.3	0.0	2.0	2.7	1.1	0.0	0.0	0.0	0.0	0.0	3.2	91.2	122.7	156.4	12.1	6.4	4.6	12.7	1.7
16-17	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	2.6	67.2	98.3	117.1	6.8	3.2	3.4	12.7	1.4
17-18	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.6	43.7	73.0	78.4	3.3	1.5	2.3	12.7	1.3
18-19	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	31.0	58.3	55.6	1.8	0.0	1.7	12.6	1.2
19-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	42.6	34.5	0.0	0.0	1.1	12.5	1.0
20-21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	29.7	18.8	0.0	0.0	0.7	12.4	1.0
21-22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	20.7	8.1	0.0	0.0	0.4	12.3	1.0
22-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	13.1	3.2	0.0	0.0	0.2	12.2	0.9
23-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	8.3	1.3	0.0	0.0	0.1	12.2	0.9
24-25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	12.2	0.3
25-26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	12.1	0.6
26-27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	12.0	0.4
27-28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%	2.5	2.2	3.9	2.2	1.3	0.7	0.9	1.1	0.5	0.3	2.5	17.8	21.0	27.9	9.3	5.9		12.25	3.24
Inflow (deg.)	-0.1	-0.1	-0.1	-0.2	-0.3	-0.6	-0.5	-0.1	-0.0	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2		
Shear	0.30	0.30	0.19	0.18	0.18	0.14	0.11	-0.05	0.17	0.27	0.18	0.18	0.18	0.20	0.23	0.27	0.28		

Table 1: Occurrences are expressed in hours per year. Turbulence intensity (TI) and its standard deviation (STI) for each wind speed bin are shown in the last two columns. The last two rows show the inflow angle (vertical wind) and shear exponent for each direction sector. The totals for these magnitudes are the weighted average with respect to the wind speed bins or direction sectors populations.

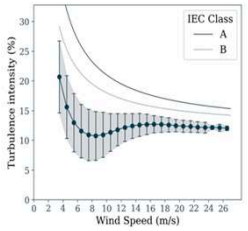
VORTEX



Wind Speed Histogram

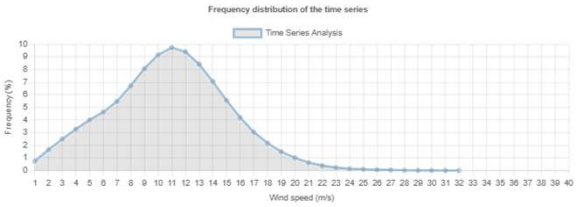


Turbulence Intensity Plot

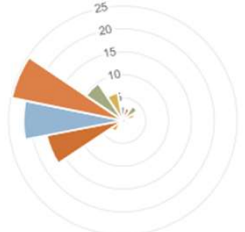


VORTEX

Ws = 10.82



Wind Rose of VORTEX (www.vortexfdc.com) - Computed at 333m resolution based on ERA5 data



Source: Timeseries data (-52.870422, -70.881689)

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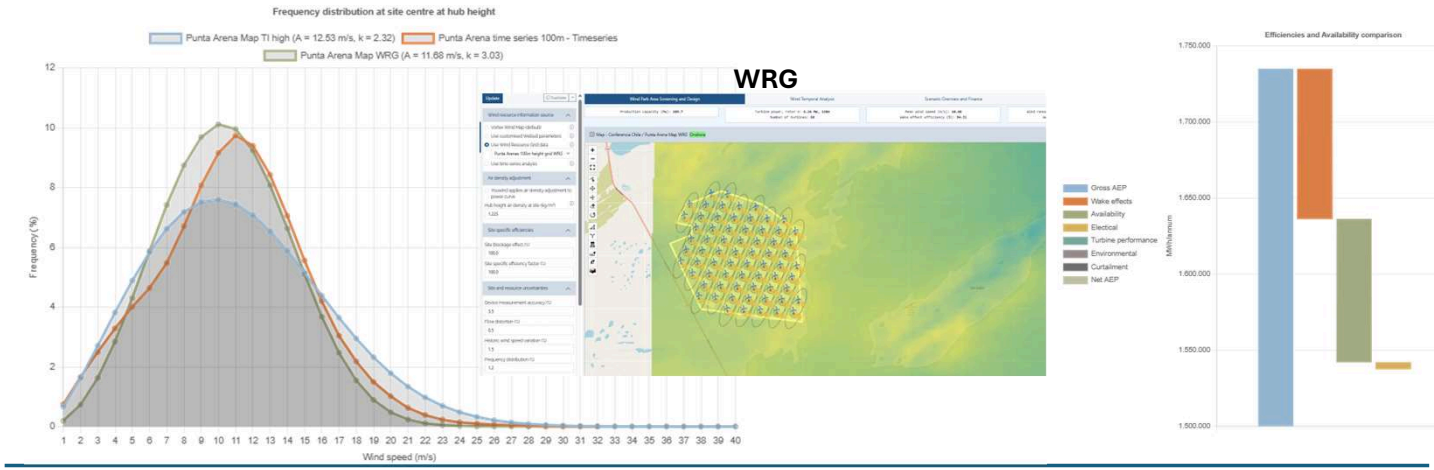
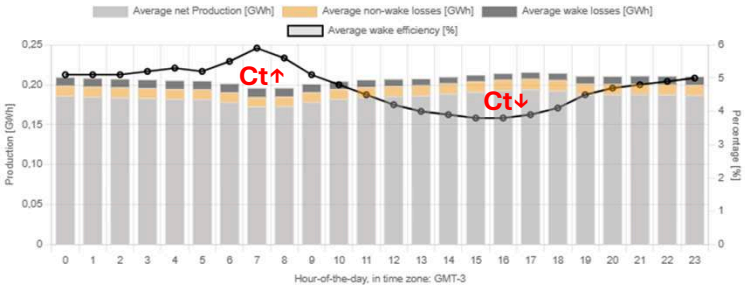
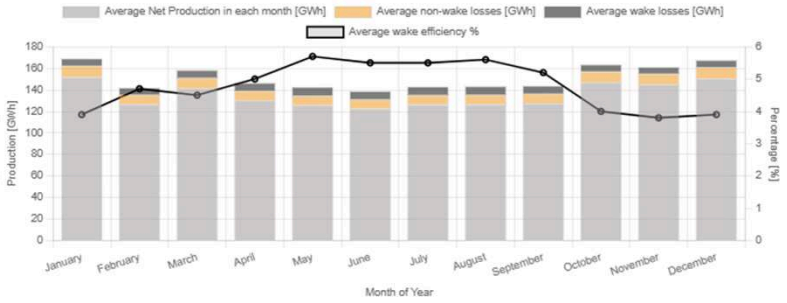
Study case – Recurso a 100m HH



Distribución

- Pico pronunciado para las series
- Escala temporal y efectos locales
- Incertidumbre fuentes en siting





Series

- Estacionalidad moderada
- Variación día noche
- Wake unidireccional

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Study case – Resultados

	MAPS	FARM	TIMES
Gross AEP (MWh)	1,737,627	1,734,930	1,820,833
Wakes	4.95%	5.69%	5.24%
Net P(50) AEP (MWh/a)	1,543,902	1,529,721	1,621,588
LCOE $/MWh	1.00 (ref 45.08)	1.01 45.47	0.96 43.15

Madurez proyecto

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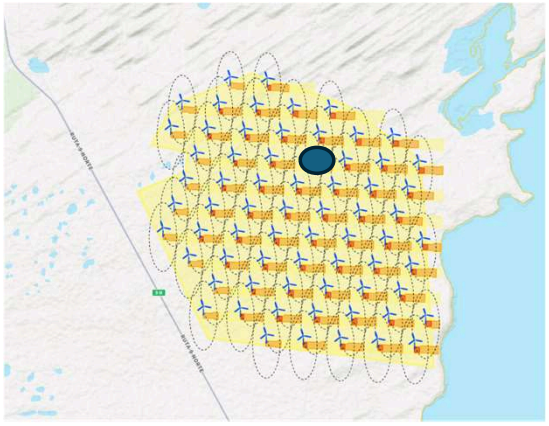
Study case – Variantes

MAPS

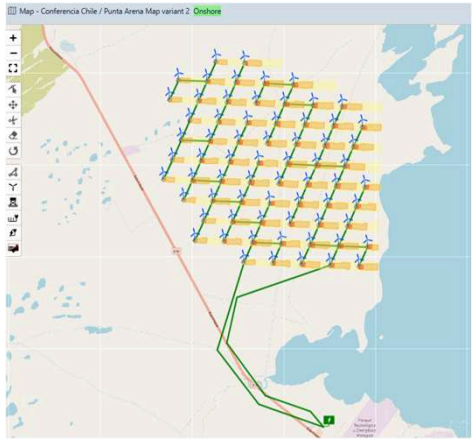
Enfoque holístico. Evaluación de distintos escenarios a partir del caso base (datos viento de Maps). Sensibilidad a elementos de diseño de parque complementarios.

Original
68 WTGs

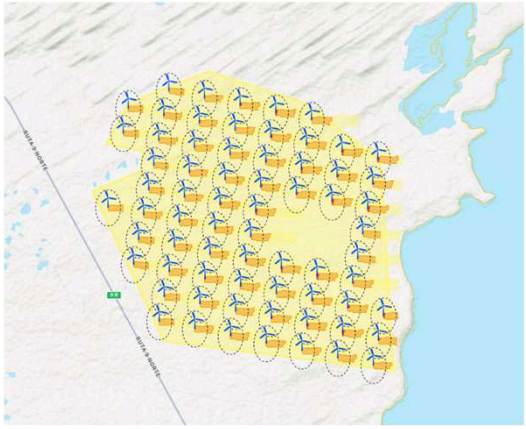
Variante 1
67 WTGs



Variante 2
Cableado
Subestación



Variante 3
68 WTGs
Distinto criterio Layout
Orientación en 280º



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Study case – Variantes

MAPS

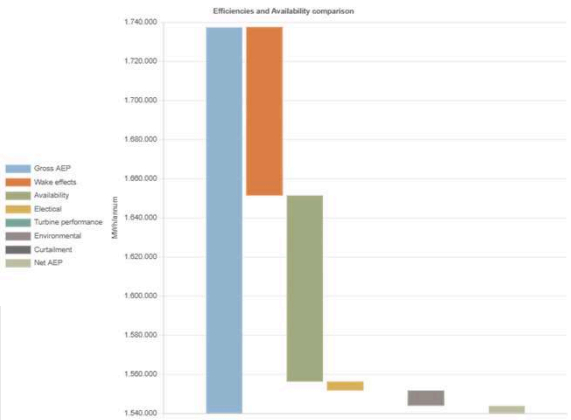
Enfoque holístico. Evaluación de distintos escenarios a partir del caso base (datos viento de Maps). Sensibilidad a elementos de diseño de parque complementarios.

Original
68 WTGs

Variante 1
67 WTGs

Δ NET AEP -1.37%
Δ LCOE 0.02%

Variante 2
Cableado
Subestación



Δ LCOE 4%

Variante 3
68 WTGs
Distinto criterio
Layout
Orientación en 280°

Δ NET AEP -0.11%
Δ Capex -0.31%
Δ LCOE 0.21%

Con viento de entrada "fijo":

- Escenario original sensible a variaciones de CAPEX y financieras
- Layout orginial estable, numero de WTGs alrededor del óptimo. Impacto de variaciones marginal

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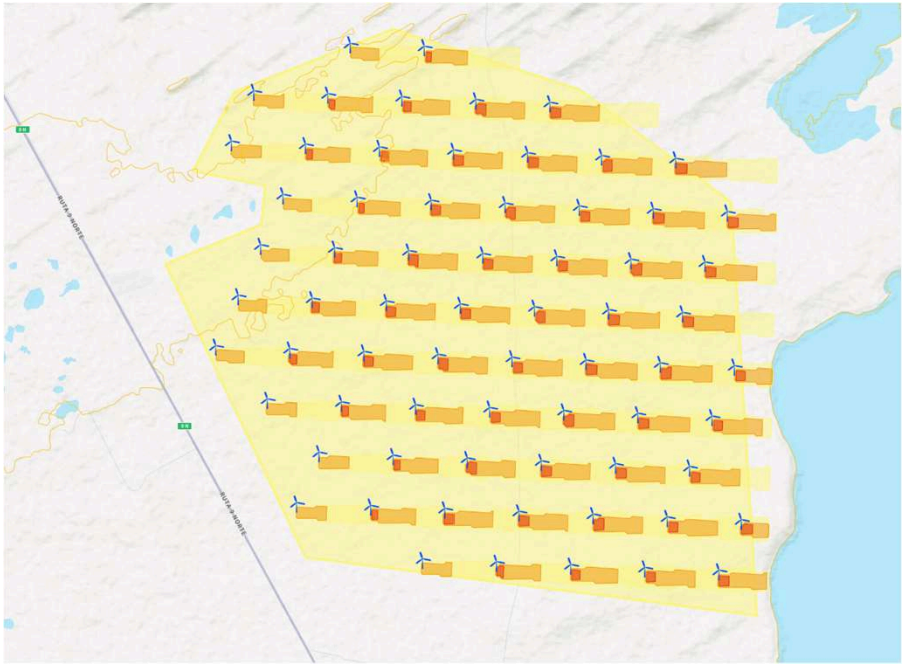
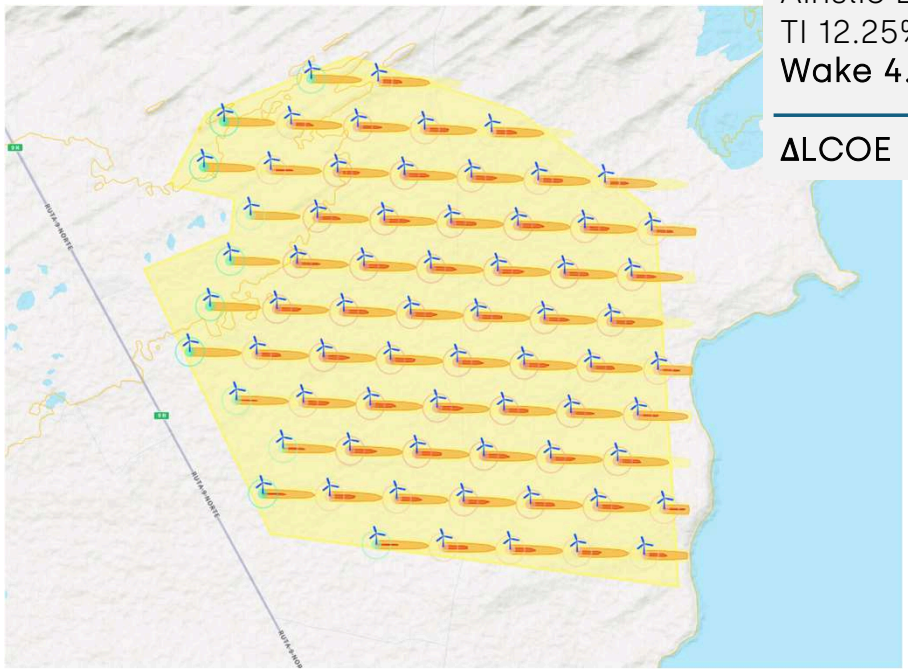
Study case – Variantes

MAPS

Variante Plus
Modificando el modelo de estela,
Sustitución modelos linealizados como Jensen por modelos con turbulencia

Original
Jensen
Wake 4.95%





Variante Plus
Ainslie EV
TI 12.25%
Wake 4.06%

ΔLCOE - 5.98 %

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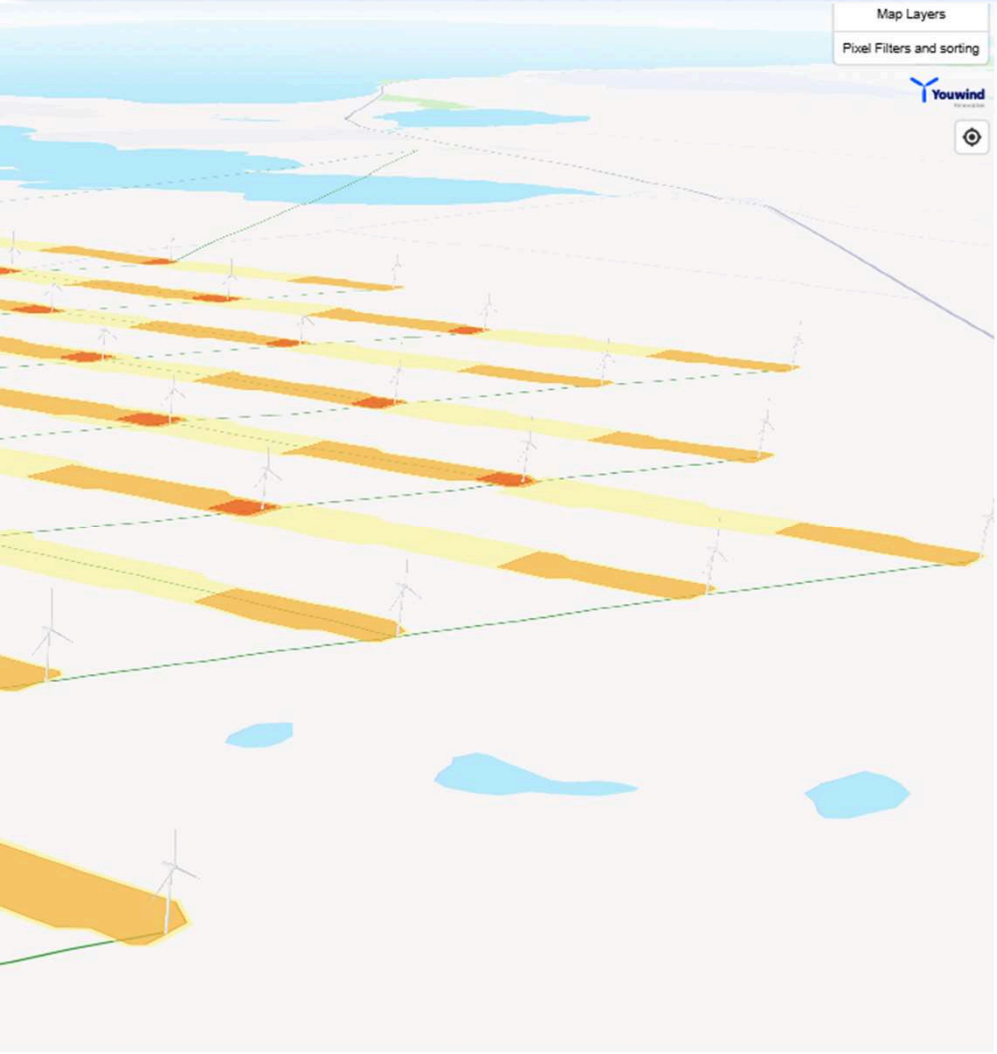
Study case – Conclusiones



1. **Modelo de estelas** → impacto significativo en LCOE, especialmente cuando conocemos TI
2. **Sensibilidad a los datos de viento** de origen. Su influencia en el LCOE es tan fundamental como elementos estructurales del proyecto → **importancia del enfoque holístico**:
   - Equivalente a incluir infraestructura eléctrica
   - Equivalente a modelo de estelas sofisticados
   - Equivalente a cambio realmente significativo de layout
3. **Optimización** e iteración de diseño → Selección de datos de viento en función de la fase de diseño, madurez del proyecto, estimación de incertidumbres para comparación consistente

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Have you ever experienced...?

Made by industry experts for a wide range of users

We have experienced many of these challenges in the past, hence we developed the ultimate IT solution to all of them and more to make your project development leaner

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*Real statements heard by Youwind team members during their past experiences

Gracias!

Sergi Roma
Business Development

srs@youwindrenewables.com
+34 609034136
www.youwindrenewables.com
Reykjavik · Barcelona

Book a demo!

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