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Energy Island Baltic Sea

Site Wind Conditions Assessment

Energy Island Baltic Sea

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Executive Summary

Objective

The objective of this technical report is to present the findings of the Site Wind Conditions Assessment conducted by EMD International A/S for Energinet in relation to the Energy Island project in the Baltic Sea.

Background

Energinet has commissioned the Energy Island project in the Baltic Sea. The Energy Island project is expected to generate significant amounts of renewable energy and reduce carbon emissions. As wind is the primary source of energy for the project, a thorough assessment of the site wind conditions is crucial for its successful implementation.

Methodology

The site wind conditions assessment is based on 12 months of onsite measurements using floating LiDAR systems (FLS) in the Baltic Sea Energy Island Offshore Wind farm Zone (OWF) and delivers the site wind condition parameters according to IEC 61400-1 [1], IEC 61400-3-1 [2] and in addition refers to Eurocode EN1991-1-4 [3] including the Danish annex [4], DS 472 ed.2 [5] and IEC 61400-15-1 CD [6].

The site wind conditions assessment is intended to serve as basis for:

- Preliminary site-suitability analysis of the Wind Turbine Generator (WTG) and Rotor Nacelle Assembly (RNA)
- Front-End Engineering and Design (FEED) of offshore support structures for WTGs and other structures.

The report includes a presentation and analysis of onsite data from the two buoys deployed on site as well as secondary measurements surrounding the site and sourced for this purpose. A wind model has been created for the site through long-term correction of 12 months of onsite LiDAR data with 20 years of EMD-WRF mesoscale data (labelled “Primary Wind Model”).

The Primary Wind Model has been backed up by two alternative models, based on data from the FINO2 meteorological mast and Taggen meteorological mast. The two alternative models are in good agreement with the Primary Model on mean wind speed for the site, given the distance from the Baltic Sea Energy Island OWF and the data quality.

Due to the short measurement period and the nature of the LiDAR measurements, the site condition parameters are supported or replaced by data from secondary sources. These include the GASP [7] dataset, secondary measurements or WRF model data.

Calculations are done in windPRO 3.6 and 4.0, developed by EMD International A/S.

Results

The site condition parameters are summarized in Table 1.

Table 1. Summary table of Site Wind Condition parameters at the four selected positions on the Baltic Sea Energy Island OWF zone. All values refer to 150 m height above sea level (ASL). Based on 1 year of onsite measurements.

Parameter	Position 1	Position 2	Position 3	Position 4
Mean wind speed	9.92 m/s	9.94 m/s	9.96 m/s	9.96 m/s
Weibull distribution, A parameter (scale)	11.20 m/s	11.22 m/s	11.25 m/s	11.25 m/s
Weibull distribution, k parameter (shape)	2.18	2.18	2.19	2.18
Normal wind profile power law exponent	0.095	0.094	0.094	0.095
Turbulence intensity mean value (TI_{μ}) at a 10-min average wind speed of 15m/s*	4.3%	4.3%	4.3%	4.3%
Turbulence intensity standard deviation (TI_{σ}) at a 10-min average wind speed of 15m/s*	2.0%	2.0%	2.0%	2.0%
Turbulence intensity 90% quantile at a 10-min average wind speed of 15m/s*	6.9%	6.9%	6.9%	6.9%
Mean air density	1.23 kg/m^3	1.23 kg/m^3	1.23 kg/m^3	1.23 kg/m^3
Mean air temperature	8.8°C	8.7°C	8.8°C	8.7°C
50-year extreme wind speed	40.7 m/s	40.7 m/s	40.7 m/s	40.7 m/s
1-year extreme wind speed	22.9 m/s	22.9 m/s	22.9 m/s	22.9 m/s
Wind shear for extreme wind speed extrapolation	0.20	0.20	0.20	0.20
Characteristic turbulence intensity at 50-year extreme wind speed	10.9%	10.9%	10.9%	10.9%
Air density for extreme wind	1.24 kg/m^3	1.24 kg/m^3	1.24 kg/m^3	1.24 kg/m^3

*Turbulence values at other wind speeds can be found in Appendix H.

The datasets produced by this study are available in a data package prepared for Energinet.

Recommendations

EMD recommends updating this site wind conditions assessment once the measurement campaign has been concluded.

EMD recommends supporting the turbulence assessment with additional turbulence measurements or motion adjusted LiDAR turbulence measurements to compare the Baltic Sea Energy Island LiDARs with the turbulence measured by the North Sea Energy Island LiDARs

EMD recommends investigating the mesoscale changes to the wind regime cause by extensive wind farm build up in the Baltic Sea region.

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1 Introduction

EMD International A/S has been tasked by Energinet to provide a site wind conditions assessment for the Energy Island Baltic Sea.

The objectives of the site wind conditions assessment are outlined in the Scope of Services Site Wind Conditions Assessment [8] provided by Energinet and aims for a site wind conditions assessment adequate for a preliminary site-suitability analysis for the Wind Turbine Generator (WTG) and Rotor Nacelle Assembly as well as input for Front-End Engineering and Design (FEED) of offshore support structures for WTGs and other structures.

The parameters for the wind condition assessment are listed in Table 2 and are defined according to IEC61400-1 [1], IEC 61400-3-1 [2] and IEC 61400-15-1 CD [6].

Table 2. List of Site Wind Condition Parameters.

SITE WIND PARAMETERS AT 150 M MSL	
Normal Conditions Parameters	**Extreme Conditions Parameters**
Mean wind speed	Extreme Turbulence Model (ETM) at hub height
Omnidirectional Weibull wind speed distribution parameters	Wind profile for extreme wind speed extrapolation with elevation
Wind profile for wind speed extrapolation with elevation	Wind profile for integrated load analysis
Wind profile for Integrated Load Analysis, Normal Wind Profile (NWP)	Turbulence intensity
Normal Turbulence Model (NTM)	Mean air density
Mean air density	Maximum 10-minute mean wind speed for a 50-year EWM
Mean air temperature	

The site wind condition parameter list is populated through a wind condition and resource assessment based on onsite floating LiDAR data from two locations and mesoscale WRF data. This model is supported by a selection of secondary stations located within meaningful distance of the Baltic Sea Energy Island wind farm zone.

Beside the present report, measurement data as well as WRF and long-term corrected datasets are provided in the form of time series text files.

All elevations throughout are referred to as Above Sea Level (ASL) with the reference sea level being the mean sea level.

A naming convention is used for turbulence conditioned on wind speed where 'mean turbulence' is the mean of 10 minute wind speed standard deviations (σ) within a wind speed bin. The 'standard deviation of turbulence' is the standard deviation across 10 minute wind speed standard deviations (σσ) in a wind speed bin. Both these quantities (mean and standard deviation of turbulence) may be normalized to the wind speed of the wind speed bin in question, in this case the normalized turbulence is referred to as Turbulence Intensity (TI), either mean or standard deviation.

2 Site Description

Energy Island Baltic Sea is located in the Baltic Sea, off the coast of Bornholm, Denmark (Figure 1).

The Baltic Sea Energy Island Offshore Wind farm Zone (OWF) is defined through a shape file provided by Energinet. The shape file is provided as a deliverable.

Closest distance to land from the OWF zone is 15 km (Bornholm).

The neighbouring wind farms Arkona and Wikinger are located adjacent to the southwestern part of the Baltic Sea Energy Island OWF. Additional wind farms are planned in that sector.

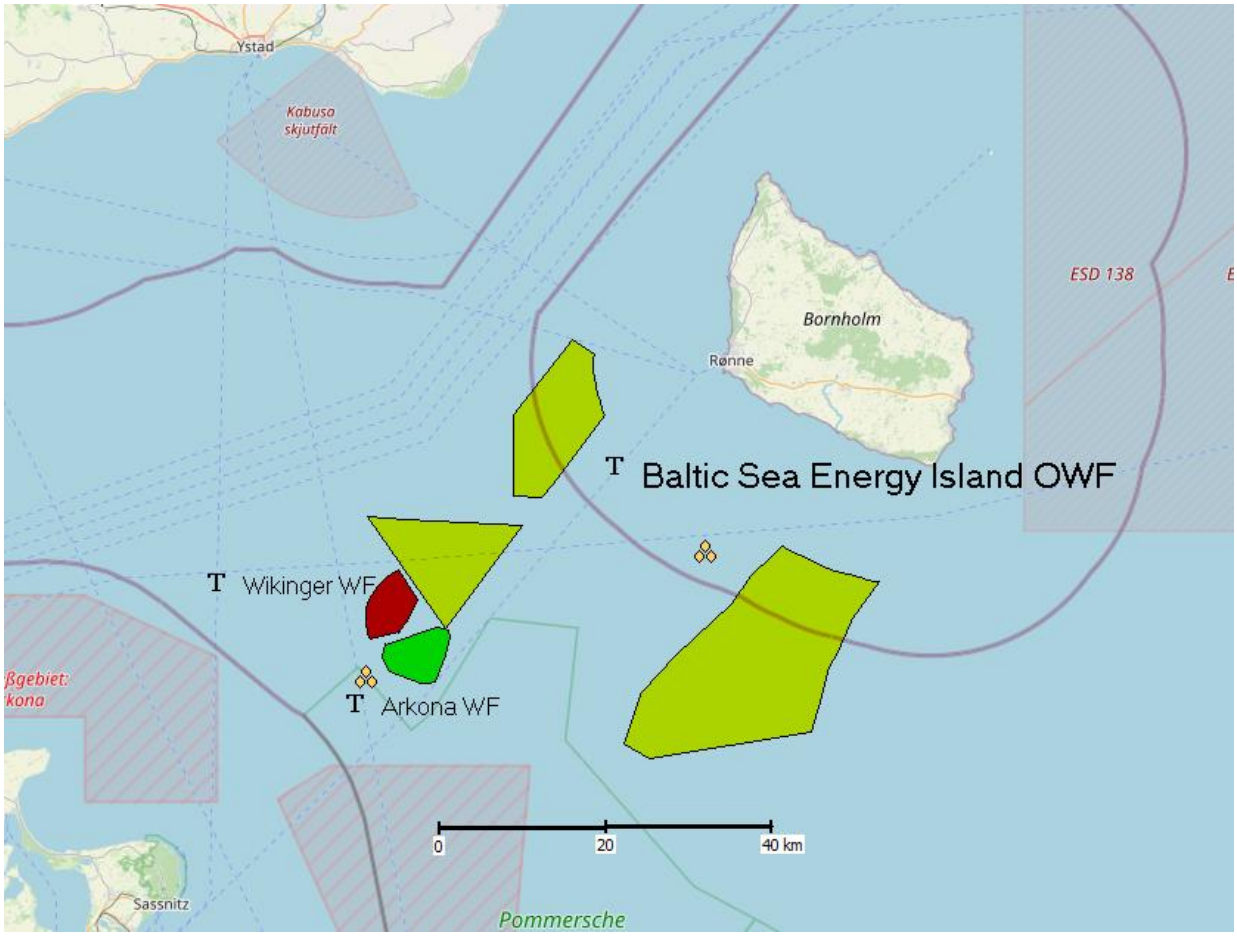

Figure 1. Regional map with location of the Baltic Sea Energy Island OWF and the adjacent wind farms (OpenStreetMap).

The wind farm zone is located in open water with sufficient distance to any shoreline (minimum 15 km). The effect of the shorelines on the wind speed gradient across the site will therefore be better represented by mesoscale effects. For this reason, no further terrain assessment has been conducted. The water depth within the OWF is between 15 and 55 m.

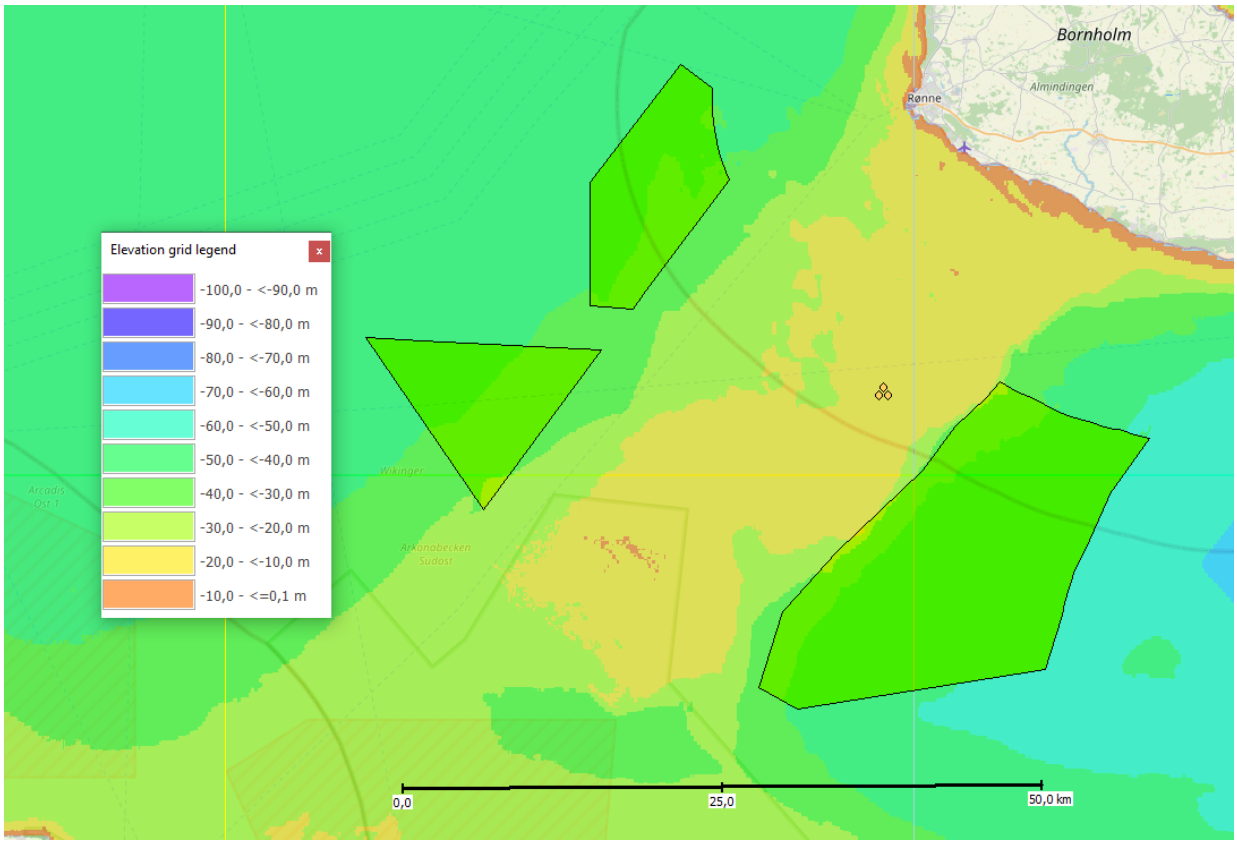

Figure 2. Bathymetric map of Baltic Sea Energy Island OWF (source: EMODnet – 115 m grid resolution)

3 Overview of Available Wind Data

A host of wind data measurements was considered for the wind condition and resource analysis. Each source is listed in Table 3 and Table 4 and considered in the following.

The two onsite floating LiDAR Systems (FLS), commissioned by Energinet, are the primary source of information and are used for the primary wind model. The data are described in section 4.

For the validation of the primary wind model and for the turbulence model, data from FINO2 and Taggen measurement masts are used.

Data from ground stations from the Danish Meteorological Institute (DMI), the Swedish Meteorological and Hydrological Institute (SMHI) and data from offshore mast and buoy from the German Federal Maritime and Hydrographic Agency (BSH) are primarily used to verify the long-term variation in wind climate or the temperature profile for the site.

The DMI observations have been retrieved via:
https://confluence.govcloud.dk/display/FDAPI/Meteorological+Observation

The SMHI data have been retrieved via the SMHI Open Data API about Meteorological Observations: https://opendata.smhi.se/apidocs/metobs/index.html

The BSH data has been retrieved from their InSitu-Portal: https://login.bsh.de/fachverfahren/

Taggen data are provided courtesy of Vattenfall AB.

While Table 4 lists the meteorological stations suggested by Energinet, some of these stations were considered unhelpful either because of distance to the site, major differences in terrain, or data were unavailable or of poor quality. Some of the stations included are done so with only limited contribution to the study as far as data quality permits.

The measurement locations are plotted on a map in Figure 3.

All secondary data used in this study are presented in Appendix A.

Table 3. Measurement stations considered in the study, including wind speed and temperature (temp), measurement heights ASL and period. FLS: Floating LiDAR System.

NAME	TYPE	MEASUREMENT HEIGHT [M] ASL	MEASUREMENT PERIOD	LENGTH [YEARS]
Lot 3 WS199	LiDAR (FLS)	30 - 270	21/11/2021 – 21/11/2022	1
Lot 4 SWLB044	LiDAR (FLS)	30 - 270	22/11/2021 – 22/11/2022	1
FINO2	Met-Mast	102.5	31/08/2008 – 1/08/2015	7
Taggen	Met-Mast	97	01/08/2014 – 31/07/2016	2
		100	01/08/2014 – 31/07/2017	3
Bornholm Airport	Climate Met-Mast	25.4, 17.4 (temp.)	01/01/2004 – 31/12/2022	19
Nexø Vest	Climate Met-Mast	32, 25 (temp.)	01/01/2002 – 31/12/2022	20
Skillinge A	Climate Met-Mast	14, 6 (temp.)	01/11/1995 – 31/10/2022	27
Arkona buoy	Climate buoy	10	01/01/2002 – 31/12/2022	20
Darsser	Climate Met-Mast	9	01/01/1995 – 31/12/2020	26
Hammer Odde Fyr	Climate Met-Mast	18, 10 (temp)	01/01/2010-31/12/2022	13
Falsterbo	Climate Met-Mast	1.9 (temp)	01/01/1974 - 31/12/2009	36

Table 4. Location of external wind measurements (geographic coordinates, datum WGS84). List of stations suggested by Energinet.

NAME	LONGITUDE	LATITUDE	Z [M]	PROVIDER (CODE#)
Lot 3 WS199	14.355600°	54.994800°	0.0	Energinet
Lot 4 SWLB044	14.588200°	54.717000°	0.0	Energinet
FINO2	13.154189°	55.006928°	0.0	BHS
Taggen	14.519333°	55.855969°	0.0	Energinet
Bornholm Airport	14.749392°	55.067704°	15.4	DMI (06190)
Nexø Vest	15.095327°	55.055735°	23.0	DMI (06197)
Skillinge A	14.314271°	55.488994°	4.4	SMHI (54290)
Arkona buoy	13.866667°	54.883333°	0.0	BHS
Darsser	12.700195°	54.699234°	0.0	BHS
Hammer Odde Fyr	14.771800°	55.297900°	8.0	DMI (06193)
Falsterbo	12.816600°	55.383700°	1.4	SMHI (52230)
Gedser (not used)	11.943500°	54.568700°	*2.6*	DMI (06149)
Södra Midsjöbanken (not used)	17.333100°	55.720000°	*0.0*	-
BC Wind (not used)	17.980200°	55.089500°	*0.0*	-

Figure 3. Location of considered measurement stations (in blue the Baltic Sea Energy Island LiDAR buoys, orange the used stations and yellow the discarded ones).

4 On-Site Floating LiDAR Measurements

Energinet has commissioned two floating LiDAR measurements on site, operated by Fugro Norway AS. The buoys are labelled LiDAR Buoy 3, WS199 and LiDAR Buoy 4, SWLB044 and their deployment locations are labelled Lot 3 and Lot 4 respectively. These two locations are in the following also referred to as Position 1 and Position 2. The campaign was commenced on 21/11/2021 and is ongoing at Position 2.

EMD has received documentation as listed in Table 5.

EMD has received measurement data as monthly batches covering the period 21/11/2021 to 22/11/2022, hence covering consecutive 12 months.

No motion correction is applied. Averaging over 10 minutes is considered sufficient to remove motion effects on mean wind speed data. This was verified during pre-deployment verification. The detrimental effects of motion on the turbulence measurements remain.

EMD has received documentation and measurements beyond those mentioned here, but those are not used directly in this study.

Table 5. List of documentation received on the Floating LiDAR Systems (FLS).

TITLE	SOURCE	DATE	CONTENT	REFERENCE
SWLB measurements at Energy Islands	Fugro	6/4/2022	Description of instrument deployment, data collection and processing.	[9]
Energy Islands – Floating LiDAR Measurements, Monthly report (Lot3 + Lot4), 9 instalments)	Fugro	25/03/2022 – 19/12/2022	Monthly reports on operation and measurements. Reports available until July – August 2022	[10]
Summary Reports of Major events (Lot 3 + 4, 7 instalments)	Fugro	21/06/2022 – 31/08/2022	7 event logs describing event with impact on measurements	[11]
ZX898, Independent analysis and reporting of ZX LiDARs performance verification executed by Zephir Ltd. at the UK Remote Sensing Test Site	DNV	02/08/2019	LiDAR verification report for ZX898, mounted on WS199 (Lot 3)	[12]
ZX993, Independent analysis and reporting of ZX LiDARs performance verification executed by Zephir Ltd. at the UK Remote Sensing Test Site	DNV	02/07/2019	LiDAR verification report for ZX993, mounted on SWLB044 (Lot 4)	[13]
WS199, Independent performance verification of Seawatch Wind LiDAR Buoy at Frøya, Norway	DNV	03/11/2021	Pre-deployment verification document for WS199 (Lot 3)	[14]
SWLB044, Independent performance verification of Seawatch Wind LiDAR Buoy at Frøya, Norway	DNV	11/11/2021	Pre-deployment verification document for SWLB044 (Lot 4)	[15]

4.1 Buoy Positions

The buoy deployment positions are reported by Fugro as listed in Table 6.

The buoys positions are recorded in the logged data series. EMD has plotted a section of these and can confirm that the drift of the buoys is within 100 m (Figure 4). For all practical purposes the buoys can be considered stationary.

During the period 20/6-2022 to 22/6-2022, the buoys were recovered, repaired and redeployed. Figure 5 presents the logged positions after redeployment and confirms that the general locations of measurement are unchanged.

Table 6. List of wind speed measurement locations.

BUOY	UTM WGS84, Zone 33		GEOGRAPHICAL COORDINATES WGS84	
Bouy 3, WS199, Lot 3	458,774	6,094,403	14.3556°	54.9948°
Bouy 4, SWLB044, Lot 4	473,473	6,063,378	14.5882°	54.7170°

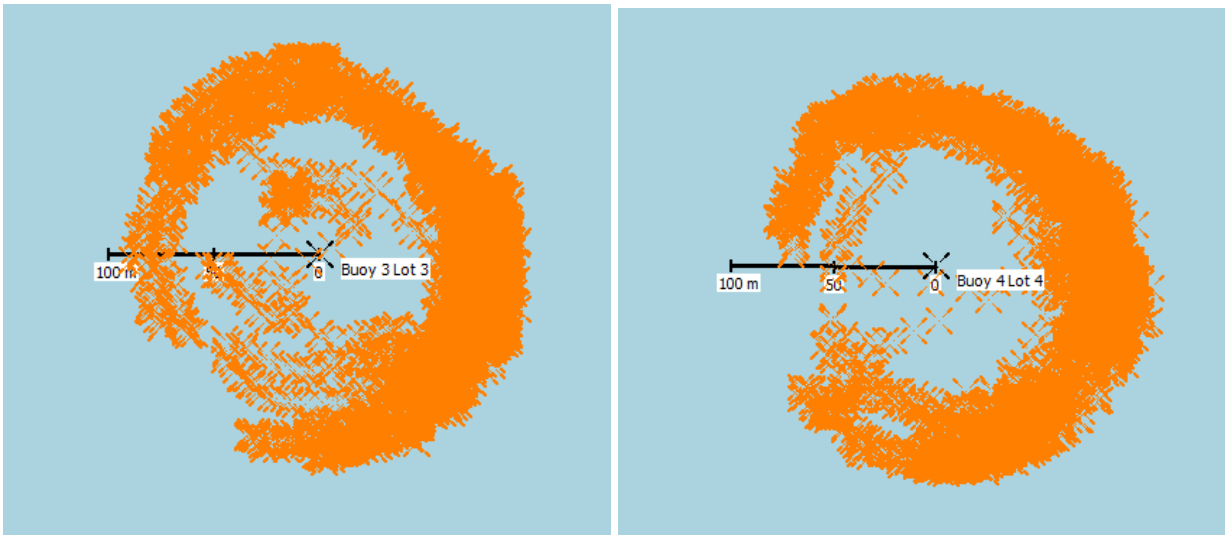

Figure 4. Section of position logs from the two buoys confirm a drift within 100 m of stated location (marked as dark X).

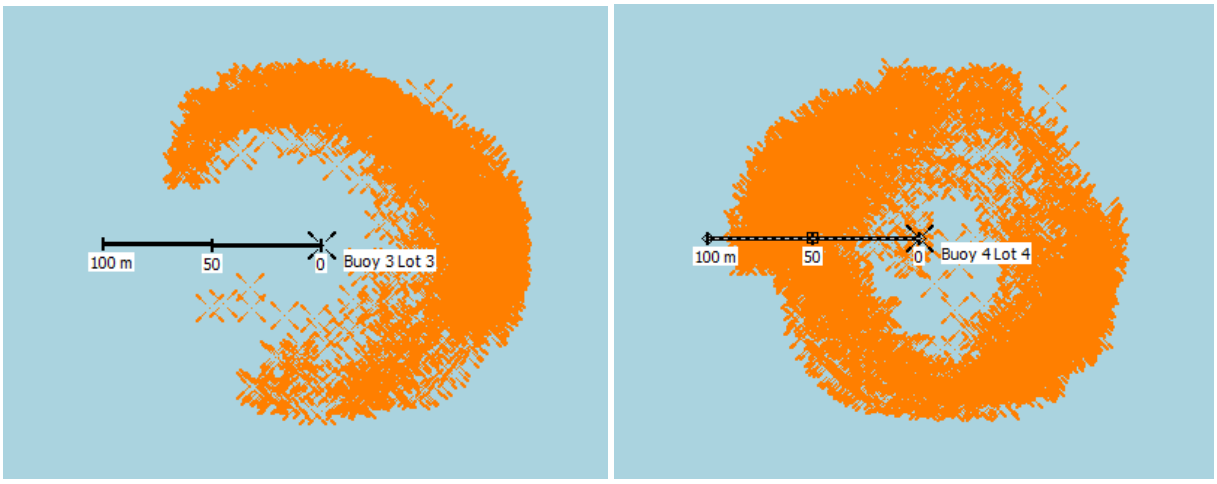

Figure 5. Position logs after redeployment (August, 2022) confirm that the locations are unchanged.

4.2 Instrumentation

The Fugro Seawatch buoy and instrumentation is described in the measurement plan [9].

The instrumentation on the WS199 and the SWLB044 is for all practical purposes identical. In the following, only instruments relevant for the analysis of the site wind conditions are described.

4.2.1 LiDAR

The LiDAR mounted on both buoys is a ZX300M LIDAR from ZX LiDARs Ltd. This LiDAR model is classified by DNV [16].

Both LiDARs (ZX898 on WS199 and ZX993 on SWLB044) were verified at the Pershore, UK, an onshore test site operated by DNV-GL [12] [13]

Once mounted on the buoys, the LiDARs were verified again by DNV. Both were at Frøya Norway [14] [15] against an onshore LiDAR of the brand ZephIR ZX300 ground-mounted on the island of Frøya.

The information from the classification and the verification was used to assess the measurement uncertainty of the LiDAR.

The LiDAR window is located at the top of the buoy and is as such elevated above sea level. This difference is compensated for in the provided data files, so that the stated height is height above sea level, not height above buoy.

4.2.2 Wind Direction

The Fugro buoys are equipped with three different wind direction sensors:

- A magnetic compass giving direction relative to magnetic north.
- The DGPS system giving the direction relative to true north.

- The LiDAR met station wind direction signal.

The DGPS is the main wind direction source, with the magnetic compass being used as backup - in case the DGPS in unavailable. The LiDAR met station signal is only used as third choice. Data are checked against the Gill wind sensor to resolve potential 180-degree direction ambiguities. This means that the wind direction signal from the buoys should be considered as relative to true north.

4.2.3 Additional Instrumentation

The Fugro buoys are equipped with additional meteorological stations. These are a Gill WindSonic ultrasonic wind sensor package, a Vaisala PTB330A pressure sensor and a Vaisala HMP155 temperature and humidity sensor.

Specifications are described by [9].

Temperature, humidity and wind speed are measured at 4.1 m height, pressure at sea level. However, as they are not used for shear or wind model analysis, they are by EMD assigned a generic height of 4 m.

The temperature data are used for the assessment of air density.

4.3 Operation History

The measurement campaign started on 21/11/2021. Fugro has submitted event logs, tracking faults and flaws with the buoys [11]. Of these, only a single event has had impact on the LiDAR data:

Buoy 3 stopped transmitting data in March 2022. The data were collected locally, and these data were used by Fugro to produce the datasets. The buoy was recovered on 20/6-2022, repaired and redeployed on 22/6-2022. At the same time Bouy 4 was recovered for service and redeployed. For this reason, both datasets have a 2-day gap during service. EMD has verified that the buoys were redeployed to the same locations.

4.4 Post-Processing of Data

4.4.1 Quality Control and Filtering Performed by Fugro

Fugro has provided some information on the post-processing of the LIDAR data [9]. ZX LiDARs provides a standard data filter for their LiDAR instruments, known as an industry filter, optimized to secure high quality data. This filter will remove data points with a low signal-to-noise ratio. Fugro has disabled the industry data filter on the LiDAR data and replaced it with a simple filtering algorithm (source: direct communication with Fugro). Fugro processes the LiDAR data as following:

- Of the 36-37 data packages produced every 10 minutes, 9 of these (25%) are required to qualify as a valid measurement.
- Check for duplicates.
- Filter for min and max wind speed values (0.001 m/s, 58 m/s).

- Filter for min and max wind direction values (0˚, 360˚).
- Check for 180˚ ambiguity.

Beyond the 9-data-package filter already provided by Fugro, EMD does not find that a higher package limit improves the quality of the remaining data. No further filtering using the package count has been done.

The resulting data were provided by Fugro in monthly data files:

- Wind speed, wind direction and turbulence data were provided in files labelled *xxxxxwindSpeedDirectionTI.csv*.
- The package counter was provided in files labelled *xxxxxWindStatus.csv.*
- Temperature, humidity and pressure data were provided in files labelled *xxxxxMetOceanData.csv*.

These files are provided in the data package (section 11).

It is understood that this setup is identical to the verification setup and that the verification is therefore valid with these filter settings.

4.4.2 Quality Control and Filtering Performed by EMD

EMD has undertaken a qualitative, manual filtering by comparing signals from the two buoys and data from several mesoscale derived datasets. Only when data differs in a substantial manner has wind speed and direction from those records been disabled. Given that the industry filter has been disabled, it is suspected that a number of faulty data points are accepted by the Fugro filtering. However, EMD finds that the dataset is remarkably good and only few such events were identified. Typical events found are wind speed peak values at tall height (>150m) for very short periods disassociated with wind speed and shear at lower height.

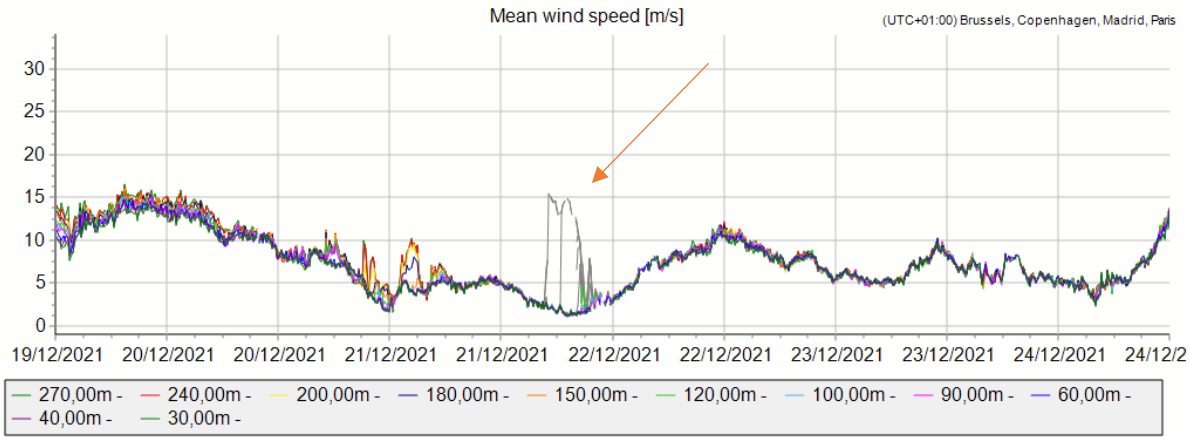

Figure 6. Example of short bursts of high wind speed at tall height disconnected from wind speed at lower height. Buoy 3 WS199.

Fugro reports [9] that the primary wind direction sensor is measuring relative to true north. EMD has compared the wind direction signal against two independent mesoscale derived datasets (EMD-WRF

and NORA3) and finds the average difference within 1˚. The difference between the two buoys is also within 1˚. EMD therefore finds the wind direction data correct with no need for adjustment.

At very low wind speed some remnants of the 180˚ ambiguity remain, but as wind direction at those wind speed is highly uncertain, no corrections to these data are made.

4.4.3 Recovery Rate and Data Substitution

As the industry filter has been disabled, the recovery rate on the data is substantially higher than usually experienced for ZX LiDAR measurements. Still, the LiDAR dataset suffers data loss as a result of above filtering. The recovery rates of the LiDAR are decreasing with height ASL. The recovery rates are documented in Table 9 and Table 10.

To recover some of this loss, data substitution procedures were performed, one based on the measured shear, one based on the second buoy (referred to as horizontal repair). Because the expected uncertainty of the shear repair procedure is expected to be smaller than the one from the horizontal repair, the shear repair has been prioritised.

The shear data substitution is based on a shear matrix created from the surrounding heights. Which height are used to create the shear matrix for each repair are listed in Table 9 and Table 10. The shear matrix is applied to the source height, also listed in below tables, to produce the substituted data. An example of a shear matrix is presented in Table 7.

The synthesized data replaces gaps and disabled data in the recorded dataset (wind speed and direction). The TI (Turbulence Intensity) signal is not repaired, but simply copied from the lower height. As the wind speed difference between source and destination height is very small, it is a valid assumption that the TI will be close to identical.

A second horizontal repair exercise is done by transferring data from WS199 to SWLB044 and vice versa. With this procedure data from each LiDAR measurement height is moved to the other LiDAR at the same height using a sectorial linear regression function. As source data only original data is allowed. Data generated through the shear matrix process described above are excluded from a potential transfer from one to the other location. The correlation between datasets from the two buoys is good (Table 8), giving sufficient confidence in the transferred data. To avoid thermal stability distortions data are moved across same heights (e.g. 150 m to 150 m).

For each transfer, a transfer function is created for 360 1˚-direction bins based on data from a 30˚ direction window. The wind speed functions are first order functions and direction functions are zero-order functions (constants). No residual resampling is used to avoid the random scatter from such a model. Only wind speed and wind direction are repaired. The turbulence intensity is missing in repaired time steps. The reason is that the methodology used for transferring the wind speed and direction cannot be applied to turbulence.

Table 9 and Table 10 list the results of each repair procedure. The heights 30 and 40 m are only repaired using horizontal repair. The results for those heights are not shown in the table.

Table 7. Example of shear matrix, here for 150 m height ASL (WS199). Values are shear exponents α. The shear matrix is constructed from data from height 120 m, 150 m and 180 m.

Hour	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
00-02	0.05	0.09	0.09	0.23	0.03	0.08	0.09	0.16	0.13	0.12	0.07	0.04
02-04	0.11	0.09	0.04	0.19	0.02	0.05	0.11	0.14	0.14	0.14	0.08	0.10
04-06	0.04	0.00	0.03	-0.03	0.02	0.05	0.09	0.11	0.16	0.12	0.05	0.03
06-08	0.05	0.02	0.05	0.00	0.00	0.02	-0.02	0.11	0.14	0.09	0.03	0.07
08-10	0.04	0.03	0.05	0.07	0.02	0.03	-0.02	0.09	0.06	0.06	0.10	0.09
10-12	-0.03	-0.04	0.05	0.05	0.01	0.04	-0.01	0.13	0.08	0.06	0.10	0.03
12-14	0.04	-0.08	0.10	-0.01	0.05	0.03	0.01	0.09	0.14	0.05	0.03	0.06
14-16	0.02	-0.10	0.08	-0.02	-0.02	-0.02	0.06	0.12	0.15	0.09	0.03	0.11
16-18	0.09	0.04	0.04	0.00	-0.04	-0.04	0.07	0.12	0.21	0.09	0.04	0.08
18-20	0.04	0.00	0.18	0.06	-0.03	-0.05	0.12	0.17	0.13	0.09	0.08	0.05
20-22	-0.02	0.01	0.29	0.09	0.05	0.02	0.01	0.14	0.14	0.13	0.11	0.06
22-24	0.05	0.07	0.19	0.09	0.08	0.03	0.13	0.12	0.11	0.09	0.08	0.06
All	0.03	0	0.09	0.05	0.03	0.03	0.05	0.12	0.14	0.1	0.06	0.06

Table 8. Correlation coefficient, r, between WS199 and SWLB044 measurements at the same height.

MEASUREMENT HEIGHT [M]	CORRELATION COEFFICIENT, R [%]
30 – 40	92
60 - 100	93
120 - 150	94
180 - 270	95

Table 9. Data substitution, WS199

REPAIRED HEIGHT [M]	60	90	100	120	150	180	200	240	270
Source height [m]	40	60	90	100	120	150	180	200	240
Shear matrix heights [m]	40, 60, 90	60, 90, 100	90, 100, 120	100, 120, 150	120, 150, 180	150, 180, 200	180, 200, 240	200, 240, 270	200, 240, 270
Recovery rate before repair	98.9%	96.3%	96.1%	95.8%	95.4%	95.2%	95.1%	94.8%	94.7%
Recovery rate after shear repair	99.3%	98.9%	96.4%	96.2%	95.9%	95.5%	95.4%	95.2%	95.0%
Recovery rate after horizontal repair	100%	99.7%	98.7%	98.5%	98.2%	97.9%	97.8%	97.7%	97.6%
Share of repaired data	1.1%	3.4%	2.6%	2.7%	2.9%	2.8%	2.8%	3.0%	3.0%

Table 10. Data substitution, SWBL044

REPAIRED HEIGHT [M]	60	90	100	120	150	180	200	240	270
Source height [m]	40	60	90	100	120	150	180	200	240
Shear matrix heights [m]	40, 60, 90	60, 90, 100	90, 100, 120	100, 120, 150	120, 150, 180	150, 180, 200	180, 200, 240	200, 240, 270	200, 240, 270
Recovery rate before repair	98.1%	96.2%	96.0%	95.6%	95.2%	95.0%	94.9%	94.6%	94.5%
Recovery rate after shear repair	98.6%	98.1%	96.3%	96.0%	95.7%	95.3%	95.1%	95.0%	94.8%
Recovery rate after horizontal repair	100%	99.7%	98.7%	98.5%	98.2%	97.9%	97.8%	97.7%	97.6%

Share of repaired data	1.9%	3.5%	2.7%	2.9%	3.1%	3.0%	3.0%	3.2%	3.2%

4.5 Data Analysis

EMD has combined the datafiles, forming time series of wind speed, wind direction, turbulence intensity and data package count for each measurement height. For 4 m height ASL, temperature, relative humidity and pressure is added. The signals for maximum wind speed and vertical wind speed are only added to the 150 m dataset.

4.5.1 Wind Speed

The mean wind speed on the LiDAR measurements is calculated both as arithmetic mean wind speed and through a Weibull fit as Weibull-derived mean wind speed. The Weibull fitting is done in windPRO using an energy conservation condition.

The following table summarizes the resulting wind speeds before and after data substitution with the Weibull parameters being after data repair.

Table 11. Weibull parameters of the repaired datasets, WS199.

HEIGHT [M]	PERIODS [MONTHS]	ARITHMETIC MEAN WIND SPEEDS, BEFORE DATA SUBSTITUTION [M/S]	ARITHMETIC MEAN WIND SPEEDS AFTER DATA SUBSTITUTION [M/S]	WEIBULL MEAN [M/S]	WEIBULL – A PARAMETER	WEIBULL – K PARAMETER
4	12	7.09	7.09	7.22	8.14	2.43
30	12	8.29	8.91	9.03	10.19	2.40
40	12	8.53	8.28	8.39	9.47	2.42
60	12	8.94	8.52	8.63	9.74	2.42
90	12	9.36	9.31	9.44	10.65	2.36
100	12	9.46	9.42	9.55	10.78	2.34
120	12	9.64	9.59	9.71	10.96	2.28
150	12	9.86	9.79	9.88	11.16	2.20
180	12	10.01	9.95	10.04	11.33	2.15
200	12	10.09	10.03	10.12	11.42	2.12
240	12	10.22	10.15	10.25	11.57	2.08
270	12	10.31	10.24	10.32	11.65	2.05

Table 12. Weibull parameters of the repaired datasets, SWLB044.

HEIGHT [M]	PERIODS [MONTHS]	ARITHMETIC MEAN WIND SPEEDS, BEFORE DATA SUBSTITUTION [M/S]	ARITHMETIC MEAN WIND SPEEDS AFTER DATA SUBSTITUTION [M/S]	WEIBULL MEAN [M/S]	WEIBULL – A PARAMETER	WEIBULL – K PARAMETER
4	12	7.10	7.10	7.24	8.16	2.45
30	12	8.34	8.32	8.43	9.51	2.43
40	12	8.58	8.56	8.67	9.78	2.43
60	12	8.99	8.95	9.06	10.22	2.39
90	12	9.40	9.35	9.45	10.67	2.32
100	12	9.50	9.46	9.56	10.79	2.29
120	12	9.68	9.64	9.72	10.98	2.23
150	12	9.89	9.85	9.91	11.19	2.16
180	12	10.05	10.01	10.04	11.34	2.09
200	12	10.14	10.09	10.12	11.42	2.06
240	12	10.28	10.22	10.25	11.56	2.02
270	12	10.37	10.31	10.33	11.65	2.00

Further details on the directional wind speed and Weibull distribution can be found in Appendix C.

4.5.2 Turbulence Intensity

Standard deviation of wind speed and hence turbulence intensity from LiDAR measurements are not immediately comparable to those of cup anemomters. The standards reffered to in this study do not recognize turbulence intensity mesurements from LiDARs and the observed turbulence data from WS199 and SWLB044 are therefore not used or documented here. They are however included in the datapackage produced as part of the deliverables.

4.5.3 Wind Direction

The wind direction distribution for the 12 months of measurements is presented in Figure 7. There is a rotation of the wind direction clockwise with increasing height of 9.9˚ (WS199) and 10.2˚ (SWLB044) from 30 m to 270 m, amounting to a rate of 0.041 and 0.043 deg/m.

The direction distribution for each height can be found in Appendix C.

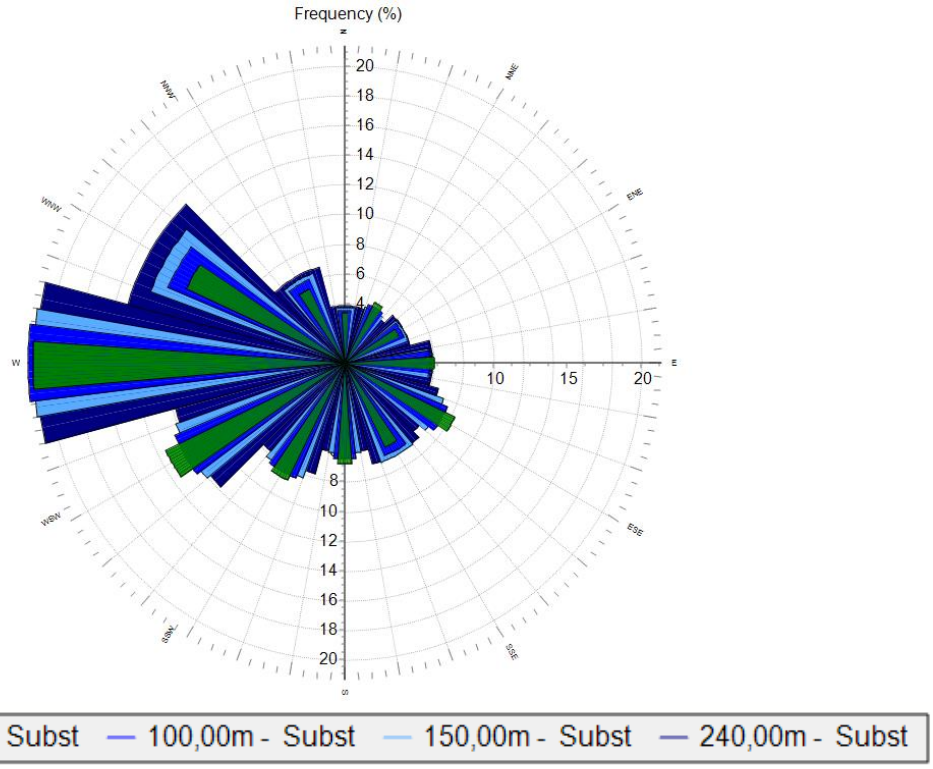

Figure 7. Directional distribution at selected heights of LiDAR measurements, WS199.

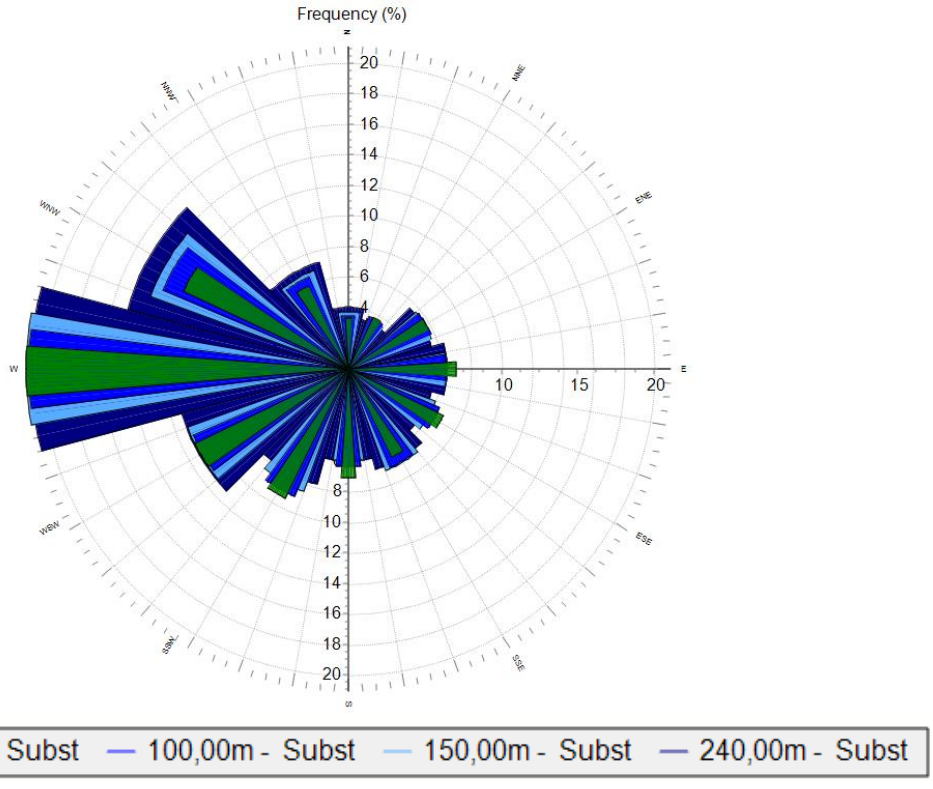

Figure 8. Directional distribution at selected heights of LiDAR measurements, SWBL044

4.5.4 Diurnal Variations

There is a minor variation in wind speed across the day with marginally higher wind speed at night and lower wind speed at daytime. The pattern is identical for the two buoys.

The temperature at the buoy is almost uniform across the day.

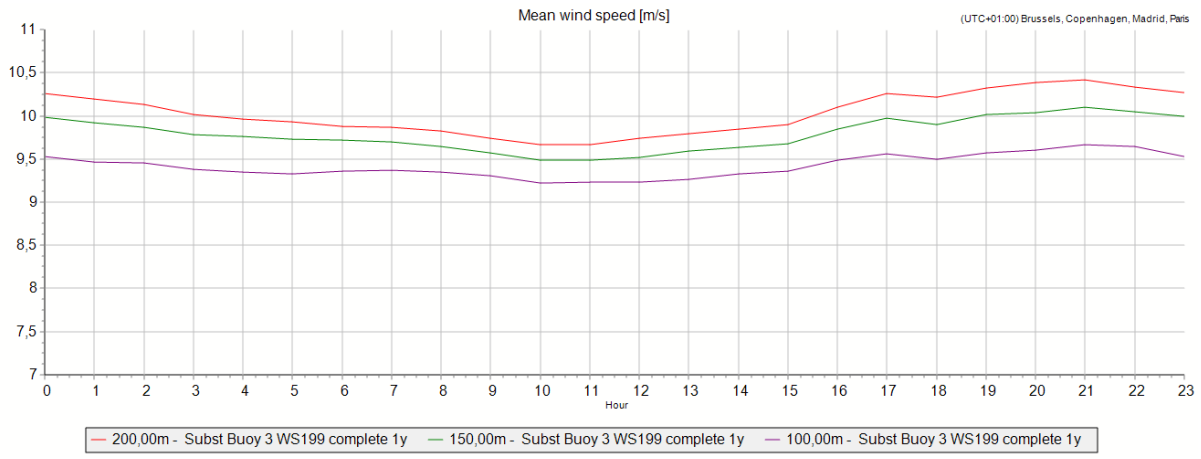

Figure 9. Diurnal wind speed variation, WS199.

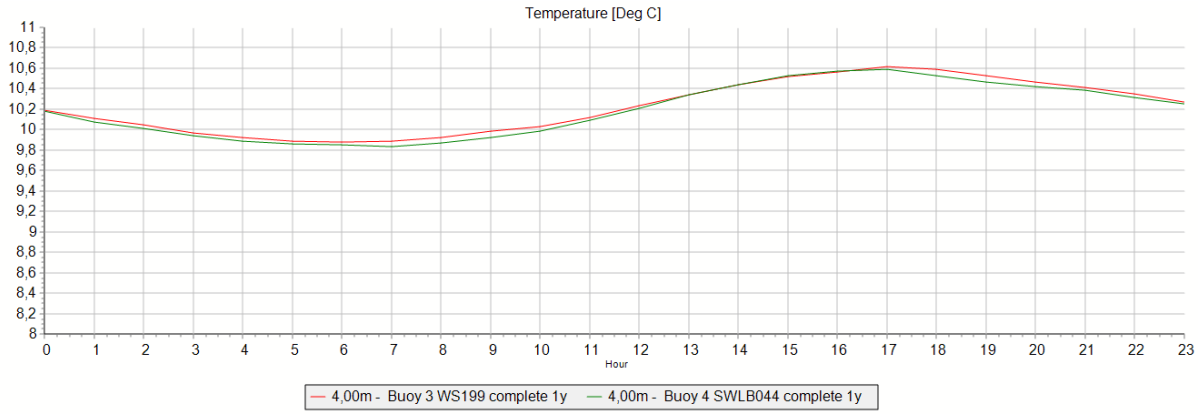

Figure 10. Diurnal temperature variation, WS199 (red) and SWLB044 (green).

4.5.5 Seasonal Variations

The specific year of measurement has the typical pattern for the region with higher wind speed during winter than during summer.

The temperature varies across the year from a mean temperature in December of 3.4˚C to 20.1˚C in August (4 m ASL).

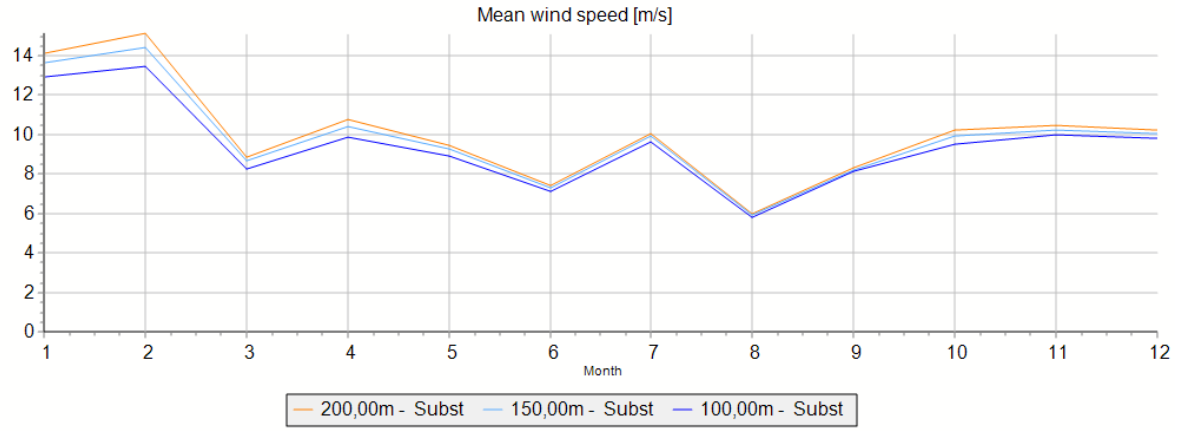

Figure 11. Monthly mean wind speed, WS199.

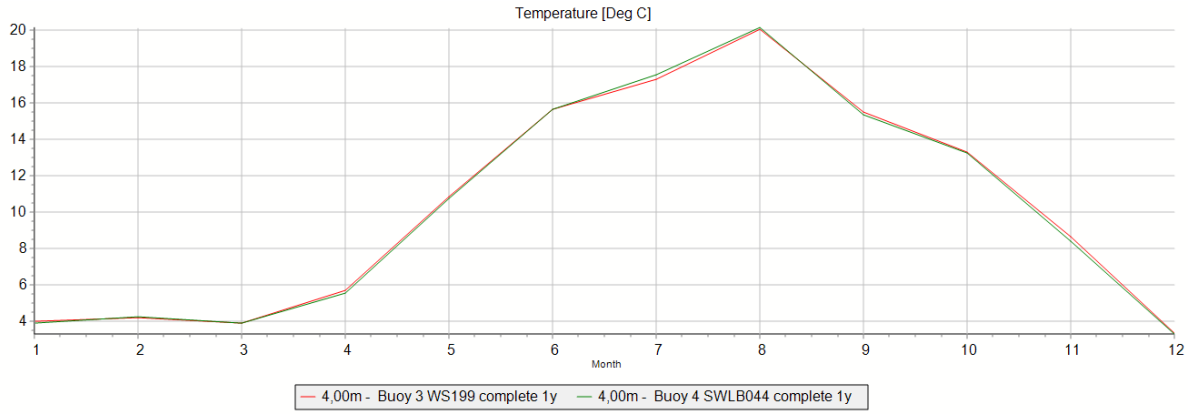

Figure 12. Monthly mean temperature, WS199 (red) and SWLB044 (green).

4.6 Measurement Uncertainty

The classification uncertainty, giving the maximum expected uncertainty, is obtained from the ZX300 classification document [16] as 1.41% (average at 130 and 135 m height). These heights are the tallest heights reported and are here considered representative of the 150 m measuring height. The classification table is included in Appendix B.

The verifications of the WS199 and SWLB044 buoy-mounted LiDARs were provided [14] [15]. Both verification tests were performed at Frøya, Norway.

In these studies the Key Performance Indicators (KPI) according to the OWA Roadmap [17] are tested and the verification uncertainty is here calculated according to the method suggested by the CT/OWA LiDAR Uncertainty Standard Review [18]. All KPI's were successfully fulfilled.

The reference LiDAR at Frøya is also ZX Z300 LiDAR and both reference LiDAR and the buoy mounted LiDARs were verified prior to the verification test at Pershore test site, UK.

The verification uncertainties from the verification reports are included in Appendix B for 120m, the closest height to 150m.

The uncertainty from data repair is found by assuming a 20% uncertainty on the wind speed change from source to destination height. With a 2% wind speed difference (from 120 to 150 m), this results in an uncertainty of 0.4% on wind speed of the synthesized data. At 150 m the synthesized data contribute 2.9% of the dataset on WS199, resulting in a total 0.01% uncertainty on the wind speed at this height and 3.1% on the dataset on SWLB044, resulting in a total 0.01% at 150 m.

The verification and classification uncertainty are combined together with a small contribution from the data repair to a combined uncertainty on the LIDAR measurements at 150 m (Table 13).

Table 13. Wind speed measurement uncertainty at 150 m ASL.

BUOY	CLASSIFICATION UNCERTAINTY	VERIFICATION UNCERTAINTY	DATA REPAIR UNCERTAINTY	TOTAL MEASUREMENT UNCERTAINTY
WS199	1.41%	1.95%	0.01%	2.41%
SWLB044	1.41%	2.34%	0.01%	2.74%

5 Reference Data

Mesoscale data have been obtained for the dual purpose of long-term correcting the onsite measurements and calculating a wind speed gradient across the wind farm zone. The period length is limited by the data availability and has afterwards, through a consistency analysis, been curtailed to an appropriate length.

Different mesoscale and re-analysis products have been used as long-term data sources:

- 35 years of ERA5 [19] data, hourly data at a height of 100 m AGL have been obtained. ERA5 is a climate reanalysis dataset developed through the Copernicus Climate Change Service (C3S) and processed/delivered by ECMWF. The locations are the closest available data node to each of the buys.
- 20 years of EMD-WRF On-Demand [20], high resolution mesoscale data have been obtained. The mesoscale model developed by EMD (http://www.emd.dk) has been run for the location of the Baltic Sea Energy Island Position 1 and 2. ERA5 data from ECMWF (http://www.ecmwf.int) has been used as the global boundary data set. The temporal resolution is hourly. Similar datasets have been obtained for the locations of selected supporting datasets including the location of a third and fourth location for the site parameter analysis. The latest data used are from 01/01/2023.
- 5 years of EMD-WRF Europe+ [21] high resolution mesoscale data has been obtained in a grid with a spacing of 6 km. The model has been developed by EMD (http://www.emd.dk). The mesoscale model is at a spatial resolution of 0.03° x 0.03° or approximately 3 x 3 km with hourly temporal resolution. ERA5 data from ECMWF (http://www.ecmwf.int) has been used as the global boundary data set. Two additional 20-year datasets were obtained for Position 1 and 2 for temperature assessment.
- 20 years of NORA3 [22] data have been obtained. The NORA3 data have been sourced from the Norwegian Meteorological Institute. The NORA3 dataset uses a combination of ERA5 reanalysis data and an extensive surface model database. Instead of a WRF model, the NORA3 model is processed using the HARMONIE-AROME model. The model grid is 3 km, and the temporal resolution is hourly. The closest available nodes to Position 1 and Position 2 are used.

The location of the mesoscale reference data around Position 1 and Position 2 is presented in Figure 13, Figure 14 and Table 14. All data are extracted through windPRO.

Table 14. Mesoscale data position and period length.

	EMD-WRF POS. 1	EMD-WRF POS. 2	ERA5 POS 1	ERA5 POS 2	NORA3 POS 1	NORA3 POS 4
Position/Node	14.355°E 54.994°N	14.588°E 54.717°N	14.531°E 54.94°N	14.513°E 54.660°N	14.374°E 54,986°N	14.579°E 54.708°N
Start (data used)	01/01/2003	01/01/2003	01/01/1988	01/01/2003	01/01/2003	01/01/2003
Stop (data used)	01/01/2023	01/01/2023	01/01/2023	01/01/2023	01/01/2023	01/01/2023

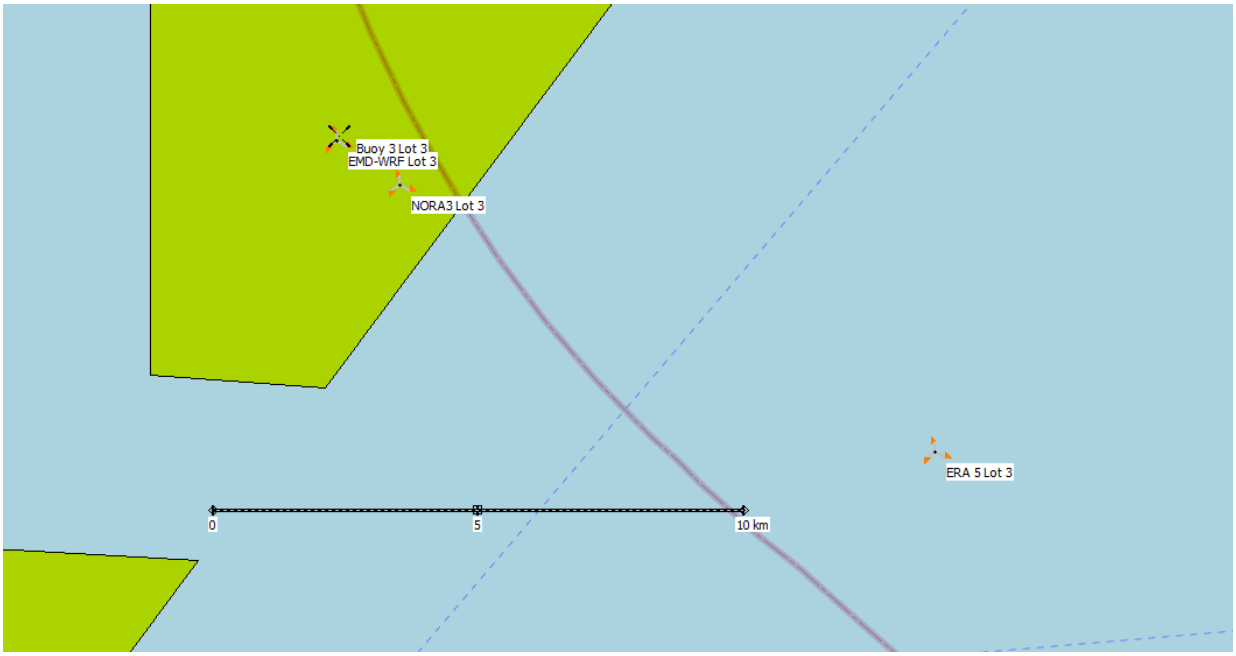

Figure 13. Location of mesoscale reference data near Lot 3 (Position 1).

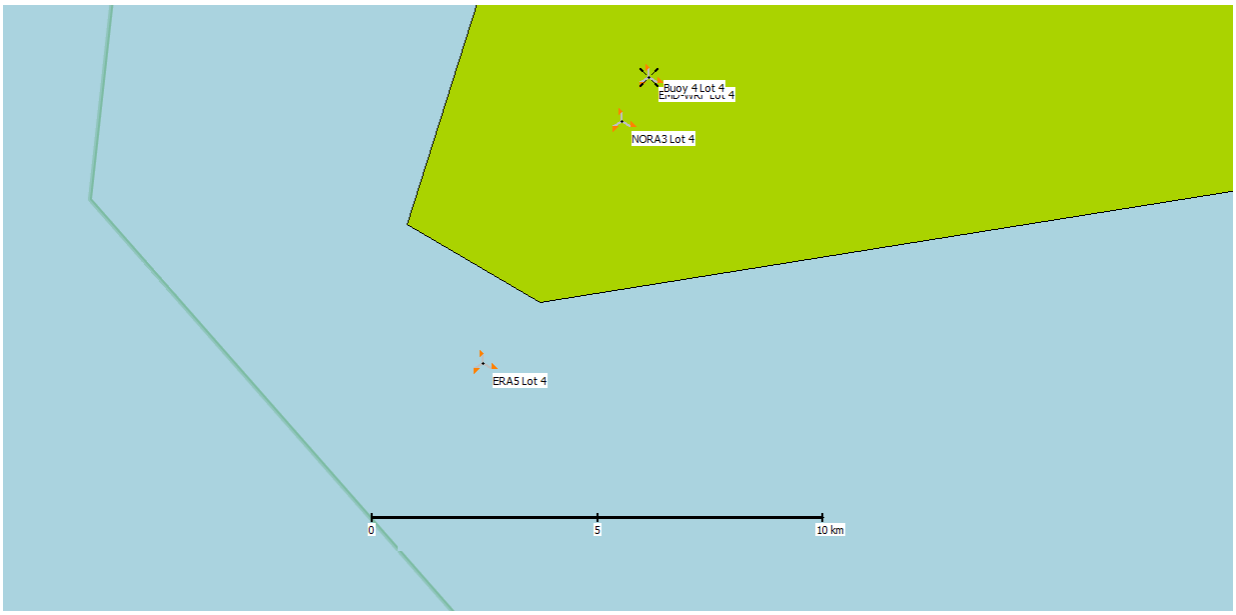

Figure 14. Location of mesoscale reference data near Lot 4 (Position 2).

6 Long-term Correction

6.1 Review of Reference Data

6.1.1 Long-term Consistency

The consistency of historical wind reference data is of vital importance when determining the long-term variation of wind speed. EMD has conducted consistency checks on the data sets in order to ensure that these would be suitable for use. These checks aim to identify trends and to establish a suitable baseline period. Three metrics have been used: The Mann-Kendall trend test, mean wind speed and production indices.

Analysis of the ERA5 dataset using the Mann-Kendall trend test [23] indicated that a 20-year period from 2003-2022 is not trended (test value 0.97). To avoid trends in the data set, EMD recommends, based on experience, a Mann-Kendall (MK) test value above 0.4, but preferably above 0.5. Extending the dataset to 1988 (35 years), another M-K test peak appears at 30 years of data (data period 1993-2022) with an M-K test value of 0.84 (Figure 15).

The mean wind speed of the 30-year period 1993-2022 at 100 m in the ERA5 dataset is 9.36 m/s. This is exactly the same wind speed as for the 20-year period of 2003-2022.

An alternative measure of considering consistency in long-term data is to compare windiness index. A windiness index can be constructed by scaling the wind speed to the expected long-term wind speed at the site, apply a power curve to each record and divide by the average of the records. The index value serves as an energy index value for each period considered. In the present case a windiness index was calculated using the period 1993-2003 as baseline. This is plotted in Figure 15 as average index of period. Interestingly, the 20-year period 2003-2022 appear to have a windiness index of 100.3%, where an index of 100% was expected. However, it is also clear that while there is a good correlation between windiness index and mean wind speed until a 27-year period, beyond this point the two parameters veers away from each other, indicating a change in data beyond 27 years of data and resulting in an incorrect baseline at 30 years data.

The decision is therefore that the 20-year period of 2003-2022, both years included, is consistent, based on wind speed comparison with the 30-year period and wind speed, windiness index and M-K test value at a 25-year period.

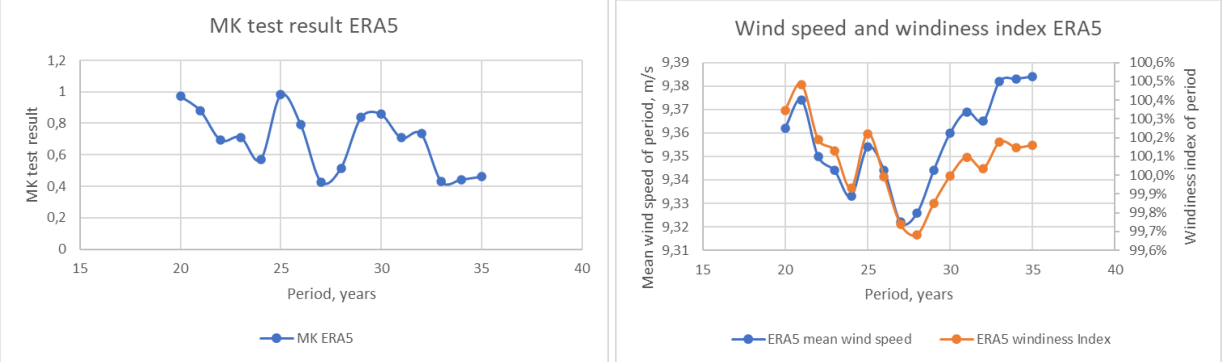

Figure 15. Consistency tests on ERA5 data. Period length, dating back from January 1st, 2023, are analyzed for M-K trend test, mean wind speed and windiness index of period.

Annual energy indices have been constructed for a selection of datasets (Appendix A) including ERA5 and EMD-WRF.

EMD-WRF data and to some extent NORA3 data are derived from ERA5 and they can be expected to have similar consistency properties.

A comparison of the ERA5-based energy index with the EMD-WRF-based energy index confirms that the above conclusions based on ERA5 are also valid for EMD-WRF. The production index of the ERA5 data for the period 2003-2022 conforms well with the index for EMD-WRF data.

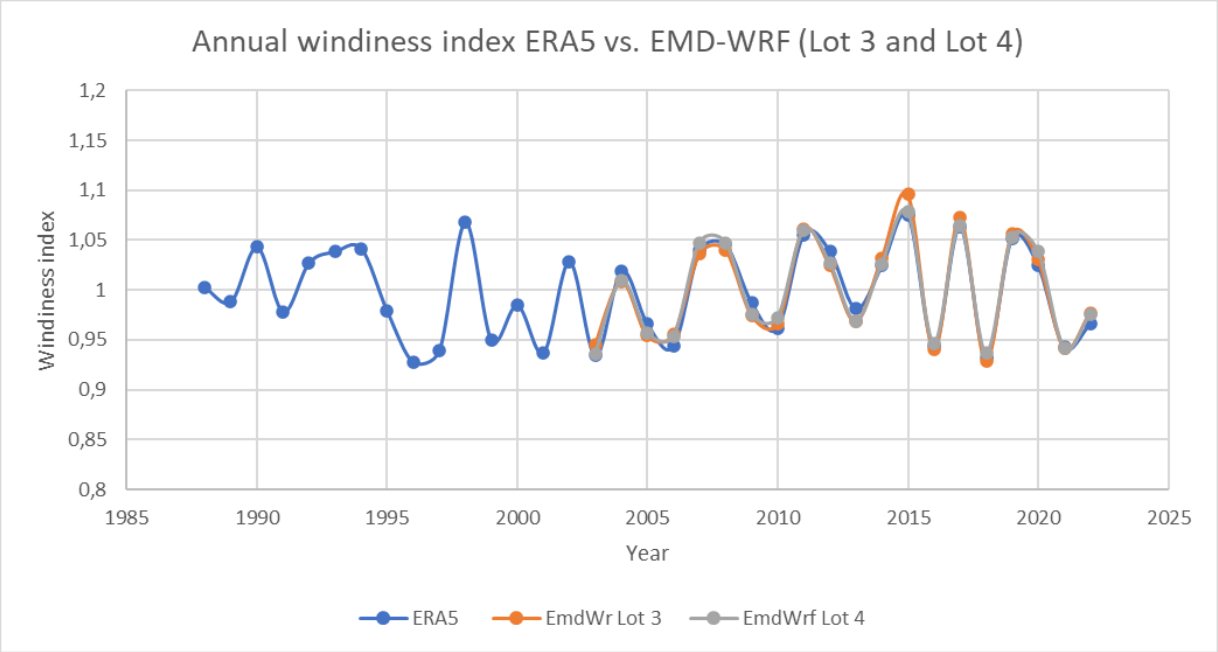

Figure 16. Annual windiness (energy) index for ERA5 and EMD-WRF data. Baseline period: 2003-2022.

Similar plots are made with five of the secondary ground stations described in Appendix A, where a long continuous time series is available (Figure 17). The match with ERA5 is quite good with some of them, especially Bornholm Airport, but also the windiness index for Nexø Vest and Skillinge in Sweden is quite recognizable in the ERA5 index. Common for all three of them is that they confirm that there is no trend in the 20-year period. There are outliers, but this is expected given the distance and the very low height at which these data were measured.

The Arkona Buoy and the Darsser mast are both located offshore and should therefore be more representable to the Baltic Sea Energy Island OWF, but both datasets suffer from extensive data loss, and it is doubtful how much it is possible to conclude on the basis of these. At least the Darsser dataset seems to confirm the lack of a trend.

Declining wind speeds may be interpreted from the last two years on Bornholm and Skillinge stations, but these are in all cases data artifact as explained in appendix A.

A diagram superimposing the windiness index of progressively longer periods (Figure 18), show the trends of ERA5 imitated by the majority of the stations with Darsser as a notable outlier. Bornholm Airport also turns out to be an outlier because of deviating values for the last two years.

The analysis of windiness indices from secondary data therefore confirms the selection of the period of 2003 to 2022 as long-term representative and consistent.

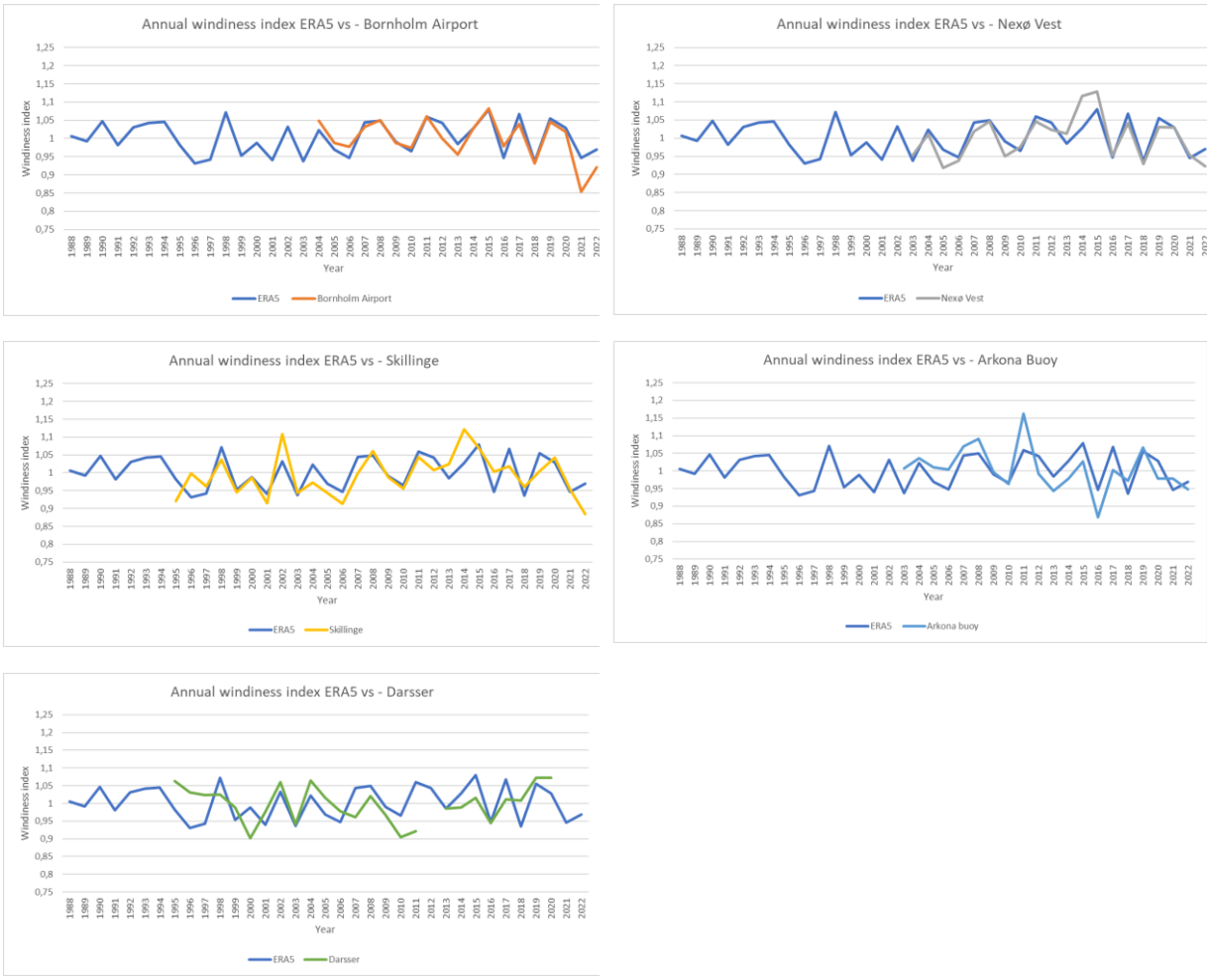

Figure 17. Annual windiness (energy) indices for a selection of secondary meteorological stations.

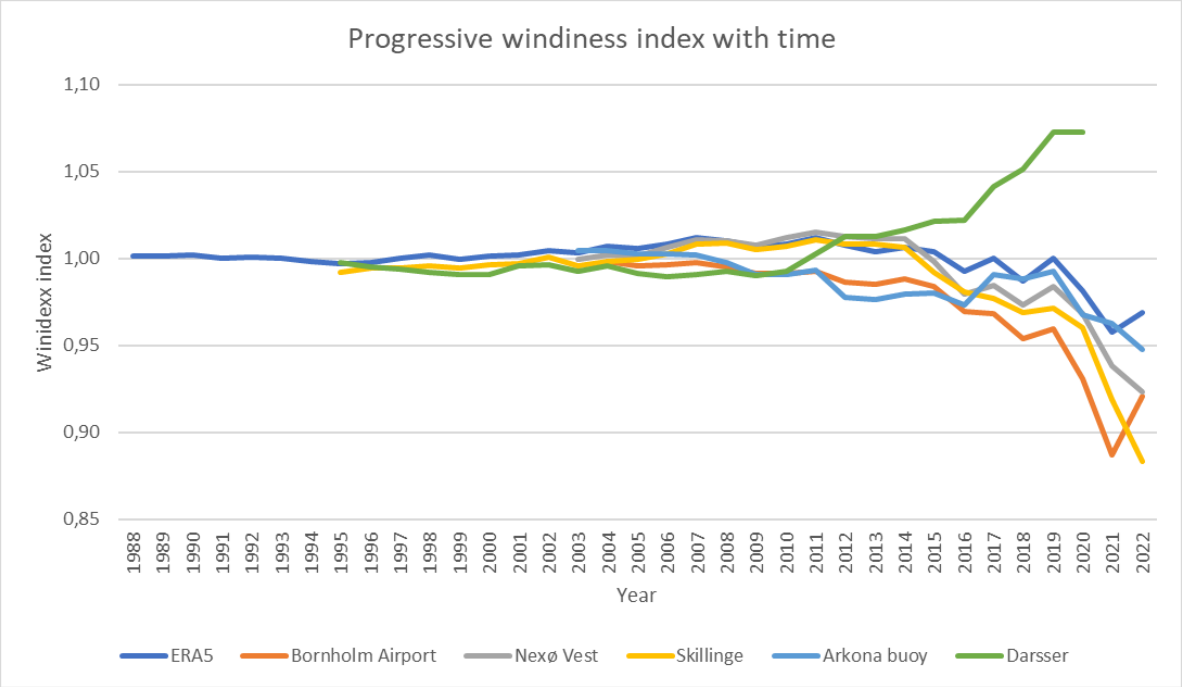

Figure 18. Progressive windiness (energy) index with time. The index of each year is the average of all following years.

6.1.2 Selection of Reference Data and Reference Period

Three potential reference datasets were considered for long-term correction of the LiDAR measurements from WS199 and SWLB044. These are the three datasets described in section 5: EMD-WRF, ERA5 and NORA3. These have all been successfully evaluated for use as long-term reference, passing all tests as described below.

The standard deviation on the resulting long-term wind speed across references and four different methodologies is 0.04 m/s on 150 m measurements on both LiDARs with no indication that any one reference or methodology increases or decreases the wind speed. EMD-WRF data therefore qualify as long-term reference as do the two other references. EMD has decided to proceed with EMD-WRF as reference. The decision to prefer the EMD-WRF data is a combination of good performance with the long-term correction methods described in section 6.2, that the resulting long term corrected wind speed is the median value of the three considered reference datasets and the very good match between observed direction distribution and reference data direction distribution.

The reference dataset is 20 years of EMD-WRF data at WS199 and SWLB044 covering the period 01/01/2003 to 31/12/2022. The datasets are available in the data package.

6.2 Correlation between Onsite and Reference Data

6.2.1 Wind Speed and Energy Correlation

The concurrent period of LiDAR data and EMD-WRF data is 12 months (21/11/2021 to 22/11/2022).

The correlation of the wind speed between LiDAR measurements and EMD-WRF data is high (Table 15).

Correlation coefficient, r, is calculated for each data point without averaging. That means that the 10-minute data of the LiDAR measurements are correlated with the hourly value of the reference data with the assumption that the hourly reference data value represents the last 10-minute period of the hour. That may not actually be the case, but the observed scatter from the 10-minute measurements is important for the following long-term correction.

The wind energy dataset is calculated by applying a power curve (generic 20 MW turbine) to the measured and reference data time series and divide with the average production. This is a measure of what a turbine would produce in a given period relative to average. Correlation is calculated on monthly averages and represent the seasonal variation in production output.

Table 15. Correlation coefficient r between the reference data (EMD-WRF, 150 m) and the onsite floating LiDAR data at 150 m ASL.

REF: EMD-WRF	WS199	SWLB044
Wind Speed Correlation, r [%] hourly	94.7	94.9
Wind Energy Correlation, r [%] monthly	99.7	99.4

6.2.2 Wind Direction Correlation

According to the instrument description from Fugro [9], the wind direction of measurements is referenced to true north with a secondary compass oriented against magnetic north (see section 4.2.2). Upon verification with EMD-WRF data an average deviation in wind direction was found within 1˚, confirming that the measured wind direction is correct.

There is a good match of wind direction roses between the LiDARs (150 m) and EMD-WRF (150 m) concurrent data (Figure 19).

The 12 months of concurrent data does not represent a long-term representative directional distribution and it must be expected that a long-term correction of data will change the observed directional distribution (Figure 20).

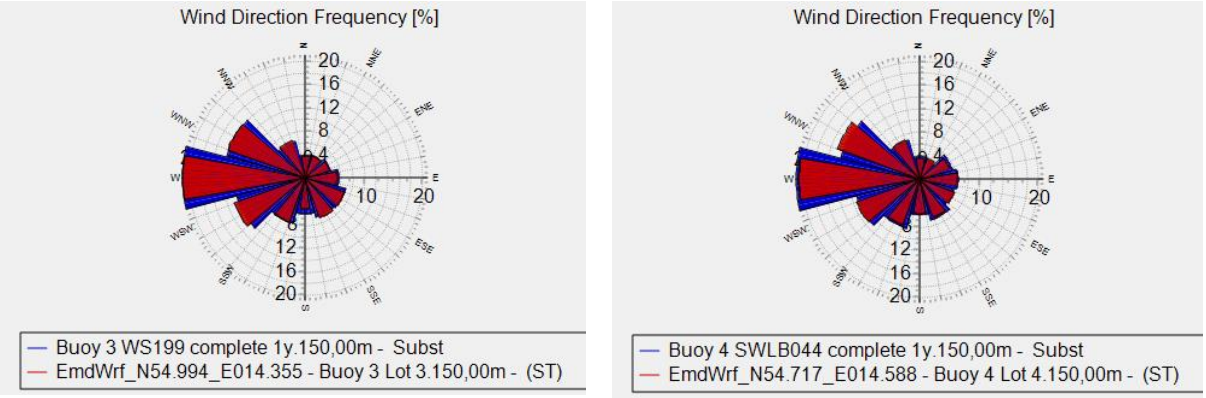

Figure 19. Wind direction roses for the concurrent period of LIDAR (blue) and EMD-WRF (red) data. Left: WS199, right: SWLB044.

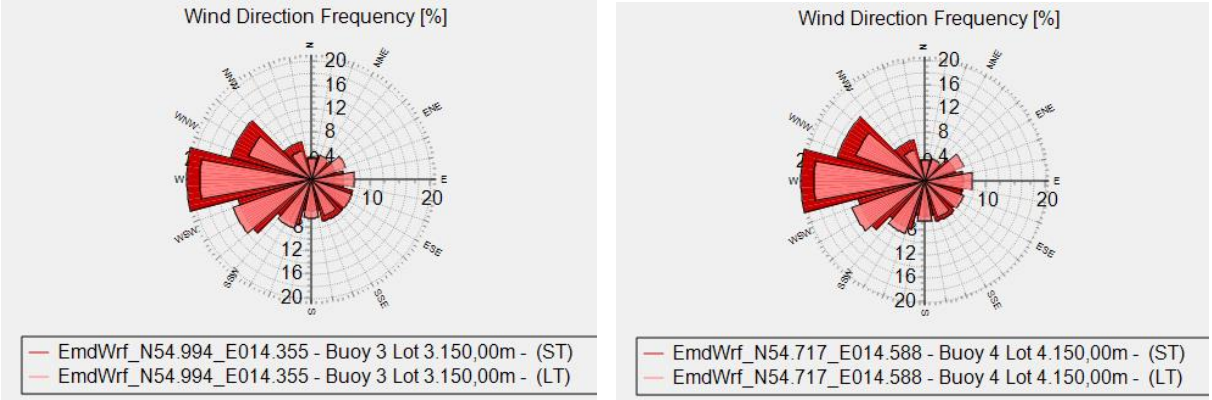

Figure 20. Wind direction roses for EMD-WRF data. Deep red represents the entire long-term period, light red represents the period concurrent with LIDAR measurements. Left: Concurrent period with WS199, right: Concurrent period with SWLB044.

6.2.3 Long-term Correction and Validation

EMD has several long-term correction methodologies at disposal. A full description of these can be found in the windPRO reference document on Measure-Correlate-Predict (MCP) methods [24].

With 12 month of data coverage and a high recovery rate, the risk of seasonal bias is limited. There is no need to curtail the period of the measured data.

The relevant windPRO methodologies that will also correct for the wind direction are linear regression, neural network and the matrix method.

The performance of each method is tested through a 24-hour slicing test. In this, the transfer function is trained on every second day of the data set and used to predict a period consisting of every other day. The metric for comparison is the Mean Bias Error on production output, which is comparable to the difference in turbine production in percentage between using measured or predicted data. The result of this test is presented in Table 16 and Table 17.

A similar test is done using the entire concurrent period, which amounts to a self-test.

Additionally, in Table 16 and Table 17 are presented Kolmogorov-Smirnov (K-S) test metrics using each method. The K-S test measures the maximum difference between measured and predicted wind distribution and is an expression of how well the observed wind distribution is captured by the prediction [24].

The matrix method generally produces the smallest error, but all methods have good performance within normally accepted parameters. The matrix method also gives satisfying results in predicting the direction distribution and Weibull distribution shape (the K-S test) as well as provide the median predicted mean wind speed value.

The long-term correction has been performed using a wind speed/direction matrix. The windPRO matrix MCP method is described by developing a relationship matrix for the wind speed bins and direction bins between the wind data at the reference and a concurrent period of wind data from the local site and applying this relationship matrix to all the long-term wind data to determine the estimated site data wind climate. This method corrects for changes in both wind speed and direction.

Table 16. Prediction test using a 24-hour slicing method and a self-test using the entire concurrent period. The parameter presented is over-prediction of production in percent. (WS199 - 150 m data).

REFERENCE: EMD-WRF LOCAL DATA: WS199, 150M	LINEAR REGRESSION	NEURAL NETWORK	MATRIX
24-hour slicing test, % production	2.14	3.57	-0.26
Concurrent period test, % production	1.43	-1.48	-0.08
Kolmogorov-Smirnov test, %	2.23	1.17	0.93
Predicted long term mean wind speed, m/s	9.91	9.83	9.86

Table 17. Prediction test using a 24-hour slicing method and a self-test using the entire concurrent period. The parameter presented is over-prediction of production in percent. (SWLB044 - 150 m data).

REFERENCE: EMD-WRF LOCAL DATA: SWLB044, 150M	LINEAR REGRESSION	NEURAL NETWORK	MATRIX
24-hour slicing test, % production	0.72	-2.89	-1.21
Concurrent period test, % production	1.02	-0.44	-0.59
Kolmogorov-Smirnov test, %	2.28	0.86	1.00
Predicted long term mean wind speed, m/s	9.92	9.89	9.87

The artificially generated time series (30 m to 270 m) represent the long-term wind climate and the 150 m results are presented in the following.

6.3 Long-Term Wind Climate

6.3.1 Long-term Wind Speed Distribution

The long-term wind speeds for the two buoys in Baltic Sea Energy Island OWF are summarized in the following tables. A detailed breakdown of the Weibull parameters can be found in Appendix D.

Table 18. Weibull parameters of the long-term wind data used, WS199.

WS199	PERIOD [Y]	ARITHMETIC MEAN WIND SPEEDS [M/S]	WEIBULL MEAN [M/S]	WEIBULL - A PARAMETER [M/S]	WEIBULL - K PARAMETER
30	20	8.32	8.39	9.46	2.3838
40	20	8.59	8.67	9.78	2.3892
60	20	9.01	9.10	10.27	2.3878
90	20	9.40	9.49	10.71	2.3327
100	20	9.51	9.61	10.84	2.3130
120	20	9.70	9.79	11.05	2.2603
150	20	9.86	9.92	11.20	2.1842
180	20	9.98	10.04	11.34	2.1315
200	20	10.08	10.13	11.44	2.0979
240	20	10.22	10.27	11.60	2.0695
270	20	10.22	10.27	11.60	2.0695

Table 19. Weibull parameters of the long-term wind data used, SWLB044.

SWLB044	PERIOD [Y]	ARITHMETIC MEAN WIND SPEEDS [M/S]	WEIBULL MEAN [M/S]	WEIBULL - A PARAMETER [M/S]	WEIBULL - K PARAMETER
30	20	8.33	8.41	9.48	2.4246
40	20	8.60	8.69	9.80	2.4446
60	20	9.01	9.12	10.29	2.4318
90	20	9.40	9.50	10.72	2.3317
100	20	9.51	9.60	10.84	2.3078
120	20	9.71	9.80	11.06	2.2560
150	20	9.87	9.94	11.22	2.1800
180	20	10.00	10.05	11.35	2.1219
200	20	10.09	10.13	11.44	2.0905
240	20	10.22	10.27	11.59	2.0591
270	20	10.3	10.33	11.66	2.0338

6.3.2 Long-term Wind Direction Distribution

The long-term frequency and energy distribution for the long-term corrected LiDAR data from WS199 and SWLB044 at 150 m ASL indicate a main wind direction from west.

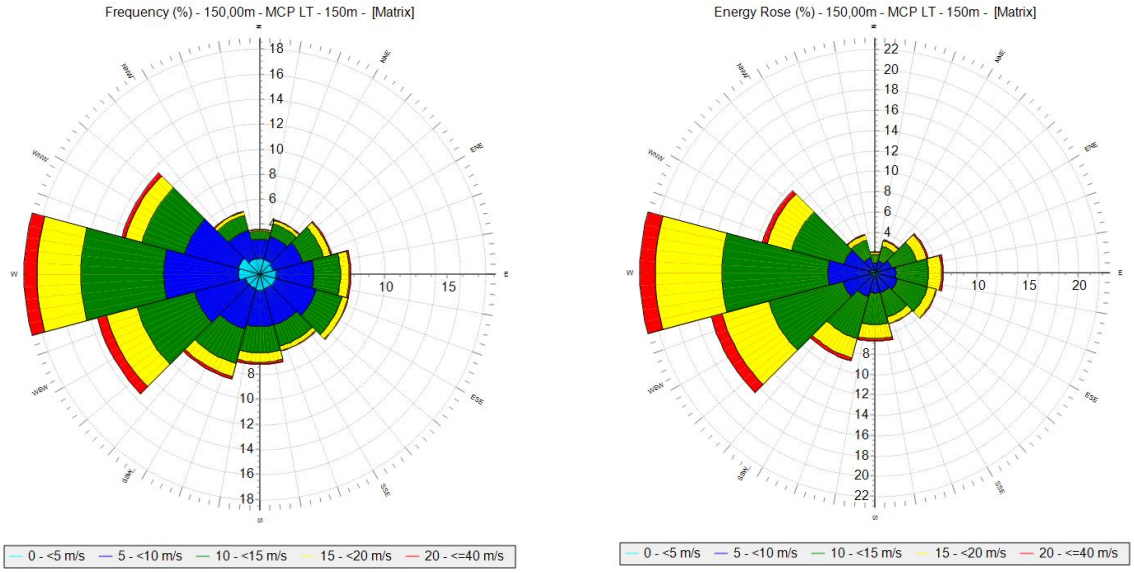

Figure 21. Left: wind direction distribution of long-term corrected LiDAR data (WS199) at 150 m. Right: Energy distribution of long-term corrected LiDAR data (WS19) at 150 m. Both are divided in wind speed intervals.

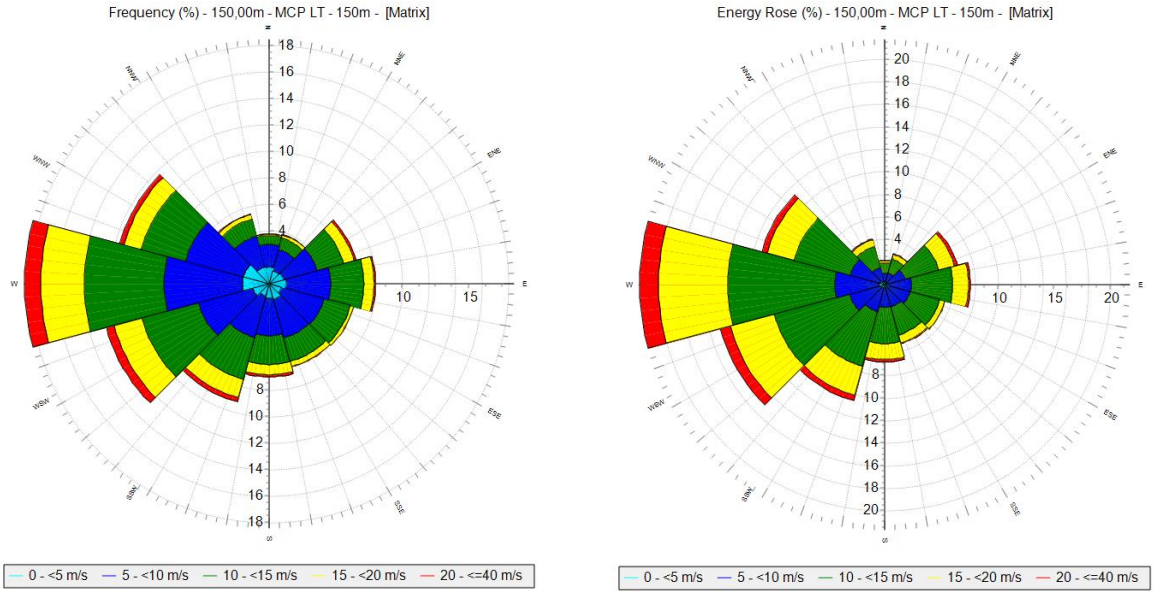

Figure 22. Left: wind direction distribution of long-term corrected LiDAR data (SWLB044) at 150 m. Right: Energy distribution of long-term corrected LiDAR data (SWLB044) at 150 m. Both are divided in wind speed intervals.

6.3.3 Long-term Diurnal Variations

The diurnal long-term wind speed is comparable to the observed diurnal wind speed. Figure 23 shows the diurnal variations for WS199. The pattern is identical for the two buoys. The long-term diurnal variation is similar to the observed 1-year dataset.

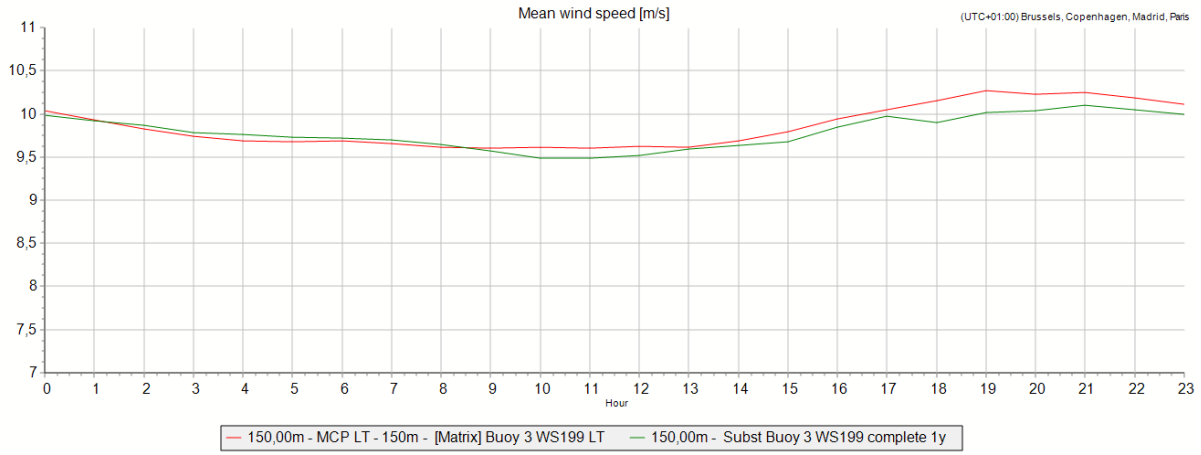

Figure 23. Diurnal wind speed, long-term corrected (red) and observed (green), WS199.

6.3.4 Long-term Seasonal Variations

The long-term seasonal variation of wind speed at 150 m is presented in Figure 24 for WS199 and compared to the actual year of observation. Whereas the seasonal variation of the measurements is based on a single year, the seasonal variation of the long term timeseries is an average of 20 years of data and therefore predictably smoother.

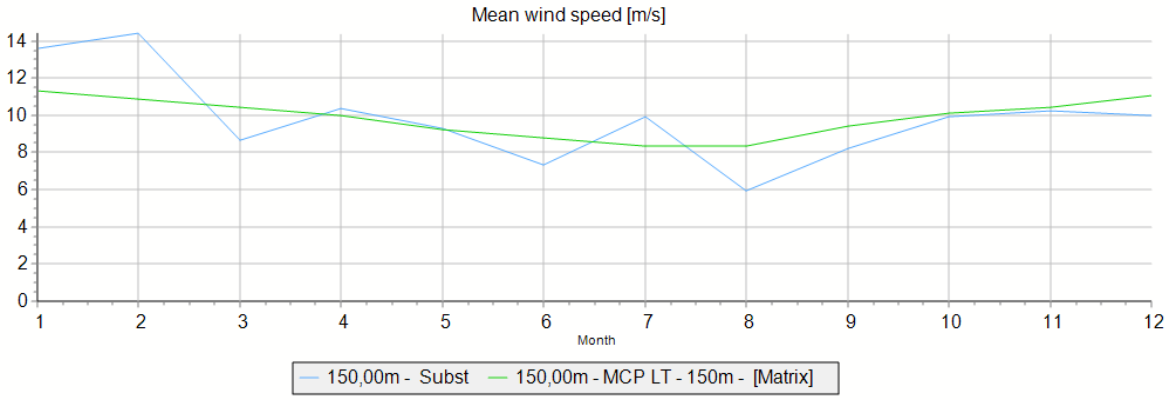

Figure 24. Seasonal variation of long-term corrected dataset (red) and observed dataset at 150 m, WS199.

7 Validation of Wind Model

7.1 Secondary Models

The wind resource at Position 1 (Lot 3) and Position 2 (Lot 4) were assessed through long-term correction of measured LIDAR data. This remains the primary model for the site.

Two secondary models were tested, translating secondary measured data from FINO2 and Taggen to the site. They each cover different directions from the Baltic Sea Energy Island OWF. These were used to validate the primary wind model at Baltic Sea Energy Island.

For the validation, the secondary data sets are transferred from their locations to WS199 and SWLB044 using the relative differences resulting from the comparison of mesoscale data. This transfer is based on the assumption that the difference between the two sites can be fully described by the difference observed in mesoscale data.

For each secondary data source, an EMD-WRF dataset was extracted (section 6.1). The correlation in terms of wind speed, energy content and direction has been analysed for sufficiency. If mismatches are identified, a transfer function has been developed to mitigate the differences.

The datasets are described and adjusted to long-term wind climate in Appendix A.

7.1.1 FINO2

Based on 7 years of mast measurements at FINO2, prior to the build-up of adjacent wind farms, a 20-year equivalent dataset was produced with the same reference period as for WS199 and SWLB044 (Appendix A). The measurement height of interest is at 102.5 m ASL.

The location of the FINO2 mast relative to the WS199 and SWLB044 buoys is presented in Figure 25. The distance from the FINO2 mast to WS199 is 77 km and to SWLB044 is 97 km.

For the validation of the wind model for WS199 and SWLB044, the long-term corrected dataset at FINO2, 102.5 m, is transferred to the location and height of the two buoys.

An EMD-WRF dataset was extracted for the FINO2 mast location (section 6.1). The correlation between the FINO2 data and EMD-WRF is high, both on wind speed, monthly energy content and directional distribution as discussed in Appendix A and the EMD-WRF data can therefore be said to capture the wind dynamics very well at FINO2.

Comparing the wind direction distribution between EMD-WRF data at FINO2 and EMD-WRF data at WS199 a difference in directional distribution and particularly energy distribution is noted (Figure 26). A transfer function is therefore required to both transfer the directions and the energy content in each direction.

A translation function is created using linear regression with a translation function for every 1° direction, used data in a +/-15° window, giving a scale and offset on wind speed as well as an offset on wind direction.

This translation function is then applied to the long-term corrected 102.5 m FINO2 data, creating a 20-year dataset at WS199 and SWLB044.

A comparison of directional distribution of transferred FINO2 data at 102.5 m with long-term corrected WS199 and SWLB044 data at 100 m is presented in Figure 27 and Figure 28. The match is reasonably good but with some deviations especially compared to SWLB044.

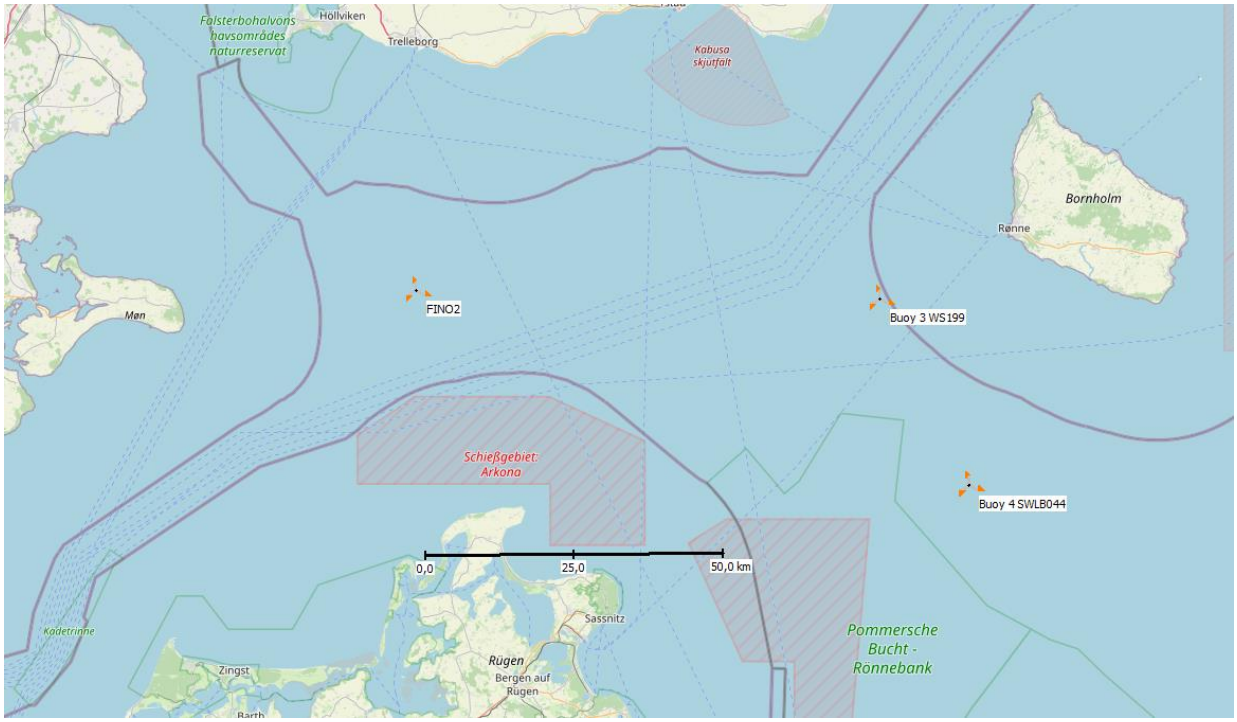

Figure 25. Location of the FINO2 mast relative to WS199 and SWLB044.

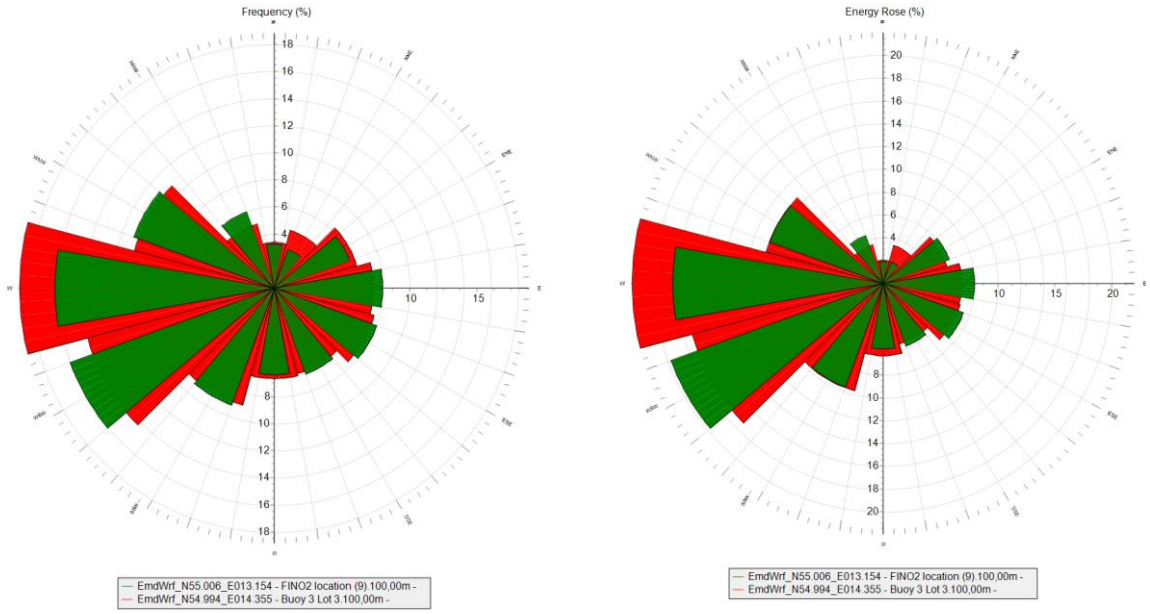

Figure 26. Left: directional distribution between EMD-WRF at FINO2 (green) and EMD-WRF at WS199 (red). Right: Energy rose of same two datasets.

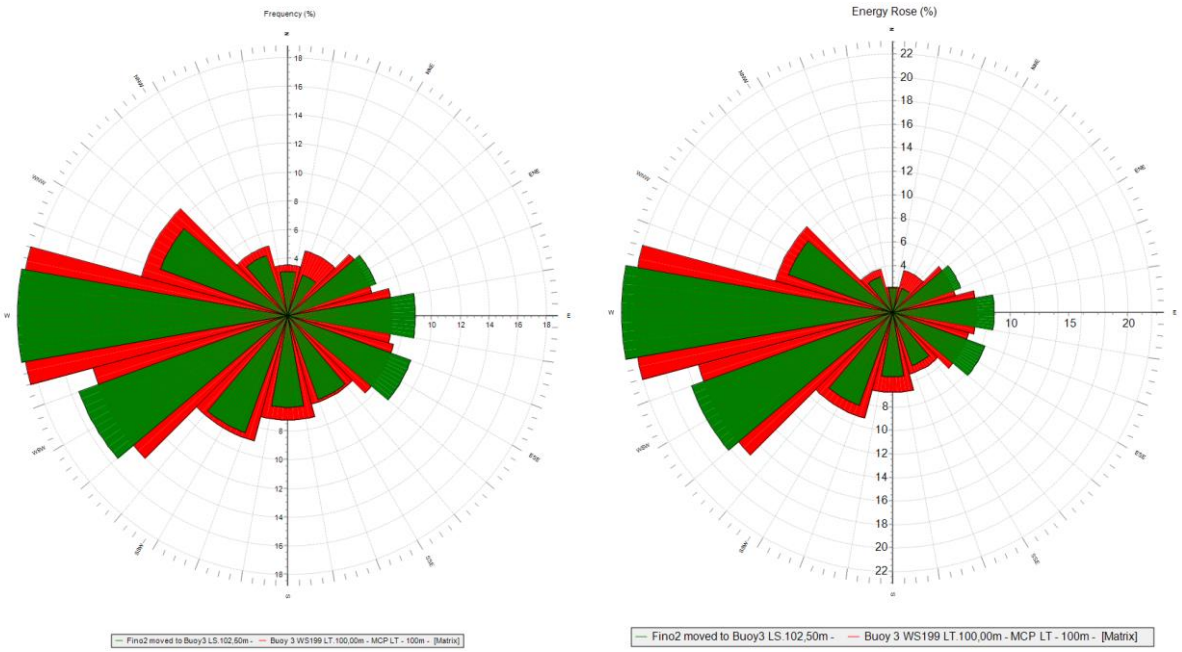

Figure 27. Comparison of directional distribution of FINO2 data moved to Buoy 3, WS199 (green) with WS199 LT (20 years) (red). Left: by frequency, Right: by energy.

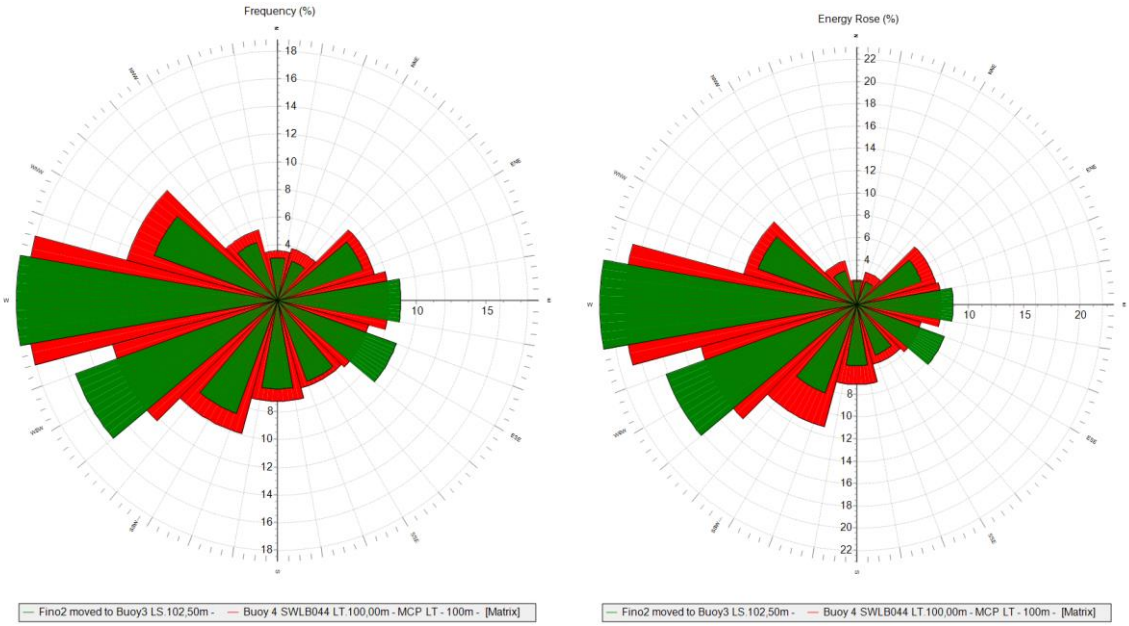

Figure 28. Comparison of directional distribution of FINO2 data moved to Buoy 4, SWLB044 (green) with SWLB044 LT (20 years) (red). Left: by frequency, Right: by energy.

The datasets at 102.5 m translated to buoy locations are shear extrapolated to 150 m using a shear matrix based on 1 year of LiDAR observations. These are the final datasets described in section 4.5. The shear matrix is based on the interval from 90 m to 180 m. The rotation of wind direction from 90 m to 150 m is not included in the extrapolation.

The mean wind speed through the steps can be followed in Table 20. The wind distribution and Weibull fit can be found in detail in Appendix F and G.

Table 20. Mean wind speed through the transfer stages, FINO2 data.

Stage	Arithmetic Mean Wind Speed [m/s]
7 years of measured mean wind speed, FINO2, 102.5 m ASL	9.88
20 years, long- term corrected at 102.5 m, FINO2	9.74
20 years, transferred to WS199, 102.5 m	9.68
20 years, transferred to WS199, 150 m	9.99
20 years, transferred to SWLB044, 102.5 m	9.65
20 years, transferred to SWLB, 150 m	9.93

7.1.2 Taggen

The Taggen mast has been measuring for three years, but during the last winter over a month of data is missing. For this reason, the Taggen data is reduced to two years of data (01/08/2014-31/07/2016). It is also apparent from the data analysis (Appendix A) that the 100 m measurement dataset is subject to situations where low wind speed consistently drops to 0 m/s. Hence the double-mounted 97 m measurements are preferred for the wind resource validation. The signal used is a combined signal of the two anemometers, eliminating the mast shadow.

Based on these 2 years of mast measurements at Taggen, a 20-year equivalent dataset was produced with the same reference period as for WS199 and SWLB044 (Appendix A). The measurement height of interest is at 97 m ASL.

The location of the Taggen mast relative to the WS199 and SWLB044 buoys is presented in Figure 29. The distance from the FINO2 mast to WS199 is 96 km and to SWLB044 is 125 km.

For the validation of the wind model for WS199 and SWLB044, the long-term corrected dataset at Taggen, 97 m, is transferred to the location and height of the two buoys.

An EMD-WRF dataset was extracted for the Taggen mast location (section 6.1). The correlation between the Taggen data and EMD-WRF is high, both on wind speed, monthly energy content and directional distribution as discussed in Appendix A and the EMD-WRF data can therefore be said to capture the wind dynamics very well at Taggen.

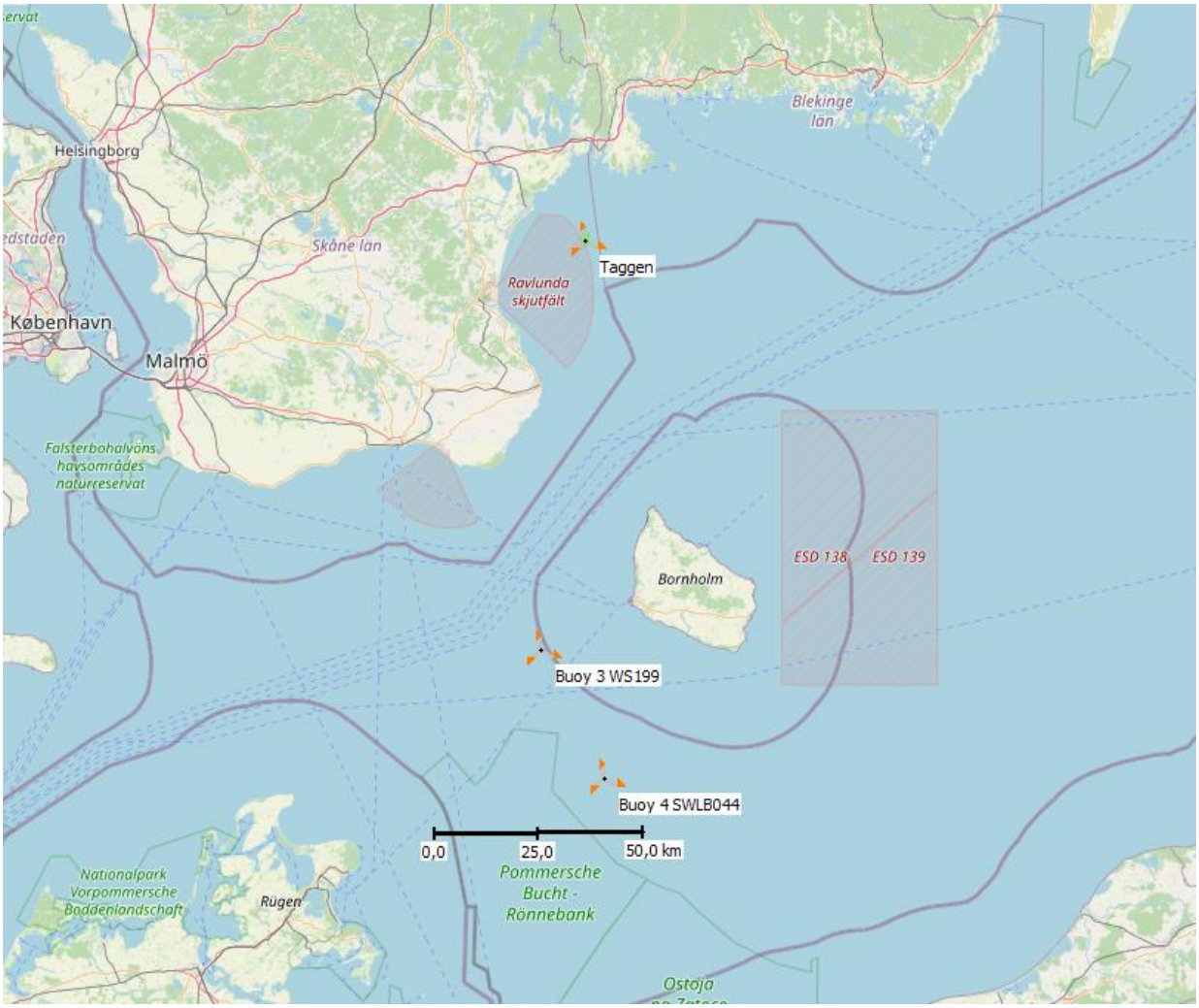

Figure 29. Location of the Taggen mast relative to WS199 and SWLB04.

Comparing the wind direction distribution between EMD-WRF data at Taggen and EMD-WRF data at WS199 some difference in directional distribution is noted, particularly in the western direction (Figure 30). An attempt to use the regression method to transfer data as described for FINO2 failed (resulting in a massively distorted Weibull distribution) so a simpler transformation is made using A-parameter scaling. Given the relatively small difference in direction distribution between EMD-WRF data on the two locations, this is considered a valid method.

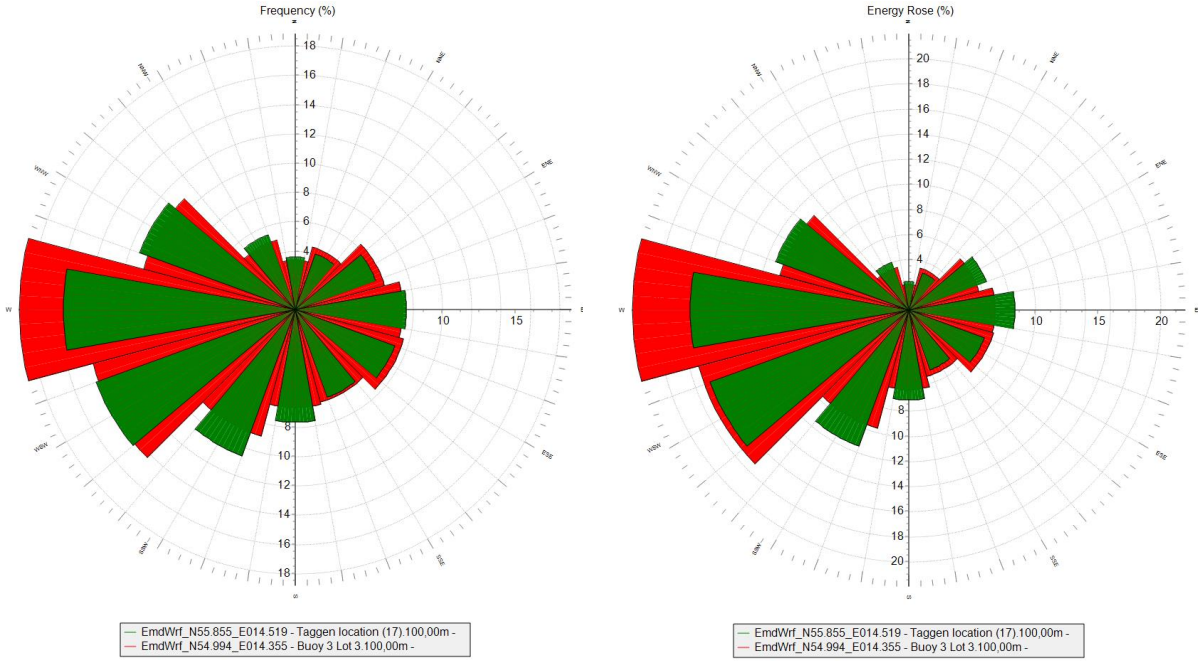

Figure 30. Left: directional distribution between EMD-WRF at WS199 (red) and EMD-WRF at Taggen (green). Right: Energy rose of same two datasets.

The A-parameter scaling method uses the relative difference in the A-parameter of the Weibull distribution in each sector between two mesoscale datasets to scale the wind speed of the data being moved. The wind direction is not being changed. The two mesoscale datasets are in this case EMD-WRF data at Taggen and at Lot 3 and Lot 4 respectively.

The results are time series at the location of WS199 and SWLB044 at 97 m height. The direction distribution is unchanged compared to the 20-year dataset at Taggen and is not a great match with WS199 and SWLB044 (Figure 31 and Figure 32).

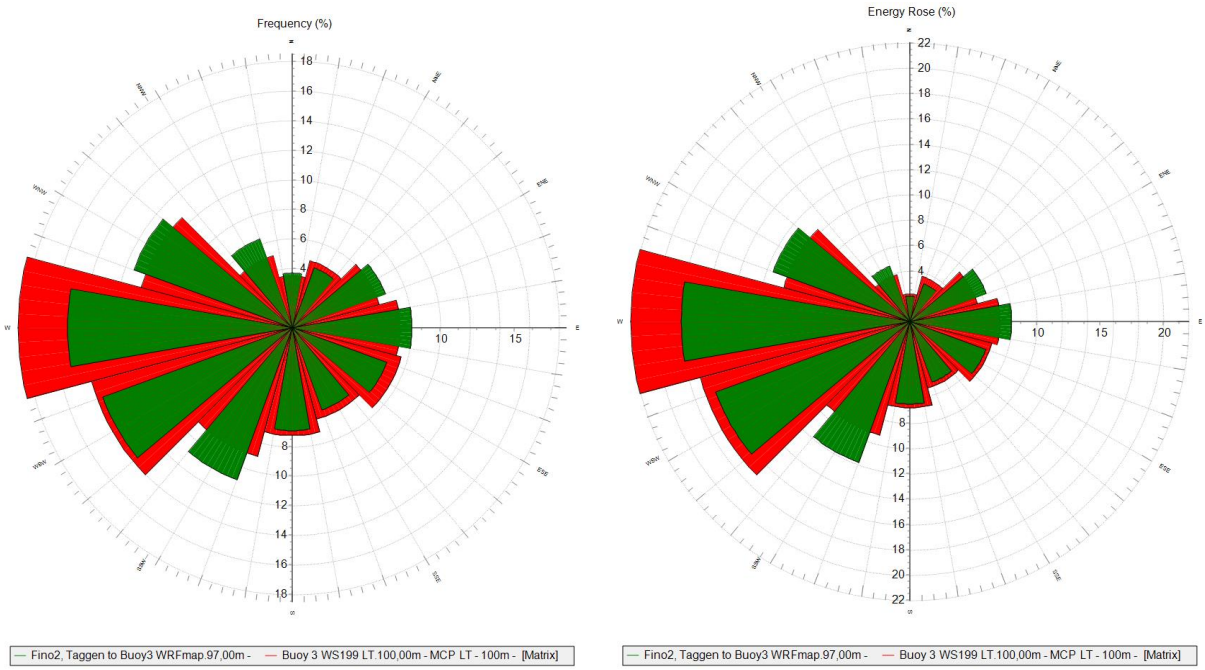

Figure 31. Comparison of directional distribution of transferred Taggen data (green) with WS199 (red) (20 years). Left: by frequency, Right: by energy.

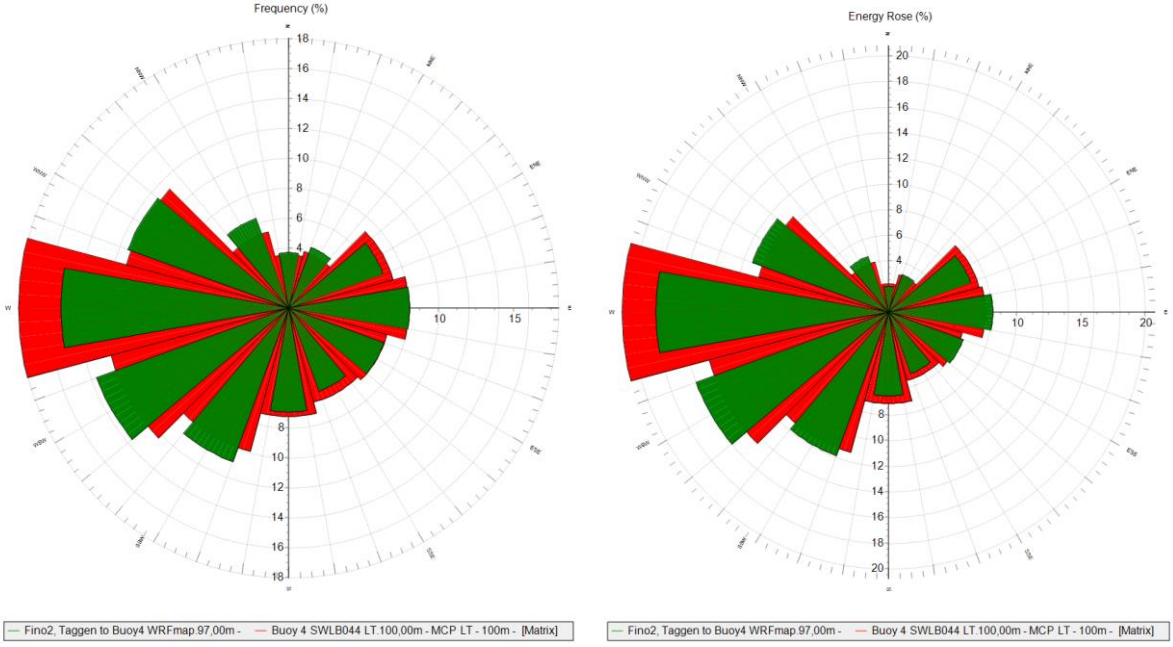

Figure 32. Comparison of directional distribution of transferred Taggen data (green) with SWLB044 (red) (20 years). Left: by frequency, Right: by energy.

The datasets at 97 m translated to buoy locations are shear extrapolated using a shear matrix based on 1 year of LiDAR observations. These are the final datasets described in section 4.5. The shear matrix is

based on the interval from 90 m to 180 m. The rotation of wind direction from 90 m to 150 m is not included in the extrapolation.

The mean wind speed through the steps can be followed in Table 21. The wind distribution and Weibull fit can be found in detail in Appendix F and G. By comparison, with the regression translation method, the resulting wind speed at 150 m would be 9.64 m/s and 9.59 m/s at WS199 and SWLB044 respectively.

Table 21. Mean wind speed through the transfer stages, Taggen data.

Stage	Arithmetic Mean Wind Speed [m/s]
2 years of measured mean wind speed, Taggen, 97 m	8.81
20 years, long-term corrected at Taggen, 97 m	8.51
20 years, transferred to WS199, 97 m	9.37
20 years, transferred to WS199, 150 m	9.71
20 years, transferred to SWLB044, 97 m	9.37
20 years, transferred to SWLB044, 150 m	9.68

7.2 Comparison of Primary Model with Secondary Models

The wind resource at Position 1 (Lot 3) and Position 2 (Lot 4) were assessed through long-term correction of measured LIDAR data. This remains the primary model for the site. Two secondary models were tested, translating measured data from FINO2 and Taggen to the site. They each cover different directions from the Baltic Sea Energy Island OWF.

The results of these tests are summed up in Table 22 and Table 23.

The long-term corrected mean wind speeds are supported well by both FINO2 and Taggen data, considering the distance across which these data have been moved.

The FINO2 data are of good quality and the site location is reasonably representative to those of Position 1 and 2, though situated far west of the Baltic Sea Energy Island OWF. The difference in predicting Position 2 compared to position 1 is marginal and may well be a model artifact.

The Taggen data are also of very good quality, but the measurements are from a location far less representative to the Baltic Sea Energy Island OWF, sheltered behind the Swedish region of Skåne in the main wind directions. This is reflected in the much lower wind speed measured at Taggen. Despite this,

transferred to Position 1 and 2 the measured, long-term corrected wind speed is predicted remarkably well, with less than 2% margin.

There is a distinct difference in the shape of the Weibull distribution of the datasets, though the difference may to some extent be an artifact of the transfer methods. Because of this, it is strongly suggested to remain with the primary dataset as being less manipulated than the supporting datasets.

While the directional distributions are qualitative similar, they are not identical. This may have mostly to do with the distance across which they have been moved (Figure 34).

The secondary models support the primary wind model, but it also clear that the primary model is stronger than any of the secondary models. Therefore, only the primary model is submitted in the data package. The frequency distributions and Weibull parameters of the secondary model are submitted in Appendix F and G.

Table 22. Comparison of model results at Position 1 150 m ASL.

	PRIMARY MODEL	TRANSFERRED FINO2 MODEL	TRANSFERRED TAGGEN MODEL
Wind speed [m/s]	9.86	9.99	9.71
Wind speed relative to primary model		101.3%	98.5%

Table 23. Comparison of model results at Position 2 150 m ASL.

	PRIMARY MODEL	TRANSFERRED FINO2 MODEL	TRANSFERRED TAGGEN MODEL
Wind speed [m/s]	9.87	9.93	9.68
Wind speed relative to primary model		100.6%	98.1%

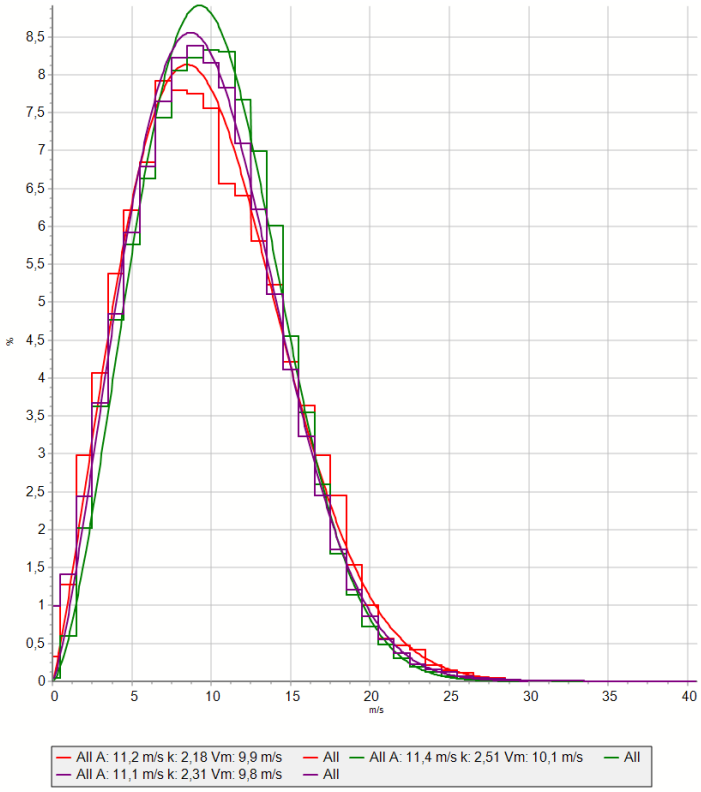

Figure 33. Wind speed probability function for the three datasets at Position 1, WS199. Primary model (red), FINO2 (green) and Taggen (purple).

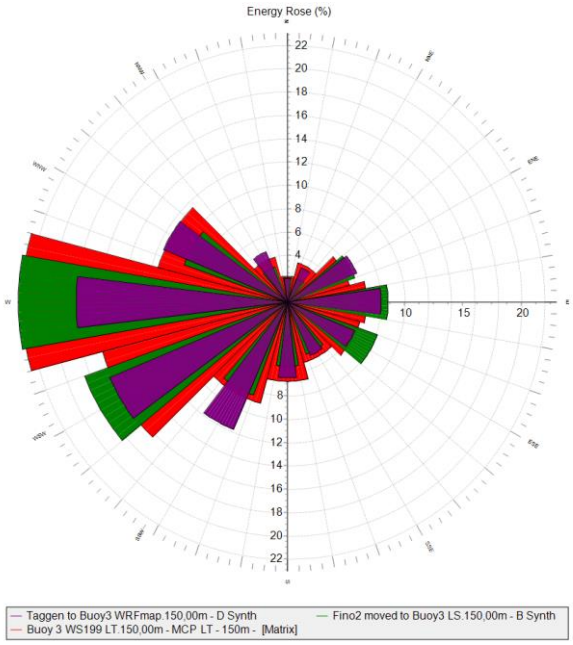

Figure 34. Directional distribution of the three long-term wind models at Position 1, WS199. Primary model (red), FINO2 (green) and Taggen (purple).

7.3 Uncertainty of Primary Wind Model

7.3.1 Measurement Uncertainty

Uncertainty on measurements was discussed in section 4.6. The results are summarized in Table 24.

Table 24. Measurement uncertainty.

BUOY	TOTAL MEASUREMENT UNCERTAINTY
WS199	2.41%
SWLB044	2.74%

7.3.2 Long-term Correction Uncertainty

The long-term correction uncertainty consists of components with very low uncertainty (correlation, reference consistency, reference period length) and one component with moderate uncertainty, which is the measurement period of 1 year. This is therefore the dominant uncertainty with very minor contributions from other components.

Based on [25], the combined long-term correction uncertainty of a 1-year period will range between 1.5% and 4%.

For the long-term correction three different references (EMD-WRF, ERA5 and NORA3) were tested using four different methods in a sensitivity analysis. The standard deviation on predicted wind speed of these was 0.4%. The references are, however, not entirely independent from each other which make this standard deviation unreliable. Instead, the range from minimum to maximum resulting wind speed can be used as an indicator of the uncertainty. This range is 1.3% for WS199 and 1.4% for SWLB044.

We therefore consider an uncertainty on long-term correction of 1.5% a reasonable value for long-term correction of the primary data from the buoys.

7.3.3 Very Long-term Uncertainty

The future climate uncertainty is the potential difference in mean wind speed of the next 20 years from the past period considered in the wind study. Northern Europe is subject to longwave oscillations meaning that a 20-year operation period can be quite different from the very long-term average. As suggested by [25], we estimate that for a 20-year dataset in this region this uncertainty is 1.5 % on wind speed.

This is supported by [26] who indicate 20-year multidecadal variability amplitude of the Baltic Sea on yield around 3%. Given a yield to wind speed ratio near unity, this translates well to wind speed and results in an uncertainty of wind speed of 1.5%.

7.3.4 Year-to-year Variability

Based on the annual variation on the EMD-WRF data the inter-annual variability is 4.4% at WS199 and 4.2% at SWLB044. Over a 20-year lifetime this uncertainty is reduced to 0.82% and 0.78% respectively.

7.3.5 Total Uncertainty

The uncertainty components are combined to a total wind speed uncertainty. A total is given for 1- and 20-year period.

The results from the secondary data provide a standard deviation on the three reported wind speed results for each buoy at 1.4% at WS199 and 1.3% at SWLB044. Due to the horizontal extrapolation distortion and in some cases poorer measurement uncertainty than at the buoys, the uncertainty on the transferred secondary data should be considered higher than on the local data, however the standard deviation of the results from the three different models remain within the range of the total wind speed uncertainty of the primary model (Table 25) and therefore confirm the primary model.

Table 25. Combined uncertainty on long-term wind data. Uncertainty given as one standard deviation wind speed.

	WS199		SWLB044	
WIND DATA UNCERTAINTY	1 YEAR	20 YEARS	1 YEAR	20 YEARS
Measurement uncertainty	2.41%	2.41%	2.74%	2.74%
Long-term correction uncertainty	1.5%	1.5%	1.5%	1.5%
Very long-term uncertainty	1.5%	1.5%	1.5%	1.5%
Annual variability	4.4%	0.82%	4.2%	0.78%
Total	**5.45%**	**3.33%**	**5.44%**	**3.55%**

8 Flow Modelling

8.1 Wind Resource Map

A wind resource map has been made for the Baltic Sea Energy Island offshore wind farm zone. The map is based on the primary wind model (long-term corrected LiDAR data) and describe the horizontal change across the site.

The variation in wind speed distribution across the site is found with a grid of mesoscale data across the site. The mesoscale data used are EMD-WRF Europe+ data and the period for each datapoint is 5 years. The grid has a spacing of 6 km between each node. EMD-WRF Europe+ is a precalculated version of EMD-WRF using a much larger domain than the EMD-WRF data otherwise used in this study. Their ready availability makes them well-suited for a grid like this.

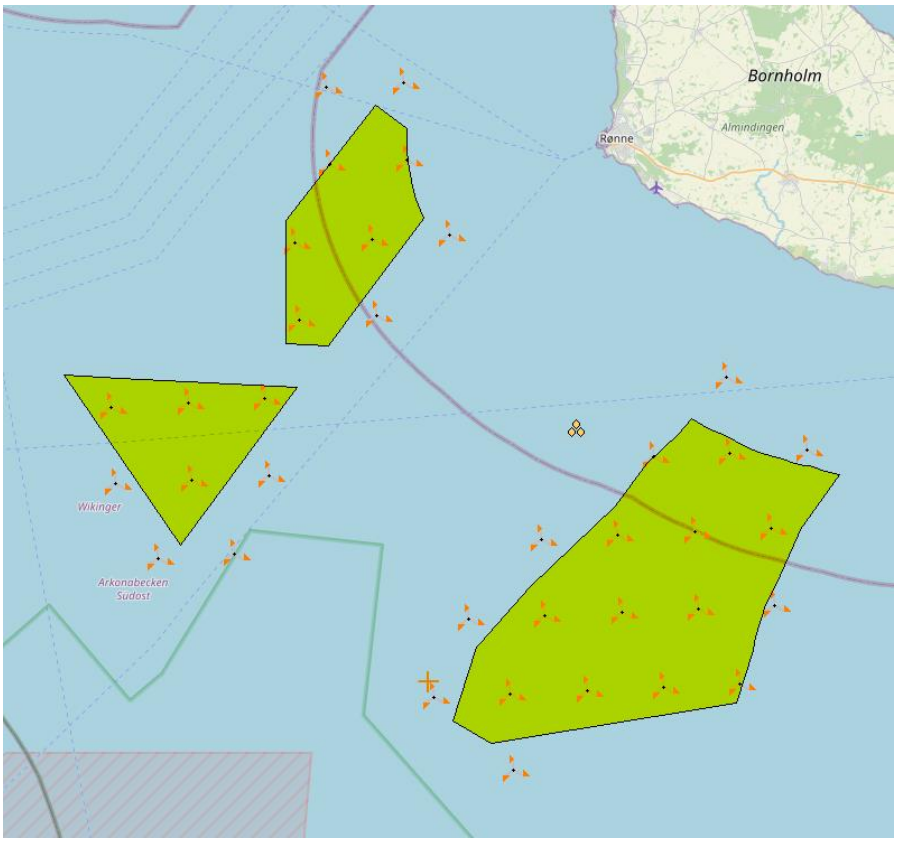

Figure 35. Grid of EMD-WRF Europe+ data

Based on this grid a wind resource map is produced of data at 150 m height.

The wind resource map is then recalibrated with the long-term corrected measurements at WS199 and SWLB044 with WS199 as anchor point for the western two segments and SWLB044 as anchor for the eastern segment.

The resulting recalibrated wind resource map is presented in Figure 36 and is provided as a deliverable.

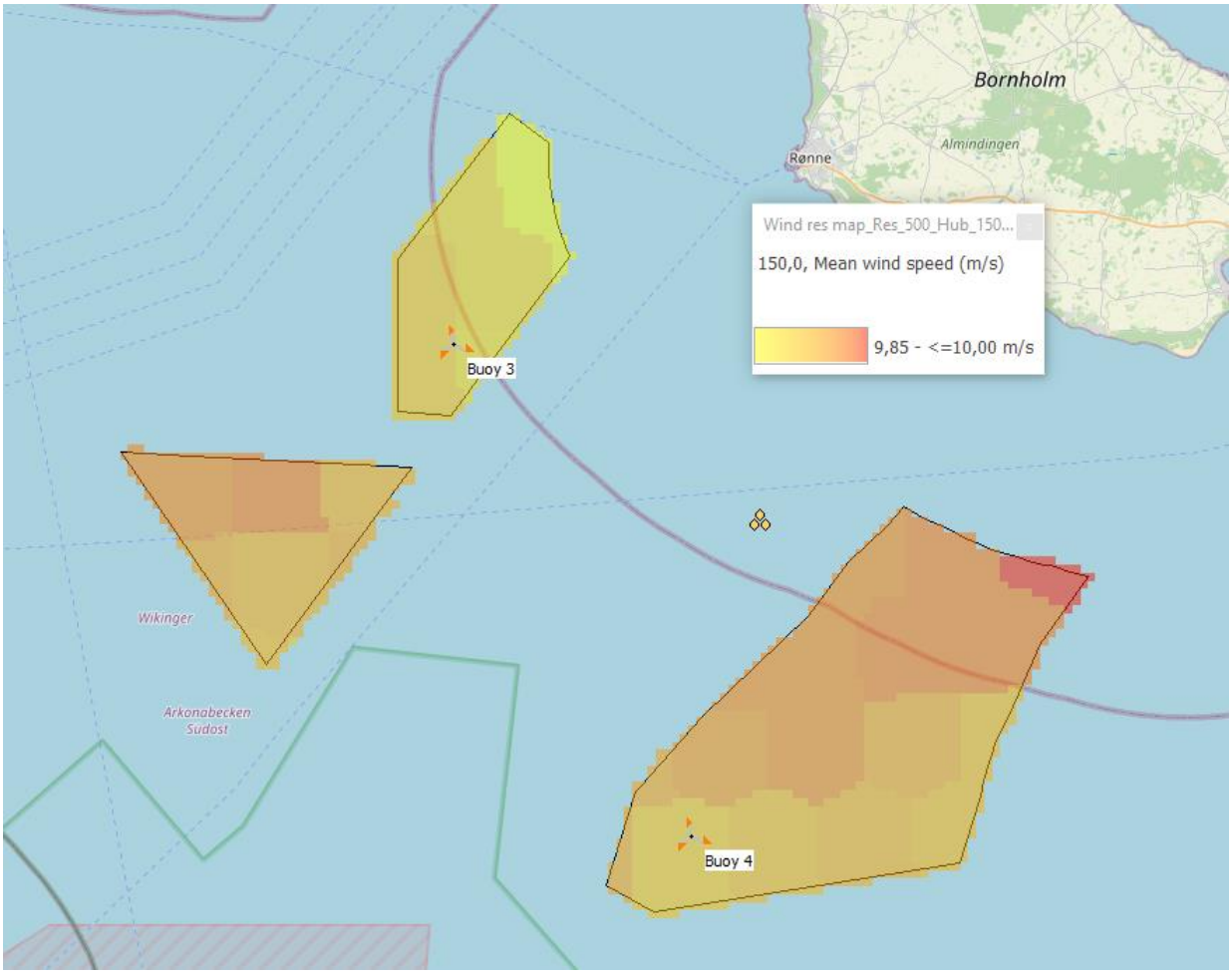

Figure 36. Wind resource map for the Baltic Sea Energy Island OWF.

8.2 Wind Resource Model for Position 3 and 4

This site parameter assessment includes data for a third and a fourth position beside the two measurement locations.

The location of Position 3 and 4 was selected as representative of section of the OWF not covered by the two buoys. Coordinates for Position 3 and 4 are presented in Table 26. The location of position 3 is 17 km southwest of Position 1 and 33 km northwest of Position 2. Position 4 is 35 km southeast of Position 1 and 22 km northeast of Position 2. Please note that Position 3 will be under influence of the operating Arkona and Wikinger wind farm plus any further development in that sector. The data presented here for position 3 and 4 are for ambient conditions without the influence of operating wind turbines.

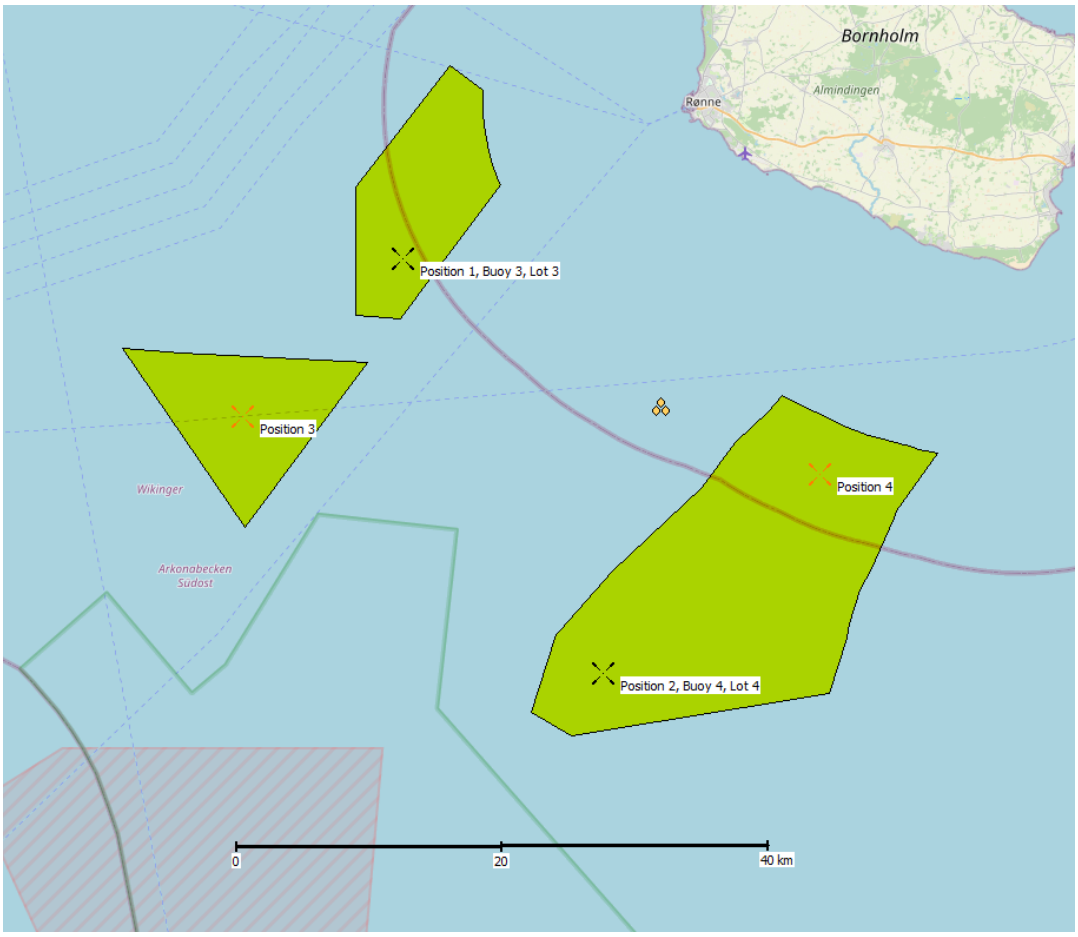

Figure 37. Location of measurement points and the selected Position 3 and 4.

Table 26. Coordinates for Position 3 and 4.

	UTM WGS84, ZONE 32		GEOGRAPHICAL COORDINATES **WGS84**	
Position 3	831,363	6,094,706	14.1682°	54.8892°
Position 4	874,818	6,093,803	14.8412°	54.8503°

For Position 3 and 4 a long-term time series has been produced for 150 m ASL.

This is achieved through the gradient file method available in windPRO. With this method observed data are moved around the site using a wind resource map. From the wind resource map, the Weibull A parameter of the Weibull distribution is picked up from the location of the observed data and the prediction location and the ratio is applied to the observed time series. A specific ratio is found for each of 12 direction sectors. No change is made to the wind direction data.

The validity of this assumption is tested by comparing the directional distribution of EMD-WRF Europe+ data for the locations of Position 1 (WS199, Lot 3), Position 2 (SWLB044, Lot 4), Position 3 and Position 4 (Figure 38). There is a marginal difference in wind direction, but small enough to assume of similar direction distribution is valid.

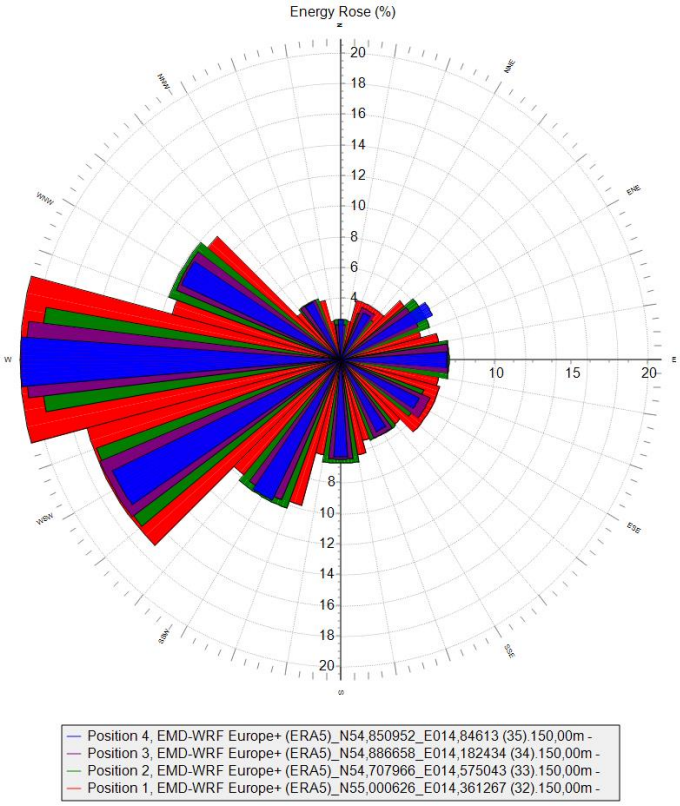

Figure 38. Comparison of direction distribution between EMD-WRF data extracted for the locations of WS199 (red), SWLB044 (purple), Position 3 (green) and Position 4 (blue).

For Position 3 the resulting time series at 150 m was generated using the long-term corrected time series for WS199 at 150 m and the recalibrated wind resource map.

For Position 4 the resulting time series at 150 m was generated using the long-term corrected time series for SWLB044 at 150 m and the recalibrated wind resource map.

In principle, with this method, a time series can be extracted for any location on the site using the wind data time series and the gradient file. Both are included as deliverables.

The time series for Position 3 and 4 includes wind speed and wind direction for 20 years in an hourly resolution.

The arithmetic mean wind speed at both Position 3 and 4 is 9.90 m/s. The Weibull distributions are presented in Table 27. Details can be found in Appendix D.

Table 27. Weibull parameters of the long-term wind data, Position 3 and 4.

POSITION	PERIOD [Y]	ARITHMETIC MEAN WIND SPEEDS [M/S]	WEIBULL MEAN [M/S]	WEIBULL - A PARAMETER [M/S]	WEIBULL - K PARAMETER
Position 3, 150 m	20	9.90	9.96	11.25	2.1873
Position 4, 150 m	20	9.90	9.96	11.25	2.1769

9 Siting Parameters

This chapter outlines the requested siting parameters for assessment of structural integrity of wind turbines in accordance with the relevant design standards: IEC 61400-1 Ed. 4 [1], IEC 61400-3-1 Ed. 1 [2], IEC 61400-15-1 CD [6], DS 472 Ed 2. [5], and EN1991-1-4 including the Danish Annex DK NA EN1991-1-4 [3] [4].

For siting parameters that require turbine specific information, the following has been assumed.

Table 28. Turbine specific information used for siting parameters.

TURBINE SPECIFICATION	VALUE
Hub height	150 m
Rotor diameter	240 m
Cut-in wind speed	3 m/s
Cut-out wind speed	25 m/s
Wind turbine class	II

9.1 Normal Wind Conditions

Normal wind conditions have been derived in accordance with IEC 61400-3-1 Ed. 1 [2], IEC 61400-1 Ed. 4 [1] and IEC 61400-15-1 CD [6]. All parameters except for the wind speed distribution have been estimated as omnidirectional characteristic values. This is in line with the IEC 61400-3-1, which allows omnidirectional values to be considered for offshore sites that are far away from the coast where the environment generally exhibits little directional variation.

Due to the site location being offshore, the terrain is classified as “not complex” (terrain complexity factor is 1.0) and the wind flow is assumed without any inclination (flow inclination 0°).

9.1.1 Wind Speed Distribution

The 10-min mean wind speed probability distribution at hub height is modelled by a Weibull distribution for each direction [1]. The distributions are estimated based on long-term corrected data from the LiDARs. Note that the temporal resolution of these data is 1 hour but according to IEC 61400-3-1 the long-term probability distribution of mean wind speed may be assumed to be independent of averaging periods between 10 minutes and 3 hours. The results are summarized in the table below. Mean wind speed is derived from the Weibull distribution. Details can be found in Appendix D.

Table 29. Weibull distribution parameters based on long-term corrected LIDAR data at 150 m ASL, Position 1 - WS199. Wind speeds are derived from the Weibull distribution.

POSITION 1 – WS199 SECTOR	A PARAMETER [M/S]	K PARAMETER [-]	FREQUENCY [%]	MEAN WIND SPEED [M/S]
Mean	11.20	2.184	100.00	9.92
0-N	7.98	1.854	3.58	7.08
1-NNE	9.24	1.910	4.51	8.19
2-ENE	10.48	2.200	5.96	9.28
3-E	10.56	2.196	7.29	9.35
4-ESE	10.00	2.370	7.35	8.87
5-SSE	9.73	2.337	6.37	8.62
6-S	10.68	2.129	7.22	9.46
7-SSW	11.38	2.329	8.68	10.08
8-WSW	13.09	2.480	13.50	11.62
9-W	13.01	2.462	18.89	11.54
10-WNW	11.16	2.212	11.45	9.89
11-NNW	9.24	2.067	5.21	8.19

Table 30. Weibull distribution parameters based on long-term corrected LIDAR data at 150 m ASL, Position 2 – SWLB044. Wind speeds are derived from the Weibull distribution.

POSITION 2 – WSLB044 SECTOR	A PARAMETER [M/S]	K PARAMETER [-]	FREQUENCY [%]	MEAN WIND SPEED [M/S]
Mean	11.22	2.180	100.00	9.94
0-N	7.97	1.923	3.76	7.07
1-NNE	9.20	1.975	3.85	8.16
2-ENE	11.04	2.172	6.79	9.78
3-E	10.66	2.321	8.01	9.45
4-ESE	9.81	2.740	6.59	8.73
5-SSE	9.80	2.313	6.50	8.69
6-S	10.95	2.242	7.02	9.69
7-SSW	12.24	2.474	9.23	10.85
8-WSW	12.63	2.425	12.71	11.20
9-W	12.90	2.270	18.44	11.42
10-WNW	10.97	2.121	11.65	9.71
11-NNW	9.40	2.047	5.45	8.33

Table 31. Weibull distribution parameters based on long-term corrected LIDAR data at 150 m ASL, Position 3. Wind speeds are derived from the Weibull distribution.

POSITION 3 SECTOR	A PARAMETER [M/S]	K PARAMETER [-]	FREQUENCY [%]	MEAN WIND SPEED [M/S]
Mean	11.25	2.187	100.00	9.96
0-N	7.99	1.856	3.58	7.10
1-NNE	9.23	1.911	4.51	8.19
2-ENE	10.48	2.201	5.96	9.29
3-E	10.65	2.196	7.29	9.43
4-ESE	10.11	2.381	7.35	8.97
5-SSE	9.82	2.335	6.37	8.71
6-S	10.77	2.138	7.22	9.54
7-SSW	11.41	2.327	8.68	10.11
8-WSW	13.18	2.480	13.50	11.69
9-W	13.02	2.461	18.89	11.54
10-WNW	11.17	2.213	11.45	9.89
11-NNW	9.32	2.068	5.21	8.25

Table 32. Weibull distribution parameters based on long-term corrected LIDAR data at 150 m ASL, Position 4. Wind speeds are derived from the Weibull distribution.

POSITION 4 SECTOR	A PARAMETER [M/S]	K PARAMETER [-]	FREQUENCY [%]	MEAN WIND SPEED [M/S]
Mean	11.25	2.177	100.00	9.96
0-N	8.29	1.922	3.76	7.35
1-NNE	9.46	1.976	3.85	8.38
2-ENE	11.42	2.152	6.79	10.11
3-E	10.63	2.296	8.01	9.42
4-ESE	9.64	2.752	6.59	8.58
5-SSE	9.69	2.304	6.50	8.59
6-S	10.90	2.236	7.02	9.66
7-SSW	12.08	2.474	9.23	10.71
8-WSW	12.61	2.428	12.71	11.19
9-W	12.97	2.266	18.44	11.49
10-WNW	10.99	2.119	11.65	9.73
11-NNW	9.52	2.049	5.45	8.43

9.1.2 Normal Wind Profile (NWP)

The site-specific normal wind profile is characterised by the mean wind shear power law coefficient (α_c). According to IEC 61400-1 Ed. 4 [1] the site-specific omnidirectional characteristic wind shear should be evaluated as the energy-weighted average of the sectorwise values.

The repaired (final) 1 year LiDAR datasets were used to calculate the characteristic shear. Two values are offered: A power law coefficient based on heights 120 m, 150 m, and 180 m, the expected hub height range, and, secondly, the shear across to expected rotor range, based on 30 m, 100 m, 150 m, 180 m and 270 m height data. As a full year is available, there is no need to long-term adjust the data to derive characteristic shear. The results are summarised in the table below.

For Position 3, the Position 1 shear can be assumed while for Position 4, the Position 2 shear can be assumed.

Table 33. Site specific omnidirectional wind shear exponent.

WIND SHEAR POWER LAW EXPONENT [-]	POSITION 1 – WS199	POSITION 2 – SWLB044
Hub height range 120 m to 180 m	0.081	0.087
Rotor range 30m to 270m	0.095	0.094

WIND PROFILE CHARACTERISTICS.

The observed wind profile at WS199 and SWLB044 is presented as a function of heat flux (Table 34). The heat flux is obtained from EMD-WRF data at buoy location. The numbers for the two locations are similar and the average can be assumed for position 3 and 4. Only the SWLB044 numbers are presented as the results are identical for the buoys and can be considered valid for all four positions. Three distinct zones can be found Figure 39:

1. Negative heat flux, typical for stable conditions, with a clear link between shear and heat flux,
2. A middle range, typical for neutral condition, with a well-defined shear
3. Positive heat flux with a substantial scatter in shear.

The different regimes are summarized in Table 34.

Table 34. Range of observed shear by heat flux.

SWLB044	LOW HEAT FLUX	CENTRAL RANGE HEAT FLUX	HIGH HEAT FLUX
Heat flux range	<5 W/m^2	5 – 25 W/m^2	>25 W/m^2
Frequency of range, WS199	26%	49%	25%
Frequency of range, SWLB044	24%	50%	26%
Typical shear range	0.08 - 0.3	0.04 - 0.08	-0.08 - 0.08

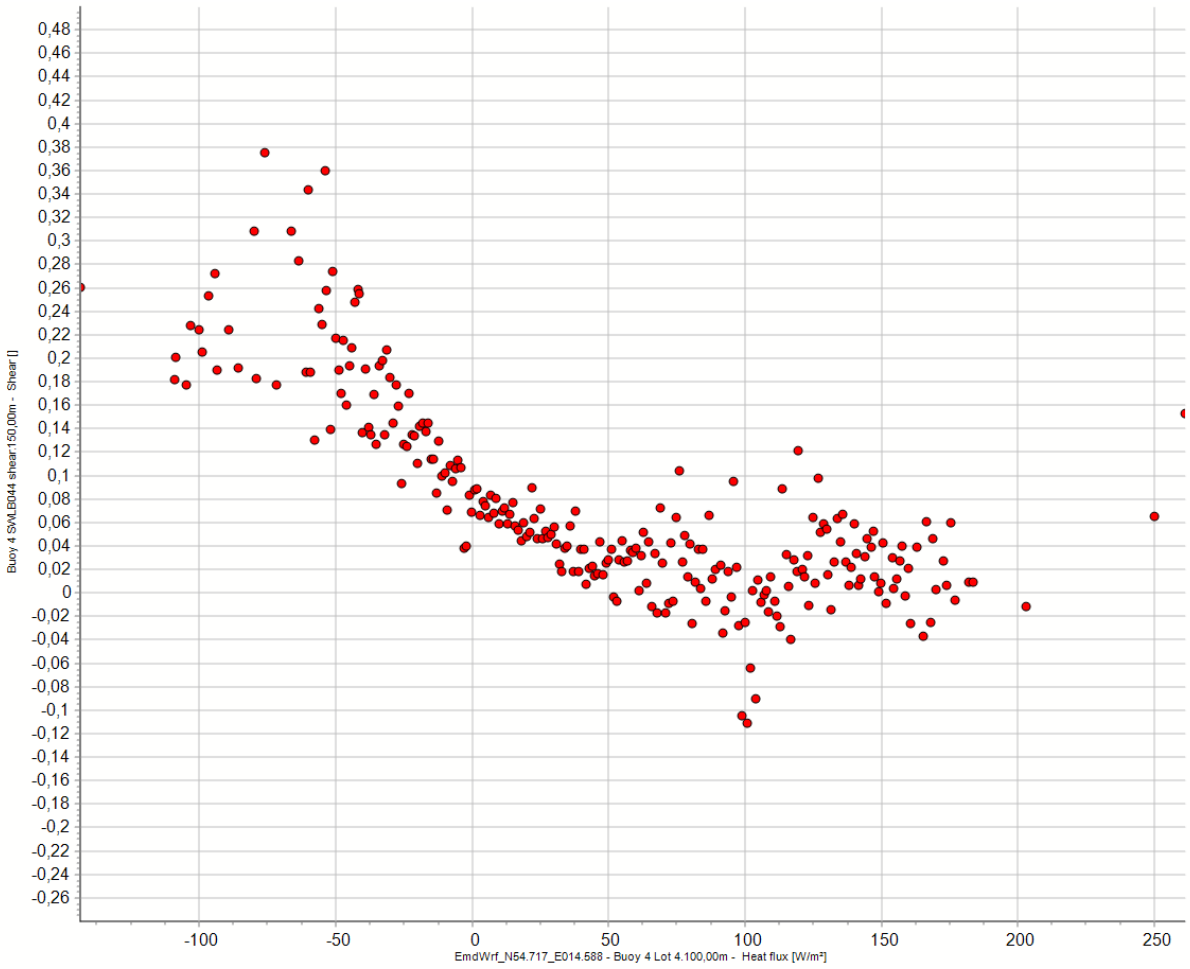

Figure 39. Shear power law coefficient as a function of heat flux at SWLB044.

Stability classes are defined through the Monin-Obukhov length, here using three categories as described in Table 35. The 1/L signal in the EMD-WRF data is used to describe stability at SWLB044 in Figure 40. Stable conditions are common during spring months. Both stable and unstable conditions are suppressed at high wind speed.

Table 35. Range of observed shear as a function of stability class.

	STABLE	NEUTRAL	UNSTABLE
Inverse Monin-Obukhov length [m]	1/L > 0.005	-0.005 > 1/L > 0.005	1/L < -0.005
Frequency, WS199	23%	14%	62%
Frequency, WSLB044	22%	14%	64%
Typical shear range	0.1 - 0.3	0.04 - 0.1	-0.08 - 0.08

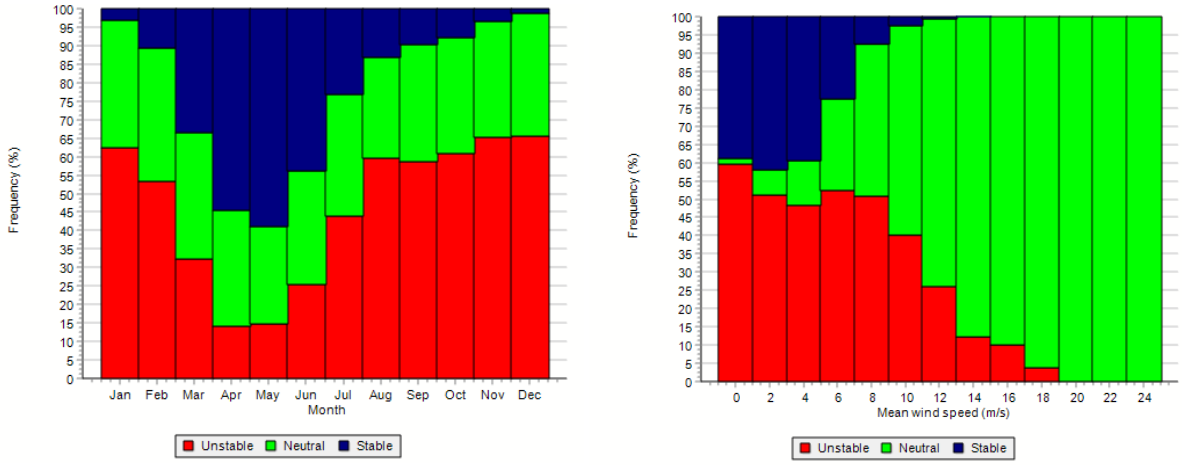

Figure 40. Frequency of stability classes as a function of month and wind speed, EMD-WRF at location of SWLB044.

Shear as a function of stability (1/L) at WS199 is presented in Figure 41. It is clear that unstable conditions result in low shear in the range of -0.08 to 0.12 while during stable conditions, a much greater variety of shear may occur. Not only high shear but also significant negative shear.

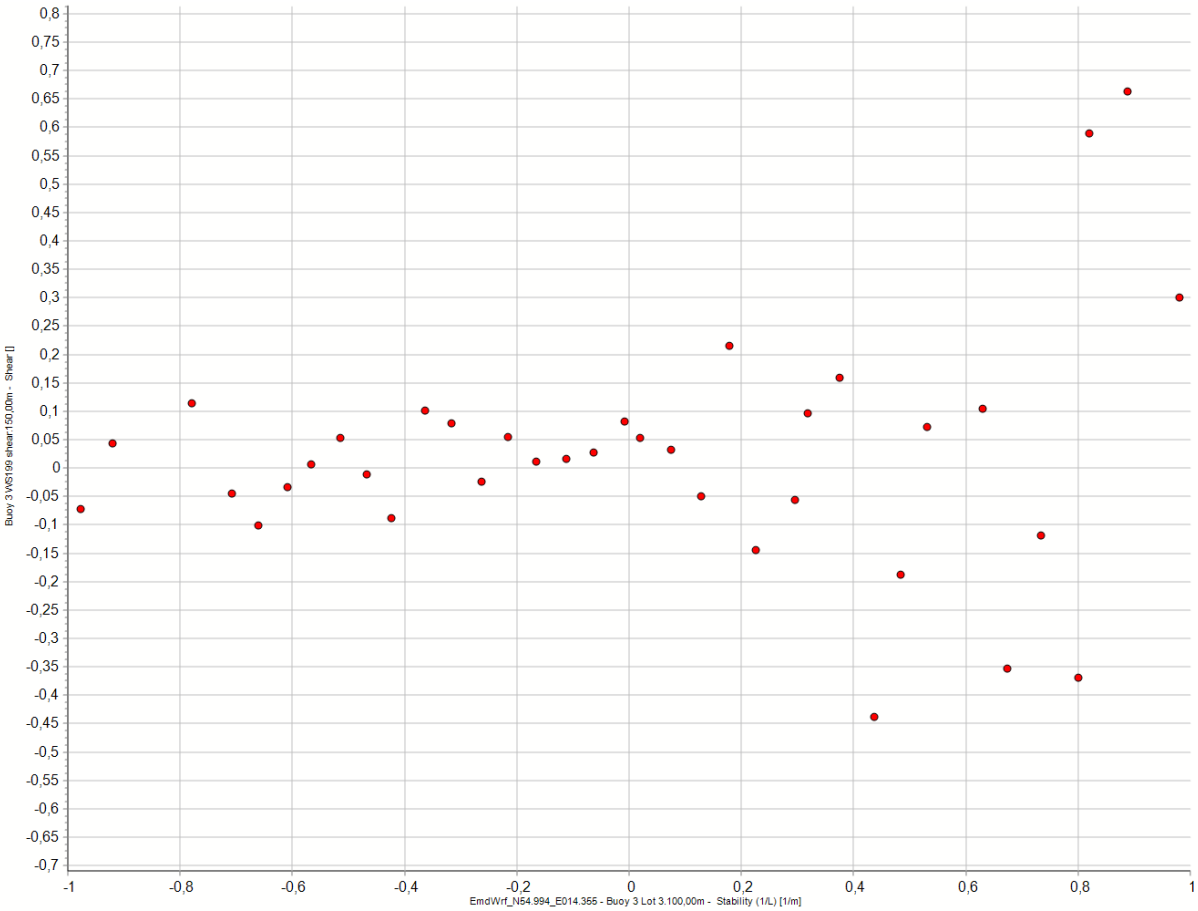

Figure 41. Shear coefficient as a function of stability (1/L), based om WM199 and EMD-WRF data.

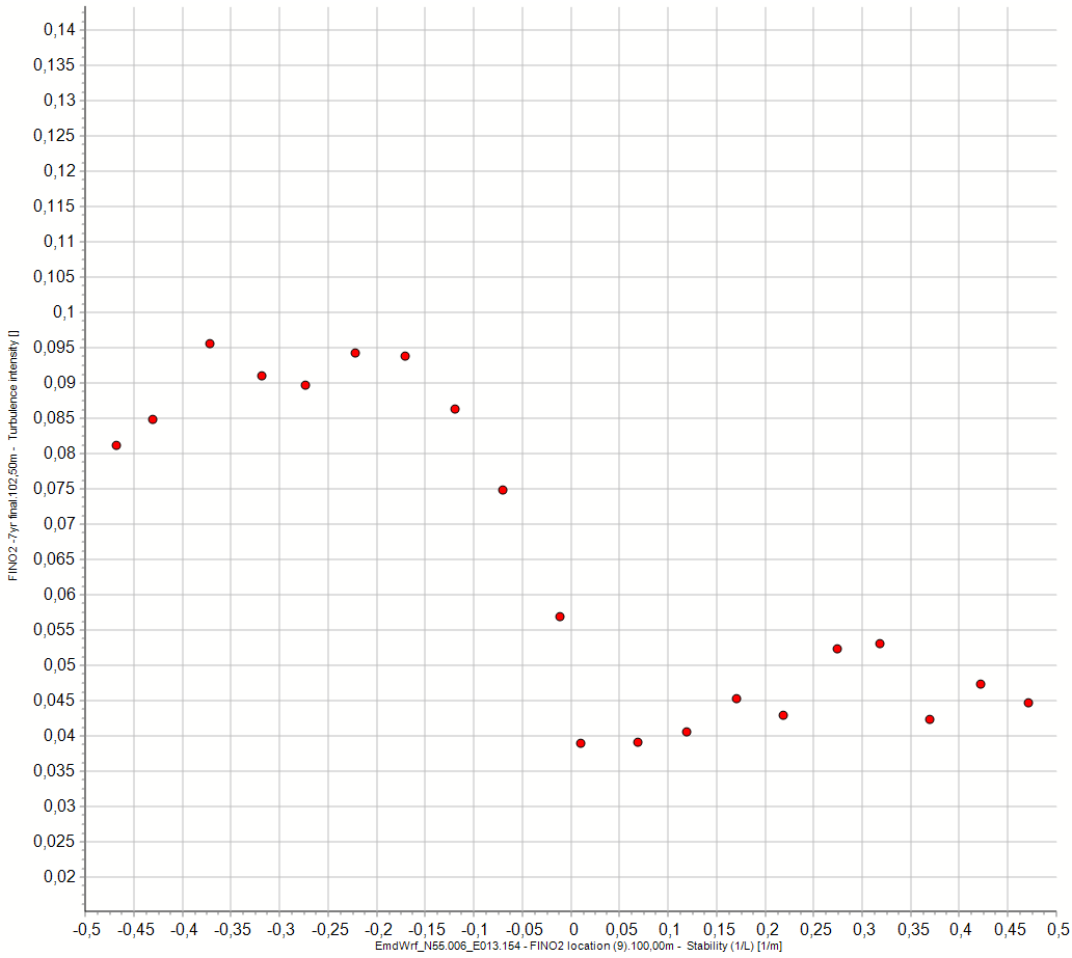

Figure 42. Turbulence intensity at FINO2, 102 m ASL, as a function of stability (1/L, EMD-WRF).

This is strongly linked to turbulence. Figure 42 presents turbulence intensity at FINO2 as a function of stability (at the EMD-WRF point associated with FINO2), where turbulence hover around 9% during unstable conditions and 4-5% during stable conditions.

At offshore locations, the main driver of the shear coefficient is seasonal rather than diurnal and a plot of rotor radius shear as a function of month (Figure 43) shows this seasonal variation. The winter and spring months with high frequency of stable wind conditions are associated with high shear values and low turbulence, while summer months with dominant neutral and unstable conditions tend to have lower shear and higher turbulence. It is not, however, as clear cut as seen in the North Sea, partly because of the higher frequency of stable conditions and partly because of the erratic shear during stable conditions.

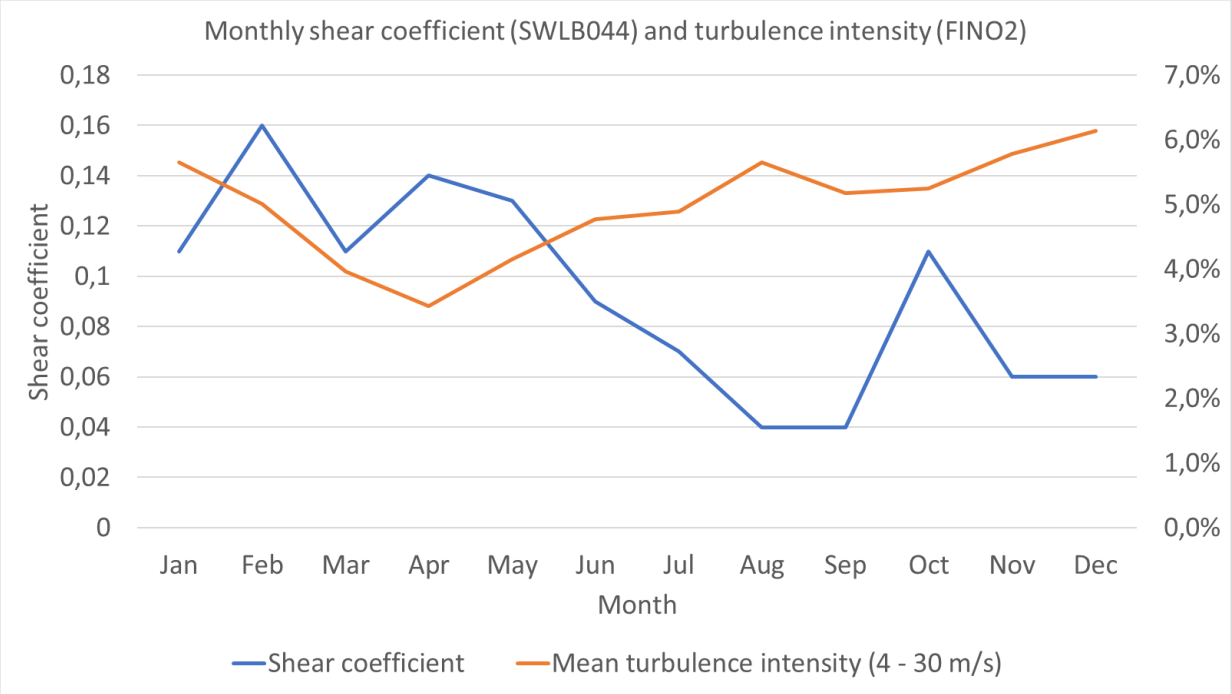

Figure 43. Monthly shear coefficient α across the rotor at SWLB044 and monthly mean turbulence intensity at FINO2.

9.1.3 Normal Turbulence Model (NTM)

TURBULENCE MODEL AND FIT

The normal turbulence model in the IEC 61400-1 [1] standard defines a linear relationship between the characteristic 90% quantile of turbulence ($\sigma_{c,90}$) and wind speed. For offshore sites, this is not representative, due to the Charnock effect, which adds a second order effect to the turbulence increase with wind speed [2]. A special purpose offshore model is therefore considered where the turbulence mean value (σ_μ) is modelled as a second order function of wind speed, and the turbulence standard deviation (σ_σ) is modelled as a linear function of wind speed. The models are outlined by the equations:

$$\sigma_\mu(u) = A_{\sigma_\mu} + B_{\sigma_\mu}u + C_{\sigma_\mu}u^2$$

$$\sigma_\sigma(u) = A_{\sigma_\sigma} + B_{\sigma_\sigma}u$$

The characteristic turbulence required for structural design can be calculated by combining the two models as [1]:

$$\sigma_{c,90}(u) = \sigma_\mu(u) + 1.28\sigma_\sigma(u)$$

SELECTION OF TURBULENCE DATA

The models and safety factors forming the basis of the IEC 61400-1 and IEC 61400-3-1 are calibrated using turbulence measured by cup anemometers. LiDARs measure turbulence in a different way than cup anemometers, as they represent a volumetric average contrary to the point observation of a cup. No industry standard has yet been established to define corrections of LiDAR turbulence for use in site

assessments and loads, although attempts are ongoing as e.g. CFARS. On top of this limitation floating LiDARs are exposed to wave movements which are amplified with increasing height. This movement appears as an additional contribution to the apparent turbulence seen by a floating LiDAR. As a consequence, floating LiDARs are not consistent with the requirements in IEC61400-1 or IEC61400-3 for assessment of turbulence and cannot be used to characterise the site turbulence.

Luckily, far offshore conditions are relatively uniform, at least regionally, which is documented in the highly relevant master thesis [27]. Causes of local variations are mainly due to coastal effects and changes in wave-seabed interaction in areas of shallow water affecting the waves. The closest alternative data sources based on cup anemometry, which are available to this study, are:

1) FINO2 masts (102 m)
2) Taggen mast (100 m)

A mast was in operation closer to the site, known as the Arkona mast, but data from this mast was not available for this study. Given its proximity and representativeness for the site it is recommended that data from this mast is obtained for further validation.

The relative positions of the two masts, plus the Arkona mast, are shown together with the bathymetry of the surrounding Baltic Sea in Figure 44 below.

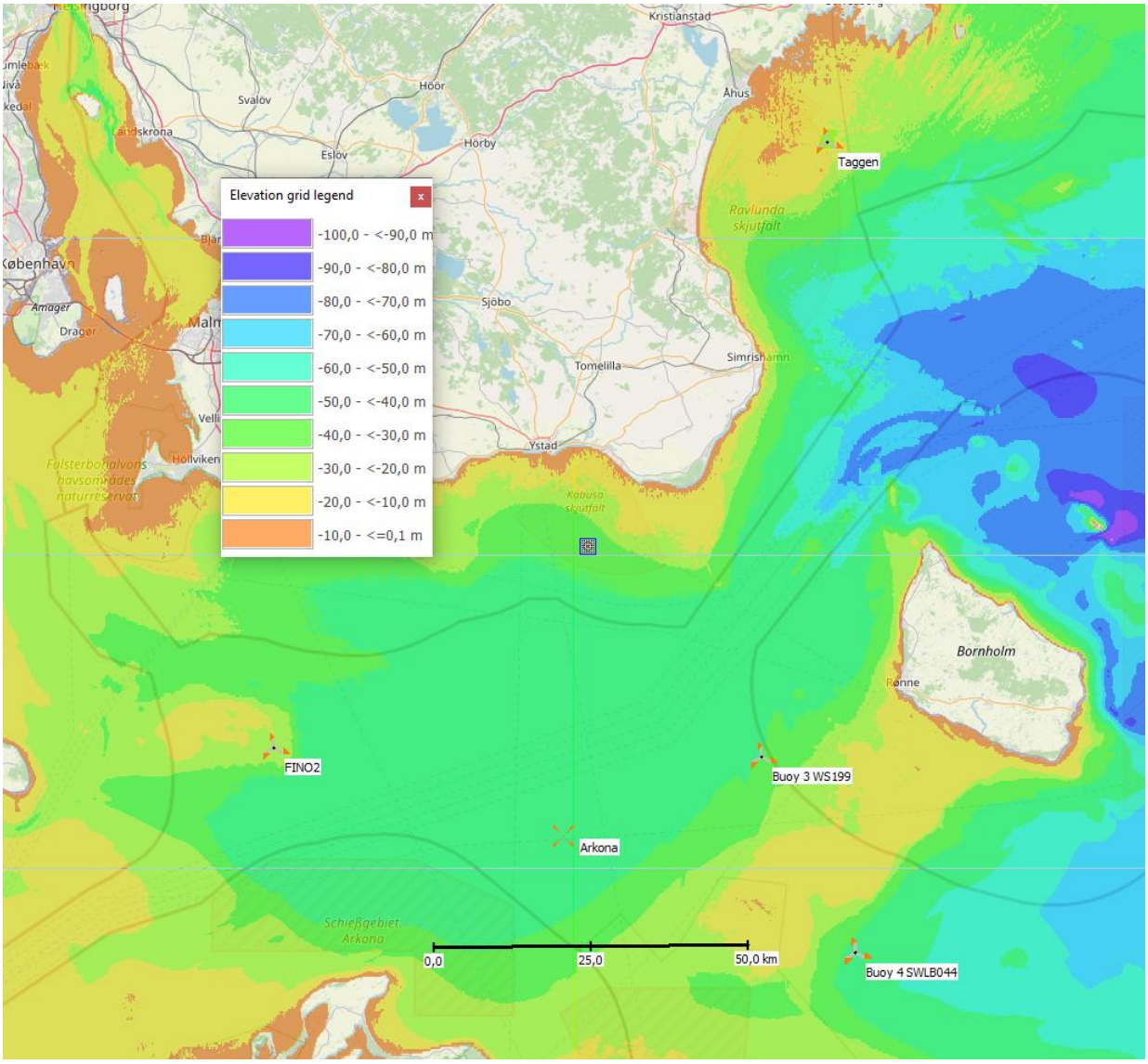

Figure 44. Plot showing the bathymetry of the Baltic Sea and the relative positions of FINO2 mast, Taggen mast, Arkona mast and the two Lidars.

The master thesis [27] documents that the turbulence level at a given height as a function of wind speed is surprisingly uniform and consistent across masts in the entire North Sea, even including the Irish Sea. There is reason to believe that there is also regional consistency across the Baltic Sea.

FINO2 is the primary source of turbulence information to the Baltic Sea Energy Island. It is equipped with a top anemometer at 102 m and boom mounted anemometers below that height. A full description of the FINO2 mast is included in Appendix A. The FINO2 mast is located deeply offshore with long distance to land. Its location on the Krieger's Flak bank gives it moderately but not critically low water in the main wind direction and with a distribution of shallow and deep water similar to that of the LiDARs, although in different directions.

The **Taggen** mast is 100 m tall with a top mounted anemometer and double mounted anemometers at several heights below, side mounted. For the turbulence assessment the 100 m measurements are preferred to the measurements of the side mounted anemometers as these are less subjected to turbulence distortion from the mast. The reported problem with wind speed dropping to 0 m/s is not a problem for the turbulence analysis. A full description of the Taggen mast is included in Appendix A. Taggen is located in the Hanö Bay, off the eastern shore of Skåne. Closest distance to shore is 14 km and it must be expected that for most wind directions, the proximity of the Swedish landmass will influence the turbulence measured. For a limited direction interval, 50˚ to 180˚, the fetch across water is sufficiently large to make the wind conditions representative for offshore conditions. The water depth in those directions is sufficiently deep to make it representative to the Baltic Sea Energy Island OWF. For the turbulence analysis 3 years of data at the top anemometer was considered.

Given the above FINO2 is representative of the conditions at the site of the Baltic Sea Energy Island. As the Arkona mast has not been available for this study using FINO2 is the preferred solution, as it is generally representative of the far offshore conditions, has high measurement levels, and limited mast distortion at the top anemometer. Given the location of the Taggen mast, it is considered less representative of the Baltic Sea Energy Island, but results are reported here as supporting data.

VARIATION OF TURBULENCE AT FINO2

For variations of turbulence versus time of year and stability see section 9.1.2 on wind shear, which shows the variation of both parameters.

FIT OF THE TURBULENCE AT FINO2

As described earlier a second-order fit is required to fit the mean turbulence offshore whereas a linear fit is sufficient for the offshore standard deviation of turbulence. According to [2] turbulence may be considered omnidirectional far offshore, which is the setting for the FINO2 data and Baltic Sea Energy Island site, hence, the turbulence data are fitted independently of direction. This also allows the exclusion of the wind direction interval from 340˚ to 40˚ where significant measurement disturbances were detected (see Appendix A).
Figure 45 shows the turbulence observations and associated omnidirectional fits for the 102 m level at FINO2. Notice the clear non-linear effects for the mean turbulence due to wave interaction (i.e. the ‘Charnock’ effect).

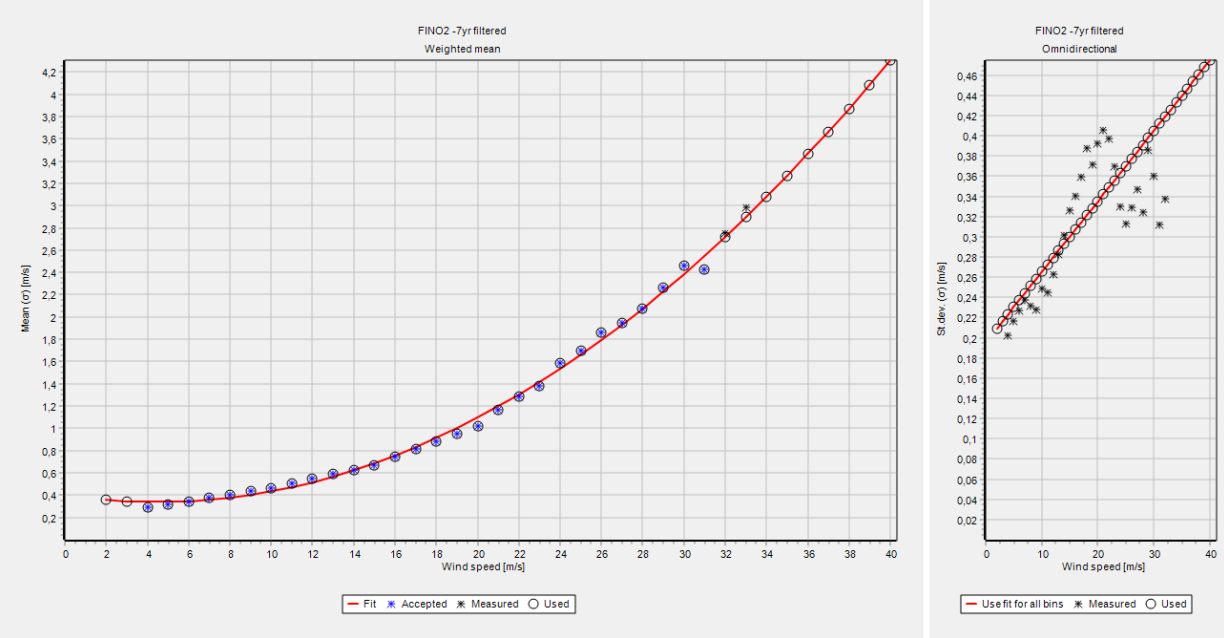

Figure 45. Left: observed mean turbulence versus wind speed at FINO2 102 m including the second order fit. Stars are observations and circles are model values. If the bin has enough samples the star is inside the circle and the bin will contribute to the fit. Right: observed standard deviation of the turbulence versus wind speed at FINO2 102 m including the first order fit.

VERTICAL EXTRAPOLATION AT FINO2

The target height of 150 m for the Baltic Sea Energy Island site means approximately 50% extrapolation from the 102 m turbulence data at FINO2. Utilizing the variation of turbulence across the eight measurement heights from 32 m to 102 m has been considered for the vertical extrapolation model. Figure 46 shows the turbulence data (parameterized) at winds speeds from 5 m/s to 25 m/s as a function of height. For each wind speed a fit modelling the variation with height has been added as dashed lines. For the mean turbulence the best fit type is linear and shows as expected a decrease with height. The decrease with height increases with wind speed. For the standard deviation of turbulence, a second

order fit is a better match, showing a slightly increasing positive gradient with wind speed but also an increasing nonlinearity.

Due to the large extrapolation, there is a high risk that turbulence gradients or fits for heights between 51 m and 91 m are not representative of the conditions from 91 m to 150 m. In particular, for the mean turbulence the fits predict a very strong decrease for large wind speeds, with an associated risk of non-conservatism for the resulting loads. Therefore, a simpler and more conservative vertical extrapolation model has been chosen for the mean turbulence. This model bases the extrapolation on the local wind shear as a function of wind speed ($\alpha(u)$) estimated at the Baltic Sea Energy Island site and reproduces the patterns of variation with height and wind speed seen in [27]. For the mean turbulence the wind speed in the expressions for mean and standard deviation of turbulence is scaled by the speed-up factor relative to 102 m due to the local wind speed dependent shear. This is consistent with assuming a constant wind speed standard deviation (i.e. turbulence mean) with height and assuming that only the wind speed changes due to shear. This is in line with the proposal in IEC 61400-15-1 CD [6] that the wind speed standard deviation may be kept constant while wind speed is extrapolated upwards to hub height.

For the standard deviation of turbulence, the behaviour is opposite that for the mean as it increases with height, again showing stronger gradients at larger wind speeds. Hence, pragmatically the reverse model is adopted as it reproduces the general patterns in [27]. Both models lead to less adjustment of the original 102 m turbulence data and their expressions are given below, with *f(u)* representing the speed-up from 102 m to height *h* due to shear.

$$f(u) = \left({}^{h}/_{102.5m}\right)^{\alpha(u)}$$

$$\sigma_{\mu,h}(u) = A_{\sigma_\mu} + B_{\sigma_\mu}(u/f(u)) + C_{\sigma_\mu}(u/f(u))^2$$

$$\sigma_{\sigma,h}(u) = A_{\sigma_\sigma} + B_{\sigma_\sigma} u\, f(u)$$

It may also be noted that there is an odd jump from 92 m to 102 m on the standard deviation of turbulence curves. The jump results in a lower standard deviation of turbulence based on 102 m data than based on 92 m data and is consistent for all wind speed bins. Below 92 m results for all heights are consistent. The primary difference between the 102 m and the lower measurements is that 102 m anemometer is top mounted while at the lower heights they are side mounted on booms that are not long enough to be IEC compliant. Our understanding is therefore that the mounting of the side anemometers is the cause of a higher-than-expected standard deviation of turbulence and that the top mounted anemometer is correct. The extrapolation of standard deviation of turbulence is therefore based on the 102 m measurements.

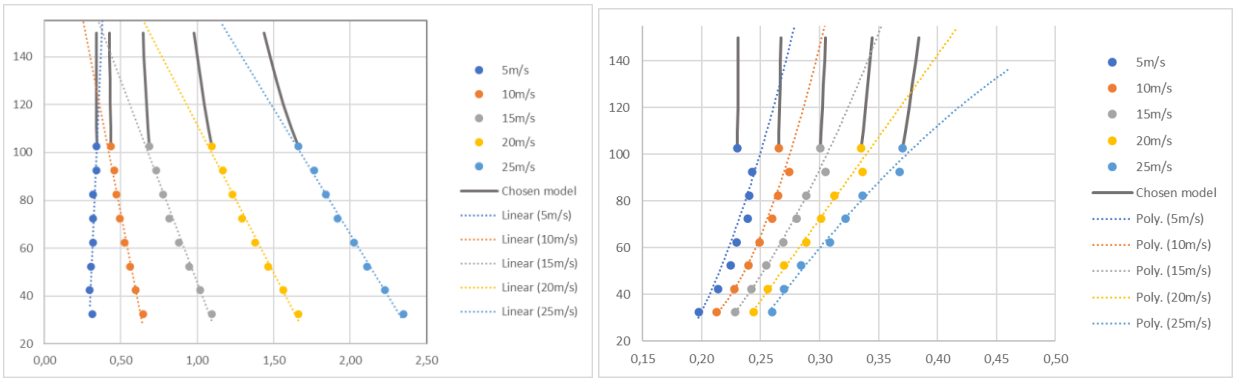

Figure 46. Variation of turbulence with height (y-axis) shown for wind speeds 5, 10, 15, 20 and 25 m/s. Turbulence mean (left) and standard deviation of turbulence (right), shown for the eight heights at FINO2: 32.4 m to 102.5 m together with possible fits to extrapolate across heights as well as the chosen model based on scaling using the wind speed dependent shear. Note the offset at 102.5 m for standard deviation of turbulence. The extrapolation is based on the top-mounted anemometer.

The consequence of the choice of vertical extrapolation model is shown in Table 36, which compares the mean, standard deviation and characteristic turbulence values at 15 m/s. As the table shows the extrapolation based on the fitting the height variation at lower heights ('extrapolation') leads to considerably lower turbulence levels.

Table 36. Comparison of the extrapolation models at 150 m with observations at 102 m for the different turbulence values at a wind speed of 15 m/s. The shear scaling is chosen as the final model. Values are presented as turbulence intensity.

At 15 m/s	TURBULENCE MEAN VALUE	STANDARD DEVIATION OF TURBULENCE	TURBULENCE CHARACTERISTIC VALUE
102.5 m observation	4.6%	2.0%	7.1%
150 m shear scaling	**4.3%**	**2.0%**	**6.9%**
150 m extrapolation	2.5%	2.3%	5.5%

Coefficients of the final turbulence model at the Baltic Sea Energy Island site are presented in Table 37. The chosen final model is based on the 102.5 m at FINO2, and vertical extrapolation based on the wind speed dependent shear exponent. A, B and C represent the zeroth, first and second order terms, respectively.

Table 37. Turbulence model parameters at the Baltic Sea Energy Island site (150 m, 15 m/s) for the chosen model. See equations at top of section.

TURBULENCE MODEL PARAMETERS AT THE SITE	TURBULENCE MEAN VALUE	STANDARD DEVIATION OF TURBULENCE	TURBULENCE CHARACTERISTIC VALUE
A [m/s]	0.4018	0.1955	0.6521
B [-]	-0.0269	0.0073	-0.0176
C [s/m]	0.0029		0.0029

ALTERNATIVE TURBULENCE MODEL TAGGEN

A similar analysis as above was conducted on the Taggen dataset at 100 m ASL in the direction interval 50˚ to 180˚. As shown in Figure 47, the turbulence fits nicely, but fail to exhibit the pronounced second order nature typical for an offshore site as visible in the FINO2 data.

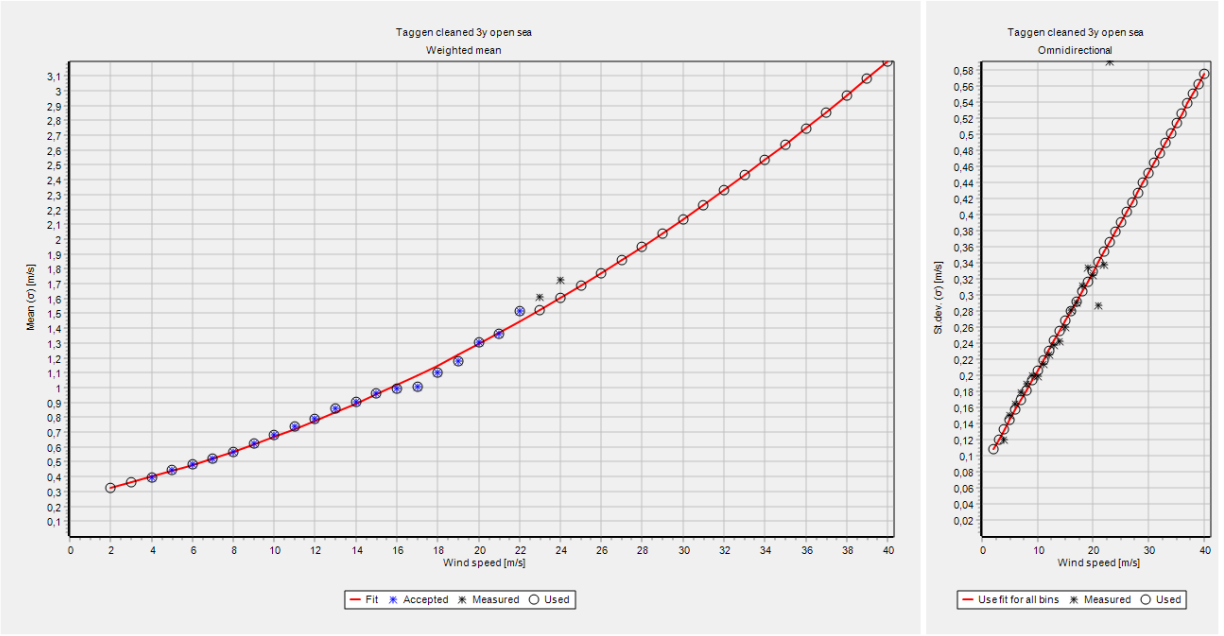

Figure 47. Left: observed mean turbulence versus wind speed at Taggen 100 m including the second order fit. Stars are observations and circles are model values. If the bin has enough samples the star is inside the circle and the bin will contribute to the fit. Right: observed standard deviation of the turbulence versus wind speed at Taggen 100 m including the first order fit.

This difference in nature becomes more visible when considering the turbulence intensity (TI) at 150 m. The Taggen data are here extrapolated to 150 m using the same method as presented for FINO2 (Figure

48 and Figure 49). The shift to higher turbulence at high wind speed is a result of the second order effects present offshore and is almost absent at Taggen.

A consequence of this difference is that at 15 m/s, turbulence at Taggen is larger than at FINO2, whereas at high wind speed, the FINO2 turbulence is higher than at Taggen. Key figures for Taggen has been calculated and are presented in Table 38 with a higher turbulence value than FINO2 at 15 m/s.

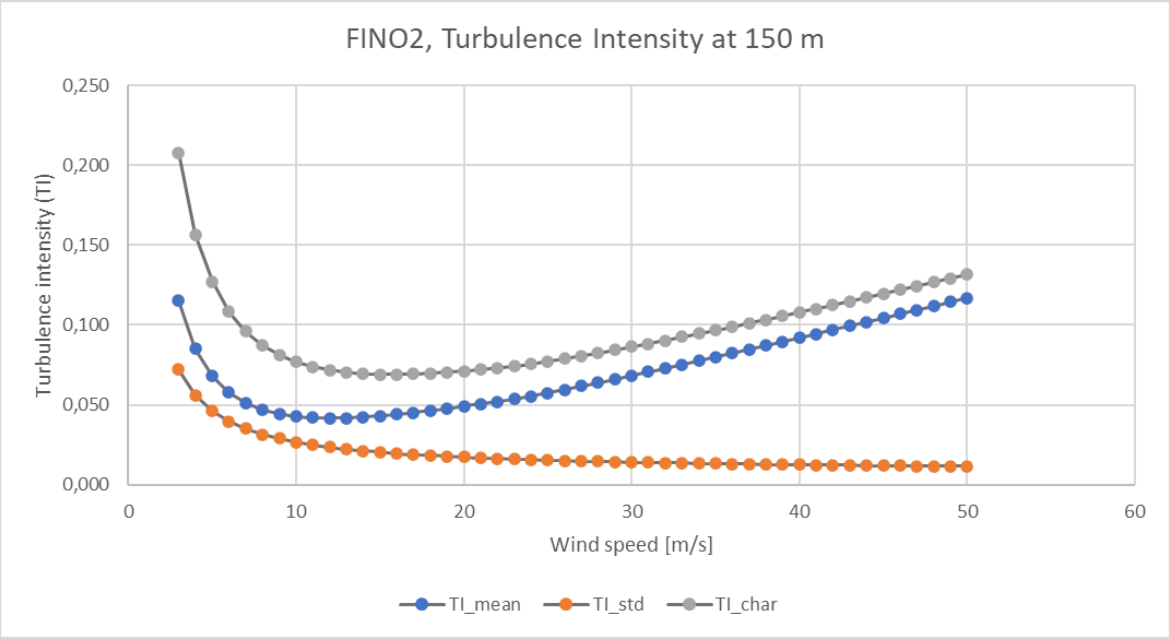

Figure 48. Turbulence intensity at FINO2, extrapolated to 150 m as a function of wind speed. Blue: Mean turbulence intensity, orange: Standard deviation of turbulence intensity, grey: Characteristic turbulence intensity.

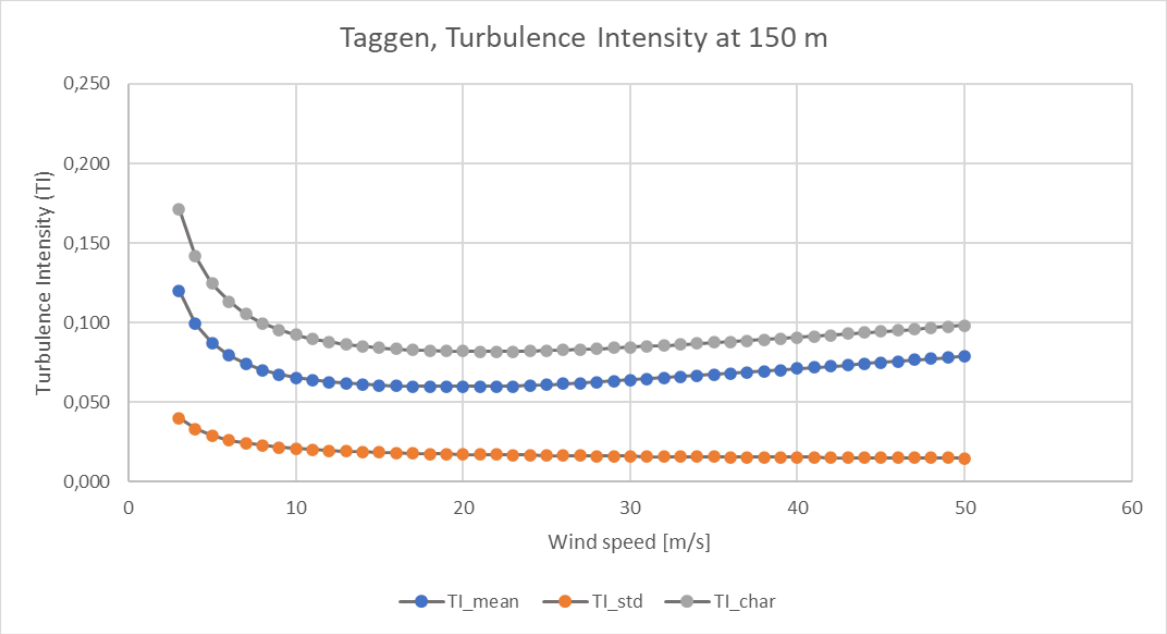

Figure 49. Turbulence intensity at Taggen, extrapolated to 150 m as a function of wind speed. Blue: Mean turbulence intensity, orange: Standard deviation of turbulence intensity, grey: Characteristic turbulence intensity.

Table 38. Turbulence intensity values for Taggen at 150 m with observations at 100 m at a wind speed of 15 m/s.

at 15 m/s	TURBULENCE MEAN VALUE	STANDARD DEVIATION OF TURBULENCE	TURBULENCE CHARACTERISTIC VALUE
150m shear scaling	**6.1%**	**1.8%**	**8.4%**

SELECTED TURBULENCE MODEL

We consider FINO2 to be more representative of the Baltic Sea Energy Island OWF for two reasons:

- FINO2 is exposed to similar offshore conditions with a long fetch in all major wind directions in a way Taggen is not.
- Taggen fail to exhibit the second order turbulence characteristic typical of offshore sites. It is expected that the Baltic Sea Energy Island OWF will exhitibit a typical offshore turbulence characteristic.

The FINO2 results are therefore reported here as representative of the Baltic Sea Energy Island OWF, but with the significant difference to the Taggen data indicating a rather large uncertainty in this

assessment. It is our recommendation that data from the Arkona mast should be included as the turbulence assessment will benefit significantly from further confirmation of the turbulence conditions.

9.1.4 Air Density

Air density during normal wind conditions is characterised by its average value at hub height, which is here set to 150 m. Two sources for air density information have been used.

Based on long-term mean temperature found in section 9.1.5, air density is calculated at 150 m elevation assuming standard pressure at this height of 996 hPa. The resulting air density is for both Position 1 and 2 1.229 kg/m^3. This is used as primary result.

Alternatively, the air density at 150 m elevation is estimated based on the recent Global Atlas and Siting Parameters (GASP). GASP is the outcome of an EUDP sponsored project by DTU and EMD [7] where site parameters such as air density are defined for the heights 50 m, 100 m and 150 m. The air density based on GASP data is found to be 1.228 kg/m^3 for position 1 and 4 and 1.227 kg/m^3 for position 2 and 3. This secondary result corroborates the primary result.

Hence the air density average value at 150 m ASL of 1.23 kg/m^3 is considered validated.

Mean air density (150 m)	**1.23 kg/m^3**

9.1.5 Air Temperature

Air temperature has been measured on buoy WS199 (Position 1) and SWLB044 (Position 2) for 12 months. The average temperature measured during that period was 10.2°C on both locations. The temperature has been long-term corrected with EMD-WRF Europe+ data from the buoy locations to 9.6°C and 9.5°C. These temperatures conform with temperatures at surrounding meteorological stations (Table 41). EMD-WRF Europe+ data are here preferred to custom EMD-WRF data as the larger domain gives a more robust temperature modelling.

The temperature at 150 m has been found using the atmospheric lapse rate of -5.41 K/km derived from the EMD-WRF Europe+ data. The result is 8.8˚C at WS199 and 8.7˚C at SWLB044 at 150m ASL.

The EMD-WRF Europe+ timeseries at 150 m has been calibrated to represent the LiDAR position at 150m height by applying an offset of 0.3˚C and 0.2˚C respectively (difference between EMD-WRF Europe+ and measurements). The resulting timeseries has then been used to estimate how many hours the temperature is outside the normal and extreme temperature ranges defined in the IEC 61400-3-1 as -10°C to 30°C and -15°C to 40°C, respectively. The results are summarized in Table 39. The probability of temperatures falling outside the defined ranges is assessed by Gaussian distributions fitted to either the 10% highest or lowest temperatures [28].

For Position 3, temperature at Position 1 can be assumed, while for Position 4, temperature for Position 2 can be assumed.

Table 39. Temperature assessment at Position 1 – WS199 (150m).

CHECK	TMIN [°C]	TMAX [°C]	< TMIN [H/YEAR]	> TMAX [H/YEAR]	TOTAL HOURS OUTSIDE RANGE [H/YEAR]
Normal range	-10.0	30.0	1.229	0.351	1.579
Extreme range	-15.0	40.0	0.006	0.000	0.006
Mean air temperature				8.8°C	
Standard deviation air temperature				6.7°C	
Maximum temperature				31.0°C	
Minimum temperature				-9.4°C	

Table 40. Temperature assessment at Position 2 – SWLB044 (150m).

CHECK	TMIN [°C]	TMAX [°C]	< TMIN [H/YEAR]	> TMAX [H/YEAR]	TOTAL HOURS OUTSIDE RANGE [H/YEAR]
Normal range	-10.0	30.0	2.728	0.753	3.481
Extreme range	-15.0	40.0	0.030	0.000	0.029
Mean air temperature				8.7°C	
Standard deviation air temperature				6.8°C	
Maximum temperature				31.0°C	
Minimum temperature				-10.8°C	

Table 41. Temperature measurements from surrounding stations

STATION	HEIGHT ASL [M]	PERIOD LENGTH [Y]	TEMPERATURE [°C]
Bornholm Airport	25.4	19	9.4
Hammer Odde Fyr	18	13	9.4
Nexø Vest	33.0	20	8.7
Skillinge	14.4	27	8.4
Arkona Buoy	10	20	9.6
Darsser	9	26	9.8
Falsterbo	1.9	36	8.7
FINO2	99.3	7	8.7

9.2 Extreme Wind Conditions

9.2.1 Extreme Wind Speed Model (EWM)

The site-specific extreme wind speed model is characterized by the extreme wind speed with a 50-year return period [1], which for offshore conditions is supplemented by the extreme wind speed with a 1-year return period [2].

Typically, more onsite data is required to reliably estimate extreme events, than what is currently available to this project. The site-specific extreme wind speeds have therefore been estimated using the approach recommended by the Eurocode for wind loads on structures EN1991-1-4 [3] including its Danish Annex DK NA EN1991-1-4 [4] as well as the Danish Standard DS 472 [5]. This result is supplemented with alternative methods/data.

EN1991-1-4 [3] defines a fundamental value of the basic wind speed ($v_{b,0}$) which corresponds to a 50-year extreme wind speed at 10 m height, independent of direction and time of year and with a standard surface roughness length of $z_{0,II} = 0.05\ m$. Inland in Denmark this basic wind speed is set to 24 m/s [4]. It is specified that this value also covers the inner seas of Denmark where the current site is located.

Instead of the simplified method to vertically extrapolate extreme winds in EN 1991-1-4 [3], the dedicated flow model WAsP Engineering (WEng) has been used for this purpose. WEng includes the effects of waves, formulated by Charnock, including the effect of upstream fetch on wave development and resulting roughness and vertical speed-up. It is noted that atmospheric conditions are assumed neutral in WEng which matches with high wind speed conditions [29]. The analysis was performed through Site Compliance in windPRO with settings as shown below:

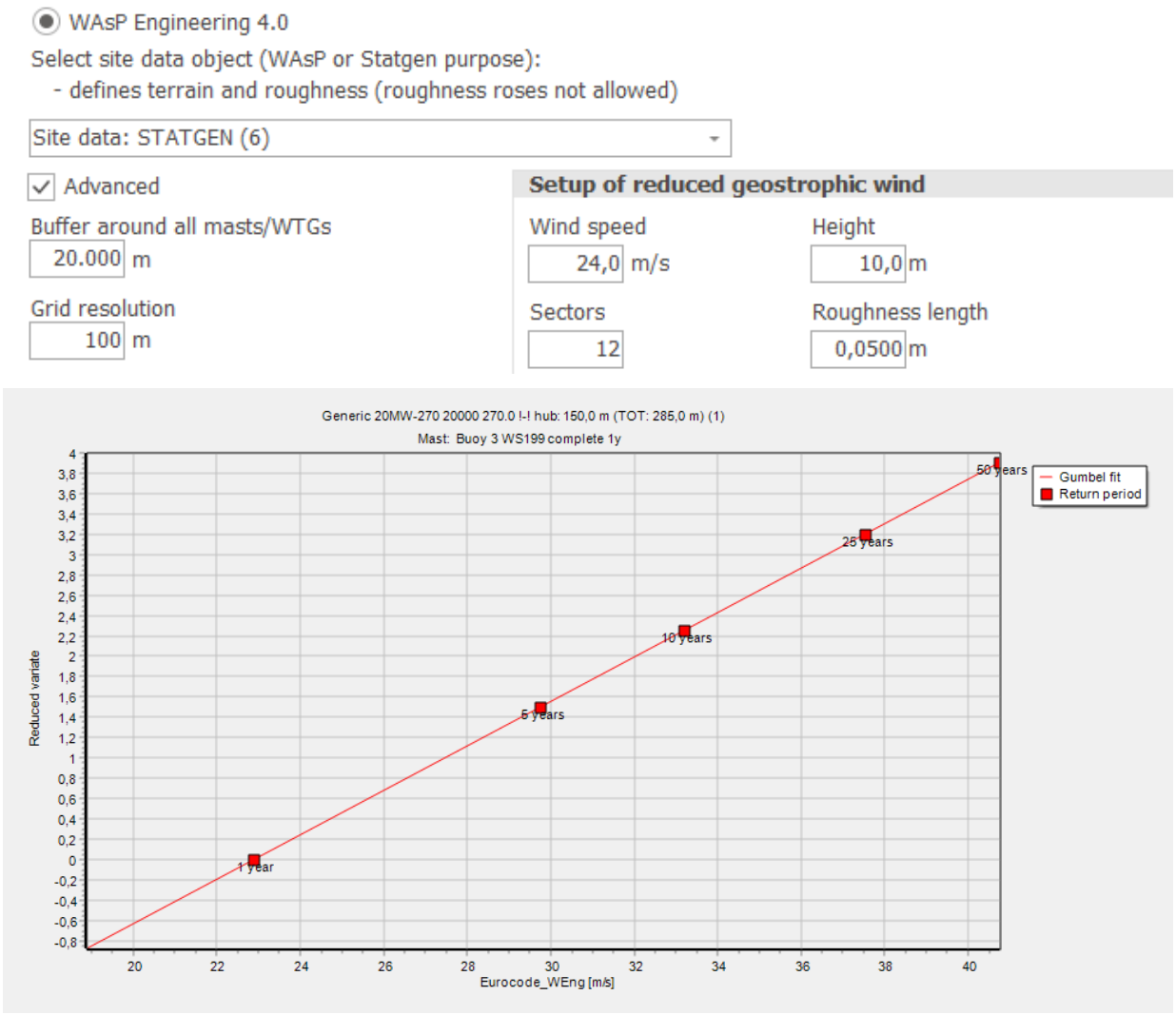

Figure 50. WAsP Engineering settings and output from modelling in windPRO, Site Compliance.

The resulting 1-year and 50-year extreme wind speeds are summarized in the table below:

Table 42. Extreme wind speed results (150 m).

RETURN PERIOD	EXTREME WIND SPEED [M/S]
1-year	22.9
50-year	40.7

For comparison, we also include two alternative estimates of the onsite extreme wind speeds based on mesoscale data and the annual maximum method (AM) combined with a spectral correction to compensate for the use of mesoscale data, see e.g. [7]. For the method details of AM, see [30]. The spectral correction may be based either on a theoretical assumption about the slope of an undampened spectrum at high frequencies or on a site estimate of the actual spectral slope using onsite measurements. Below we include both spectral correction estimates, the theoretical and the site specific for both buoys.

Finally, as a fourth option the peak-over-threshold (POT) method is used based on the onsite buoy data.

Table 43. Extreme wind speed alternative results using different methods (150 m). Note that after index correction the POT-N extreme wind speed drops to 36.7 m/s / 38.5 m/s respectively.

EXTREME WIND METHOD	50-YEAR EXTREME WIND SPEED [M/S]
EN1991-1-4 + WEng + DS472	40.7 (main result)
AM Mesoscale (20y) + Spectral correction (theoretical)	39.6 (WS199 & SWLB044)
AM Mesoscale (20y) + Spectral correction (site specific)	39.0 (WS199), 39.16 (SWLB044)
POT (N=20, Δt_{min}=4 days)	47.0 (WS199), 49.3 (SWLB044)
POT (N=20, Δt_{min}=4 days) including index correction	36.7 (WS199), 38.5 m/s (SWLB044)

It is noted that the alternative estimates are surprisingly consistent around 40 m/s even if they are based mostly on different data and statistical methods. The POT-N method produces very high values due to three storm events in February 2022, but when adjusted with an extreme wind speed index, the value is consistent with the other results. Using the Danish Standard [5] directly focused on offshore design conditions for wind turbines is still considered the best alternative as it is based on decades of building experience and knowledge of regional extremes condensed into the building codes.

9.2.2 Wind Shear at Extreme Wind Speed

The site-specific wind profile associated with extreme wind speed events has been estimated based on the on-site LiDAR data at the buoys WS199 and SWLB044. The plot below shows the wind shear exponent versus wind speed at 150 m above sea level for the two buoys. The wind shear exponent is estimated for each time step and then averaged in 0.5 m/s bins. Notice the linear increase in shear from around 0.02 at 6 m/s, to 0.2 around 23 m/s. Above 23 m/s no gradient can be recognized and it can be considered flat at 0.2, but with a noticeable scatter.

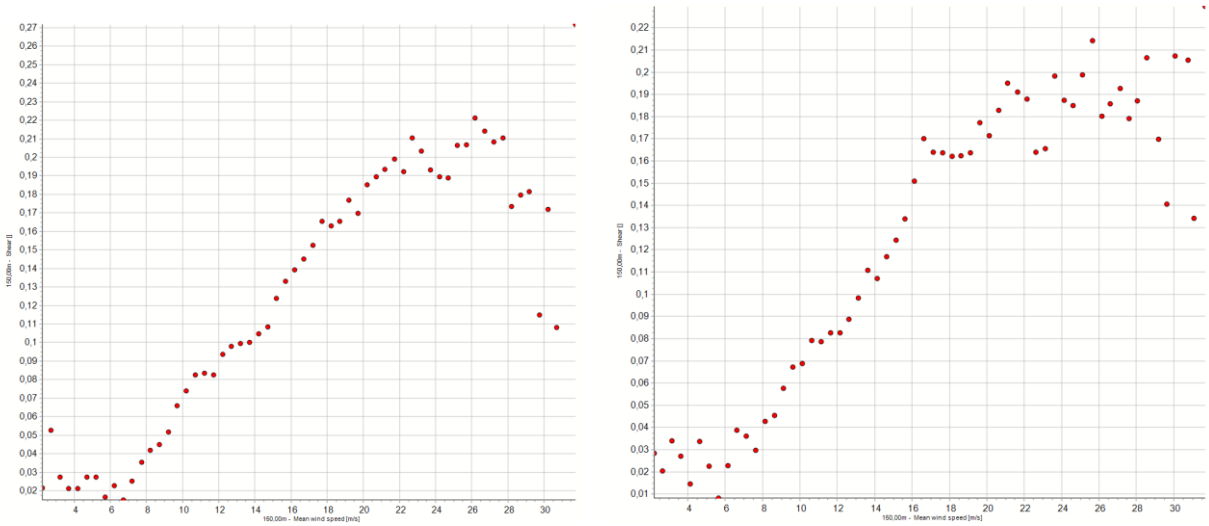

Figure 51. Observed wind shear versus wind speed (0.5 m/s bins) at the two Baltic Sea Energy Island buoys, WS199 (right) and SWLB044 (left). For both buoys the wind shear clearly levels off at around 0.2 for wind speeds above ca. 23m/s. At lower wind speeds the wind shear increases linearly.

Given these observations the expected wind shear at extreme wind speeds is summarized below.

Expected wind shear at extreme wind speeds	**0.20**

9.2.3 Extreme Wind Shear (EWS)

To estimate the site-specific extreme wind shear, it is recommended to use equations (27) and (28) in section 6.3.3.7 of the IEC 61400-1 [1] with site-specific values for the ambient turbulence standard deviation together with the site-specific wind shear exponent.

9.2.4 Turbulence at Extreme Wind speed

In addition to the normal turbulence model, the IEC 61400-3-1 [2] requires that the site-specific turbulence for extreme wind speed is defined. Using the turbulence model defined in section 9.1.3 the turbulence is estimated as the site estimate of the 50-year extreme wind speed as shown below:

Table 44. Turbulence at extreme wind speed as turbulence intensity.

50-YEAR WINDSPEED (@HUB HEIGHT) [M/S]	TURBULENCE INTENSITY MEAN [%]	STD. DEV OF TURBULENCE INTENSITY [%]	TURBULENCE INTENSITY CHARACTERISTIC [%]
40.7	9.4	1.2	10.9

Wave development and growth is limited, such that, for a given wind speed, the significant wave height and peak wavelengths stop growing above a certain wind speed. In effect, this means that the sea surface roughness will eventually saturate as the wind speed becomes increasingly extreme, and the Charnock effect (second order effect) will cease to grow. In [33] and [34] it was reported that the 10 m

wind speed required for saturation of the surface roughness is in the range 33-40 m/s while [35] indicates saturation at 35 m/s in 10 m height. In this work the latter saturation value of 35 m/s at 10 m height is adopted. The saturation estimates correspond to a virtually infinite fetch, and prolonged wind duration for full wave development, it is therefore expected that the wind speed required for saturation at the real sites will be lower than 35 m/s, making this assumption conservative.

9.2.5 Extreme Turbulence Model (ETM)

The site-specific extreme turbulence model as function of wind speed (σ_{ETM}) is assessed using the peak factor method described in the IEC 61400-1 footnote 32 [1]:

$$\sigma_{ETM}(V_{hub}) = \sigma_{mean}(V_{hub}) + k_p(V_{hub}) \cdot \sigma_{stddev}(V_{hub}),$$

$$k_p = 0.01\left(\frac{V_{ave}}{(m/s)} - 21\right)\left(\frac{V_{hub}}{(m/s)} - 5\right) + 5$$

Omnidirectional values are used for the mean wind speed (V_{ave}) as well as the mean and standard deviation of turbulence. The extreme turbulence values are plotted below:

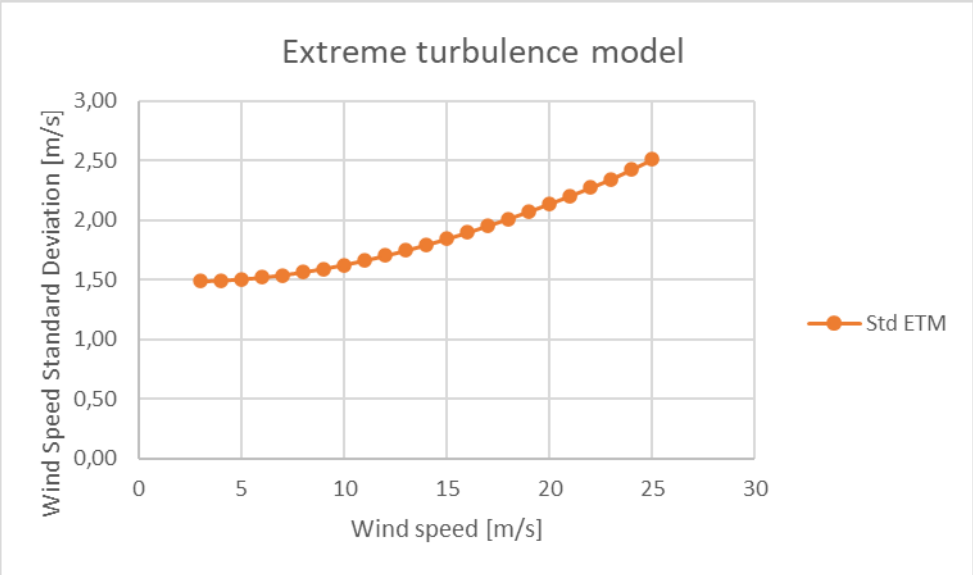

Figure 52. Extreme turbulence model. Turbulence is standard deviation of wind speed.

9.2.6 Air Density for Extreme Wind

The air density for extreme wind conditions is found based on average temperature at high wind speed events (5.4˚C on Position 1 and 2). This is calculated as 1.24 kg/m^3 for both Position 1 and 2. Alternatively the air density for extreme wind conditions can be taken from GASP [7], which results in a value of 1.23 kg/m^3.

It was decided to proceed with the air density for extreme wind speeds from the buoys.

Air density for extreme wind speeds (150 m)	**1.24 kg/m^3**

9.3 Summary Table of Siting Parameters

The requested omnidirectional siting parameters are summarized in the table below.

Table 45. Summary table of siting parameters (150m).

Parameter	Position 1	Position 2	Position 3	Position 4
Mean wind speed	9.92 m/s	9.94 m/s	9.96 m/s	9.96 m/s
Weibull distribution, A parameter (scale)	11.20 m/s	11.22 m/s	11.25 m/s	11.25 m/s
Weibull distribution, k parameter (shape)	2.18	2.18	2.19	2.18
Normal wind profile power law exponent	0.095	0.094	0.094	0.095
Turbulence intensity mean value (TI_{μ}) at a 10-min average wind speed of 15m/s*	4.3%	4.3%	4.3%	4.3%
Turbulence intensity standard deviation (TI_{σ}) at a 10-min average wind speed of 15m/s*	2.0%	2.0%	2.0%	2.0%
Turbulence intensity 90% quantile at a 10-min average wind speed of 15m/s*	6.9%	6.9%	6.9%	6.9%
Mean air density	1.23 kg/m^3	1.23 kg/m^3	1.23 kg/m^3	1.23 kg/m^3
Mean air temperature	8.8°C	8.7°C	8.8°C	8.7°C
50-year extreme wind speed	40.7 m/s	40.7 m/s	40.7 m/s	40.7 m/s
1-year extreme wind speed	22.9 m/s	22.9 m/s	22.9 m/s	22.9 m/s
Wind shear for extreme wind speed extrapolation	0.20	0.20	0.20	0.20
Characteristic turbulence intensity at 50-year extreme wind speed	10.9%	10.9%	10.9%	10.9%
Air density for extreme wind	1.24 kg/m^3	1.24 kg/m^3	1.24 kg/m^3	1.24 kg/m^3

*Turbulence values at other wind speeds can be found in Appendix H.

10 Impact of adjacent offshore wind farms

The ambient site parameter study is based on the IEC requirements for a such a study. This does not include influence from adjacent offshore wind farms. The buoys have recorded the wind conditions during a period with some adjacent wind farms in operation so the wind speed recorded will have their effect included. The long term wind conditions are based of WRF data which have only a very minimal impact from adjacent wind farms, so the long term wind data from the two buoys can be said to consider the current situation with the effect of the already built wind farms. The wind farms operating during the measurement period are the Arkona and the Wikinger wind farms.

The direct effect of adjacent wind farms in terms of wake wind speed reduction and wake turbulence are effects that will have to be combined with the ambient site parameters as reported here and are therefore outside the scope of this study.

There is a larger scale effect to the general wind climate from the extensive build-up of wind farms that goes beyond the direct wake effect and potentially change the wind speed and turbulence conditions of the Baltic Sea Energy Island OWF. Such an effect can be modelled as mesoscale effects through a WRF model. While this remains outside the scope of the present site parameter study, an assessment of this impact may be helpful for the FEED process and can be added to the study in the revalidation process when two years of onsite LiDAR data will be available.

Figure 53 presents the location of planned and operational wind farms in the region. Green areas identify wind farms in operation during measurements in this study.

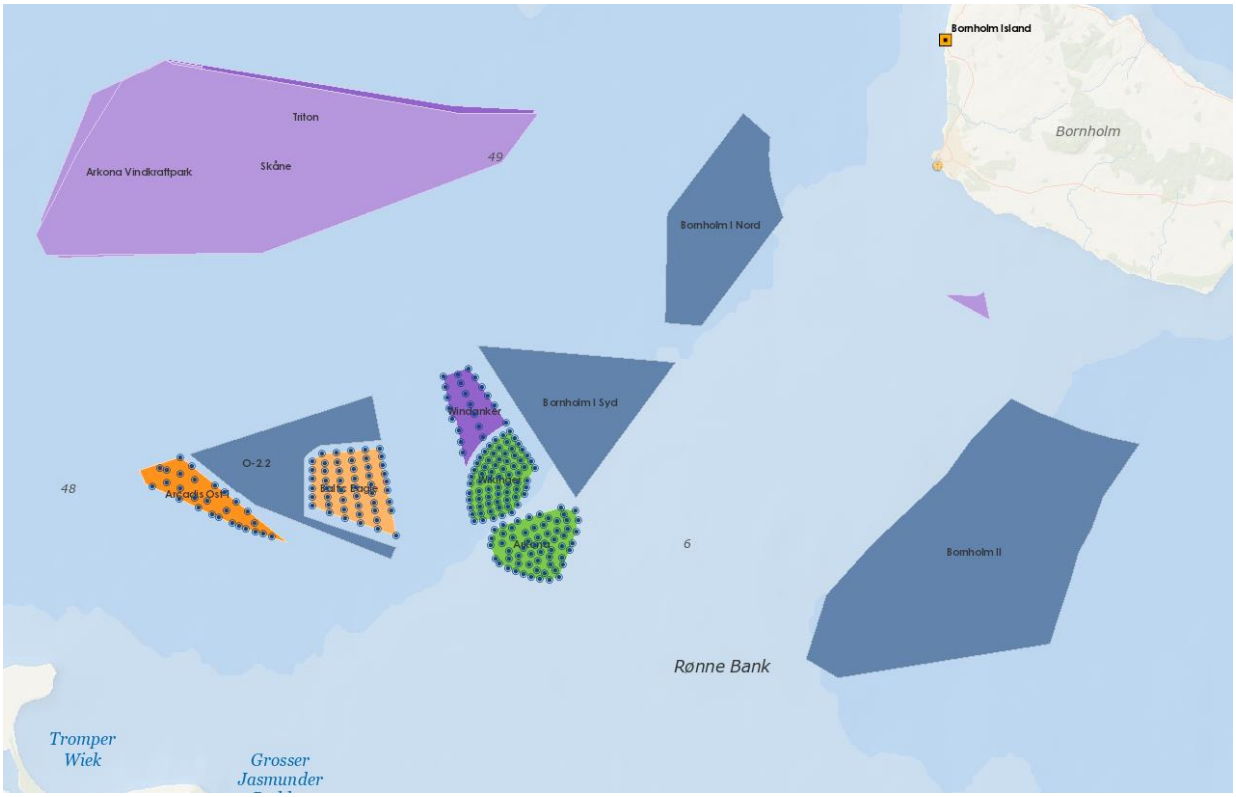

Figure 53. Adjacent planned and operational wind farms near Baltic Sea Energy Island OWF. The two wind farms marked with green color (Arkona and Wikinger) were operational during LiDAR data collection. (Source: 4C Offshore [39])

11 Data Package

EMD has submitted datasets in support of this study. These are as far as it is possible provided in accessible formats.

11.1 Raw Buoy Data

The raw data from the two buoys, WS199 (Lot 3) and SWLB044 (Lot 4) are provided as presented to EMD. These are the monthly data conforming to the description in this report.

The files are located in the folder Raw buoy data.

Four sets of data files are provided for each buoy. These the files used in this study:

- LiDAR buoy other parameters

  Containing temperature data

- LiDAR buoy position data

  Containing a time series record of the buoy location.

- LiDAR buoy wind parameters

  Containing wind speed and wind direction data

- LiDAR buoy wind stats

  Containing a record of returned data packages (data quality signal)

Please refer to Fugro's documentation for details on the content and data structure of the files [9]

For convenience, the raw data files are combined in a single text file. The text file can be imported directly into windPRO, but as an open format, it is generally accessible. Please note that maximum wind speed and vertical wind speed are only prepared for 150 m height data series.

- Lot 3 WS199 raw data.txt
- Lot 4 SWLB044 raw data.txt

Both datasets are included as windPRO Meteo objects in an Object export file

- Raw buoy data.wpobjects

The object export files can be imported into windPRO 3.6 or later by right-clicking in the Object list and select Import -> Import from windPRO object export file.

11.2 Filtered and Repaired LIDAR Data

Datasets for the filtered and repaired datasets are provided. The filter and repair process is described in section 4.4.3. The two datasets represent one complete year of data. The text file can be imported directly into windPRO, but as an open format, it is generally accessible.

- Lot 3 WS199 1 year complete.txt
- Lot 4 SWLB044 1 year complete.txt

The text file includes measurements at all heights. Measurements on the buoy (non-LiDAR data) are for practical reasons set at 4 m. The dataset is organized in columns, grouped by height. Data for a given height with SampleStatus flagged as “1” is disabled by EMD.

The content of the columns is explained in Table 46.

Both datasets are included as windPRO Meteo objects in an Object export file

- Complete 1y buoy data.wpobjects

The object export files can be imported into windPRO 3.6 or later by right-clicking in the Object list and select Import -> Import from windPRO object export file.

Table 46. Column explanation for data time series.

COLUMN LABEL	DESCRIPTION
TimeStamp	Date and time, dd/mm/yyyy hh.mm
MeanWindSpeedUID_xx,xm	Mean wind speed at height xx.x m, m/s
DirectionUID_xx,xm	Wind direction at height xx.x m, m/s
TurbIntUID_xx,xm	Turbulence intensity at height xx.x m
OtherUID_xx	Number of datapackages received at height xx.x m, m/s
WindSpeedVerticalUID_xx,xm	Vertical wind speed at height xx.x m, m/s
MaxWindspeedUID_xx,xm	Maximum wind speed at height xx.x m, m/s
OtherUID_xx,xm	Info flag at height xx.x m
TemperatureUID_4.0m,xm	Temperature at 4m, ˚C
RelativeHumidity_UID_4.0m,xm	Relative humidity at 4m, %
PressureUID_4.0m,xm	Pressure at 4m, hPa
Comment_xx,xm	Comments for height xx.x m (not used)
TimeStampStatus_12,0m	Internal setting for WindPRO
SampleStatus_12,0m	Status flag on entire sample: 0: OK, 1: disabled, 2: below limit, 4: above limit, 8: duplicate, 16: null value, 32: missing, 128: other error
DataStatus_yyyy_xx,xm	Status flag for parameter yyyy flagged at height xx.x m. Settings as for Sample Status.
DataStatus…..	Datastatus for other parameters.

11.3 Long-term Corrected LiDAR data

The long-term corrected time series at Position 1, 2, 3 and 4 are included in the data package. Position 1 and 2 (WS199 and SWLB044) include all LiDAR measurement heights. Position 3 and 4 only includes the 150 m height.

- Position 1 WS199 LTC.txt
- Position 2 SWLB044 LTC.txt
- Position 3 LTC.txt
- Position 4 LTC.txt

Parameters included are wind speed and wind direction. Data format follows the format described above. The text file can be imported directly into windPRO, but as an open format, it is generally accessible.

All three datasets are included as windPRO Meteo objects in an Object export file.

- LTC Position 1-4.wpobjects

The object export files can be imported into windPRO 3.6 or later by right-clicking in the Object list and select Import -> Import from windPRO object export file.

11.4 EMD-WRF Dataset

The EMD-WRF datasets for the Position 1 (Lot 3, WS199) and Position 2 (Lot 4, SWLB044) are included in the data package.

Text file export with selected parameters are included for each location

- EMD-WRF Position 1.txt
- EMD-WRF Position 2.txt

The data columns are described in Table 47.

Temperature, Heatflux and Stability (1/L) signals are prepared for the 100 m data only.

All EMD-WRF datasets are included as windPRO Meteo objects in an Object export file.

- EMD-WRF Position 1-3.wpobjects

The object export file can be imported into windPRO 3.6 or later by right-clicking in the Object list and select Import -> Import from windPRO object export file. The object export file includes more parameters than presented in the text file.

Table 47. Column explanation for EMD-WRF data time series.

COLUMN LABEL	DESCRIPTION
TimeStamp	Date and time, dd/mm/yyyy hh.mm
MeanWindSpeedUID_xx,xm	Mean wind speed at height xx.x m, m/s
DirectionUID_xx,xm	Wind direction at height xx.x m, m/s
TurbIntUID_xx,xm	Turbulence intensity at height xx.x m
TemperatureUID_100,0m	Temperature at height at 100 m, C
HeatFluxUID_100,0m	Heat flux at height at 100 m, W/m^2
StabilityUID_100,0m	Stability (1/L) at 100 m, 1/m
Comment_xx,xm	Comments for height xx.x m (not used)
TimeStampStatus_12,0m	Internal setting for WindPRO
SampleStatus_12,0m	Status flag on entire sample: 0: OK, 1: disabled, 2: below limit, 4: above limit, 8: duplicate, 16: null value, 32: missing, 128: other error
DataStatus_yyyy_xx,xm	Status flag for parameter yyyy flagged at height xx.x m. Settings as for Sample Status.
DataStatus	Datastatus for other parameters.

11.5 Turbulence Data

The FINO2 dataset was used as primary data for the turbulence analysis. Data for the measurement heights 91, 71 and 51 m are included in the data package. Data from 340˚ to 40˚ has been removed.

- 7y FINO2 data filtered.txt

Parameters included are wind speed, wind direction and turbulence intensity. Data format follows the format described above. The text file can be imported directly into windPRO, but as an open format, it is generally accessible.

The FINO2 dataset is included as windPRO Meteo objects in an Object export file.

- 7y FINO2 data filtered.wpobjects

The object export file can be imported into windPRO 3.6 or later by right-clicking in the Object list and select Import -> Import from windPRO object export file. The object export file includes more parameters than presented in the text file.

11.6 Wind Resource Map/Gradient File

The wind resource map used as a gradient file in section 8.1 is provided as an .rsf file (recognized WAsP format).

- Wind res map_Res_500_Hub_150,0_3._calibrated_Rescale 150m_150,0m.rsf

11.7 Wind Farm Zone

The Baltic Sea Energy Island Offshore Wind Farm zone is defined by a shape file provided by Energinet.

The file is called:

- OWF_Bornholm_Split_POL

12 References

[1] IEC, International Standard IEC 61400-1 ed. 4: Wind Turbines - Part 1: Design Requirements, 2019.

[2] IEC, International Standard IEC 61400-3-1 ed. 1, Wind Energy generation systems - Part 3-1: Design requirements for fixed offshore wind turbines, 2019.

[3] Eurocode, EN1991-1-4: Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions., 2005.

[4] Eurocode, EN1991-1-4 DK NA, 2007.

[5] Dansk Standard, DS 472 Ed. 2: Forudsætninger for vindmøllekonstruktioner i Danmark, 2007.

[6] IEC, IEC., IEC CD 61400-15-1, Wind energy generation systems – Part 15-1: Site suitability input conditions for wind power plants, 2021.

[7] X. G. e. a. Larsén, "DTU Wind Energy E-Report-0208: Calculation of Global Atlas of Siting Parameters," 2020.

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[9] Fugro Norway AS, "SWLB measurements at Energy Islands, C75486_Project_Measurement_Plan_All_Lots 05," 2022.

[10] Fugro, "Energy Islands Floating LiDAR Measurements, Monthly reports for Lot 3, Lot 4, volume 1-9," 2022.

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[12] DNV, "ZX898, Independent analysis and reporting of ZX LiDARs performance verification executed by Zephir Ltd. At the UK Remote Sensing Test Site," 2019.

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Appendix A. Supporting Data

Several data sources have been used to support the assessment of site wind conditions. These data are of different types and quality and have thus been used for different purposes. The description of the measurement setup, data quality check and processing are presented in a first section. The second section deals with data analysis of different parameters. Finally, the long-term correction of the relevant supporting data is described.

Appendix A.1. Available Data, Data Treatment and Quality Check

For an overview of the measurements station please refer to Table 3, Table 4 and Figure 3.

i. FINO2

Wind data from the FINO2 offshore measurement mast has been used to assess the expected turbulence conditions on the Baltic Sea Energy Island site and to validate the wind model.

The data was made available by the FINO (Forschungsplattformen in Nord- und Ostsee) initiative, which was funded by the German Federal Ministry of Economic Affairs and Climate Action (BMWK) on the basis of a decision by the German Bundestag, organised by the Projektträger Jülich (PTJ) and coordinated by the German Federal Maritime and Hydrographic Agency (BSH).

The FINO2 mast is mounted on a platform and is part of the FINO research project. The met mast was setup in the Baltic Sea about 38 km north of the German coast, 39 km east of the Danish coast and 40 km south of Swedish coast. The distance from the FINO2 mast to WS199 is 77 km and to SWLB044 is 97 km (Figure 55).

The collected measurements considered in this report are:

- wind speed from cup anemometers at 102.5, 92.4, 82.4, 72.4, 62.4, 52.4, 42.4, and 32.4 m above MSL as 10-minute values (mean, min, max and standard deviation)
- wind direction at 91.8, 71.8, 51.8 and 31.8 m above MSL as 10-minute values (mean, min, max and standard deviation)
- wind speed and wind direction from sonic anemometers at 82.1, 62.1 and 42.1 m above MSL as 10-minute values (mean, min, max and standard deviation)
- absolute temperature at 99.3, 70.3, 50.3, 40.3 and 30.3 m above MSL, as 10 minutes values (mean values)

Besides the data obtained, the FINO2 mast was also equipped with sonic anemometers, relative humidity, air pressure, precipitation, and global irradiance sensors.

Figure 54. Picture of FINO2 met mast, and view on the top anemometer from top and southeast (source: [35]).

The available data covers a period of around 14.8 years, from April/2008 to February/2023. However, the series was trimmed to 7 full years, from 31/08/2008 to 31/08/2015, in order to avoid the influence of wakes from the neighbouring wind farm installed after September 2015 (EnBW Baltic 2/Kriegers Flak 1) (Figure 55).

Figure 55. Indicative location map for the offshore secondary datasets (FINO2, Arkona buoy and Darsser) with existing wind farms in green (background map: 4C Offshore [34]).

EMD has access to a mast report [36] describing the equipment installed and mast details. EMD has not received any anemometer calibration reports. The data obtained was considered to be logged with the right calibration factors. EMD has obtained access to the data as csv files. Therefore, the conversion of the raw data could not be verified.

According to the documentation available [36], FINO2 design and installation has not been conducted fully according to the IEC standards [37], especially in relation to the sizes of the mast and booms for the side anemometers (92.4, 82.4, 72.4, 62.4, 52.4, 42.4, and 32.4 m).

Table 48. Mounting of sensors on the FINO2 mast.

HEIGHT AMSL[M]	DESCRIPTION	MOUNTING AND ORIENTATION	HORIZONTAL BOOM LENGTH [m]	VERTICAL BOOM LENGTH [m]
102.5	Cup anemometer – Vector A100L2	Top	-	-*
92.4	Cup anemometer – Vector A100L2	180°	2.92	1.5
82.4	Cup anemometer – Vector A100L2	180°	3.5	1.5

HEIGHT AMSL[M]	DESCRIPTION	MOUNTING AND ORIENTATION	HORIZONTAL BOOM LENGTH [m]	VERTICAL BOOM LENGTH [m]
72.4	Cup anemometer – Vector A100L2	180°	4.5	1.5
62.4	Cup anemometer – Vector A100L2	180°	5.0	1.5
52.4	Cup anemometer – Vector A100L2	180°	6.1	1.5
42.4	Cup anemometer – Vector A100L2	180°	6.5	1.5
32.4	Cup anemometer – Vector A100L2	180°	7.7	1.50
82.1	Ultrasonic anemometer – Thies 4.383021.400	0°	3.5	-
62.1	Ultrasonic anemometer – Thies 4.383021.400	0°	5.0	-
42.1	Ultrasonic anemometer – Thies 4.383021.400	0°	6.5	1.5
91.8	Wind vane – Thies 4.3120.22.012	0°	2.9	1.5
71.8	Wind vane – Thies 4.3120.22.012	0°	4.5	0.8
51.8	Wind vane – Thies 4.3120.22.012	0°	6.1	0.8
31.8	Wind vane – Thies 4.3120.22.012	0°	7.7	0.8
99.3	Thermometer – Thies 1.1005.50.015	180°	-	-
70.3	Thermometer – Thies 2.1260.00.000	180°	-	-
50.3	Thermometer – Thies 1.1005.50.015	180°	-	-
40.3	Thermometer – Thies 2.1260.00.000	180°	-	-

HEIGHT AMSL[M]	DESCRIPTION	MOUNTING AND ORIENTATION	HORIZONTAL BOOM LENGTH [m]	VERTICAL BOOM LENGTH [m]
30.3	Thermometer – Thies 1.10005.54.241	180°	-	-

* Information not available

As FINO2 is a large offshore mast, the observed mast disturbance on the wind speed measurements is significant, especially for the anemometers mounted on horizontal booms. On Figure 56 it can be seen how the turbulence intensity is increasing with heights (except for the top anemometer at 102.5 m) in the sector where anemometers are affected by mast shadowing.

The top anemometer is not installed on the very top of the mast structure, but on the side facing south (Figure 54). The lightning finial (in the northwest corner) as well as the pyramidal top of the mast are expected to cause flow disturbance of the 102.5 m measurements. On Figure 57, the wind speed measured at 92.5 m is indeed greater than the wind speed measured 102.5 m in east northeast sector. It has not been possible to remove the tower shadowing from the data since no double nor triple cup anemometry has been available at the same heights.

Data from sonic anemometers has not been deemed reliable for the purpose of this analysis (low data availability) and couldn't be used to remove the shadowing either.

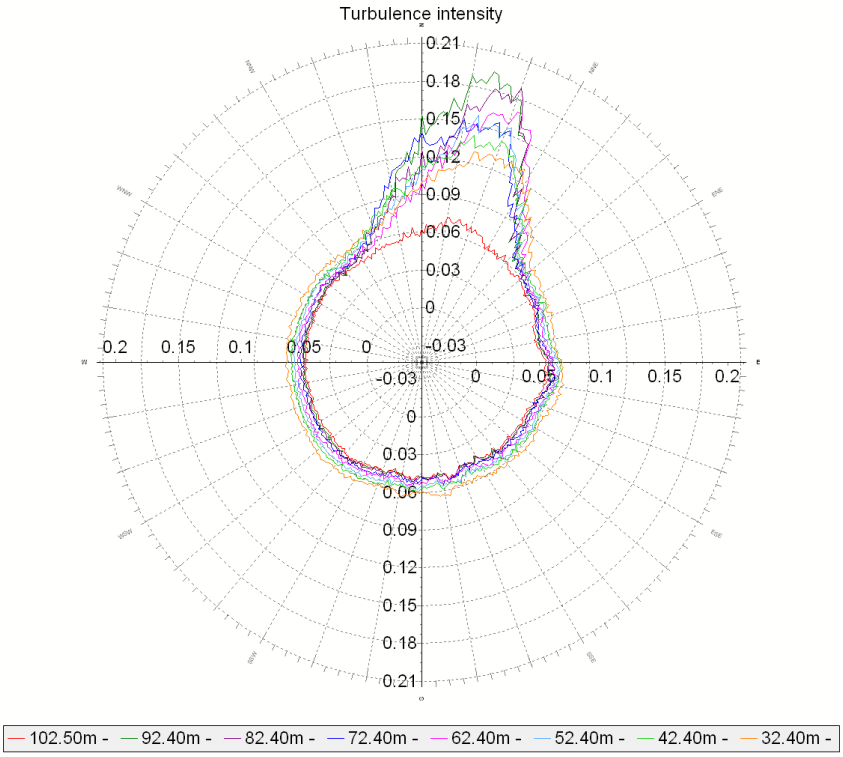

Figure 56. Directional Turbulence Intensity for the cup anemometers, FINO2.

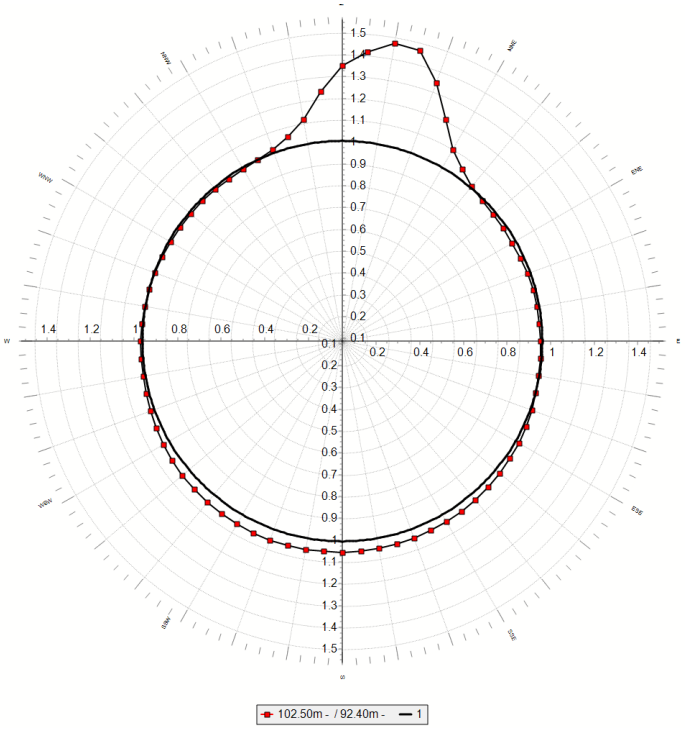

Figure 57. Directional wind speed ratio between 102.5 m and 92.5 m data, FINO2.

In general, the data quality is good. The wind directions and wind speed data at each height correlates well with the data at the other heights. The data has been filtered for faulty equipment and failures. Where possible, the missing direction data has been substituted with data from the available closest wind vanes.

7 full years have been selected from 01/09/2008 to 31/08/2015. The data from the 102.5 m anemometer is the primary data from the FINO2 met mast considered in the study. The recovery rate of the final data for the 7-year period is 93.3%.

For the turbulence intensity evaluation, the data heavily affected by shadowing has been excluded (340-40 degrees).

The following major gaps (consecutive days with missing or erroneous data) in the wind data (wind speed at 102.5 and wind direction at 91.8 m) can be noted:

- 15 days from 30/11/2009
- 7.5 days from 09/09/2010
- 20.5 days from 15/05/2011
- 11 days from 22/05/2012
- 11.5 days from 08/06/2012
- 16.5 days in January 2015 (divided in about 5 different periods)

- 10 days from 19/03/2015

Due to the unavailability of some information, as mast's maintenance and instrument certification, it was not possible to precisely assess an uncertainty on FINO2's measurements. The uncertainty on FINO2 measurements was estimated to be in the magnitude of 3.5%, taking into account the lack of information and the noncompliance to the standards [37].

ii. Taggen

Wind data from the Taggen offshore measurement mast has been used to assess the expected turbulence conditions on the Baltic Sea Energy Island site and to validate the wind model.

The data belong to Vattenfall and was made available by Energinet.

The met mast was setup in the Hanö Bay/Baltic Sea, about 14 km south-east of the town of Åhus on the Swedish coast. The distance from the Taggen mast to WS199 is 96.5 km and to SWLB044 is 127 km (Figure 58).

The collected measurements considered in this report are:

- wind speed from cup anemometers at 100, 97, 75 and 60 m above MSL as 10-minute values (mean, min, max and standard deviation)
- wind direction at 96 and 58 m above MSL as 10-minute values (mean, min, max and standard deviation)
- absolute temperature at 96 and 8 m above MSL, as 10 minutes values (mean values)

Besides the data considered, the Taggen mast was also equipped with relative humidity and air pressure sensors.

The available data covers a period of around 3.2 years, from July/2014 to September/2017. For the wind model validation, the series was trimmed in 2 full years (August/2014 to July/2016), to ensure the highest recovery rate possible. And for the turbulence evaluation, the series used was trimmed to 3 full years (August/2014 to July/2017).

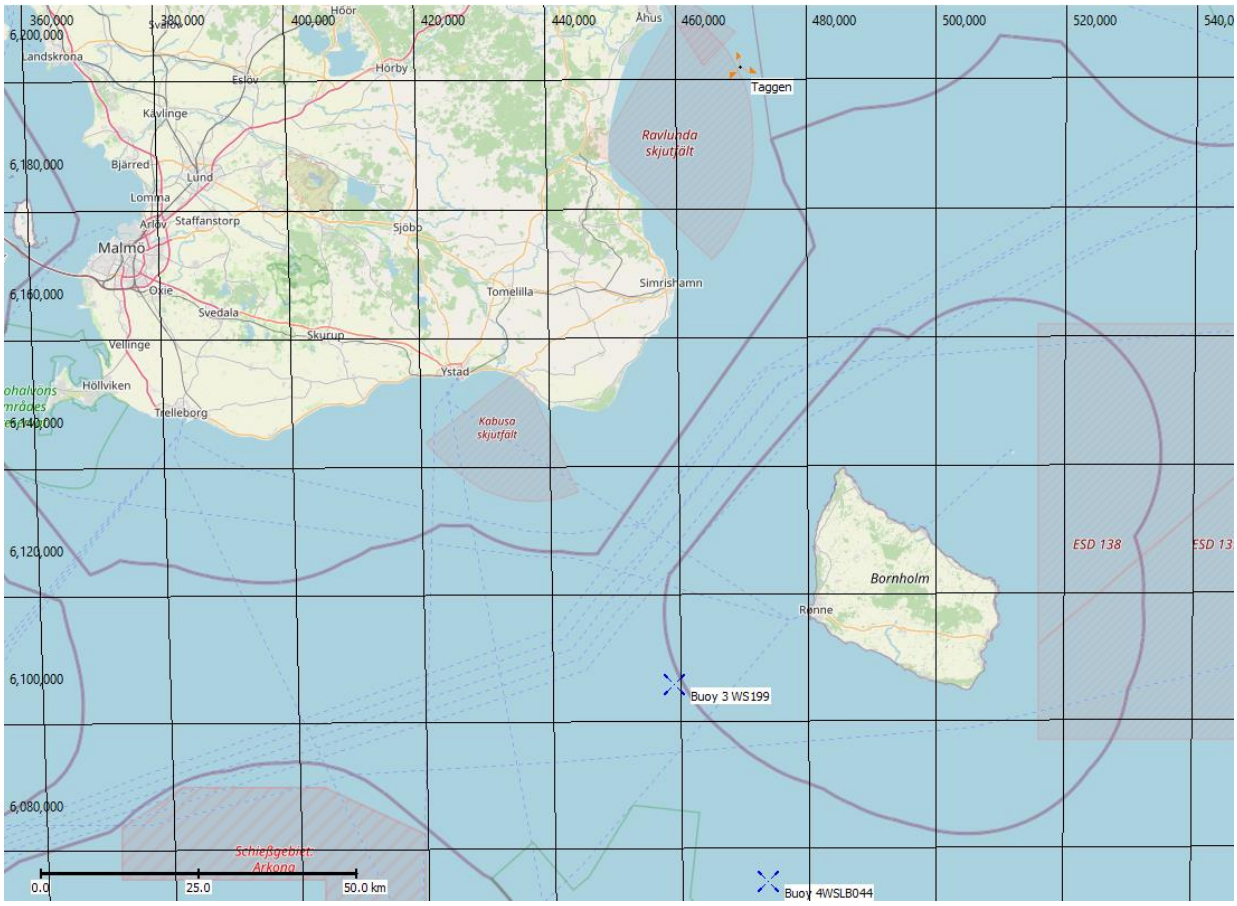

Figure 58. Taggen mast and Buoys positions. The black grid represents the coordinates in UTM WGS 84 Z33. Source: Open Street Maps.

EMD had access to a foundation design report [38] with structural details about the mast, but without information about the installed equipment. No calibration reports were available at the time of performing this study. The data obtained was considered to be logged with the right calibration factors. EMD has obtained access to the data as .txt files. Therefore, the conversion of the raw data could not be verified.

According to the documentation available [38], the Taggen mast is equipped as described in Table 49.

Table 49. Mounting of sensors on the Taggen mast

HEIGHT AMSL[M]	DESCRIPTION	MOUNTING AND ORIENTATION	HORIZONTAL BOOM LENGTH [m]	VERTICAL BOOM LENGTH [m]
100	Cup anemometer – Risø P2546A	Top	-	-
97	Cup anemometer – Risø P2546A	335°	6.1	-*
97	Cup anemometer – Risø P2546A	155°	6.1	-*
75	Cup anemometer – Risø P2546A	335°	9.5	-*
75	Cup anemometer – Risø P2546A	155°	9.5	-*
60	Cup anemometer – Risø P2546A	335°	12.9	-*
60	Cup anemometer – Risø P2546A	155°	12.9	-*
96	Wind vane – Vector W200P	335°	6.1	-*
58	Wind vane – Vector W200P	335°	12.9	-*
96	Thermo hygrometer – Vaisala HMP 45A	335°	-	-
96	Barometer – F4002D Vaisala PTB110	335°	-	-
8	Thermo hygrometer – Vaisala HMP 45A	335°	-	-

* Information not available

As the Taggen mast has two anemometers in each height, it was possible to evaluate the mast influence on the measurements. Figure 59 shows the ratio between the 100 and the 97 N (left) and two anemometers at 97 m (right).

The observed mast disturbance on the wind speed measurements is visible, especially for the anemometers mounted on horizontal booms. In Figure 60, it can be seen that there is a significant

increase of the turbulence intensity in the sectors where the anemometers are shadowed by the mast, the exception is the top anemometer.

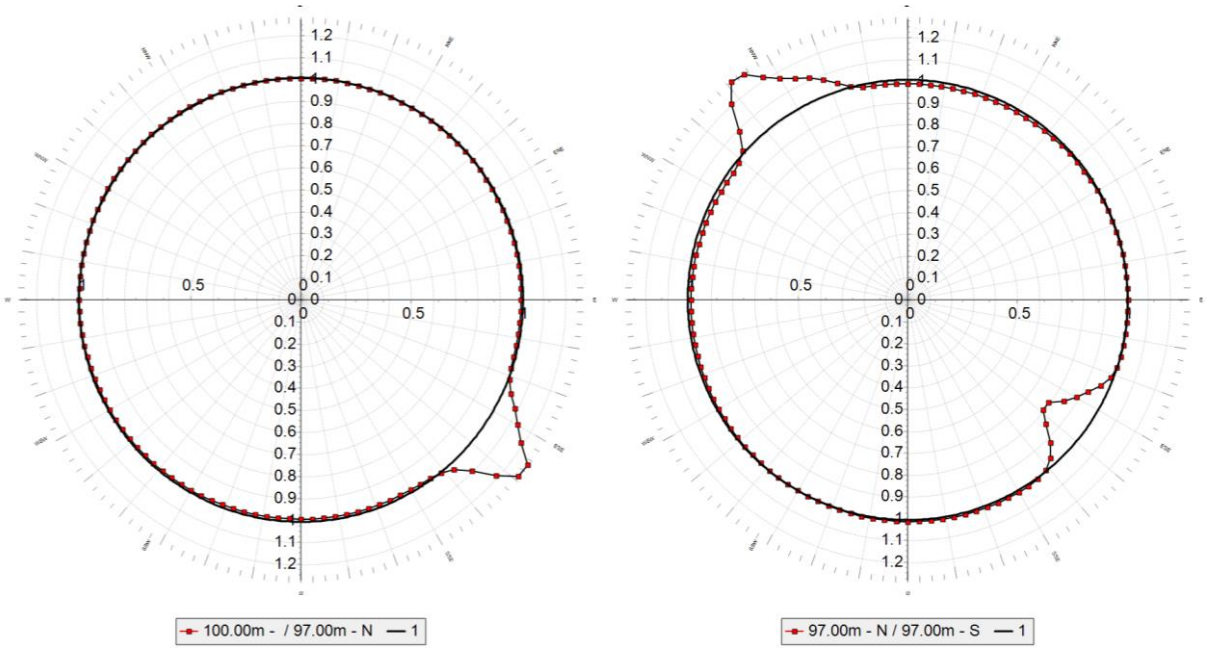

Figure 59. Directional wind speed ratio between 100 m and 97N m data (left) and between the two instruments at 97 m (right), 2 years – Taggen.

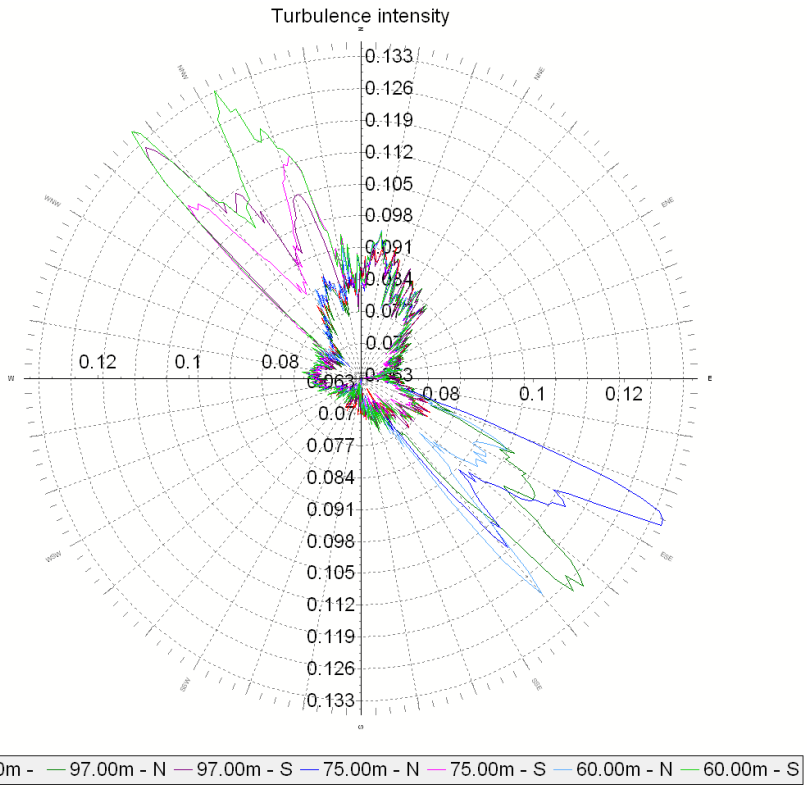

Figure 60. Directional Turbulence Intensity for the cup anemometers, 3 years - Taggen.

In general, the data quality is good. The wind directions and wind speed data at each height correlates well with the data at the other heights. The data has been filtered for faulty equipment and failures.

The top anemometer at 100 m exhibits a curious behaviour in some period as low wind speed drops either very low or the anemometers stops. There is no such impact at high wind speed, but it makes the data problematic for wind speed assessment, though this issue will not influence turbulence assessment (Figure 61).

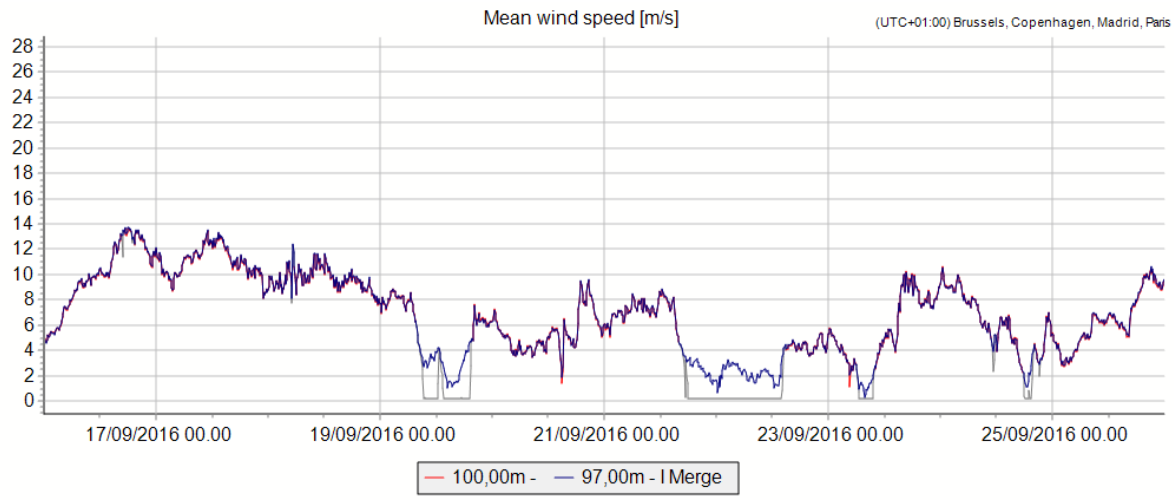

Figure 61.Wind speed at 100 will often drop to very low or 0 m/s, which makes the 100 m anemometer problematic for wind speed assessment. This has very little or no influence on the turbulence assessment as this is concerned with higher wind speeds.

For the wind model verification, 2 full years have been selected from 01/08/2014 to 31/07/2016. The data from the two anemometers at 97 m was merged and is the primary data from the Taggen met mast considered in the study. The top anemometer was not used because it presents several periods of faulty data. The recovery rate of the final data for the 2-year period is 100%. In this period, all the data loss is shorter than half day, so no major gaps were found.

For the turbulence intensity evaluation, 3 full years have been selected from 01/08/2014 to 31/07/2017. The data from the top 100 m anemometer is the primary data from Taggen met mast. The recovery rate of the 3-year period is 93.2%. From this dataset, only the direction interval representative for open sea conditions (between 50 and 180 degrees) has been kept. The selected data for the offshore sector represents 31.1% of the 3-year period.

The following major gaps (consecutive days with missing or erroneous data) in the wind data (wind speed at 100 and wind direction at 96 m) can be noted:

- 19 days from 10/08/2016
- 38 days from 07/12/2016

Due to the unavailability of some information, as mast's maintenance and instrument certification, it was not possible to precisely assess an uncertainty on Taggen's measurements. The uncertainty on Taggen measurements was estimated to be in the magnitude of 3%, taking into account the lack of information.

iii. Meteorological stations

BORNHOLM AIRPORT

The observations made at Bornholm Airport come from a meteorological mast operated by DMI (#06190). The data has been used to check the long-term consistency of the reference data and the long-term temperature.

Wind speed and direction measurements are recorded at 10 m AGL. Temperature data is measured at 2 m AGL. The period of measurements used is 01/01/2004 until 31/12/2022, which corresponds to 19 full years. The time resolution is 10 min.

The met mast is located on the west coast of Bornholm Island, about 3.5 km south from the city of Rønne. The distance to the shore is about 510 m. The elevation from the site is 15.4 m ASL. and the distance to Buoy 3WS199 is about 26 km.

The measurements might be affected by the airport building to the north. But from east, south and west no disturbance of the flow is expected. The terrain is simple with low roughness.

Figure 62. Location map of Bornholm Airport met mast (DMI #6190, [39]), (source: KMS Ortofoto forår).

In general, the data quality is acceptable. Some filtering of erroneous data has been made. At low winds speed, the wind direction measurements seem less stable. The data at low wind speed is however not disregarded in order to avoid overprediction of the mean wind speed.

In the winter of 2020-2021 a period of very low wind speed is observed. There is no explanation given, but it is suspected to be an instrument issue, resulting in lower than expected wind speed for 2021.

The recovery rate of the data for the selected period is very good with 97.4%.

NEXØ VEST

The observations made at Nexø Vest come from a meteorological mast operated by DMI (#06197). The data has been used to check the long-term consistency of the reference data and the long-term temperature.

Wind speed and direction measurements are recorded at 10 m AGL. Temperature data is measured at 2 m AGL. The period of measurements used is 01/01/2002 until 31/12/2022, which corresponds to 20 full years. The time resolution is 10 min.

The met mast is located to the southwest of the town of Nexø, on the eastern part of Bornholm. The distance to the east coast of the island is about 200 m. The elevation from the site is about 23 m ASL. and the distance to Buoy 4WSLB044 is about 50 km.

The mast is placed among fields, in a partly open landscape.

Figure 63. Location map of Nexø Vest met mast (DMI #6197, [39]), (source: KMS Ortofoto forår).

In general, the data quality is good. Some filtering of erroneous data has been made. At low winds speed, the wind direction measurements seem less stable. This data is however not disregarded in order to avoid overprediction of the mean wind speed.

The recovery rate of the data for the selected period is very good with 98.6%.

SKILLINGE A

The observations made at Skillinge A come from a meteorological mast operated by SMHI (#54290) [40]. The data has been used to check the long-term consistency of the reference data and the long-term temperature.

Wind speed and direction measurements are recorded at 10 m AGL. Temperature data is measured at 2 m AGL. The period of measurements used is 01/11/1995 until 31/10/2022, which corresponds to 27 full years. The time resolution is hourly.

The met mast is located about 2.5 km northeast west of the town Skillinge on the eastern coast of Skåne peninsula (Sweden). The distance to the shore is about 120 m. The elevation from the site is about 4 m ASL. The met mast is placed about 55 km north of Buoy 3 WS199.

Figure 64. Location map of Skillinge met mast (SMHI #54290 [40]) (source: Bing aerial map).

In general, the data quality is good. No filtering of erroneous data has been necessary.

Please note that the year 2022 is incomplete. Wind speed recorded is substantially below expected from July until end of data in October 2022. This is not explained, but suspected to be an instrument issue, resulting in a lower than expected wind speed for 2022.

The recovery rate of the data for the selected period is good with 96.9%.

ARKONA BUOY

The observations made at the Arkona buoy have been provided by the BSH data base. The data has been used to check the long-term consistency of the reference data and the long-term temperature.

Wind speed and direction measurements are recorded at 10 m AMSL. Temperature data is measured at 10 m AMSL. The period of measurements used is 01/01/2002 until 31/12/2022, which corresponds to 20 full years. The time resolution is hourly.

The buoy is located in the Baltic Sea within the area of a planned/existing wind farm complex (14 km from Arkona OWF and 9.5 km from Wikinger OWF, see Figure 53). The buoy is placed about 33 km west-southwest of Buoy 3 WS199. The effect from the existing wind farms mentioned on the wind data

measured at the buoy is deemed acceptable (large distance and downwind), considering the purpose of the data as secondary data.

In general, the data quality is fair. Several data gaps can be noticed. Some filtering of erroneous data has been necessary. The recovery rate of the data for the selected period is acceptable with 87.4 %.

DARSSER

The observations made at Darsser come from an offshore meteorological mast operated by BSH [41]. The data has been used to check the long-term consistency of the reference data and the long-term temperature.

Wind speed, wind direction and temperature measurements are recorded at 9 m AMSL. The period of measurements used is for the wind data 01/01/2014 until 31/01/2020 (7 full years) and for the temperature data is 01/01/1995 until 31/12/2020 (26 full years). The time resolution is hourly.

The offshore met mast is located about 27 km from the German coast and 33 km from the Danish coast (Figure 55). The met mast is placed about 110 km west-southwest of Buoy 3 WS199.

An existing offshore wind farm is operating about 6.7 km south from the mast. The effect from the existing wind farms mentioned on the wind data measured is deemed acceptable (distance and not in main wind direction), considering the purpose of the data as secondary data.

In general, the wind data quality is good. No filtering of erroneous data has been necessary.

The recovery rate of the wind data for the selected period is good with 95.6%.

The temperature data suffers from some gaps in few winters. The recovery is 83.3%.

iv. Other Datasets

Other secondary datasets have been considered in the study and partially used. The position of these other datasets can be seen on Figure 3.

From the DMI ground station of Hammer Odde Fyr (#06193), only the temperature data has been used for the period 01/01/2010-31/12/2022. In terms of wind data, the data is indeed firstly redundant with the one from Bornholm Airport and Nexø Vest and secondly available for a shorter in period (13 years).

Temperature data only from the SMHI ground station of Falsterbo (52230) has been used as well. The wind data from Falsterbo is deemed not suitable for the study due to its coarse data resolution (3h) quality.

The DMI ground station at Gedser (#06149), on Falster Island, has not been included in the study due to its great distance to the project and non-representative position.
Two other data sources Södra Midsjöbanken and BC Wind have been excluded due to the distance to the Baltic Sea OWF (about 200 km to the east) and their position in a part of the Baltic Sea which is much more open.

Appendix A.2. Data Analysis of Supporting Data

WIND SPEED DISTRIBUTION

The following table summarizes the resulting wind speeds.

Table 50. Summary of secondary data wind speed

MAST (DATA PERIOD)	ARITHMETIC MEAN WIND SPEEDS [M/S]	MAX MEAN WIND SPEED [M/S]	WEIBULL MEAN [M/S]	WEIBULL – A PARAMETER	WEIBULL – K PARAMETER
FINO 2 – 102.5 m (01/09/2008 - 31/08/2015)	9.87	33.19	10.01	11.29	2.46
Taggen – 97 m (01/08/2014 - 31/07/2016)	8.80	28.69	8.87	10.00	2.37

WIND DIRECTION DISTRIBUTION

The frequency and energy distributions indicate that there are two main wind directions at FINO2, west and southwest. Similar observations are made for Taggen data to the exception of the eastern sector being more dominant than at FINO2.

FINO2 7 years
102.5 m ASL
(09/2008 - 08/2015)

Taggen 2 years
97 m ASL
(08/2014 – 07/2015)

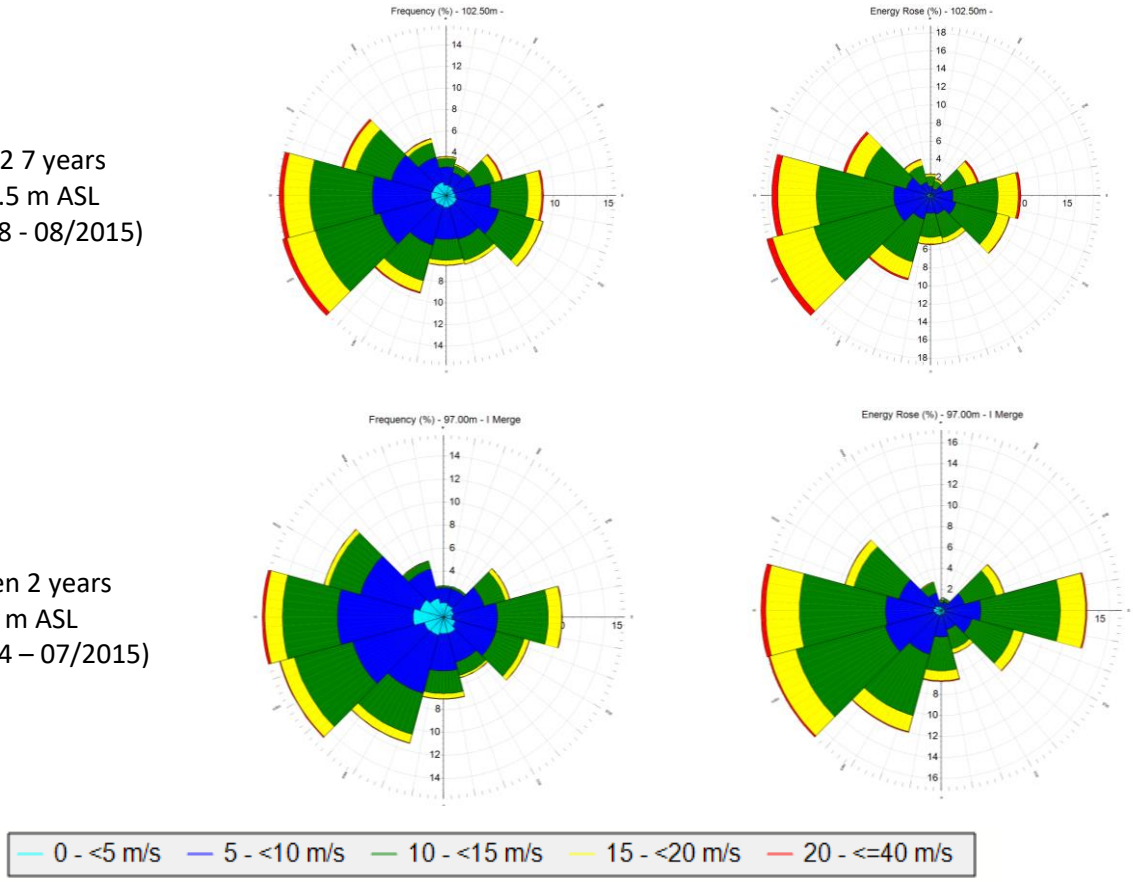

Figure 65. Wind direction frequency (on the left) and energy (on the right) distribution, FINO2 and Taggen datasets

TURBULENCE INTENSITY

The turbulence intensity calculated from the mean wind speed and its standard deviation is presented in Figure 66. Note that sectors have been excluded either due to flow distortion (at FINO2, for directions between 340 and 40 degrees) or non-representativity (at Taggen, for directions between 180 and 50 degrees). Moreover, Taggen turbulence data is based on 100 m data (3 years) whereas the data related to wind speed analysis is based on 2 years at 97 m (see main report).

For FINO2, at 102.5 m, the mean turbulence intensity is 5.00% and 7.15% for Taggen at 100 m. These values are within expected range of offshore sites.

As observed on Figure 67, the turbulence intensity has a relatively uniform distribution across de sectors at FINO2, the same can be seen for the enabled sectors at Taggen.

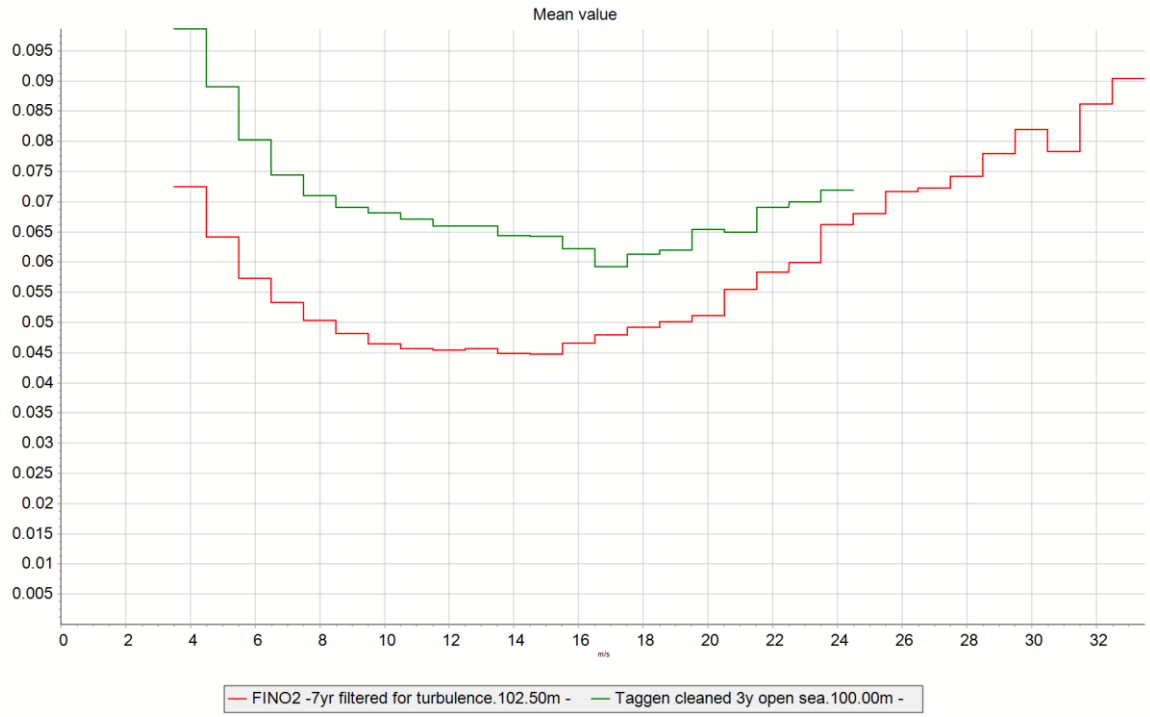

Figure 66. Turbulence intensity measured per wind speed bin at FINO2 (7 years – 102.5 m) and Taggen (3 years – 100 m) for the relevant sectors.

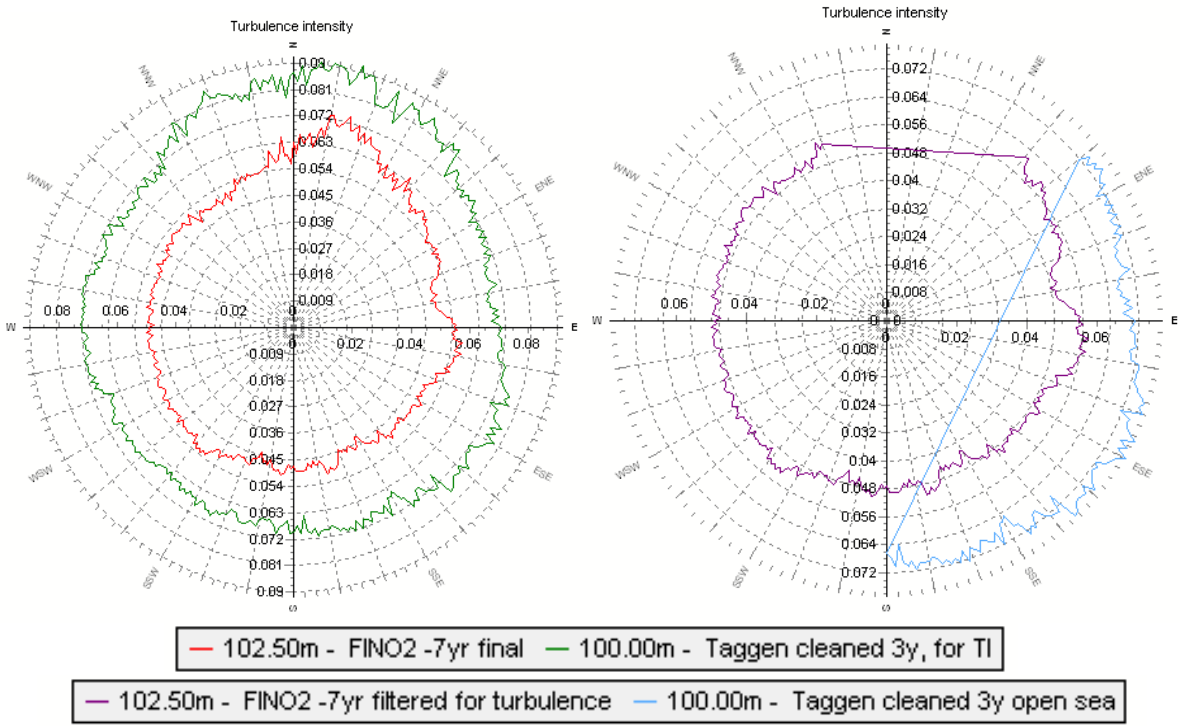

Figure 67. Turbulence intensity measured at FINO2 (7 years – 102.5 m) and Taggen (3 years – 100 m), to the left for all data and to the right for the data used (after exclusion of irrelevant sectors).

DIURNAL VARIATIONS

The diurnal variations of wind speed do not follow exactly the same pattern at FINO2 and Taggen. The wind speed is lowest at midday and highest during the night at FINO2 whereas it lowest in the morning and highest in the evening at Taggen. The daily variations of turbulence intensity are minimal as expected on an offshore site.

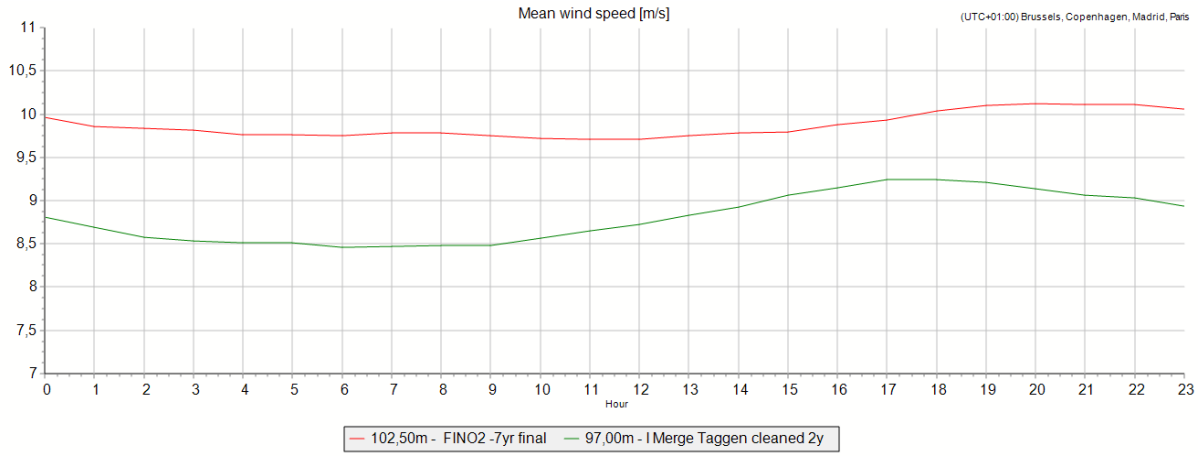

Figure 68. Daily variation of wind speed measured at FINO2 (7 years – 102.5 m) and Taggen (2 years – 97 m)

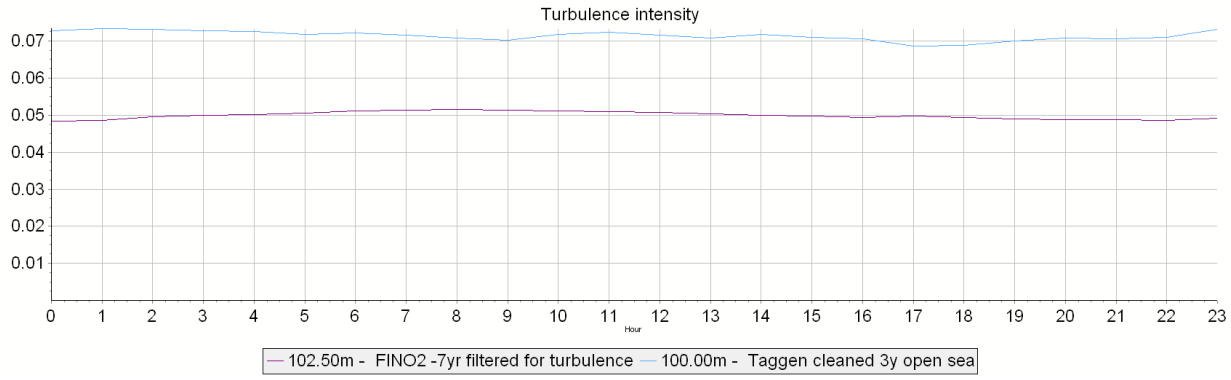

Figure 69. Daily variation of turbulence intensity measured *at FINO2 (7 years – 102.5 m) and Taggen (3 years – 100 m) for the relevant sectors.*

SEASONAL VARIATIONS

The monthly wind speed variations point to highest wind speeds during the late autumn and winter.

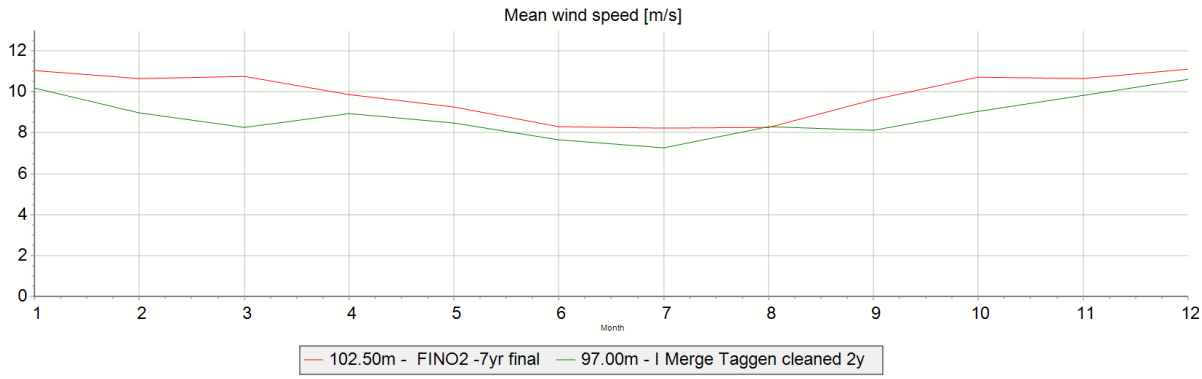

Figure 70. Monthly variation of wind speed measured at FINO2 (7 years – 102.5 m) and Taggen (2 years – 97 m).

TEMPERATURE

A summary of the mean temperature measured on the 8 secondary data sources is presented in Table 51.

The diurnal distribution of temperature shows a distinct difference between onshore and offshore stations. The amplitude is far smaller on the offshore sites as expected, which will resemble the Baltic Sea Energy Island OWF more than the onshore stations.

Table 51. Summary about Secondary Temperature data

SOURCE	HEIGHT (ASL) [M]	POSITION	DATE START-END	PERIOD LENGTH [Y]	TIME RESOLUTION	MEAN **TEMPERATURE [°C]**
Bornholm Airport	17.4	Onshore	01/01/2004 - 31/12/2022	19	10 min	9.4
Hammer Odde Fyr	10.0	Onshore	01/01/2010 - 31/12/2022	13	10 min	9.4
Nexø Vest	25	Onshore	01/01/2002- 31/12/2022	20	10 min	8.7
Skillinge	6	Onshore	01/11/1995 - 31/10/2022	27	1 hour	8.4
Arkona Buoy	10	Onshore	01/01/2002- 31/12/2022	20	1 hour	9.6
Darsser	9	Offshore	01/01/1995- 31/12/2020	26	1 hour	9.8
Falsterbo	1.9	Onshore	01/01/1974 - 31/12/2009	36	3 hours	8.7
FINO2	99.3	Offshore	01/09/2008- 31/08/2015	7	10 min	8.7

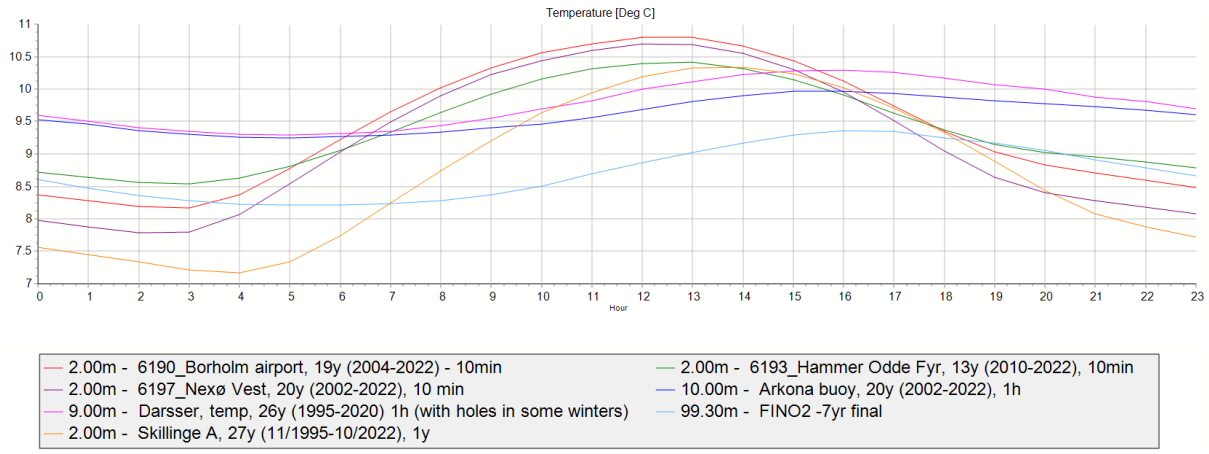

Figure 71. Diurnal variation of absolute temperature at the 8 secondary data sources. Falsterbo data are not shown because they are 3h datasets.

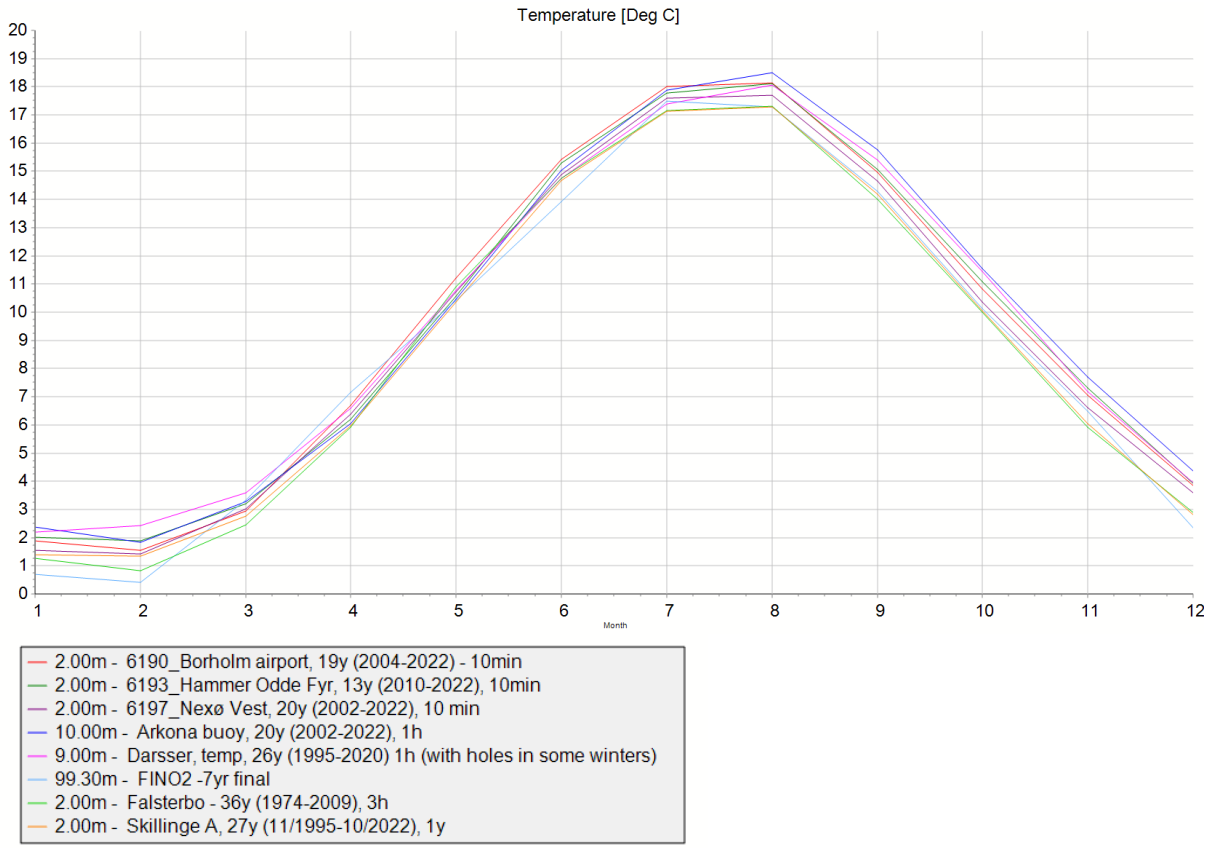

Figure 72. Monthly variation of absolute temperature at the 8 secondary data sources.

Appendix A.3. Long-term Correction of Supporting Data

The measurement data from FINO2 and Taggen have been long-term corrected for wind model validation use. The reference period used is 2003-2022 (20 years). The argumentation for use of this period is presented in section 6.1.2.

REFERENCE DATA AND CORRELATION

For each dataset, three different reference datasets were considered: EMD-WRF, ERA5 and NORA3. These reference datasets are discussed in section 5. The closest node to each location was used.

EMD has several long-term correction methodologies at disposal. A full description of these can be found in the WindPRO reference document on Measure-Correlate-Predict (MCP) methods [24].

As each secondary data set consists of a number of complete years with reasonably high recovery rate, the risk of seasonal bias is limited. For FINO2, the 102.5 m measurements were used from a 7-year period from 01/09/2008 to 31/08/2015. For Taggen, a 2-year period was used at 97 m height from 01/08/2014 - 31/07/2016. The shorter data set was selected to achieve a higher availability, but tests showed that the long-term corrected result with three years of data would be practically identical.

In each case correlation on wind speed, monthly correlation on energy content (index), self-prediction (concurrent period) and 24-hour slicing test (both converted to production output) as well as the ability to correctly reproduce observed directional distribution and wind speed frequency distribution was considered. The reference data and methodology with the best combined success was selected. This is summarized in Table 52.

For FINO2 it was found that the 7-year period direction distribution is close enough to the expected long term direction distribution that the Local Scaling method can be used. The scale factor applied to the observed FINO2 data is 1.008 and the offset is -0.221 m/s. The resulting long-term series is a 7 year data set with a 10 minute resolution. Because of the selected long term correction method, slicing tests cannot be done.

For Taggen, the Linear regression method was used, producing a 20-year time series with an hourly resolution. While the slicing test on production is relatively poor, the slicing test on wind speed is excellent at -0.32% for the entire period and -0.05% for 24-hour slicing.

Table 52. Best performing reference data and long-term correction methodology (LTC) for each secondary dataset.

REF: EMD-WRF	FINO2	TAGGEN
Reference dataset	EMD-WRF	NORA3
Correlation, r [%] Wind Speed, hourly	93.9	92.6
Correlation, r [%] Wind Energy, monthly	95.6	98.4
LTC methodology	Local Scaling	Linear regression
24-hour slicing test, % production	-	1.32
Concurrent period prediction test, % production	-	1.30

LONG-TERM WIND SPEED DISTRIBUTION

The long-term corrected wind speeds and wind distributions are presented in Table 53.

Frequency tables for each dataset can be found in appendix E.

*Table 53. Long-term corrected wind speed and wind distribution, secondary data. * The FINO2 long term correction method produces a 7 year time series that is 20 year equivalent.*

	ELEVATION ASL [M]	PERIOD [Y]	ARITHMETIC MEAN WIND SPEEDS [M/S]	WEIBULL MEAN [M/S]	WEIBULL - A PARAMETER	WEIBULL - K PARAMETER
FINO2	102.5	7 (20)*	9.74	9.89	11.15	2.421
Taggen	97	20	8.51	8.63	9.74	2.386

LONG-TERM WIND DIRECTION DISTRIBUTION

FINO2 7 (20) years
102.5 m ASL
(09/2008 - 08/2015)

Taggen 20 years
97 m ASL
(01/2003 - 12/2022)

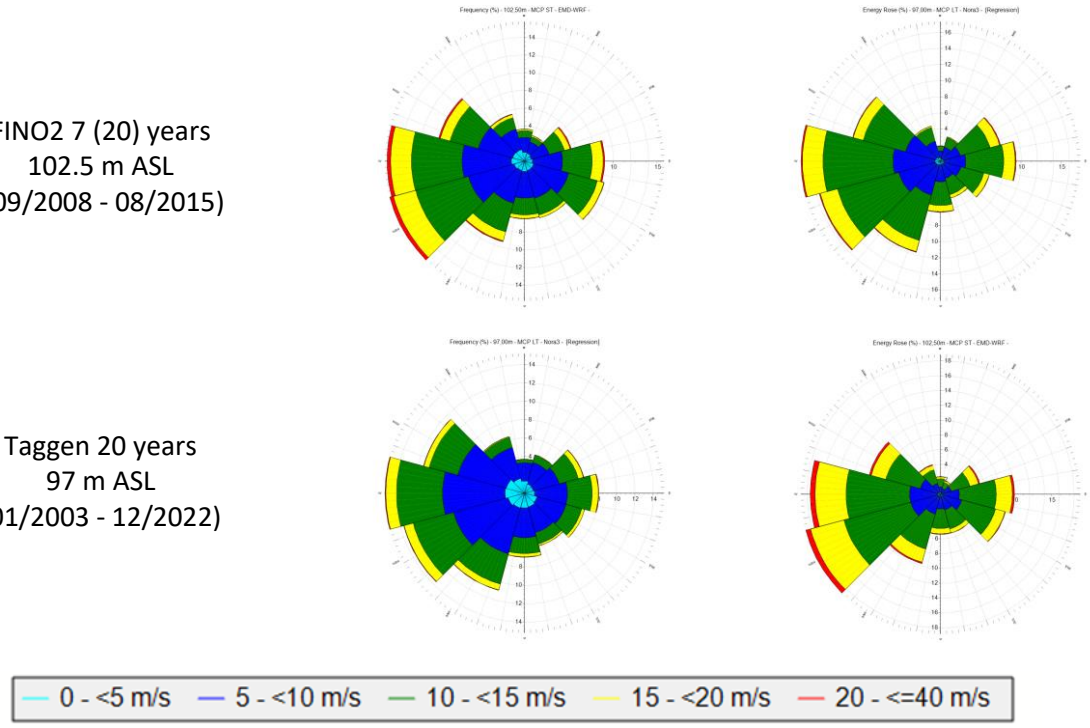

Figure 73. Long-term corrected frequency and energy roses, secondary data.

LONG-TERM DIURNAL VARIATIONS

Daily variation of the two long-term corrected datasets is presented in Figure 74. FINO2 and Taggen are both subject to higher wind speed at night than at daytime, but far more pronounced at Taggen, which is due to its proximity to land.

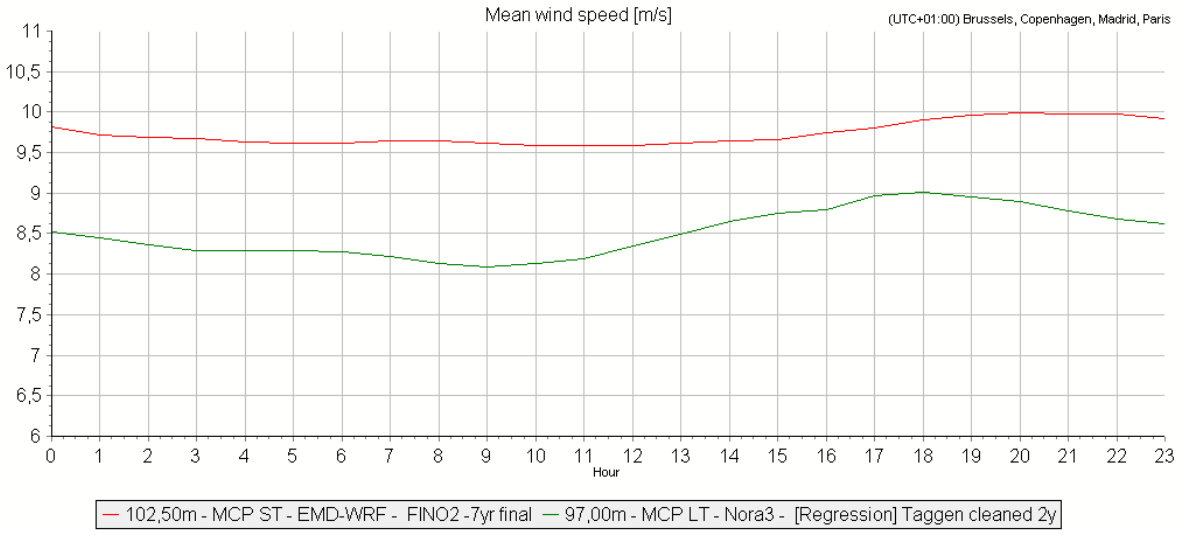

Figure 74. Long-term corrected diurnal variation, secondary data. Red: FINO2, green: Taggen.

LONG-TERM SEASONAL VARIATIONS

The long-term seasonal variation mirrors that of the observation but is more smooth in shape with high wind speed at winter and lower wind speed in summer.

While the energy distribution will vary from month to month, there is no major different directional energy distribution summer and winter on any of the datasets. South-west to west remain the main wind directions throughout the year, with eastern wind directions contributing significantly in early spring months on both datasets.

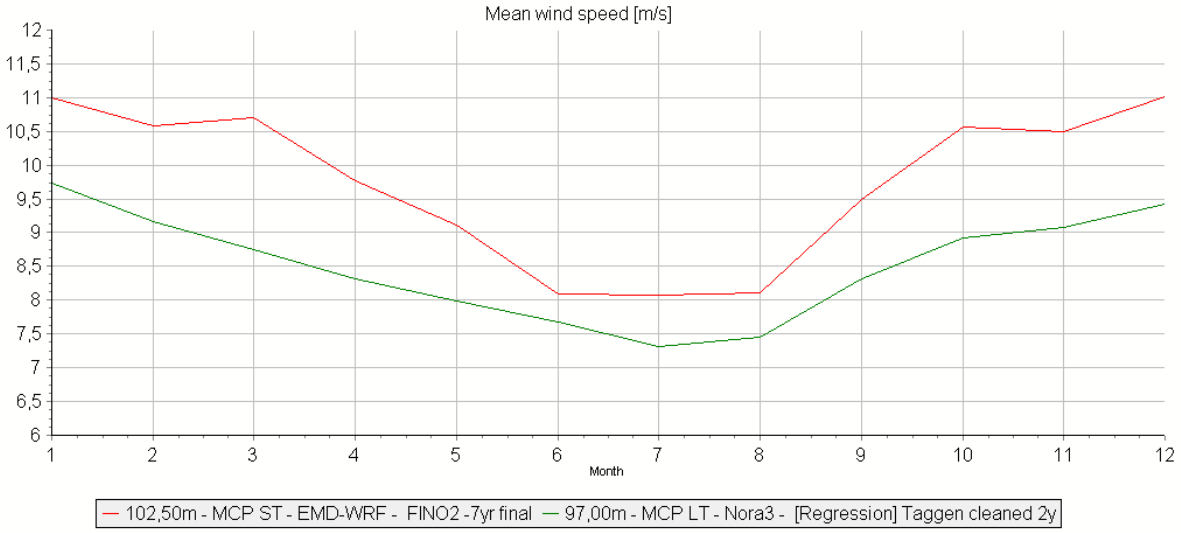

Figure 75. Long-term corrected seasonal variation, secondary data. Red: FINO2, green: Taggen.

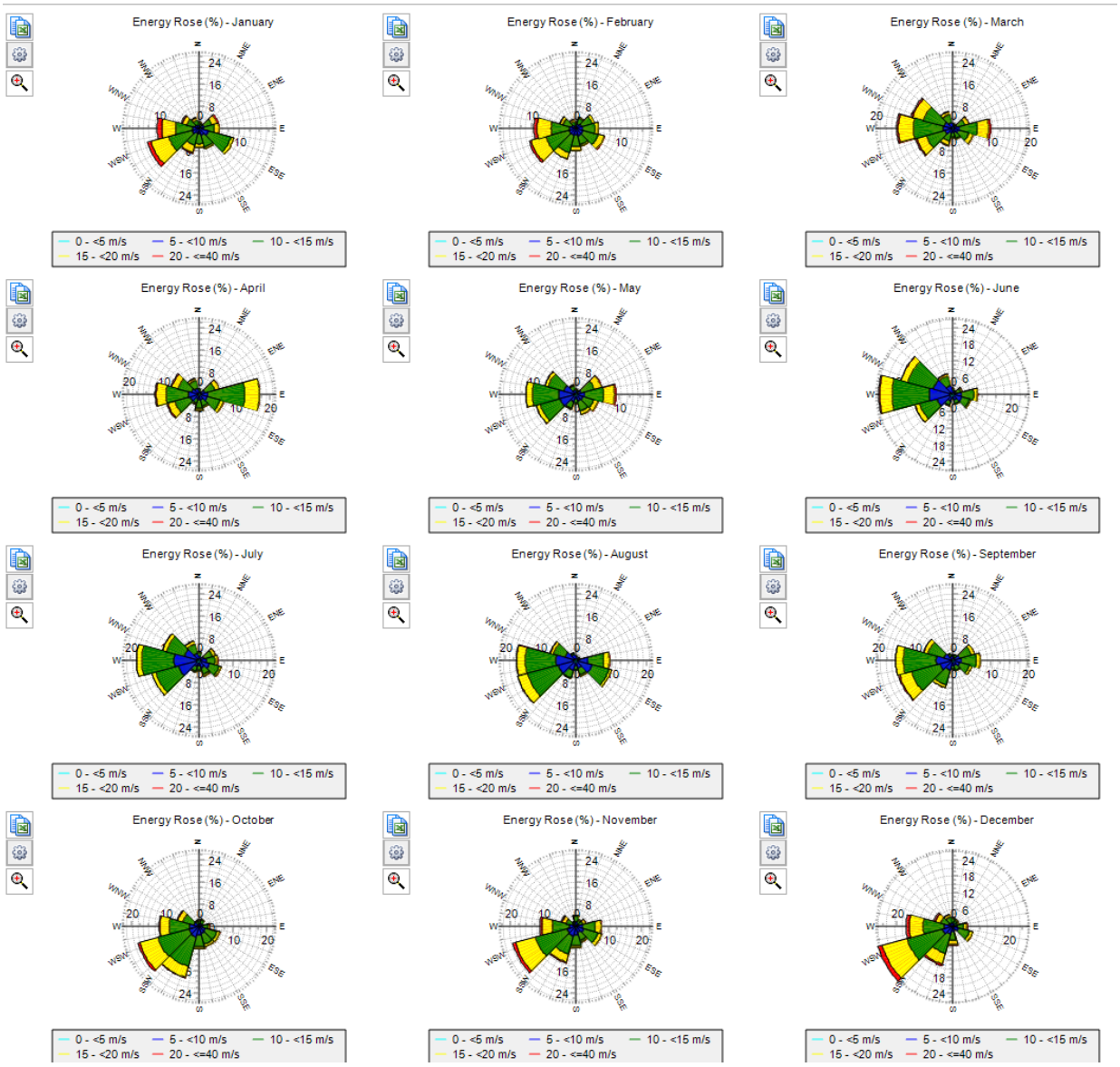

Figure 76. Long-term monthly energy roses, FINO2.

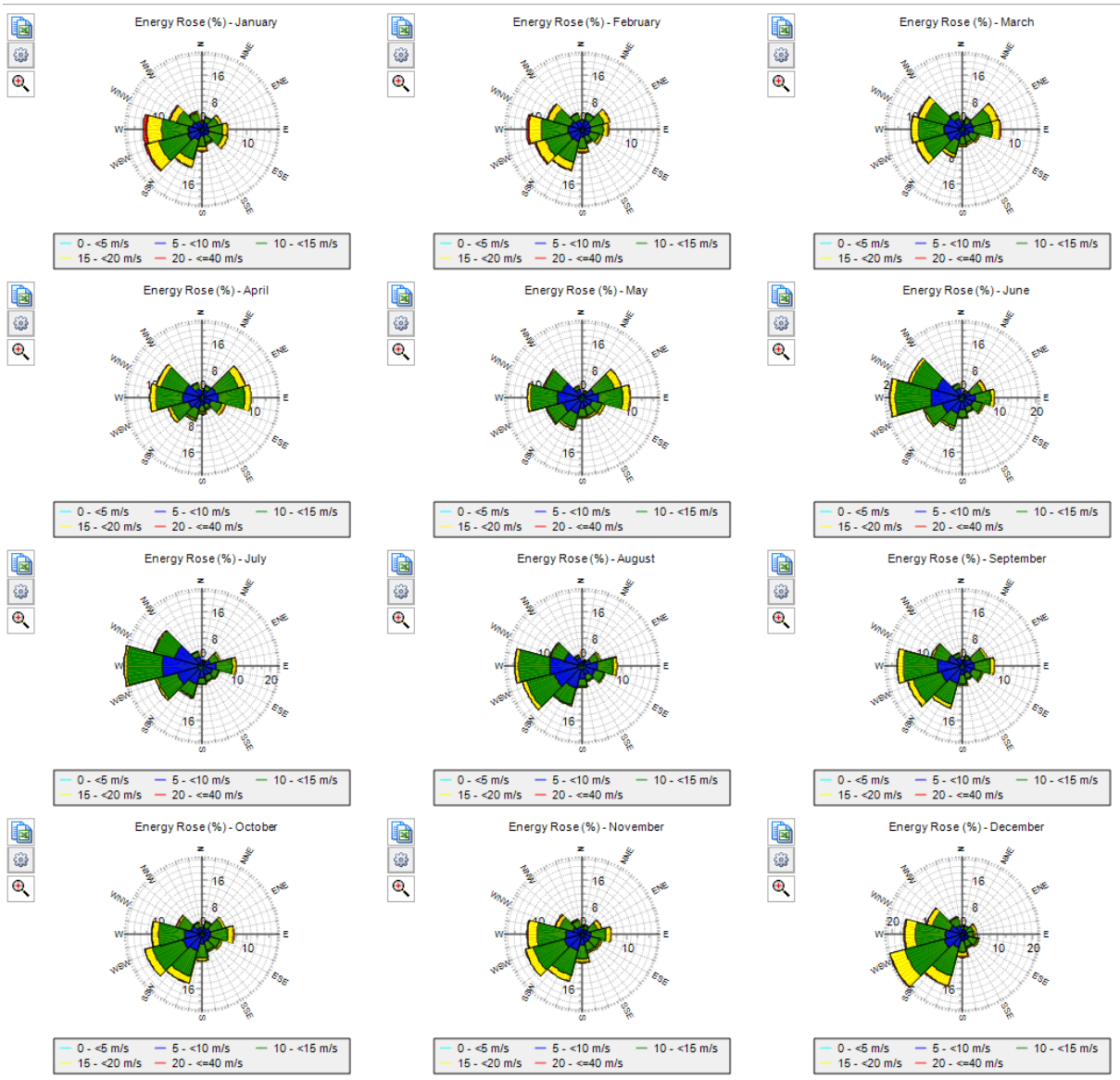

Figure 77. Long-term monthly energy roses, Taggen.

Appendix B. Verification and Classification Uncertainty

Verification uncertainty at 120 m height for WS199 [14].

WS199 height 120 m													
BIN lower [m/s]	BIN upper [m/s]	# of 10 min data sets	V_{rsd} [m/s]	V_{mm} [m/s]	V_{maxrsd} [m/s]	V_{minrsd} [m/s]	Std_{Vrsd} [m/s]	$Std_{Vrsd}/\sqrt{n}$ [m/s]	Mean deviation [%]	RSD Mounting uncertainty [%]	Separation Uncertainty [%]	V_{RLL} Uncertainty [%]	**V_{RSD} Uncertainty (k=1) [%]**
3.75	4.25	50	4.02	3.99	5.34	2.98	0.37	0.052	0.57%	0.50%	0.18%	1.84%	**2.38%**
4.25	4.75	73	4.57	4.48	5.53	3.89	0.29	0.033	1.84%	0.50%	0.18%	1.76%	**2.70%**
4.75	5.25	74	5.07	5.01	5.58	4.26	0.24	0.028	1.21%	0.50%	0.18%	1.67%	**2.20%**
5.25	5.75	88	5.60	5.49	6.45	4.84	0.27	0.029	1.90%	0.50%	0.18%	1.64%	**2.62%**
5.75	6.25	92	6.00	6.00	7.12	5.11	0.31	0.033	0.04%	0.50%	0.18%	1.73%	**1.89%**
6.25	6.75	126	6.61	6.51	7.60	5.90	0.31	0.028	1.64%	0.50%	0.18%	1.65%	**2.42%**
6.75	7.25	102	7.10	6.99	9.16	6.16	0.37	0.037	1.63%	0.50%	0.18%	1.52%	**2.35%**
7.25	7.75	130	7.61	7.51	8.84	6.82	0.36	0.031	1.32%	0.50%	0.18%	1.55%	**2.14%**
7.75	8.25	108	8.08	7.99	10.17	7.18	0.41	0.040	1.12%	0.50%	0.18%	1.49%	**2.00%**
8.25	8.75	112	8.62	8.50	10.01	7.88	0.37	0.035	1.48%	0.50%	0.18%	1.47%	**2.19%**
8.75	9.25	86	9.05	9.02	10.36	8.08	0.42	0.046	0.40%	0.50%	0.18%	1.52%	**1.74%**
9.25	9.75	89	9.66	9.55	10.77	8.91	0.35	0.037	1.15%	0.50%	0.18%	1.44%	**1.96%**
9.75	10.25	96	10.12	10.00	11.32	9.30	0.38	0.039	1.16%	0.50%	0.18%	1.43%	**1.95%**
10.25	10.75	69	10.67	10.47	13.90	9.80	0.51	0.062	1.89%	0.50%	0.18%	1.47%	**2.52%**
10.75	11.25	82	11.09	10.98	12.57	10.17	0.42	0.047	0.96%	0.50%	0.18%	1.45%	**1.87%**
11.25	11.75	62	11.57	11.49	12.66	10.27	0.44	0.055	0.71%	0.50%	0.18%	1.47%	**1.78%**
11.75	12.25	70	12.04	12.00	13.54	10.95	0.43	0.051	0.33%	0.50%	0.18%	1.49%	**1.67%**
12.25	12.75	68	12.64	12.51	13.89	11.60	0.44	0.054	1.10%	0.50%	0.18%	1.54%	**2.01%**
12.75	13.25	57	13.04	12.99	14.09	12.10	0.38	0.050	0.35%	0.50%	0.18%	1.50%	**1.67%**
13.25	13.75	70	13.55	13.46	14.32	12.65	0.35	0.042	0.62%	0.50%	0.18%	1.69%	**1.90%**
13.75	14.25	43	14.03	13.98	14.92	12.79	0.44	0.067	0.35%	0.50%	0.18%	1.66%	**1.84%**
14.25	14.75	29											
14.75	15.25	21											
15.25	15.75	25											
15.75	16.25	21											

Verification uncertainty at 120 m height for SWLB044 [15].

SWLB044 height 120 m													
BIN lower [m/s]	BIN upper [m/s]	# of 10 min data sets	V_{rsd} [m/s]	V_{mm} [m/s]	V_{maxrsd} [m/s]	V_{minrsd} [m/s]	Std_{Vrsd} [m/s]	$Std_{Vrsd}/\sqrt{n}$ [m/s]	Mean deviation [%]	RSD Mounting uncertainty [%]	Separation Uncertainty [%]	V_{RLL} Uncertainty [%]	**V_{RSD} Uncertainty (k=1) [%]**
3.75	4.25	49	4.03	4.00	5.17	3.30	0.36	0.051	0.82%	0.50%	0.24%	1.84%	**2.45%**
4.25	4.75	79	4.57	4.48	5.66	3.97	0.32	0.036	1.94%	0.50%	0.24%	1.76%	**2.79%**
4.75	5.25	77	5.08	5.01	6.42	4.21	0.33	0.037	1.39%	0.50%	0.24%	1.67%	**2.36%**
5.25	5.75	93	5.65	5.50	6.40	4.96	0.30	0.032	2.67%	0.50%	0.24%	1.64%	**3.23%**
5.75	6.25	103	6.06	6.00	7.36	4.74	0.40	0.039	0.90%	0.50%	0.24%	1.73%	**2.13%**
6.25	6.75	131	6.64	6.51	8.11	5.87	0.37	0.033	2.05%	0.50%	0.24%	1.65%	**2.73%**
6.75	7.25	105	7.17	6.99	9.37	6.34	0.41	0.040	2.63%	0.50%	0.24%	1.52%	**3.14%**
7.25	7.75	133	7.65	7.50	9.39	6.83	0.41	0.036	1.94%	0.50%	0.24%	1.55%	**2.59%**
7.75	8.25	112	8.16	7.99	10.59	6.97	0.50	0.048	2.11%	0.50%	0.24%	1.49%	**2.70%**
8.25	8.75	111	8.61	8.50	10.37	7.77	0.42	0.040	1.33%	0.50%	0.24%	1.47%	**2.11%**
8.75	9.25	86	9.11	9.02	10.44	7.73	0.47	0.050	1.06%	0.50%	0.24%	1.52%	**2.01%**
9.25	9.75	90	9.67	9.54	10.91	8.64	0.44	0.047	1.33%	0.50%	0.24%	1.44%	**2.09%**
9.75	10.25	95	10.12	10.00	11.50	9.19	0.43	0.045	1.22%	0.50%	0.24%	1.43%	**2.01%**
10.25	10.75	68	10.61	10.48	11.59	9.63	0.40	0.048	1.23%	0.50%	0.24%	1.47%	**2.05%**
10.75	11.25	82	11.19	10.98	12.72	10.01	0.50	0.055	1.90%	0.50%	0.24%	1.45%	**2.50%**
11.25	11.75	62	11.57	11.49	13.08	10.15	0.47	0.060	0.76%	0.50%	0.24%	1.47%	**1.82%**
11.75	12.25	69	12.18	12.00	13.45	11.01	0.47	0.056	1.48%	0.50%	0.24%	1.49%	**2.22%**
12.25	12.75	68	12.64	12.51	14.18	11.44	0.51	0.062	1.04%	0.50%	0.24%	1.54%	**2.00%**
12.75	13.25	57	13.18	12.99	13.89	12.28	0.44	0.058	1.46%	0.50%	0.24%	1.50%	**2.21%**
13.25	13.75	70	13.61	13.46	14.94	12.62	0.47	0.056	1.10%	0.50%	0.24%	1.69%	**2.13%**
13.75	14.25	43	14.05	13.98	15.81	13.10	0.48	0.073	0.51%	0.50%	0.24%	1.66%	**1.90%**
14.25	14.75	29											
14.75	15.25	21											
15.25	15.75	25											
15.75	16.25	21											

Type specific classification uncertainty from classification report for ZX300 by DNV-GL [16]

ZX300 Type Class Table											
EVs / Heights	Max influence (m x Range)								Preliminary accuracy	Type specific class	Standard uncertainty
	Temperature Gradient	Air Temperature	Turbulence Intensity	Wind Veer	Wind Shear	Air Density	Rain	Flow inclination angle			
[m]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
135	-1.85	-1.81	0.46	0.60	-2.48	*	-0.59	0.71	3.78	2.67	1.54
130	-2.03	-1.34	0.62	0.57	-1.14	*	-0.60	1.17	3.11	2.20	1.27
125	-1.80	-1.37	0.70	0.59	-1.20	*	-0.96	1.07	3.07	2.17	1.25
120	-1.91	-1.13	0.78	0.58	-0.61	*	-0.92	0.96	2.83	2.00	1.16
115	-1.97	-0.90	0.87	0.57	-0.02	*	-0.87	0.86	2.70	1.91	1.10
110	-2.03	-0.66	0.95	0.57	0.57	*	-0.82	0.76	2.71	1.92	1.11
105	-2.09	-0.42	1.04	0.56	1.16	*	-0.77	0.65	2.88	2.04	1.18
100	-1.52	2.50	1.71	0.00	1.02	-0.45	-0.01	0.55	3.61	2.55	1.47
95	-1.18	1.96	1.47	0.12	1.17	-0.33	0.20	0.22	2.99	2.12	1.22
90	-0.82	1.42	1.43	0.23	1.31	-0.20	0.23	-0.11	2.57	1.81	1.05
85	-0.46	0.91	1.40	0.34	1.52	-0.07	0.25	-0.66	2.43	1.72	0.99
80	-0.10	0.57	1.50	0.47	1.68	0.05	0.28	-0.63	2.47	1.75	1.01
75	0.11	0.61	1.61	0.60	2.23	0.18	0.30	-0.59	2.96	2.10	1.21
70	0.14	1.11	1.33	0.72	2.79	0.31	0.28	-0.56	3.43	2.43	1.40
65	0.23	1.35	1.09	0.89	2.36	0.75	0.26	-0.52	3.21	2.27	1.31
60	0.23	1.77	0.86	1.04	2.05	1.13	0.24	-0.49	3.28	2.32	1.34
55	0.25	2.07	0.71	0.45	1.91	1.51	0.23	*	3.32	2.34	1.35
50	0.28	1.03	0.52	0.61	1.60	1.89	0.28	*	2.83	2.00	1.15
45	0.32	0.41	0.39	0.77	1.29	2.27	0.31	*	2.82	2.00	1.15
40	0.16	-0.22	0.27	0.93	0.99	2.66	0.35	*	3.03	2.14	1.24
35	0.10	-0.61	0.41	0.45	0.13	0.48	0.38	*	1.07	0.75	0.44
30	0.03	-0.76	0.53	0.34	-0.44	-0.41	0.41	*	1.23	0.87	0.50
25	0.02	-0.78	0.67	0.29	-1.01	-1.30	0.45	*	2.01	1.42	0.82
20	0.00	-0.71	0.82	0.23	-1.58	-2.18	0.48	*	2.95	2.09	1.21

* EV was not assessed in the height

Appendix C. Filtered and Repaired Dataset: Position 1 (Lot3, WS199), Position 2 (Lot 4, SWLB044)

Project:
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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

270,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,24	6,88	7,05	8,81	8,56	8,20	9,25	8,52	10,22	11,70	12,39	10,97	10,03
0		0,49	2	0	0	1	1	0	0	0	0	0	0	0	0
1	0,50	1,49	804	61	69	82	40	56	72	106	88	57	59	56	58
2	1,50	2,49	1320	123	76	97	63	64	82	129	129	131	124	151	151
3	2,50	3,49	2280	150	174	127	200	189	149	180	199	192	269	314	137
4	3,50	4,49	2822	167	166	191	313	292	255	154	226	286	287	326	159
5	4,50	5,49	3065	172	209	173	289	226	296	257	254	334	346	319	190
6	5,50	6,49	3505	267	224	168	257	214	268	336	244	414	481	403	229
7	6,50	7,49	3695	318	251	263	257	285	234	212	246	389	457	517	266
8	7,50	8,49	3867	251	201	138	272	439	231	154	261	360	627	601	332
9	8,50	9,49	3674	147	146	115	205	408	294	212	210	317	635	677	308
10	9,50	10,49	3530	116	110	85	218	315	274	250	219	280	785	648	230
11	10,50	11,49	3447	56	103	142	164	292	221	232	267	336	825	566	243
12	11,50	12,49	3338	30	60	163	148	202	323	254	252	413	798	515	180
13	12,50	13,49	3090	41	43	144	132	115	284	160	195	383	801	610	182
14	13,50	14,49	2880	35	38	125	121	79	213	145	248	397	794	545	140
15	14,50	15,49	2335	28	32	100	110	53	198	105	226	336	621	388	138
16	15,50	16,49	1692	19	28	54	101	58	103	67	128	231	487	271	145
17	16,50	17,49	1354	14	9	63	99	20	51	31	110	173	448	213	123
18	17,50	18,49	1099	11	5	61	38	14	19	23	113	164	426	125	100
19	18,50	19,49	880	3	2	28	20	2	23	10	104	173	351	83	81
20	19,50	20,49	697	0	0	8	9	0	21	4	52	135	329	71	68
21	20,50	21,49	532	0	0	3	2	1	9	6	43	121	231	85	31
22	21,50	22,49	358	0	0	0	0	1	2	6	37	92	113	91	16
23	22,50	23,49	240	0	0	0	0	0	0	3	12	66	81	70	8
24	23,50	24,49	167	0	0	0	0	0	0	2	6	44	52	52	11
25	24,50	25,49	164	0	0	0	0	0	0	1	12	40	56	49	6
26	25,50	26,49	122	0	0	0	0	0	0	1	8	42	39	32	0
27	26,50	27,49	124	0	0	0	0	0	0	0	12	37	34	37	4
28	27,50	28,49	107	0	0	0	0	0	0	0	7	46	27	22	5
29	28,50	29,49	80	0	0	0	0	0	0	0	1	25	38	14	2
30	29,50	30,49	74	0	0	0	0	0	0	0	0	17	40	17	0
31	30,50	31,49	57	0	0	0	0	0	0	0	1	13	26	17	0
32	31,50	32,49	29	0	0	0	0	0	0	0	0	8	15	6	0
33	32,50	33,49	11	0	0	0	0	0	0	0	0	4	6	1	0
34	33,50	34,49	5	0	0	0	0	0	0	0	0	4	0	1	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

240,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,15	6,77	7,09	8,65	8,60	8,27	9,20	8,45	10,14	11,73	12,21	10,80	9,98
0		0,49	2	0	0	0	0	0	0	1	1	0	0	0	0
1	0,50	1,49	802	60	72	81	40	57	64	116	83	55	70	51	53
2	1,50	2,49	1314	126	86	90	68	73	88	127	133	122	121	146	134
3	2,50	3,49	2324	164	159	155	177	174	175	191	205	195	273	307	149
4	3,50	4,49	2793	164	166	173	290	287	256	166	234	273	303	338	143
5	4,50	5,49	3142	178	210	188	297	230	303	248	271	330	372	324	191
6	5,50	6,49	3550	263	226	192	263	220	251	354	263	410	469	411	228
7	6,50	7,49	3712	319	249	268	252	291	229	207	242	399	482	502	272
8	7,50	8,49	3782	224	210	131	268	420	258	168	261	310	614	602	316
9	8,50	9,49	3741	149	138	122	212	427	267	222	212	327	664	698	303
10	9,50	10,49	3601	110	111	106	224	320	272	243	225	303	784	674	229
11	10,50	11,49	3468	60	107	126	186	274	220	250	280	338	850	550	227
12	11,50	12,49	3407	35	61	142	135	220	332	247	247	464	820	527	177
13	12,50	13,49	3172	39	58	157	137	136	267	164	220	384	861	598	151
14	13,50	14,49	2880	34	33	135	138	74	232	139	253	388	784	526	144
15	14,50	15,49	2286	23	38	72	103	70	197	101	224	331	619	350	158
16	15,50	16,49	1687	12	20	58	109	54	83	57	134	257	481	295	127
17	16,50	17,49	1324	11	10	70	95	23	52	32	113	164	443	183	128
18	17,50	18,49	1041	12	4	44	26	7	28	27	118	174	387	125	89
19	18,50	19,49	897	3	1	29	16	6	21	9	102	198	342	79	91
20	19,50	20,49	701	0	2	8	9	3	22	5	54	136	328	81	53
21	20,50	21,49	484	0	0	0	2	0	4	6	41	123	195	86	27
22	21,50	22,49	293	0	0	0	0	1	2	6	16	80	107	70	11
23	22,50	23,49	212	0	0	0	0	0	2	4	16	57	61	61	11
24	23,50	24,49	171	0	0	0	0	0	0	2	11	47	62	38	11
25	24,50	25,49	164	0	0	0	0	0	0	1	10	40	66	43	4
26	25,50	26,49	107	0	0	0	0	0	0	2	10	31	33	31	0
27	26,50	27,49	122	0	0	0	0	0	0	0	9	50	24	32	7
28	27,50	28,49	109	0	0	0	0	0	0	0	5	42	39	22	1
29	28,50	29,49	79	0	0	0	0	0	0	0	0	22	39	18	0
30	29,50	30,49	58	0	0	0	0	0	0	0	0	14	29	15	0
31	30,50	31,49	38	0	0	0	0	0	0	0	0	18	14	6	0
32	31,50	32,49	15	0	0	0	0	0	0	0	0	5	10	0	0
33	32,50	33,49	6	0	0	0	0	0	0	0	0	3	2	1	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

200,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,03	6,66	7,15	8,51	8,66	8,42	9,04	8,45	10,10	11,56	11,97	10,63	9,72
0		0,49	4	0	0	2	0	0	0	0	1	1	0	0	0
1	0,50	1,49	777	64	54	71	36	49	77	106	90	52	66	61	51
2	1,50	2,49	1384	139	104	94	75	93	78	136	125	119	131	146	144
3	2,50	3,49	2304	171	151	154	178	138	178	184	217	230	259	293	151
4	3,50	4,49	2784	174	170	174	256	279	298	165	218	262	302	335	151
5	4,50	5,49	3163	180	218	171	276	236	309	251	265	363	354	341	199
6	5,50	6,49	3564	247	217	240	252	241	239	365	286	402	468	382	225
7	6,50	7,49	3755	303	251	266	242	304	244	203	236	386	555	500	265
8	7,50	8,49	3940	236	237	145	281	405	249	194	277	343	631	609	333
9	8,50	9,49	3764	132	128	121	197	449	290	218	229	319	674	693	314
10	9,50	10,49	3713	101	114	103	247	342	249	275	255	307	811	678	231
11	10,50	11,49	3554	64	104	136	177	263	245	248	265	388	899	556	209
12	11,50	12,49	3463	50	66	135	153	225	308	218	276	477	860	538	157
13	12,50	13,49	3240	34	74	157	148	151	274	152	240	411	865	564	170
14	13,50	14,49	2893	22	38	129	132	103	248	145	297	364	805	472	138
15	14,50	15,49	2204	16	27	75	105	75	159	101	199	330	613	370	134
16	15,50	16,49	1606	18	25	57	102	53	92	43	149	192	464	274	137
17	16,50	17,49	1351	12	9	61	84	25	48	35	126	202	453	186	110
18	17,50	18,49	1020	11	3	36	24	10	30	45	116	223	342	99	81
19	18,50	19,49	835	3	5	21	12	12	16	3	77	194	336	77	79
20	19,50	20,49	620	0	0	6	9	7	12	7	49	118	280	83	49
21	20,50	21,49	425	0	0	1	0	1	1	8	42	112	157	86	17
22	21,50	22,49	255	0	0	0	0	0	3	5	12	71	85	67	12
23	22,50	23,49	163	0	0	0	0	0	0	2	13	48	55	34	11
24	23,50	24,49	166	0	0	0	0	0	0	2	11	45	66	40	2
25	24,50	25,49	150	0	0	0	0	0	0	3	13	43	49	39	3
26	25,50	26,49	110	0	0	0	0	0	0	0	12	44	21	29	4
27	26,50	27,49	124	0	0	0	0	0	0	0	5	60	32	27	0
28	27,50	28,49	82	0	0	0	0	0	0	0	3	22	39	17	1
29	28,50	29,49	58	0	0	0	0	0	0	0	0	17	31	10	0
30	29,50	30,49	47	0	0	0	0	0	0	0	0	17	20	10	0
31	30,50	31,49	14	0	0	0	0	0	0	0	0	9	3	2	0
32	31,50	32,49	3	0	0	0	0	0	0	0	0	1	2	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	1	0	0	0	0	0	0	0	0	1	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

180,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,95	6,61	7,21	8,39	8,64	8,48	8,99	8,42	10,04	11,47	11,85	10,53	9,51
0		0,49	1	0	0	0	0	0	0	0	0	0	1	0	0
1	0,50	1,49	767	61	49	75	33	55	84	99	89	51	68	55	48
2	1,50	2,49	1403	156	107	107	71	90	74	145	131	109	127	138	148
3	2,50	3,49	2312	169	149	149	180	144	184	191	203	223	272	282	166
4	3,50	4,49	2757	178	161	172	252	252	302	154	226	276	297	334	153
5	4,50	5,49	3160	168	207	173	271	230	318	246	273	365	366	336	207
6	5,50	6,49	3643	235	231	240	268	259	248	356	299	409	482	387	229
7	6,50	7,49	3743	294	256	279	232	332	224	222	225	355	559	490	275
8	7,50	8,49	4003	247	218	151	263	400	257	225	285	355	658	615	329
9	8,50	9,49	3819	133	130	126	210	453	287	219	234	304	707	700	316
10	9,50	10,49	3799	91	124	114	249	346	256	299	268	316	842	650	244
11	10,50	11,49	3624	75	87	122	176	287	247	257	262	428	939	524	220
12	11,50	12,49	3502	46	76	147	164	211	325	184	304	482	861	541	161
13	12,50	13,49	3290	31	93	169	130	175	257	163	278	384	886	566	158
14	13,50	14,49	2847	25	34	102	122	119	273	113	283	391	799	464	122
15	14,50	15,49	2244	12	34	76	121	77	155	111	221	303	614	374	146
16	15,50	16,49	1565	16	16	60	101	53	86	53	139	197	477	266	101
17	16,50	17,49	1314	10	13	54	79	20	47	44	115	218	433	171	110
18	17,50	18,49	1021	14	3	34	25	10	24	40	111	252	340	87	81
19	18,50	19,49	799	2	3	20	10	15	13	7	61	175	341	80	72
20	19,50	20,49	557	0	0	1	6	7	9	4	54	112	245	83	36
21	20,50	21,49	370	0	0	0	0	0	3	8	34	90	136	78	21
22	21,50	22,49	221	0	0	0	0	0	1	3	12	67	83	44	11
23	22,50	23,49	159	0	0	0	0	0	0	6	11	47	55	32	8
24	23,50	24,49	155	0	0	0	0	0	0	1	16	42	61	32	3
25	24,50	25,49	133	0	0	0	0	0	0	0	12	38	46	36	1
26	25,50	26,49	128	0	0	0	0	0	0	0	8	53	35	29	3
27	26,50	27,49	108	0	0	0	0	0	0	0	7	42	35	23	1
28	27,50	28,49	66	0	0	0	0	0	0	0	0	20	29	17	0
29	28,50	29,49	54	0	0	0	0	0	0	0	0	20	25	9	0
30	29,50	30,49	20	0	0	0	0	0	0	0	0	6	10	4	0
31	30,50	31,49	10	0	0	0	0	0	0	0	0	7	3	0	0
32	31,50	32,49	1	0	0	0	0	0	0	0	0	0	1	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	1	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

150,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,79	6,51	7,32	8,16	8,57	8,51	8,95	8,42	9,82	11,25	11,65	10,23	9,28
0		0,49	3	0	0	0	0	0	0	0	0	1	2	0	0
1	0,50	1,49	765	59	48	54	50	59	71	105	88	52	66	56	57
2	1,50	2,49	1529	169	116	125	99	103	81	163	113	112	148	160	140
3	2,50	3,49	2296	169	140	172	171	140	183	186	209	243	271	264	148
4	3,50	4,49	2772	175	182	147	224	224	294	136	239	313	300	352	186
5	4,50	5,49	3175	174	204	196	246	274	298	255	274	358	351	339	206
6	5,50	6,49	3594	228	211	244	259	291	236	365	326	379	471	365	219
7	6,50	7,49	3845	291	258	275	233	339	255	231	252	377	565	502	267
8	7,50	8,49	4196	232	237	170	277	411	250	219	275	386	726	635	378
9	8,50	9,49	3864	128	147	109	227	423	309	254	256	294	716	685	316
10	9,50	10,49	3980	108	121	121	269	372	282	274	299	351	917	638	228
11	10,50	11,49	3713	67	76	119	179	294	281	234	290	484	965	517	207
12	11,50	12,49	3566	32	111	138	161	219	323	168	355	475	870	552	162
13	12,50	13,49	3396	24	110	131	120	176	298	146	348	416	944	532	151
14	13,50	14,49	2808	25	53	118	127	137	246	122	224	392	788	445	131
15	14,50	15,49	2095	12	20	53	93	109	134	126	200	274	597	356	121
16	15,50	16,49	1598	15	22	62	110	51	82	74	123	223	492	243	101
17	16,50	17,49	1264	10	7	46	68	17	36	55	126	272	386	145	96
18	17,50	18,49	978	13	6	25	26	13	15	24	96	226	368	84	82
19	18,50	19,49	729	1	2	15	12	16	9	14	49	160	309	79	63
20	19,50	20,49	448	0	0	2	6	0	4	6	41	111	186	64	28
21	20,50	21,49	261	0	0	0	0	0	3	9	17	68	98	53	13
22	21,50	22,49	185	0	0	0	0	0	0	4	15	61	74	24	7
23	22,50	23,49	162	0	0	0	0	0	0	2	15	40	68	35	2
24	23,50	24,49	137	0	0	0	0	0	0	1	6	41	59	29	1
25	24,50	25,49	128	0	0	0	0	0	0	0	5	57	39	24	3
26	25,50	26,49	114	0	0	0	0	0	0	0	10	46	34	24	0
27	26,50	27,49	66	0	0	0	0	0	0	0	2	17	33	14	0
28	27,50	28,49	48	0	0	0	0	0	0	0	2	18	22	5	1
29	28,50	29,49	25	0	0	0	0	0	0	0	0	10	12	3	0
30	29,50	30,49	8	0	0	0	0	0	0	0	0	5	3	0	0
31	30,50	31,49	3	0	0	0	0	0	0	0	0	2	1	0	0
32	31,50	32,49	1	0	0	0	0	0	0	0	0	1	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

120,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,59	6,43	7,30	7,93	8,57	8,47	8,78	8,33	9,64	10,98	11,36	9,94	9,06
0		0,49	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0,50	1,49	776	70	46	57	51	67	81	94	78	51	77	53	51
2	1,50	2,49	1601	184	130	133	117	99	89	177	112	118	140	149	153
3	2,50	3,49	2284	173	125	180	152	137	202	201	207	256	245	267	139
4	3,50	4,49	2817	159	194	152	208	239	279	155	248	333	310	355	185
5	4,50	5,49	3192	165	209	183	250	283	271	259	278	332	400	339	223
6	5,50	6,49	3649	227	208	264	241	325	218	371	323	370	491	393	218
7	6,50	7,49	3951	274	281	269	258	337	236	260	272	370	607	489	298
8	7,50	8,49	4277	223	237	183	251	429	265	240	305	412	794	589	349
9	8,50	9,49	4113	141	165	126	265	435	310	256	288	310	809	701	307
10	9,50	10,49	4165	107	115	115	281	364	320	317	302	420	982	619	223
11	10,50	11,49	3818	62	93	105	191	330	296	204	372	493	978	506	188
12	11,50	12,49	3715	18	130	125	138	226	339	163	385	551	923	565	152
13	12,50	13,49	3313	24	108	131	128	172	238	155	328	459	922	508	140
14	13,50	14,49	2828	17	47	109	130	171	242	136	238	370	760	465	143
15	14,50	15,49	2043	11	19	47	113	102	131	144	173	266	602	323	112
16	15,50	16,49	1536	22	6	59	102	42	63	84	125	291	465	180	97
17	16,50	17,49	1163	12	9	40	58	15	13	42	115	270	393	117	79
18	17,50	18,49	890	14	6	23	22	18	12	13	66	188	376	75	77
19	18,50	19,49	548	0	0	3	10	4	1	9	47	121	232	72	49
20	19,50	20,49	340	0	0	2	3	0	4	10	20	88	143	46	24
21	20,50	21,49	183	0	0	0	1	0	0	5	23	45	84	18	7
22	21,50	22,49	175	0	0	0	0	0	1	2	8	36	85	37	6
23	22,50	23,49	137	0	0	0	0	0	0	1	3	47	66	19	1
24	23,50	24,49	127	0	0	0	0	0	0	0	10	57	41	18	1
25	24,50	25,49	111	0	0	0	0	0	0	0	9	44	38	19	1
26	25,50	26,49	63	0	0	0	0	0	0	0	6	16	31	10	0
27	26,50	27,49	46	0	0	0	0	0	0	0	0	21	21	4	0
28	27,50	28,49	20	0	0	0	0	0	0	0	0	8	9	3	0
29	28,50	29,49	8	0	0	0	0	0	0	0	0	5	3	0	0
30	29,50	30,49	5	0	0	0	0	0	0	0	0	4	1	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

100,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,42	6,45	7,23	7,78	8,58	8,35	8,61	8,28	9,45	10,73	11,09	9,69	8,91
0		0,49	4	0	0	0	0	0	0	1	2	0	0	1	0
1	0,50	1,49	784	56	54	52	57	68	88	90	81	58	73	61	46
2	1,50	2,49	1642	163	134	143	119	100	94	172	122	126	156	157	156
3	2,50	3,49	2335	188	134	171	146	146	205	210	198	253	257	255	172
4	3,50	4,49	2803	149	177	174	219	249	269	166	262	340	284	346	168
5	4,50	5,49	3245	151	220	172	232	296	268	268	284	327	430	376	221
6	5,50	6,49	3699	235	217	278	231	333	218	365	328	381	479	411	223
7	6,50	7,49	4117	280	274	263	248	392	231	244	279	412	728	480	286
8	7,50	8,49	4366	201	292	184	281	395	282	257	315	404	785	609	361
9	8,50	9,49	4319	138	181	107	246	478	345	301	306	361	877	684	295
10	9,50	10,49	4275	100	108	108	315	395	290	312	344	430	1051	582	240
11	10,50	11,49	4062	54	116	121	197	321	302	223	400	590	1038	529	171
12	11,50	12,49	3695	16	126	120	139	263	301	169	368	548	950	535	160
13	12,50	13,49	3410	24	98	132	141	181	271	179	334	491	933	509	117
14	13,50	14,49	2615	15	45	79	125	163	216	146	234	348	736	386	122
15	14,50	15,49	1965	11	10	51	119	86	108	123	169	306	560	311	111
16	15,50	16,49	1411	21	8	45	107	16	41	78	118	283	452	141	101
17	16,50	17,49	1086	17	3	43	47	23	13	27	93	250	401	96	73
18	17,50	18,49	756	10	4	18	12	7	3	14	55	161	324	83	65
19	18,50	19,49	452	2	3	3	11	0	3	10	32	101	182	55	50
20	19,50	20,49	237	0	0	0	4	0	1	8	30	52	101	26	15
21	20,50	21,49	183	0	0	0	0	0	1	2	9	51	87	23	10
22	21,50	22,49	151	0	0	0	0	0	0	0	4	43	72	30	2
23	22,50	23,49	136	0	0	0	0	0	0	1	9	54	47	21	4
24	23,50	24,49	112	0	0	0	0	0	0	0	7	49	39	16	1
25	24,50	25,49	68	0	0	0	0	0	0	0	5	26	29	8	0
26	25,50	26,49	51	0	0	0	0	0	0	0	7	20	18	6	0
27	26,50	27,49	25	0	0	0	0	0	0	0	0	7	15	3	0
28	27,50	28,49	13	0	0	0	0	0	0	0	0	8	4	1	0
29	28,50	29,49	4	0	0	0	0	0	0	0	0	2	2	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

90,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,31	6,37	7,21	7,68	8,55	8,29	8,48	8,17	9,35	10,58	10,91	9,62	8,79
0		0,49	3	0	0	0	0	1	0	0	0	0	0	2	0
1	0,50	1,49	814	59	56	57	60	71	86	103	75	63	71	57	56
2	1,50	2,49	1665	161	142	156	116	94	101	182	132	113	158	169	141
3	2,50	3,49	2370	200	134	161	140	143	204	209	205	260	265	252	197
4	3,50	4,49	2853	143	193	159	223	279	262	164	259	353	285	353	180
5	4,50	5,49	3348	168	222	178	239	313	270	276	301	351	446	374	210
6	5,50	6,49	3827	228	227	291	250	366	233	352	352	377	513	388	250
7	6,50	7,49	4157	266	280	261	240	403	200	249	284	419	773	484	298
8	7,50	8,49	4528	207	307	170	287	453	280	262	340	441	832	626	323
9	8,50	9,49	4445	136	182	96	274	484	383	304	309	393	890	700	294
10	9,50	10,49	4479	85	136	109	340	425	282	313	373	480	1103	603	230
11	10,50	11,49	4100	47	134	105	187	351	291	247	387	598	1064	519	170
12	11,50	12,49	3823	18	134	124	147	255	306	178	380	605	1002	523	151
13	12,50	13,49	3425	19	88	134	157	189	264	205	346	459	919	524	121
14	13,50	14,49	2557	12	34	74	121	147	191	123	234	361	765	361	134
15	14,50	15,49	1853	13	9	53	118	83	75	103	169	314	532	277	107
16	15,50	16,49	1319	24	7	41	95	24	37	71	128	296	398	125	73
17	16,50	17,49	1058	19	4	33	43	19	8	21	85	225	409	104	88
18	17,50	18,49	642	7	6	18	17	3	3	15	37	141	267	69	59
19	18,50	19,49	408	2	1	3	8	0	3	6	36	87	153	58	51
20	19,50	20,49	220	0	0	0	3	0	2	6	23	46	100	23	17
21	20,50	21,49	176	0	0	0	0	0	0	1	6	42	89	28	10
22	21,50	22,49	134	0	0	0	0	0	0	0	6	40	64	23	1
23	22,50	23,49	140	0	0	0	0	0	0	0	9	69	43	19	0
24	23,50	24,49	93	0	0	0	0	0	0	0	2	34	33	22	2
25	24,50	25,49	59	0	0	0	0	0	0	0	10	27	15	7	0
26	25,50	26,49	38	0	0	0	0	0	0	0	1	8	22	7	0
27	26,50	27,49	21	0	0	0	0	0	0	0	0	9	11	1	0
28	27,50	28,49	9	0	0	0	0	0	0	0	0	5	4	0	0
29	28,50	29,49	3	0	0	0	0	0	0	0	0	3	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.26

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

60,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,91	6,29	7,01	7,40	8,40	8,05	8,00	7,78	8,94	10,05	10,34	9,26	8,45
0		0,49	1	0	0	1	0	0	0	0	0	0	0	0	0
1	0,50	1,49	899	68	68	64	56	69	102	129	79	63	74	66	61
2	1,50	2,49	1723	146	139	147	123	94	107	192	130	122	167	182	174
3	2,50	3,49	2441	168	158	165	173	157	195	212	218	276	267	240	212
4	3,50	4,49	3037	165	200	174	199	310	282	210	269	356	319	341	212
5	4,50	5,49	3507	169	214	202	239	354	274	304	310	349	518	366	208
6	5,50	6,49	4112	231	229	290	250	378	270	371	345	479	585	444	240
7	6,50	7,49	4470	274	322	267	248	419	227	263	296	477	832	549	296
8	7,50	8,49	4881	186	312	156	287	498	354	299	380	516	958	623	312
9	8,50	9,49	4953	119	184	96	326	586	336	352	416	534	1084	678	242
10	9,50	10,49	4752	86	183	104	326	500	268	326	461	573	1148	586	191
11	10,50	11,49	4214	44	161	104	208	346	243	289	430	716	1022	481	170
12	11,50	12,49	3834	12	99	137	184	229	308	178	379	605	1056	513	134
13	12,50	13,49	3018	16	61	113	139	144	212	161	303	444	873	446	106
14	13,50	14,49	2149	13	18	52	122	115	131	122	196	334	570	329	147
15	14,50	15,49	1439	17	8	43	103	62	39	72	118	288	434	163	92
16	15,50	16,49	1138	20	1	31	69	17	13	37	68	272	421	113	76
17	16,50	17,49	780	18	4	29	34	4	5	10	57	160	296	85	78
18	17,50	18,49	462	3	5	12	10	0	3	4	36	91	166	67	65
19	18,50	19,49	264	2	2	1	7	0	0	5	19	53	113	31	31
20	19,50	20,49	169	0	0	0	1	0	0	2	3	49	76	26	12
21	20,50	21,49	131	0	0	0	0	0	0	0	4	43	59	24	1
22	21,50	22,49	119	0	0	0	0	0	0	0	8	47	37	27	0
23	22,50	23,49	89	0	0	0	0	0	0	0	7	43	22	16	1
24	23,50	24,49	56	0	0	0	0	0	0	0	7	19	23	7	0
25	24,50	25,49	32	0	0	0	0	0	0	0	3	10	18	1	0
26	25,50	26,49	20	0	0	0	0	0	0	0	0	7	11	2	0
27	26,50	27,49	8	0	0	0	0	0	0	0	0	6	2	0	0
28	27,50	28,49	0	0	0	0	0	0	0	0	0	0	0	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

40,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,52	6,21	6,76	7,08	8,15	7,67	7,62	7,45	8,48	9,51	9,84	8,97	8,08
0		0,49	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0,50	1,49	924	68	73	67	61	63	109	109	97	59	76	61	81
2	1,50	2,49	1792	164	144	148	118	109	122	198	138	133	171	167	180
3	2,50	3,49	2616	161	163	173	177	184	205	237	239	314	292	259	212
4	3,50	4,49	3217	171	217	179	215	324	291	241	293	347	372	352	215
5	4,50	5,49	3874	168	226	226	253	381	309	341	349	450	550	403	218
6	5,50	6,49	4403	240	270	306	261	397	254	377	319	536	717	484	242
7	6,50	7,49	4863	262	358	262	293	433	291	284	398	527	968	535	252
8	7,50	8,49	5283	187	274	118	319	638	349	326	443	634	1053	659	283
9	8,50	9,49	5449	118	203	94	373	695	363	429	483	622	1171	657	241
10	9,50	10,49	4869	89	207	109	314	500	252	339	507	707	1110	551	184
11	10,50	11,49	3994	36	102	120	198	310	230	256	403	698	1020	466	155
12	11,50	12,49	3473	15	89	129	175	129	265	149	361	513	1032	491	125
13	12,50	13,49	2433	17	46	70	133	53	157	164	222	389	658	397	127
14	13,50	14,49	1724	15	5	45	100	91	84	88	131	299	493	261	112
15	14,50	15,49	1349	22	6	36	90	40	26	39	82	276	493	145	94
16	15,50	16,49	886	13	3	35	56	9	8	10	69	181	320	112	70
17	16,50	17,49	589	15	4	19	22	2	8	5	50	120	216	73	55
18	17,50	18,49	325	3	3	4	9	0	0	4	15	76	126	43	42
19	18,50	19,49	153	0	1	0	3	0	0	0	4	36	78	21	10
20	19,50	20,49	118	0	0	0	1	0	0	0	2	34	54	21	6
21	20,50	21,49	117	0	0	0	0	0	0	0	4	46	41	25	1
22	21,50	22,49	103	0	0	0	0	0	0	0	12	52	19	19	1
23	22,50	23,49	53	0	0	0	0	0	0	0	11	12	19	11	0
24	23,50	24,49	34	0	0	0	0	0	0	0	2	10	21	1	0
25	24,50	25,49	15	0	0	0	0	0	0	0	0	9	4	2	0
26	25,50	26,49	6	0	0	0	0	0	0	0	0	4	2	0	0
27	26,50	27,49	2	0	0	0	0	0	0	0	0	2	0	0	0
28	27,50	28,49	0	0	0	0	0	0	0	0	0	0	0	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

30,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,28	6,06	6,66	6,91	7,99	7,41	7,39	7,21	8,18	9,20	9,55	8,74	8,04
0		0,49	1	0	0	0	0	0	1	0	0	0	0	0	0
1	0,50	1,49	946	76	77	75	64	66	97	119	87	64	77	69	75
2	1,50	2,49	1874	171	145	154	121	119	125	196	150	132	187	171	203
3	2,50	3,49	2725	162	155	182	179	179	240	255	250	327	309	284	203
4	3,50	4,49	3422	188	218	188	212	349	306	275	319	381	420	371	195
5	4,50	5,49	4051	170	248	223	268	396	341	300	346	498	595	437	229
6	5,50	6,49	4725	238	277	320	278	438	281	416	375	595	818	461	228
7	6,50	7,49	5192	251	384	242	286	507	304	318	445	605	1014	555	281
8	7,50	8,49	5467	169	281	114	346	718	382	368	476	666	1083	593	271
9	8,50	9,49	5519	112	216	106	394	686	325	433	534	643	1182	658	230
10	9,50	10,49	4817	83	195	118	325	475	219	322	477	765	1106	552	180
11	10,50	11,49	3742	34	86	98	186	187	211	222	386	685	1045	456	146
12	11,50	12,49	3177	13	77	127	138	67	246	164	330	468	898	516	133
13	12,50	13,49	2197	16	39	60	144	59	145	113	170	362	603	344	142
14	13,50	14,49	1647	15	7	50	81	97	76	66	94	300	533	226	102
15	14,50	15,49	1178	20	6	29	88	26	18	20	78	256	429	127	81
16	15,50	16,49	802	21	3	32	46	2	8	9	66	146	284	103	82
17	16,50	17,49	448	6	2	14	18	0	1	5	23	93	170	54	62
18	17,50	18,49	223	2	2	4	6	0	0	0	7	54	85	29	34
19	18,50	19,49	140	0	1	0	3	0	0	0	3	36	69	24	4
20	19,50	20,49	132	0	0	0	0	0	0	0	4	45	54	25	4
21	20,50	21,49	104	0	0	0	0	0	0	0	10	45	25	22	2
22	21,50	22,49	77	0	0	0	0	0	0	0	10	36	23	8	0
23	22,50	23,49	33	0	0	0	0	0	0	0	4	9	17	3	0
24	23,50	24,49	28	0	0	0	0	0	0	0	1	11	14	2	0
25	24,50	25,49	4	0	0	0	0	0	0	0	0	2	2	0	0
26	25,50	26,49	3	0	0	0	0	0	0	0	0	3	0	0	0
27	26,50	27,49	0	0	0	0	0	0	0	0	0	0	0	0	0
28	27,50	28,49	0	0	0	0	0	0	0	0	0	0	0	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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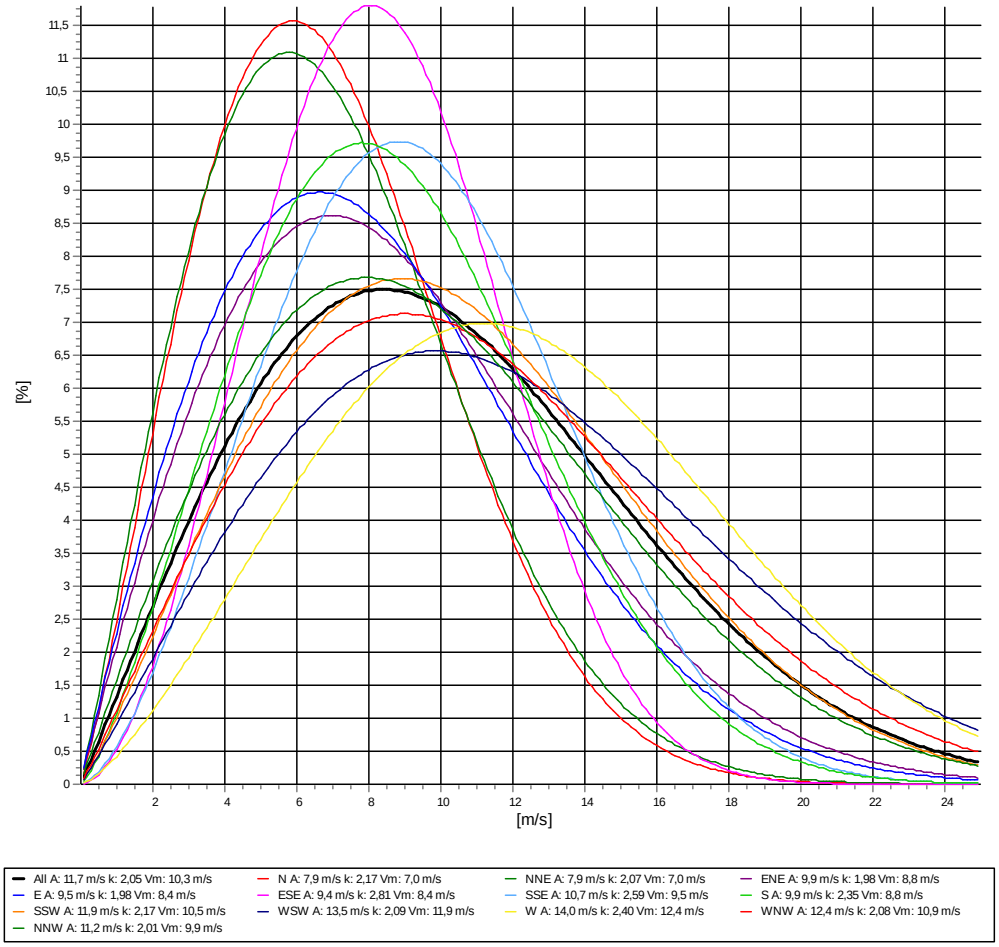
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **270,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,85	2,170	3,91	6,95
1-NNE	7,93	2,074	3,78	7,03
2-ENE	9,91	1,984	4,53	8,78
3-E	9,50	1,977	5,95	8,42
4-ESE	9,43	2,809	6,46	8,40
5-SSE	10,67	2,588	7,04	9,48
6-S	9,91	2,351	5,91	8,78
7-SSW	11,86	2,173	7,60	10,50
8-WSW	13,48	2,092	11,78	11,94
9-W	14,03	2,404	20,81	12,44
10-WNW	12,36	2,078	15,34	10,94
11-NNW	11,21	2,006	6,89	9,93
Mean	**11,65**	**2,053**	**100,00**	**10,32**



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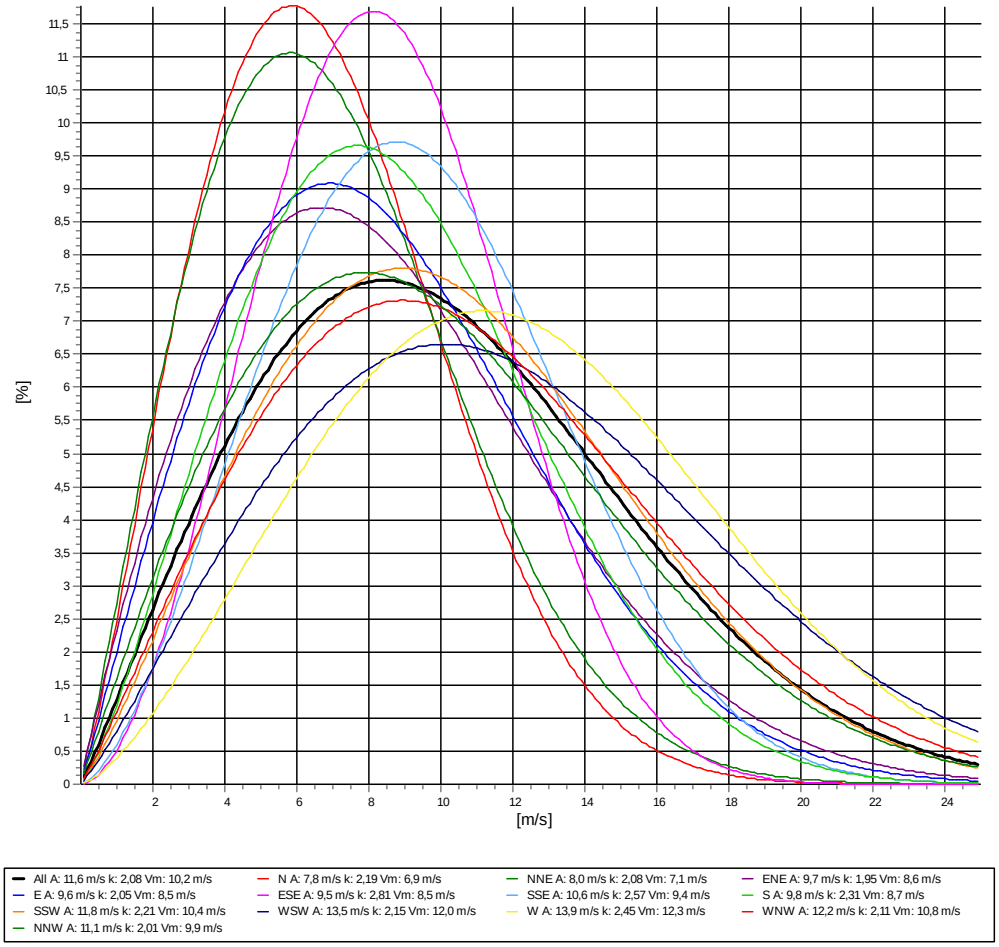
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **240,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,75	2,188	3,86	6,87
1-NNE	7,97	2,083	3,81	7,06
2-ENE	9,68	1,950	4,56	8,58
3-E	9,60	2,050	5,92	8,50
4-ESE	9,50	2,808	6,54	8,46
5-SSE	10,62	2,567	7,04	9,43
6-S	9,82	2,306	6,01	8,70
7-SSW	11,77	2,207	7,76	10,43
8-WSW	13,54	2,149	11,83	11,99
9-W	13,86	2,445	20,88	12,29
10-WNW	12,15	2,109	15,13	10,76
11-NNW	11,12	2,009	6,67	9,85
Mean	**11,57**	**2,082**	**100,00**	**10,25**



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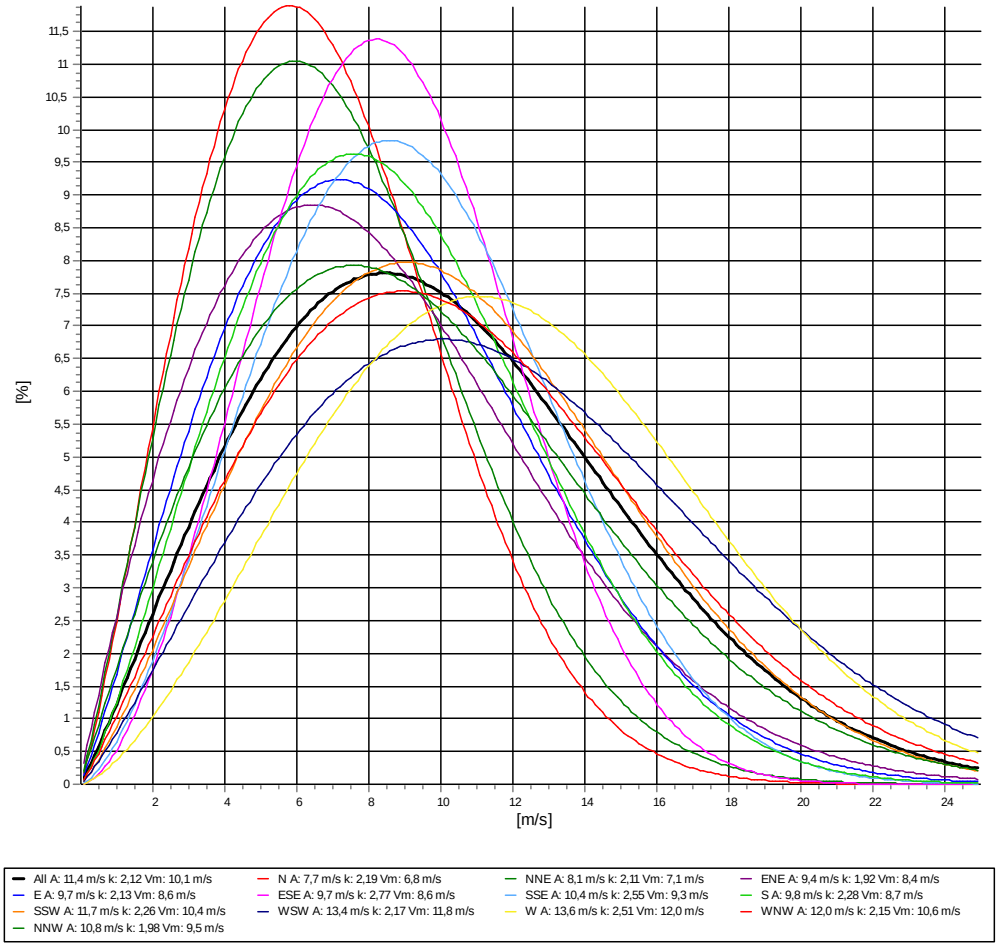
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **200,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,69	2,194	3,84	6,81
1-NNE	8,06	2,114	3,87	7,14
2-ENE	9,44	1,919	4,57	8,38
3-E	9,69	2,128	5,79	8,58
4-ESE	9,66	2,774	6,72	8,60
5-SSE	10,42	2,547	7,08	9,25
6-S	9,77	2,282	6,04	8,66
7-SSW	11,72	2,259	7,96	10,38
8-WSW	13,35	2,171	11,98	11,82
9-W	13,58	2,506	20,82	12,05
10-WNW	11,96	2,150	14,78	10,60
11-NNW	10,77	1,985	6,55	9,55
Mean	**11,42**	**2,117**	**100,00**	**10,12**



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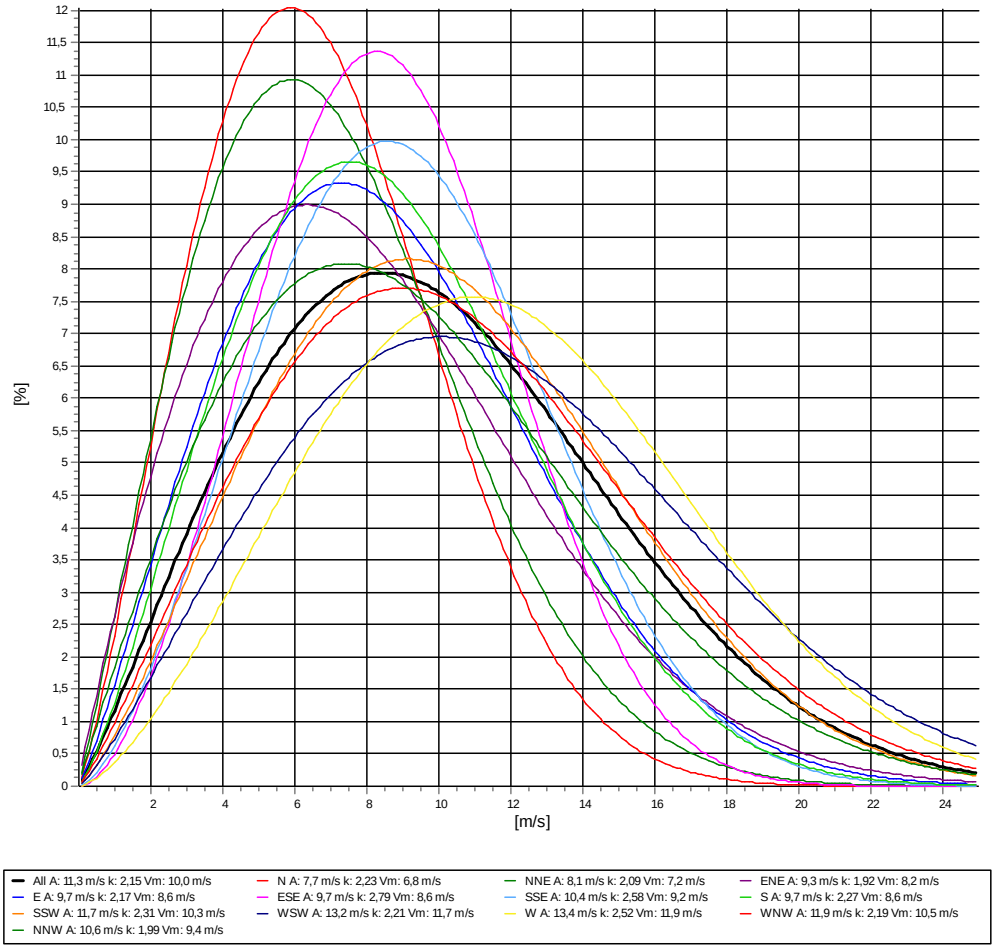
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **180,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,69	2,233	3,80	6,81
1-NNE	8,08	2,088	3,86	7,16
2-ENE	9,29	1,919	4,60	8,24
3-E	9,71	2,167	5,74	8,60
4-ESE	9,71	2,786	6,85	8,65
5-SSE	10,38	2,579	7,12	9,22
6-S	9,72	2,274	6,11	8,61
7-SSW	11,66	2,314	8,06	10,33
8-WSW	13,23	2,211	11,90	11,72
9-W	13,42	2,518	21,00	11,91
10-WNW	11,86	2,192	14,43	10,50
11-NNW	10,56	1,986	6,53	9,36
Mean	**11,33**	**2,146**	**100,00**	**10,04**



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Calculated:
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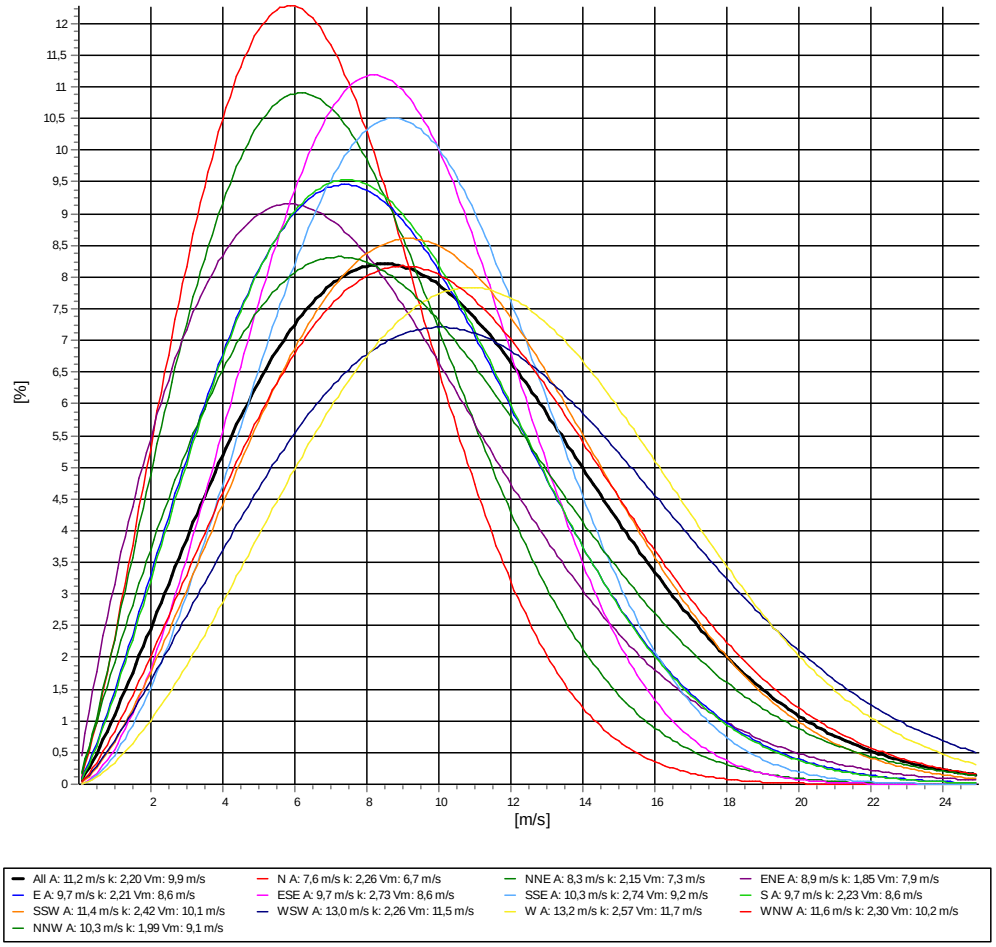
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y ; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **150,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,60	2,257	3,73	6,73
1-NNE	8,26	2,148	4,00	7,31
2-ENE	8,94	1,851	4,49	7,94
3-E	9,70	2,206	5,71	8,59
4-ESE	9,70	2,731	7,09	8,63
5-SSE	10,35	2,735	7,13	9,21
6-S	9,71	2,230	6,13	8,60
7-SSW	11,43	2,418	8,22	10,13
8-WSW	12,97	2,262	12,11	11,49
9-W	13,18	2,571	21,03	11,70
10-WNW	11,57	2,297	13,96	10,25
11-NNW	10,28	1,990	6,40	9,11
Mean	**11,16**	**2,200**	**100,00**	**9,88**



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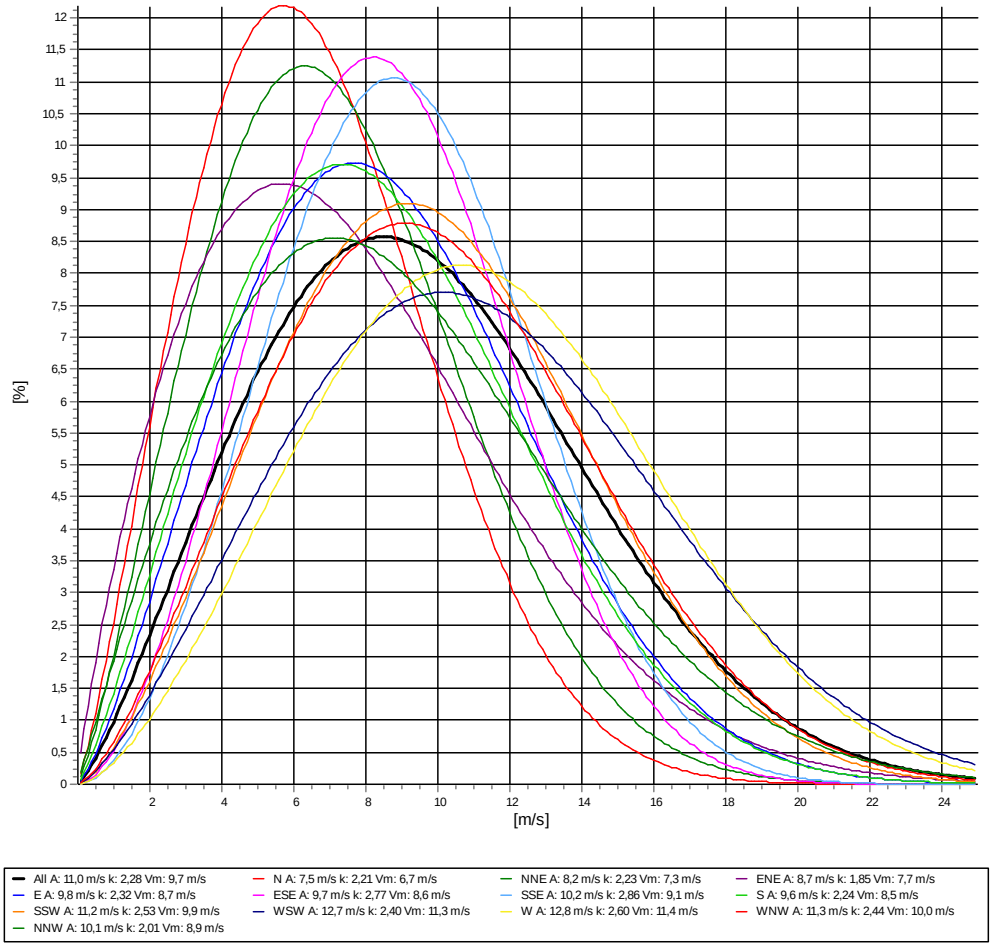
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **120,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,54	2,209	3,67	6,67
1-NNE	8,23	2,234	4,10	7,29
2-ENE	8,68	1,846	4,44	7,71
3-E	9,79	2,317	5,72	8,67
4-ESE	9,65	2,772	7,31	8,59
5-SSE	10,20	2,862	6,96	9,09
6-S	9,56	2,240	6,36	8,47
7-SSW	11,20	2,527	8,37	9,94
8-WSW	12,71	2,404	12,24	11,27
9-W	12,84	2,604	21,25	11,40
10-WNW	11,28	2,442	13,37	10,01
11-NNW	10,06	2,010	6,21	8,92
Mean	**10,96**	**2,277**	**100,00**	**9,71**



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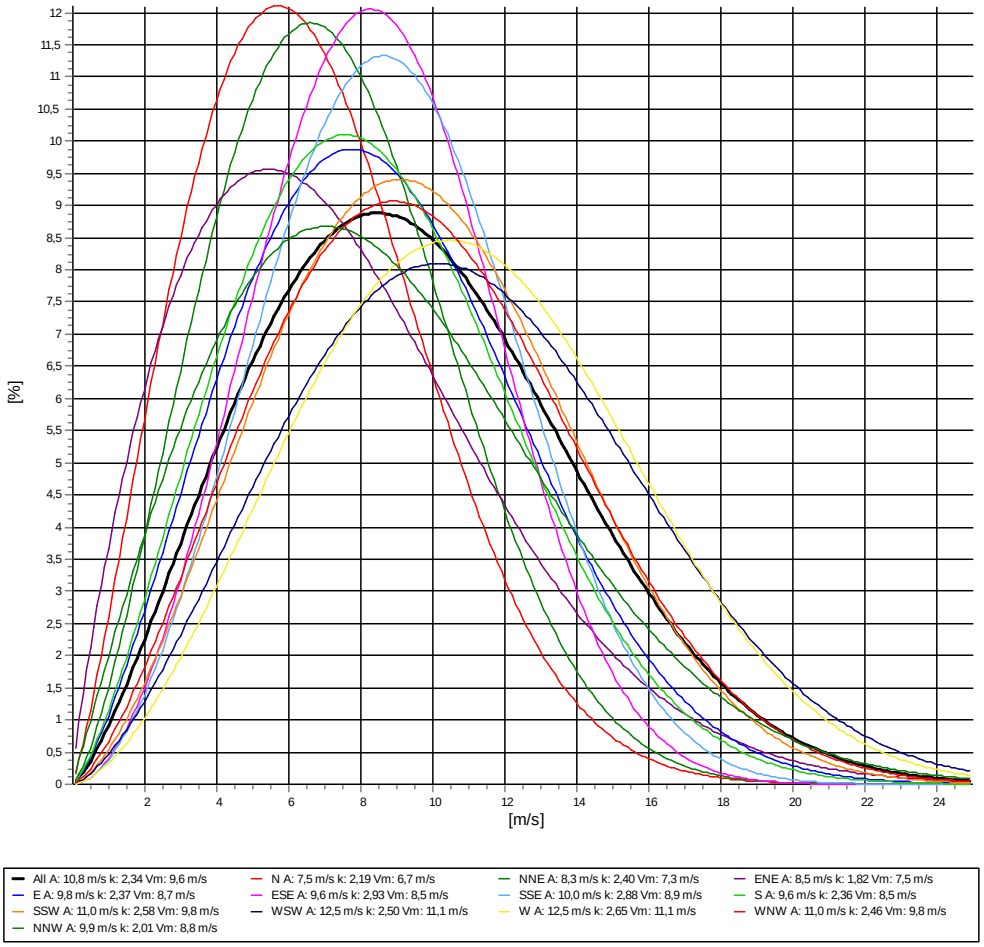
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y ; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **100,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,54	2,190	3,52	6,68
1-NNE	8,27	2,403	4,24	7,33
2-ENE	8,46	1,818	4,35	7,52
3-E	9,80	2,368	5,76	8,68
4-ESE	9,55	2,929	7,52	8,52
5-SSE	10,01	2,878	6,82	8,93
6-S	9,56	2,360	6,47	8,47
7-SSW	11,00	2,578	8,45	9,77
8-WSW	12,45	2,496	12,46	11,05
9-W	12,52	2,650	21,36	11,12
10-WNW	11,01	2,465	12,96	9,77
11-NNW	9,92	2,009	6,09	8,79
Mean	**10,78**	**2,335**	**100,00**	**9,55**



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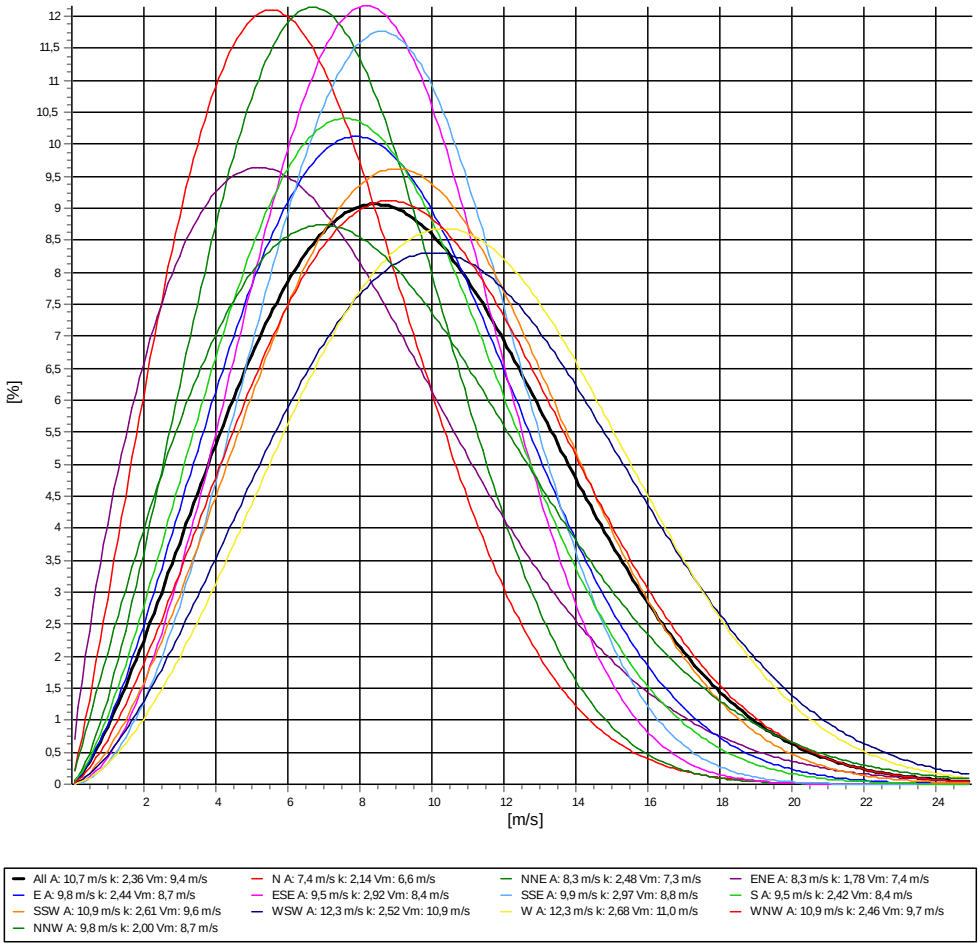
21/08/2023 13.26

Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y ; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **90,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,43	2,143	3,45	6,58
1-NNE	8,26	2,476	4,37	7,32
2-ENE	8,30	1,777	4,23	7,38
3-E	9,80	2,441	5,83	8,69
4-ESE	9,45	2,923	7,81	8,43
5-SSE	9,91	2,969	6,62	8,84
6-S	9,46	2,418	6,45	8,39
7-SSW	10,86	2,606	8,54	9,64
8-WSW	12,26	2,525	12,59	10,88
9-W	12,32	2,683	21,36	10,95
10-WNW	10,92	2,455	12,74	9,69
11-NNW	9,83	2,004	6,02	8,71
Mean	**10,65**	**2,360**	**100,00**	**9,44**



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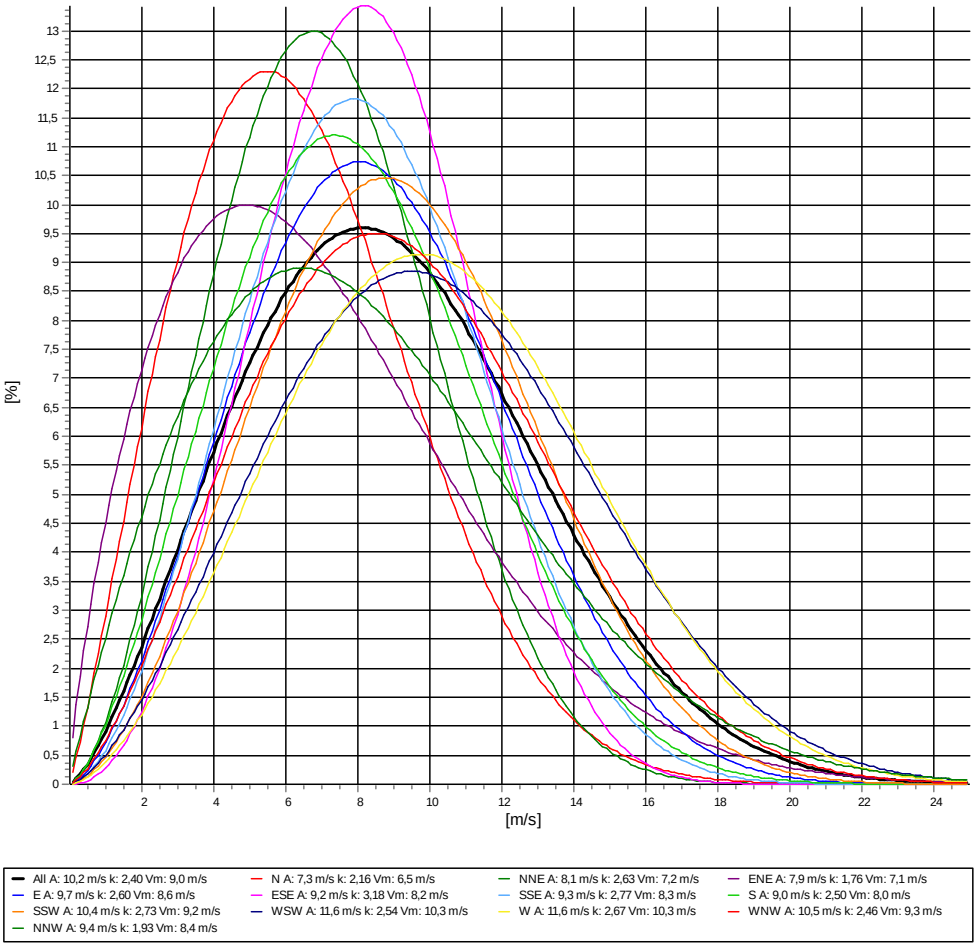
21/08/2023 13.26

Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **60,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,34	2,157	3,33	6,50
1-NNE	8,10	2,631	4,49	7,20
2-ENE	7,95	1,756	4,15	7,08
3-E	9,70	2,596	5,89	8,61
4-ESE	9,20	3,178	8,13	8,24
5-SSE	9,28	2,768	6,39	8,26
6-S	9,02	2,501	6,71	8,01
7-SSW	10,37	2,731	8,62	9,23
8-WSW	11,57	2,543	13,15	10,27
9-W	11,64	2,669	21,16	10,35
10-WNW	10,51	2,465	12,16	9,32
11-NNW	9,42	1,931	5,81	8,36
Mean	**10,19**	**2,399**	**100,00**	**9,03**



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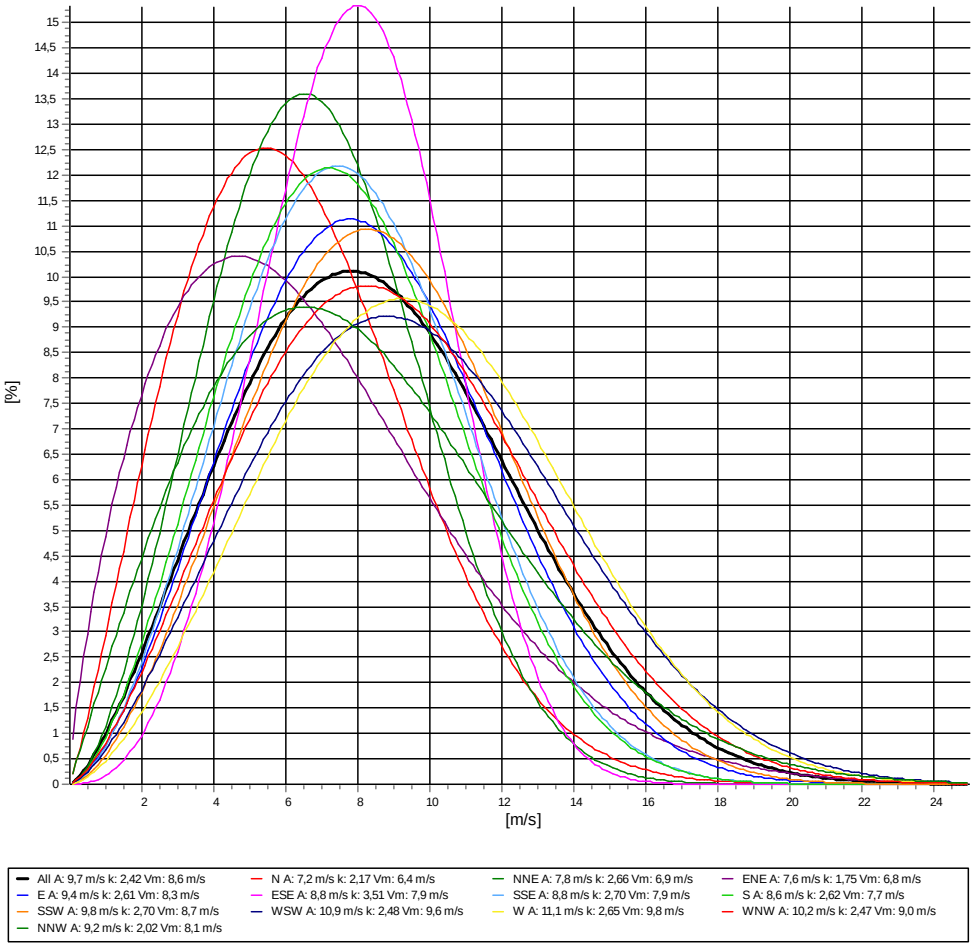
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **40,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,24	2,171	3,35	6,41
1-NNE	7,80	2,657	4,55	6,93
2-ENE	7,62	1,748	4,06	6,79
3-E	9,38	2,606	6,02	8,33
4-ESE	8,81	3,512	8,28	7,93
5-SSE	8,84	2,704	6,31	7,86
6-S	8,64	2,621	6,83	7,68
7-SSW	9,83	2,699	8,80	8,74
8-WSW	10,87	2,476	13,46	9,64
9-W	11,07	2,651	21,03	9,84
10-WNW	10,17	2,467	11,80	9,02
11-NNW	9,18	2,020	5,52	8,13
Mean	**9,74**	**2,420**	**100,00**	**8,63**



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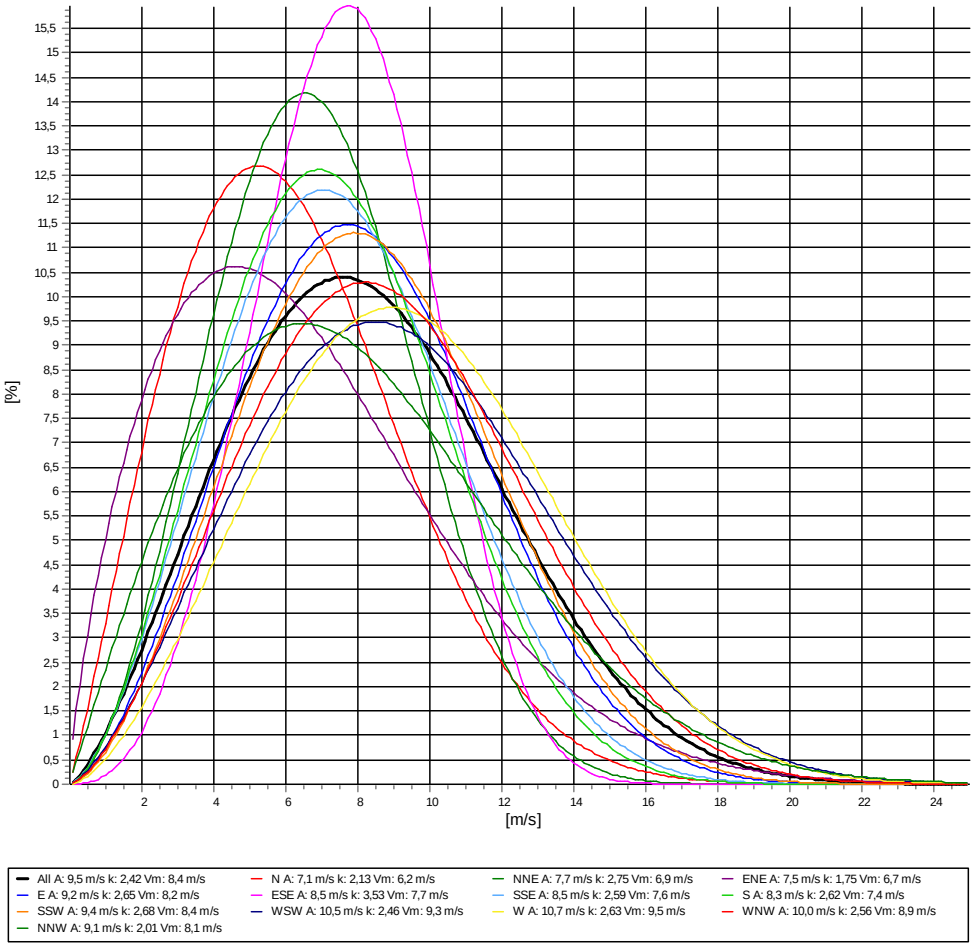
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 complete 1y; Buoy 3 WS199; Complete period **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **30,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,05	2,126	3,32	6,25
1-NNE	7,70	2,749	4,59	6,85
2-ENE	7,48	1,753	4,06	6,66
3-E	9,22	2,648	6,04	8,20
4-ESE	8,51	3,532	8,30	7,66
5-SSE	8,52	2,590	6,31	7,57
6-S	8,33	2,622	6,84	7,40
7-SSW	9,44	2,676	8,82	8,39
8-WSW	10,50	2,456	13,72	9,31
9-W	10,75	2,626	20,96	9,55
10-WNW	9,99	2,556	11,56	8,87
11-NNW	9,11	2,011	5,48	8,07
Mean	**9,47**	**2,420**	**100,00**	**8,39**



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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

270,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,31	6,70	6,92	8,58	8,82	8,22	9,43	8,81	10,33	11,56	12,72	10,99	9,84
0		0,49	2	0	0	0	1	0	0	0	0	0	1	0	0
1	0,50	1,49	609	47	64	51	43	50	61	42	70	51	39	50	41
2	1,50	2,49	1301	113	125	114	100	73	59	106	119	115	151	119	107
3	2,50	3,49	2379	177	182	257	226	168	173	162	160	238	298	190	148
4	3,50	4,49	2738	191	186	185	255	200	215	226	203	219	350	308	200
5	4,50	5,49	3213	245	197	288	273	128	206	255	359	294	388	382	198
6	5,50	6,49	3424	266	144	281	254	236	262	287	275	322	401	421	275
7	6,50	7,49	3718	359	138	267	186	301	210	210	255	334	482	575	401
8	7,50	8,49	3747	213	95	233	252	298	253	184	280	352	558	648	381
9	8,50	9,49	3840	161	109	145	255	386	282	225	303	315	643	716	300
10	9,50	10,49	3463	111	101	107	284	291	262	216	231	288	694	627	251
11	10,50	11,49	3553	63	103	146	234	249	350	196	182	386	848	552	244
12	11,50	12,49	3390	38	67	191	224	218	288	198	207	392	756	606	205
13	12,50	13,49	3137	52	67	169	201	138	219	203	203	419	724	574	168
14	13,50	14,49	2879	66	47	159	182	64	224	158	227	419	701	468	164
15	14,50	15,49	2174	18	30	95	148	52	171	127	217	288	585	314	129
16	15,50	16,49	1530	5	25	55	76	25	104	61	136	222	476	252	93
17	16,50	17,49	1163	1	7	28	26	4	60	51	67	192	445	171	111
18	17,50	18,49	1172	1	4	71	34	1	15	39	72	187	477	152	119
19	18,50	19,49	945	0	1	52	17	0	26	7	106	150	418	88	80
20	19,50	20,49	794	0	1	28	18	0	27	1	128	112	326	86	67
21	20,50	21,49	518	0	0	12	11	0	9	9	70	81	212	70	44
22	21,50	22,49	386	0	0	2	1	0	0	4	39	74	170	67	29
23	22,50	23,49	288	0	0	0	0	0	0	2	22	65	118	76	5
24	23,50	24,49	249	0	0	0	0	0	0	2	10	49	103	80	5
25	24,50	25,49	218	0	0	0	0	0	0	2	10	32	117	54	3
26	25,50	26,49	147	0	0	0	0	0	0	1	9	26	79	29	3
27	26,50	27,49	96	0	0	0	0	0	0	0	12	19	42	22	1
28	27,50	28,49	86	0	0	0	0	0	0	1	14	19	23	27	2
29	28,50	29,49	68	0	0	0	0	0	0	1	3	18	23	23	0
30	29,50	30,49	66	0	0	0	0	0	0	0	2	12	28	24	0
31	30,50	31,49	59	0	0	0	0	0	0	0	0	13	32	14	0
32	31,50	32,49	44	0	0	0	0	0	0	0	0	6	32	6	0
33	32,50	33,49	28	0	0	0	0	0	0	0	0	2	26	0	0
34	33,50	34,49	14	0	0	0	0	0	0	0	0	1	13	0	0
35	34,50	35,49	5	0	0	0	0	0	0	0	0	1	4	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

240,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,22	6,64	7,01	8,55	8,85	8,17	9,41	8,73	10,49	11,42	12,56	10,82	9,77
0		0,49	4	1	0	0	1	1	0	0	0	0	1	0	0
1	0,50	1,49	600	40	68	50	36	60	58	49	56	57	35	45	46
2	1,50	2,49	1329	127	121	122	95	82	72	110	110	138	137	115	100
3	2,50	3,49	2391	181	176	254	208	182	183	179	144	245	299	195	145
4	3,50	4,49	2743	174	183	164	267	194	200	229	209	236	365	314	208
5	4,50	5,49	3246	240	202	298	285	125	209	269	368	287	385	390	188
6	5,50	6,49	3435	276	147	264	245	225	281	296	287	330	400	417	267
7	6,50	7,49	3749	326	139	283	202	288	188	230	237	321	503	601	431
8	7,50	8,49	3802	229	104	215	241	326	253	182	300	320	612	666	354
9	8,50	9,49	3846	165	112	144	271	373	286	253	278	317	611	732	304
10	9,50	10,49	3554	104	113	119	300	282	254	223	235	332	725	609	258
11	10,50	11,49	3606	51	113	141	225	269	365	202	176	399	874	538	253
12	11,50	12,49	3443	31	70	178	230	221	291	236	192	449	767	593	185
13	12,50	13,49	3091	43	62	183	212	127	211	180	226	403	714	572	158
14	13,50	14,49	2859	65	46	149	177	65	237	169	258	408	679	450	156
15	14,50	15,49	2138	21	38	98	135	50	185	111	224	283	574	290	129
16	15,50	16,49	1508	1	20	48	80	28	100	67	124	230	471	244	95
17	16,50	17,49	1184	1	11	29	32	4	49	35	87	215	434	170	117
18	17,50	18,49	1182	2	3	67	26	0	21	40	95	196	467	152	113
19	18,50	19,49	944	0	3	57	22	0	28	13	116	138	412	81	74
20	19,50	20,49	723	0	2	23	23	0	19	10	119	108	284	76	59
21	20,50	21,49	512	0	0	10	8	0	6	5	54	87	223	67	52
22	21,50	22,49	340	0	0	0	0	0	0	4	42	65	141	75	13
23	22,50	23,49	268	0	0	0	0	0	0	1	23	60	108	70	6
24	23,50	24,49	260	0	0	0	0	0	0	0	16	44	119	76	5
25	24,50	25,49	186	1	0	0	0	0	0	4	6	36	94	40	5
26	25,50	26,49	121	0	0	0	0	0	0	2	15	17	66	19	2
27	26,50	27,49	104	0	0	0	0	0	0	0	13	24	41	24	2
28	27,50	28,49	75	0	0	0	0	0	0	1	10	15	26	22	1
29	28,50	29,49	79	0	0	0	0	0	0	0	7	13	32	27	0
30	29,50	30,49	59	0	0	0	0	0	0	0	0	20	24	14	1
31	30,50	31,49	44	0	0	0	0	0	0	0	0	3	33	8	0
32	31,50	32,49	35	0	0	0	0	0	0	0	0	1	30	4	0
33	32,50	33,49	16	0	0	0	0	0	0	0	0	0	16	0	0
34	33,50	34,49	4	0	0	0	0	0	0	0	0	1	2	1	0
35	34,50	35,49	3	0	0	0	0	0	0	0	0	1	2	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

200,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,09	6,65	6,94	8,52	8,82	8,27	9,35	8,68	10,55	11,24	12,36	10,48	9,61
0		0,49	5	0	0	0	0	0	0	1	1	0	2	0	1
1	0,50	1,49	565	43	66	40	39	45	55	45	60	53	33	49	37
2	1,50	2,49	1365	98	138	121	104	82	87	101	115	142	146	116	115
3	2,50	3,49	2384	189	170	234	174	213	178	183	146	260	288	193	156
4	3,50	4,49	2765	164	177	180	294	207	195	210	203	238	357	348	192
5	4,50	5,49	3312	231	215	303	275	135	218	295	359	298	362	407	214
6	5,50	6,49	3423	282	143	248	241	224	269	310	299	322	409	433	243
7	6,50	7,49	3767	319	143	295	202	277	210	228	221	328	510	626	408
8	7,50	8,49	3996	229	114	236	263	355	247	221	285	327	639	715	365
9	8,50	9,49	3902	168	114	129	291	358	290	268	268	316	680	713	307
10	9,50	10,49	3594	89	123	119	306	288	253	224	251	335	769	608	229
11	10,50	11,49	3679	64	97	157	240	299	343	237	162	443	848	531	258
12	11,50	12,49	3547	30	68	214	223	232	292	225	230	460	787	603	183
13	12,50	13,49	3177	49	72	154	223	131	255	157	259	398	798	516	165
14	13,50	14,49	2790	58	51	150	171	65	244	172	268	408	653	395	155
15	14,50	15,49	2050	8	26	81	140	67	178	104	238	269	543	268	128
16	15,50	16,49	1420	2	19	31	55	33	99	39	141	235	454	222	90
17	16,50	17,49	1252	3	8	51	31	2	35	34	108	254	456	154	116
18	17,50	18,49	1173	1	2	58	27	2	30	40	120	188	488	125	92
19	18,50	19,49	934	0	5	58	27	3	24	25	147	125	374	72	74
20	19,50	20,49	628	0	1	16	17	4	10	9	77	93	264	76	61
21	20,50	21,49	446	0	0	6	7	0	0	7	49	75	186	85	31
22	21,50	22,49	292	0	0	1	0	0	0	1	32	63	129	59	7
23	22,50	23,49	259	0	0	0	0	0	0	3	22	61	106	59	8
24	23,50	24,49	213	0	0	0	0	0	0	1	10	34	117	47	4
25	24,50	25,49	153	0	0	0	0	0	0	4	11	30	82	26	0
26	25,50	26,49	117	0	0	0	0	0	0	2	15	20	49	28	3
27	26,50	27,49	90	0	0	0	0	0	0	2	11	23	30	23	1
28	27,50	28,49	63	0	0	0	0	0	0	0	7	11	27	17	1
29	28,50	29,49	71	0	0	0	0	0	0	0	6	12	31	21	1
30	29,50	30,49	52	0	0	0	0	0	0	0	1	3	36	12	0
31	30,50	31,49	28	0	0	0	0	0	0	0	0	2	25	1	0
32	31,50	32,49	17	0	0	0	0	0	0	0	0	1	16	0	0
33	32,50	33,49	3	0	0	0	0	0	0	0	0	1	2	0	0
34	33,50	34,49	3	0	0	0	0	0	0	0	0	0	3	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

Project:
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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

180,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,01	6,60	6,97	8,46	8,78	8,35	9,26	8,71	10,53	11,16	12,18	10,32	9,43
0		0,49	5	1	0	0	0	0	0	0	1	0	0	2	1
1	0,50	1,49	563	52	57	49	42	44	57	42	57	45	31	51	36
2	1,50	2,49	1394	106	133	122	100	90	80	116	108	157	144	119	119
3	2,50	3,49	2364	180	191	232	185	210	187	167	155	234	276	192	155
4	3,50	4,49	2805	175	181	173	264	202	201	192	227	251	367	371	201
5	4,50	5,49	3353	224	224	313	295	126	234	298	350	301	375	392	221
6	5,50	6,49	3374	273	141	254	235	217	263	319	298	318	407	410	239
7	6,50	7,49	3916	297	145	298	222	284	230	228	218	326	583	662	423
8	7,50	8,49	4027	252	120	222	244	349	267	230	299	350	639	689	366
9	8,50	9,49	3937	151	120	155	303	367	275	281	258	313	728	694	292
10	9,50	10,49	3618	86	134	100	318	281	251	223	250	364	799	579	233
11	10,50	11,49	3770	62	86	182	249	312	352	220	176	451	884	552	244
12	11,50	12,49	3502	28	72	210	206	241	287	221	237	453	815	550	182
13	12,50	13,49	3257	67	82	147	244	148	249	159	281	428	794	499	159
14	13,50	14,49	2768	47	50	140	158	72	251	169	318	383	654	376	150
15	14,50	15,49	2005	4	29	82	132	60	210	94	214	253	553	242	132
16	15,50	16,49	1421	3	16	40	47	31	72	37	160	267	444	209	95
17	16,50	17,49	1324	2	7	57	34	7	33	39	120	261	508	158	98
18	17,50	18,49	1129	1	7	59	24	5	28	52	146	175	428	112	92
19	18,50	19,49	858	1	2	49	27	10	14	25	112	123	354	68	73
20	19,50	20,49	603	0	1	16	16	0	7	12	75	96	247	80	53
21	20,50	21,49	401	0	0	2	4	0	1	2	47	74	178	72	21
22	21,50	22,49	288	0	0	0	0	0	0	2	37	63	132	46	8
23	22,50	23,49	228	0	0	0	0	0	0	4	21	40	98	62	3
24	23,50	24,49	170	0	0	0	0	0	0	5	8	35	91	31	0
25	24,50	25,49	149	0	0	0	0	0	0	2	12	24	79	32	0
26	25,50	26,49	108	0	0	0	0	0	0	3	7	27	42	27	2
27	26,50	27,49	81	0	0	0	0	0	0	0	16	15	27	22	1
28	27,50	28,49	68	0	0	0	0	0	0	0	6	10	35	17	0
29	28,50	29,49	65	0	0	0	0	0	0	0	1	9	40	15	0
30	29,50	30,49	26	0	0	0	0	0	0	0	0	2	19	5	0
31	30,50	31,49	25	0	0	0	0	0	0	0	0	0	25	0	0
32	31,50	32,49	7	0	0	0	0	0	0	0	0	0	7	0	0
33	32,50	33,49	4	0	0	0	0	0	0	0	0	2	2	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

150,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,85	6,54	6,98	8,31	8,73	8,35	9,14	8,79	10,41	10,88	11,95	10,03	9,29
0		0,49	4	0	0	0	0	0	0	2	0	0	0	1	1
1	0,50	1,49	554	57	53	47	36	39	49	43	57	51	48	43	31
2	1,50	2,49	1451	103	135	134	103	103	98	91	117	150	158	129	130
3	2,50	3,49	2407	162	205	226	210	229	194	154	168	239	269	211	140
4	3,50	4,49	2781	178	182	209	232	194	219	191	227	234	326	364	225
5	4,50	5,49	3371	219	202	321	288	142	234	309	353	298	379	413	213
6	5,50	6,49	3424	251	147	263	227	234	253	309	311	332	417	447	233
7	6,50	7,49	3978	308	140	313	213	254	251	234	244	326	632	636	427
8	7,50	8,49	4195	245	120	238	239	377	309	252	296	358	688	726	347
9	8,50	9,49	4061	143	147	159	326	372	284	276	292	315	833	648	266
10	9,50	10,49	3675	67	125	117	335	310	273	231	222	391	809	534	261
11	10,50	11,49	3875	58	92	207	257	291	339	211	213	500	876	578	253
12	11,50	12,49	3615	41	97	185	222	227	314	201	273	470	891	541	153
13	12,50	13,49	3344	53	69	159	237	176	280	153	379	421	760	487	170
14	13,50	14,49	2681	38	40	121	133	86	283	166	316	357	654	329	158
15	14,50	15,49	1855	3	30	83	120	53	151	97	192	274	513	219	120
16	15,50	16,49	1563	0	12	59	57	29	63	43	183	280	534	195	108
17	16,50	17,49	1252	2	9	53	31	18	25	54	144	222	468	142	84
18	17,50	18,49	1063	3	6	53	21	14	26	61	134	151	406	108	80
19	18,50	19,49	724	1	4	37	21	2	9	19	100	107	289	58	77
20	19,50	20,49	546	0	1	9	13	0	5	12	68	76	261	65	36
21	20,50	21,49	333	0	0	0	1	0	0	2	42	58	164	52	14
22	21,50	22,49	236	0	0	0	0	0	0	6	25	33	103	66	3
23	22,50	23,49	187	1	0	0	0	0	0	6	12	33	100	35	0
24	23,50	24,49	174	0	0	0	0	0	0	3	13	39	97	22	0
25	24,50	25,49	123	0	0	0	0	0	0	1	8	28	61	24	1
26	25,50	26,49	81	0	0	0	0	0	0	0	10	12	39	19	1
27	26,50	27,49	63	0	0	0	0	0	0	0	8	15	26	14	0
28	27,50	28,49	67	0	0	0	0	0	0	0	2	4	41	20	0
29	28,50	29,49	36	0	0	0	0	0	0	0	0	3	30	3	0
30	29,50	30,49	17	0	0	0	0	0	0	0	0	0	16	1	0
31	30,50	31,49	10	0	0	0	0	0	0	0	0	3	7	0	0
32	31,50	32,49	3	0	0	0	0	0	0	0	0	1	2	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

120,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,64	6,44	6,98	8,18	8,62	8,35	8,98	8,81	10,28	10,55	11,60	9,74	9,06
0		0,49	3	0	0	0	0	0	0	0	0	2	1	0	0
1	0,50	1,49	614	70	58	57	33	44	53	41	60	60	52	52	34
2	1,50	2,49	1471	107	145	138	94	103	100	84	126	154	141	133	146
3	2,50	3,49	2435	174	186	221	223	221	196	155	177	233	285	241	123
4	3,50	4,49	2773	166	197	213	230	209	219	187	238	230	312	348	224
5	4,50	5,49	3359	178	187	327	272	162	232	315	337	285	397	412	255
6	5,50	6,49	3632	253	172	274	240	273	257	292	312	348	484	495	232
7	6,50	7,49	3988	282	135	311	219	229	243	263	252	351	672	652	379
8	7,50	8,49	4285	236	136	257	224	379	333	284	305	340	736	708	347
9	8,50	9,49	4266	147	161	171	333	426	326	292	321	359	834	617	279
10	9,50	10,49	3937	58	142	158	362	322	307	243	245	410	854	574	262
11	10,50	11,49	3963	51	105	208	245	293	312	184	253	563	969	552	228
12	11,50	12,49	3724	50	86	179	235	236	318	218	346	522	862	523	149
13	12,50	13,49	3340	40	56	137	198	183	312	141	430	426	738	488	191
14	13,50	14,49	2559	30	45	123	141	92	272	184	286	352	630	276	128
15	14,50	15,49	1989	8	31	102	115	65	109	102	245	286	567	227	132
16	15,50	16,49	1432	0	14	57	44	22	47	65	181	234	530	165	73
17	16,50	17,49	1200	3	7	46	34	28	26	84	136	169	429	153	85
18	17,50	18,49	872	1	5	42	21	7	14	29	138	124	338	74	79
19	18,50	19,49	614	0	4	24	10	0	6	16	90	77	279	53	55
20	19,50	20,49	409	0	0	5	4	0	1	8	53	53	200	58	27
21	20,50	21,49	242	1	0	0	1	0	0	4	20	33	120	54	9
22	21,50	22,49	216	0	0	0	0	0	0	4	20	34	105	53	0
23	22,50	23,49	192	0	0	0	0	0	0	5	15	50	100	22	0
24	23,50	24,49	114	0	0	0	0	0	0	1	5	34	54	19	1
25	24,50	25,49	73	0	0	0	0	0	0	0	7	10	41	15	0
26	25,50	26,49	72	0	0	0	0	0	0	0	10	11	35	15	1
27	26,50	27,49	60	0	0	0	0	0	0	0	5	4	37	14	0
28	27,50	28,49	39	0	0	0	0	0	0	0	2	1	33	3	0
29	28,50	29,49	18	0	0	0	0	0	0	0	0	1	16	1	0
30	29,50	30,49	10	0	0	0	0	0	0	0	0	2	7	1	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	1	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

100,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,46	6,47	6,87	8,09	8,51	8,30	8,87	8,78	10,08	10,34	11,28	9,55	8,85
0		0,49	4	0	0	0	0	0	0	0	0	2	0	2	0
1	0,50	1,49	655	55	69	55	50	47	57	44	59	62	48	53	56
2	1,50	2,49	1513	121	154	130	96	103	96	83	139	144	157	140	150
3	2,50	3,49	2357	150	188	227	204	219	193	156	181	195	277	235	132
4	3,50	4,49	2876	162	196	206	243	226	198	196	263	238	330	374	244
5	4,50	5,49	3345	180	191	343	278	156	231	300	317	285	418	402	244
6	5,50	6,49	3758	242	175	269	230	299	256	298	296	359	504	549	281
7	6,50	7,49	4110	279	147	317	230	233	252	298	298	362	738	625	331
8	7,50	8,49	4379	241	150	257	244	377	336	305	294	371	767	696	341
9	8,50	9,49	4455	132	184	172	375	439	356	327	338	390	850	610	282
10	9,50	10,49	4089	58	130	193	381	330	311	223	251	437	926	602	247
11	10,50	11,49	4113	68	95	220	220	302	316	183	343	620	1001	521	224
12	11,50	12,49	3838	37	84	158	211	268	322	243	390	571	869	525	160
13	12,50	13,49	3285	46	54	134	213	177	329	215	407	407	724	422	157
14	13,50	14,49	2531	24	47	136	155	86	218	172	314	348	635	259	137
15	14,50	15,49	1911	4	30	101	97	59	84	81	244	268	586	237	120
16	15,50	16,49	1360	4	12	44	52	25	50	102	154	190	492	168	67
17	16,50	17,49	971	2	9	31	17	20	14	42	142	137	373	99	85
18	17,50	18,49	791	0	2	39	15	2	8	33	121	95	326	70	80
19	18,50	19,49	521	0	2	17	9	0	1	12	63	61	251	53	52
20	19,50	20,49	321	0	0	5	4	0	0	6	31	44	158	54	19
21	20,50	21,49	220	1	0	0	0	0	0	4	16	27	117	50	5
22	21,50	22,49	190	0	0	0	0	0	0	5	16	44	89	36	0
23	22,50	23,49	142	0	0	0	0	0	0	3	9	40	72	18	0
24	23,50	24,49	80	0	0	0	0	0	0	0	6	15	41	18	0
25	24,50	25,49	73	0	0	0	0	0	0	0	8	11	35	19	0
26	25,50	26,49	74	0	0	0	0	0	0	0	9	10	40	15	0
27	26,50	27,49	37	0	0	0	0	0	0	0	1	2	26	8	0
28	27,50	28,49	22	0	0	0	0	0	0	0	0	2	17	3	0
29	28,50	29,49	8	0	0	0	0	0	0	0	0	1	6	1	0
30	29,50	30,49	2	0	0	0	0	0	0	0	0	1	1	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	1	0	0	0	0	0	0	0	0	1	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

90,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,35	6,37	6,82	8,06	8,40	8,31	8,79	8,79	9,94	10,19	11,06	9,44	8,74
0		0,49	3	1	1	0	0	0	0	0	0	0	0	0	1
1	0,50	1,49	698	62	72	65	56	49	55	40	70	61	64	52	52
2	1,50	2,49	1517	118	145	132	97	98	94	87	131	147	157	151	160
3	2,50	3,49	2367	160	199	227	198	213	190	150	185	189	286	222	148
4	3,50	4,49	2973	168	203	208	267	216	205	190	273	238	342	382	281
5	4,50	5,49	3404	161	185	327	286	173	242	311	335	292	440	416	236
6	5,50	6,49	3864	237	178	284	259	310	238	302	295	367	557	568	269
7	6,50	7,49	4198	285	137	318	228	224	266	316	313	361	777	647	326
8	7,50	8,49	4521	252	180	245	271	410	333	322	302	391	827	651	337
9	8,50	9,49	4581	128	178	191	400	455	368	336	358	414	886	600	267
10	9,50	10,49	4281	56	137	221	418	342	308	216	260	494	977	598	254
11	10,50	11,49	4173	64	82	203	215	296	300	218	384	645	1017	526	223
12	11,50	12,49	3900	35	84	178	208	270	348	280	422	566	848	502	159
13	12,50	13,49	3296	37	57	128	222	183	315	214	436	388	729	418	169
14	13,50	14,49	2467	18	47	150	143	85	206	148	328	319	651	238	134
15	14,50	15,49	1861	4	27	80	89	57	73	108	231	261	600	211	120
16	15,50	16,49	1250	3	13	37	46	32	33	86	134	180	444	183	59
17	16,50	17,49	935	2	6	32	15	12	19	45	132	134	364	92	82
18	17,50	18,49	695	1	3	42	9	0	2	27	95	82	296	59	79
19	18,50	19,49	491	0	0	17	11	0	0	8	64	44	240	58	49
20	19,50	20,49	309	0	0	2	3	0	0	9	25	44	145	63	18
21	20,50	21,49	220	1	0	0	0	0	0	4	18	28	123	43	3
22	21,50	22,49	157	0	0	0	0	0	0	3	11	45	74	24	0
23	22,50	23,49	114	0	0	0	0	0	0	0	6	33	52	23	0
24	23,50	24,49	72	0	0	0	0	0	0	0	8	13	38	13	0
25	24,50	25,49	72	0	0	0	0	0	0	0	12	13	31	16	0
26	25,50	26,49	63	0	0	0	0	0	0	0	6	3	40	14	0
27	26,50	27,49	33	0	0	0	0	0	0	0	0	2	25	6	0
28	27,50	28,49	14	0	0	0	0	0	0	0	0	0	13	1	0
29	28,50	29,49	5	0	0	0	0	0	0	0	0	1	3	1	0
30	29,50	30,49	1	0	0	0	0	0	0	0	0	1	0	0	0
31	30,50	31,49	1	0	0	0	0	0	0	0	0	1	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

60,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,95	6,35	6,57	7,74	8,10	8,22	8,37	8,40	9,43	9,64	10,46	9,12	8,51
0		0,49	4	0	0	1	0	0	0	0	0	1	1	0	1
1	0,50	1,49	771	57	85	82	59	64	51	56	59	80	60	68	50
2	1,50	2,49	1596	116	157	120	112	98	111	123	123	167	172	127	170
3	2,50	3,49	2411	148	211	243	213	206	165	161	179	196	285	245	159
4	3,50	4,49	3031	173	173	218	280	191	226	187	266	245	401	404	267
5	4,50	5,49	3703	181	205	314	320	168	258	342	368	322	533	460	232
6	5,50	6,49	4147	221	199	285	302	309	247	372	306	386	677	579	264
7	6,50	7,49	4343	271	181	319	237	259	285	339	325	399	806	620	302
8	7,50	8,49	4991	250	211	293	340	487	399	350	382	451	910	599	319
9	8,50	9,49	4927	124	155	232	494	415	362	354	350	500	1025	669	247
10	9,50	10,49	4682	61	131	240	349	372	347	231	417	614	1074	593	253
11	10,50	11,49	4414	60	72	170	215	380	292	340	504	673	995	496	217
12	11,50	12,49	3888	40	74	188	254	298	315	260	473	489	896	457	144
13	12,50	13,49	2948	33	67	129	190	135	239	189	394	360	728	330	154
14	13,50	14,49	2157	10	42	108	129	79	138	164	244	280	583	251	129
15	14,50	15,49	1451	5	13	48	62	43	38	116	157	201	498	192	78
16	15,50	16,49	950	3	1	23	18	7	17	45	119	136	389	124	68
17	16,50	17,49	734	4	4	43	9	0	3	16	74	94	318	80	89
18	17,50	18,49	528	0	2	24	15	0	0	9	44	57	245	63	69
19	18,50	19,49	331	0	0	5	7	0	0	5	30	36	162	62	24
20	19,50	20,49	195	0	0	1	0	0	0	1	9	29	108	38	9
21	20,50	21,49	145	0	0	0	0	0	0	0	6	39	68	31	1
22	21,50	22,49	98	0	0	0	0	0	0	0	4	25	42	27	0
23	22,50	23,49	78	0	0	0	0	0	0	0	9	16	40	13	0
24	23,50	24,49	85	0	0	0	0	0	0	0	13	9	43	20	0
25	24,50	25,49	48	0	0	0	0	0	0	0	6	7	27	8	0
26	25,50	26,49	23	0	0	0	0	0	0	0	0	2	17	4	0
27	26,50	27,49	12	0	0	0	0	0	0	0	0	0	12	0	0
28	27,50	28,49	2	0	0	0	0	0	0	0	0	0	1	1	0
29	28,50	29,49	3	0	0	0	0	0	0	0	0	2	1	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

40,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,56	6,18	6,42	7,44	7,74	7,86	7,94	7,99	8,97	9,15	9,92	8,90	8,28
0		0,49	1	0	0	0	0	0	0	0	0	0	0	0	1
1	0,50	1,49	788	54	74	88	75	68	58	54	63	74	57	71	52
2	1,50	2,49	1711	125	162	140	139	106	120	140	139	171	168	127	174
3	2,50	3,49	2621	164	210	239	215	225	156	185	198	221	354	264	190
4	3,50	4,49	3095	168	171	233	295	203	223	197	267	271	441	389	237
5	4,50	5,49	4077	190	207	316	340	176	287	413	363	374	664	503	244
6	5,50	6,49	4411	238	208	284	331	323	295	411	323	466	757	511	264
7	6,50	7,49	4728	268	224	357	272	337	341	353	396	433	855	605	287
8	7,50	8,49	5375	227	222	308	438	516	419	310	405	540	1031	610	349
9	8,50	9,49	5392	124	150	256	512	550	349	389	472	576	1127	628	259
10	9,50	10,49	4920	40	114	214	339	463	327	366	583	622	1070	553	229
11	10,50	11,49	4293	58	64	173	220	346	262	300	521	641	1004	513	191
12	11,50	12,49	3370	29	79	186	230	164	251	201	397	455	810	426	142
13	12,50	13,49	2528	37	56	92	140	91	183	221	342	311	597	305	153
14	13,50	14,49	1735	9	19	68	91	52	86	116	185	196	548	252	113
15	14,50	15,49	1147	3	5	32	41	22	18	62	120	170	444	151	79
16	15,50	16,49	790	2	5	29	19	1	9	19	58	121	350	93	84
17	16,50	17,49	587	1	1	31	10	0	1	11	40	57	287	74	74
18	17,50	18,49	363	0	2	18	10	0	0	4	35	44	157	55	38
19	18,50	19,49	234	1	0	4	1	0	0	0	5	26	132	53	12
20	19,50	20,49	138	0	0	0	0	0	0	0	5	26	69	33	5
21	20,50	21,49	116	0	0	0	0	0	0	0	9	37	42	28	0
22	21,50	22,49	88	0	0	0	0	0	0	0	12	21	36	19	0
23	22,50	23,49	71	0	0	0	0	0	0	0	12	8	39	12	0
24	23,50	24,49	51	0	0	0	0	0	0	0	8	1	32	10	0
25	24,50	25,49	20	0	0	0	0	0	0	0	0	1	18	1	0
26	25,50	26,49	10	0	0	0	0	0	0	0	0	2	8	0	0
27	26,50	27,49	2	0	0	0	0	0	0	0	0	1	1	0	0
28	27,50	28,49	2	0	0	0	0	0	0	0	0	1	1	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.29

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)

Frequency distribution (TAB file data)

30,00m - Subst

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,32	6,04	6,32	7,24	7,59	7,54	7,69	7,69	8,67	8,84	9,63	8,71	8,25
0		0,49	1	1	0	0	0	0	0	0	0	0	0	0	0
1	0,50	1,49	820	53	77	93	71	65	64	71	60	79	68	73	46
2	1,50	2,49	1780	149	177	151	133	119	120	134	146	183	172	129	167
3	2,50	3,49	2779	175	203	236	225	230	175	196	204	239	413	295	188
4	3,50	4,49	3305	174	180	267	310	204	243	248	292	312	451	391	233
5	4,50	5,49	4297	195	200	324	364	234	293	444	386	413	681	511	252
6	5,50	6,49	4642	242	217	295	307	334	342	430	370	483	843	528	251
7	6,50	7,49	4974	281	242	369	329	389	375	300	433	499	907	576	274
8	7,50	8,49	5687	217	211	324	498	626	407	352	434	573	1066	608	371
9	8,50	9,49	5502	107	138	247	490	557	376	513	534	567	1120	625	228
10	9,50	10,49	4882	48	121	231	354	430	290	282	602	640	1109	529	246
11	10,50	11,49	3941	45	69	173	181	209	217	296	480	632	968	481	190
12	11,50	12,49	3151	39	77	147	215	122	235	198	416	405	731	424	142
13	12,50	13,49	2228	36	42	80	124	82	153	164	275	249	581	290	152
14	13,50	14,49	1578	8	11	58	72	42	73	107	129	197	550	231	100
15	14,50	15,49	979	3	8	32	35	10	24	29	77	166	385	138	72
16	15,50	16,49	731	2	4	44	10	0	3	12	60	90	343	81	82
17	16,50	17,49	515	0	2	24	18	0	0	8	49	47	227	62	78
18	17,50	18,49	286	0	1	6	5	0	0	2	12	35	145	50	30
19	18,50	19,49	188	0	0	1	1	0	0	0	9	25	96	42	14
20	19,50	20,49	115	0	0	0	0	0	0	0	4	28	51	30	2
21	20,50	21,49	102	0	0	0	0	0	0	0	12	30	36	24	0
22	21,50	22,49	85	0	0	0	0	0	0	0	13	15	44	13	0
23	22,50	23,49	63	0	0	0	0	0	0	0	9	3	37	14	0
24	23,50	24,49	28	0	0	0	0	0	0	0	3	2	22	1	0
25	24,50	25,49	10	0	0	0	0	0	0	0	0	2	8	0	0
26	25,50	26,49	1	0	0	0	0	0	0	0	0	0	1	0	0
27	26,50	27,49	2	0	0	0	0	0	0	0	0	1	1	0	0
28	27,50	28,49	2	0	0	0	0	0	0	0	0	2	0	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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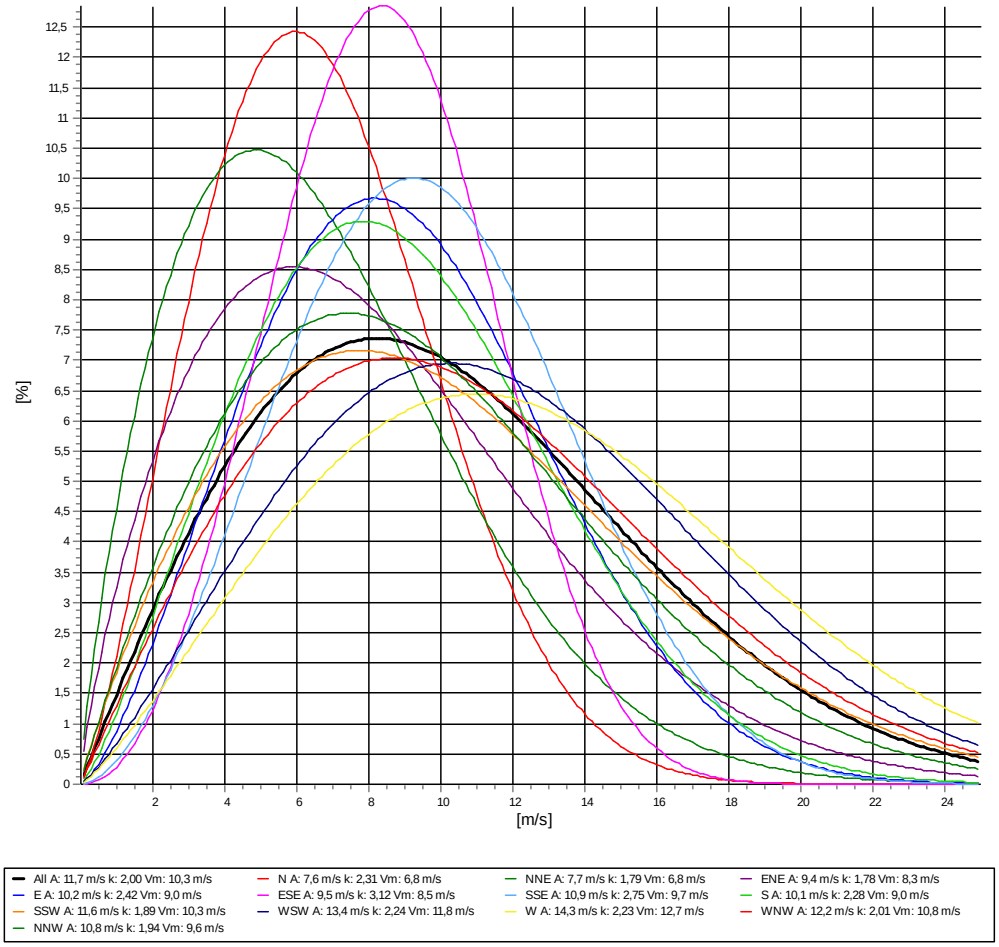
Calculated:
21/08/2023 13.29

Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **270,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,63	2,306	4,13	6,76
1-NNE	7,67	1,793	3,29	6,82
2-ENE	9,37	1,784	5,71	8,34
3-E	10,18	2,423	6,42	9,03
4-ESE	9,46	3,120	5,60	8,46
5-SSE	10,90	2,748	6,76	9,70
6-S	10,12	2,281	5,79	8,96
7-SSW	11,55	1,888	7,76	10,25
8-WSW	13,37	2,242	11,11	11,84
9-W	14,34	2,226	20,96	12,70
10-WNW	12,24	2,013	15,14	10,85
11-NNW	10,80	1,936	7,34	9,58
Mean	**11,65**	**1,998**	**100,00**	**10,33**



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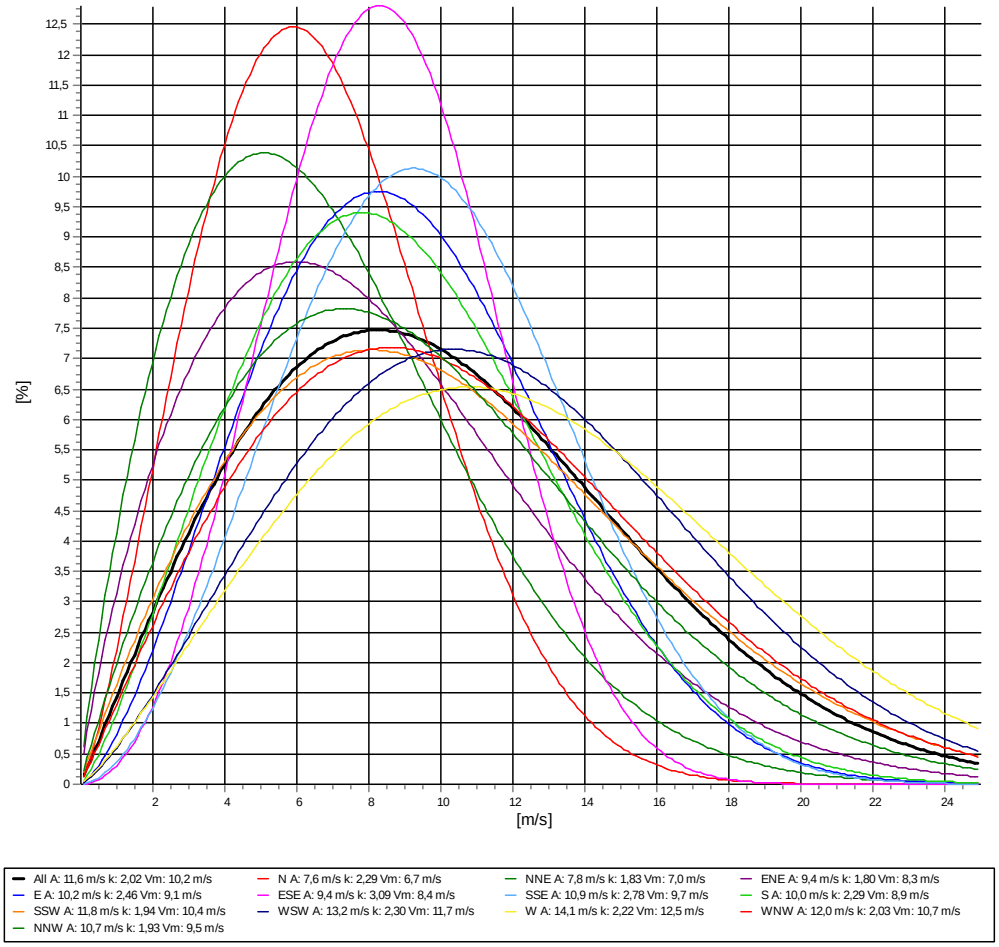
Calculated:
21/08/2023 13.29

Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **240,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,58	2,291	4,04	6,71
1-NNE	7,83	1,832	3,37	6,95
2-ENE	9,37	1,802	5,63	8,33
3-E	10,22	2,459	6,45	9,07
4-ESE	9,43	3,094	5,64	8,43
5-SSE	10,88	2,782	6,79	9,68
6-S	10,03	2,288	6,02	8,89
7-SSW	11,76	1,935	7,82	10,43
8-WSW	13,25	2,303	11,26	11,73
9-W	14,11	2,221	20,80	12,50
10-WNW	12,04	2,026	14,95	10,67
11-NNW	10,72	1,930	7,24	9,50
Mean	**11,56**	**2,023**	**100,00**	**10,25**



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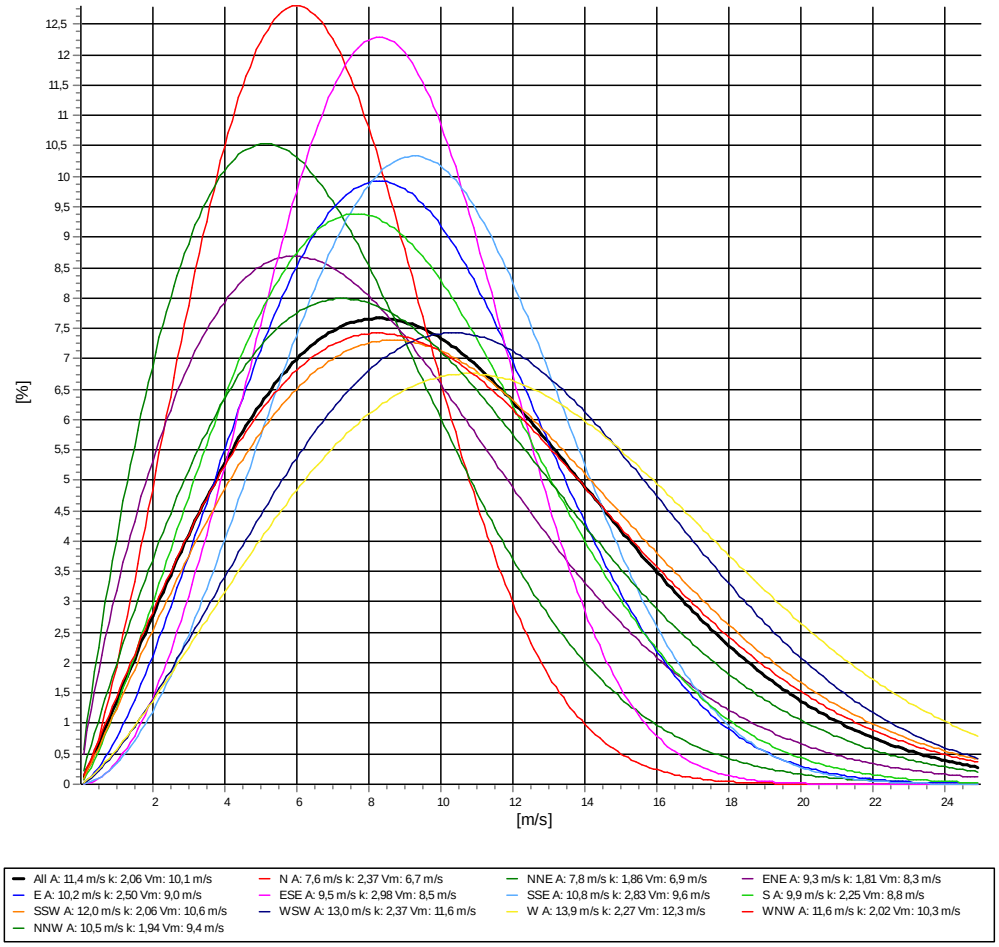
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **200,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,57	2,372	3,93	6,71
1-NNE	7,78	1,858	3,40	6,91
2-ENE	9,28	1,806	5,59	8,25
3-E	10,18	2,501	6,50	9,03
4-ESE	9,52	2,984	5,86	8,50
5-SSE	10,81	2,826	6,81	9,63
6-S	9,94	2,254	6,11	8,80
7-SSW	11,97	2,059	8,00	10,61
8-WSW	13,03	2,367	11,31	11,55
9-W	13,90	2,275	20,76	12,32
10-WNW	11,62	2,015	14,65	10,30
11-NNW	10,55	1,945	7,07	9,35
Mean	**11,42**	**2,063**	**100,00**	**10,12**



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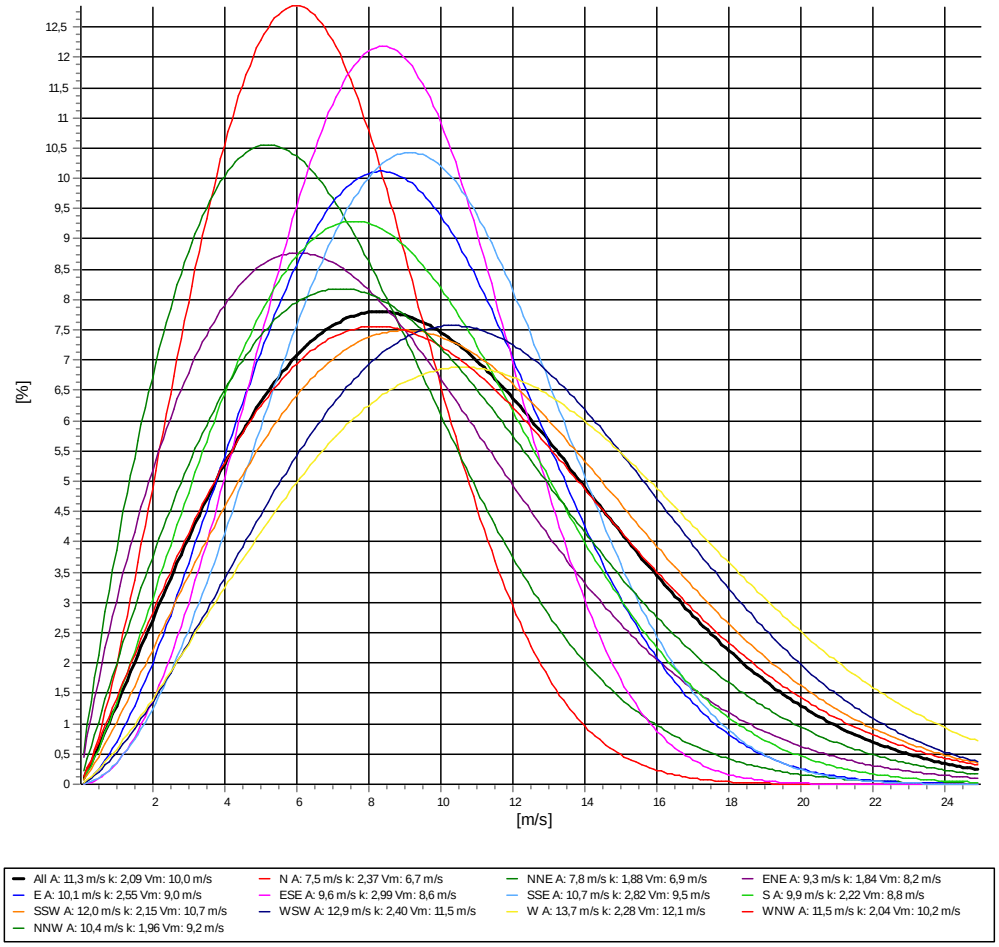
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **180,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,54	2,372	3,90	6,68
1-NNE	7,82	1,879	3,48	6,94
2-ENE	9,28	1,836	5,62	8,24
3-E	10,15	2,552	6,49	9,01
4-ESE	9,62	2,989	5,92	8,59
5-SSE	10,69	2,821	6,88	9,52
6-S	9,94	2,225	6,09	8,80
7-SSW	12,04	2,153	8,17	10,66
8-WSW	12,92	2,400	11,33	11,45
9-W	13,68	2,283	20,93	12,12
10-WNW	11,48	2,036	14,21	10,17
11-NNW	10,36	1,962	6,97	9,18
Mean	**11,34**	**2,093**	**100,00**	**10,04**



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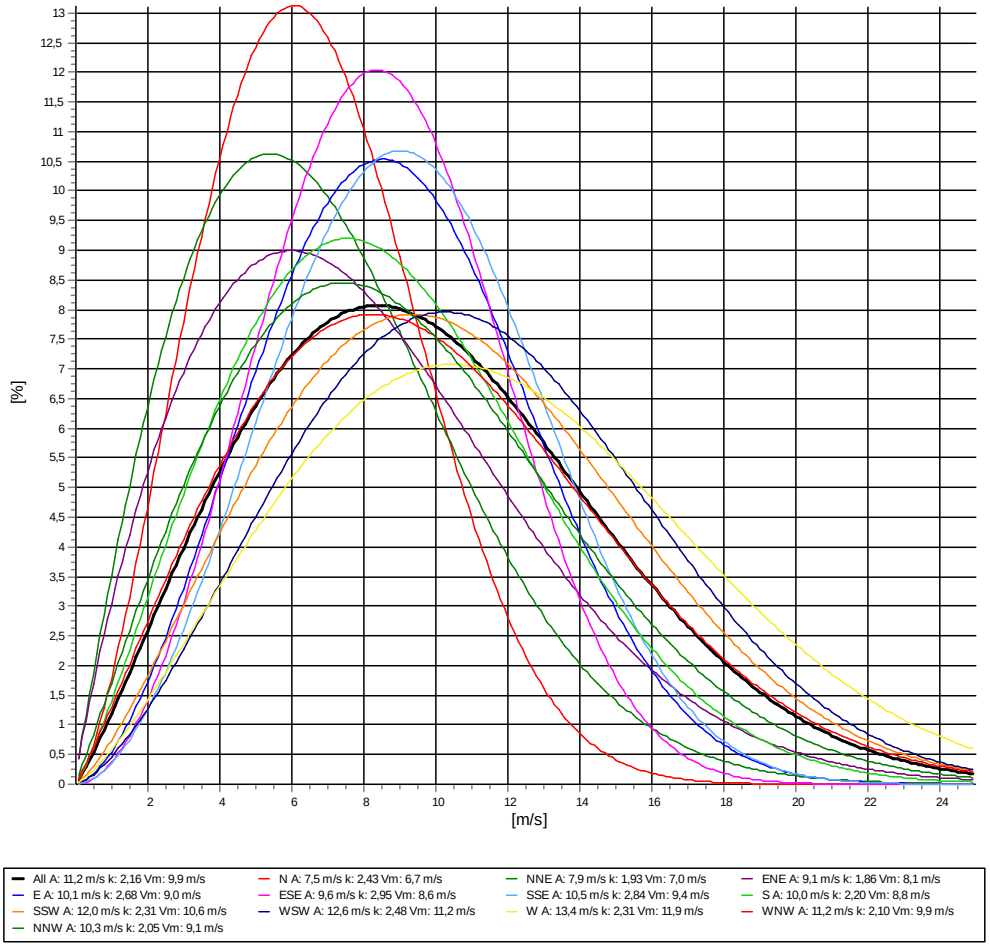
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **150,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,53	2,432	3,74	6,68
1-NNE	7,89	1,932	3,51	7,00
2-ENE	9,11	1,855	5,78	8,09
3-E	10,14	2,678	6,42	9,01
4-ESE	9,63	2,954	6,09	8,59
5-SSE	10,52	2,845	7,07	9,37
6-S	9,96	2,199	6,04	8,82
7-SSW	11,99	2,310	8,52	10,62
8-WSW	12,62	2,484	11,17	11,20
9-W	13,41	2,306	21,06	11,88
10-WNW	11,20	2,104	13,78	9,92
11-NNW	10,31	2,049	6,83	9,13
Mean	**11,19**	**2,155**	**100,00**	**9,91**



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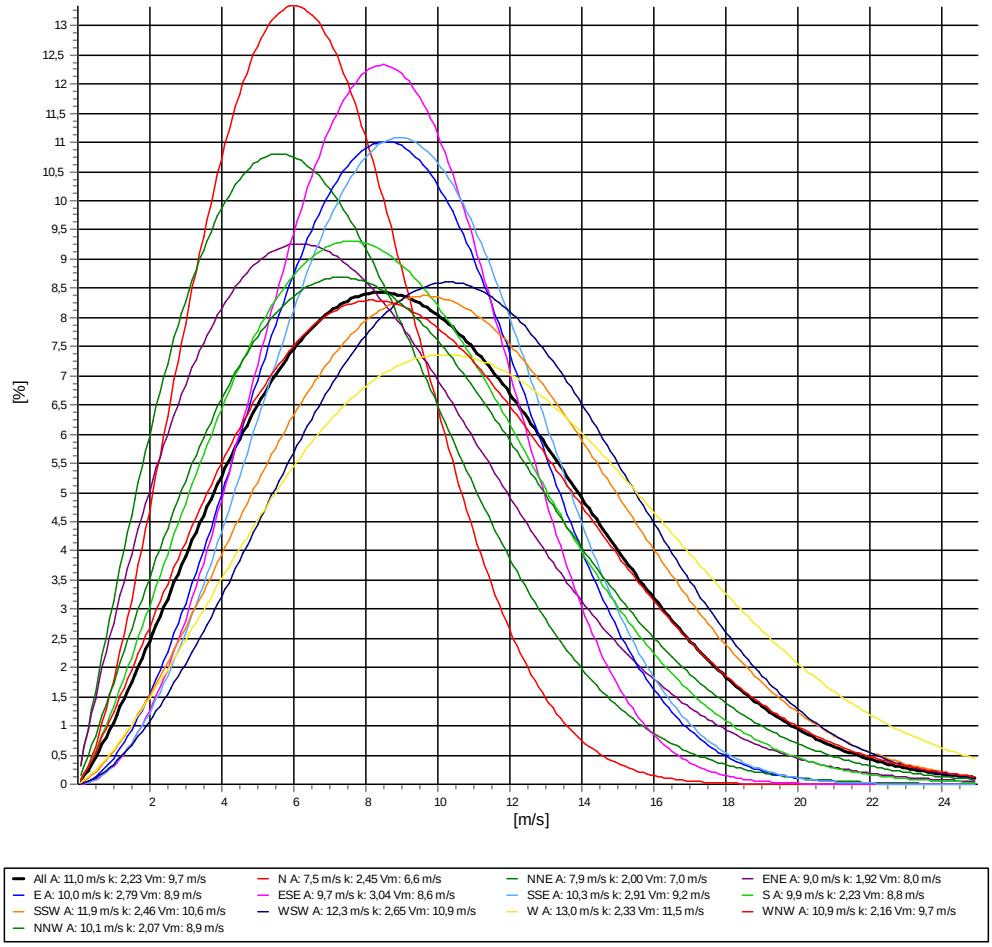
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **120,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,45	2,452	3,57	6,61
1-NNE	7,93	1,998	3,61	7,03
2-ENE	9,03	1,922	5,88	8,01
3-E	10,03	2,791	6,32	8,93
4-ESE	9,65	3,043	6,35	8,62
5-SSE	10,33	2,909	7,10	9,22
6-S	9,93	2,228	6,17	8,80
7-SSW	11,90	2,458	8,89	10,56
8-WSW	12,30	2,649	11,10	10,93
9-W	12,99	2,330	20,92	11,51
10-WNW	10,91	2,163	13,48	9,67
11-NNW	10,08	2,065	6,63	8,93
Mean	**10,98**	**2,230**	**100,00**	**9,72**



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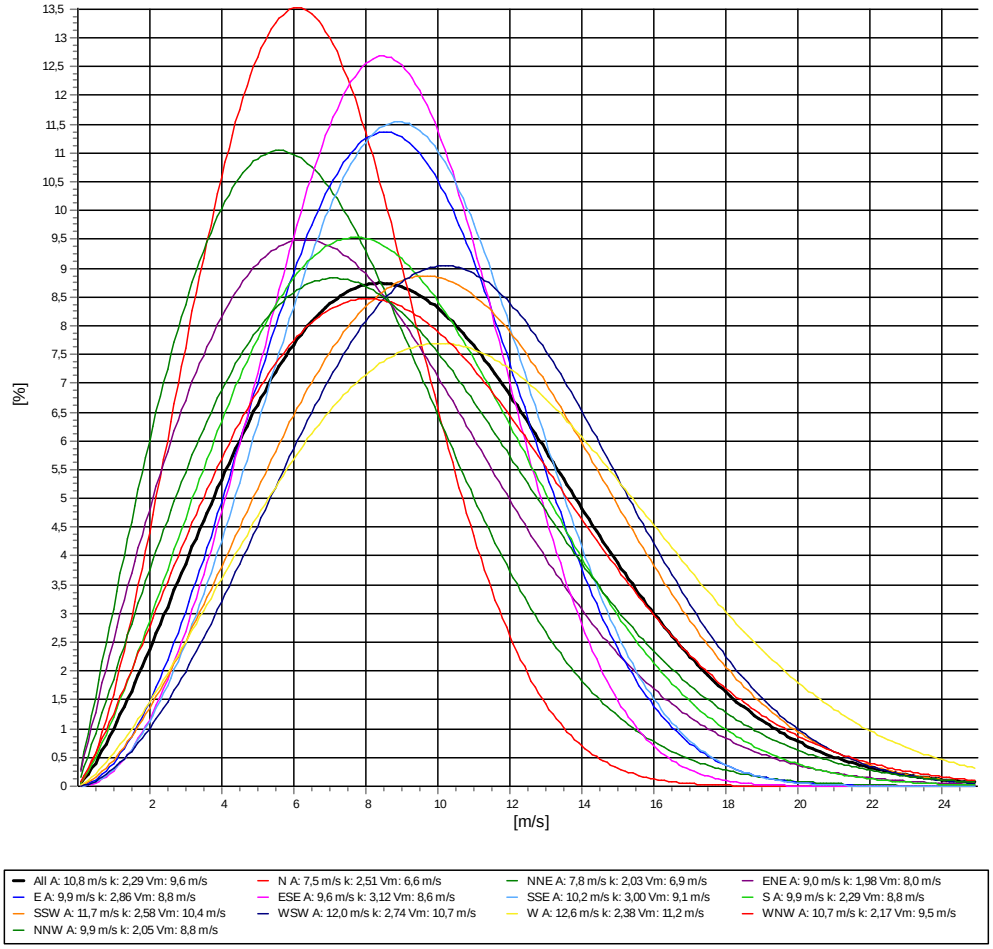
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **100,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,49	2,509	3,47	6,65
1-NNE	7,84	2,026	3,69	6,94
2-ENE	8,98	1,983	5,87	7,96
3-E	9,92	2,859	6,39	8,84
4-ESE	9,60	3,122	6,47	8,59
5-SSE	10,19	3,003	6,97	9,10
6-S	9,90	2,291	6,40	8,77
7-SSW	11,68	2,580	9,05	10,38
8-WSW	12,03	2,738	11,03	10,70
9-W	12,65	2,383	20,90	11,21
10-WNW	10,71	2,170	13,19	9,49
11-NNW	9,88	2,049	6,56	8,75
Mean	**10,79**	**2,289**	**100,00**	**9,56**



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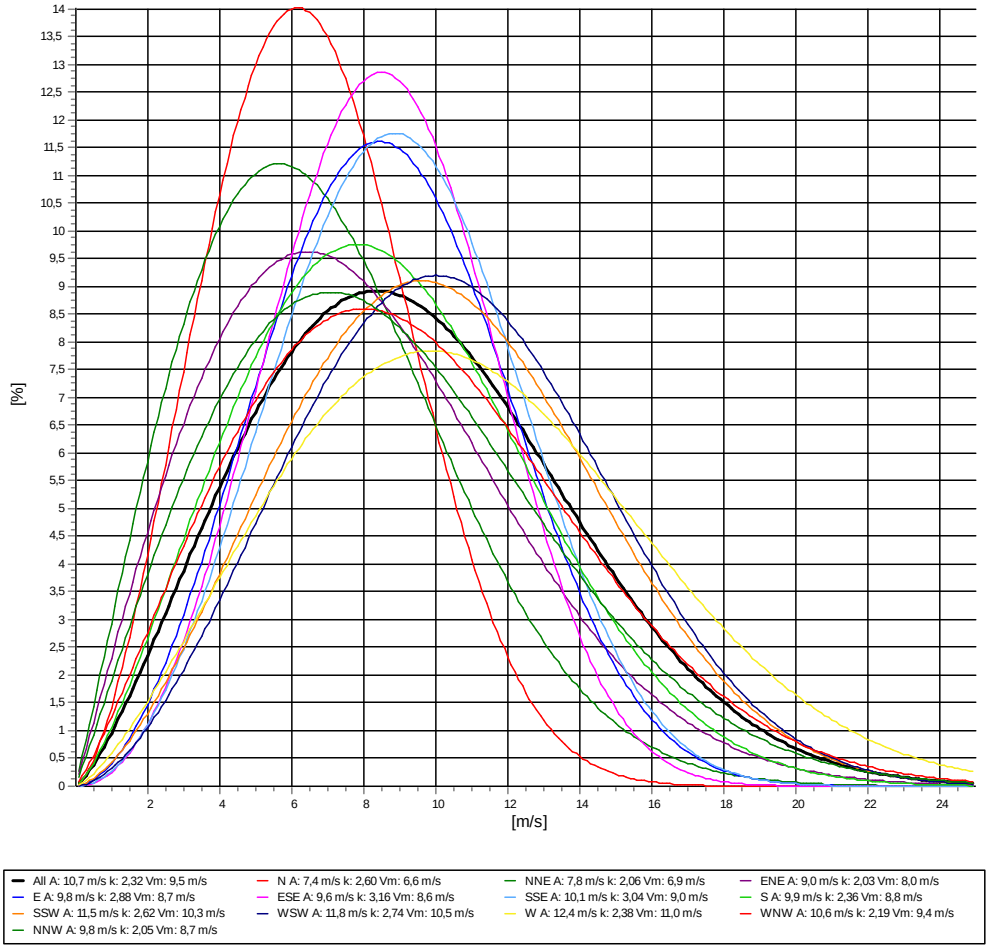
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **90,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,43	2,599	3,41	6,60
1-NNE	7,81	2,062	3,68	6,92
2-ENE	9,00	2,032	5,88	7,98
3-E	9,79	2,884	6,55	8,72
4-ESE	9,58	3,164	6,52	8,57
5-SSE	10,10	3,038	6,84	9,02
6-S	9,89	2,360	6,51	8,77
7-SSW	11,54	2,625	9,20	10,25
8-WSW	11,82	2,737	10,96	10,52
9-W	12,41	2,383	21,03	11,00
10-WNW	10,61	2,188	12,90	9,40
11-NNW	9,79	2,050	6,52	8,68
Mean	**10,67**	**2,318**	**100,00**	**9,45**



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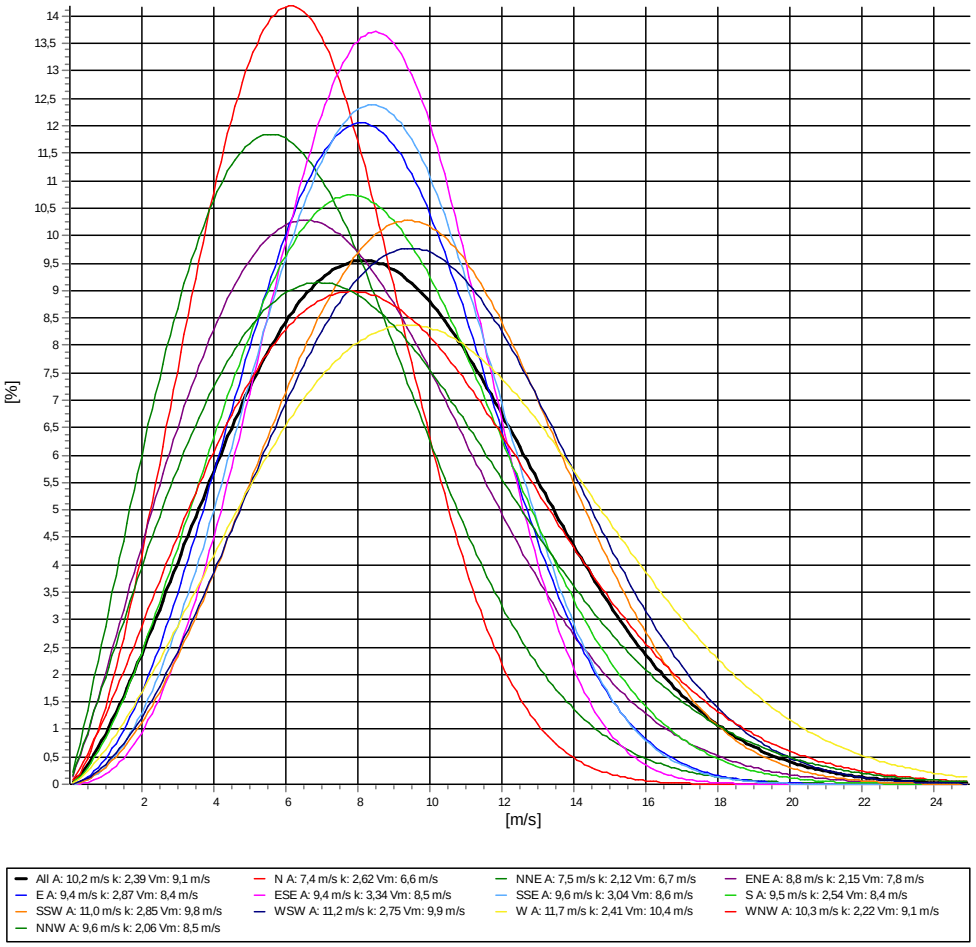
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **60,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,38	2,615	3,33	6,56
1-NNE	7,54	2,124	3,76	6,68
2-ENE	8,76	2,148	5,86	7,76
3-E	9,40	2,874	6,84	8,38
4-ESE	9,43	3,342	6,66	8,46
5-SSE	9,59	3,036	6,63	8,57
6-S	9,51	2,536	6,95	8,44
7-SSW	10,95	2,850	9,22	9,76
8-WSW	11,17	2,747	11,04	9,94
9-W	11,74	2,415	21,10	10,41
10-WNW	10,27	2,221	12,45	9,09
11-NNW	9,57	2,061	6,16	8,48
Mean	**10,22**	**2,393**	**100,00**	**9,06**



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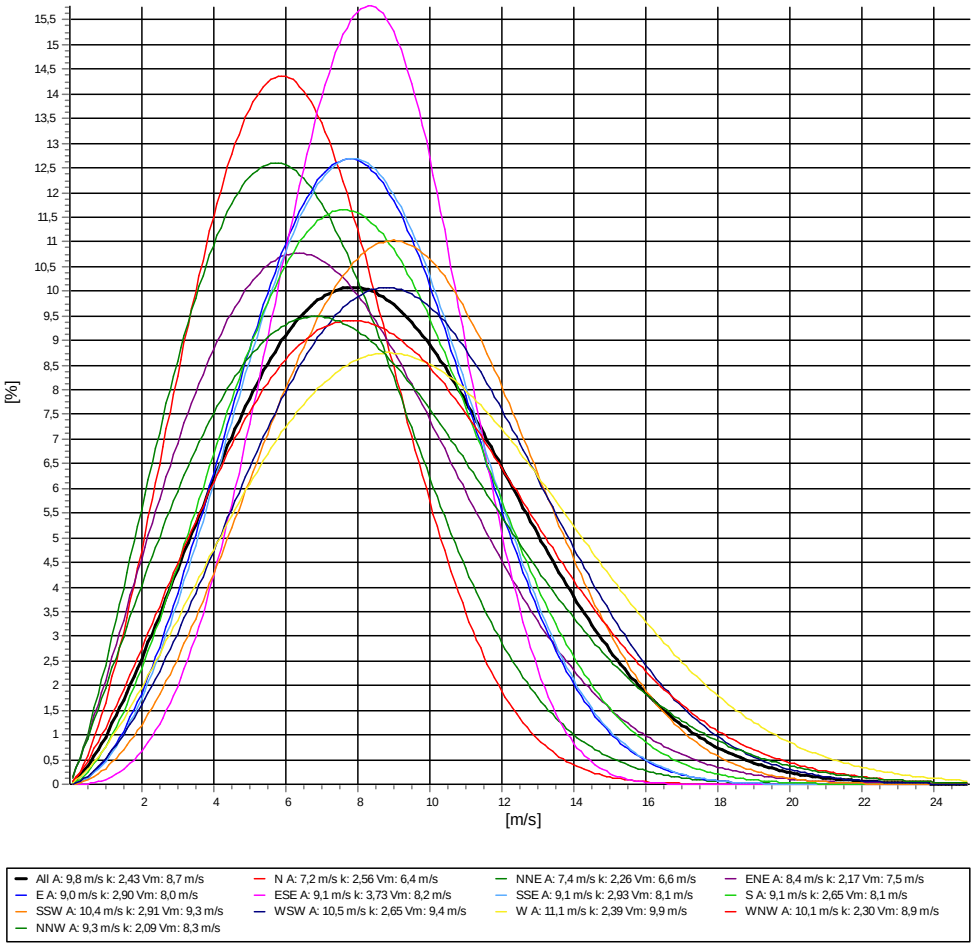
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **40,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,16	2,557	3,30	6,36
1-NNE	7,41	2,260	3,75	6,57
2-ENE	8,43	2,173	5,83	7,47
3-E	8,99	2,896	7,06	8,02
4-ESE	9,05	3,735	6,92	8,17
5-SSE	9,07	2,929	6,43	8,09
6-S	9,10	2,655	7,12	8,09
7-SSW	10,39	2,912	9,41	9,27
8-WSW	10,52	2,654	11,14	9,35
9-W	11,13	2,387	21,08	9,87
10-WNW	10,06	2,299	11,94	8,91
11-NNW	9,32	2,092	6,03	8,26
Mean	**9,78**	**2,425**	**100,00**	**8,67**



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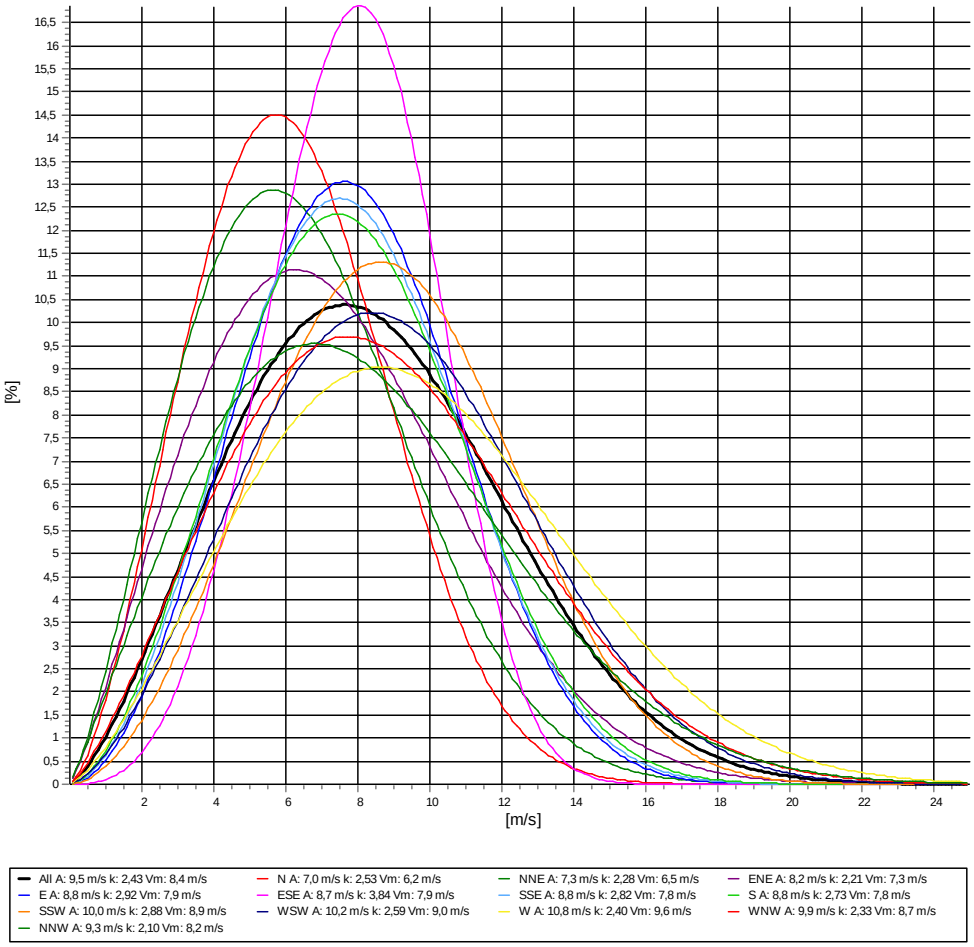
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 complete 1y; Buoy 4 SWLB044; Complete pe **Period:** Full period: 21/11/2021 - 22/11/2022 (12,0 months)
Height: **30,00m - Subst**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,03	2,529	3,37	6,24
1-NNE	7,31	2,280	3,76	6,47
2-ENE	8,24	2,206	5,89	7,30
3-E	8,81	2,924	7,10	7,85
4-ESE	8,70	3,844	6,94	7,87
5-SSE	8,77	2,816	6,44	7,82
6-S	8,80	2,735	7,19	7,83
7-SSW	10,03	2,878	9,51	8,94
8-WSW	10,16	2,587	11,23	9,02
9-W	10,82	2,398	20,99	9,59
10-WNW	9,86	2,329	11,67	8,73
11-NNW	9,28	2,097	5,92	8,22
Mean	**9,51**	**2,431**	**100,00**	**8,43**



Appendix D. Long-term Corrected Dataset: Position 1 (Lot 3, WS199), Position 2 (Lot 4, SWLB044), Position 3, Position 4

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

270,00m - MCP LT - 270m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,31	7,32	8,36	9,68	9,45	8,86	8,75	9,49	10,16	11,92	12,26	10,70	8,79
0		0,49	519	57	34	94	62	24	40	55	48	35	29	24	17
1	0,50	1,49	2477	203	153	179	179	121	126	290	330	234	201	224	237
2	1,50	2,49	4631	342	318	288	316	233	247	431	505	428	548	583	392
3	2,50	3,49	7405	407	449	530	815	643	621	544	596	641	922	790	447
4	3,50	4,49	9180	435	502	655	855	848	830	649	892	950	1041	896	627
5	4,50	5,49	10915	653	603	564	1008	946	989	915	931	1240	1410	1048	608
6	5,50	6,49	11730	875	865	687	803	785	732	1057	934	1367	1511	1346	768
7	6,50	7,49	12414	930	767	743	1052	1253	851	623	842	1230	1775	1525	823
8	7,50	8,49	13496	623	648	633	1037	1342	1106	789	890	1387	2114	1890	1037
9	8,50	9,49	12061	634	503	721	964	1054	848	801	807	1250	1939	1730	810
10	9,50	10,49	12469	344	528	589	962	991	704	954	1037	1393	2533	1666	768
11	10,50	11,49	11739	152	470	798	775	904	707	918	865	1510	2400	1552	688
12	11,50	12,49	10182	154	319	595	642	785	797	767	838	1285	2049	1433	518
13	12,50	13,49	9504	169	263	521	685	598	566	627	694	1184	2294	1464	439
14	13,50	14,49	9210	155	293	543	526	556	489	566	850	1446	2194	1262	330
15	14,50	15,49	7704	125	212	421	656	457	390	517	608	1123	1870	1070	255
16	15,50	16,49	6097	96	176	406	562	314	260	376	516	957	1391	773	270
17	16,50	17,49	5098	71	144	454	386	201	118	291	456	720	1499	556	202
18	17,50	18,49	4674	40	83	202	306	109	150	310	540	967	1418	424	125
19	18,50	19,49	3797	30	57	150	209	46	87	178	292	921	1309	414	104
20	19,50	20,49	2912	14	45	117	86	49	35	119	131	664	1174	377	101
21	20,50	21,49	2154	13	37	67	74	24	20	86	206	536	713	350	28
22	21,50	22,49	1314	13	12	22	38	11	6	64	134	297	480	221	16
23	22,50	23,49	906	3	12	17	31	3	5	31	67	336	262	138	1
24	23,50	24,49	839	5	4	11	15	0	1	16	45	235	316	185	6
25	24,50	25,49	599	2	5	5	10	0	2	2	38	212	223	98	2
26	25,50	26,49	332	2	1	5	2	1	0	1	19	92	141	67	1
27	26,50	27,49	284	0	1	1	5	1	0	8	32	95	103	38	0
28	27,50	28,49	232	1	0	2	1	1	0	2	11	86	102	26	0
29	28,50	29,49	135	0	3	1	0	0	0	0	6	35	75	15	0
30	29,50	30,49	150	1	0	0	1	0	0	0	2	37	86	23	0
31	30,50	31,49	60	0	0	0	1	0	0	0	0	10	43	6	0
32	31,50	32,49	49	0	1	0	0	0	0	0	1	14	30	3	0
33	32,50	33,49	13	0	0	0	0	0	0	0	0	4	9	0	0
34	33,50	34,49	18	0	0	0	0	0	0	0	0	5	12	1	0
35	34,50	35,49	12	0	0	0	0	0	0	0	0	1	7	4	0
36	35,50	36,49	3	0	0	0	0	0	0	0	0	1	2	0	0
37	36,50	37,49	2	0	0	0	0	0	0	0	0	2	0	0	0
38	37,50	38,49	2	0	0	0	0	0	0	0	0	0	2	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	2	0	0	0	0	0	0	0	0	0	2	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

240,00m - MCP LT - 240m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,22	7,22	8,32	9,58	9,53	8,85	8,71	9,55	10,01	11,85	12,12	10,49	8,70
0		0,49	483	38	51	84	19	34	38	64	58	30	32	18	17
1	0,50	1,49	2512	210	181	211	130	167	144	285	302	253	179	230	220
2	1,50	2,49	4608	363	319	320	286	223	241	440	515	437	511	552	401
3	2,50	3,49	7415	399	408	523	705	628	619	545	666	659	989	815	459
4	3,50	4,49	9167	415	534	672	857	852	880	625	895	946	1029	874	588
5	4,50	5,49	11097	668	568	591	1084	983	998	913	995	1286	1297	1058	656
6	5,50	6,49	12082	886	888	726	786	810	820	1058	975	1399	1520	1450	764
7	6,50	7,49	12234	853	816	750	1000	1144	820	652	828	1201	1793	1546	831
8	7,50	8,49	13840	707	657	682	1169	1399	1065	798	929	1433	2069	1921	1011
9	8,50	9,49	12306	484	483	700	908	1107	902	863	813	1268	2122	1814	842
10	9,50	10,49	12243	341	512	665	969	943	683	922	1042	1310	2472	1680	704
11	10,50	11,49	11700	165	498	742	772	915	679	919	926	1482	2377	1516	709
12	11,50	12,49	10575	183	368	524	668	777	811	843	867	1460	2092	1485	497
13	12,50	13,49	9825	175	269	615	680	613	592	640	744	1231	2424	1443	399
14	13,50	14,49	8952	120	254	563	502	564	503	465	791	1473	2190	1236	291
15	14,50	15,49	7361	131	216	358	505	439	379	511	612	1173	1732	1004	301
16	15,50	16,49	6045	79	175	466	683	328	261	365	548	847	1351	725	217
17	16,50	17,49	5460	65	136	427	403	205	168	395	591	875	1423	562	210
18	17,50	18,49	4578	41	90	212	281	98	120	281	399	1084	1405	420	147
19	18,50	19,49	3695	18	54	141	163	61	76	209	259	870	1337	419	88
20	19,50	20,49	2866	15	49	113	125	44	27	117	182	653	1081	380	80
21	20,50	21,49	1775	11	25	51	61	29	17	99	175	468	582	234	23
22	21,50	22,49	1300	8	18	33	40	12	8	74	112	367	438	179	11
23	22,50	23,49	833	5	9	13	25	4	5	28	51	257	283	152	1
24	23,50	24,49	677	2	5	5	15	1	0	20	45	230	241	109	4
25	24,50	25,49	641	1	5	6	6	0	2	15	30	237	242	96	1
26	25,50	26,49	296	1	1	5	4	1	0	7	29	72	131	45	0
27	26,50	27,49	213	0	1	2	3	0	0	0	5	94	79	29	0
28	27,50	28,49	223	1	0	0	1	1	0	0	7	63	110	40	0
29	28,50	29,49	135	0	2	0	0	1	0	0	4	41	76	11	0
30	29,50	30,49	78	0	0	0	1	0	0	0	0	17	54	6	0
31	30,50	31,49	46	0	1	0	1	0	0	1	1	13	26	3	0
32	31,50	32,49	23	0	0	0	0	0	0	0	0	8	13	2	0
33	32,50	33,49	18	0	0	0	0	0	0	0	0	4	11	3	0
34	33,50	34,49	11	0	0	0	0	0	0	0	0	2	7	2	0
35	34,50	35,49	2	0	0	0	0	0	0	0	0	1	1	0	0
36	35,50	36,49	3	0	0	0	0	0	0	0	0	1	2	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	1	0	0	0	0	0	0	0	0	0	1	0	0
39	38,50	39,49	1	0	0	0	0	0	0	0	0	0	1	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

200,00m - MCP LT - 200m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,08	7,22	8,30	9,39	9,45	8,93	8,71	9,48	9,97	11,72	11,84	10,27	8,46
0		0,49	459	32	34	64	42	21	31	66	59	24	35	17	34
1	0,50	1,49	2443	241	200	176	128	142	135	283	276	202	207	220	233
2	1,50	2,49	4860	421	296	362	364	257	255	474	510	455	556	536	374
3	2,50	3,49	7193	385	395	475	634	568	606	571	606	734	971	793	455
4	3,50	4,49	9216	454	532	692	796	822	937	592	884	960	989	928	630
5	4,50	5,49	11500	647	583	588	1039	978	1003	1022	1066	1338	1368	1170	698
6	5,50	6,49	11909	794	863	833	863	851	852	1004	932	1308	1519	1266	824
7	6,50	7,49	12861	846	908	810	1050	1208	827	727	824	1243	1979	1575	864
8	7,50	8,49	13850	631	619	741	1150	1450	1017	814	1018	1415	2041	1872	1082
9	8,50	9,49	12534	496	508	658	973	1062	972	913	897	1174	2257	1852	772
10	9,50	10,49	12415	369	504	720	971	999	659	962	1048	1332	2421	1693	737
11	10,50	11,49	11819	184	486	587	734	867	761	892	999	1692	2461	1464	692
12	11,50	12,49	10833	207	415	608	796	770	710	816	914	1495	2245	1424	433
13	12,50	13,49	9845	98	352	644	567	659	595	548	851	1354	2375	1427	375
14	13,50	14,49	9285	168	238	529	574	609	548	522	865	1526	2260	1171	275
15	14,50	15,49	7392	142	232	456	596	486	430	502	628	1055	1631	967	267
16	15,50	16,49	6049	100	161	382	492	313	251	394	653	1006	1335	731	231
17	16,50	17,49	5299	72	124	286	382	211	202	412	465	973	1492	486	194
18	17,50	18,49	4453	41	71	186	254	107	108	271	362	1234	1336	381	102
19	18,50	19,49	3282	24	45	151	182	66	59	197	204	675	1201	394	84
20	19,50	20,49	2395	17	39	90	99	38	30	134	237	559	832	269	51
21	20,50	21,49	1679	10	27	46	84	27	17	107	154	471	518	202	16
22	21,50	22,49	1091	3	13	23	39	14	2	66	75	286	421	142	7
23	22,50	23,49	762	3	5	8	20	3	3	29	55	272	247	116	1
24	23,50	24,49	602	3	3	8	15	0	3	19	33	197	253	67	1
25	24,50	25,49	470	0	3	4	9	0	0	8	32	151	188	74	1
26	25,50	26,49	250	0	2	4	5	1	0	1	10	78	95	54	0
27	26,50	27,49	203	0	2	3	1	1	0	1	7	90	84	14	0
28	27,50	28,49	145	0	0	0	3	1	0	1	4	42	67	27	0
29	28,50	29,49	123	0	1	0	1	0	0	0	1	42	64	14	0
30	29,50	30,49	39	0	0	0	0	0	0	0	0	10	26	3	0
31	30,50	31,49	31	0	0	0	2	0	0	0	1	9	15	4	0
32	31,50	32,49	19	0	0	0	0	0	0	0	1	7	9	2	0
33	32,50	33,49	8	0	0	0	0	0	0	0	0	2	3	3	0
34	33,50	34,49	2	0	0	0	0	0	0	0	0	2	0	0	0
35	34,50	35,49	2	0	0	0	0	0	0	0	0	0	2	0	0
36	35,50	36,49	1	0	0	0	0	0	0	0	0	0	1	0	0
37	36,50	37,49	1	0	0	0	0	0	0	0	0	0	1	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

180,00m - MCP LT - 180m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,98	7,14	8,28	9,28	9,42	8,94	8,69	9,36	9,94	11,54	11,70	10,11	8,40
0		0,49	481	33	35	61	28	27	29	85	59	24	49	30	21
1	0,50	1,49	2420	216	204	180	99	159	109	294	270	222	206	194	267
2	1,50	2,49	5049	448	293	388	417	241	307	519	529	463	542	529	373
3	2,50	3,49	7130	357	436	448	593	509	584	550	631	819	921	786	496
4	3,50	4,49	9212	451	524	672	795	811	908	638	834	1041	1006	969	563
5	4,50	5,49	11271	596	576	685	1014	971	1021	1085	1029	1248	1234	1118	694
6	5,50	6,49	12257	875	853	808	900	931	885	979	1023	1319	1593	1265	826
7	6,50	7,49	13119	849	848	887	1135	1226	816	791	886	1257	1938	1627	859
8	7,50	8,49	13727	680	628	664	1061	1365	1041	800	1022	1388	2134	1873	1071
9	8,50	9,49	12751	414	499	713	954	1147	977	920	980	1274	2303	1798	772
10	9,50	10,49	12785	415	570	726	998	1004	664	1029	1050	1319	2577	1683	750
11	10,50	11,49	11926	206	450	550	732	843	775	854	1079	1833	2519	1435	650
12	11,50	12,49	10713	158	470	672	779	830	678	752	933	1483	2158	1343	457
13	12,50	13,49	10288	107	334	580	615	767	681	497	853	1444	2575	1488	347
14	13,50	14,49	9383	136	248	531	576	578	527	619	927	1580	2171	1215	275
15	14,50	15,49	7444	136	234	520	609	483	396	479	740	1072	1605	927	243
16	15,50	16,49	6039	89	132	335	574	305	294	424	593	1039	1459	597	198
17	16,50	17,49	4747	63	112	257	319	172	171	371	431	1018	1281	392	160
18	17,50	18,49	4519	41	74	224	278	141	104	316	367	1097	1303	436	138
19	18,50	19,49	3249	19	45	120	132	46	45	174	239	759	1181	387	102
20	19,50	20,49	2303	13	39	64	102	33	29	126	224	552	817	266	38
21	20,50	21,49	1392	10	21	46	56	27	10	89	126	370	440	182	15
22	21,50	22,49	819	3	15	10	27	11	5	72	86	292	229	65	4
23	22,50	23,49	698	3	6	14	15	3	2	31	45	211	278	89	1
24	23,50	24,49	557	1	5	3	12	1	1	8	34	205	224	62	1
25	24,50	25,49	370	2	1	4	6	1	1	1	12	116	183	43	0
26	25,50	26,49	233	0	2	5	6	1	0	2	5	89	82	41	0
27	26,50	27,49	189	0	0	0	2	0	0	1	7	53	96	30	0
28	27,50	28,49	83	0	2	0	0	1	0	0	1	20	54	5	0
29	28,50	29,49	78	0	0	0	1	0	0	0	1	26	41	9	0
30	29,50	30,49	46	0	1	0	1	0	0	0	1	16	24	3	0
31	30,50	31,49	23	0	0	0	1	0	0	0	0	7	11	4	0
32	31,50	32,49	12	0	0	0	0	0	0	0	0	4	6	2	0
33	32,50	33,49	3	0	0	0	0	0	0	0	0	2	1	0	0
34	33,50	34,49	2	0	0	0	0	0	0	0	0	0	2	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	1	0	0	0	0	0	0	0	0	0	1	0	0
37	36,50	37,49	1	0	0	0	0	0	0	0	0	0	1	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - MCP LT - 150m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,86	7,14	8,37	9,18	9,37	8,92	8,60	9,33	9,88	11,38	11,45	9,92	8,16
0		0,49	565	51	30	58	71	28	45	40	81	46	49	38	28
1	0,50	1,49	2246	227	142	190	187	111	120	294	164	141	204	220	246
2	1,50	2,49	5234	389	300	407	408	284	327	558	530	457	579	518	477
3	2,50	3,49	7130	407	443	462	583	519	561	580	635	790	871	788	491
4	3,50	4,49	9431	493	573	613	647	802	892	649	930	1168	1061	987	616
5	4,50	5,49	10884	606	642	698	1004	918	939	972	945	1129	1268	1020	743
6	5,50	6,49	12003	775	856	1036	874	1013	776	1017	951	1241	1651	1086	727
7	6,50	7,49	13884	854	869	915	968	1275	996	810	1004	1368	2098	1790	937
8	7,50	8,49	13671	608	689	617	1077	1449	1140	982	1044	1242	2108	1736	979
9	8,50	9,49	13582	452	569	742	1192	1132	974	937	1061	1369	2399	1933	822
10	9,50	10,49	13258	398	498	762	945	1028	794	1065	1218	1579	2704	1588	679
11	10,50	11,49	11512	187	403	610	790	972	799	775	1051	1656	2292	1418	559
12	11,50	12,49	11220	179	531	626	716	790	752	719	1043	1610	2484	1311	459
13	12,50	13,49	10173	157	293	631	551	757	652	451	928	1649	2564	1301	239
14	13,50	14,49	9176	119	229	558	647	680	495	608	857	1572	2014	1115	282
15	14,50	15,49	7393	108	268	405	572	353	408	656	655	1196	1635	867	270
16	15,50	16,49	6378	125	229	392	648	298	217	500	605	1149	1448	575	192
17	16,50	17,49	5228	63	126	305	381	238	116	345	475	1166	1399	464	150
18	17,50	18,49	4300	36	81	193	286	151	103	187	340	1044	1356	420	103
19	18,50	19,49	2694	26	57	99	121	58	43	178	239	597	911	292	73
20	19,50	20,49	1757	12	36	54	58	17	16	145	207	408	526	244	34
21	20,50	21,49	989	4	13	29	42	7	5	78	95	217	392	95	12
22	21,50	22,49	822	3	11	24	10	5	4	66	67	248	307	71	6
23	22,50	23,49	739	1	11	10	2	1	0	29	40	276	303	65	1
24	23,50	24,49	377	0	6	4	1	0	0	4	19	134	180	28	1
25	24,50	25,49	248	0	0	1	0	0	0	4	11	101	99	31	1
26	25,50	26,49	197	1	0	0	0	0	0	3	10	45	91	47	0
27	26,50	27,49	94	0	2	2	0	0	0	0	2	25	50	13	0
28	27,50	28,49	73	0	0	0	0	0	0	0	2	28	35	8	0
29	28,50	29,49	21	0	0	0	0	0	0	0	0	6	12	3	0
30	29,50	30,49	20	0	0	0	0	0	0	0	0	4	12	4	0
31	30,50	31,49	10	0	0	0	0	0	0	0	0	2	8	0	0
32	31,50	32,49	5	0	0	0	0	0	0	0	0	3	2	0	0
33	32,50	33,49	4	0	0	0	0	0	0	0	0	2	2	0	0
34	33,50	34,49	2	0	0	0	0	0	0	0	0	0	2	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

120,00m - MCP LT - 120m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,70	7,04	8,36	9,12	9,36	8,78	8,51	9,23	9,76	11,19	11,21	9,59	8,12
0		0,49	500	49	19	31	21	84	54	58	53	21	49	43	18
1	0,50	1,49	2423	260	202	206	211	175	140	259	163	161	200	258	188
2	1,50	2,49	5312	401	301	412	402	344	349	531	477	544	554	568	429
3	2,50	3,49	7016	379	457	458	523	451	623	581	608	815	824	801	496
4	3,50	4,49	9099	559	592	666	670	717	813	557	838	1084	1016	972	615
5	4,50	5,49	11298	614	639	745	949	1062	936	1043	1015	1187	1306	1065	737
6	5,50	6,49	12191	859	959	976	785	1002	718	1112	1026	1207	1610	1147	790
7	6,50	7,49	13756	785	785	866	976	1318	1013	816	1154	1407	2169	1551	916
8	7,50	8,49	13812	526	648	857	1097	1382	1072	946	1041	1452	2141	1759	891
9	8,50	9,49	14470	567	627	742	1220	1301	1075	1062	1168	1470	2537	1834	867
10	9,50	10,49	13259	333	421	684	1084	1037	905	996	1118	1667	2682	1570	762
11	10,50	11,49	11777	176	418	580	867	927	782	719	1314	1690	2517	1317	470
12	11,50	12,49	11779	179	531	666	823	874	744	689	1211	1829	2672	1202	359
13	12,50	13,49	10835	161	399	590	716	781	736	649	955	1707	2398	1390	353
14	13,50	14,49	9348	119	255	633	679	679	559	770	769	1461	2129	1052	243
15	14,50	15,49	7122	99	178	427	646	436	302	608	601	1191	1642	739	253
16	15,50	16,49	6482	98	177	449	556	277	207	455	627	1482	1449	530	175
17	16,50	17,49	5144	75	161	281	265	173	118	219	535	1277	1419	504	117
18	17,50	18,49	3257	45	103	129	178	78	44	190	298	790	981	309	112
19	18,50	19,49	2240	21	66	93	106	36	24	135	188	566	736	221	48
20	19,50	20,49	1290	6	48	51	47	13	7	77	103	332	462	118	26
21	20,50	21,49	975	9	16	23	17	10	1	79	81	278	373	78	10
22	21,50	22,49	799	1	20	16	11	7	2	52	33	262	331	62	2
23	22,50	23,49	448	3	13	8	4	0	0	22	31	143	186	37	1
24	23,50	24,49	310	1	7	4	1	1	0	10	18	114	122	31	1
25	24,50	25,49	164	0	2	2	1	0	0	7	4	48	88	12	0
26	25,50	26,49	80	0	0	3	0	0	0	3	2	39	28	5	0
27	26,50	27,49	75	1	0	0	0	0	0	1	2	30	35	6	0
28	27,50	28,49	22	0	1	0	0	0	0	0	1	4	16	0	0
29	28,50	29,49	16	0	0	1	0	0	0	0	1	3	8	3	0
30	29,50	30,49	8	0	0	0	0	0	0	0	0	3	4	1	0
31	30,50	31,49	6	0	0	0	0	0	0	0	0	3	3	0	0
32	31,50	32,49	6	0	0	0	0	0	0	0	0	3	3	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	0	1	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

100,00m - MCP LT - 100m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,51	6,97	8,32	8,97	9,32	8,66	8,42	9,05	9,54	10,91	10,90	9,39	7,91
0		0,49	502	56	26	21	13	76	50	59	71	14	49	37	30
1	0,50	1,49	2513	214	189	199	179	195	160	290	196	220	197	238	236
2	1,50	2,49	5479	465	321	489	401	331	369	518	494	553	562	556	420
3	2,50	3,49	6860	395	428	446	455	446	638	601	574	716	860	780	521
4	3,50	4,49	9411	478	548	677	750	837	814	611	917	1137	1069	919	654
5	4,50	5,49	11268	638	688	758	785	1044	903	1034	989	1206	1317	1166	740
6	5,50	6,49	12326	806	901	984	834	1064	680	1114	1080	1296	1624	1132	811
7	6,50	7,49	14354	807	903	1023	982	1333	1023	810	1162	1499	2358	1602	852
8	7,50	8,49	14312	622	743	736	1132	1337	1141	1039	1200	1441	2218	1751	952
9	8,50	9,49	14833	467	586	743	1279	1379	1083	1119	1212	1642	2713	1743	867
10	9,50	10,49	14092	275	501	757	1217	1196	962	1018	1347	1786	2721	1570	742
11	10,50	11,49	12225	170	567	587	852	873	817	782	1292	1868	2754	1266	397
12	11,50	12,49	11706	163	418	671	793	917	663	631	1184	1957	2611	1261	437
13	12,50	13,49	10877	176	426	635	690	801	717	761	990	1654	2426	1331	270
14	13,50	14,49	8937	108	227	517	773	680	519	693	804	1517	1989	870	240
15	14,50	15,49	7215	88	179	341	564	416	296	633	712	1523	1568	702	193
16	15,50	16,49	5989	102	174	409	498	223	206	353	549	1376	1446	484	169
17	16,50	17,49	4622	81	156	300	291	147	95	201	444	1125	1278	402	102
18	17,50	18,49	2702	28	93	155	114	53	38	175	228	597	832	281	108
19	18,50	19,49	1841	24	60	75	92	18	21	120	152	472	589	181	37
20	19,50	20,49	1185	7	34	53	33	13	2	96	93	349	406	75	24
21	20,50	21,49	833	4	21	19	20	6	2	47	32	221	391	63	7
22	21,50	22,49	447	1	18	15	6	0	1	33	26	142	173	31	1
23	22,50	23,49	351	3	9	7	3	1	0	14	29	134	122	28	1
24	23,50	24,49	196	0	4	3	0	0	0	5	4	57	106	17	0
25	24,50	25,49	99	1	0	3	1	0	0	3	4	46	34	7	0
26	25,50	26,49	84	0	0	3	0	0	0	1	2	36	35	7	0
27	26,50	27,49	29	0	1	0	0	0	0	0	1	8	18	1	0
28	27,50	28,49	12	0	0	0	0	0	0	0	1	2	6	3	0
29	28,50	29,49	7	0	0	1	0	0	0	0	0	1	4	1	0
30	29,50	30,49	8	0	0	0	0	0	0	0	0	5	3	0	0
31	30,50	31,49	5	0	0	0	0	0	0	0	0	1	4	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

90,00m - MCP LT - 90m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,40	6,95	8,18	8,82	9,30	8,58	8,34	8,96	9,39	10,75	10,72	9,31	7,87
0		0,49	528	47	47	38	41	45	43	75	61	29	33	42	27
1	0,50	1,49	2613	200	223	224	191	194	173	295	201	220	220	261	211
2	1,50	2,49	5440	467	360	472	397	332	323	556	480	541	532	552	428
3	2,50	3,49	6937	380	426	496	437	465	631	608	605	783	839	743	524
4	3,50	4,49	9379	454	587	698	672	811	804	601	974	1164	1089	894	631
5	4,50	5,49	11470	661	710	756	810	1075	857	1135	1012	1188	1348	1117	801
6	5,50	6,49	12530	792	888	1000	814	1113	702	1015	1116	1360	1772	1143	815
7	6,50	7,49	14566	805	943	1003	986	1381	1058	892	1170	1508	2394	1579	847
8	7,50	8,49	14723	562	802	773	1114	1370	1222	1139	1277	1528	2206	1748	982
9	8,50	9,49	14954	418	519	773	1460	1473	1053	1028	1134	1741	2749	1812	794
10	9,50	10,49	14249	309	575	814	1088	1227	919	1068	1417	1881	2762	1456	733
11	10,50	11,49	12621	175	558	539	912	940	855	875	1257	2003	2856	1250	401
12	11,50	12,49	12269	141	394	673	811	955	700	793	1272	2130	2673	1316	411
13	12,50	13,49	10285	140	412	665	688	754	665	702	989	1509	2281	1203	277
14	13,50	14,49	8953	127	244	507	687	626	434	637	901	1584	2028	902	276
15	14,50	15,49	6931	95	155	360	632	343	320	626	607	1463	1470	676	184
16	15,50	16,49	5617	97	174	392	393	207	167	320	596	1337	1374	430	130
17	16,50	17,49	4055	72	166	266	332	129	59	181	301	932	1113	412	92
18	17,50	18,49	2915	31	88	116	149	37	31	202	238	735	918	258	112
19	18,50	19,49	1487	20	69	70	68	18	12	128	112	351	467	136	36
20	19,50	20,49	1174	6	29	42	31	10	2	69	55	358	462	82	28
21	20,50	21,49	716	5	22	17	17	3	2	48	36	226	297	37	6
22	21,50	22,49	325	2	17	7	6	1	0	23	24	110	107	27	1
23	22,50	23,49	258	1	4	6	2	0	0	12	10	86	105	31	1
24	23,50	24,49	141	1	1	3	0	0	0	5	3	62	54	12	0
25	24,50	25,49	80	0	1	4	1	0	0	1	3	36	29	5	0
26	25,50	26,49	54	0	0	0	0	0	0	1	1	19	27	6	0
27	26,50	27,49	25	0	0	0	0	0	0	0	0	7	16	2	0
28	27,50	28,49	11	0	0	1	0	0	0	0	0	2	6	2	0
29	28,50	29,49	7	0	0	0	0	0	0	0	0	5	2	0	0
30	29,50	30,49	3	0	0	0	0	0	0	0	0	1	2	0	0
31	30,50	31,49	4	0	0	0	0	0	0	0	0	1	3	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

60,00m - MCP LT - 60m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,01	6,96	7,89	8,60	8,94	8,30	7,85	8,57	9,02	10,30	10,16	8,97	7,54
0		0,49	577	50	36	33	48	36	87	65	58	50	17	50	47
1	0,50	1,49	2774	225	225	191	199	167	228	330	261	173	303	256	216
2	1,50	2,49	5224	410	360	476	333	272	319	508	484	515	519	570	458
3	2,50	3,49	7297	383	474	526	473	654	630	598	673	804	817	709	556
4	3,50	4,49	9926	479	714	715	730	976	740	771	811	1188	1217	929	656
5	4,50	5,49	11975	611	730	789	846	1119	1003	1089	1144	1408	1427	1058	751
6	5,50	6,49	13185	830	959	1056	752	1211	909	920	1110	1301	1928	1346	863
7	6,50	7,49	15384	819	1010	891	1149	1572	1176	979	1301	1626	2305	1678	878
8	7,50	8,49	16388	633	937	719	1201	1635	1239	1238	1536	1761	2842	1722	925
9	8,50	9,49	16449	430	566	873	1470	1723	1106	1158	1455	2044	3072	1809	743
10	9,50	10,49	15119	388	763	648	1102	1290	836	1200	1443	2304	3085	1430	630
11	10,50	11,49	13274	173	544	679	1111	911	820	981	1374	2456	2688	1218	319
12	11,50	12,49	12047	152	385	835	968	915	632	841	1155	2011	2645	1200	308
13	12,50	13,49	10118	150	342	616	632	789	486	784	1039	1784	2324	890	282
14	13,50	14,49	7418	109	227	548	508	425	308	570	695	1563	1468	756	241
15	14,50	15,49	5823	105	173	285	378	332	208	336	608	1473	1231	592	102
16	15,50	16,49	4525	59	108	222	343	190	97	232	392	1081	1276	380	145
17	16,50	17,49	3290	52	130	218	245	54	32	137	248	773	951	342	108
18	17,50	18,49	1656	31	68	83	87	28	12	119	111	404	487	162	64
19	18,50	19,49	1193	12	35	50	34	10	8	64	74	289	444	139	34
20	19,50	20,49	740	9	25	22	15	6	3	44	46	247	263	48	12
21	20,50	21,49	341	6	17	11	3	1	0	24	31	90	132	25	1
22	21,50	22,49	261	4	11	9	1	0	1	11	15	103	81	23	2
23	22,50	23,49	190	5	5	5	0	0	0	6	4	89	60	16	0
24	23,50	24,49	67	1	1	2	0	0	0	1	1	20	27	14	0
25	24,50	25,49	31	0	0	1	0	0	0	0	2	6	19	3	0
26	25,50	26,49	23	0	0	0	0	0	0	0	0	10	12	1	0
27	26,50	27,49	13	2	0	0	0	0	0	0	0	2	8	1	0
28	27,50	28,49	7	1	0	0	0	0	0	0	0	1	3	2	0
29	28,50	29,49	4	0	0	0	0	0	0	0	0	3	1	0	0
30	29,50	30,49	1	1	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.42

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

40,00m - MCP LT - 40m (1) - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,59	6,77	7,57	8,25	8,66	7,81	7,53	8,04	8,55	9,71	9,66	8,63	7,35
0		0,49	576	86	58	37	18	45	38	67	59	35	34	36	63
1	0,50	1,49	2869	235	235	220	222	200	194	377	286	188	280	223	209
2	1,50	2,49	5683	437	354	402	391	357	406	565	501	605	630	582	453
3	2,50	3,49	7846	385	536	530	541	657	668	690	695	887	945	745	567
4	3,50	4,49	10818	555	711	796	775	968	888	903	920	1320	1263	1045	674
5	4,50	5,49	13124	607	859	904	851	1340	1079	1088	1182	1581	1650	1253	730
6	5,50	6,49	14584	871	1047	1179	947	1302	1030	1023	1252	1500	2216	1381	836
7	6,50	7,49	16605	821	1158	777	1164	1682	1305	1124	1619	1994	2603	1498	860
8	7,50	8,49	17860	528	886	710	1294	2113	1271	1421	1624	2070	3119	1902	922
9	8,50	9,49	17344	392	644	826	1649	1700	1088	1443	1611	2582	3074	1680	655
10	9,50	10,49	14956	374	793	735	1212	1274	753	1192	1560	2346	2746	1301	670
11	10,50	11,49	13077	165	439	770	1098	895	682	788	1409	2505	2745	1243	338
12	11,50	12,49	11206	134	421	645	946	625	610	766	1101	2110	2496	1089	263
13	12,50	13,49	8088	137	281	655	484	388	394	645	795	1548	1705	801	255
14	13,50	14,49	6466	125	210	242	357	428	246	445	432	1468	1586	722	205
15	14,50	15,49	5291	99	136	301	427	214	129	278	499	1309	1328	425	146
16	15,50	16,49	3720	58	132	334	339	100	78	151	300	784	901	433	110
17	16,50	17,49	2229	56	87	106	164	32	35	112	202	529	632	210	64
18	17,50	18,49	1343	27	32	39	69	13	11	51	76	361	487	129	48
19	18,50	19,49	684	15	33	18	37	5	6	34	47	182	231	59	17
20	19,50	20,49	379	10	18	8	10	5	4	22	23	83	162	30	4
21	20,50	21,49	273	5	7	6	2	0	0	16	9	105	100	19	4
22	21,50	22,49	151	2	2	8	0	0	0	1	3	75	44	16	0
23	22,50	23,49	73	3	1	3	1	0	0	0	1	32	25	7	0
24	23,50	24,49	37	0	2	0	0	0	0	0	1	8	22	4	0
25	24,50	25,49	18	0	0	0	0	0	0	0	0	4	11	3	0
26	25,50	26,49	13	0	0	0	0	0	0	0	0	4	7	2	0
27	26,50	27,49	4	1	0	0	0	0	0	0	0	0	3	0	0
28	27,50	28,49	3	0	0	0	0	0	0	0	0	2	1	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

30,00m - MCP LT - MCP 30m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,32	6,77	7,35	8,04	8,21	7,55	7,10	7,88	8,29	9,41	9,35	8,42	7,23
0		0,49	559	45	55	26	57	28	24	68	40	46	49	57	64
1	0,50	1,49	2940	240	255	225	249	198	229	303	265	212	291	272	201
2	1,50	2,49	5854	397	418	435	383	414	430	543	571	611	611	556	485
3	2,50	3,49	8208	434	447	537	502	652	804	764	738	978	970	758	624
4	3,50	4,49	11389	601	859	812	749	1138	945	876	990	1318	1392	1099	610
5	4,50	5,49	13925	651	884	989	981	1309	1078	1191	1147	1689	1857	1406	743
6	5,50	6,49	15893	892	1185	1141	1031	1572	1160	1176	1479	1647	2382	1432	796
7	6,50	7,49	17607	761	1056	841	1287	1987	1363	1322	1803	2141	2672	1564	810
8	7,50	8,49	18987	671	910	721	1531	2190	1380	1463	1702	2573	3244	1764	838
9	8,50	9,49	17569	380	772	963	1622	1617	920	1454	1716	2437	3250	1748	690
10	9,50	10,49	14838	397	605	714	1394	1320	698	1068	1385	2586	2857	1275	539
11	10,50	11,49	12051	163	344	799	952	608	598	891	1328	2423	2470	1133	342
12	11,50	12,49	9964	183	422	656	707	456	409	668	906	1818	2307	1158	274
13	12,50	13,49	7488	127	337	507	372	514	274	538	558	1447	1765	830	219
14	13,50	14,49	6651	94	192	430	327	295	241	402	623	1734	1577	584	152
15	14,50	15,49	4656	108	149	286	373	183	85	307	485	1081	1067	361	171
16	15,50	16,49	2783	73	119	117	170	79	40	128	197	606	732	395	127
17	16,50	17,49	1808	42	66	79	78	32	10	81	139	415	613	191	62
18	17,50	18,49	931	16	22	28	29	6	2	53	62	263	323	98	29
19	18,50	19,49	540	12	14	19	10	5	1	29	29	144	212	55	10
20	19,50	20,49	247	6	7	10	5	1	0	18	16	72	85	24	3
21	20,50	21,49	217	6	2	8	1	0	0	2	10	100	68	19	1
22	21,50	22,49	104	1	1	0	0	0	0	0	7	38	49	8	0
23	22,50	23,49	65	0	0	0	1	0	0	0	5	32	20	7	0
24	23,50	24,49	21	1	0	0	0	0	0	0	0	8	8	4	0
25	24,50	25,49	12	1	0	1	1	0	0	0	0	3	5	1	0
26	25,50	26,49	10	0	0	0	0	0	0	0	1	5	4	0	0
27	26,50	27,49	1	0	0	0	0	0	0	0	0	1	0	0	0
28	27,50	28,49	1	0	0	0	0	0	0	0	0	1	0	0	0
29	28,50	29,49	1	0	0	0	0	0	0	0	0	0	1	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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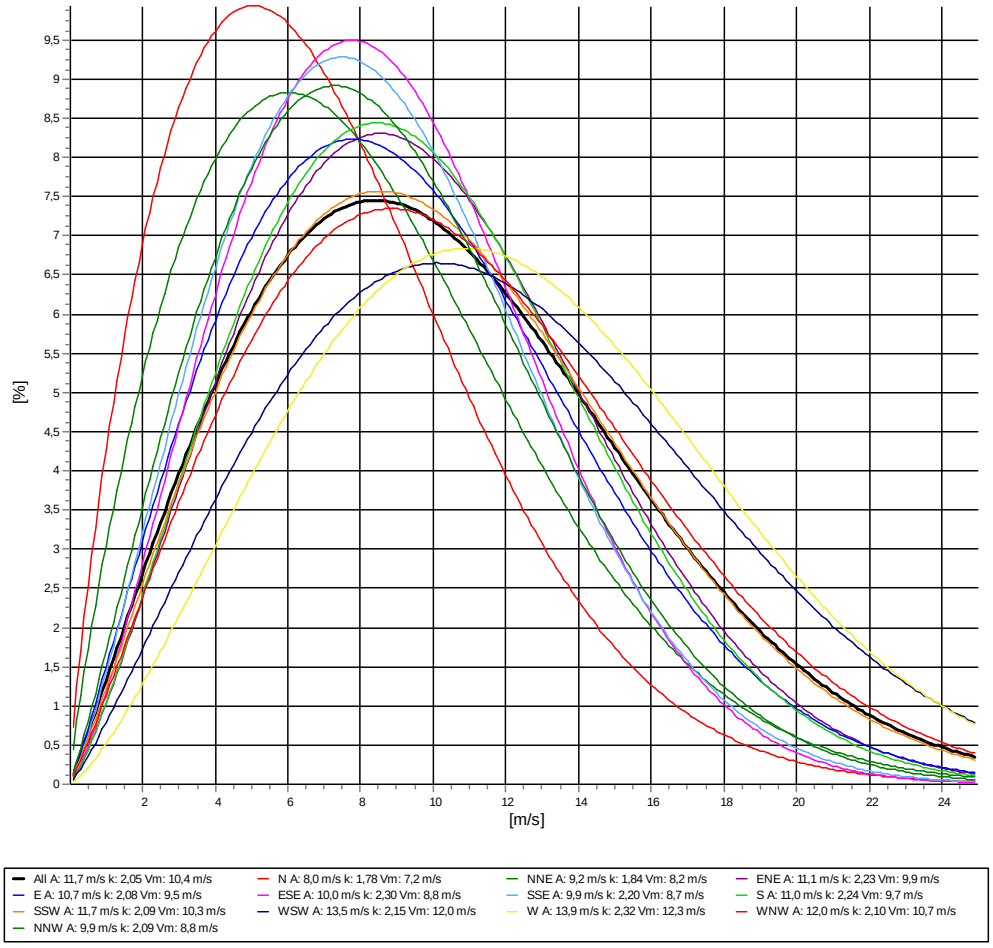
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **270,00m - MCP LT - 270m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,04	1,777	3,74	7,16
1-NNE	9,22	1,839	4,28	8,20
2-ENE	11,14	2,229	5,72	9,87
3-E	10,69	2,078	7,45	9,47
4-ESE	9,96	2,296	7,02	8,82
5-SSE	9,86	2,197	6,12	8,74
6-S	11,00	2,240	6,84	9,74
7-SSW	11,67	2,091	8,08	10,34
8-WSW	13,55	2,150	13,08	12,00
9-W	13,92	2,317	19,52	12,33
10-WNW	12,05	2,095	12,68	10,67
11-NNW	9,92	2,094	5,49	8,79
Mean	**11,69**	**2,047**	**100,00**	**10,35**



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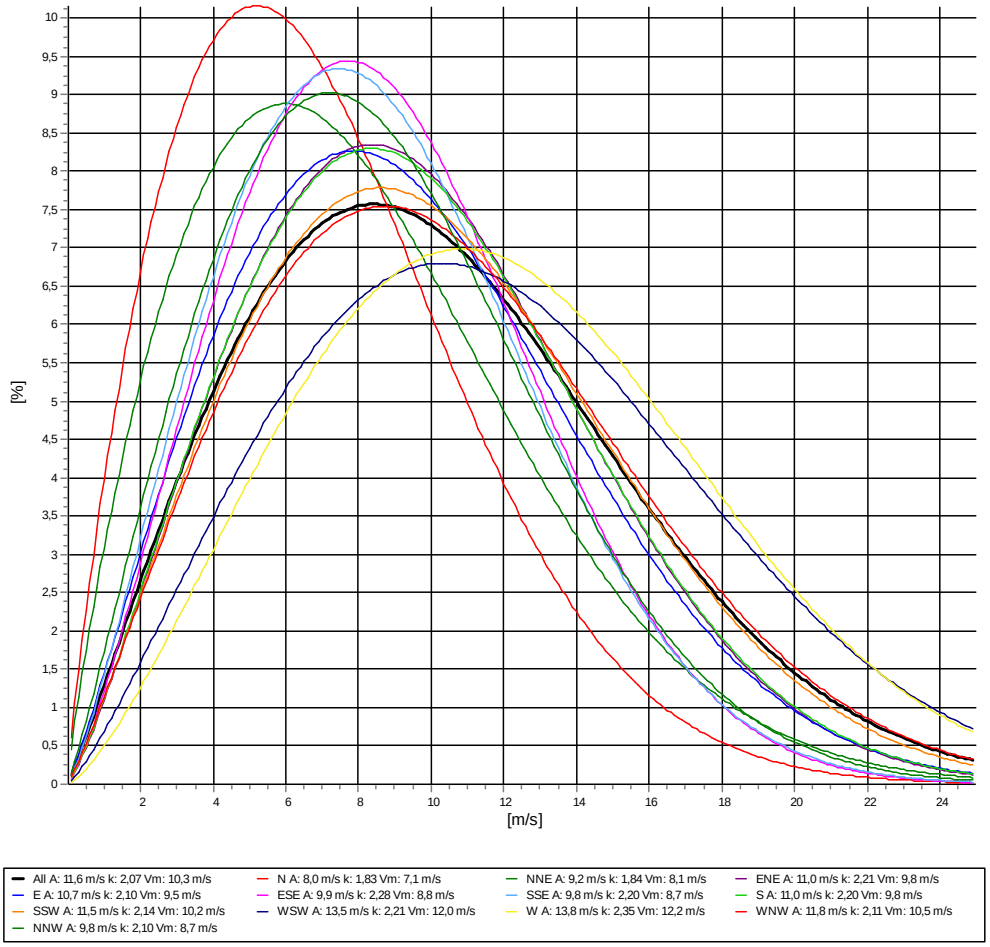
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **240,00m - MCP LT - 240m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,00	1,832	3,64	7,11
1-NNE	9,17	1,837	4,33	8,15
2-ENE	11,01	2,210	5,82	9,75
3-E	10,72	2,096	7,33	9,49
4-ESE	9,95	2,276	7,06	8,81
5-SSE	9,83	2,204	6,19	8,70
6-S	11,03	2,197	6,93	9,77
7-SSW	11,54	2,141	8,21	10,22
8-WSW	13,53	2,212	13,26	11,99
9-W	13,75	2,346	19,24	12,19
10-WNW	11,80	2,114	12,58	10,45
11-NNW	9,81	2,097	5,40	8,69
Mean	**11,60**	**2,069**	**100,00**	**10,27**



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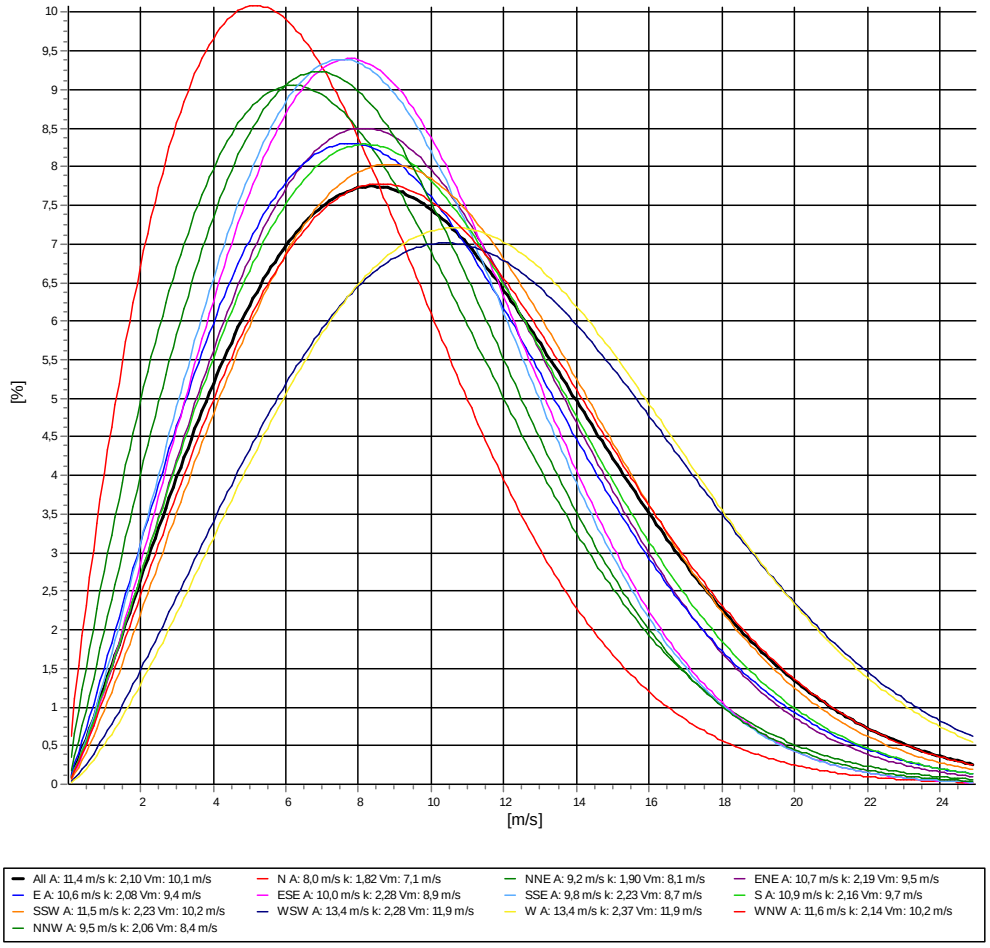
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **200,00m - MCP LT - 200m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,03	1,820	3,64	7,14
1-NNE	9,18	1,903	4,37	8,14
2-ENE	10,74	2,190	5,78	9,51
3-E	10,62	2,084	7,34	9,41
4-ESE	9,99	2,277	7,15	8,85
5-SSE	9,85	2,229	6,28	8,72
6-S	10,91	2,161	7,04	9,66
7-SSW	11,52	2,230	8,37	10,20
8-WSW	13,40	2,278	13,35	11,87
9-W	13,42	2,367	19,11	11,90
10-WNW	11,56	2,143	12,18	10,23
11-NNW	9,48	2,063	5,38	8,40
Mean	**11,44**	**2,098**	**100,00**	**10,13**



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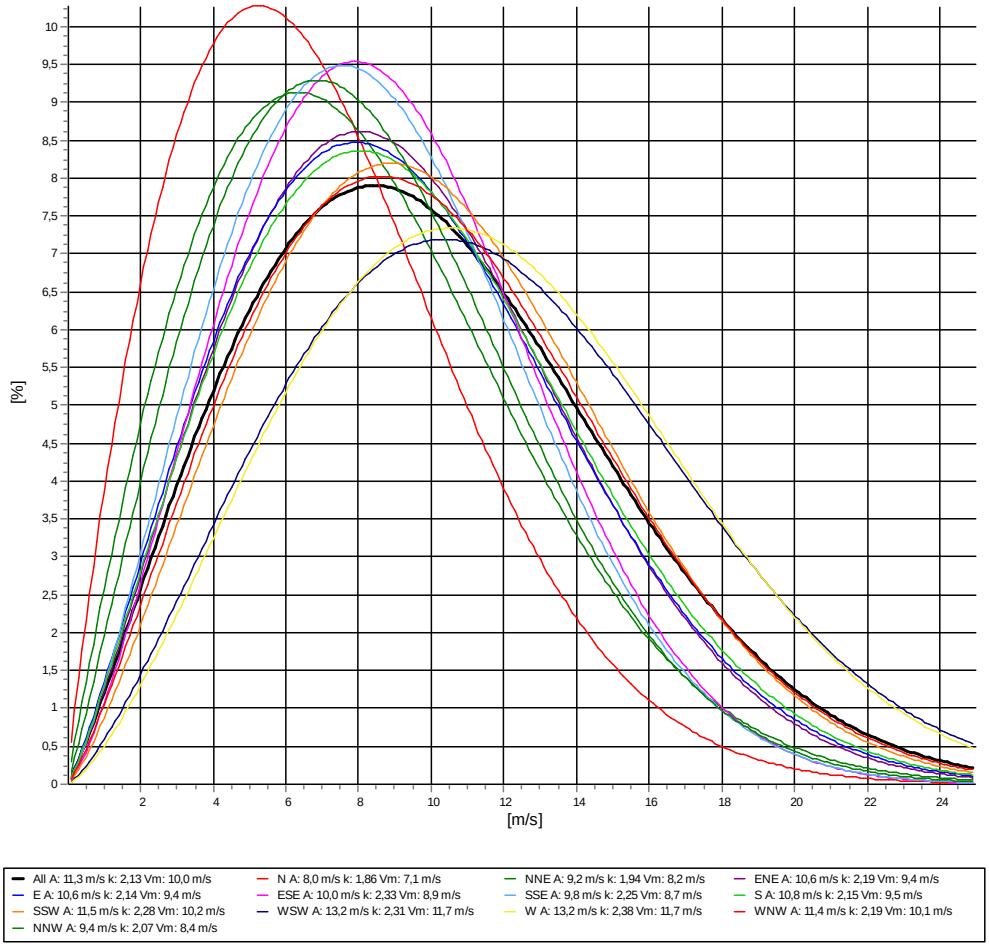
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **180,00m - MCP LT - 180m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,97	1,856	3,61	7,08
1-NNE	9,22	1,942	4,37	8,17
2-ENE	10,60	2,192	5,80	9,39
3-E	10,61	2,143	7,32	9,40
4-ESE	10,04	2,334	7,21	8,89
5-SSE	9,82	2,252	6,31	8,70
6-S	10,78	2,150	7,13	9,54
7-SSW	11,47	2,278	8,57	10,16
8-WSW	13,22	2,315	13,50	11,71
9-W	13,24	2,382	18,96	11,74
10-WNW	11,39	2,194	11,92	10,09
11-NNW	9,45	2,072	5,32	8,37
Mean	**11,34**	**2,132**	**100,00**	**10,04**



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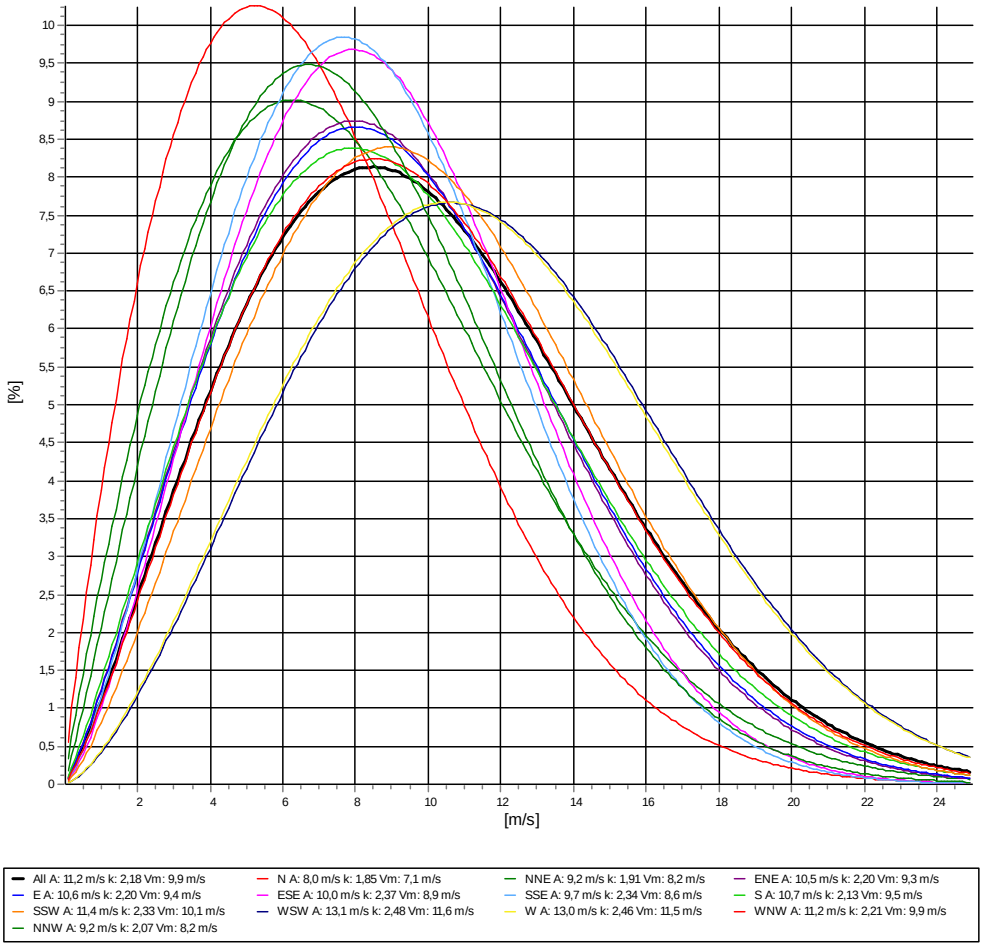
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - MCP LT - 150m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,98	1,854	3,58	7,08
1-NNE	9,23	1,910	4,51	8,19
2-ENE	10,48	2,199	5,96	9,28
3-E	10,56	2,196	7,29	9,35
4-ESE	10,00	2,370	7,35	8,87
5-SSE	9,73	2,337	6,37	8,62
6-S	10,68	2,129	7,22	9,46
7-SSW	11,38	2,328	8,67	10,08
8-WSW	13,09	2,480	13,50	11,62
9-W	13,01	2,462	18,89	11,54
10-WNW	11,16	2,212	11,45	9,89
11-NNW	9,24	2,067	5,21	8,19
Mean	**11,20**	**2,184**	**100,00**	**9,92**



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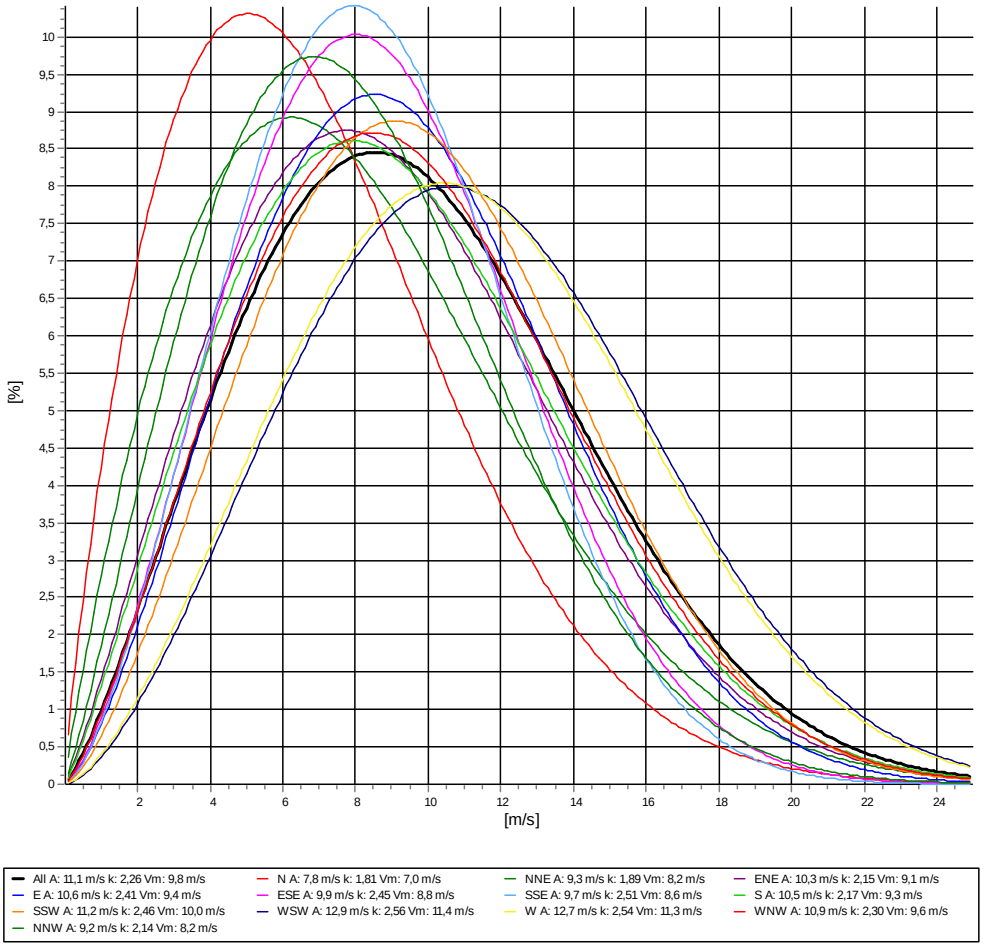
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **120,00m - MCP LT - 120m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,84	1,813	3,61	6,97
1-NNE	9,27	1,887	4,59	8,23
2-ENE	10,32	2,155	6,05	9,14
3-E	10,64	2,413	7,33	9,43
4-ESE	9,91	2,451	7,51	8,79
5-SSE	9,73	2,512	6,40	8,63
6-S	10,53	2,168	7,21	9,33
7-SSW	11,23	2,459	8,80	9,96
8-WSW	12,88	2,563	13,84	11,44
9-W	12,72	2,539	18,65	11,29
10-WNW	10,86	2,299	10,94	9,62
11-NNW	9,21	2,136	5,06	8,16
Mean	**11,05**	**2,260**	**100,00**	**9,79**



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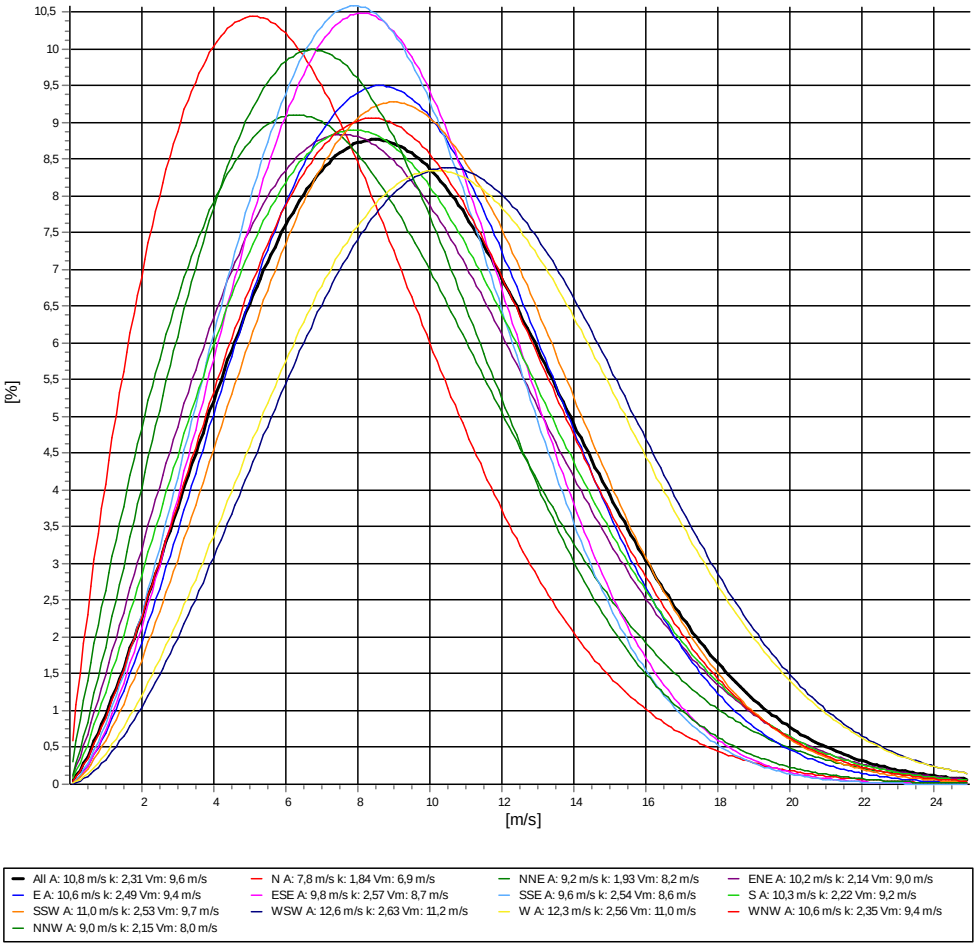
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **100,00m - MCP LT - 100m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,81	1,843	3,52	6,94
1-NNE	9,20	1,927	4,69	8,16
2-ENE	10,17	2,142	6,06	9,00
3-E	10,60	2,492	7,28	9,41
4-ESE	9,83	2,566	7,64	8,73
5-SSE	9,64	2,535	6,39	8,56
6-S	10,35	2,216	7,28	9,16
7-SSW	10,99	2,529	9,01	9,75
8-WSW	12,55	2,633	14,03	11,16
9-W	12,34	2,563	18,53	10,96
10-WNW	10,63	2,353	10,55	9,42
11-NNW	9,03	2,154	5,03	8,00
Mean	**10,84**	**2,313**	**100,00**	**9,61**



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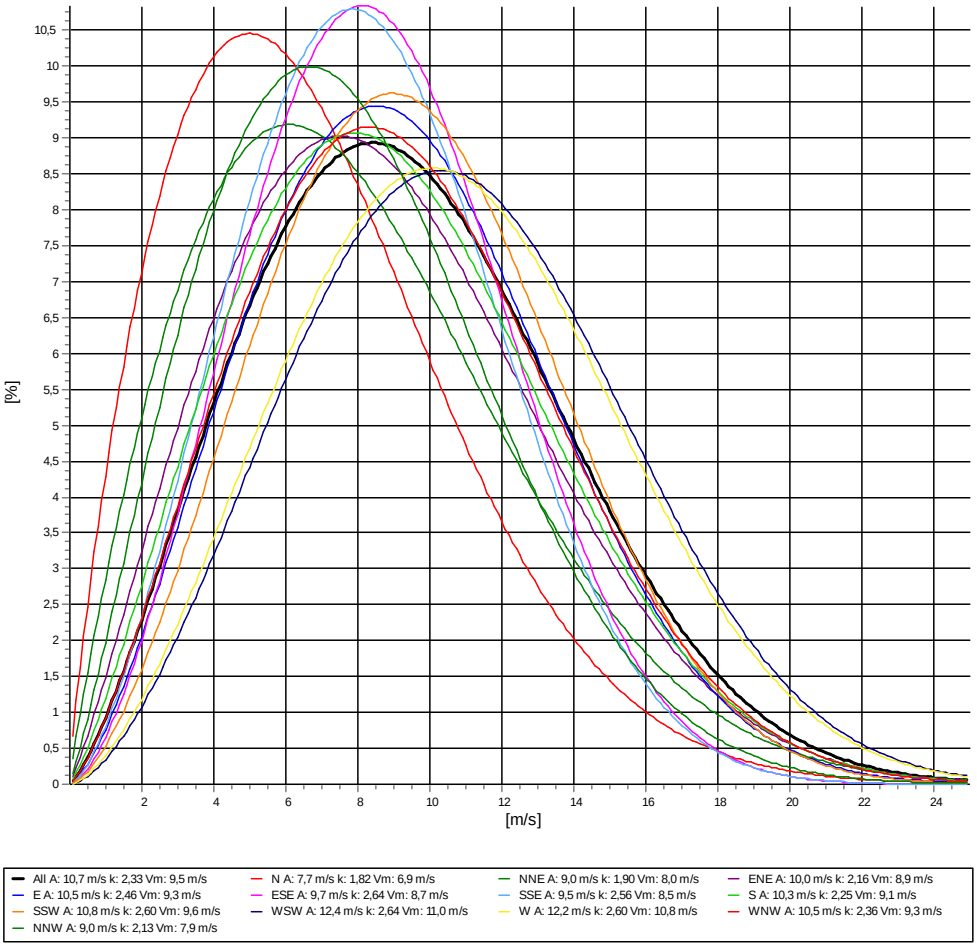
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **90,00m - MCP LT - 90m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,74	1,820	3,43	6,88
1-NNE	9,04	1,902	4,80	8,03
2-ENE	10,01	2,159	6,11	8,87
3-E	10,54	2,456	7,27	9,35
4-ESE	9,74	2,642	7,71	8,65
5-SSE	9,53	2,557	6,29	8,46
6-S	10,27	2,250	7,43	9,10
7-SSW	10,83	2,599	9,04	9,62
8-WSW	12,35	2,643	14,20	10,98
9-W	12,15	2,601	18,39	10,79
10-WNW	10,53	2,356	10,34	9,33
11-NNW	8,96	2,132	4,99	7,94
Mean	**10,71**	**2,333**	**100,00**	**9,49**



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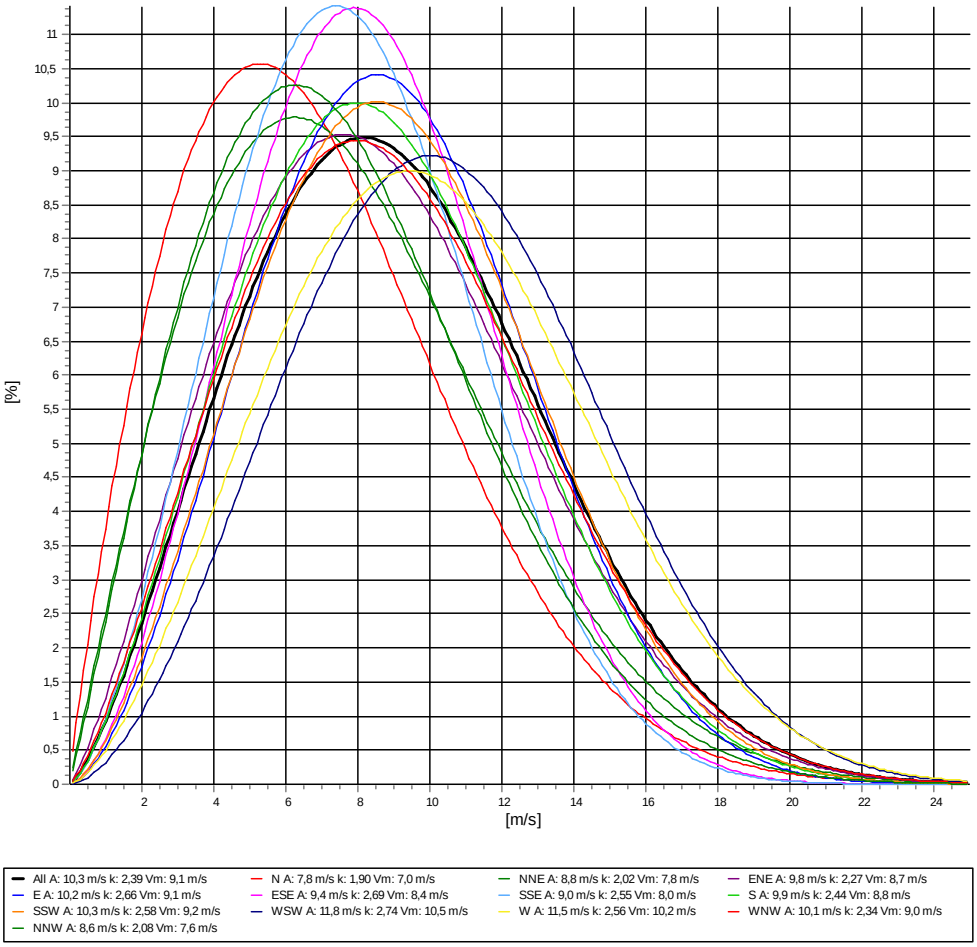
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **60,00m - MCP LT - 60m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,84	1,896	3,50	6,96
1-NNE	8,81	2,015	5,05	7,81
2-ENE	9,83	2,269	5,99	8,71
3-E	10,20	2,661	7,20	9,07
4-ESE	9,40	2,687	8,17	8,36
5-SSE	8,98	2,550	6,21	7,97
6-S	9,90	2,435	7,42	8,77
7-SSW	10,33	2,576	9,17	9,17
8-WSW	11,81	2,742	14,59	10,51
9-W	11,45	2,564	18,05	10,17
10-WNW	10,14	2,336	9,91	8,99
11-NNW	8,57	2,077	4,76	7,59
Mean	**10,27**	**2,388**	**100,00**	**9,10**



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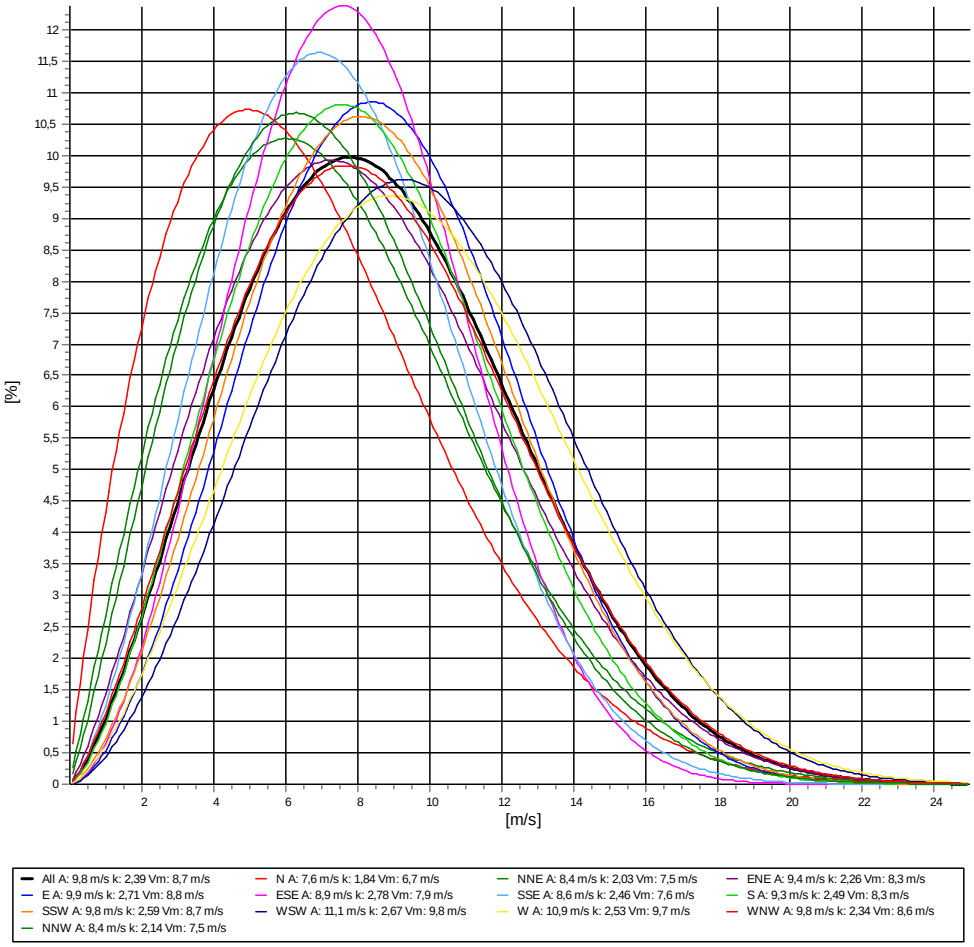
Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **40,00m - MCP LT - 40m (1) - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,60	1,839	3,50	6,75
1-NNE	8,43	2,027	5,18	7,47
2-ENE	9,41	2,257	5,85	8,33
3-E	9,94	2,711	7,41	8,84
4-ESE	8,89	2,776	8,18	7,91
5-SSE	8,57	2,458	6,23	7,60
6-S	9,31	2,490	7,53	8,26
7-SSW	9,78	2,586	9,24	8,68
8-WSW	11,07	2,668	14,95	9,84
9-W	10,88	2,525	17,71	9,65
10-WNW	9,76	2,343	9,60	8,65
11-NNW	8,42	2,141	4,62	7,45
Mean	**9,78**	**2,389**	**100,00**	**8,67**



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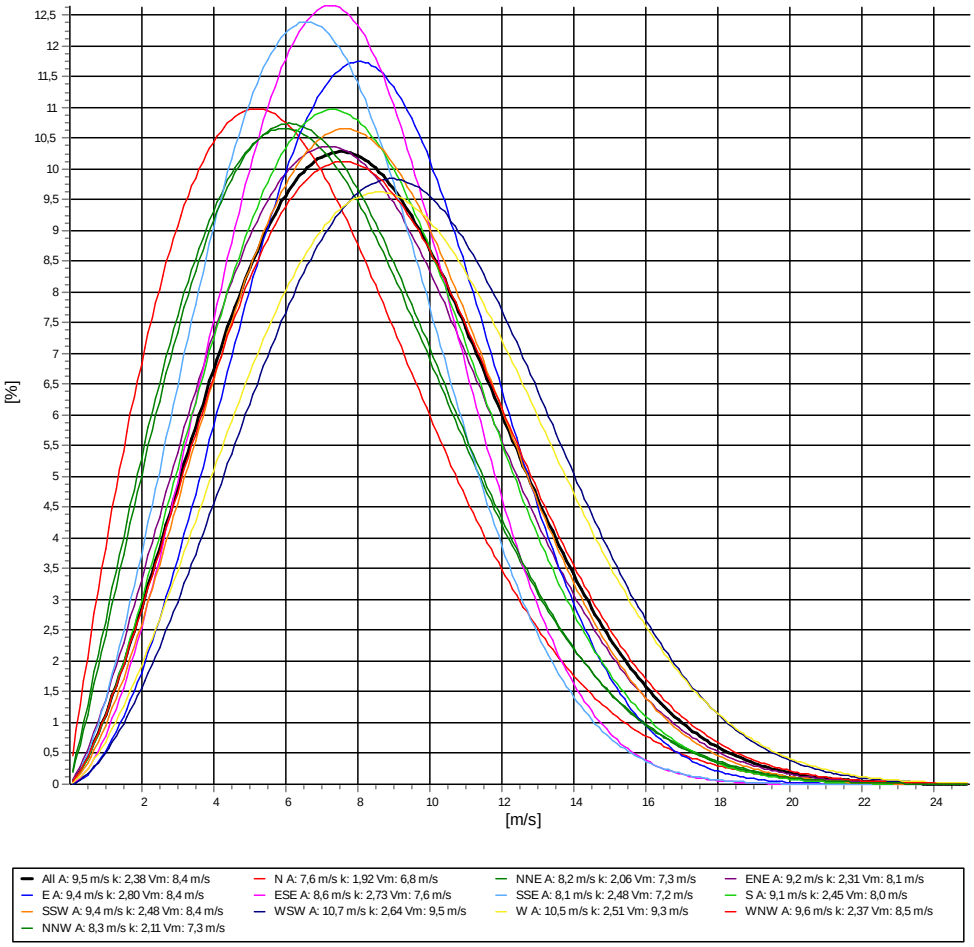
21/08/2023 13.42

Meteo data report - Weibull data overview

Mast: Buoy 3 WS199 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **30,00m - MCP LT - MCP 30m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,61	1,919	3,59	6,75
1-NNE	8,21	2,063	5,20	7,28
2-ENE	9,17	2,314	5,90	8,13
3-E	9,42	2,795	7,31	8,39
4-ESE	8,57	2,728	8,33	7,62
5-SSE	8,10	2,482	6,10	7,19
6-S	9,05	2,446	7,61	8,03
7-SSW	9,42	2,481	9,24	8,36
8-WSW	10,72	2,638	15,07	9,52
9-W	10,51	2,505	17,61	9,33
10-WNW	9,57	2,371	9,58	8,48
11-NNW	8,28	2,110	4,44	7,33
Mean	**9,46**	**2,384**	**100,00**	**8,39**



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Calculated:
21/08/2023 13.44

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

270,00m - MCP LT - 270m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,30	7,46	7,93	9,57	9,42	8,66	8,70	9,61	10,65	11,73	12,31	10,62	8,97
0		0,49	327	27	40	31	36	32	17	16	24	48	8	19	29
1	0,50	1,49	2146	132	194	275	172	127	118	182	219	233	180	150	164
2	1,50	2,49	4883	345	397	536	385	318	348	380	397	437	648	423	269
3	2,50	3,49	7707	461	509	601	759	697	610	569	612	784	1051	671	383
4	3,50	4,49	9031	554	637	774	940	558	643	687	794	746	1032	1130	536
5	4,50	5,49	11065	849	519	892	1041	640	880	924	971	1041	1369	1190	749
6	5,50	6,49	11945	918	434	899	1088	955	882	905	809	1113	1514	1487	941
7	6,50	7,49	12323	765	470	795	846	916	997	764	944	1223	1623	1806	1174
8	7,50	8,49	13370	692	504	656	1067	1239	923	760	1033	1510	2102	1892	992
9	8,50	9,49	12553	466	469	537	1175	1080	889	763	1029	1290	1998	1938	919
10	9,50	10,49	12146	376	415	619	988	1049	954	894	838	1292	2465	1577	679
11	10,50	11,49	11988	312	403	746	989	897	839	784	805	1415	2454	1620	724
12	11,50	12,49	10680	210	320	815	876	734	577	711	928	1272	2120	1495	622
13	12,50	13,49	9842	222	291	790	929	499	465	648	850	1318	2112	1299	419
14	13,50	14,49	8999	230	191	544	717	390	491	753	833	1255	2011	1228	356
15	14,50	15,49	6900	108	205	387	413	410	390	587	574	1159	1585	841	241
16	15,50	16,49	5212	94	102	181	311	228	258	343	467	910	1450	640	228
17	16,50	17,49	5008	98	69	212	304	130	118	312	438	945	1469	703	210
18	17,50	18,49	4920	55	64	411	336	79	78	273	415	820	1616	588	185
19	18,50	19,49	3801	30	52	296	252	45	72	150	570	735	1106	390	103
20	19,50	20,49	3039	13	34	217	159	10	45	110	393	579	1097	313	69
21	20,50	21,49	1968	10	18	151	132	3	28	62	191	371	699	247	56
22	21,50	22,49	1539	6	16	87	38	1	14	28	158	296	595	273	27
23	22,50	23,49	1159	3	10	45	17	0	5	24	99	296	427	207	26
24	23,50	24,49	841	0	2	27	9	0	2	18	66	225	310	171	11
25	24,50	25,49	613	0	4	8	4	0	2	9	44	147	287	103	5
26	25,50	26,49	489	2	4	3	0	0	0	12	36	120	226	86	0
27	26,50	27,49	233	0	0	2	0	0	2	8	19	35	131	35	1
28	27,50	28,49	170	0	0	0	0	0	0	5	18	25	91	28	3
29	28,50	29,49	152	0	0	0	0	0	0	3	8	20	88	33	0
30	29,50	30,49	101	0	0	0	0	0	0	2	3	39	47	10	0
31	30,50	31,49	76	0	0	0	0	0	0	1	6	12	51	6	0
32	31,50	32,49	39	0	0	0	0	0	0	1	1	9	26	2	0
33	32,50	33,49	33	0	0	0	0	0	0	1	1	8	23	0	0
34	33,50	34,49	15	0	0	0	0	0	0	1	1	2	11	0	0
35	34,50	35,49	6	0	0	0	0	0	0	0	1	0	5	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	1	0	0	0	0	0	0	0	0	0	1	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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21/08/2023 13.44

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

240,00m - MCP LT - 240m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,22	7,34	8,08	9,62	9,38	8,69	8,61	9,60	10,74	11,61	12,16	10,44	8,82
0		0,49	321	27	27	27	18	47	34	21	17	38	23	17	25
1	0,50	1,49	2168	149	207	235	168	138	167	179	185	242	173	150	175
2	1,50	2,49	4814	319	387	516	392	319	318	381	362	468	664	390	298
3	2,50	3,49	7893	489	475	657	798	636	702	617	558	812	1035	716	398
4	3,50	4,49	8995	573	622	729	937	638	630	673	805	729	1020	1090	549
5	4,50	5,49	11074	836	468	889	1031	628	851	991	1077	1045	1319	1168	771
6	5,50	6,49	11872	877	389	887	1047	922	928	934	772	1141	1504	1555	916
7	6,50	7,49	12594	846	466	849	806	918	953	720	931	1308	1789	1833	1175
8	7,50	8,49	13496	696	531	707	1121	1286	998	808	1095	1340	2057	1855	1002
9	8,50	9,49	12497	471	448	533	1191	1076	838	737	952	1336	2089	1918	908
10	9,50	10,49	12678	348	508	675	992	1021	938	940	890	1442	2626	1622	676
11	10,50	11,49	12025	258	432	752	1031	925	836	843	844	1337	2369	1582	816
12	11,50	12,49	10702	198	303	779	953	764	623	711	1003	1370	2034	1477	487
13	12,50	13,49	9853	231	277	807	920	523	417	678	811	1353	2168	1267	401
14	13,50	14,49	8912	204	223	482	706	380	501	781	943	1414	1848	1119	311
15	14,50	15,49	6567	109	216	335	414	422	302	493	593	1049	1535	828	271
16	15,50	16,49	5478	95	99	228	307	240	294	337	437	1001	1518	670	252
17	16,50	17,49	5195	82	95	219	292	145	154	316	538	1024	1530	650	150
18	17,50	18,49	4810	46	54	388	281	73	107	326	492	920	1405	542	176
19	18,50	19,49	3687	32	56	380	256	40	47	186	503	587	1125	364	111
20	19,50	20,49	2743	14	26	207	175	15	43	100	355	504	963	271	70
21	20,50	21,49	2054	5	20	147	98	3	33	70	216	388	783	239	52
22	21,50	22,49	1470	3	12	84	36	2	9	34	135	302	536	289	28
23	22,50	23,49	927	3	12	45	18	0	1	21	103	236	297	171	20
24	23,50	24,49	843	0	1	25	6	0	1	18	58	219	407	104	4
25	24,50	25,49	582	0	5	12	2	0	1	10	50	152	260	87	3
26	25,50	26,49	415	1	2	3	1	1	1	10	32	101	206	57	0
27	26,50	27,49	216	1	0	1	0	0	0	7	32	20	122	33	0
28	27,50	28,49	140	0	0	1	0	0	0	4	13	10	90	22	0
29	28,50	29,49	112	0	0	0	0	0	0	2	6	43	37	24	0
30	29,50	30,49	80	0	0	0	0	0	0	3	5	13	52	7	0
31	30,50	31,49	45	0	0	0	0	0	0	0	3	8	33	1	0
32	31,50	32,49	31	0	0	0	0	0	0	2	1	6	20	2	0
33	32,50	33,49	13	0	0	0	0	0	0	0	0	1	11	1	0
34	33,50	34,49	15	0	0	0	0	0	0	1	2	2	10	0	0
35	34,50	35,49	2	0	0	0	0	0	0	0	0	0	2	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	1	0	0	0	0	0	0	0	0	1	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

200,00m - MCP LT - 200m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,09	7,34	7,95	9,57	9,36	8,69	8,61	9,57	10,85	11,36	11,91	10,14	8,69
0		0,49	297	19	21	41	47	24	23	20	16	31	22	12	21
1	0,50	1,49	2141	143	225	221	181	157	138	165	171	261	166	150	163
2	1,50	2,49	4908	334	435	502	380	340	341	428	353	505	606	430	254
3	2,50	3,49	7666	473	500	609	681	606	737	532	512	828	1017	722	449
4	3,50	4,49	9379	591	621	756	1015	642	695	698	853	744	1080	1132	552
5	4,50	5,49	11071	803	481	907	978	652	912	1081	1018	1011	1313	1171	744
6	5,50	6,49	11533	878	387	838	996	859	865	877	775	1098	1529	1527	904
7	6,50	7,49	13454	845	515	1000	873	998	998	848	894	1413	1921	1966	1183
8	7,50	8,49	13976	736	454	724	1174	1262	1014	901	1071	1371	2255	1945	1069
9	8,50	9,49	12647	417	504	534	1239	1153	856	743	1062	1316	2228	1794	801
10	9,50	10,49	12393	366	530	620	929	1039	871	903	810	1558	2397	1634	736
11	10,50	11,49	12494	269	420	842	1051	1036	847	863	921	1537	2411	1556	741
12	11,50	12,49	10462	182	410	753	925	709	612	657	971	1411	2055	1303	474
13	12,50	13,49	10421	251	300	794	929	541	493	733	1034	1502	2168	1274	402
14	13,50	14,49	8458	191	191	467	647	368	492	757	1018	1272	1792	1000	263
15	14,50	15,49	6810	117	159	229	485	471	487	475	612	1155	1562	781	277
16	15,50	16,49	5502	102	119	207	320	202	207	321	604	1063	1455	703	199
17	16,50	17,49	5296	71	76	368	274	142	102	332	619	993	1589	547	183
18	17,50	18,49	4726	46	63	446	282	65	144	346	478	825	1388	506	137
19	18,50	19,49	3328	28	39	319	231	30	60	180	506	559	1002	290	84
20	19,50	20,49	2621	12	26	157	162	16	35	99	329	485	952	276	72
21	20,50	21,49	1831	5	20	141	94	3	15	76	177	344	685	235	36
22	21,50	22,49	999	4	12	82	36	0	7	33	132	205	286	173	29
23	22,50	23,49	1009	1	2	38	18	0	3	21	100	274	407	134	11
24	23,50	24,49	681	0	3	25	5	0	1	15	73	164	295	97	3
25	24,50	25,49	437	1	5	8	3	1	2	13	44	79	220	60	1
26	25,50	26,49	321	1	0	4	1	0	1	10	28	57	181	38	0
27	26,50	27,49	180	0	0	1	0	0	0	11	20	27	105	16	0
28	27,50	28,49	103	0	0	1	0	0	0	2	9	13	52	26	0
29	28,50	29,49	64	0	0	0	0	0	0	3	4	11	35	11	0
30	29,50	30,49	50	0	0	0	0	0	0	1	4	8	35	2	0
31	30,50	31,49	30	0	0	0	0	0	0	0	0	7	22	1	0
32	31,50	32,49	19	0	0	0	0	0	0	2	0	2	15	0	0
33	32,50	33,49	10	0	0	0	0	0	0	0	2	2	6	0	0
34	33,50	34,49	2	0	0	0	0	0	0	1	0	0	1	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	1	0	0	0	0	0	0	0	0	1	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

180,00m - MCP LT - 180m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			10,00	7,25	7,97	9,53	9,36	8,70	8,60	9,57	10,85	11,22	11,75	9,93	8,59
0		0,49	294	28	28	32	41	19	31	17	15	16	27	10	30
1	0,50	1,49	2234	158	209	212	169	176	123	188	205	268	209	160	157
2	1,50	2,49	4872	359	422	503	377	338	343	376	369	480	609	439	257
3	2,50	3,49	7708	438	515	595	659	629	734	526	518	884	961	786	463
4	3,50	4,49	9180	600	586	768	981	654	669	689	769	756	1012	1114	582
5	4,50	5,49	11311	871	482	903	1000	609	947	1125	1054	1011	1376	1191	742
6	5,50	6,49	11699	828	424	828	1010	856	870	917	803	1117	1597	1570	879
7	6,50	7,49	13469	820	508	1011	834	1055	1021	774	919	1456	2011	1931	1129
8	7,50	8,49	13977	735	502	741	1240	1240	1072	901	1043	1292	2107	2023	1081
9	8,50	9,49	13032	405	495	589	1212	1141	875	842	1039	1472	2388	1779	795
10	9,50	10,49	12642	365	544	654	1036	992	914	860	898	1557	2394	1668	760
11	10,50	11,49	12458	215	404	935	1145	1041	833	866	972	1540	2239	1551	717
12	11,50	12,49	10633	229	419	683	776	730	632	670	918	1572	2271	1322	411
13	12,50	13,49	10530	236	269	752	967	587	511	811	1228	1567	2043	1158	401
14	13,50	14,49	8472	173	220	500	646	440	521	712	1002	1234	1757	973	294
15	14,50	15,49	6996	113	162	243	416	427	525	481	755	1159	1590	847	278
16	15,50	16,49	5317	97	111	221	363	210	150	296	594	1104	1413	612	146
17	16,50	17,49	5374	70	83	370	294	128	116	340	596	1062	1576	555	184
18	17,50	18,49	4376	41	64	424	253	79	116	340	601	631	1339	383	105
19	18,50	19,49	3291	26	35	296	247	29	75	204	433	576	941	312	117
20	19,50	20,49	2334	10	29	182	138	14	17	90	264	404	878	237	71
21	20,50	21,49	1598	7	14	121	103	2	15	66	242	267	572	174	15
22	21,50	22,49	1118	3	12	72	29	0	5	35	132	252	393	166	19
23	22,50	23,49	812	0	2	32	16	0	4	24	89	213	325	101	6
24	23,50	24,49	589	0	6	17	4	1	1	12	55	146	257	87	3
25	24,50	25,49	447	1	2	5	2	0	2	15	34	83	257	46	0
26	25,50	26,49	203	1	0	3	0	0	1	9	27	49	93	20	0
27	26,50	27,49	139	0	0	1	0	0	0	8	13	23	72	22	0
28	27,50	28,49	88	0	0	0	0	0	0	6	6	11	53	12	0
29	28,50	29,49	46	0	0	0	0	0	0	2	5	7	28	4	0
30	29,50	30,49	38	0	0	0	0	0	0	0	2	7	28	1	0
31	30,50	31,49	23	0	0	0	0	0	0	0	1	5	16	1	0
32	31,50	32,49	11	0	0	0	0	0	0	1	1	1	8	0	0
33	32,50	33,49	6	0	0	0	0	0	0	0	0	1	5	0	0
34	33,50	34,49	2	0	0	0	0	0	0	1	1	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	1	0	0	0	0	0	0	0	0	1	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.44

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - MCP LT - 150m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,87	7,13	7,92	9,54	9,39	8,53	8,66	9,60	10,59	11,05	11,45	9,78	8,48
0		0,49	361	57	43	16	27	31	18	39	47	15	32	13	23
1	0,50	1,49	2384	177	275	215	168	195	177	160	248	215	234	174	146
2	1,50	2,49	4969	307	427	530	394	434	332	306	366	500	646	468	259
3	2,50	3,49	7120	374	460	573	600	588	610	521	595	771	855	724	449
4	3,50	4,49	9382	679	607	749	951	600	653	675	782	800	1028	1119	739
5	4,50	5,49	11745	783	595	950	953	730	931	1107	1076	1103	1482	1340	695
6	5,50	6,49	11875	775	442	907	848	891	952	869	872	1162	1694	1507	956
7	6,50	7,49	13162	799	461	912	966	998	1063	879	874	1374	2018	1821	997
8	7,50	8,49	14332	787	559	727	1198	1203	1127	892	1154	1534	2216	1876	1059
9	8,50	9,49	13580	444	587	546	1418	1257	966	936	1120	1485	2393	1608	820
10	9,50	10,49	13019	335	431	803	1104	1048	939	840	919	1712	2474	1616	798
11	10,50	11,49	12248	235	431	988	1059	1030	787	915	984	1465	2304	1490	560
12	11,50	12,49	11578	200	430	691	1044	917	684	804	1255	1602	2156	1332	463
13	12,50	13,49	10054	215	260	629	775	559	678	801	1163	1439	1915	1217	403
14	13,50	14,49	8068	138	155	551	658	355	547	642	831	1320	1718	801	352
15	14,50	15,49	7271	90	166	396	467	358	399	470	828	1376	1656	827	238
16	15,50	16,49	5897	72	118	294	344	138	153	319	752	1217	1648	690	152
17	16,50	17,49	5113	48	83	358	328	135	150	436	751	782	1391	487	164
18	17,50	18,49	3919	35	65	499	376	66	109	326	521	576	957	268	121
19	18,50	19,49	3081	19	66	240	186	14	57	125	390	565	1071	285	63
20	19,50	20,49	2168	10	32	140	100	7	40	93	323	414	761	202	46
21	20,50	21,49	1262	8	29	93	51	0	12	48	157	244	404	186	30
22	21,50	22,49	901	3	12	66	16	0	4	31	63	203	342	143	18
23	22,50	23,49	684	2	8	19	6	0	5	27	28	177	339	70	3
24	23,50	24,49	511	0	4	11	0	0	0	19	34	97	253	93	0
25	24,50	25,49	307	3	2	4	0	0	3	12	15	84	149	34	1
26	25,50	26,49	109	2	2	0	0	0	0	5	7	17	58	17	1
27	26,50	27,49	88	0	2	0	0	0	0	5	12	7	50	12	0
28	27,50	28,49	50	0	0	1	0	0	0	2	3	11	30	3	0
29	28,50	29,49	46	0	1	0	0	0	0	2	3	12	28	0	0
30	29,50	30,49	15	0	1	0	0	0	0	1	0	4	9	0	0
31	30,50	31,49	13	0	0	0	0	0	0	0	0	5	8	0	0
32	31,50	32,49	5	0	0	0	0	0	0	0	0	1	4	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	3	0	0	0	0	0	0	2	0	0	1	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

120,00m - MCP LT - 120m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,71	7,04	8,08	9,46	9,27	8,61	8,57	9,54	10,45	10,74	11,21	9,48	8,27
0		0,49	339	75	21	17	28	9	28	30	15	39	44	17	16
1	0,50	1,49	2282	189	201	205	184	125	164	173	217	242	222	195	165
2	1,50	2,49	5057	304	430	538	433	436	342	346	456	511	459	444	358
3	2,50	3,49	7348	384	456	629	630	602	599	435	662	758	957	807	429
4	3,50	4,49	9292	624	591	775	837	666	657	770	829	831	939	1078	695
5	4,50	5,49	11628	811	596	932	918	759	880	1026	1067	974	1446	1345	874
6	5,50	6,49	11793	714	443	851	860	838	783	916	913	1107	1897	1631	840
7	6,50	7,49	13608	748	425	915	990	945	1257	1008	1016	1489	2116	1809	890
8	7,50	8,49	14669	677	566	774	1337	1374	1119	925	1219	1447	2240	1978	1013
9	8,50	9,49	13910	469	544	616	1422	1323	1008	980	1194	1509	2364	1697	784
10	9,50	10,49	13256	316	487	880	1229	1050	988	854	908	1560	2541	1617	826
11	10,50	11,49	13137	240	461	1146	1160	1069	889	915	1109	1514	2602	1452	580
12	11,50	12,49	11677	233	368	717	972	954	701	795	1354	1799	2053	1269	462
13	12,50	13,49	10161	142	229	624	757	594	819	756	1180	1572	2031	1090	367
14	13,50	14,49	8976	139	277	705	787	437	501	769	1009	1544	1709	795	304
15	14,50	15,49	6962	74	172	424	400	206	263	501	965	1284	1759	734	180
16	15,50	16,49	5902	85	132	448	337	216	226	425	689	863	1632	664	185
17	16,50	17,49	4623	52	86	346	312	189	128	321	676	851	1151	392	119
18	17,50	18,49	3422	35	70	300	209	35	47	199	595	627	932	282	91
19	18,50	19,49	2603	17	43	225	143	17	16	164	461	348	862	237	70
20	19,50	20,49	1692	8	30	138	167	6	7	111	204	268	548	171	34
21	20,50	21,49	913	6	18	60	21	0	3	53	80	125	398	129	20
22	21,50	22,49	810	0	9	36	8	0	1	35	59	133	395	121	13
23	22,50	23,49	513	1	9	11	2	0	0	28	33	156	218	53	2
24	23,50	24,49	308	1	5	7	0	0	0	15	18	69	163	28	2
25	24,50	25,49	172	1	3	6	0	0	0	6	15	30	90	21	0
26	25,50	26,49	120	0	4	1	0	0	0	6	9	11	72	16	1
27	26,50	27,49	68	0	1	1	0	0	0	2	1	10	44	9	0
28	27,50	28,49	22	0	0	1	0	0	0	3	2	4	12	0	0
29	28,50	29,49	32	0	0	0	0	0	0	3	1	3	24	1	0
30	29,50	30,49	18	0	0	0	0	0	0	1	0	5	12	0	0
31	30,50	31,49	3	0	0	0	0	0	0	0	0	1	2	0	0
32	31,50	32,49	3	0	0	0	0	0	0	0	0	1	2	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	1	0	0	0	0	0	0	0	0	0	1	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.44

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

100,00m - MCP LT - 100m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,51	7,00	7,83	9,44	9,05	8,57	8,44	9,42	10,22	10,49	10,90	9,26	8,02
0		0,49	395	73	32	22	13	26	20	33	31	56	30	16	43
1	0,50	1,49	2353	214	219	183	197	127	175	137	190	270	196	227	218
2	1,50	2,49	5006	273	456	534	405	406	384	323	446	456	480	477	366
3	2,50	3,49	7429	419	493	605	666	580	614	446	640	698	1018	810	440
4	3,50	4,49	9297	593	574	781	929	655	634	813	856	800	945	1036	681
5	4,50	5,49	11897	794	693	965	875	807	868	908	1071	964	1534	1471	947
6	5,50	6,49	11985	690	431	858	868	811	830	1011	1002	1210	1920	1576	778
7	6,50	7,49	14018	754	443	890	992	978	1189	1077	1089	1482	2207	1933	984
8	7,50	8,49	14884	646	634	763	1399	1415	1193	921	1304	1569	2297	1777	966
9	8,50	9,49	15150	476	640	876	1615	1400	1156	1119	1278	1465	2596	1775	754
10	9,50	10,49	13783	327	470	1059	1221	1085	1022	849	1024	1743	2616	1585	782
11	10,50	11,49	12851	252	297	964	1042	1000	769	893	1255	1804	2533	1423	619
12	11,50	12,49	11826	201	384	711	924	950	714	957	1408	1838	2044	1259	436
13	12,50	13,49	10596	137	285	855	772	693	772	865	1285	1625	2055	960	292
14	13,50	14,49	8720	131	255	631	720	345	433	683	1206	1485	1763	774	294
15	14,50	15,49	7312	77	153	521	522	315	373	556	889	1057	1803	851	195
16	15,50	16,49	5079	94	133	312	281	182	166	352	679	956	1315	478	131
17	16,50	17,49	4016	44	62	310	181	105	77	261	749	755	1016	336	120
18	17,50	18,49	3096	23	62	386	219	31	26	212	506	421	860	271	79
19	18,50	19,49	2247	25	33	238	146	7	5	137	246	322	840	193	55
20	19,50	20,49	1069	4	27	93	57	3	10	65	99	101	435	146	29
21	20,50	21,49	879	4	10	56	4	0	0	43	51	150	436	109	16
22	21,50	22,49	558	0	15	22	5	0	0	27	45	158	219	60	7
23	22,50	23,49	397	1	4	12	0	0	0	18	24	73	203	62	0
24	23,50	24,49	190	1	7	9	0	0	0	3	18	48	81	23	0
25	24,50	25,49	129	1	3	1	0	0	0	9	8	21	65	20	1
26	25,50	26,49	79	0	0	2	0	0	0	3	1	5	61	7	0
27	26,50	27,49	32	0	0	1	0	0	0	4	1	5	19	2	0
28	27,50	28,49	25	0	0	0	0	0	0	0	0	3	21	1	0
29	28,50	29,49	15	0	0	0	0	0	0	0	1	5	9	0	0
30	29,50	30,49	4	0	0	0	0	0	0	0	0	2	2	0	0
31	30,50	31,49	2	0	0	0	0	0	0	0	0	0	2	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	0	1	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

90,00m - MCP LT - 90m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,40	6,94	7,84	9,32	8,97	8,50	8,41	9,34	10,12	10,27	10,73	9,15	7,98
0		0,49	431	74	33	26	13	31	12	35	30	51	41	35	50
1	0,50	1,49	2393	240	199	218	187	145	179	127	184	277	190	230	217
2	1,50	2,49	4907	327	408	550	382	357	341	351	427	449	460	449	406
3	2,50	3,49	7509	402	511	629	671	604	616	448	625	720	1010	795	478
4	3,50	4,49	9496	579	568	819	978	665	622	823	864	862	985	1021	710
5	4,50	5,49	11992	799	636	858	926	808	834	974	1119	1026	1587	1558	867
6	5,50	6,49	12278	705	454	909	936	851	785	956	917	1255	2001	1666	843
7	6,50	7,49	13937	733	462	910	927	1037	1231	1097	1181	1523	2225	1758	853
8	7,50	8,49	15569	681	599	794	1578	1499	1243	1003	1316	1629	2493	1744	990
9	8,50	9,49	15053	436	641	905	1651	1383	1159	1073	1250	1453	2606	1751	745
10	9,50	10,49	14131	384	487	1188	1170	976	896	889	1194	1886	2673	1627	761
11	10,50	11,49	13267	195	326	1003	1029	1071	868	968	1392	1984	2473	1362	596
12	11,50	12,49	11641	197	369	568	878	1010	683	963	1471	1837	2037	1220	408
13	12,50	13,49	10843	156	302	972	775	570	773	839	1444	1680	2046	933	353
14	13,50	14,49	8502	123	220	618	719	404	428	771	1176	1289	1748	720	286
15	14,50	15,49	6819	108	155	490	517	299	349	505	788	905	1761	766	176
16	15,50	16,49	4970	69	121	256	243	195	134	357	747	936	1282	509	121
17	16,50	17,49	3897	36	72	349	216	60	45	257	733	717	955	331	126
18	17,50	18,49	2808	35	49	339	186	22	17	194	415	415	857	205	74
19	18,50	19,49	1927	16	35	233	162	4	10	101	169	198	725	215	59
20	19,50	20,49	1008	8	19	79	36	0	2	63	87	159	390	137	28
21	20,50	21,49	762	1	9	48	3	0	1	27	54	136	376	90	17
22	21,50	22,49	484	3	8	14	5	0	0	24	20	73	258	74	5
23	22,50	23,49	293	0	8	14	0	0	0	7	22	82	122	35	3
24	23,50	24,49	181	1	3	5	0	0	0	8	10	48	88	17	1
25	24,50	25,49	109	0	4	3	0	0	0	2	2	12	67	18	1
26	25,50	26,49	49	0	0	0	0	0	0	5	4	6	29	5	0
27	26,50	27,49	29	0	0	0	0	0	0	0	0	5	24	0	0
28	27,50	28,49	17	0	0	0	0	0	0	0	1	1	14	1	0
29	28,50	29,49	10	0	0	0	0	0	0	1	0	3	6	0	0
30	29,50	30,49	7	0	0	0	0	0	0	0	0	5	2	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	1	0	0	0	0	0	0	0	0	0	1	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
21/08/2023 13.44

Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

60,00m - MCP LT - 60m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,01	6,83	7,57	8,96	8,64	8,34	8,05	8,96	9,62	9,83	10,13	8,85	7,72
0		0,49	528	60	59	76	66	23	32	31	40	62	29	23	27
1	0,50	1,49	2485	246	208	225	189	152	132	141	208	314	276	196	198
2	1,50	2,49	4889	269	500	523	369	354	356	407	369	387	530	439	386
3	2,50	3,49	7574	393	473	663	651	585	574	448	661	694	952	862	618
4	3,50	4,49	9747	595	572	848	902	592	715	746	908	915	1223	1036	695
5	4,50	5,49	12518	723	677	903	914	833	905	1263	989	1109	1775	1561	866
6	5,50	6,49	13038	687	525	929	928	962	871	1143	1092	1358	2123	1624	796
7	6,50	7,49	14966	834	600	889	1177	1239	1172	1057	1286	1577	2473	1716	946
8	7,50	8,49	16592	651	665	948	1703	1581	1291	1122	1405	1712	2761	1821	932
9	8,50	9,49	16440	312	662	1396	1841	1520	1134	914	1377	1799	2945	1791	749
10	9,50	10,49	15070	302	460	950	1216	1233	1000	1210	1524	2051	2845	1574	705
11	10,50	11,49	14316	293	287	983	1166	1198	843	1223	1862	2205	2379	1324	553
12	11,50	12,49	12715	183	408	1085	1063	921	813	1070	1631	1784	2320	1004	433
13	12,50	13,49	9706	108	413	854	639	554	552	938	1375	1585	1652	763	273
14	13,50	14,49	7620	106	149	647	606	380	300	543	927	1154	1800	791	217
15	14,50	15,49	5337	86	85	244	345	183	131	440	949	825	1383	562	104
16	15,50	16,49	4013	60	107	268	166	73	68	327	628	761	1094	388	73
17	16,50	17,49	2874	41	57	373	127	35	28	168	233	434	940	304	134
18	17,50	18,49	1953	27	38	169	121	10	7	114	142	279	712	249	85
19	18,50	19,49	1135	11	30	103	53	3	4	60	72	151	485	116	47
20	19,50	20,49	678	2	21	56	20	0	1	29	47	106	278	103	15
21	20,50	21,49	520	2	10	29	6	0	0	15	24	117	243	61	13
22	21,50	22,49	282	0	10	12	10	0	0	6	24	57	115	45	3
23	22,50	23,49	149	0	0	7	1	0	0	4	7	36	81	11	2
24	23,50	24,49	78	0	2	4	0	0	0	2	2	15	42	10	1
25	24,50	25,49	47	1	2	2	0	0	0	0	0	3	30	8	1
26	25,50	26,49	14	0	1	0	0	0	0	0	0	0	11	2	0
27	26,50	27,49	20	0	0	1	0	0	0	0	2	5	11	1	0
28	27,50	28,49	12	0	0	0	0	0	0	0	0	4	8	0	0
29	28,50	29,49	4	0	0	0	0	0	0	0	0	2	2	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

40,00m - MCP LT - 40m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,60	6,78	7,33	8,54	8,30	7,91	7,68	8,42	9,04	9,31	9,62	8,56	7,54
0		0,49	591	42	51	97	61	56	16	53	61	40	39	39	36
1	0,50	1,49	2581	237	203	266	204	179	161	165	261	255	280	181	189
2	1,50	2,49	5293	310	515	555	361	379	321	483	401	477	590	479	422
3	2,50	3,49	8091	418	473	729	721	632	574	503	691	783	1059	901	607
4	3,50	4,49	10399	574	578	838	879	643	771	883	874	1068	1422	1193	676
5	4,50	5,49	13525	749	642	962	1084	931	980	1389	1105	1286	2015	1555	827
6	5,50	6,49	14108	723	663	994	961	1083	1063	1255	1233	1533	2281	1542	777
7	6,50	7,49	16574	816	605	1069	1511	1577	1309	1074	1363	1815	2699	1744	992
8	7,50	8,49	17919	642	724	1214	1890	1698	1274	1174	1547	1979	3056	1790	931
9	8,50	9,49	17575	344	658	1290	1810	1695	1238	1188	1780	2014	3026	1798	734
10	9,50	10,49	15520	264	403	899	1203	1383	899	1440	2041	2210	2687	1448	643
11	10,50	11,49	14428	284	364	1241	1234	1182	790	1122	1759	2122	2564	1225	541
12	11,50	12,49	11253	189	433	911	780	586	620	1108	1591	1724	1958	987	366
13	12,50	13,49	8201	127	255	659	619	437	384	705	1099	1220	1715	743	238
14	13,50	14,49	6237	98	124	517	427	272	186	493	767	895	1621	660	177
15	14,50	15,49	4379	89	89	182	289	87	116	319	557	884	1162	512	93
16	15,50	16,49	3288	69	83	366	149	42	36	172	335	474	1126	330	106
17	16,50	17,49	2123	33	46	218	84	14	11	123	166	353	753	225	97
18	17,50	18,49	1397	16	33	161	93	4	5	49	91	195	507	195	48
19	18,50	19,49	718	2	19	68	36	0	1	24	35	118	272	95	48
20	19,50	20,49	498	2	12	27	16	0	0	21	20	81	237	68	14
21	20,50	21,49	293	2	6	19	9	0	0	5	21	82	106	39	4
22	21,50	22,49	136	0	3	6	4	0	0	3	4	26	60	29	1
23	22,50	23,49	85	0	1	3	1	0	0	1	1	15	56	6	1
24	23,50	24,49	55	0	1	4	0	0	0	0	0	9	31	10	0
25	24,50	25,49	18	0	0	1	0	0	0	0	0	1	14	2	0
26	25,50	26,49	20	0	0	1	0	0	0	0	1	4	12	2	0
27	26,50	27,49	10	0	0	0	0	0	0	0	0	5	5	0	0
28	27,50	28,49	5	0	0	0	0	0	0	0	0	2	3	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Meteo data report - Frequency distribution (TAB file data)

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

30,00m - MCP LT - 30m - [Matrix]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,33	6,54	7,21	8,28	7,96	7,55	7,34	8,15	8,76	9,00	9,37	8,38	7,35
0		0,49	492	39	54	49	55	41	30	41	64	37	46	23	13
1	0,50	1,49	2567	234	209	244	165	183	114	179	271	260	277	219	212
2	1,50	2,49	5641	394	424	550	414	439	334	496	478	588	593	478	453
3	2,50	3,49	8431	426	584	793	712	624	624	576	689	878	1066	875	584
4	3,50	4,49	10881	629	590	808	925	685	797	1035	985	1011	1413	1214	789
5	4,50	5,49	14891	799	699	1015	1213	1118	1184	1471	1191	1527	2125	1619	930
6	5,50	6,49	15221	784	692	1106	1214	1225	1130	1223	1372	1710	2350	1563	852
7	6,50	7,49	17365	805	648	1346	1731	1683	1279	1085	1532	1874	2941	1551	890
8	7,50	8,49	18862	506	651	1182	2053	1902	1437	1318	1756	1977	3234	1934	912
9	8,50	9,49	18722	346	604	1201	1931	1780	1298	1567	1957	2133	3239	1878	788
10	9,50	10,49	15452	301	452	1284	1315	1200	783	1214	1913	2216	2775	1319	680
11	10,50	11,49	12822	195	412	1151	936	586	621	1199	1792	2151	2239	1084	456
12	11,50	12,49	9635	170	338	903	782	533	462	873	1373	1276	1822	829	274
13	12,50	13,49	7763	143	229	558	418	321	268	625	998	1191	1896	831	285
14	13,50	14,49	5727	79	132	302	430	238	113	436	704	968	1537	656	132
15	14,50	15,49	3660	71	112	306	151	77	78	235	443	665	973	427	122
16	15,50	16,49	2914	69	62	274	109	33	29	187	373	492	919	260	107
17	16,50	17,49	1755	26	45	175	87	14	10	106	121	246	600	238	87
18	17,50	18,49	1020	15	26	82	42	4	3	33	45	163	465	105	37
19	18,50	19,49	690	9	16	45	19	0	1	27	31	113	306	98	25
20	19,50	20,49	329	0	8	12	4	0	0	13	26	87	122	45	12
21	20,50	21,49	220	0	5	9	3	1	0	4	13	57	83	38	7
22	21,50	22,49	158	0	1	4	1	0	0	2	2	15	105	27	1
23	22,50	23,49	58	0	2	2	2	0	0	0	0	11	32	9	0
24	23,50	24,49	20	0	0	0	0	0	0	0	1	4	11	4	0
25	24,50	25,49	16	0	1	1	0	0	0	0	0	5	6	3	0
26	25,50	26,49	6	0	0	0	0	0	0	0	0	1	5	0	0
27	26,50	27,49	1	0	0	0	0	0	0	0	0	1	0	0	0
28	27,50	28,49	1	0	0	0	0	0	0	0	0	0	1	0	0
29	28,50	29,49	0	0	0	0	0	0	0	0	0	0	0	0	0
30	29,50	30,49	0	0	0	0	0	0	0	0	0	0	0	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	0	0	0	0	0	0	0	0	0	0	0	0	0
33	32,50	33,49	0	0	0	0	0	0	0	0	0	0	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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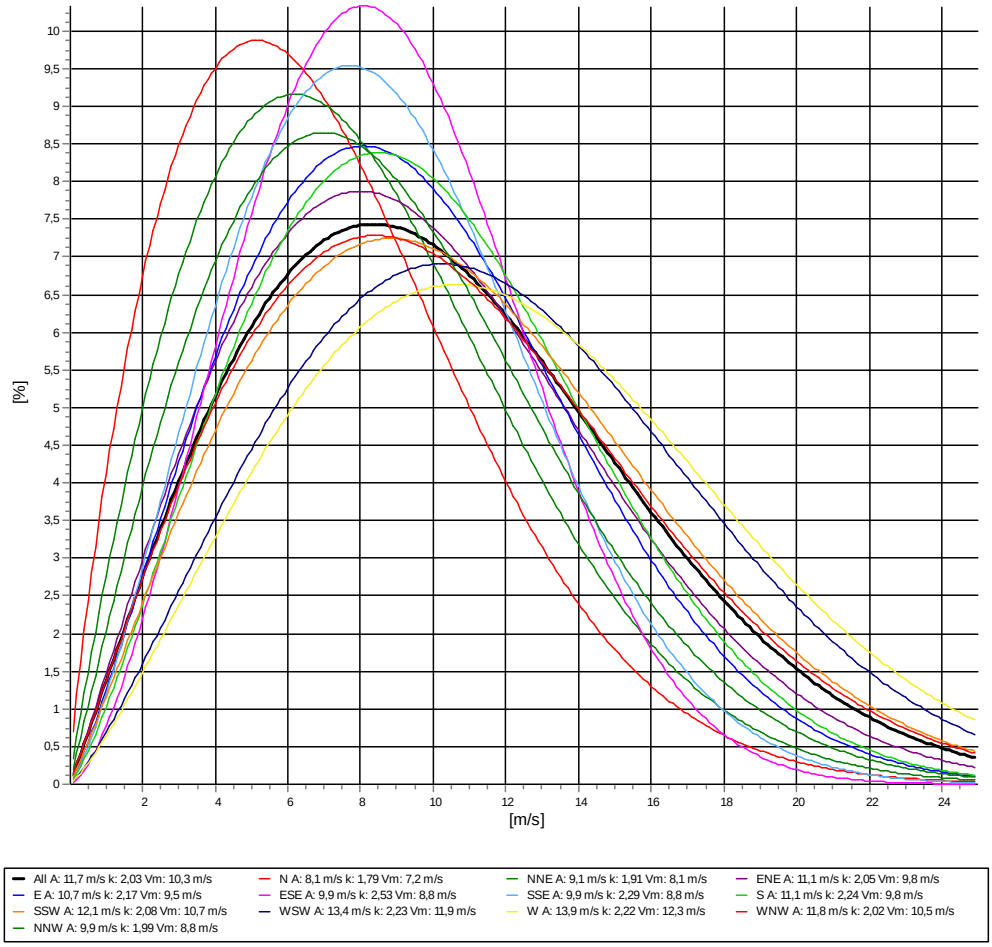
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **270,00m - MCP LT - 270m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,12	1,788	3,98	7,22
1-NNE	9,10	1,913	3,64	8,08
2-ENE	11,08	2,050	6,58	9,82
3-E	10,72	2,173	7,98	9,49
4-ESE	9,87	2,531	6,30	8,76
5-SSE	9,89	2,290	6,07	8,76
6-S	11,07	2,240	6,67	9,80
7-SSW	12,13	2,076	8,32	10,75
8-WSW	13,38	2,227	12,39	11,85
9-W	13,91	2,220	19,41	12,32
10-WNW	11,84	2,016	12,89	10,49
11-NNW	9,90	1,994	5,77	8,77
Mean	**11,66**	**2,034**	**100,00**	**10,33**



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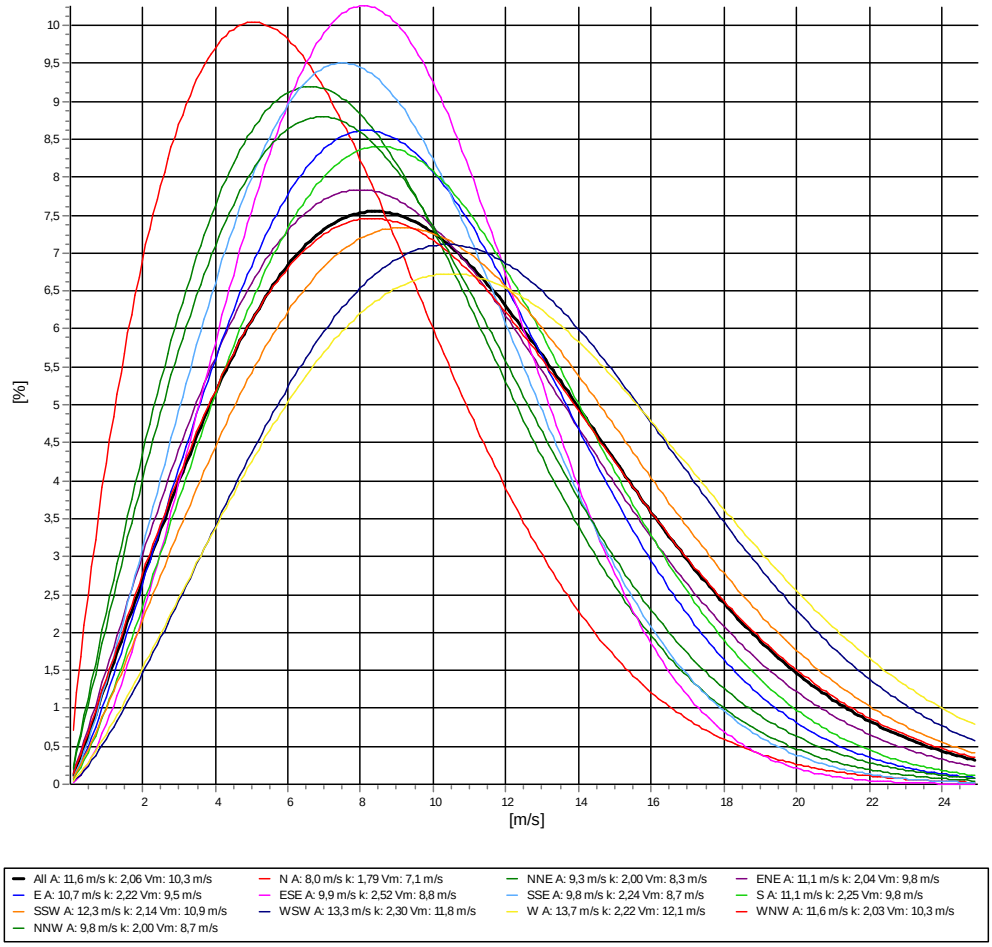
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **240,00m - MCP LT - 240m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,99	1,790	3,94	7,11
1-NNE	9,34	2,005	3,63	8,28
2-ENE	11,09	2,039	6,62	9,83
3-E	10,70	2,217	7,98	9,47
4-ESE	9,90	2,516	6,37	8,78
5-SSE	9,78	2,242	6,12	8,66
6-S	11,09	2,250	6,82	9,82
7-SSW	12,26	2,142	8,45	10,85
8-WSW	13,31	2,299	12,53	11,79
9-W	13,71	2,220	19,20	12,15
10-WNW	11,63	2,032	12,62	10,30
11-NNW	9,77	2,003	5,73	8,65
Mean	**11,59**	**2,059**	**100,00**	**10,27**



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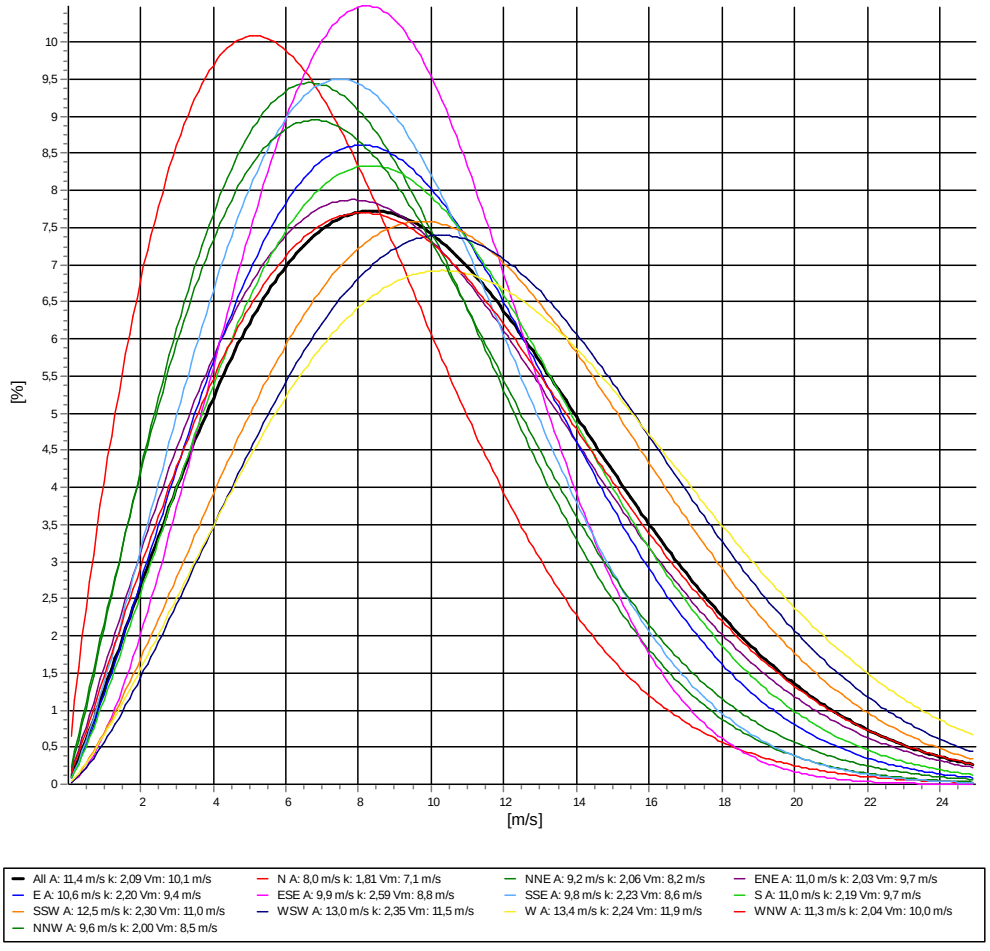
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **200,00m - MCP LT - 200m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,01	1,811	3,93	7,12
1-NNE	9,24	2,056	3,72	8,19
2-ENE	10,98	2,025	6,64	9,73
3-E	10,64	2,200	7,96	9,42
4-ESE	9,91	2,592	6,45	8,80
5-SSE	9,75	2,235	6,25	8,64
6-S	10,97	2,195	6,93	9,72
7-SSW	12,47	2,298	8,68	11,05
8-WSW	13,00	2,346	12,62	11,52
9-W	13,42	2,242	18,97	11,88
10-WNW	11,28	2,038	12,27	9,99
11-NNW	9,58	1,997	5,58	8,49
Mean	**11,44**	**2,091**	**100,00**	**10,13**



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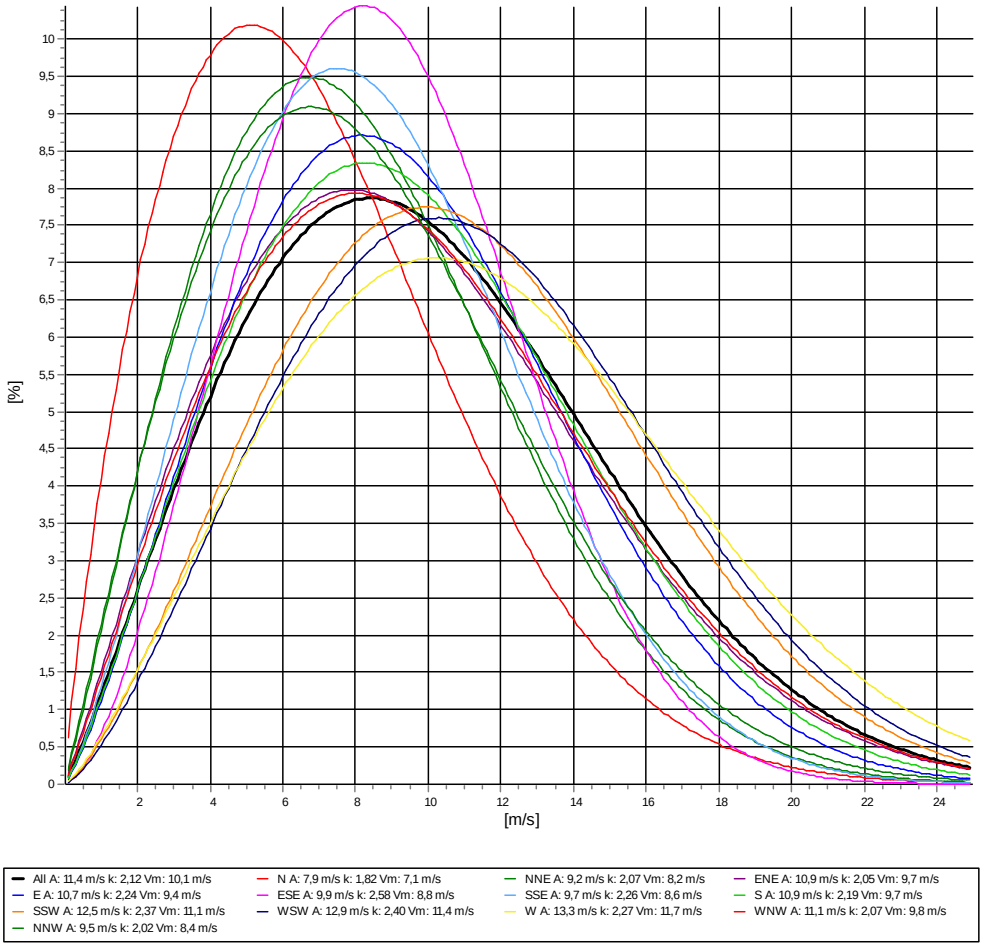
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **180,00m - MCP LT - 180m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,95	1,820	3,90	7,06
1-NNE	9,25	2,068	3,73	8,19
2-ENE	10,93	2,049	6,67	9,68
3-E	10,65	2,239	7,96	9,44
4-ESE	9,92	2,583	6,50	8,81
5-SSE	9,74	2,264	6,34	8,62
6-S	10,94	2,188	6,96	9,69
7-SSW	12,50	2,369	8,90	11,08
8-WSW	12,86	2,398	12,68	11,40
9-W	13,25	2,268	18,73	11,74
10-WNW	11,05	2,066	12,12	9,79
11-NNW	9,48	2,016	5,50	8,40
Mean	**11,35**	**2,122**	**100,00**	**10,05**



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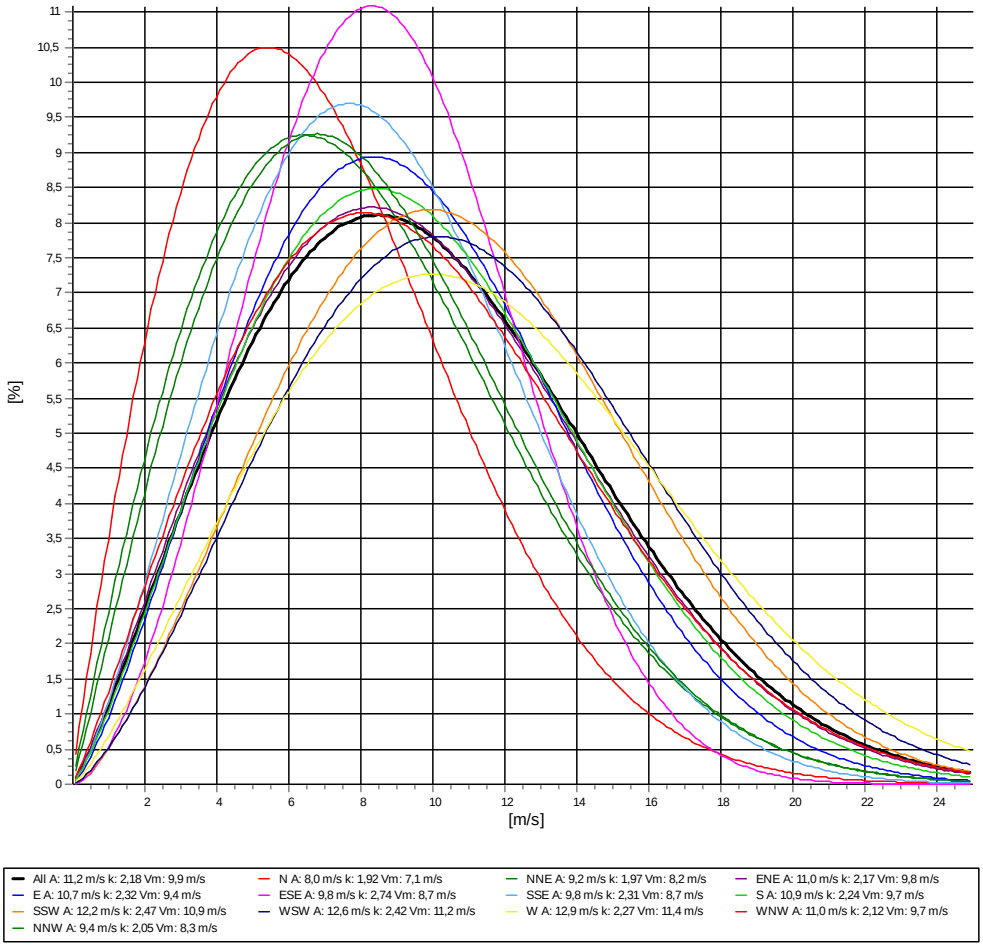
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - MCP LT - 150m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,97	1,923	3,76	7,07
1-NNE	9,20	1,974	3,85	8,15
2-ENE	11,04	2,172	6,79	9,78
3-E	10,66	2,321	8,01	9,45
4-ESE	9,81	2,740	6,59	8,73
5-SSE	9,80	2,313	6,50	8,69
6-S	10,95	2,242	7,02	9,69
7-SSW	12,24	2,474	9,22	10,85
8-WSW	12,63	2,425	12,71	11,20
9-W	12,89	2,270	18,44	11,42
10-WNW	10,97	2,121	11,65	9,71
11-NNW	9,40	2,047	5,45	8,33
Mean	**11,22**	**2,180**	**100,00**	**9,94**



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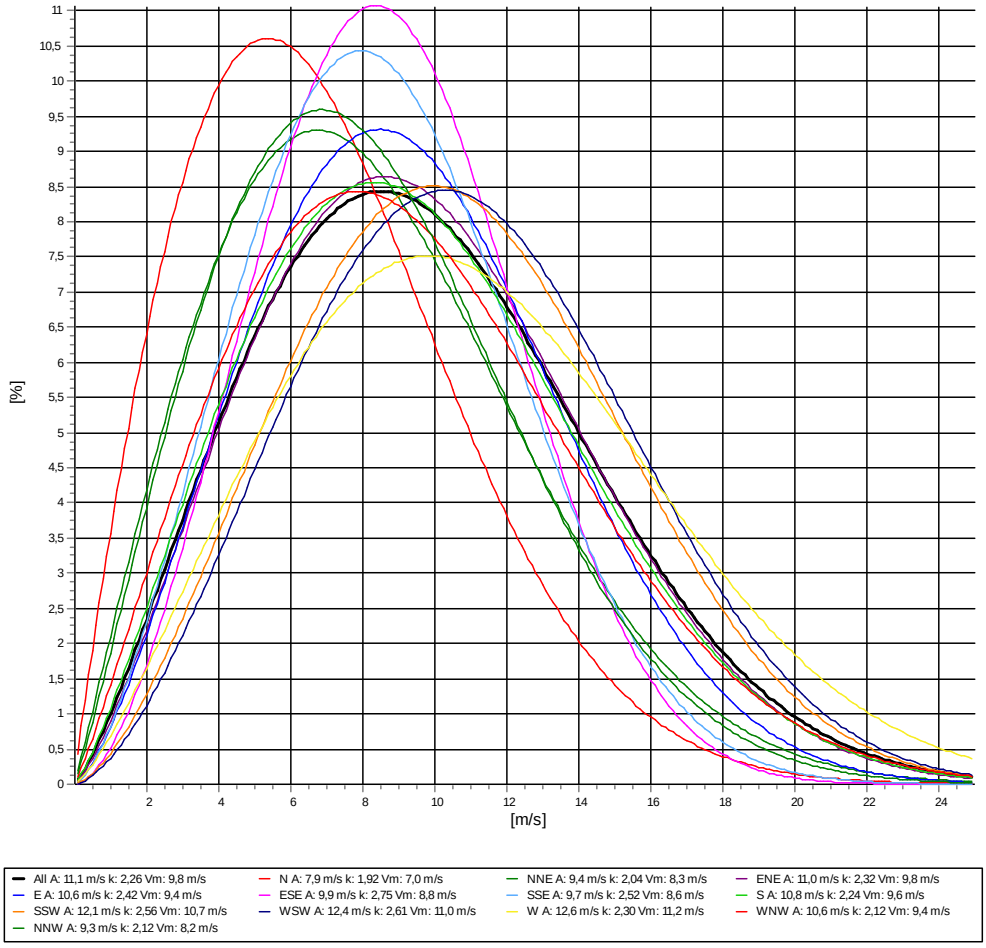
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **120,00m - MCP LT - 120m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,89	1,922	3,62	6,99
1-NNE	9,36	2,045	3,81	8,29
2-ENE	11,01	2,316	7,03	9,76
3-E	10,57	2,420	8,07	9,37
4-ESE	9,86	2,750	6,76	8,77
5-SSE	9,73	2,517	6,52	8,64
6-S	10,84	2,239	7,17	9,60
7-SSW	12,08	2,557	9,67	10,73
8-WSW	12,37	2,609	12,37	10,99
9-W	12,60	2,299	18,22	11,16
10-WNW	10,59	2,124	11,45	9,38
11-NNW	9,30	2,118	5,32	8,24
Mean	**11,06**	**2,256**	**100,00**	**9,80**



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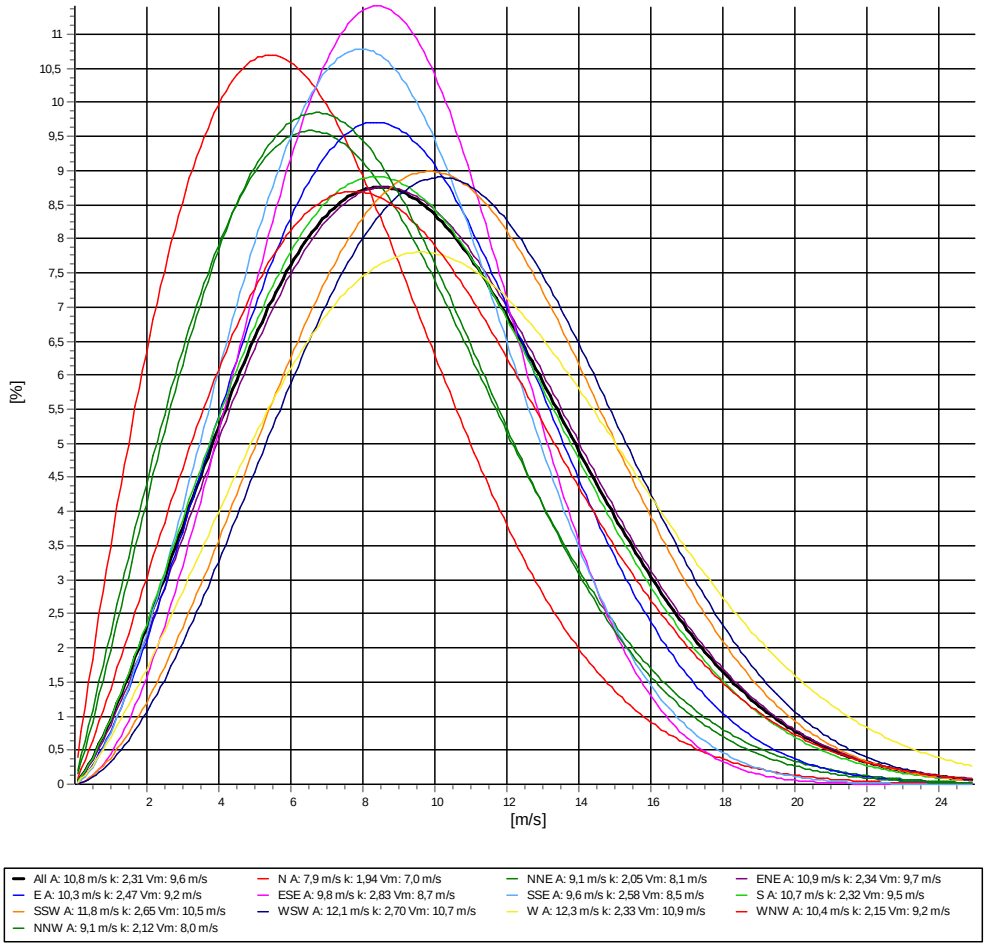
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **100,00m - MCP LT - 100m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,87	1,942	3,57	6,98
1-NNE	9,09	2,049	3,89	8,06
2-ENE	10,95	2,338	7,22	9,70
3-E	10,32	2,475	8,02	9,15
4-ESE	9,80	2,833	6,80	8,73
5-SSE	9,61	2,584	6,52	8,54
6-S	10,68	2,317	7,26	9,46
7-SSW	11,78	2,651	9,93	10,47
8-WSW	12,06	2,696	12,29	10,73
9-W	12,25	2,330	18,04	10,86
10-WNW	10,37	2,154	11,21	9,19
11-NNW	9,07	2,122	5,27	8,03
Mean	**10,84**	**2,308**	**100,00**	**9,60**



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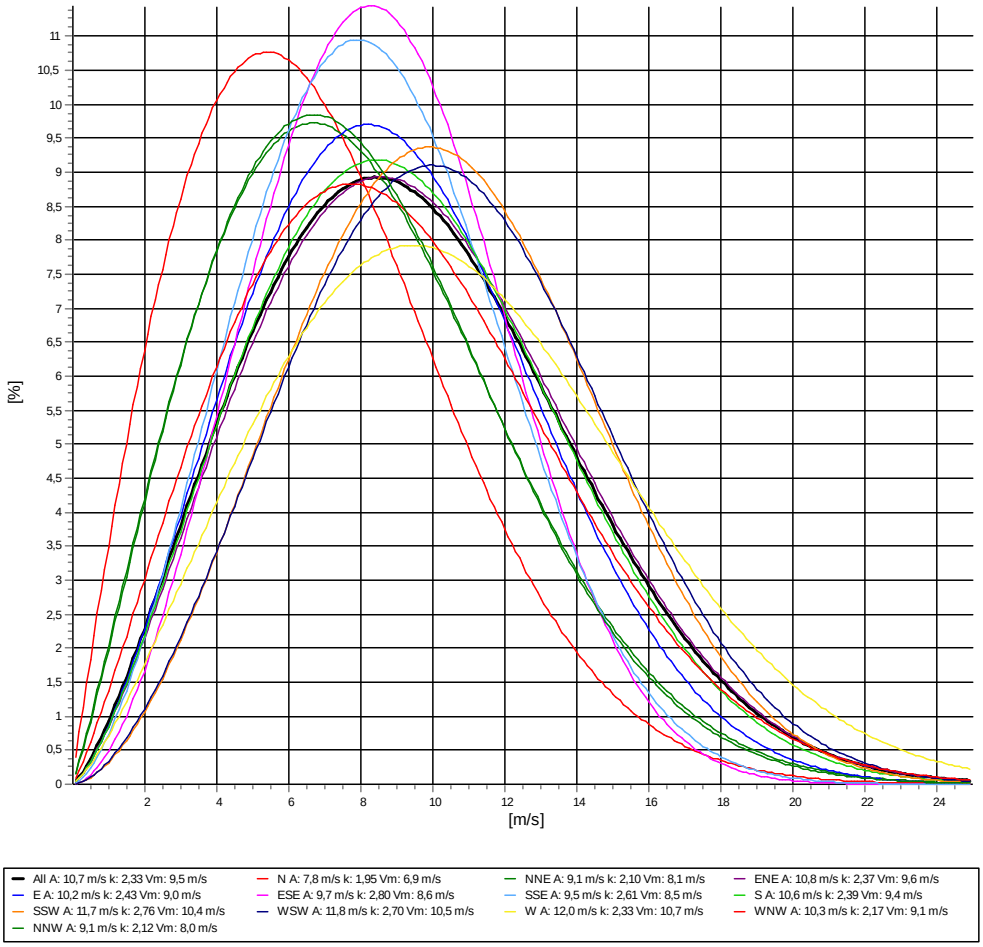
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **90,00m - MCP LT - 90m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,83	1,946	3,60	6,94
1-NNE	9,10	2,095	3,82	8,06
2-ENE	10,83	2,365	7,30	9,60
3-E	10,19	2,433	8,09	9,03
4-ESE	9,69	2,803	6,84	8,63
5-SSE	9,55	2,611	6,40	8,48
6-S	10,61	2,388	7,34	9,40
7-SSW	11,68	2,759	10,06	10,39
8-WSW	11,83	2,705	12,33	10,52
9-W	12,05	2,327	17,99	10,67
10-WNW	10,29	2,173	10,99	9,11
11-NNW	9,06	2,121	5,23	8,02
Mean	**10,72**	**2,332**	**100,00**	**9,50**



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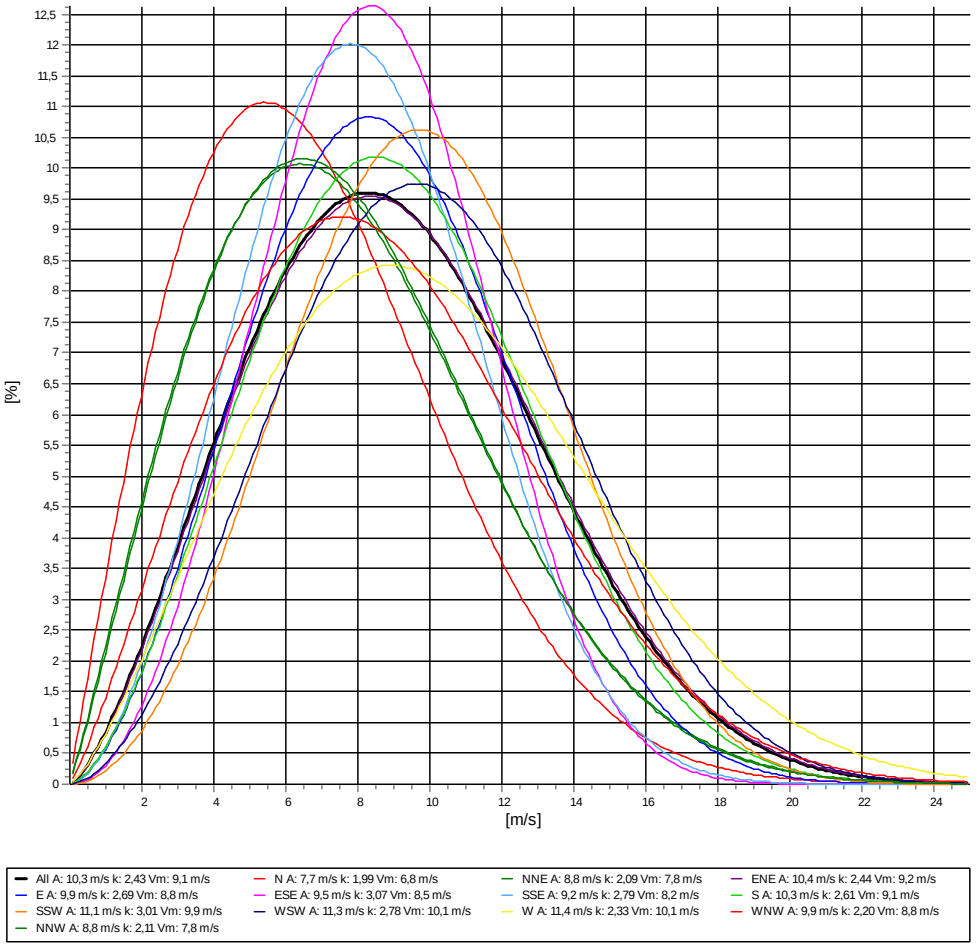
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **60,00m - MCP LT - 60m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,73	1,990	3,42	6,85
1-NNE	8,76	2,086	4,00	7,76
2-ENE	10,36	2,436	7,52	9,19
3-E	9,89	2,688	8,14	8,79
4-ESE	9,50	3,074	7,09	8,49
5-SSE	9,18	2,785	6,23	8,17
6-S	10,26	2,606	7,66	9,11
7-SSW	11,09	3,009	10,14	9,91
8-WSW	11,30	2,778	12,26	10,06
9-W	11,35	2,329	17,98	10,06
10-WNW	9,94	2,200	10,49	8,81
11-NNW	8,77	2,114	5,06	7,77
Mean	**10,29**	**2,432**	**100,00**	**9,12**



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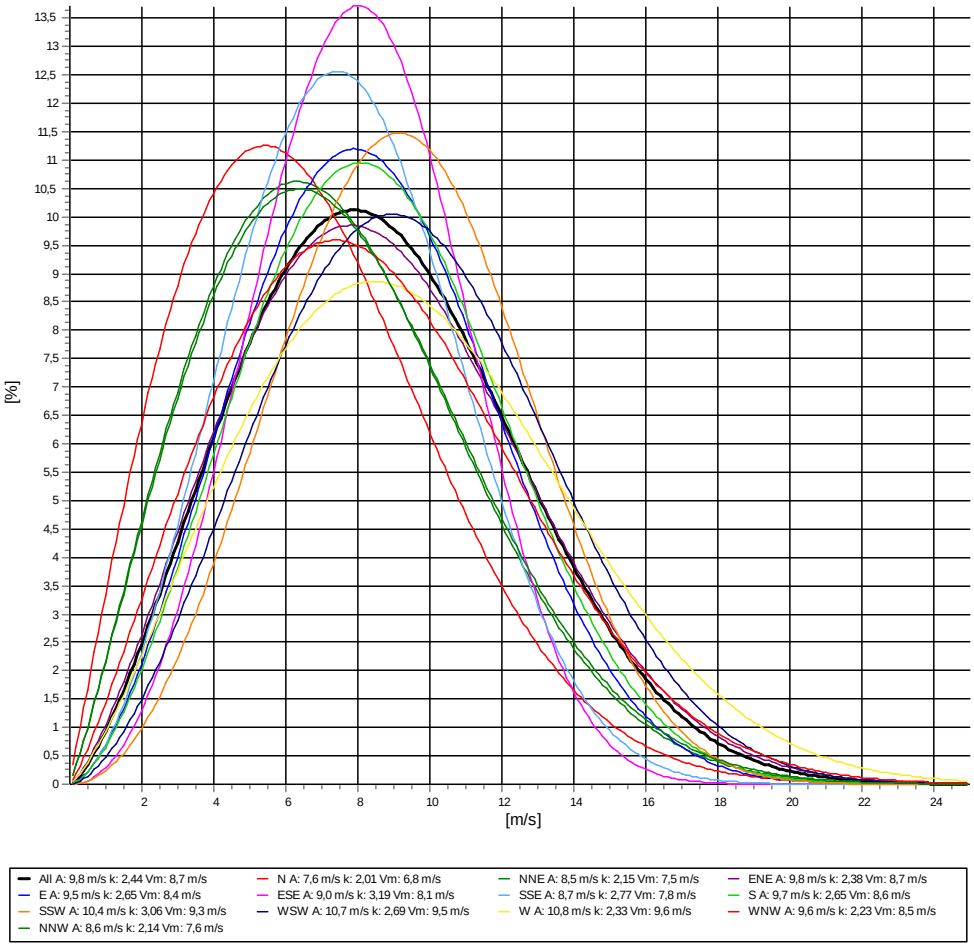
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **40,00m - MCP LT - 40m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,64	2,009	3,44	6,77
1-NNE	8,47	2,147	3,98	7,51
2-ENE	9,85	2,376	7,58	8,73
3-E	9,47	2,655	8,23	8,42
4-ESE	9,04	3,191	7,35	8,10
5-SSE	8,73	2,767	6,13	7,77
6-S	9,66	2,650	7,84	8,59
7-SSW	10,42	3,060	10,16	9,31
8-WSW	10,66	2,686	12,36	9,47
9-W	10,78	2,329	17,89	9,55
10-WNW	9,64	2,228	10,15	8,54
11-NNW	8,57	2,142	4,89	7,59
Mean	**9,80**	**2,445**	**100,00**	**8,69**



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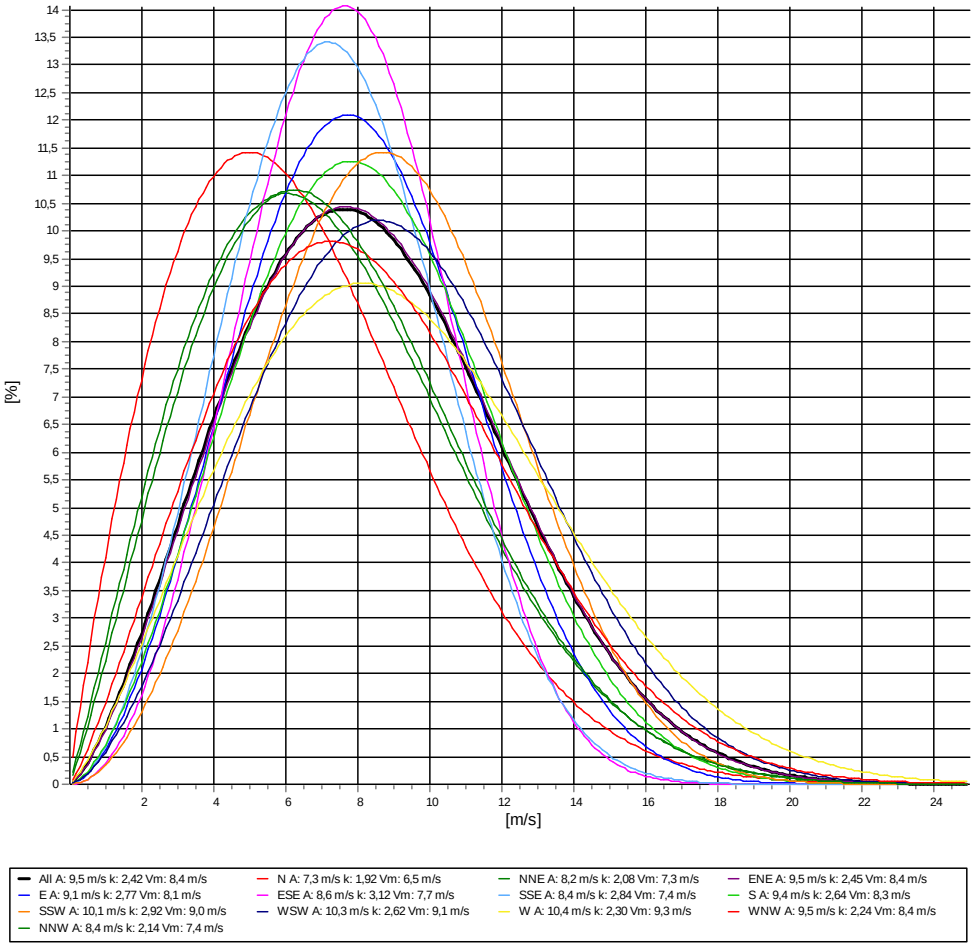
Meteo data report - Weibull data overview

Mast: Buoy 4 SWLB044 LT; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **30,00m - MCP LT - 30m - [Matrix]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,32	1,922	3,45	6,50
1-NNE	8,25	2,080	3,99	7,31
2-ENE	9,51	2,446	7,64	8,43
3-E	9,07	2,769	8,39	8,08
4-ESE	8,65	3,121	7,24	7,74
5-SSE	8,36	2,840	6,04	7,45
6-S	9,37	2,641	7,95	8,33
7-SSW	10,05	2,919	10,34	8,97
8-WSW	10,30	2,622	12,35	9,15
9-W	10,45	2,298	17,79	9,26
10-WNW	9,46	2,238	9,88	8,38
11-NNW	8,37	2,143	4,93	7,41
Mean	**9,48**	**2,425**	**100,00**	**8,41**



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Meteo data report - Frequency distribution (TAB file data)

Mast: Position 3; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - MCP LT - 150m - [Matrix] Scaled res map cal

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,90	7,16	8,36	9,18	9,45	9,02	8,68	9,41	9,91	11,45	11,46	9,92	8,23
0		0,49	562	51	30	58	71	28	44	38	81	46	49	38	28
1	0,50	1,49	2227	226	142	192	185	106	118	290	164	139	204	218	243
2	1,50	2,49	5166	387	300	405	404	276	316	550	521	448	576	517	466
3	2,50	3,49	7083	407	445	457	572	509	548	580	635	786	872	786	486
4	3,50	4,49	9357	493	574	616	627	783	883	633	929	1156	1057	989	617
5	4,50	5,49	10813	605	642	701	988	898	940	960	946	1119	1267	1020	727
6	5,50	6,49	11929	767	858	1029	880	998	757	1010	940	1242	1646	1083	719
7	6,50	7,49	13752	852	867	919	945	1249	974	807	999	1326	2101	1782	931
8	7,50	8,49	13615	613	688	614	1068	1438	1136	961	1046	1246	2105	1743	957
9	8,50	9,49	13519	454	573	741	1174	1122	971	926	1053	1342	2395	1933	835
10	9,50	10,49	13316	399	495	764	959	1059	800	1076	1219	1572	2693	1589	691
11	10,50	11,49	11483	190	402	608	770	956	783	781	1051	1645	2304	1421	572
12	11,50	12,49	11352	178	533	638	776	824	765	735	1048	1612	2471	1316	456
13	12,50	13,49	10055	160	292	618	511	744	634	454	920	1616	2562	1298	246
14	13,50	14,49	9269	115	227	562	656	691	555	598	864	1581	2018	1118	284
15	14,50	15,49	7370	110	271	399	555	386	381	617	650	1230	1645	860	266
16	15,50	16,49	6490	124	228	397	673	294	254	549	613	1127	1459	577	195
17	16,50	17,49	5308	66	124	311	408	249	130	362	476	1183	1372	467	160
18	17,50	18,49	4377	36	81	191	298	167	99	192	349	1065	1378	420	101
19	18,50	19,49	2765	27	56	96	134	71	55	181	240	624	909	289	83
20	19,50	20,49	1810	12	36	57	61	20	18	150	204	430	536	245	41
21	20,50	21,49	1043	4	13	28	49	10	8	89	106	236	389	99	12
22	21,50	22,49	815	3	11	25	14	7	4	66	62	241	304	70	8
23	22,50	23,49	733	1	11	10	2	1	1	34	46	262	300	64	1
24	23,50	24,49	418	0	6	4	1	0	0	5	22	161	191	27	1
25	24,50	25,49	258	0	0	1	0	0	0	5	11	109	99	32	1
26	25,50	26,49	197	1	0	0	0	0	0	2	10	47	90	47	0
27	26,50	27,49	96	0	2	2	0	0	0	1	2	25	51	13	0
28	27,50	28,49	76	0	0	0	0	0	0	0	2	32	34	8	0
29	28,50	29,49	24	0	0	0	0	0	0	0	0	9	12	3	0
30	29,50	30,49	20	0	0	0	0	0	0	0	0	3	13	4	0
31	30,50	31,49	10	0	0	0	0	0	0	0	0	3	7	0	0
32	31,50	32,49	5	0	0	0	0	0	0	0	0	2	3	0	0
33	32,50	33,49	4	0	0	0	0	0	0	0	0	2	2	0	0
34	33,50	34,49	3	0	0	0	0	0	0	0	0	1	2	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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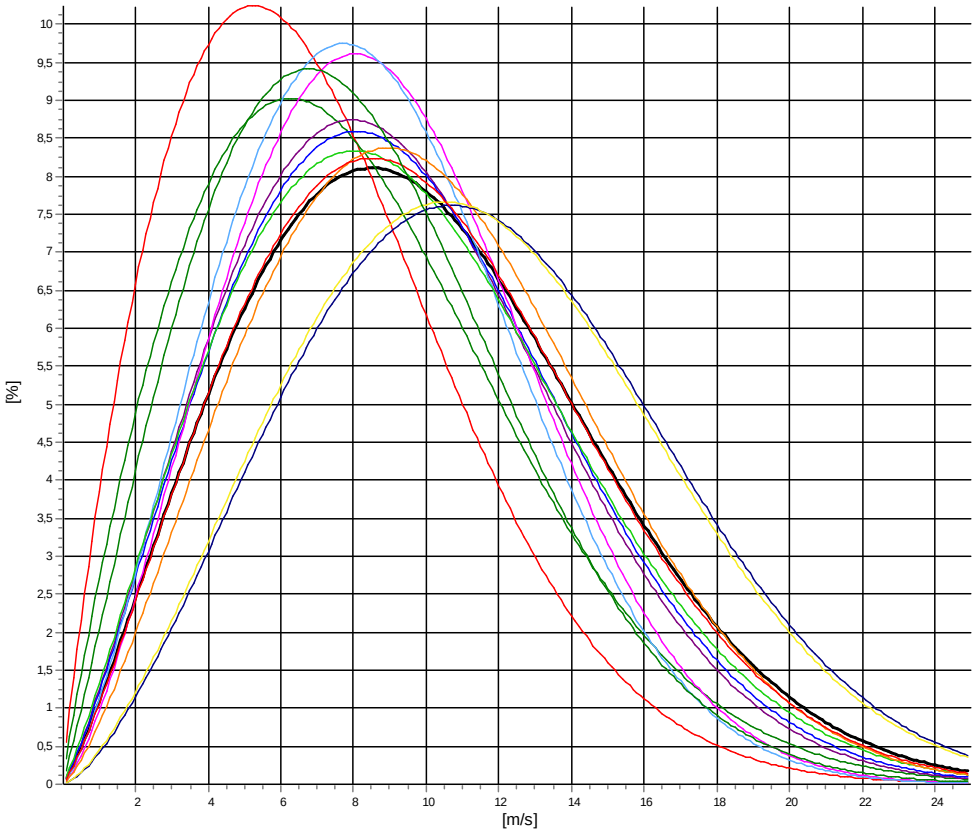
Meteo data report - Weibull data overview

Mast: Position 3; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - MCP LT - 150m - [Matrix] Scaled res map cal**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,99	1,856	3,58	7,10
1-NNE	9,23	1,911	4,51	8,19
2-ENE	10,48	2,201	5,96	9,28
3-E	10,65	2,196	7,29	9,43
4-ESE	10,11	2,381	7,35	8,97
5-SSE	9,82	2,335	6,37	8,71
6-S	10,77	2,138	7,22	9,54
7-SSW	11,41	2,327	8,67	10,11
8-WSW	13,18	2,480	13,50	11,69
9-W	13,02	2,461	18,89	11,54
10-WNW	11,17	2,213	11,45	9,89
11-NNW	9,32	2,068	5,21	8,25
Mean	**11,25**	**2,187**	**100,00**	**9,96**



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Meteo data report - Frequency distribution (TAB file data)

Mast: Position 4; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - MCP LT - 150m - [Matrix] Scaled res map cal

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,90	7,42	8,14	9,89	9,38	8,38	8,57	9,56	10,45	11,03	11,52	9,80	8,58
0		0,49	351	49	43	14	27	31	18	39	48	15	32	13	22
1	0,50	1,49	2363	170	260	205	169	202	180	162	252	216	230	173	144
2	1,50	2,49	4923	281	422	504	395	448	347	307	370	503	634	461	251
3	2,50	3,49	7105	357	438	538	603	605	635	531	614	777	847	726	434
4	3,50	4,49	9196	589	559	690	969	615	649	675	818	793	1013	1115	711
5	4,50	5,49	11767	778	623	904	927	760	941	1116	1083	1122	1466	1335	712
6	5,50	6,49	11615	700	417	835	852	913	959	865	871	1149	1663	1495	896
7	6,50	7,49	13360	798	458	927	990	1068	1110	882	919	1386	2030	1795	997
8	7,50	8,49	14349	806	505	740	1191	1203	1129	899	1187	1546	2168	1908	1067
9	8,50	9,49	13737	505	601	620	1463	1304	937	946	1083	1475	2381	1600	822
10	9,50	10,49	12768	356	448	560	1076	1045	968	820	943	1707	2455	1610	780
11	10,50	11,49	12411	268	416	1009	1086	1006	778	923	1053	1462	2321	1489	600
12	11,50	12,49	11548	195	413	743	996	894	682	812	1245	1616	2151	1341	460
13	12,50	13,49	10098	208	339	653	800	466	672	802	1136	1460	1930	1218	414
14	13,50	14,49	8087	178	168	549	627	391	536	632	836	1317	1696	798	359
15	14,50	15,49	7299	105	142	524	467	299	364	458	803	1382	1667	830	258
16	15,50	16,49	5890	75	153	292	341	122	133	326	785	1210	1606	692	155
17	16,50	17,49	5016	66	82	288	317	126	149	432	680	747	1474	495	160
18	17,50	18,49	3819	42	74	404	365	41	97	329	536	598	938	273	122
19	18,50	19,49	3272	29	73	435	189	12	64	115	352	548	1091	286	78
20	19,50	20,49	2239	20	41	189	100	3	28	90	299	411	798	206	54
21	20,50	21,49	1249	6	36	118	61	0	8	48	111	238	403	185	35
22	21,50	22,49	923	6	13	85	16	0	5	26	59	197	354	146	16
23	22,50	23,49	719	4	14	51	8	0	4	28	27	174	335	67	7
24	23,50	24,49	531	1	7	15	2	0	1	17	29	99	265	95	0
25	24,50	25,49	333	0	1	13	0	0	2	12	14	82	172	36	1
26	25,50	26,49	122	3	2	2	0	0	0	5	6	18	66	19	1
27	26,50	27,49	87	2	3	0	0	0	0	5	9	7	48	13	0
28	27,50	28,49	57	0	1	0	0	0	0	2	3	12	36	3	0
29	28,50	29,49	43	0	0	1	0	0	0	2	2	11	27	0	0
30	29,50	30,49	20	0	1	0	0	0	0	1	0	5	13	0	0
31	30,50	31,49	15	0	1	0	0	0	0	0	0	5	9	0	0
32	31,50	32,49	4	0	0	0	0	0	0	0	0	1	3	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	0	1	0	0
34	33,50	34,49	2	0	0	0	0	0	0	2	0	0	0	0	0
35	34,50	35,49	1	0	0	0	0	0	0	0	0	0	1	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

Project:
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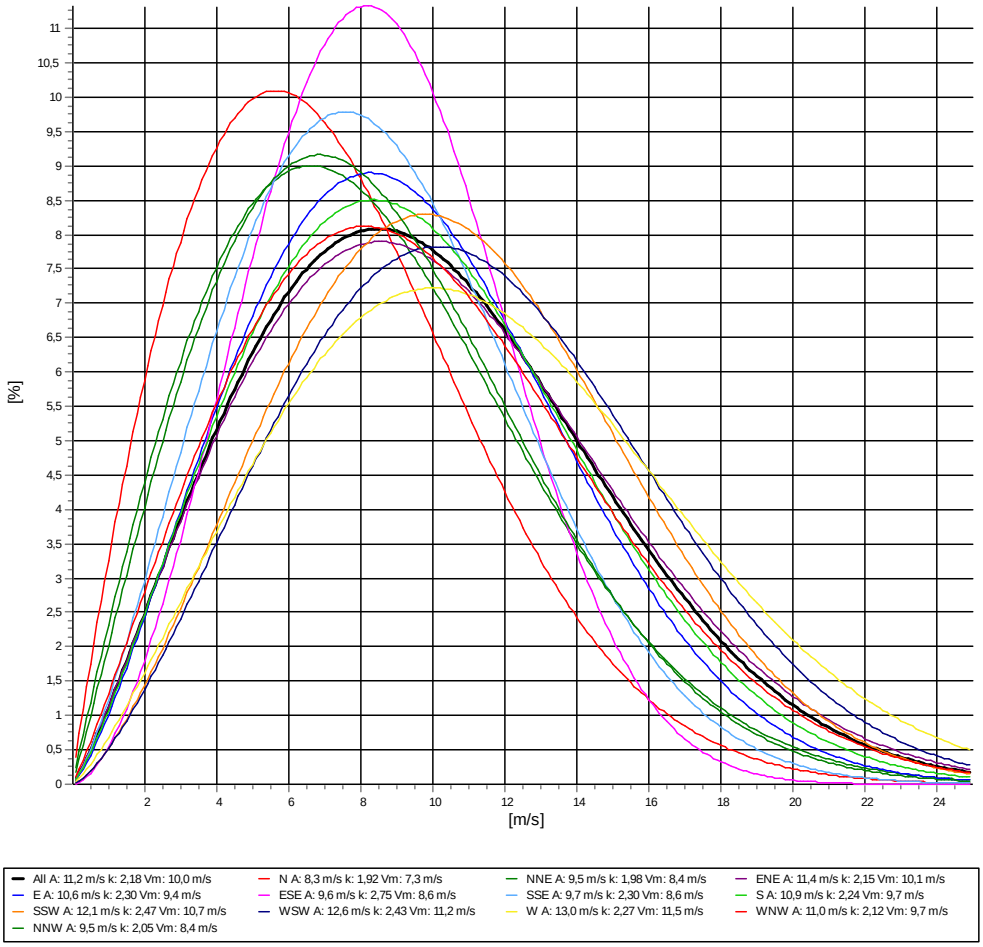
Calculated:
21/08/2023 13.50

Meteo data report - Weibull data overview

Mast: Position 4; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - MCP LT - 150m - [Matrix] Scaled res map cal**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,29	1,922	3,76	7,35
1-NNE	9,46	1,976	3,85	8,38
2-ENE	11,42	2,152	6,79	10,11
3-E	10,63	2,296	8,01	9,41
4-ESE	9,64	2,752	6,59	8,58
5-SSE	9,69	2,304	6,50	8,58
6-S	10,90	2,236	7,02	9,66
7-SSW	12,08	2,474	9,22	10,71
8-WSW	12,61	2,428	12,71	11,18
9-W	12,97	2,266	18,44	11,48
10-WNW	10,99	2,119	11,65	9,73
11-NNW	9,52	2,049	5,45	8,43
Mean	**11,25**	**2,177**	**100,00**	**9,96**



Appendix E. Long-term Corrected Datasets: FINO2 LT, Taggen LT

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21/08/2023 14.06

Meteo data report - Frequency distribution (TAB file data)

Mast: FINO2 -7yr final; FINO2; FINO2 LT **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

102,50m - MCP ST - EMD-WRF -

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,74	7,68	7,60	9,89	10,35	9,42	8,45	8,61	9,77	10,92	10,67	9,78	8,37
0		0,49	757	32	32	42	72	83	79	98	74	80	62	61	42
1	0,50	1,49	5206	315	281	270	367	451	436	501	568	610	518	464	425
2	1,50	2,49	9886	582	551	522	815	847	936	940	1095	1132	941	822	703
3	2,50	3,49	14050	882	813	778	980	1351	1480	1317	1356	1523	1441	1128	1001
4	3,50	4,49	17028	1000	978	984	1122	1676	1718	1440	1531	1875	1725	1589	1390
5	4,50	5,49	20107	1337	1047	1073	1480	1736	1599	1498	1654	2493	2413	2101	1676
6	5,50	6,49	22106	1265	1013	1205	1819	1993	1588	1623	1935	2603	2835	2488	1739
7	6,50	7,49	24452	1122	913	1294	2225	2329	1596	1840	2228	2959	3328	2791	1827
8	7,50	8,49	26082	1079	732	1382	2394	2622	1848	1874	2407	3407	3890	2775	1672
9	8,50	9,49	27548	921	655	1524	2419	2944	2011	1918	2439	3998	4447	2763	1509
10	9,50	10,49	27325	881	564	1425	2197	2748	1887	1692	2678	4261	4751	2948	1293
11	10,50	11,49	26617	719	588	1477	2404	2851	1679	1657	2548	4195	4507	2908	1084
12	11,50	12,49	24937	596	569	1342	2333	2377	1702	1601	2321	4330	4375	2377	1014
13	12,50	13,49	23097	555	608	1159	2144	2251	1455	1284	2283	4156	4048	2232	922
14	13,50	14,49	19640	438	386	940	1984	1969	1104	1005	1963	3746	3488	1831	786
15	14,50	15,49	15361	258	203	699	1866	1464	687	720	1591	3215	2923	1261	474
16	15,50	16,49	11585	128	132	617	1455	923	408	488	1245	2708	2154	994	333
17	16,50	17,49	8360	77	106	546	1000	565	207	218	876	2183	1494	779	309
18	17,50	18,49	5823	63	53	449	632	338	100	193	523	1488	1070	674	240
19	18,50	19,49	3976	60	13	307	421	183	82	141	351	1046	741	509	122
20	19,50	20,49	2762	42	3	228	349	81	12	118	232	730	583	301	83
21	20,50	21,49	1642	10	9	160	228	32	4	42	111	436	419	156	35
22	21,50	22,49	988	4	5	49	90	16	0	5	86	306	298	113	16
23	22,50	23,49	573	1	2	34	38	9	0	2	33	164	208	69	13
24	23,50	24,49	332	0	0	34	33	4	0	0	5	72	123	46	15
25	24,50	25,49	207	0	0	37	16	0	0	0	6	37	53	54	4
26	25,50	26,49	91	0	0	1	1	0	0	0	2	13	53	17	4
27	26,50	27,49	81	0	0	0	0	0	0	0	6	12	47	14	2
28	27,50	28,49	65	0	0	0	0	0	0	0	1	11	37	15	1
29	28,50	29,49	23	0	0	0	0	0	0	0	0	5	16	1	1
30	29,50	30,49	24	0	0	0	0	0	0	0	0	1	22	1	0
31	30,50	31,49	18	0	0	0	0	0	0	0	0	9	9	0	0
32	31,50	32,49	3	0	0	0	0	0	0	0	0	2	1	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	1	0	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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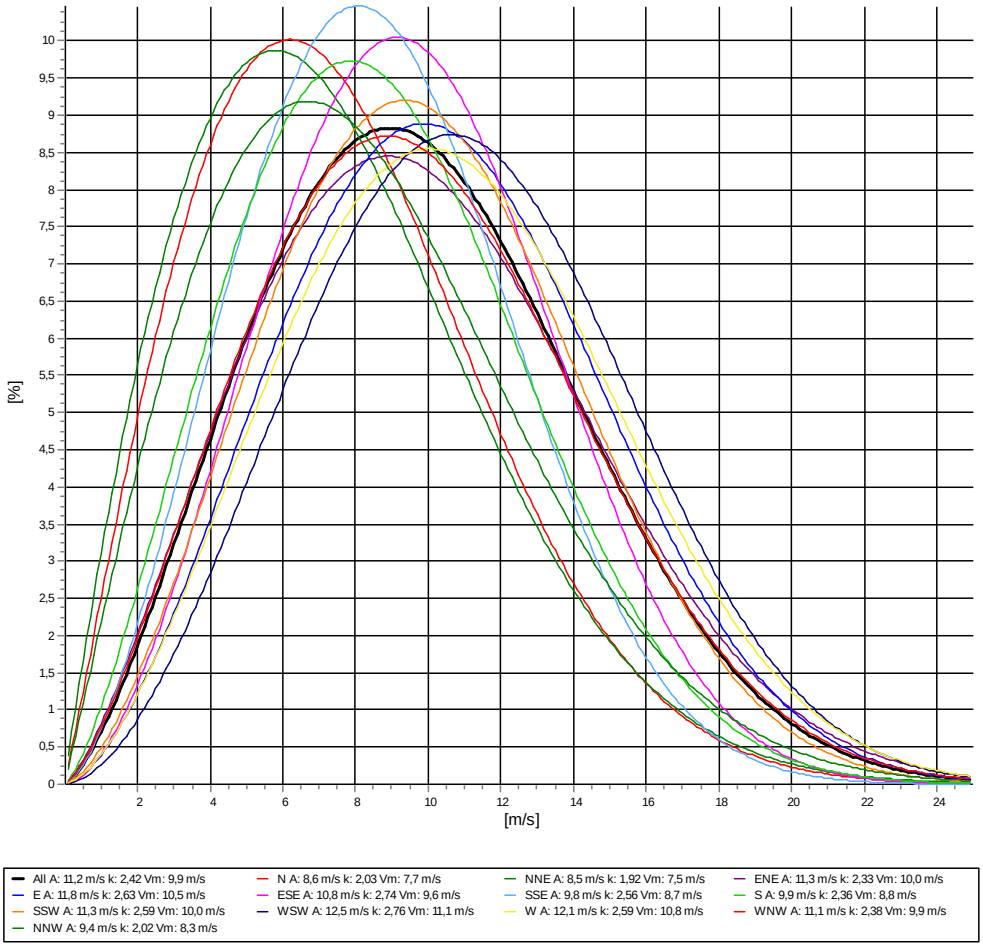
Calculated:
21/08/2023 14.06

Meteo data report - Weibull data overview

Mast: FINO2 -7yr final; FINO2; FINO2 LT **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **102,50m - MCP ST - EMD-WRF -**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,65	2,032	3,63	7,66
1-NNE	8,47	1,923	3,01	7,52
2-ENE	11,32	2,331	5,45	10,03
3-E	11,85	2,633	9,06	10,53
4-ESE	10,82	2,737	9,34	9,62
5-SSE	9,82	2,556	6,64	8,71
6-S	9,93	2,363	6,52	8,80
7-SSW	11,28	2,587	9,43	10,02
8-WSW	12,52	2,758	15,79	11,14
9-W	12,14	2,586	15,56	10,78
10-WNW	11,14	2,380	10,06	9,88
11-NNW	9,39	2,018	5,50	8,32
Mean	**11,15**	**2,421**	**100,00**	**9,89**



Project:
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Calculated:
21/08/2023 14.07

Meteo data report - Frequency distribution (TAB file data)

Mast: Taggen cleaned 2y ; Taggen; Taggen LT **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

97,00m - MCP LT - Nora3 - [Regression]

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			8,51	6,19	7,20	9,20	9,22	8,18	7,56	8,09	8,82	9,18	9,22	8,51	7,13
0		0,49	1841	84	89	118	151	186	161	171	214	200	203	150	114
1	0,50	1,49	2978	201	168	186	225	225	283	238	253	314	317	295	273
2	1,50	2,49	5337	342	342	362	389	394	411	466	507	566	575	499	484
3	2,50	3,49	8047	553	493	470	616	601	675	722	801	817	828	802	669
4	3,50	4,49	10696	747	642	669	688	829	821	885	1046	1097	1174	1125	973
5	4,50	5,49	12912	849	708	753	908	976	948	967	1227	1426	1530	1491	1129
6	5,50	6,49	14965	877	760	799	1018	1072	1061	1111	1553	1727	1882	1818	1287
7	6,50	7,49	16623	835	869	934	1118	1092	1044	1203	1692	2016	2448	2086	1286
8	7,50	8,49	16970	660	780	970	1174	1192	961	1132	1813	2284	2681	2054	1269
9	8,50	9,49	16801	489	768	998	1171	1014	898	1050	1899	2442	2823	2142	1107
10	9,50	10,49	15402	351	665	952	1138	977	802	944	1770	2389	2581	1963	870
11	10,50	11,49	13515	223	495	916	1188	825	682	866	1601	2110	2448	1495	666
12	11,50	12,49	10987	126	353	828	1057	740	474	682	1394	1775	1970	1173	415
13	12,50	13,49	8753	72	212	775	921	571	388	525	1030	1418	1592	981	268
14	13,50	14,49	6476	43	114	610	752	433	292	435	779	1099	1129	645	145
15	14,50	15,49	4655	26	61	471	588	325	200	268	570	784	862	399	101
16	15,50	16,49	3202	12	23	344	453	214	125	189	391	513	590	289	59
17	16,50	17,49	2041	2	14	248	297	129	71	127	268	337	338	179	31
18	17,50	18,49	1291	1	4	159	161	68	31	100	159	215	247	128	18
19	18,50	19,49	784	1	3	87	99	20	19	58	89	157	141	102	8
20	19,50	20,49	453	1	0	51	49	11	15	26	49	101	97	50	3
21	20,50	21,49	246	0	1	27	13	3	5	20	17	53	57	48	2
22	21,50	22,49	138	0	0	8	0	3	0	15	20	28	38	24	2
23	22,50	23,49	80	0	0	4	0	0	3	8	6	20	28	11	0
24	23,50	24,49	48	0	0	0	0	0	0	1	3	8	24	12	0
25	24,50	25,49	24	0	0	0	0	0	0	1	2	4	11	5	1
26	25,50	26,49	22	0	0	0	0	0	0	1	0	2	13	6	0
27	26,50	27,49	14	0	0	0	0	0	0	0	0	2	10	2	0
28	27,50	28,49	5	0	0	0	0	0	0	0	0	0	5	0	0
29	28,50	29,49	6	0	0	0	0	0	0	0	0	2	4	0	0
30	29,50	30,49	5	0	0	0	0	0	0	0	0	3	2	0	0
31	30,50	31,49	0	0	0	0	0	0	0	0	0	0	0	0	0
32	31,50	32,49	2	0	0	0	0	0	0	0	0	2	0	0	0
33	32,50	33,49	1	0	0	0	0	0	0	0	0	0	1	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

Project:
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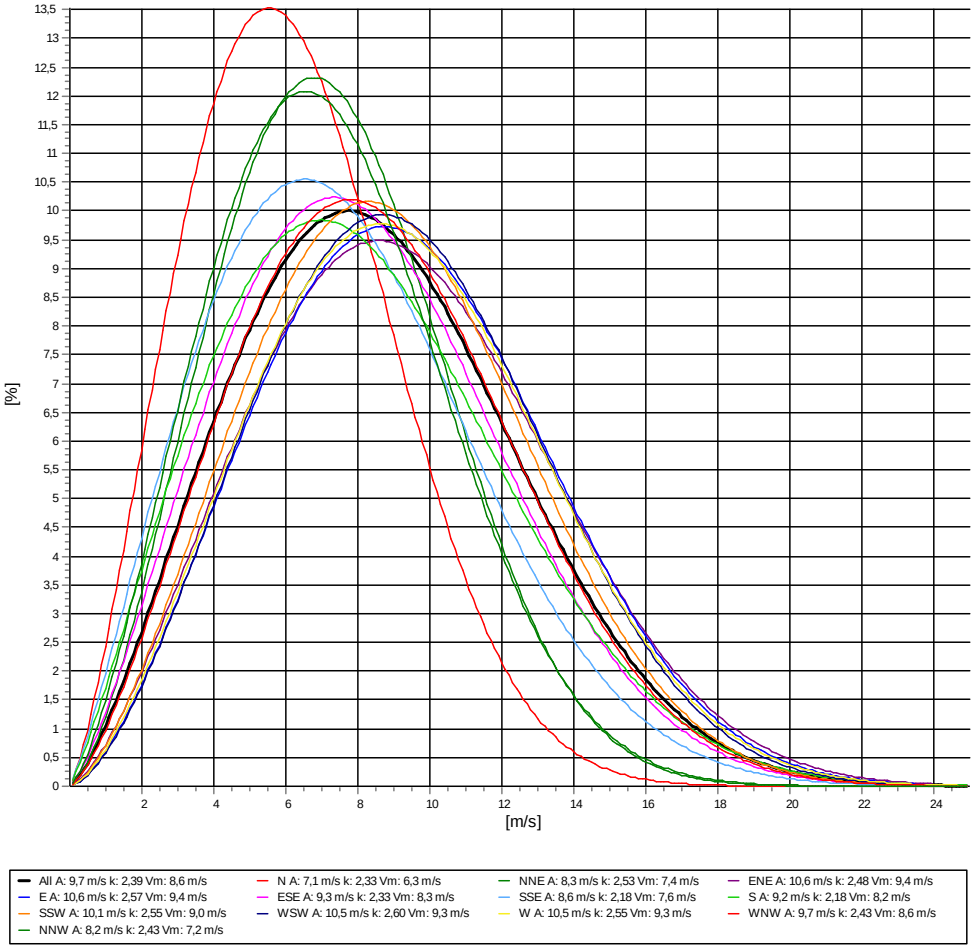
Calculated:
21/08/2023 14.07

Meteo data report - Weibull data overview

Mast: Taggen cleaned 2y ; Taggen; Taggen LT **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **97,00m - MCP LT - Nora3 - [Regression]**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	7,06	2,330	3,70	6,26
1-NNE	8,29	2,534	4,31	7,35
2-ENE	10,57	2,478	6,70	9,38
3-E	10,60	2,566	8,08	9,41
4-ESE	9,34	2,331	6,79	8,28
5-SSE	8,64	2,184	5,91	7,65
6-S	9,24	2,179	6,96	8,19
7-SSW	10,10	2,551	10,92	8,97
8-WSW	10,49	2,601	13,64	9,32
9-W	10,49	2,548	15,20	9,31
10-WNW	9,69	2,432	11,39	8,59
11-NNW	8,16	2,427	6,38	7,24
Mean	**9,74**	**2,386**	**100,00**	**8,63**



Appendix F. Translated to Position 1: FINO2 LT, Taggen LT

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Energy Island Baltic Sea

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Meteo data report - Frequency distribution (TAB file data)

Mast: Fino2 moved to Buoy 3 LS; Complete period **Period:** Full period: 31/08/2008 - 31/08/2015 (84,0 months)

Frequency distribution (TAB file data)

150,00m - B Synth

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,99	7,90	8,20	9,57	9,64	9,06	8,20	8,91	9,66	11,30	11,80	10,07	8,20
0		0,49	163	0	0	0	72	69	13	9	0	0	0	0	0
1	0,50	1,49	2051	53	67	50	357	466	300	336	238	164	13	2	5
2	1,50	2,49	6897	329	303	367	843	870	804	715	795	798	431	326	316
3	2,50	3,49	12358	608	633	811	1049	1470	1387	1197	1269	1325	1022	874	713
4	3,50	4,49	16239	881	856	1153	1286	1757	1731	1407	1505	1727	1621	1246	1069
5	4,50	5,49	19616	1074	1087	1449	1681	1854	1695	1442	1618	2186	2096	1818	1616
6	5,50	6,49	22578	1197	1072	1681	2055	2070	1603	1544	1820	2623	2806	2457	1650
7	6,50	7,49	25334	1117	1029	1851	2380	2413	1725	1835	2186	2900	3433	2701	1764
8	7,50	8,49	27450	1055	906	2022	2704	2702	1931	1911	2457	3117	4012	3013	1620
9	8,50	9,49	28007	903	733	2027	2551	2950	1896	1868	2430	3810	4602	2831	1406
10	9,50	10,49	28386	826	583	2155	2474	2848	1779	1773	2606	4079	5302	2814	1147
11	10,50	11,49	28277	659	594	1828	2473	2750	1700	1676	2532	4323	5680	2957	1105
12	11,50	12,49	26153	537	650	1621	2221	2410	1506	1607	2297	4291	5734	2430	849
13	12,50	13,49	23826	446	610	1265	2245	2138	1266	1326	2104	4182	5339	2203	702
14	13,50	14,49	20466	333	508	1127	1926	1651	850	1045	1694	3962	5037	1908	425
15	14,50	15,49	15517	174	293	885	1427	1087	456	718	1467	3284	4169	1263	294
16	15,50	16,49	12101	111	174	657	1066	694	268	530	1016	2846	3618	925	196
17	16,50	17,49	8853	94	102	552	636	474	132	279	564	2440	2701	728	151
18	17,50	18,49	5717	45	28	378	382	211	70	180	373	1565	1846	570	69
19	18,50	19,49	3890	18	16	148	243	96	15	162	274	1078	1405	404	31
20	19,50	20,49	2469	12	7	99	131	48	0	130	135	727	935	234	11
21	20,50	21,49	1657	2	13	61	58	24	0	37	59	553	700	132	18
22	21,50	22,49	1046	0	4	46	22	15	0	8	24	305	522	94	6
23	22,50	23,49	665	0	0	15	9	5	0	4	19	198	338	75	2
24	23,50	24,49	406	0	0	0	1	1	0	2	10	77	243	72	0
25	24,50	25,49	237	0	0	0	1	0	0	0	4	45	157	29	1
26	25,50	26,49	114	0	0	0	0	0	0	0	1	24	78	11	0
27	26,50	27,49	72	0	0	0	0	0	0	0	0	10	56	6	0
28	27,50	28,49	89	0	0	0	0	0	0	0	0	13	75	1	0
29	28,50	29,49	44	0	0	0	0	0	0	0	0	8	36	0	0
30	29,50	30,49	33	0	0	0	0	0	0	0	0	3	30	0	0
31	30,50	31,49	26	0	0	0	0	0	0	0	0	4	22	0	0
32	31,50	32,49	9	0	0	0	0	0	0	0	0	1	8	0	0
33	32,50	33,49	4	0	0	0	0	0	0	0	0	4	0	0	0
34	33,50	34,49	1	0	0	0	0	0	0	0	0	1	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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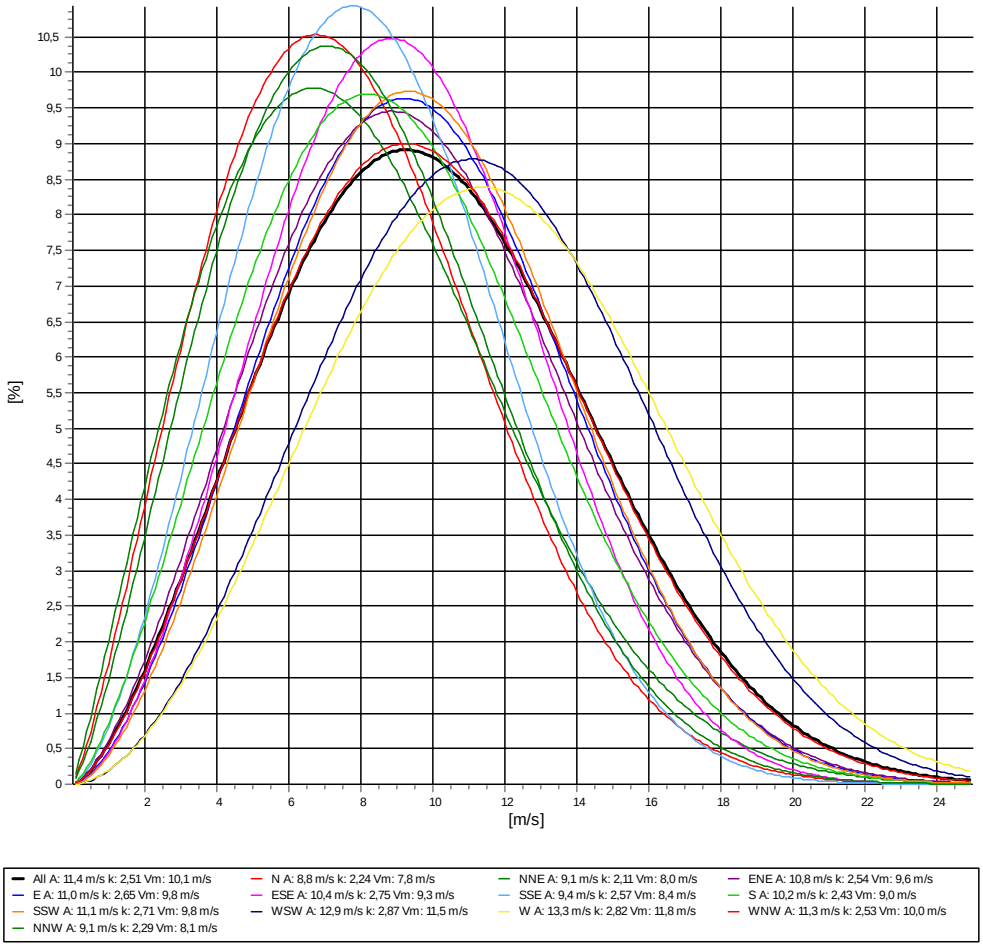
Meteo data report - Weibull data overview

Mast: Fino2 moved to Buoy 3 LS; Complete period **Period:** Full period: 31/08/2008 - 31/08/2015 (84,0 months)
Height: **150,00m - B Synth**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,82	2,241	3,07	7,81
1-NNE	9,09	2,107	3,01	8,05
2-ENE	10,81	2,538	6,53	9,60
3-E	11,00	2,655	8,89	9,78
4-ESE	10,43	2,754	9,12	9,28
5-SSE	9,44	2,569	6,20	8,38
6-S	10,20	2,435	6,38	9,04
7-SSW	11,07	2,707	8,66	9,84
8-WSW	12,88	2,868	15,46	11,48
9-W	13,29	2,819	18,80	11,84
10-WNW	11,32	2,526	9,43	10,04
11-NNW	9,10	2,290	4,45	8,06
Mean	**11,36**	**2,507**	**100,00**	**10,08**



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Meteo data report - Frequency distribution (TAB file data)

Mast: Taggen moved to Buoy 3; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - B Synth

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,64	7,18	8,33	9,28	9,47	9,17	8,52	8,62	9,44	10,90	11,36	9,67	7,94
0		0,49	400	5	0	0	0	0	0	52	61	89	36	70	87
1	0,50	1,49	1613	134	52	0	0	0	77	221	250	219	270	180	210
2	1,50	2,49	3190	203	166	115	154	181	259	326	355	366	365	364	336
3	2,50	3,49	5246	351	272	251	288	281	398	608	638	557	569	524	509
4	3,50	4,49	7960	492	457	494	562	581	678	774	911	747	778	791	695
5	4,50	5,49	10564	683	565	679	852	937	924	908	1070	954	1056	1083	853
6	5,50	6,49	12820	723	668	925	1093	1105	1054	1026	1335	1246	1304	1312	1029
7	6,50	7,49	14621	721	662	1006	1313	1335	1218	1136	1594	1407	1664	1526	1039
8	7,50	8,49	16142	704	769	1134	1446	1435	1199	1149	1638	1719	2033	1827	1089
9	8,50	9,49	16455	552	767	1208	1472	1499	1105	1059	1732	1871	2416	1717	1057
10	9,50	10,49	16234	454	741	1113	1507	1320	969	961	1769	2051	2643	1820	886
11	10,50	11,49	15133	320	605	1027	1415	1254	851	877	1648	2067	2665	1685	719
12	11,50	12,49	13446	225	517	912	1254	1052	714	745	1388	2059	2591	1426	563
13	12,50	13,49	11052	147	345	691	1036	816	481	573	1205	1821	2382	1173	382
14	13,50	14,49	8710	75	208	525	796	608	365	447	914	1501	2097	898	276
15	14,50	15,49	6818	53	110	354	534	400	302	372	729	1304	1759	738	163
16	15,50	16,49	4786	29	64	215	292	259	170	227	497	1033	1416	479	105
17	16,50	17,49	3213	22	14	94	149	124	95	161	324	777	1058	316	79
18	17,50	18,49	2310	5	12	71	38	56	57	124	250	587	827	237	46
19	18,50	19,49	1519	0	0	25	11	23	30	78	139	428	614	153	18
20	19,50	20,49	966	3	0	3	1	10	17	41	92	277	382	126	14
21	20,50	21,49	643	0	0	1	0	1	10	25	41	189	293	71	12
22	21,50	22,49	421	0	0	0	0	1	3	16	20	117	187	71	6
23	22,50	23,49	274	0	0	0	0	0	2	9	13	88	128	32	2
24	23,50	24,49	256	0	0	0	0	0	0	7	10	87	117	35	0
25	24,50	25,49	125	0	0	0	0	0	0	0	5	42	56	21	1
26	25,50	26,49	94	0	0	0	0	0	0	1	2	28	52	11	0
27	26,50	27,49	58	0	0	0	0	0	0	1	0	20	29	7	1
28	27,50	28,49	47	0	0	0	0	0	0	1	0	9	32	5	0
29	28,50	29,49	24	0	0	0	0	0	0	0	0	4	18	2	0
30	29,50	30,49	21	0	0	0	0	0	0	0	0	2	19	0	0
31	30,50	31,49	12	0	0	0	0	0	0	0	0	3	9	0	0
32	31,50	32,49	13	0	0	0	0	0	0	0	0	2	11	0	0
33	32,50	33,49	11	0	0	0	0	0	0	0	0	3	8	0	0
34	33,50	34,49	4	0	0	0	0	0	0	0	0	0	4	0	0
35	34,50	35,49	3	0	0	0	0	0	0	0	0	0	3	0	0
36	35,50	36,49	2	0	0	0	0	0	0	0	0	0	2	0	0
37	36,50	37,49	3	0	0	0	0	0	0	0	0	2	1	0	0
38	37,50	38,49	1	0	0	0	0	0	0	0	0	0	1	0	0
39	38,50	39,49	1	0	0	0	0	0	0	0	0	1	0	0	0
40	39,50	40,49	1	0	0	0	0	0	0	0	0	0	1	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

Project:
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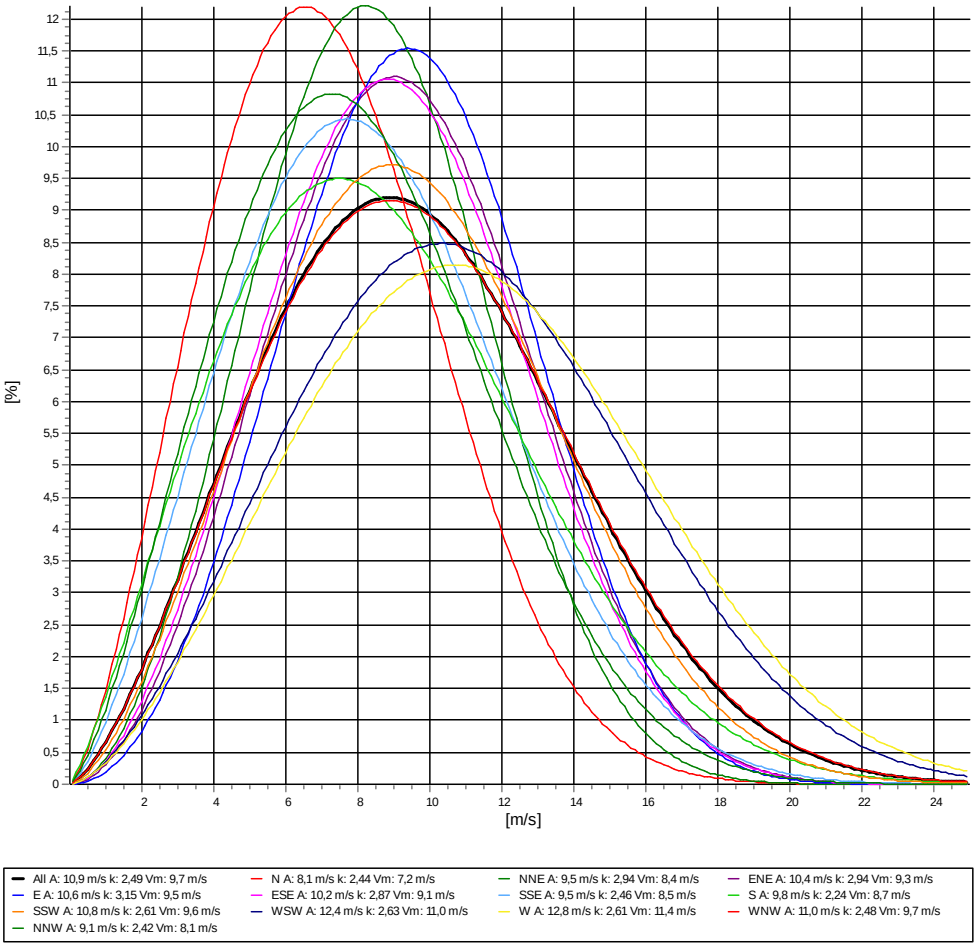
Calculated:
21/08/2023 14.14

Meteo data report - Weibull data overview

Mast: Taggen moved to Buoy 3; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - B Synth**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,13	2,440	3,37	7,21
1-NNE	9,46	2,939	3,99	8,44
2-ENE	10,40	2,935	6,19	9,28
3-E	10,62	3,147	8,11	9,50
4-ESE	10,25	2,874	7,58	9,13
5-SSE	9,54	2,456	6,27	8,46
6-S	9,77	2,238	6,81	8,65
7-SSW	10,76	2,608	10,63	9,56
8-WSW	12,41	2,631	13,51	11,02
9-W	12,84	2,612	17,06	11,41
10-WNW	10,97	2,481	10,67	9,73
11-NNW	9,08	2,417	5,81	8,05
Mean	**10,93**	**2,486**	**100,00**	**9,69**



Appendix G. Translated to Position 2: FINO2 LT, Taggen LT

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Meteo data report - Frequency distribution (TAB file data)

Mast: Fino2 moved to Buoy4 LS; Complete period **Period:** Full period: 31/08/2008 - 31/08/2015 (84,0 months)

Frequency distribution (TAB file data)

150,00m - B Synth

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,93	7,86	7,99	10,05	10,15	8,77	7,96	8,87	9,52	10,53	11,65	10,49	8,52
0		0,49	24	0	0	0	0	0	0	14	5	5	0	0	0
1	0,50	1,49	1670	22	6	0	39	188	176	357	359	405	105	7	6
2	1,50	2,49	6515	304	197	179	405	786	658	754	903	1001	644	372	312
3	2,50	3,49	11905	580	502	548	991	1367	1213	1272	1299	1425	1146	893	669
4	3,50	4,49	16769	862	782	1076	1339	2169	1587	1386	1542	1916	1828	1229	1053
5	4,50	5,49	19736	1085	1004	1336	1552	2174	1591	1477	1647	2419	2231	1709	1511
6	5,50	6,49	22642	1162	1016	1533	2112	2418	1514	1595	1859	2601	2896	2335	1601
7	6,50	7,49	25844	1126	983	1772	2625	2719	1551	1878	2180	3051	3524	2730	1705
8	7,50	8,49	28446	999	828	1830	3266	3205	1822	1902	2362	3501	4140	2960	1631
9	8,50	9,49	29354	909	586	2130	3301	3273	1711	1999	2362	3971	4764	2907	1441
10	9,50	10,49	28942	774	578	1970	2829	3270	1680	1772	2507	4169	5335	2864	1194
11	10,50	11,49	28357	689	562	1966	2845	2969	1514	1720	2308	4128	5798	2830	1028
12	11,50	12,49	27038	593	602	1790	2837	2704	1269	1649	2202	4012	5589	2813	978
13	12,50	13,49	23675	496	490	1318	2571	2092	902	1336	2091	3913	5372	2276	818
14	13,50	14,49	19339	277	291	1188	2326	1437	544	1045	1595	3258	4802	2022	554
15	14,50	15,49	15537	130	180	923	2035	806	272	802	1398	2880	4041	1790	280
16	15,50	16,49	11503	79	105	720	1277	415	138	492	1012	2425	3449	1133	258
17	16,50	17,49	7724	56	43	562	638	213	77	284	560	1479	2659	907	246
18	17,50	18,49	5351	50	20	458	419	98	18	200	359	1007	1848	748	126
19	18,50	19,49	3820	13	7	274	359	27	0	185	278	673	1396	552	56
20	19,50	20,49	2462	1	3	154	217	9	0	104	127	483	939	399	26
21	20,50	21,49	1517	1	0	81	87	5	0	21	72	297	716	222	15
22	21,50	22,49	893	0	0	45	18	0	0	12	29	129	500	148	12
23	22,50	23,49	611	0	0	48	8	0	0	4	26	72	362	89	2
24	23,50	24,49	388	0	0	8	1	0	0	0	7	36	253	81	2
25	24,50	25,49	251	0	0	0	0	0	0	0	4	20	165	61	1
26	25,50	26,49	138	0	0	0	0	0	0	0	0	8	92	38	0
27	26,50	27,49	75	0	0	0	0	0	0	0	0	7	54	13	1
28	27,50	28,49	75	0	0	0	0	0	0	0	0	7	59	9	0
29	28,50	29,49	72	0	0	0	0	0	0	0	0	5	65	2	0
30	29,50	30,49	28	0	0	0	0	0	0	0	0	1	27	0	0
31	30,50	31,49	33	0	0	0	0	0	0	0	0	5	28	0	0
32	31,50	32,49	14	0	0	0	0	0	0	0	0	0	14	0	0
33	32,50	33,49	3	0	0	0	0	0	0	0	0	1	2	0	0
34	33,50	34,49	0	0	0	0	0	0	0	0	0	0	0	0	0
35	34,50	35,49	0	0	0	0	0	0	0	0	0	0	0	0	0
36	35,50	36,49	0	0	0	0	0	0	0	0	0	0	0	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	0	0	0	0	0	0	0	0	0	0	0	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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Calculated:
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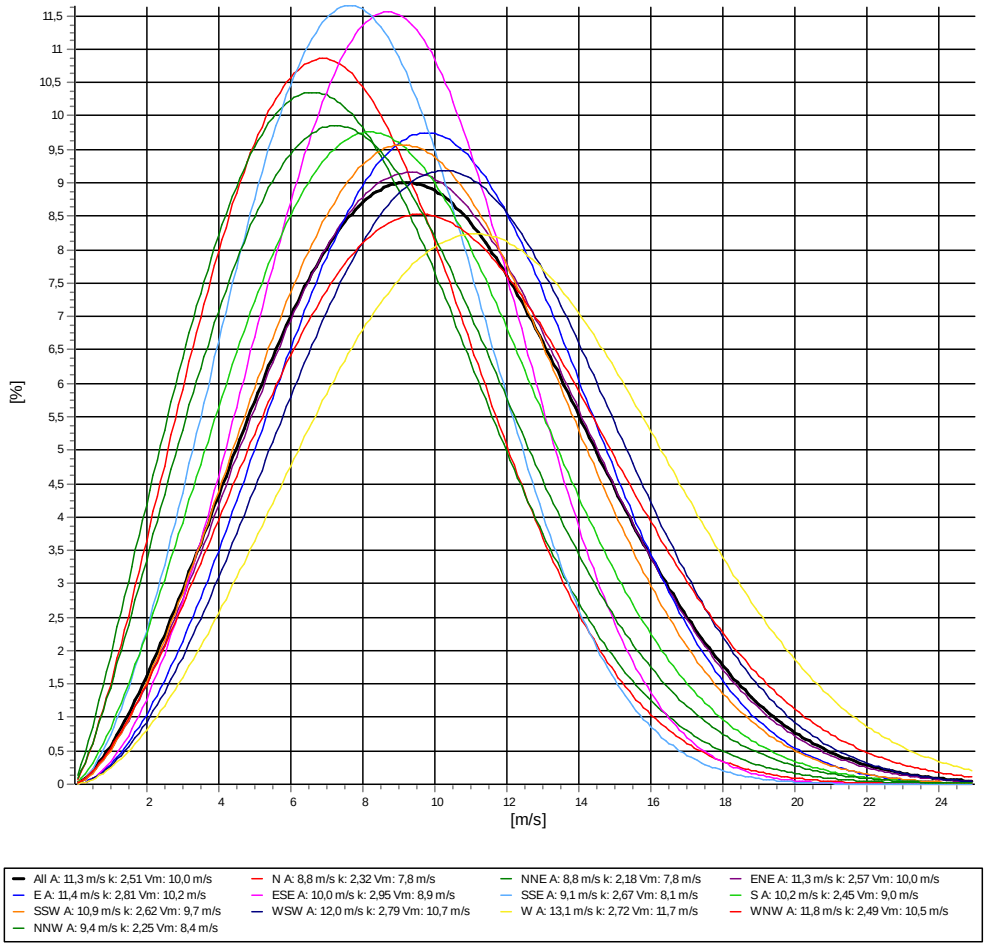
Meteo data report - Weibull data overview

Mast: Fino2 moved to Buoy 4 LS; Complete period **Period:** Full period: 31/08/2008 - 31/08/2015 (84,0 months)
Height: **150,00m - B Synth**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,78	2,321	3,00	7,78
1-NNE	8,78	2,177	2,58	7,77
2-ENE	11,28	2,571	6,43	10,02
3-E	11,42	2,814	10,01	10,17
4-ESE	10,01	2,948	9,49	8,93
5-SSE	9,13	2,665	5,35	8,12
6-S	10,17	2,446	6,53	9,02
7-SSW	10,94	2,615	8,54	9,72
8-WSW	12,03	2,788	14,47	10,71
9-W	13,15	2,725	19,03	11,70
10-WNW	11,79	2,487	10,02	10,46
11-NNW	9,44	2,245	4,56	8,36
Mean	**11,27**	**2,515**	**100,00**	**10,00**



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Calculated:
21/08/2023 14.19

Meteo data report - Frequency distribution (TAB file data)

Mast: Taggen moved to Buoy 4; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)

Frequency distribution (TAB file data)

150,00m - B Synth

Bin	Start	End	Sum	0-N	1-NNE	2-ENE	3-E	4-ESE	5-SSE	6-S	7-SSW	8-WSW	9-W	10-WNW	11-NNW
Mean			9,59	7,27	8,33	9,53	9,80	9,15	8,58	8,73	9,45	10,20	11,12	10,02	8,26
0		0,49	309	0	0	0	0	0	0	0	0	43	120	84	62
1	0,50	1,49	1397	90	7	0	0	0	4	170	263	239	241	173	210
2	1,50	2,49	2433	189	85	11	0	0	115	279	322	354	393	375	310
3	2,50	3,49	4774	340	211	172	211	142	383	525	600	573	609	498	510
4	3,50	4,49	7341	509	361	360	416	404	633	777	859	791	780	787	664
5	4,50	5,49	10330	697	537	549	776	801	982	930	1032	1006	1108	1051	861
6	5,50	6,49	13217	746	659	791	1072	1314	1299	1030	1327	1335	1341	1275	1028
7	6,50	7,49	15478	767	692	923	1385	1569	1487	1206	1578	1559	1701	1509	1102
8	7,50	8,49	17059	742	766	1024	1650	1737	1513	1239	1625	1807	2089	1712	1155
9	8,50	9,49	17585	584	812	1139	1736	1869	1328	1139	1771	2012	2360	1736	1099
10	9,50	10,49	17132	471	730	1067	1712	1596	1172	1167	1729	2106	2554	1835	993
11	10,50	11,49	15711	369	572	1021	1658	1431	1030	908	1586	2041	2570	1706	819
12	11,50	12,49	13718	226	458	916	1458	1180	818	782	1385	1839	2389	1602	665
13	12,50	13,49	11086	125	287	704	1204	786	557	599	1128	1600	2321	1281	494
14	13,50	14,49	8475	80	153	523	919	528	383	466	904	1294	1895	1020	310
15	14,50	15,49	6192	51	58	306	567	311	242	340	635	1009	1614	853	206
16	15,50	16,49	4332	32	23	181	317	125	157	235	489	772	1228	612	161
17	16,50	17,49	2923	20	13	79	175	45	79	155	334	530	956	450	87
18	17,50	18,49	1986	2	1	46	56	16	40	105	217	371	782	293	57
19	18,50	19,49	1220	1	1	15	4	2	14	55	151	230	516	194	37
20	19,50	20,49	797	1	0	6	1	2	4	44	76	139	350	153	21
21	20,50	21,49	541	0	0	0	0	0	4	23	38	107	247	112	10
22	21,50	22,49	387	0	0	0	0	0	0	11	28	75	191	74	8
23	22,50	23,49	255	0	0	0	0	0	0	10	13	55	118	56	3
24	23,50	24,49	165	0	0	0	0	0	0	1	6	28	85	45	0
25	24,50	25,49	117	0	0	0	0	0	0	2	3	16	61	34	1
26	25,50	26,49	75	0	0	0	0	0	0	1	2	12	40	20	0
27	26,50	27,49	52	0	0	0	0	0	0	1	0	3	34	14	0
28	27,50	28,49	28	0	0	0	0	0	0	0	0	1	21	6	0
29	28,50	29,49	27	0	0	0	0	0	0	0	0	4	19	3	1
30	29,50	30,49	19	0	0	0	0	0	0	0	0	0	16	3	0
31	30,50	31,49	15	0	0	0	0	0	0	0	1	2	12	0	0
32	31,50	32,49	10	0	0	0	0	0	0	0	0	0	9	1	0
33	32,50	33,49	8	0	0	0	0	0	0	0	0	0	8	0	0
34	33,50	34,49	12	0	0	0	0	0	0	0	0	3	9	0	0
35	34,50	35,49	1	0	0	0	0	0	0	0	0	0	1	0	0
36	35,50	36,49	4	0	0	0	0	0	0	0	0	1	3	0	0
37	36,50	37,49	0	0	0	0	0	0	0	0	0	0	0	0	0
38	37,50	38,49	0	0	0	0	0	0	0	0	0	0	0	0	0
39	38,50	39,49	0	0	0	0	0	0	0	0	0	0	0	0	0
40	39,50	40,49	1	0	0	0	0	0	0	0	0	0	1	0	0
41	40,50		0	0	0	0	0	0	0	0	0	0	0	0	0

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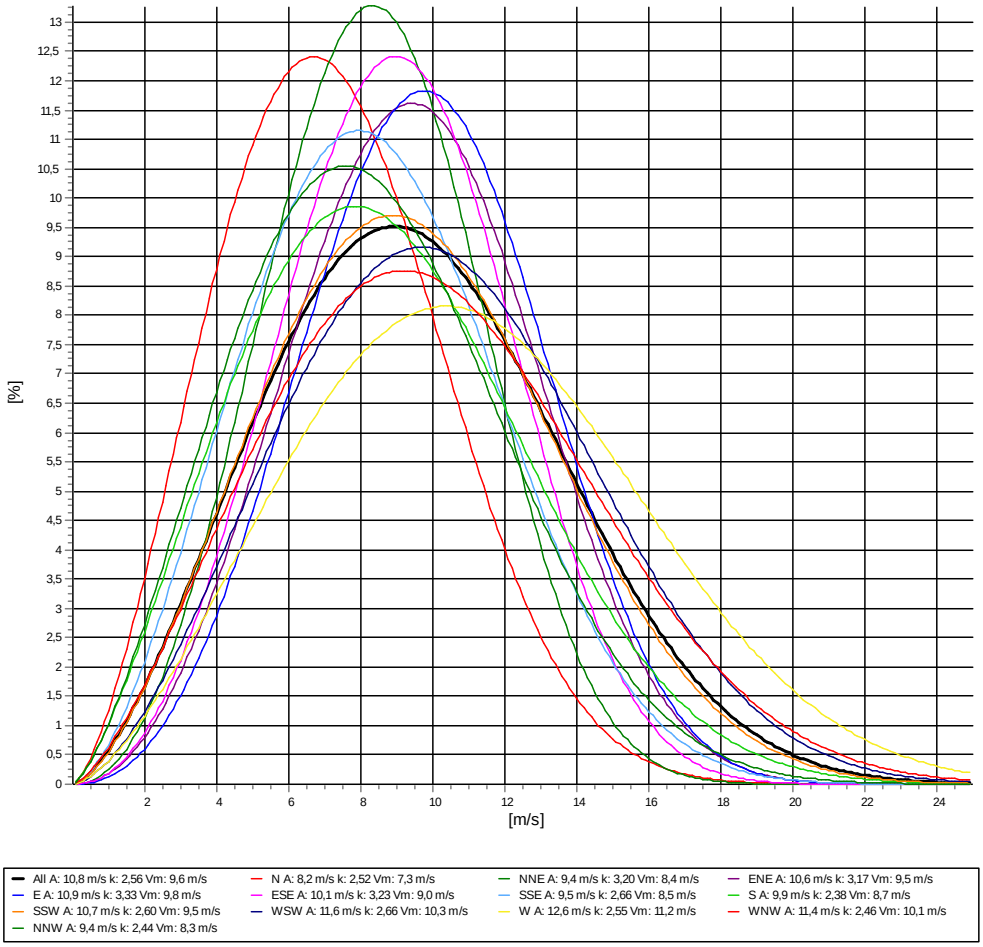
Calculated:
21/08/2023 14.19

Meteo data report - Weibull data overview

Mast: Taggen moved to Buoy 4; Complete period **Period:** Full period: 01/01/2003 - 01/01/2023 (240,0 months)
Height: **150,00m - B Synth**

Weibull data

Sector	A [m/s]	k	f	Mean wind speed [m/s]
0-N	8,19	2,521	3,45	7,27
1-NNE	9,37	3,204	3,67	8,40
2-ENE	10,62	3,170	5,61	9,50
3-E	10,88	3,326	8,74	9,76
4-ESE	10,09	3,226	7,91	9,04
5-SSE	9,51	2,656	6,99	8,45
6-S	9,87	2,383	6,96	8,75
7-SSW	10,73	2,595	10,33	9,53
8-WSW	11,58	2,660	12,53	10,30
9-W	12,59	2,553	16,43	11,18
10-WNW	11,38	2,459	11,17	10,09
11-NNW	9,40	2,444	6,21	8,34
Mean	**10,83**	**2,564**	**100,00**	**9,62**



Appendix H. Normal Turbulence Model (150 m)

Wind speed [m/s]	Turbulence intensity mean value (TI_μ) [%]	Turbulence intensity standard deviation (TI_σ) [%]	Turbulence intensity 90% quantile [%]
3	11.5	7.2	20.8
4	8.5	5.6	15.6
5	6.8	4.6	12.7
6	5.8	4.0	10.8
7	5.1	3.5	9.6
8	4.7	3.2	8.7
9	4.4	2.9	8.1
10	4.3	2.7	7.7
11	4.2	2.5	7.4
12	4.2	2.4	7.2
13	4.2	2.2	7.0
14	4.2	2.1	6.9
15	4.3	2.0	6.9
16	4.4	2.0	6.9
17	4.5	1.9	6.9
18	4.6	1.8	7.0
19	4.8	1.8	7.0
20	4.9	1.7	7.1
21	5.0	1.7	7.2
22	5.2	1.6	7.3
23	5.3	1.6	7.4
24	5.5	1.6	7.6
25	5.7	1.5	7.7

Wind speed [m/s]	TURBULENCE MEAN VALUE (σ_μ) [M/S]	TURBULENCE STANDARD DEVIATION (σ_σ) [M/S]	Turbulence 90% QUANTILE [m/s]
3	0.35	0.22	0.62
4	0.34	0.22	0.63
5	0.34	0.23	0.63
6	0.35	0.24	0.65
7	0.36	0.24	0.67
8	0.38	0.25	0.70
9	0.40	0.26	0.73
10	0.43	0.27	0.77
11	0.46	0.27	0.81
12	0.50	0.28	0.86
13	0.54	0.29	0.91
14	0.59	0.30	0.97
15	0.65	0.31	1.04
16	0.70	0.31	1.10
17	0.77	0.32	1.18
18	0.83	0.33	1.25
19	0.90	0.34	1.34
20	0.98	0.34	1.42
21	1.06	0.35	1.51
22	1.14	0.36	1.60
23	1.23	0.37	1.70
24	1.33	0.38	1.81
25	1.44	0.38	1.93