



EVALUATION REPORT SITE CONDITIONS – WIND CONDITIONS – KRIEGER'S FLAK II

PREPARED FOR:
ENERGINET ELTRANSMISSION A/S

ORDER NO.: 15626458

*Report No.: R15626458-0-2, Rev. 0,
2025-01-20*

Wind Farm: Kriegers Flak II

Evaluation Basis:
IECRE OD-502: Operational Document,
"Project Certification Scheme", Edition 1.0,
2018-10

CLASSIFICATION
CLIENT'S DISCRETION

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DOCUMENT HISTORY

REVISION	RELEASE DATE	AFFECTED PAGE(S)	MODIFICATION
0	2025-01-20	-	Initial Document

1. DOCUMENTS

1.1 Examined Documents

/1.1.1/ C2Wind ApS: Report
"Lot 2 (Kriegers Flak II) - Wind Assessment",
Doc. No. 23072-04-03, Rev. 4, 2024-09-24, 112 pages
(DEWI-OCC Order-No.: 15626458 - Doc No. -00+169)

/1.1.2/ C2Wind ApS: Report
"Lot 2 (Kriegers Flak II)
Wind Assessment Supplementary Note",
Doc. No. 23072-04-04, Rev. 1, 2024-10-18, 37 pages
(DEWI-OCC Order-No.: 15626458 - Doc No. -00+170)

1.2 Noted Documents

/1.2.1/ DNV: Certificate
"Fugro Norway AS - ISO 9001 Management System Certificate",
Doc. No. 10000409040-MS-NA-NOR, Rev. -, 2023-09-28, 2 pages
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00c+174)

/1.2.2/ fugro Norway: Report
"SWLB measurements - Danish Offshore Wind 2030
Project Measurement Plan, All Lots",
Doc. No. C75516/C75517/C75518_Project_Measurement_Plan_All_Lots 09, Rev. 9, 2023-
11-25, 50 pages
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+172)

/1.2.3/ fugro Seawatch (SWLB): Data File
"Stations and deployment record - DOW2030 KFII",
Doc. No. 3594A85256CE88D87D4427C76167AFA5, 85KB pages
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+070)

/1.2.4/ Energinet: Folder
"Buoy drawings and moorings"
3 files
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+001 - +003)

/1.2.5/ Energinet: Folder
"Buoy pre-deployment verification reports"
5 files
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+004 - +008)

/1.2.6/ Energinet: Folder
"Instrument Certificates"
53 files
(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+009 - +061)

/1.2.7/ Energinet: Folder
"Service Reports"

8 files

(DEWI-OCC Order-No.: 15626458 – Doc. No. -00b+062 - +069)

/1.2.8/ DEWI-OCC GmbH: Evaluation Report

"Site Conditions – Measurement Campaign for Wind and Metocean Conditions – Kriegers
Flak II"

Doc. No. R15626458-0-1, Rev. 0, 2024-12-20, 6 pages

2. CERTIFICATION SCHEME

/2.1/ IECRE OD-502: Operational Document, "Project Certification Scheme", Edition 1.0, 2018-10

3. APPLIED STANDARDS AND GUIDELINES

The conformity evaluation was carried out based on the following standards and guidelines:

/3.1/ IEC 61400-3-1: "Wind energy generator systems – Part 3-1: Design requirements for fixed offshore wind turbines", Edition 1.0, 2019-04

/3.2/ IEC 61400-1: "Wind energy generator systems – Part 1: Design requirements", Edition 4.0, 2019-02

4. SCOPE OF EVALUATION

The wind conditions for the offshore wind farm Kriegers Flak II documented in chapter 1 shall be evaluated for conformity with IECRE OD-502 /2.1/ and respective technical standards /3.1/ and /3.2/ with the purpose of use in the design basis for FEED design.

The documents in 1.1 shall be reviewed for completeness, correctness and consistency.

Marine conditions, soil conditions, electrical conditions and other site conditions are not subject of this evaluation report.

5. REMARKS

5.1 General information and site configuration

The offshore wind farm Kriegers Flak II is located 15 to 35 km off the eastern coast of Denmark, in the Danish Baltic Sea. The number and locations of wind turbines are not yet defined.

The documents listed in chapter 1 present the wind conditions for the offshore wind farm Kriegers Flak II. /1.1.1/ provides the majority of the information while /1.1.2/ supplements /1.1.1/ with a longer set of on-site measurement data. Both documents shall be read together. The documentation details the wind conditions and relevant input parameters as well as the applied codes and standards to be used for the design basis for FEED design for the offshore wind farm.

The location of the planned wind farm area is given in /1.1.1/. Wind conditions at the site were derived on the basis of LiDAR measurements and modeling data and are detailed in /1.1.1/ and /1.1.2/. Hydrographic conditions at the wind farm site, results of the geophysical and geotechnical campaigns, electrical network conditions, ice conditions and other site conditions are not part of this report.

5.2 Site Conditions

5.2.1 Wind conditions

Wind conditions for the site of the offshore wind farm Kriegers Flak II are detailed in /1.1.1/ and the supplementary note /1.1.2/.

Wind data was derived on the basis of floating LiDAR measurements at two locations. In total 12 months of measurements were derived by the company "Fugro". Independent testing and verification of the

LiDAR buoys is documented in /1.2.2/ and /1.2.5/. Deployment times and information on instrumentation are documented in /1.2.3/.

The company “Fugro” is not recognized by IECRE as a testing laboratory for wind and metocean measurements. The qualification of the testing laboratory and the involved personnel as well as the quality of the measurement campaign were therefore confirmed by DEWI-OCC on the basis of the documentation /1.2.1/ to /1.2.7/. The evaluation of the measurement campaign is documented in /1.2.8/.

According to /1.1.1/ data was supplemented with secondary data from other measurement sites. Turbulence data is derived from secondary sources instead of on-site measurements.

Other data sources are listed including measurement period and utilization of data.

Data quality and selection as well as processing of data for the chosen use are discussed.

For long term correction meso-scale time series with up to 30 years of data were used. According to /1.1.1/ several long-term time series were compared with the measurement data and the best fit was chosen. Relevant data is presented in /1.1.1/ and /1.1.2/.

A height of 150 m above mean sea level is chosen as reference height. Should the hub height or other relevant assumptions of the final chosen wind turbine deviate from the presented height and assumptions, data shall be reassessed.

Parameters for extreme wind conditions and normal wind conditions as well as information for wind shear and turbulence intensity are given in /1.1.1/ and /1.1.2/. Values for gust are not presented. Values for gust shall be determined once the wind turbine model is known and included in the project documentation.

Under consideration of all remarks, wind conditions as detailed in /1.1.1/ and /1.1.2/ are suitable for application in the design basis for FEED design.

6. INTERFACE TO OTHER EVALUATION MODULES

- 6.1 The measurement campaign at the offshore wind farm Kriegers Flak II is evaluated in R15626458-0-1
- 6.2 Metocean conditions for the offshore wind farm Kriegers Flak II are evaluated in R15626458-0-3
- 6.3 Sea ice conditions at the offshore wind farm Kriegers Flak II are evaluated in R15626458-0-4

7. CONDITIONS

- 7.1 Should the hub height or other relevant assumptions of the final chosen wind turbine deviate from the presented assumptions and height of 150 m above sea level, data shall be reassessed.
- 7.2 If additional on-site measurement data becomes available, wind parameters shall be reassessed.
- 7.3 Values for gust shall be determined once the wind turbine model is known and if gust is used in design, it shall be evaluated during further certification.
- 7.4 Once wind farm layout and WTG type are known, the wake induced turbulence shall be calculated and included in documentation.

8. CONCLUSION

The wind conditions for the offshore wind farm Kriegers Flak II presented in /1.1.1/ and /1.1.2/ submitted for review were found plausible and in conformity with IECRE OD-502 /2.1/ and the respective technical standards /3.1/ and /3.2/.

Under consideration of the remarks in this report there are no objections against the application of the wind conditions in the design basis for FEED design in the offshore wind farm Kriegers Flak II.

Changes in the wind conditions shall be approved by DEWI-OCC GmbH; otherwise this report loses its validity.

Bremen, 2025-01-20

Expert in Charge

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