EVALUATION REPORT SITE CONDITIONS - MEASUREMENT CAMPAIGN FOR WIND AND METOCEAN CONDITIONS

PREPARED FOR:

ENERGINET ELTRANSMISSION A/S

Order No.: 14772868

Report No.: *R14772868-0-5, Rev. 2, 2024-07-09*

Wind Farm: Energy Island North Sea Wind Farms

CLASSIFICATION

CLIENT'S DISCRETION

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DOCUMENT HISTORY

REVISION	RELEASE DATE	MODIFICATION
0	2023-12-22	Initial Document
1	2024-06-28	Update of /1.1.3/ and /1.1.6/.
2	2024-07-09	Update of /1.2.10/, /1.2.11/ and /1.2.12/.

1 DOCUMENTS

1.1 Examined Documents

/1.1.1/ DNV GL: Certificate
"ISO 9001 Management System Certificate Fugro Norway AS",
Doc. No. 10000409040-MSC-NA-NOR, 2020-12-16, 2 pages
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+038)

/1.1.2/ Fugro: Report
"SWLB measurements at Energy Islands Project Measurement Plan, All Lots",
Doc. No. C75486_Project_Measurement_Plan_All_Lots 09, Rev. 9, 2023-05-30, 56 pages
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+039)

/1.1.3/ Energinet: Excel-File
"Stations and deployment record - EINS",
MD5 checksum: D7ED6B74294B9BEA11E246CD9BA6F4B1, 79 kB
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+047)

/1.1.4/ Energinet: Folder
"Buoy predeployment validation reports", 11 files
MD5 checksum: 31C235877CAA7B49E65ED01B63F81E11
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+041)

/1.1.5/ Energinet: Folder
"Instrument certificates and reports", 103 files
MD5 checksum: 4E57DF8944CAB3F13F0B921B83C8A57E
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+042)

/1.1.6/ Energinet: Folder
"Service reports", MD5 checksum:
F751DC01543860C133EFFBAF40EA631D, 11 files
(DEWI-OCC Order-No.: 14772868 – Doc. No. -00+048)

1.2 Noted Documents

/1.2.1/ DNV GL: Report
"Independent performance verification of Seawatch Wind Lidar Buoy at Frøya, Norway",
Doc. No. 10281716-R-2 Rev. B, 2021-05-07, 45 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+010)

/1.2.2/ DNV: Report
"Independent performance verification of Seawatch Wind Lidar Buoy at the LEG offshore platform",
Doc. No. 10298247-R-1 Rev. A, 2021-07-09, 43 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+011)

/1.2.3/ DNV: Report
"Independent analysis and reporting of ZX Lidars performance verification executed by ZX Lidars at the UK Remote Sensing Test Site",
Doc. No. 10284581-R-61-A Rev. A, 2021-10-05, 38 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+013)

/1.2.4/ DNV GL: Report
"Independent analysis and reporting of ZX Lidars performance verification executed by ZX Lidars at the UK Remote Sensing Test Site",
Doc. No. 10284581-R-1 Rev. A, 2021-02-17, 82 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+014)

/1.2.5/ DNV: Report
"WS191 Independent performance verification of Seawatch Wind Lidar Buoy at Frøya, Norway",
Doc. No. 10332389-R-4 Rev. A, 2022-04-04, 37 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+017)

/1.2.6/ DNV: Report
"ZX862 Independent analysis and reporting of ZX Lidars performance verification executed by ZX Lidars at the UK Remote Sensing Test Site",
Doc. No. 10284581-R-84-A Rev. A, 2021-11-12, 38 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+018)

/1.2.7/ Energinet: Data Sheet
"Deployment record for Lot 1, North Sea", 1 page
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+015)

/1.2.8/ Energinet: Data Sheet
"Deployment record for Lot 2, North Sea", 1 page
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+016)

/1.2.9/ EMD International A/S: Report
"Site Wind Conditions Assessment Energy Island North Sea",
Doc. No. 230331_22306_A_TS_2 Rev. 2, 2023-05-12, 250 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+009)

/1.2.10/ DHI: Report
"Energy Island, North Sea Metocean Assessment Part A: Data Basis – Measurements and Models Establishment of bathymetry, measurements and hindcast",
Doc. No. 4500087261, Rev. 1.1, 2023-11-20, 163 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+044)

/1.2.11/ DHI: Report
"Energy Island, North Sea Metocean Assessment Part B: Data Analyses – Energy Island (Design) Metocean site conditions for detailed design of the energy island",
Doc. No. 4500087261, Rev. 1.2, 2023-08-09, 163 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+045)

/1.2.12/ DHI: Report
"Energy Island North Sea Metocean Assessment Part C: Data Analyses – Wind Farm Area Metocean site conditions for FEED of the offshore wind farms",
Doc. No. 4500087261, Rev. 1.3, 2023-11-20, 101 pages
(DEWI-OCC Order-No.: 14772868 - Doc No. -00+046)

2 CERTIFICATION SCHEME

/2.1/ IECRE OD-502: Operational Document, "Project Certification Scheme", Edition 1.0, 2018-10-11

3 STANDARDS AND GUIDELINES

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

/3.1/ ISO/IEC 17025: “General requirements for the competence of testing and calibration laboratories”. Edition 2017

4 SCOPE OF EVALUATION

An on-site measurement campaign for the Energy Island North Sea wind farm and artificial island structure area was executed by the company “Fugro” for the purpose of use in the design basis for FEED design as part of project certification according to IECRE OD-502 /2.1/. Fugro is not recognized by IECRE as a testing laboratory nor accredited according to ISO 17025 /3.1/ for wind and metocean measurements. The qualification of the testing laboratory and the involved personnel as well as the quality of the measurement campaign shall be confirmed by DEWI-OCC. The quality of the executed measurement campaign, the qualification of the testing laboratory and the involved personnel shall be evaluated for conformity with requirements of ISO 17025 /3.1/ on the basis of the documentation /1.1.1/ to /1.1.6/ for use in a project certification according to IECRE OD-502 /2.1/.

Evaluation of results of the measurement campaign, validation of results, and presentation of design parameters as well as the investigation of soil conditions are not subject of this evaluation report.

5 REMARKS

5.1 General

The Energy Island North Sea Wind Farm site is located in the North Sea off the Coast of Jutland, Denmark. The number and locations of wind turbines as well as the exact extent of the energy island are not yet defined.

The documents listed in chapter 1.1 present proof for the quality of the measurement campaign executed for the Energy Island North Sea Wind Farm, the qualification of the measurement company Fugro and the suitability of the personnel that was involved in the presented measurement campaign.

Documents /1.2.1/ to /1.2.9/ include supplementary performance verification of the utilized buoys as well as deployment information.

5.2 Measurement Campaign

The company Fugro, executing the measurements for the Energy Island North Sea wind farm and artificial island structure area, holds an ISO 9001 certification /1.1.1/, valid at the time of measurement activity. Based on this the compliance of the quality measurement system of Fugro with the requirements of ISO 17025 /3.1/ will be considered as given.

A measurement plan /1.1.2/ describing the instrumentation of the buoys, measurement principles and methodology, data treatment, post-processing and quality control was provided by Fugro.

Document /1.1.3/ provides an overview of deployment locations for the measurement equipment in the North Sea and Baltic Sea. It also provides information on the existence of service records and any disturbances as well as a detailed list of the configuration of each buoy.

In addition, /1.1.3/ provides a list of the involved Fugro personnel, their role in the project and their qualification.

Service records for the measurement equipment /1.1.6/, pre-deployment validation reports /1.1.4/ and certificates for the measurement instruments /1.1.5/ were included in the evaluation.

The performance of the utilized buoys was verified by DNV before project specific adjustments, which is documented in /1.2.1/ to /1.2.6/.

Procedures to ensure general competency, training procedures and personnel information are assumed to be covered by the ISO 9001 certificate /1.1.1/ of Fugro. The qualification of personnel involved in the project as presented in /1.1.1/ is deemed appropriate.

The equipment presented in /1.1.2/ and /1.1.3/ is appropriate for the measurements executed for the project. The described methodologies, measurement procedures, data handling and processing are deemed suitable. Certificates, pre-deployment validation and in service documentation are deemed sufficient and measurement results are traceable.

The qualification of Fugro as well as the involved personnel and the presented execution of measurements are deemed to be in compliance with the requirements of ISO 17025 /3.1/ for measurements of offshore wind and metocean data for the Energy Island North Sea wind farm and artificial island structure area. Consequently, the quality of measurements of the wind data and metocean data as used in /1.2.10/ to /1.2.12/ is deemed sufficient for the purpose of use in the design basis.

6 INTERFACE TO OTHER EVALUATION MODULES

6.1 Wind conditions at the site are evaluated in R14772868-0-1

6.2 The data basis for metocean conditions at the site of the Wind Farm Area and Energy Island (Metocean Assessment Part A) is evaluated in R14772868-0-2

6.3 The data analysis for Metocean conditions at the site of the Energy Island Area (Metocean Assessment Part B) is evaluated in R14772868-0-3

6.4 The data analysis for Metocean conditions at the site of the Wind Farm Area (Metocean Assessment Part C) is evaluated in R14772868-0-4

7 CONCLUSION

The qualification of the company Fugro for the on-site measurement campaign for the Energy Island North Sea wind farm and artificial island structure area as well as the measurement instrumentation and processes as documented in /1.1.1/ to /1.1.6/ were found plausible with ISO 17025 /3.1/ and suitable for use in project certification according to IECRE OD-502 /2.1/.

There are no objections against the application of the measurement campaign for the design basis for FEED design for the Energy Island North Sea Wind Farms wind farm and artificial island structure area.

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

Bremen, 2024-07-09

Expert in Charge

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