DNV·GL

STATEMENT OF FEASIBILITY

Statement No.:
C-DNVGL-SE-0190-07164-0

Issued
2021-02-26

Issued for:

Concept

of

Thor Offshore Wind Farm

Comprising:

Wind Turbines

Specified in Annex 1

Issued to:

Energinet Eltransmission A/S

Tonne Kjærsvej 65
7000 Fredericia
Danmark

According to:

DNVGL-SE-0190:2020-09
Project certification of wind power plants

Based on the documents:
CR-C-DNVGL-SE-0190-07164-0 Certification Report, dated 2021-02-26

Hamburg, 2021-02-26

For DNV GL Renewables Certification

Fabio Pollicino
Director and Service Line Leader for Project Certification

DAkkS Deutsche Akkreditierungsstelle D-ZE-11053-01-00

By DAkkS according DIN EN IEC/ISO 17065 accredited Certification Body for products. The accreditation is valid for the fields of certification listed in the certificate.

Hellerup,2021-02-26

For DNV GL Renewables Certification

Iris Pernille Lohmann
Project Manager
Principal Engineer

STATEMENT OF FEASIBILITY – ANNEX 1

Wind power plant area

Coordinate system and datum	ETRS89 UTM32N M	
	East	North
Corner coordinates of the wind farm	399264	6232328
	402011	6236670
	425649	6264590
	425945	6258540
	425702	6253830
	425266	6247230
	425636	6240830
	426100	6233490
	425953	6232328

Wind conditions – Normal

Annual average wind speed (at proposed hub height 140.0 m MSL)	10.50 m/s
Weibull A-parameter	11.85 m/s
Weibull k-parameter	2.3
Wind shear for extrapolation in the interval [114;164] m MSL	0.06
Wind shear for load calculation	0.09
Ambient turbulence / characteristic turbulence at 15 m/s (NTM)	5.0% / 6.9%
Air density	1.23 kg/m^3

Wind conditions – Extreme

Wind speed 50-year recurrence, 10 min. (at proposed hub height)	47.0 m/s
Wind shear for EWM	0.11
Turbulence intensity for use with EWM	11%
Air density	1.21 kg/m3

Marine conditions

Highest astronomical tide (HAT)	+0.6 m MSL
Lowest astronomical tide (LAT)	-0.6 m MSL
Significant wave height for 50-year recurrence period, $H_{m0,50\text{-}yr}$	9.7 m
Significant wave height for 1-year recurrence period, $H_{m0,1\text{-}yr}$	7.1 m
Peak wave period $T_{p,50\%}$ for extreme for 50-year recurrence wave $H_{m0,50\text{-}yr}$	14.9 s
Peak wave period $T_{p,50\%}$ for extreme for 1-year recurrence wave $H_{m0,1\text{-}yr}$	12.8 s
Extreme deterministic wave height for 50-year recurrence period, $H_{max,50\text{-}yr}$	18.3 m
Extreme deterministic wave height for 1-year recurrence period, $H_{max,1\text{-}yr}$	12.8 m
Extreme wave crest elevation* for 50-year recurrence period	13.8 m MSL
Extreme wave crest elevation* for 1-year recurrence period	9.2 m MSL
Extreme high-water level* for 50-year recurrence period	2.2 m MSL
Extreme high-water level* for 1-year recurrence period	1.6 m MSL
Extreme depth averaged current speed for 50-year recurrence period	0.9 m/s
Extreme depth averaged current speed for 1-year recurrence period	0.7 m/s

* excluding sea level rise and vertical land movement

STATEMENT OF FEASIBILITY – ANNEX 1

Summary of scope of work

The table below lists the work packages of the concept evaluation and indicates if these work packages have been

- verified by DNV GL (verified)
- same as or covered by a certificate / statement this assessment is based on (as certified)
- taken as given without verification by DNV GL (as given by customer)
- not included in this assessment (not included)
- not present in this case (none).

1)	site wind and other enviromental conditions, mean/extreme wind speed	Verified
2)	water depth, currents and mean/extreme sea state, if applicable	Verified
3)	reliability of the sources of item 1. and 2.	Verified
4)	grid connection possibilities resp. distance to main consumers, local rules of authorities	Not included
5)	logistic accessibility for large components and human resources	Not included
6)	general soil conditions, depth of effective foundation level below (soil or water) surface	Not included
7)	general foundation type (on- or offshore, if offshore: fixed or floating)	Not included
8)	corrosion protection strategy/corrosion control concept	Not included
9)	general plant layout	Not included
10)	size, type and number of wind turbines and their distances to each other	Not included
11)	concept of substation with respect to structural, safety and electrical design	Not included
12)	control of wind power plant	Not included
13)	homogeneity of lifecycle concept of wind power plant, i.e. trade-off between dimensioning of components and maintenance/repair frequency, if applicable	Not included
14)	standards to be applied for design and their interfaces. Advantages and disadvantages of different standard series and their holistic concept (i.e. fit of the design standard to the planned manufacturing standard)	Not included
15)	risk analyses for different possible design approaches for the components of the wind power plant. Trade-off between high risk approach and its possible gains/losses as compared to conventional design	Not included
16)	reviewing extent, contents and time horizon of test series required for newly innovated design parts or components.	Not included