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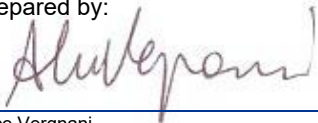
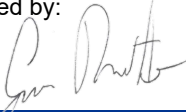
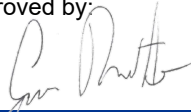
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Information about this document (the “Document”)

Project name: Monte Croce di Ferro Wind Farm
 Document title: Energy Production Assessment – Executive Summary
 DNV document no.: 10476371-ITBO-L-01
 Document revision: C
 Issue date: 2024-01-16
 Applicable contract(s): OPP-00327557-ITBO-P-01

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Revision log

Revision	Date	Description
A	2024-01-04	First issue
B	2024-01-09	Revision after Customer's comments
C	2024-01-16	Revision after Customer's comments

ENERGY PRODUCTION ASSESSMENT OF THE MONTE CROCE DI FERRO WIND FARM – EXECUTIVE SUMMARY

The Customer is developing the Monte Croce di Ferro Wind Farm (the “Project”) and has instructed DNV to carry out an independent analysis of the wind regime and energy production of the Project which is reported in DNV report 10476371-ITBO-R-01 Issue A dated 2023-12-05 /1/. The present document provides an executive summary of such report.

Project description

The Project consists of 7 wind turbines and is located approximately 70km to the Est of Genova, in the province of Parme in the Emilia-Romagna region of Italy.

The wind turbine layout characteristics are presented in Table 1 and the coordinates for each wind turbine location are listed in Table 2.

Table 1 Wind turbine layout

Layout configuration	Wind turbine model	Hub height [m]	Turbines	Total installed capacity [MW]
A	V136 4.2 MW	112.0	BT1	4.2
	V136 4.3MW	112.0	BT2, BT3, BT4, BT5, BT6 and BT7	25.8

Table 2 Wind farm information

Wind farm	Wind turbine	Coordinates [m] WGS 84 UTM zone 32N		Wind turbine model	Hub height [m]
Monte Croce di Ferro	BT1	564806	4924469	V136 4.2MW	112.0
	BT2	565046	4924040	V136 4.3MW	112.0
	BT3	565475	4924154	V136 4.3MW	112.0
	BT4	565771	4924231	V136 4.3MW	112.0
	BT5	566150	4924371	V136 4.3MW	112.0
	BT6	566727	4924633	V136 4.3MW	112.0
	BT7	567100	4924658	V136 4.3MW	112.0

Wind resource summary

The Customer supplied wind data recorded by the on-site measurement equipment listed in Table 3.

Table 3 List of on-site monitoring equipment

Monitoring equipment	Measurement period start date	Measurement period end date	Wind measurement type	Measurement heights [m]
Mast CrociFerro	Mar 2006	Jul 2008	Wind speed	40.0, 30.0, 20.0
Mast CrociFerro	Mar 2006	Jul 2008	Wind direction	40.0, 20.0
Sodar FRI2	Jan 2023	Jul 2023	Wind speed	35.0-200.0
Sodar FRI2	Jan 2023	Jul 2023	Wind direction	35.0-200.0

Due to the lack of a proper validation, wind data from Sodar FRI2 have been used to perform qualitative investigations only.

Results of the wind analysis are presented in Table 4.

Table 4 Wind analysis results

Hub height [m]	On-site measurement period [years]	Long-term reference period [years] ¹	Long-term Wind speed at Mast Crocifermo	Average wind farm Long-term wind speed [m/s]
112.0	2.2	-	7.5	7.2

Note: 1 Long term adjustment was not applied due to low quality of correlations with available long-term reference resources

Energy assessment summary

Results of the energy analysis are presented in Table 5.

Table 5 Energy production summary

Configuration	A
Evaluation period [years]	10
Gross energy [GWh/year]	100.3
P50 loss factors	
- Turbine interaction [%]	97.9
- Availability [%]	95.1
- Electrical [%]	97.0
- Turbine performance [%]	97.6
- Environmental [%]	99.5
- Curtailment [%]	-
Total loss factor [%]	87.6
Effect of asymmetric production [%]	99.9
Evaluation period P50 net energy production [GWh/year]	87.9
Evaluation period P50 net energy capacity factor [Hours]	2930

The P50 net energy prediction represents the long-term mean, 50 % exceedance level, for the annual energy production of the wind farm. This value is the best estimate of the long-term mean value to be expected for the Project. There is therefore a 50 % chance that, even when taken over very long periods, the mean energy production will be lower than the value given.



References

/1/ "Monte Croce di Ferro Wind Farm – Energy Production Assessment" , DNV report 10476371-ITBO-R-01 dated 2023-12-05