



ProfEC | Ventus

REPORT

ENERGY YIELD ASSESSMENT FOR THE WIND FARM WESTSTREAM-1 (MAURITANIA)

Client:
weelectrify Africa UG
Am Einlaß 3a
80469 München
Germany
(short: **weelectrify**)

Contractor:
ProfEC Ventus GmbH
Im Ofenerfeld 23
26127 Oldenburg
Germany
(short: **ProfEC Ventus**)



ENERGY YIELD ASSESSMENT FOR THE WIND FARM WESTSTREAM 1 (MAURITANIA)

Client: weelectrify Africa UG
Am Einlaß 3a
80469 München
Germany

Contact: Mr. Philipp Wagner

Project Nr.: 1589 – 2022

Report Nr.: 1599 – 2022

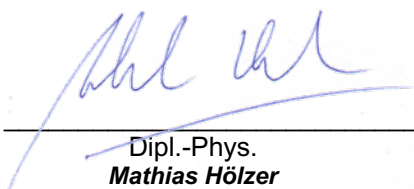
Version: V1

Report author: Mathias Hölzer
Dipl.-Phys.

Report verifier: Andreas Jansen
MSc BHons Dipl-Ing(FH)

Date: August 4, 2022

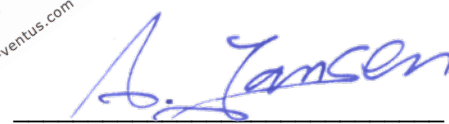
Author:



Dipl.-Phys.
Mathias Hölzer
Technical Director



Verified and approved:



MSc Bhons Dipl-Ing(FH)
Andreas Jansen
Deputy Technical Director

Issue	Date	Author	Description and brief summary of changes
Draft	July 18, 2022	MHoe	Draft for client revision
V1	August 4, 2022	MHoe	Original Version

**This report in excerpts may only be copied with written consent of ProfEC Ventus GmbH
The report consists of 124 pages incl. all annexes.**

Elaborated results are only valid in the context of this report and refer strictly to the specific site characteristics and assumptions mentioned.

Table of Content

1	INTRODUCTION.....	6
2	RESUME ANALYTIQUE.....	7
2.1	ÉVALUATION DE LA MESURE.....	7
2.2	ÉVALUATION DE LA PRODUCTION ANNUELLE D'ENERGIE (AEP).....	7
3	EXECUTIVE SUMMARY.....	9
3.1	EVALUATION OF MEASUREMENT.....	9
3.2	EVALUATION OF ANNUAL ENERGY PRODUCTION (AEP).....	9
4	SITE CONDITIONS.....	11
4.1	TOPOGRAPHY.....	11
4.2	ROUGHNESS AND OBSTACLES.....	12
5	METEOROLOGICAL MAST AND MEASUREMENT EQUIPMENT.....	13
5.1	LOCATION AND CHARACTERISTICS.....	13
5.2	SENSOR MOUNTING.....	13
6	ANALYSIS OF MEASUREMENT DATA.....	15
6.1	DATA ANALYSIS, CLEANING AND SYNTHESIS PROCESS.....	15
6.2	RESULTS OF DATA CLEANING AND SYNTHESIS.....	16
6.2.1	<i>Mast shading correction</i>	16
6.2.2	<i>Wind speed measurement and evaluation</i>	16
6.2.3	<i>Wind direction measurement and evaluation</i>	16
6.2.4	<i>Wind shear analysis</i>	17
6.2.5	<i>Daily Profiles</i>	18
6.2.6	<i>Auxiliary quantities: Air temperature, pressure, humidity and air density</i>	19
7	LONG-TERM CORRELATION ANALYSES AND FINAL DATA TREATMENT.....	20
7.1	LONG-TERM CORRELATION DATA SOURCE ANALYSES.....	20
7.2	CORRELATION, PLAUSIBILITY CHECK OF REFERENCE DATASETS AND LONG-TERM CORRECTION.....	20
7.3	FINAL WIND DATA ANALYSIS.....	23
8	MODELLING OF WIND RESOURCE AND WIND ENERGY RESOURCE.....	24
8.1	THE EUROPEAN WIND ATLAS.....	24
8.2	TERRAIN AND ROUGHNESS MODEL.....	25
8.3	POWER AND THRUST COEFFICIENT CURVES.....	25
8.4	ENERGY FORECAST AND FLOW MODEL SYSTEM SETUP.....	25
8.5	WIND MAP CALCULATION AND WIND FARM OPTIMIZATION.....	26
8.6	FREE ANNUAL ENERGY PREDICTION.....	28
9	LOSSES ANALYSES.....	29
9.1	WAKE LOSSES.....	29
9.2	BLOCKAGE LOSSES.....	30
9.3	OTHER LOSSES.....	30
9.3.1	<i>Availability</i>	30
9.3.2	<i>Electrical Efficiency</i>	30
9.3.3	<i>Turbine Performance</i>	30
9.3.4	<i>Environmental conditions</i>	31
9.3.5	<i>Curtailment</i>	31
9.4	SUMMARY OF LOSSES.....	32
10	UNCERTAINTY ANALYSES.....	34
10.1	UNCERTAINTY OF MEASURED WIND SPEED.....	34
10.2	UNCERTAINTY OF MODELED WIND SPEED AT HUB HEIGHT.....	34
10.3	UNCERTAINTY OF ENERGY YIELD PREDICTION.....	35
11	FINAL RESULTS OF ENERGY YIELD ASSESSMENT.....	37
12	DEVIATIONS FROM STANDARDS AND/OR INTERNAL QM PROCEDURES.....	38
13	REFERENCES.....	39
14	ANNEXES.....	40