

Project	Smoke Test Project	
Layout	Layout_SmokeTest.csv	
Date	2024-04-23T04:26:29+00:00	
Turbine Manufacturer/Model	AAER A-1650/77	AAER Smoke test-csv
Turbine Rated Power (kW)	1650.00	4200.00
Hub Height (m)	102.5	102.5
Number of Turbines	10	2
Total Number of Turbines	12	
Plant Capacity	24.9 MW	
Site Air Density (kg/m ³)	1.21	

The estimates presented herein are based on wind flow simulation using 200m WRB; on-site measurements were considered for this analysis. UL Solutions considers these estimates preliminary for the specified project.

Availability Accounting		Overall Wind Plant Summary	
Wake Efficiency	99.61%	Average Free Wind Speed (m/s)	8.93
Machine Availability	95.87%	Gross Plant Production (GWh/yr)	74.39
Electrical Efficiency	98.60%	Net Plant Production (GWh/yr)	41.94
Turbine Performance	85.12%	Net Capacity Factor	19.21
Environmental	93.53%		
Curtailments/Operational Strategies	50.49%		
Total Gross to Net Losses	37.85%		

Note: 1. "Modified Park" Wake model used in calculation.
 2. Neighboring WindFarms have been considered in wake calculation. Please check the details below.

Turbine Manufacturer/Model	AAER A-1650/77
Hub Height	102.5
Number Of Turbine(s)	1

ID	Mast Association	Coordinates WGS84 UTM 34N Easting (m)	Coordinates Northing (m)	Elevation (m)	Hub Height (m)	Turbine Model	Free Speed (m/s)	Gross MWh/yr	Array Eff. (%)	Array Loss (%)	Total Loss (%)	Net MWh/yr	Turbine Rank	Net Capacity Factor (%)	Total TI at 15m/s (%)
1	16Apr-10mb	550942.27	4466008.39	1273.54	102.50	AAER A-1650/77	9.53	7574.73	99.40	0.60	44.49	4204.96	3	29.07	12.41
2	16Apr-10mb	552439.50	4467277.05	1164.81	102.50	AAER A-1650/77	8.33	6308.68	99.37	0.63	46.86	3352.29	8	23.18	14.12
3	16Apr-10mb	553261.88	4466122.45	1141.71	102.50	AAER A-1650/77	8.66	6699.98	99.24	0.76	46.46	3587.23	5	24.80	13.65
4	16Apr-10mb	556864.83	4472496.50	920.50	102.50	AAER A-1650/77	7.97	5922.85	99.82	0.18	47.40	3115.13	9	21.54	14.82
5	16Apr-10mb	561081.18	4470634.86	1045.31	102.50	AAER A-1650/77	7.83	5701.12	99.86	0.14	47.57	2988.87	10	20.66	15.00
6	16Apr-10mb	557285.30	4469715.72	930.34	102.50	AAER A-1650/77	8.38	6366.69	99.79	0.21	46.43	3410.88	7	23.58	14.18
7	16Apr-10mb	557919.16	4466890.95	948.22	102.50	AAER A-1650/77	9.00	7023.86	99.90	0.10	43.88	3942.08	4	27.25	13.39
8	16Apr-10mb	552542.49	4465197.19	1224.12	102.50	AAER A-1650/77	10.03	8037.29	99.37	0.63	43.53	4538.99	1	31.38	11.87
9	16Apr-10mb	550724.18	4464611.48	1244.06	102.50	AAER A-1650/77	9.34	7573.17	99.47	0.53	44.38	4212.40	2	29.12	12.52
10	16Apr-10mb	549687.18	4463193.21	1163.20	102.50	AAER A-1650/77	8.25	6285.21	99.88	0.12	45.67	3414.83	6	23.61	14.07

11	16Apr-10mb	552408.68	4463598.50	1227.41	102.50	AAER Smoke test-csv	9.93	3441.79	99.54	0.46	25.10	2577.93	12	7.00	11.95
12	16Apr-10mb	552058.56	4463217.59	1239.50	102.50	AAER Smoke test-csv	9.87	3454.84	99.87	0.13	24.94	2593.31	11	7.04	11.83

Tower ID	X Coordinates	Y Coordinates	Elevation (m)	Hub Height (m)	Turbine Type	VLT HH (m)	Gross AEPLT HH	Wind Shear
16Apr-10mb_102.5	550291.16	4464165.91	1207.02	102.50	AAER A-1650/77	8.93	7069.50	0.36
16Apr-10mb_102.5	550291.16	4464165.91	1207.02	102.50	AAER Smoke test-csv	8.93	4073.98	0.36

Energy Losses	
Availability	
Availability - contractual	99.30%
Availability - non-contractual	99.30%
Loss due to correction of downtime	99.30%
Availability of collection and substation	99.30%
Availability of utility grid	99.30%
Plant restart after grid outages	99.30%
Availability Total	95.87%

Turbine Performance	
Power Curve Adjustment	99.30%
High Wind Control Hysteresis	86.94%
Wind Shear	99.30%
Sub-Optimal Performance	99.30%
Turbine Performance Total	85.12%

Electrical	
Electrical Efficiency	99.30%
Power Consumption of Weather Package	99.30%
Electrical Total	98.60%

Environmental	
Icing and blade soiling losses	99.30%
Blade Degradation	99.30%
Low temperature shutdown loss	99.57%
High temperature shutdown loss	96.68%
Site Access	99.30%
Lightning	99.30%
Others	99.93%
Environmental Total	93.53%

Curtailments	
Environmental Curtailment	99.30%
Grid Curtailment	65.60%
Directional Curtailment	99.30%
Temperature Derating	78.05%
Curtailments Total	50.49%

TOTAL	38.00%
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