https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Ten years of SCADA data from the Princess Amalia offshore wind farm: dataset description and access

René Bos[1], Rody Kemp[1]

[1]Eneco, Rotterdam, Marten Meesweg 5, 3038 AV Rotterdam, The Netherlands

Correspondence to: René Bos (rene.bos@eneco.com)

Abstract. A comprehensive set of operational data from the 120-MW Princess Amalia offshore wind farm has been made available for the scientific community to use. The dataset spans the period 2008–2017 and covers meteorological, power, and control variables of all 60 turbines. This data description paper additionally contains the relevant background information of the wind farm, including coordinates, neighboring wind farms, and relevant metocean and environmental measurement campaigns. Together, these resources enable a wide range of applications, including wake model validation, wind farm control studies, operational analysis, and reliability research. The dataset is hosted by TNO and is freely available under a Creative Commons Attribution 4.0 (CC BY 4.0) license.

1 Introduction

The wind energy industry has always relied heavily on numerical models developed by academia. From wakes to grid integration, these models help the industry to design more cost-effective wind farms, reduce the uncertainty around financial returns, and realize the large-scale build-out we see today. Yet, their accuracy and robustness depend on validation against real-world operational data — data that is often locked within companies due to confidentiality constraints, commercial interests, or other concerns surrounding public disclosure. Although data exchanges do take place, they are most often in the bigger research projects with industry support, which tend to focus on a higher technology readiness and can take years from the initial idea to the point where the data is accessible to academics. And even then, non-disclosure agreements and restrictions on the publication format make it difficult for the scientific community to replicate and cross-check results.

To support open scientific research and encourage model development and validation, Eneco is publishing the first decade of operational data of the Princess Amalia wind farm under a Creative Commons Attribution 4.0 (CC BY 4.0) license. To our knowledge, this is among the longest publicly available wind farm SCADA datasets with a length comparable to the Hill of Towie onshore wind farm dataset (Clerc & Lingkan, 2025). By making the data openly available, we hope that it may also support exploratory studies (that are difficult to capture under the scope of non-disclosure agreements) and shorter duration research topics (such as graduation projects).

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

2 Wind farm description

The Princess Amalia wind farm (Dutch: *Prinses Amaliawindpark*; abbr. *PAWP*) is the second Dutch offshore wind farm and the first Dutch offshore wind farm to be constructed outside the twelve nautical mile zone (see Figure 1). It is located about 24 km off the coast of IJmuiden in the Q7 mining block, from which it owes its former name *Offshore Windpark Q7*. Foundation installation started in October 2006, followed by wind turbine installation in September 2007. The wind farm was officially opened on 4 June 2008. It received a feed-in tariff of 97 €/MWh under the MEP scheme (*Ministeriële regeling milieukwaliteit elektriciteitsproductie*) during the first ten years. The Princess Amalia wind farm has been wholly owned by Eneco since 2011.

PAWP has a total capacity of 120 MW, consisting of 60 x Vestas V80-2.0 MW on a monopile foundation. The wind turbines have a diameter of 80 m and a hub height of 59 m above mean sea level (MSL). They are positioned in a hexagonal grid pattern and connected to the offshore high voltage station by eight 22-kV strings (see Figure 2 and Appendix A). The 150-kV export cable lands just south of Wijk aan Zee and follows a land route until it connects to the Velsen high-voltage station. The water depth at the site ranges from 19 to 24 m beneath the lowest astronomical tide (LAT). The difference between MSL and LAT is approximately 1.1 m.

There are two neighboring windfarms in the direct vicinity of PAWP. One is located some 13 km to the east: the Offshore Windpark Egmond aan Zee (OWEZ), which was commissioned in January 2007. A second wind farm, Eneco Luchterduinen (LUD), is situated 20 km to the south and was opened in September 2015. The coordinates of both neighboring wind farms are listed in Appendix B.

The mean wind speed at hub height is around 9 m/s and is dominant from the southwest. During the ten years that this dataset spans, there have been several metocean campaigns in the vicinity of PAWP that may support the analysis. Data from these campaigns is available from TNO (TNO, 2026) and the Netherlands Enterprise Agency (RVO, 2026). These include two offshore met masts: the OWEZ Meteorological Mast (July 2005 to December 2010) and MeteoMast IJmuiden (November 2011 to March 2016), which are 10 and 60 km away, respectively. In addition, two sets of floating lidars have been active to support the Hollandse Kust tenders: HKZ-A/B (June 2016 to June 2018) at a 35-km distance and HKN-A/B (April 2017 to April 2019) at a 10-km distance. Finally, at a distance of 80 to 100 km, several permanent vertical lidars have been in operation on Lichteiland Goeree (since November 2014), Europlatform (since Jul 2016), and K13-A (since November 2016).

For high-quality reanalysis data of the area, we refer the reader to the Dutch Offshore Wind Atlas (Wijnant et al., 2019) and its expansion in the WINS50 project (Baas, 2024). The data is available as hourly or daily time series per grid point, or as slices, and is hosted at the KNMI Data Platform (KNMI, 2026). Together, these cover the period from 2007 to 2021, ranging from 10 to 600-m height at a 2.5-km horizontal resolution. The wind rose for the period overlapping with the SCADA dataset is shown in Figure 3.

A lot of environmental research has been carried out in the first operational years to support model calculations in the pre-construction environmental impact assessment. Most of them focused on the development of benthic fauna on the seafloor

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

in and around PAWP, since the wind farm area is closed off from bottom trawling (Jarvis et al., 2004; Lock et al. 2014; Jak and Glorius, 2017; Berges and van Hal, 2017; Leewis et al., 2018; Coolen et al., 2018; Leewis and Klink, 2022). Related to this were studies on the fish stock (van Hal, 2013; van Hal, 2014; Machiels, 2017), seafloor morphology (Bijker, 2013), hard substrate fauna (Vanagt et al., 2013; Vanagt and Faasse, 2014), underwater noise (Jansen and de Jong, 2014), and the potential impact of electromagnetic fields (Snoek et al., 2020). In addition, PAWP housed two bat detector systems that served as input for the bat migration study of Lagerveld et al., 2021. Finally, there have been studies on vessel movements (de Jong and Koldenhof, 2013), radar disturbance (Dielemans, 2012), and visibility from shore (Rooijmans, 2012).



Figure 1. Photograph of the Princess Amalia wind farm in April 2015.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.

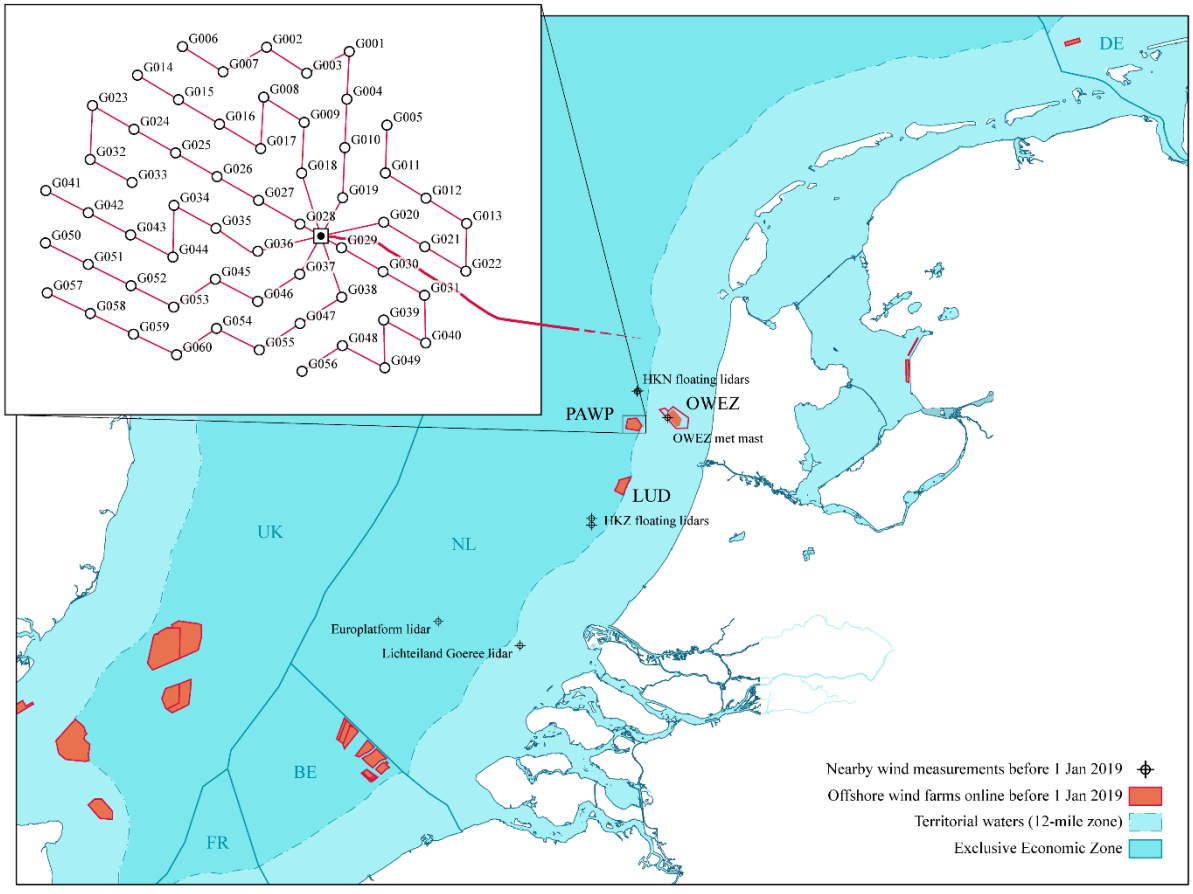


Figure 2. Location of the Princess Amalia wind farm (PAWP) in the Dutch Exclusive Economic Zone and the neighboring wind farms Offshore Windpark Egmond aan Zee (OWEZ) and Eneco Luchterduinen (LUD). The coordinates are listed in Appendices A and B.

75

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

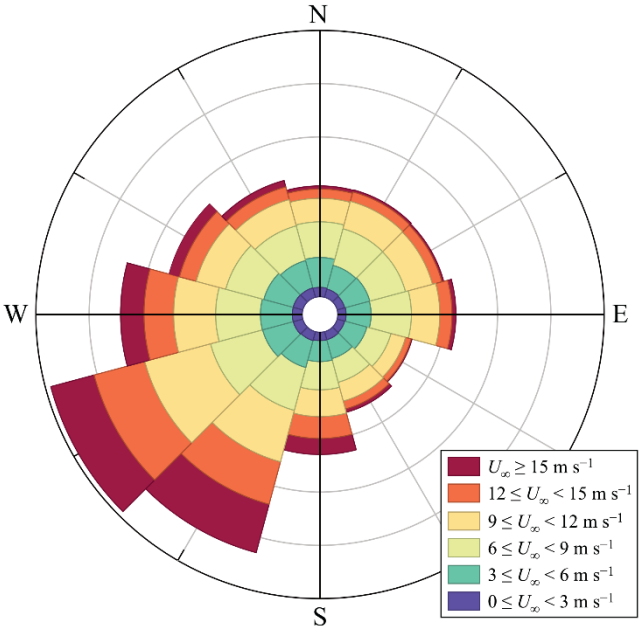


Figure 3. Freestream wind rose at the hub height of 59 m MSL, interpolated from the Dutch Offshore Wind Atlas (KNMI, 2026).

3 Dataset description

3.1 Scope

The PAWP dataset spans from the moment of first power (6 Jan 2008) until the end of the subsidy period (31 December 2017). The data is sampled from the supervisory control and data acquisition (SCADA) system in ten-minute intervals and for all sixty turbines. Table 1 shows a list of the variables with their units.

Most of the signals originate from the turbines and cover wind measurements (see Figure 4a), power production, and control actions for each of the 60 turbines. All variables contain the ten-minute mean value. For the blade pitch, generator speed, rotor speed, power, and wind speed signals, the minimum, maximum, and standard deviations are included as well. Next to the turbine signals, we also included the significant wave height and maximum wave height measured by a Radac Waveguide radar looking down from the offshore substation (see Figure 4b). These measurements are logged as one-minute means and are only included from September 2011 onwards.

Table 1. Overview of variables.

Variable	Source	Description	Statistics	Frequency	Precision/unit	Typical range

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



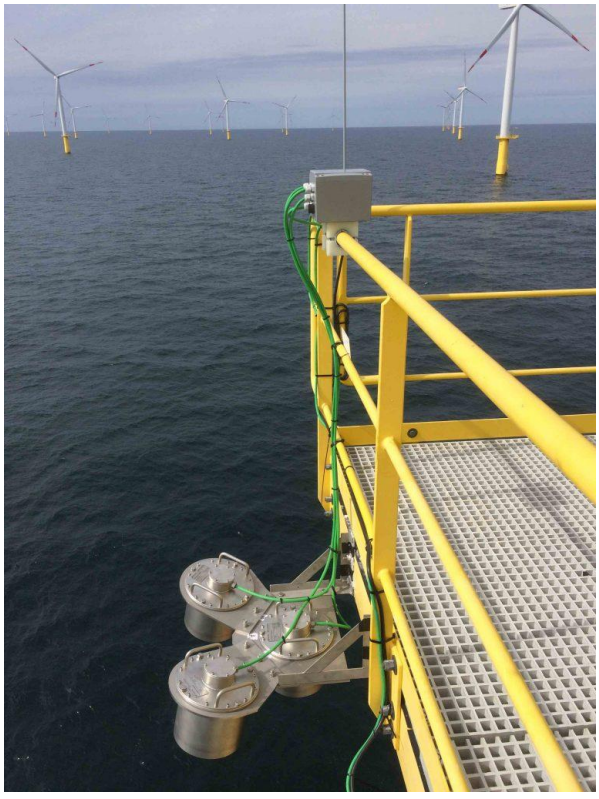
eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Ambient temperature	Turbines	Measured underneath the nacelle at the rear escape hatch	mean	10 min	1 °C	−10 to 30
Blade pitch angle	Turbines	As measured by the pitch drive	mean, min, max, std	10 min	0.1°	−5 to 93
First alarm in 10 min frame	Turbines	Contains alarm codes	first	10 min	1	0 to 922
Generator speed	Turbines	Measured on the high-speed shaft	mean, min, max, std	10 min	1 rpm	0 to 1680
Nacelle direction	Turbines	From the yaw drives	mean	10 min	0.1°	0 to 360
Nacelle temperature	Turbines	Measured underneath the nacelle at the rear escape hatch	mean	10 min	1 °C	−15 to 35
Operating state	Turbines	See Table 3	mean	10 min	0.001	0 to 5
Power	Turbines	Active power measured at the converter	mean, min, max, std	10 min	0.1 kW	−10 to 2000
Rotor speed	Turbines	Measured on the low-speed shaft	mean, min, max, std	10 min	0.1 rpm	0 to 18
Spinner temperature	Turbines	Measured at the spinner cabinet inside the nose cone	mean	10 min	1 °C	0 to 30
Wave height	Substation	Significant and maximum wave height from the radar mounted on a railing on the substation	33%ile, max	1 min	10^{-9} m	0.2 to 8
Wind direction	Turbines	Combined from the sonic anemometer and the nacelle position	mean	10 min	0.1°	0 to 360
Wind speed	Turbines	Measured at the rear of the nacelle and processed by a transfer function	mean, min, max, std	10 min	0.1 m s^{-1}	0 to 30

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



a. Sonic anemometer, mounted on the left-hand boom next to the red aeronautical obstruction light, as viewed from the roof of turbine G052.



b. Radac WaveGuide as mounted on Butendiek (Radac, 2020). The system at the Princess Amalia wind farm has the same setup but was unfortunately covered in too much guano for a clear photo.

Figure 4. Photographs of the wind and wave sensors.

3.2 File structure

The data is saved as comma-separated values (CSV) with a separate file for each variable. A header text containing the column names is included in the first line. Each file spans the released data period and contains 61 columns, with column 1 containing the time stamps in Coordinated Universal Time (UTC) and columns 2–61 containing the values for the turbines G001 through G060. In case of the wave data, there are only two columns: the time stamps and the wave heights. The full set covers 29 files and totals to around 3.8 GB.

3.3 Data quality and availability

The data has been retrieved from the raw sensor readings and processed by the onboard turbine controller. The instantaneous high-frequency data was then and aggregated into ten-minute statistics through VestasOnline Business. A ten-minute data point covers the interval prior to the recorded time stamp; e.g., the value at 12:00 represents the statistics over 11:50 to 12:00.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Missing data is denoted with "NaN". These instances indicate a loss of communication, which can be due to loss of power or a fault in the connecting network. Most often, missing data periods coincide with turbine errors or maintenance actions. The turbine signals have a 95.8% data availability. The significant wave height and maximum wave height amounted to 70.6% and 67.3%, respectively, although it must be noted that this was an experimental setup.

When doing performance analyses, please note that a controller update was rolled out on 8 October 2015. As a result, the cut-in behavior, power, and thrust characteristics are different prior and after this date.

In the ten years that this dataset spans, PAWP has known three cable failures (see Figure 5). The first fault occurred on 16 July 2010 and isolated turbine G041 until communication was restored on 1 June 2011. The second incident was between 28 November 2010 and 12 May 2011 and affected the turbines G031, G039, G040, G048, G049, and G056. The third only lasted between 23 June 2016 and 23 July 2016 and affected the turbines G014, G015, and G016. In addition, there have been several major component campaigns to exchange various drivetrain components, which may explain longer downtimes for individual turbines.

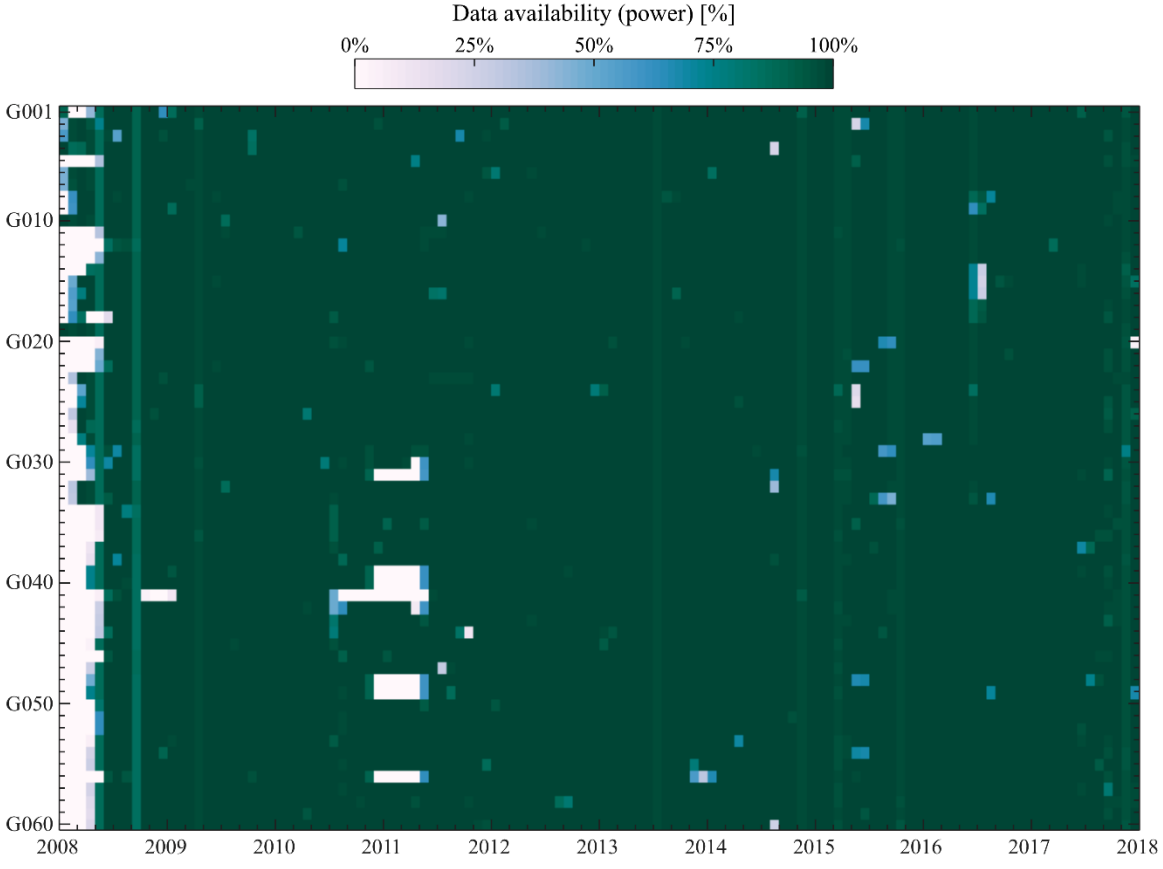


Figure 5. Monthly availability of the 10-minute power signals per turbine location. Missing data are communication errors, which can be attributed to downtime, string failures, or a loss of connection to the onshore system.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

120

Unfortunately, the wind direction measurements suffer from some compass misalignments and are therefore not always reliable. It is strongly advised to check the wind direction with measurements in the vicinity or with hindcast data such as ERA5. Furthermore, when processing temperature data, please be aware that the measurements may be affected by the turbine cooling system.

125 The operating state contains a code that indicates the control region the turbine is in. Although the value definitions can change slightly over the period, they can be roughly attributed to the states listed in Table 2. The alarm codes are linked to ambient events and hardware/software errors; however, we are unable to share their complete descriptions. Nevertheless, we kept them as part of the dataset in case they are useful for some reliability studies or trend analyses.

Apart from sampling, no further data manipulation or cleaning has been done for the turbine data. This means data can 130 be noisy and can show erroneous values at some times. Power can sometimes slightly exceed 2 MW, which is normal behavior caused by the turbine dynamics. However, the occasional spikes beyond 2.1 or even 3 MW can be filtered out. Negative power values are common and are due to control actions (e.g., yawing) and/or auxiliary systems (e.g., cooling) that draw power from the grid during idling periods.

The wave data was compiled from several (experimental) Radac devices that were active from 2011 onwards. Data has 135 been aggregated and, where applicable, data from individual beams was averaged to yield one single figure. Unlike the turbine data, the wave data is stored as 1-minute averages. For more information about the setup, we refer the reader to van der Vlugt & van der Vlugt (2014).

Table 2. Operating state definition.

State	Description
0	Idling
1–3	Running
4–5	Parked

140

4 Examples

As an example, Figure 6 shows an extract of the ten-minute wind speed and power output of all 60 turbines. Apart from the turbines ramping up and down in response to changing wind conditions, it also shows periods of downtime, cut-out events, and faulty erroneous data points.

145 When aggregated on a monthly basis, the data shows a ramp-up period during the first months of 2008, followed by a clear seasonal profile in the following years. The annual energy production, excluding the downtime caused by inter-array

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.

cable failures, averaged out to about 430 GWh/year. The turbines' technical availability during this period was relatively constant at around 97%.

Finally, Figure 8 shows the total logged production by each turbine position over the period 2010–2017, including communication errors. The years 2008 and 2009 were deliberately omitted to avoid compass misalignment problems prior to 1 October 2009. After that period, the wind direction can be taken as the median of all 60 measurements, which proved to be a good way to ignore individual misalignments and showed a fairly good match with hindcast models. With southwest being the dominant wind direction, it shows that the westernmost turbines are also the highest yielding ones. The only exception being G041, which suffered from a cable fault in 2010. Overlaid in the same figure is the total wind farm array efficiency, which here was constructed by taking the total production over a 5-degree direction bin and dividing it by the average production of the 3 highest-yielding turbines. The array efficiency clearly shows the impact of PAWP's hexagonal layout, with wake losses increasing at roughly every 60 degrees.

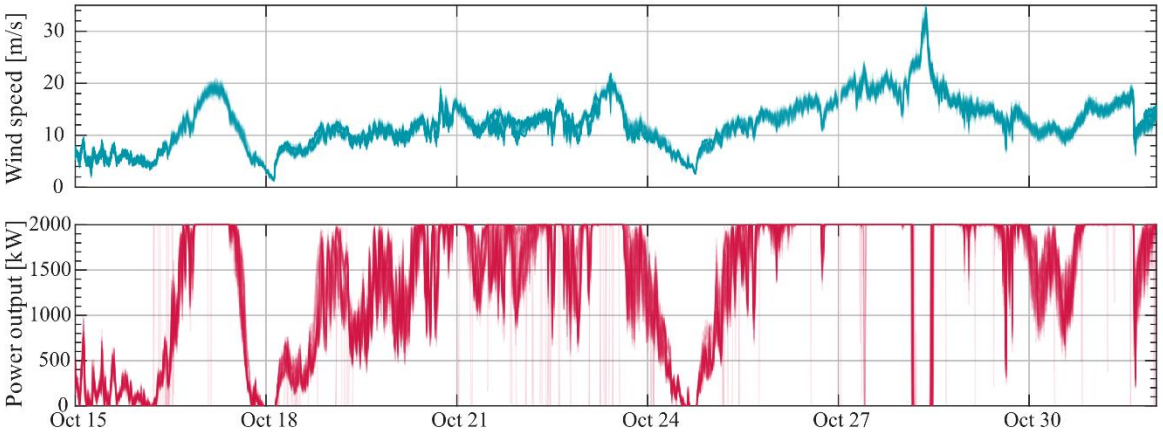


Figure 6. Nacelle wind speed (top) and power output (bottom) of each of the 60 turbines for 15–31 October 2015. This period also contains the passing of a major autumn storm on 28 October 2015 that resulted in a series of cut-out events.

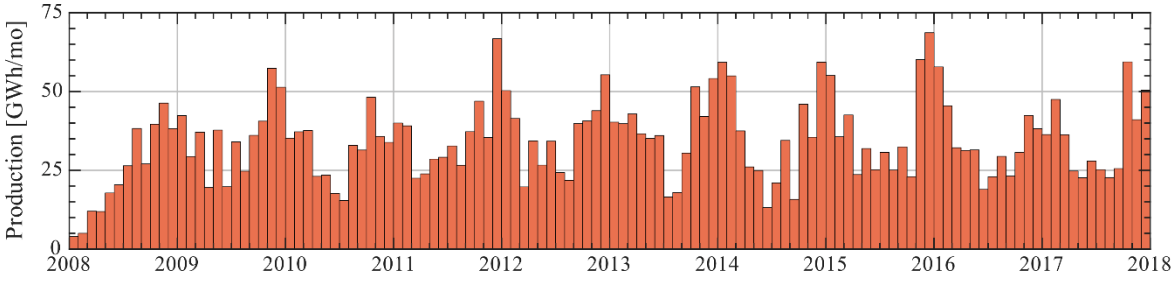


Figure 7. Total monthly energy production from all 60 turbines of the total released data period.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.

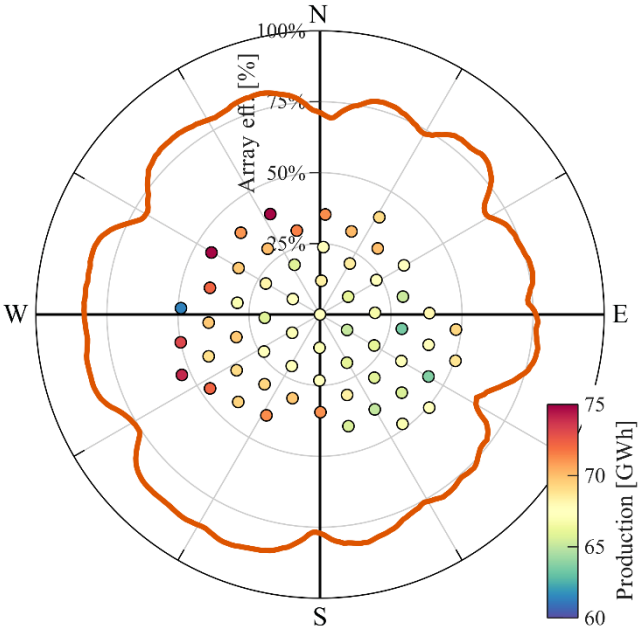


Figure 8. Total logged production of each turbine over the period 2010–2017 (colored nodes) and the array efficiency per wind direction.

5 Licensing terms

All is released under a Creative Commons Attribution 4.0 International (CC BY 4.0) license, which permits the user to copy, share, transform, and build upon the data. The dataset is intended to support scientific research, education, model validation, and other analytical activities. Users are encouraged to cite both this data description paper and the dataset repository in any publications or derivative works that make use of the data.

The release of this dataset does not transfer ownership of any intellectual property rights relating to the original wind turbine technology, software, control systems, proprietary algorithms, trade secrets, or other confidential information of the turbine manufacturer or other third parties. Only the data and information explicitly included in the published dataset are made available under the CC BY 4.0 license.

6 Conclusion

A comprehensive ten-year SCADA dataset of the Princess Amalia wind farm has been made public for the scientific community to use. The data period covers the subsidized operational period during which PAWP ran at high technical availability and in stable market conditions. Moreover, the dataset can be complemented with metocean measurements from nearby floating lidar buoys and high-quality reanalysis data from the Dutch Offshore Wind Atlas. As such, this provides an

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

excellent opportunity to test out wake models, O&M models, and undoubtedly many other applications that we have not yet foreseen. The dataset has been made available through TNO and can be freely accessed after registering.

Appendix A Wind turbine coordinates

The coordinates of the offshore substation (OSS) and the turbines in the Princess Amalia Wind Farm are listed in Table A1. These represent the center of the monopile foundation.

Table A1. Substation and turbine coordinates of the Princess Amalia Wind Farm (center of foundation).

	WGS84		ETRS89/UTM Zone 31N	
Name	Latitude [° N]	Longitude [° E]	Easting [m]	Northing [m]
Substation	52.58553	4.23536	583695	5826882
G001	52.60457	4.24072	584022	5829007
G002	52.60516	4.22669	583071	5829056
G003	52.60240	4.23342	583532	5828757
G004	52.59964	4.24016	583994	5828458
G005	52.59689	4.24689	584455	5828159
G006	52.60537	4.21240	582103	5829063
G007	52.60269	4.21922	582570	5828772
G008	52.60000	4.22604	583037	5828481
G009	52.59732	4.23285	583503	5828191
G010	52.59463	4.23967	583970	5827900
G011	52.59194	4.24649	584437	5827608
G012	52.58926	4.25330	584904	5827318
G013	52.58657	4.26012	585371	5827027
G014	52.60249	4.20467	581585	5828734
G015	52.59989	4.21157	582057	5828452
G016	52.59728	4.21847	582529	5828170
G017	52.59467	4.22538	583002	5827888
G018	52.59207	4.23227	583474	5827606
G019	52.58945	4.23917	583946	5827323
G020	52.58684	4.24606	584418	5827041
G021	52.58424	4.25295	584890	5826759
G022	52.58163	4.25985	585362	5826477
G023	52.59943	4.19696	581068	5828385
G024	52.59690	4.20393	581545	5828111
G025	52.59438	4.21093	582024	5827839
G026	52.59186	4.21789	582500	5827566
G027	52.58933	4.22488	582978	5827293
G028	52.58680	4.23185	583455	5827020
G029	52.58428	4.23882	583932	5826747
G030	52.58174	4.24580	584410	5826473
G031	52.57921	4.25277	584887	5826200
G032	52.59385	4.19641	581041	5827763
G033	52.59140	4.20345	581523	5827499
G034	52.58896	4.21050	582005	5827235

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

G035	52.58651	4.21756	582488	5826971
G036	52.58406	4.22461	582970	5826707
G037	52.58162	4.23166	583452	5826443
G038	52.57917	4.23872	583935	5826179
G039	52.57672	4.24576	584417	5825915
G040	52.57427	4.25282	584900	5825651
G041	52.59070	4.18879	580531	5827405
G042	52.58834	4.19593	581019	5827150
G043	52.58598	4.20305	581506	5826895
G044	52.58361	4.21018	581993	5826640
G045	52.58124	4.21731	582481	5826385
G046	52.57888	4.22444	582968	5826130
G047	52.57651	4.23156	583455	5825875
G048	52.57414	4.23868	583942	5825620
G049	52.57178	4.24581	584430	5825365
G050	52.58529	4.18859	580527	5826802
G051	52.58300	4.19579	581019	5826556
G052	52.58072	4.20298	581511	5826310
G053	52.57843	4.21017	582002	5826064
G054	52.57615	4.21736	582494	5825818
G055	52.57385	4.22456	582986	5825571
G056	52.57156	4.23176	583478	5825325
G057	52.58012	4.18874	580547	5826228
G058	52.57791	4.19600	581043	5825990
G059	52.57570	4.20326	581539	5825752
G060	52.57349	4.21052	582035	5825515

Appendix B Neighboring wind farms

During the data period, there are two other relevant offshore wind farms within the vicinity of the Princess Amalia Wind Farm. The Offshore Windpark Egmond aan Zee (OWEZ) consists of 36 Vestas V90-3.0 MW turbines with a rated power of 3 MW, a rotor diameter of 90 m, and a hub height of 70 m above MSL (see Table B1). It has been in operation from January 2007 until present day. Eneco Luchterduinen consists of 43 Vestas V112-3.0 MW turbines with a rater power of 3 MW, a rotor diameter of 112 m, and a hub height of 81 m above MSL (see Table B2). It has been in operation from September 2015 until present day.

Table B1. Turbine coordinates of the Offshore Windpark Egmond aan Zee (center of foundation).

	WGS84		ETRS89/UTM Zone 31N	
Turbine	Latitude [° N]	Longitude [° E]	Easting [m]	Northing [m]
1	52.57877	4.43420	597181	5826380
2	52.58319	4.42807	596756	5826863
3	52.58753	4.42206	596339	5827338
4	52.59196	4.41592	595914	5827822
5	52.59637	4.40981	595490	5828305

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

6	52.60080	4.40367	595065	5828789
7	52.60529	4.39744	594633	5829281
8	52.60971	4.39130	594208	5829764
9	52.61413	4.38516	593783	5830248
10	52.61862	4.37915	593366	5830739
11	52.62298	4.37289	592933	5831216
12	52.62740	4.36674	592508	5831700
13	52.58190	4.44918	598189	5826748
14	52.58632	4.44305	597764	5827232
15	52.59074	4.43692	597339	5827715
16	52.59517	4.43079	596914	5828199
17	52.60224	4.42098	596234	5828973
18	52.60667	4.41485	595809	5829457
19	52.61108	4.40871	595384	5829940
20	52.61551	4.40258	594959	5830424
21	52.61993	4.39644	594534	5830908
22	52.59176	4.45480	598548	5827853
23	52.59620	4.44862	598119	5828338
24	52.60066	4.44250	597695	5828826
25	52.60748	4.43303	597038	5829572
26	52.61246	4.42613	596560	5830116
27	52.61688	4.41999	596135	5830600
28	52.62131	4.41386	595710	5831084
29	52.62573	4.40772	595285	5831568
30	52.60200	4.45987	598868	5828998
31	52.60646	4.45379	598446	5829486
32	52.61321	4.44441	597796	5830224
33	52.61826	4.43742	597312	5830776
34	52.62268	4.43129	596887	5831260
35	52.62711	4.42516	596462	5831744
36	52.63153	4.41902	596037	5832228

200

Table B2. Turbine coordinates of Eneco Luchterduinen (center of foundation).

	WGS84		ETRS89/UTM Zone 31N	
Turbine	Latitude [° N]	Longitude [° E]	Easting [m]	Northing [m]
1	52.37745	4.16473	579284	5803659
2	52.38013	4.15678	578738	5803949
3	52.38282	4.14885	578193	5804239
4	52.38552	4.14090	577648	5804530
5	52.38820	4.13295	577102	5804820
6	52.39088	4.12498	576555	5805110
7	52.38438	4.16935	579586	5804435
8	52.38702	4.16162	579055	5804720
9	52.38962	4.15387	578523	5805000
10	52.39223	4.14613	577992	5805283
11	52.39487	4.13838	577460	5805568
12	52.39747	4.13065	576929	5805848
13	52.39133	4.17402	579891	5805213
14	52.39388	4.16650	579375	5805489
15	52.39643	4.15895	578856	5805764

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

16	52.39897	4.15142	578339	5806038
17	52.40152	4.14387	577821	5806313
18	52.40407	4.13633	577304	5806589
19	52.39808	4.17850	580184	5805969
20	52.40057	4.17115	579679	5806237
21	52.40303	4.16382	579176	5806503
22	52.40552	4.15648	578672	5806772
23	52.40800	4.14917	578170	5807040
24	52.41047	4.14183	577667	5807306
25	52.40468	4.18370	580525	5806709
26	52.40708	4.17660	580038	5806968
27	52.40948	4.16952	579552	5807227
28	52.41188	4.16242	579065	5807486
29	52.41428	4.15530	578576	5807745
30	52.41668	4.14820	578089	5808005
31	52.41130	4.18892	580868	5807451
32	52.41365	4.18200	580393	5807704
33	52.41598	4.17508	579919	5807956
34	52.41832	4.16815	579443	5808208
35	52.42065	4.16125	578970	5808460
36	52.42300	4.15432	578494	5808714
37	52.41772	4.19453	581238	5808171
38	52.42063	4.18582	580640	5808485
39	52.42308	4.17862	580146	5808750
40	52.42553	4.17138	579650	5809014
41	52.42368	4.20005	581603	5808841
42	52.42785	4.18532	580593	5809287
43	52.43092	4.20495	581922	5809651

Data availability

The Princess Amalia wind farm dataset is hosted by TNO at https://offshorewind-measurements.tno.nl/ (doi: 10.82135/tno-1036183) and can be accessed free of charge. After registering, a link to the download page will be provided by email. Questions about the contents of the dataset can be sent to pawpopendata@eneco.com.

Author contributions

RBo wrote the draft of the paper and created the tables and images. RKe edited the manuscript and prepared the dataset for publication.

Competing interests

The authors declare that they have no conflict of interest.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.



eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Disclaimer

This dataset and the accompanying documentation are provided on an "as is" basis, without any representation or warranty, express or implied, as to their accuracy, completeness, reliability, suitability, availability, or fitness for any particular purpose. The authors and any affiliated organizations make no commitment to update, correct, supplement, or maintain the dataset following publication. While every effort has been made to ensure data integrity, users are solely responsible for interpreting the data and drawing conclusions from it.

To the fullest extent permitted by applicable law, the authors and their respective affiliates, employees, and contractors shall not be liable for any direct, indirect, incidental, consequential, special, exemplary, or punitive damages, losses, costs, or claims arising from or related to the use, misuse, interpretation, analysis, publication, redistribution, or reliance upon the dataset or any results derived from it. Publication of the dataset does not constitute a representation regarding the performance, design, operation, safety, suitability, or fitness of any wind turbine, wind farm asset, software system, or related technology.

Acknowledgements

We are grateful for the kind help from TNO Wind Energy as the hosting and data publication partner, in particular Marco Turrini, Jan Willem Wagenaar and Chao Liu (TNO). Furthermore, we greatly appreciate the support from Vestas to make this possible.

References

Baas, P.: Winds of the North Sea in 2050 - Public Final Report, WINS50 Report, 33 pp., https://www.wins50.nl/downloads/wins50_endreport_final_20240403.pdf, 2024.

Berges, B. and van Hal, R.: Seafloor mapping trial in Princess Amalia Wind Farm Use of ME70 on board of RV Tridens, Wageningen Marine Research, Report C098/17, 18 pp., https://doi.org/10.18174/428569, 2017.

Bijker, R.: Mogelijke morfologische effecten van het Prinses Amaliawindpark, ACRB, Report Q214R1, 24 pp., https://www.eneco.nl/-/media/eneco-com/files/bodemmorfologieanalyse.pdf, 2013.

Clerc, A., & Lingkan, E. (2026). Hill of Towie wind farm open dataset (Version 2.1.0) [Dataset], Zenodo, https://doi.org/10.5281/zenodo.14870021.

Coolen, J. W. P., van der Weide, B., Cuperus, J., Blomberg, M., Van Moorsel, G. W. N. M., Faasse, M. A., Bos, O. G., Degraer, S., and Lindeboom, H. J.: Benthic biodiversity on old platforms, young wind farms, and rocky reefs, ICES J. Mar. Sci., 7, 1250-1265, https://doi.org/10.1093/icesjms/fsy092, 2020.

Dielemans, F.: Onderzoek naar radarverstoring door Prinses Amaliawindpark en Offshore Windpark Egmond aan Zee, Radio Holland, 37 pp., https://www.eneco.nl/-/media/eneco-com/files/scheepsenwalradareindrapport.pdf, 2012.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.

van Hal, R.: Demershal fish monitoring Princess Amalia Wind Farm, IMARES, Report C125/14, 53 pp., https://edepot.wur.nl/380372, 2014.

van Hal, R.: Roundfish monitoring Princess Amalia Wind Farm, IMARES, Report C117/13-A, 33 pp., https://edepot.wur.nl/298292, 2013.

Jak, R. and Glorius, S.: Macrobenthos in offshore wind farms - A review of research, results and relevance for future developments, Wageningen Marine Research, Report C043/17, 47 pp., https://doi.org/10.18174/415357, 2016.

Jansen, H. W. and de Jong, C. A. F.: Underwater noise measurements in the North Sea in and near the Princess Amalia Wind Farm in operation, TNO, Report TNO 2013 R11916, 55 pp., https://www.eneco.nl/-/media/eneco-com/files/onderwatergeluidsrapport.pdf.

Jarvis, S., Allen, J., Proctor, N., Crossfield, A., Dawes, O., Leighton, A., McNeill, L., and Musk, W.: North Sea Wind Farms: Q7 Lot 1 Benthic Fauna. Final Report, Institute of Estuarine & Coastal Studies (IECS), Report ZBB607.1-F-2004, 89 pp., https://tethys.pnnl.gov/sites/default/files/publications/North_Sea_Wind_Farms_NSW_Lot_1_Benthic_Fauna.pdf, 2004.

de Jong, T. and Koldenhof, Y.: Scheepvaartbewegingen Prinses Amaliawindpark, MARIN Report No. 25805.600-1-MSCN-rev. 1, 28 pp., https://www.eneco.nl/-/media/eneco-com/files/scheepvaartbewegingeneindrapport.pdf, 2013.

KNMI, Data Platform, https://dataplatform.knmi.nl/, last access 31 March 2026.

Lagerveld, S., Jonge Poerink, B., and Geelhoed, S. C. V.: Offshore Occurrence of a Migratory Bat, Pipistrellus nathusii, Depends on Seasonality and Weather Conditions, Animals, 11, 3442, https://doi.org/10.3390/ani11123442, 2021.

Leewis, L. and Klink, A. D.: Prinses Amalia Windturbine park 2022 - Statistical comparison of benthic fauna inside and outside the Prinses Amalia Wind Park fifteen years after construction; first analysis., Eurofins, 31 pp., https://tethys.pnnl.gov/sites/default/files/publications/Leewis_and_Klink_2022.pdf, 2022.

Leewis, L., Klink, A. D., and Verduin, E. C.: Benthic development in and around offshore wind farm Prinses Amalia Wind Park near the Dutch coastal zone before and after construction (2003-2017) - A statistical approach, Eurofins, 65 pp., https://noordzeeloket.nl/publish/pages/187417/benthic_development_in_and_around_offshore_wind_farm_prinses_amalia_windpark.pdf, 2018.

Lock, K., Faasse, M., and Vanagt, T.J.: Assessment of the soft sediment fauna six years after construction of the Princess Amalia wind farm, eCOAST, Report 2013002, 151 pp., https://www.vliz.be/imisdocs/publications/ocrd/297640.pdf, 2014.

Machiels, M.: Visserij-intensiteit in en rondom het Prinses Amalia Wind Park, Wageningen Marine Research, Report C091/17, 23 pp., https://doi.org/10.18174/428217, 2017.

Radac, Radac wave radar direction Butendiek [Photograph], https://www.radac.nl/waveguide-direction/, last access 14 September 2026.

Rooijmans, P.: Zichtbaarheid van Prinses Amaliawindpark vanaf de kust bij IJmuiden, Ecofys HSENL12282, 42 pp., https://www.eneco.nl/-/media/eneco-com/files/zichtbaarheideindrapport.pdf, 2012.

https://doi.org/10.5194/wes-2026-193
Preprint. Discussion started: 4 November 2026
© Author(s) 2026. CC BY 4.0 License.

RVO: Site Characterisation Studies, https://offshorewind.rvo.nl/, last access 31 March 2026.

Snoek, R. C., Böhm, C., Didderen, K., Lengkeek, W., Driessen, F. M. F., and Maathuis, M. A. M.: Potential effects of electromagnetic fields in the Dutch North Sea. Phase 2 – Pilot field study, Waterproof and Bureau Waardenburg, Report WP2018_1130_R3r3, 52 pp., https://noordzeeloket.nl/publish/pages/173407/potential_effects_of_electromagnetic_fields_in_the_dutch_north_sea_-_phase_12pilot_study_rws_wvl.pdf, 2020.

TNO: Offshore Wind Measurements, https://offshorewind-measurements.tno.nl/en/, last access 31 March 2026.

Vanagt, T. J. and Faasse, M.: Development of hard substratum fauna in the Princess Amalia Wind Farm: Monitoring six years after construction, eCOAST report 2013009, 106 pp., https://www.eneco.nl/-/media/eneco-com/files/hardsubstraat_rapport_2013.pdf, 2014.

Vanagt, T. J., Van de Moortel, L., and Faasse, M.: Development of hard substrate fauna in the Princess Amalia Wind Farm: Monitoring 3.5 years after construction, eCOAST report 2011036, 75 pp., https://www.eneco.nl/-/media/eneco-com/files/hardsubstraat_rapport_2011.pdf, 2013.

van der Vlugt, T. and van der Vlugt, R.: Comparison of Directional WaveGuide Radar with Directional WaveRider Buoy, Radac BV, Delft, the Netherlands, 2014, https://radac.nl/docs/Comparison_directionradar_buoy.pdf, last access 24 September 2026.

Wijnant, I. L., van Ulft, B., van Stratum, B., Barkmeijer J., Onvlee, J., de Valk, C., Knoop, S., Kok, S., Marseille, G. J., Klein Baltink, H., and Stepek, A.: The Dutch Offshore Wind Atlas (DOWA): description of the dataset, KNMI, Technical Report TR-380, 60 pp., https://cdn.knmi.nl/system/data_center_publications/files/000/071/572/original/TR380.pdf, 2019.