Scenario — PV
GEMINI-60-house-part-of-a-settlement Denmark - Aalborg 57.033, 9.844

Name	Slope °	Azimuth °	Wp	Wall d/h m	Face	Bifacial	Wp counted
Roof East	22	-90	19,800	—	front	—	yes
Roof West	22	90	19,800	—	front	—	yes
Terrace railing south	90	0	4,620	5 / 4	front	—	yes
Terrace railing north	90	180	4,620	5 / 4	front	—	yes
share central structure east part	8	-90	20,460	—	front	—	yes
share central strucure west part	8	90	20,460	—	front	—	yes
Total counted			89,760				

Location: My connection with Aalborg: here lives Dr. Franz Wilhelm Winterberg, a pioneer in lithium ion batteries for cars. He could have been a European founder of something like BYD and CATL with another mindset here. So I use Aalborg as the far north example.
Database PVGIS-SARAH3 2005–2023 loss 14 % azimuth 0 = south, 90 = west, −90 = east.
Price bands and charts use UTC+1 from longitude (15° per hour), not the political time zone.
Peak hour 2009-06-14 12:11 local (11:11 UTC) 59,506 W 0.663 W/Wp of 89,760 Wp.
Database gaps: 11 days with 0 yield while the sun reached the horizon at noon. 2008-01-23, 2008-03-01, 2008-03-06, 2008-05-17, 2008-05-18, 2009-04-18, 2009-04-19, 2009-08-15, 2009-08-16, 2014-12-02, 2016-10-16. Yield charts skip them. The simulation uses the lowest-yield day of that month.
Sell when the export price is above 0. At 0 cent export PV yield only, not the battery. Do not sell when the earning is negative. At 15:00 import/export scheduling.

Scenario — house, heat pump, battery
GEMINI-60-house-part-of-a-settlement Denmark - Aalborg 57.033, 9.844

Chapter	Parameter	Value
Building	Design out / in / heat	-10.0 °C / 20.0 °C / 1,600 W
	Heat on / cool on / ground	22.0 °C / 25.0 °C / 10.0 °C
	Curve / flow min / max	0.3 / 25.0 °C / 55.0 °C
	Thermal mass of the house	25.0 kWh/K
	Household only	4.0 kWh/day
DHW	Litres at 40 °C / tank	200 L tank 42.0 °C 8–18 h
	Water out of the pipe Q1–Q4	6 °C 10 °C 14 °C 9 °C
Heat pump	Source	air and ground
	COP −10/0/10 @ 35 °C	2.4 3.4 4.5
	COP −10/0/10 @ 50 °C	1.9 2.6 3.3
	kW −10/0/10 @ 35 °C	4.0 5.0 6.0
	kW −10/0/10 @ 50 °C	3.5 4.5 5.0
Battery	kWh / C-rate / SOC min–max–start	257.2 kWh C 0.5 5 / 95 / 50 %
	Nameplate	—
	Charge / discharge η	95 % / 90 %
Grid	Inverter / grid connection	54.0 kW / 27.0 kW
	Max export	27.0 kW
	Import cap Jan–Jun kW	Jan 2 Feb 2 Mar 2 Apr 2 May 2 Jun 2
	Import cap Jul–Dec kW	Jul 2 Aug 2 Sep 2 Oct 2 Nov 2 Dec 2
Cars	Lunch DC / night AC	0.0 kWh @ 100.0 kW night 10.0 kWh @ 11.0 kW

Clock is winter time UTC+1. Emergency import is an hour above the monthly kW cap.

Records 1–10 contribution of each PV
Denmark - Aalborg 57.033, 9.844

PV	2009-06-14 11:11	2009-05-28 11:11	2021-06-12 11:11	2010-06-18 11:11	2009-06-13 11:11	2005-06-10 11:11	2023-05-17 11:11	2022-06-16 11:11	2012-06-21 11:11	2019-05-28 11:11
Roof East	13,797	13,572	13,632	13,665	13,611	13,589	13,377	13,548	13,550	13,393
Roof West	13,347	13,250	13,203	13,183	13,179	13,184	13,089	13,083	13,046	13,085
Terrace railing south	2,618	2,733	2,591	2,576	2,590	2,606	2,882	2,557	2,553	2,702
Terrace railing north	177	196	198	188	179	169	177	135	116	248
share central structure east part	14,868	14,672	14,700	14,711	14,668	14,653	14,472	14,604	14,581	14,454
share central strucure west part	14,698	14,551	14,538	14,529	14,505	14,501	14,363	14,429	14,392	14,338
Watt at record	59,506	58,973	58,862	58,853	58,731	58,702	58,360	58,355	58,237	58,220
Percent of installed peak	66.3	65.7	65.6	65.6	65.4	65.4	65.0	65.0	64.9	64.9

Values are watts at that hour. Date and time are UTC. Record 59,506 W (66.3 % of 89,760 Wp).

Hours at or above a share of the record
Denmark - Aalborg 57.033, 9.844

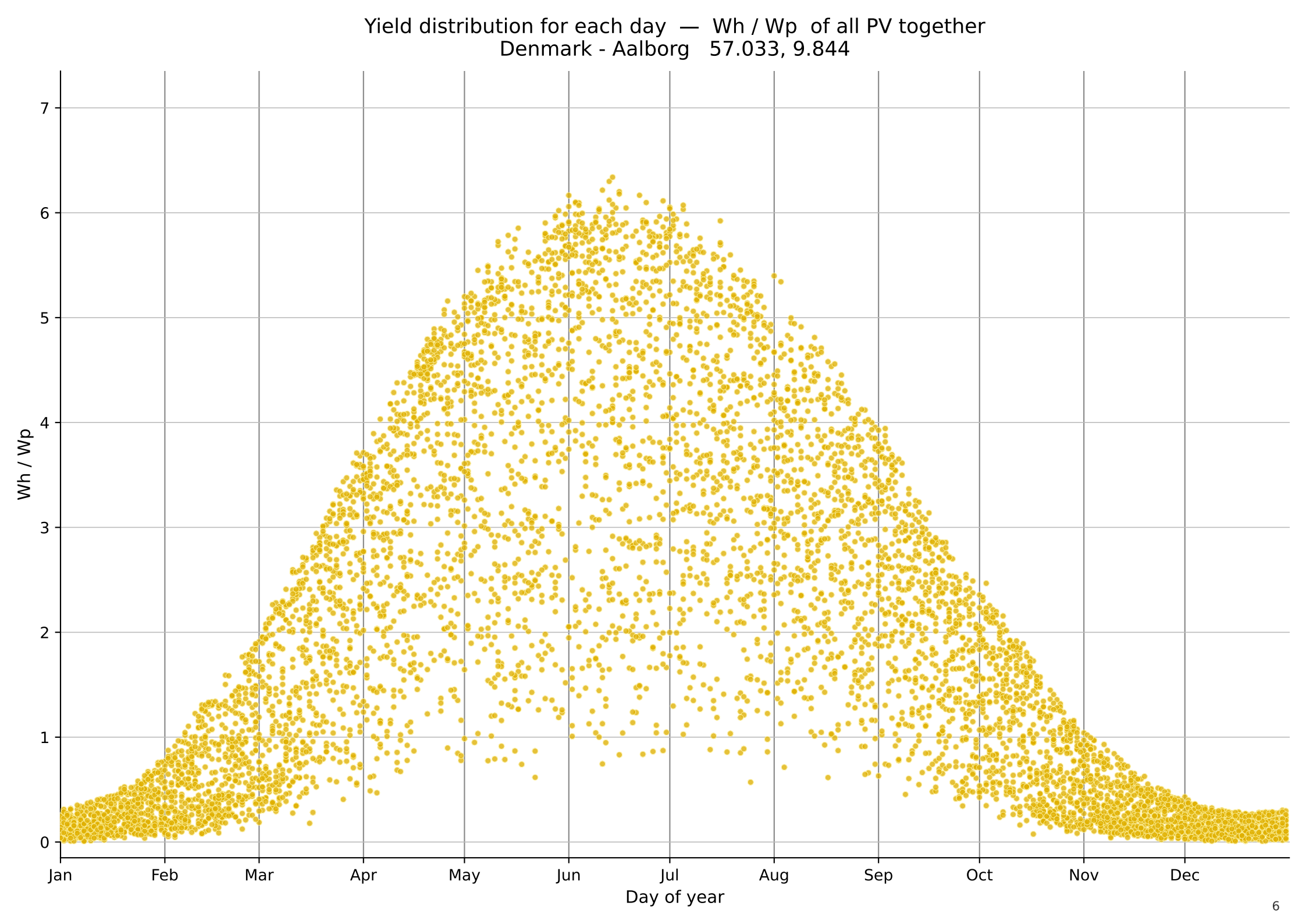
Of the record	Hours	Watts
98 %	8	58,316 W
96 %	55	57,125 W
94 %	166	55,935 W
92 %	396	54,745 W
90 %	703	53,555 W

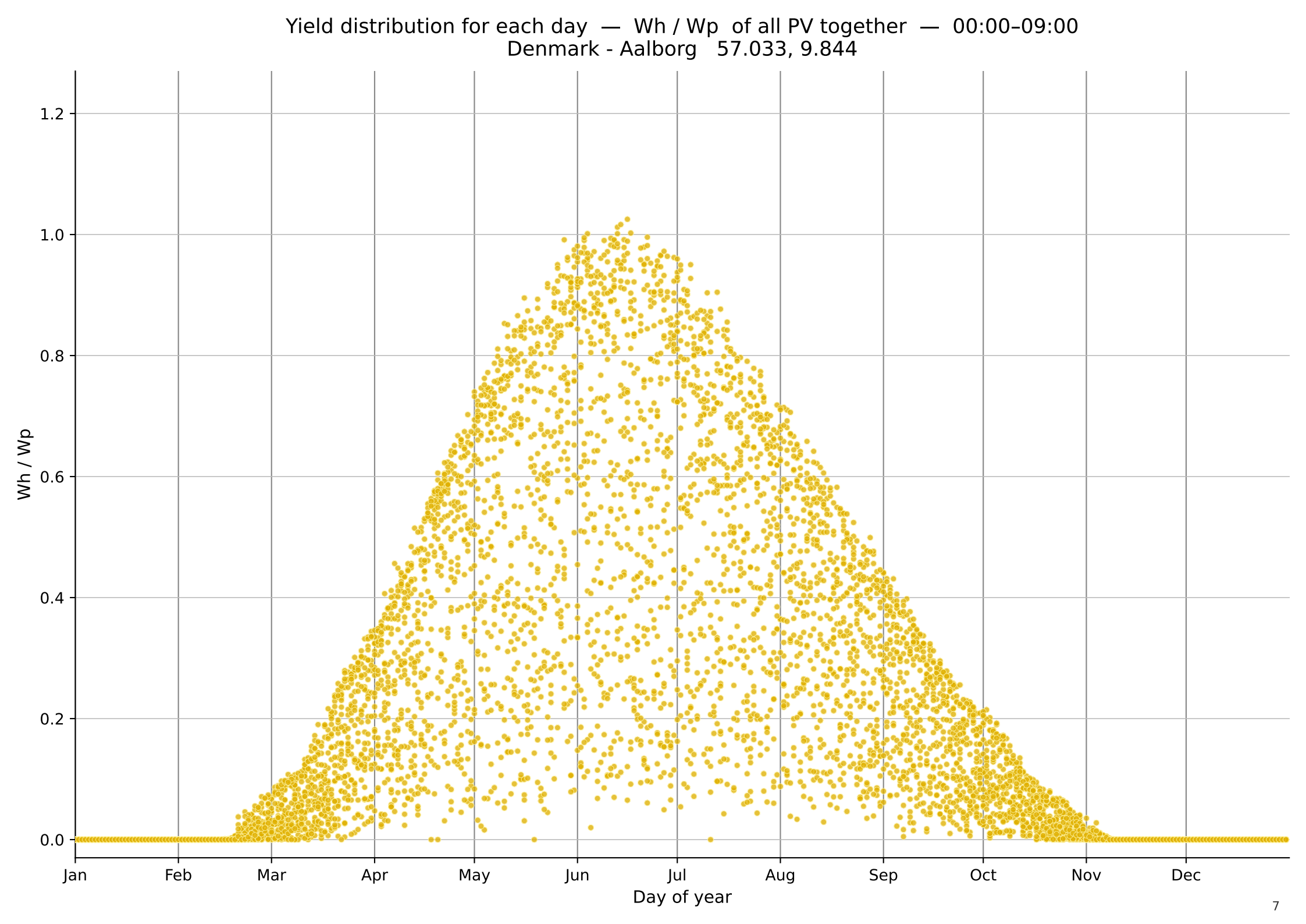
Record hour = 59,506 W combined.

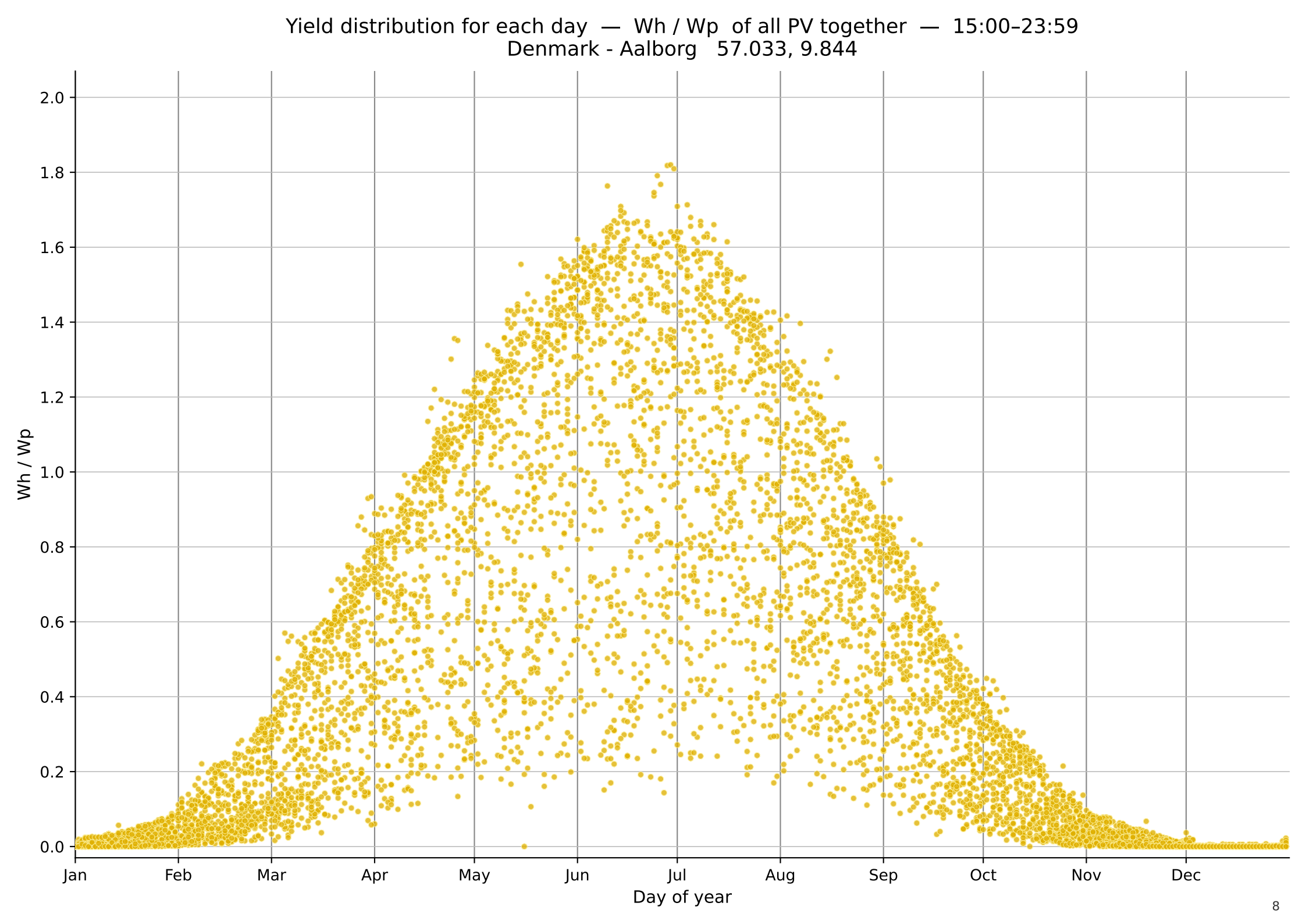
Records of each photovoltaic field
Denmark - Aalborg 57.033, 9.844

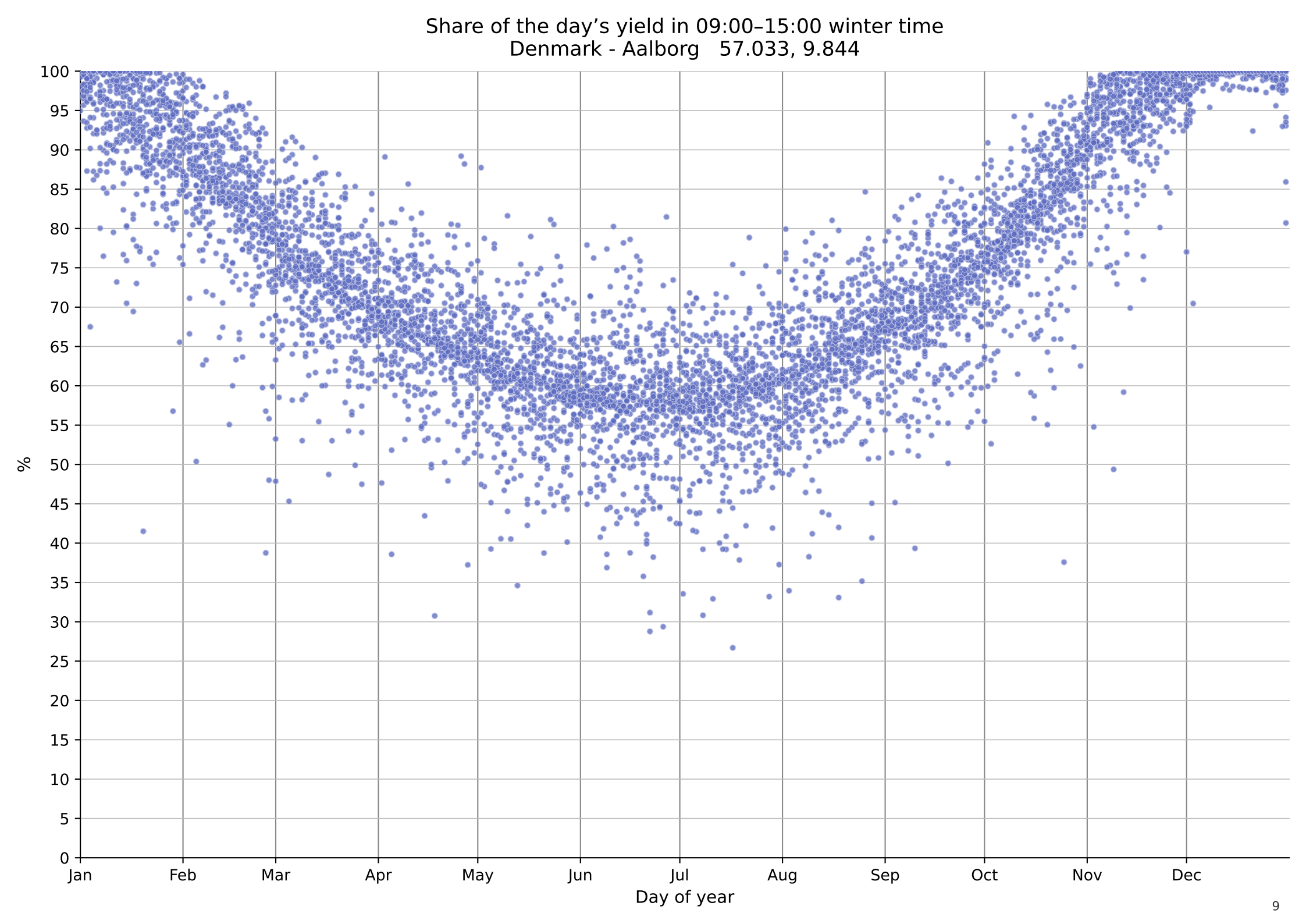
PV	Date	Watts	%	h ≥98%	h ≥96%	h ≥94%	h ≥92%	h ≥90%
Roof East	2019-05-28 09:11	15,346	77.5	1	12	61	183	396
Roof West	2005-06-22 13:11	14,988	75.7	20	72	188	405	699
Terrace railing south	2022-04-11 11:11	3,466	75.0	5	9	21	64	131
Terrace railing north	2012-06-02 05:11	830	18.0	2	4	11	24	38
share central structure east part	2009-06-14 10:11	14,991	73.3	9	58	163	368	651
share central strucure west part	2007-06-14 12:11	14,908	72.9	17	77	196	409	742

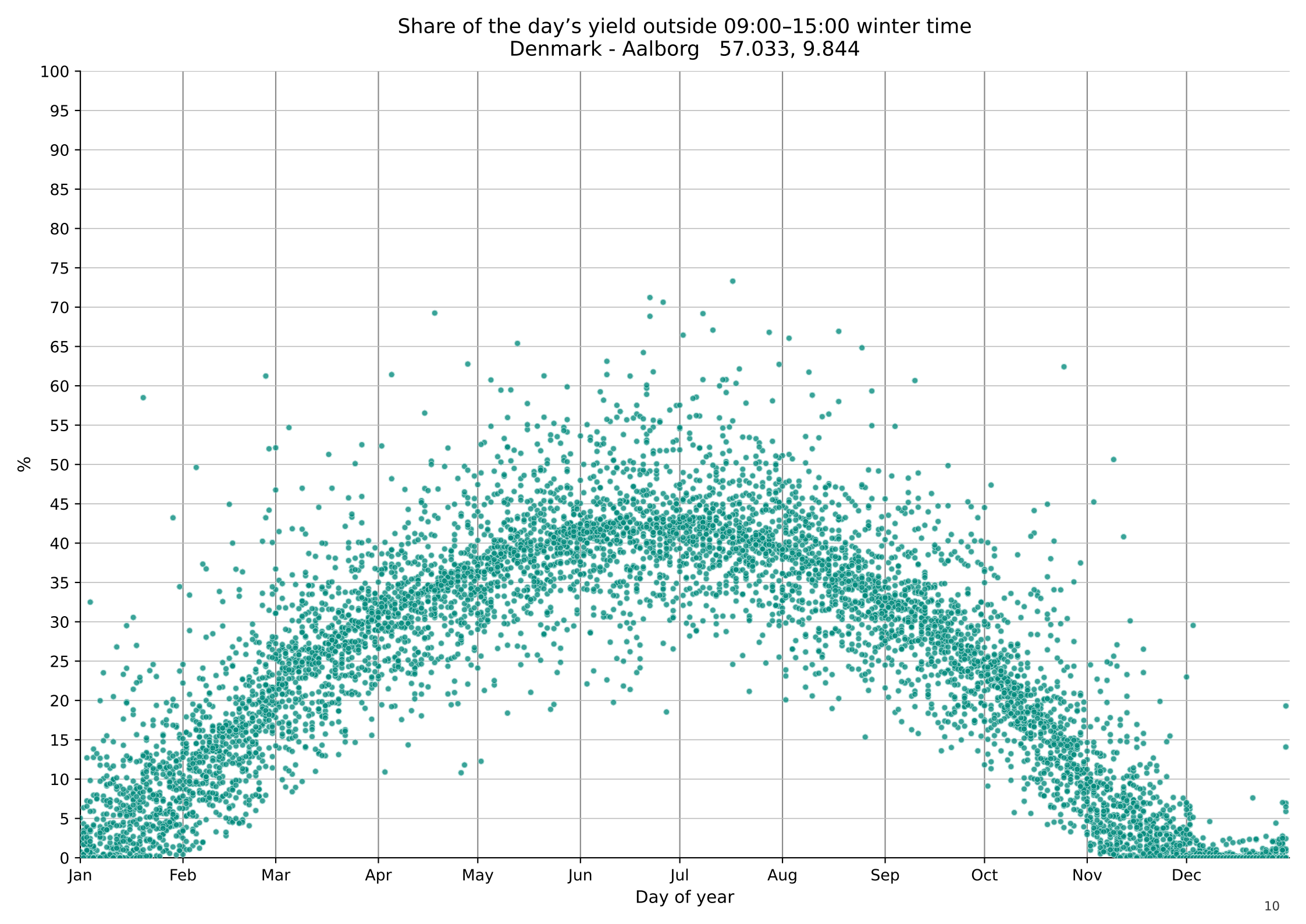
Watts is the highest hour of that field. % is of its own Wp. Hours are the count of hours at or above that share of its own record. Use this to size the MPPT or the inverter for that field.

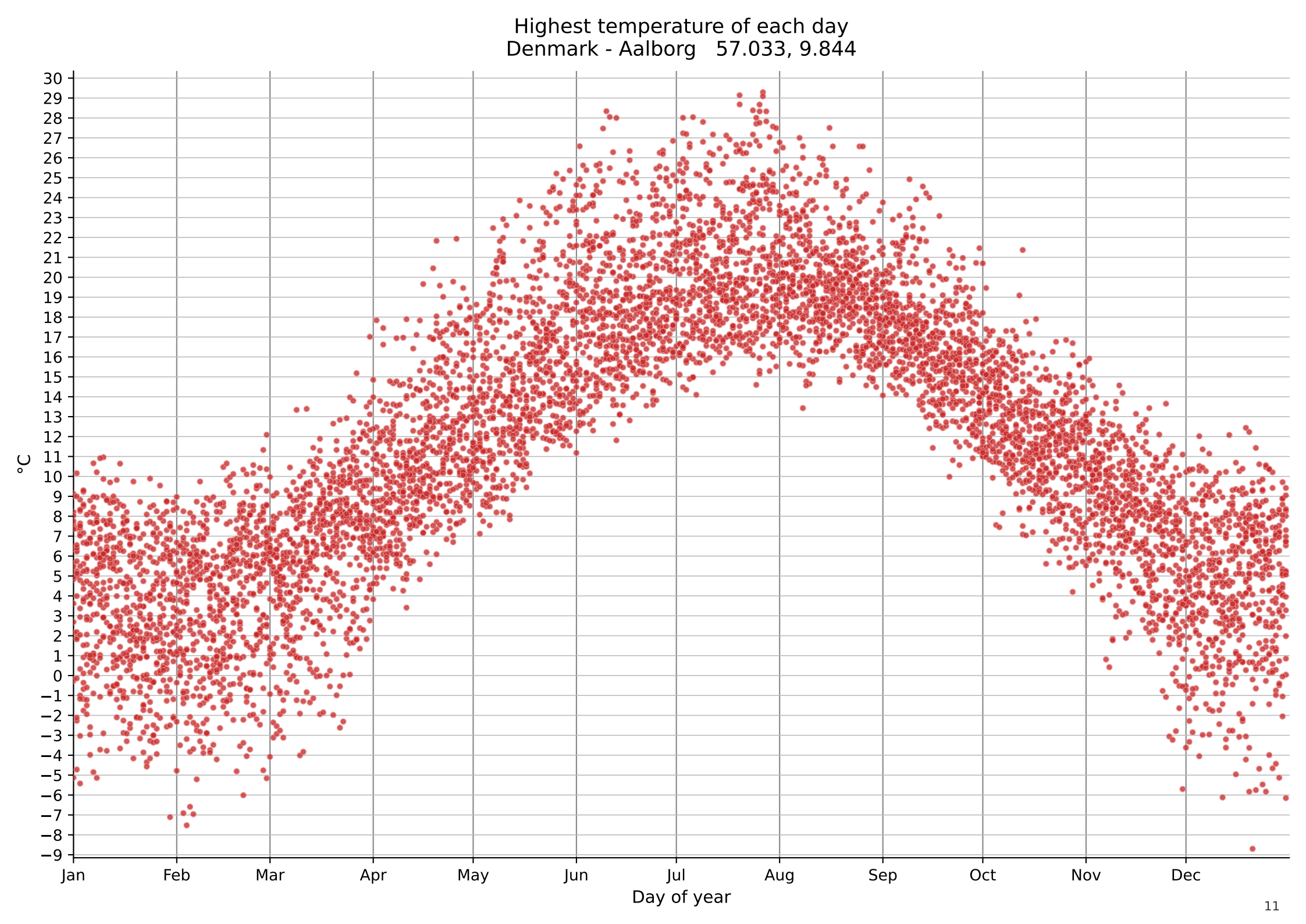

Yield distribution for each day — Wh / Wp of all PV together
Denmark - Aalborg 57.033, 9.844
Wh / Wp
0
1
2
3
4
5
6
7
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

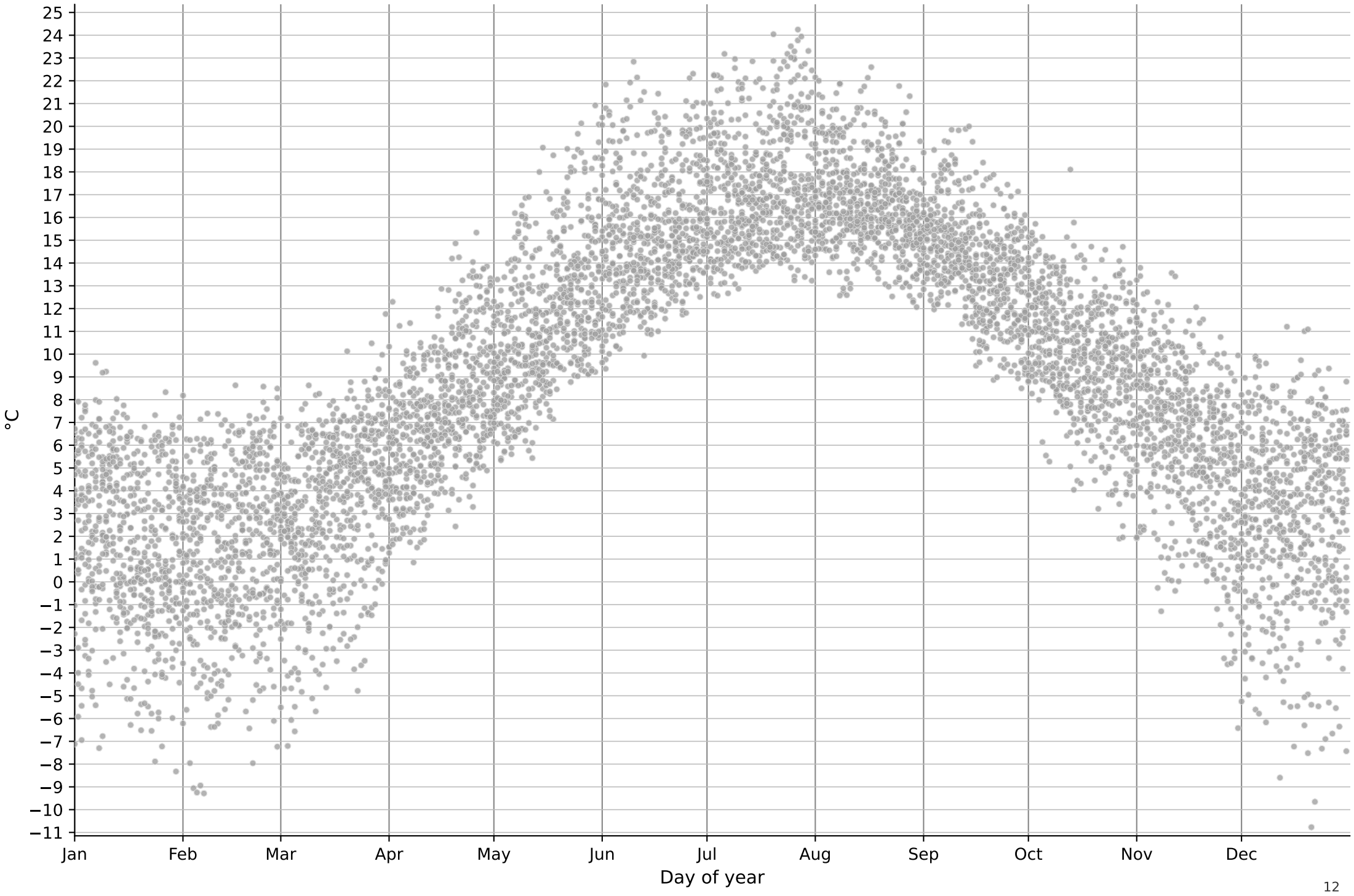

Yield distribution for each day — Wh / Wp of all PV together — 00:00–09:00
Denmark - Aalborg 57.033, 9.844
Wh / Wp
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

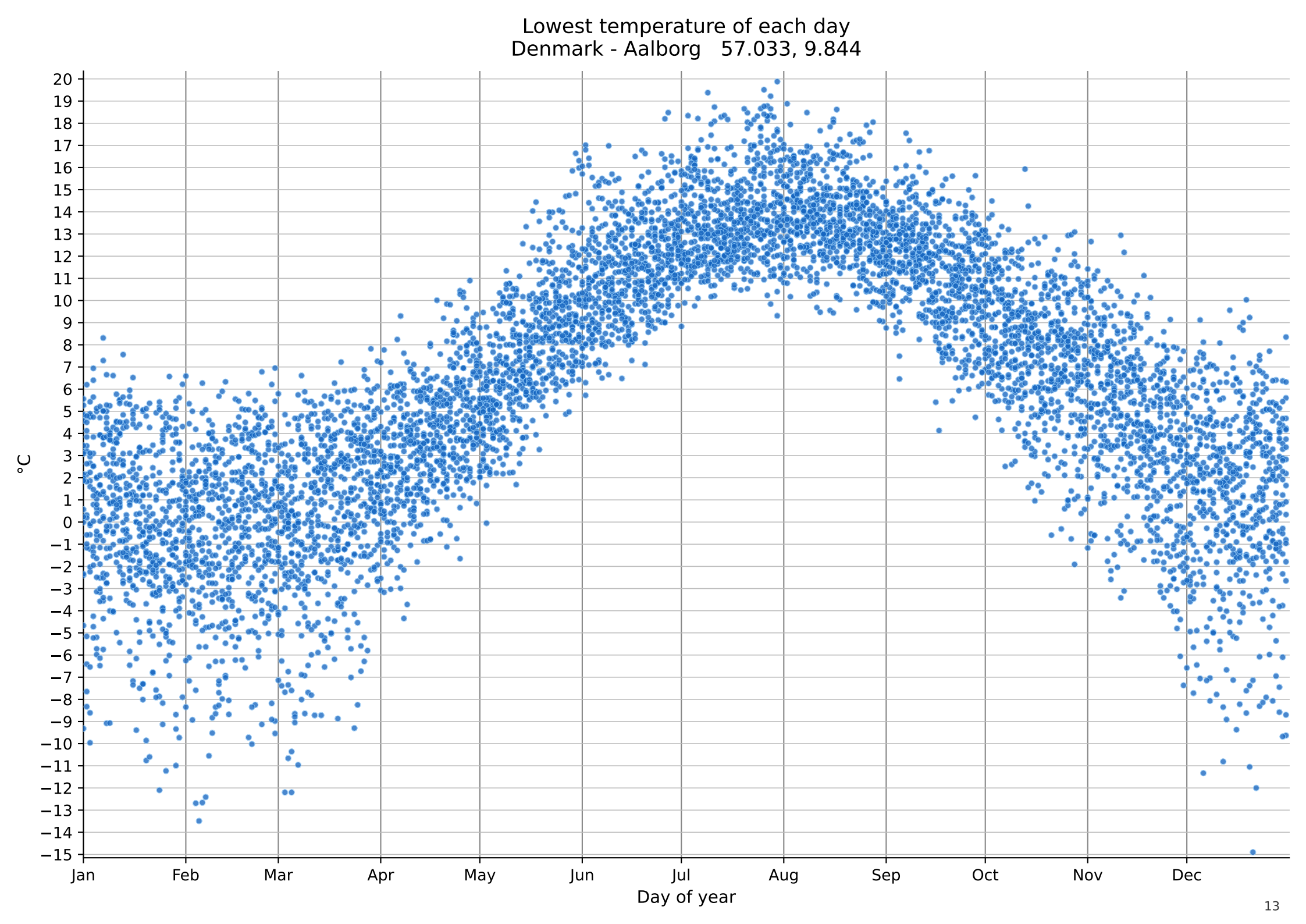

Yield distribution for each day — Wh / Wp of all PV together — 15:00–23:59
Denmark - Aalborg 57.033, 9.844
Wh / Wp
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

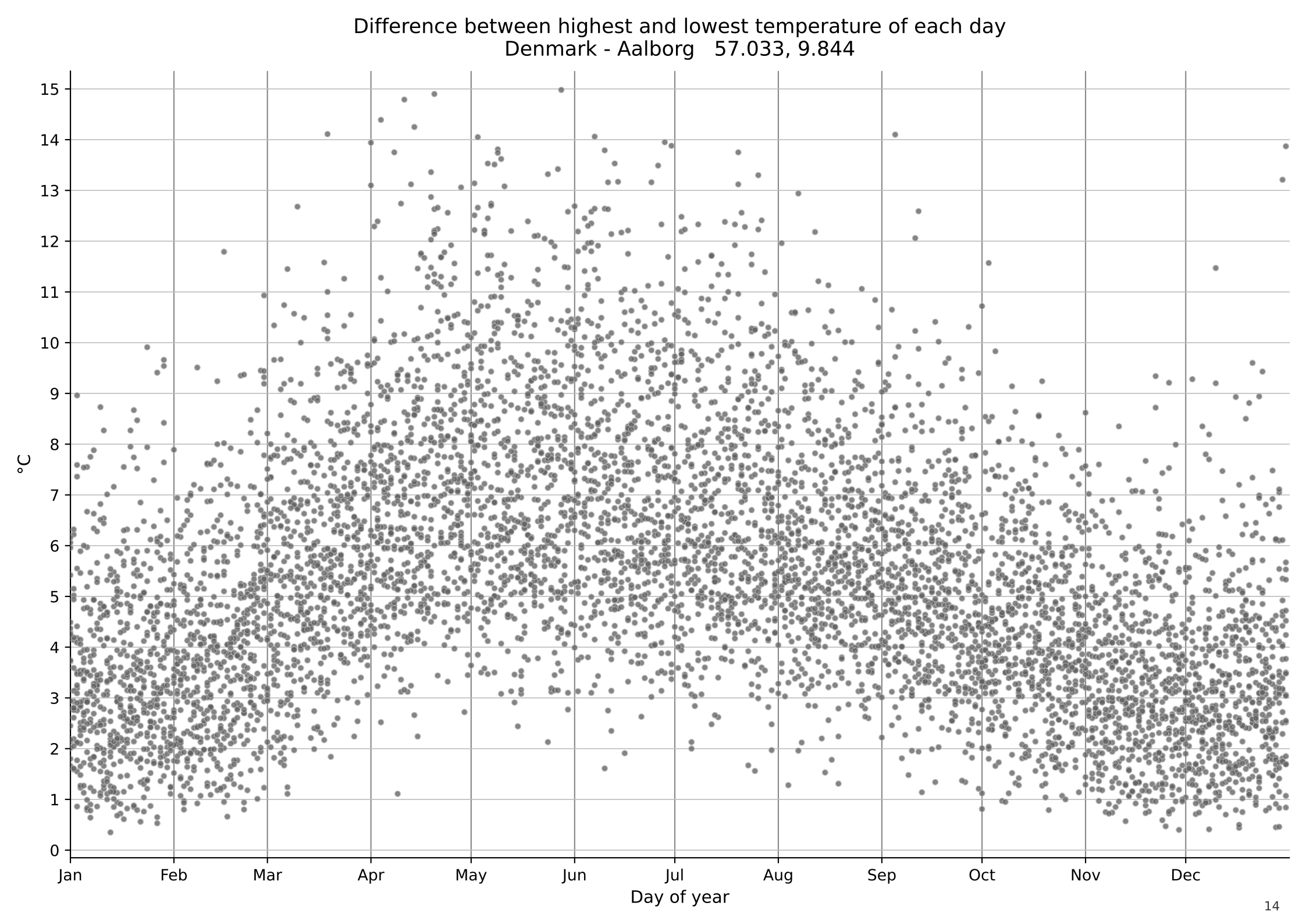

Share of the day’s yield in 09:00–15:00 winter time
Denmark - Aalborg 57.033, 9.844
%
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Share of the day’s yield outside 09:00–15:00 winter time
Denmark - Aalborg 57.033, 9.844
%
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Highest temperature of each day
Denmark - Aalborg 57.033, 9.844
°C
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−9
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Average temperature of each day
Denmark - Aalborg 57.033, 9.844
°C
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−9
−10
−11
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Lowest temperature of each day
Denmark - Aalborg 57.033, 9.844
°C
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−9
−10
−11
−12
−13
−14
−15
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Difference between highest and lowest temperature of each day
Denmark - Aalborg 57.033, 9.844
°C
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

Monthly and yearly specific yield (kWh/kWp = Wh/Wp)
Denmark - Aalborg 57.033, 9.844

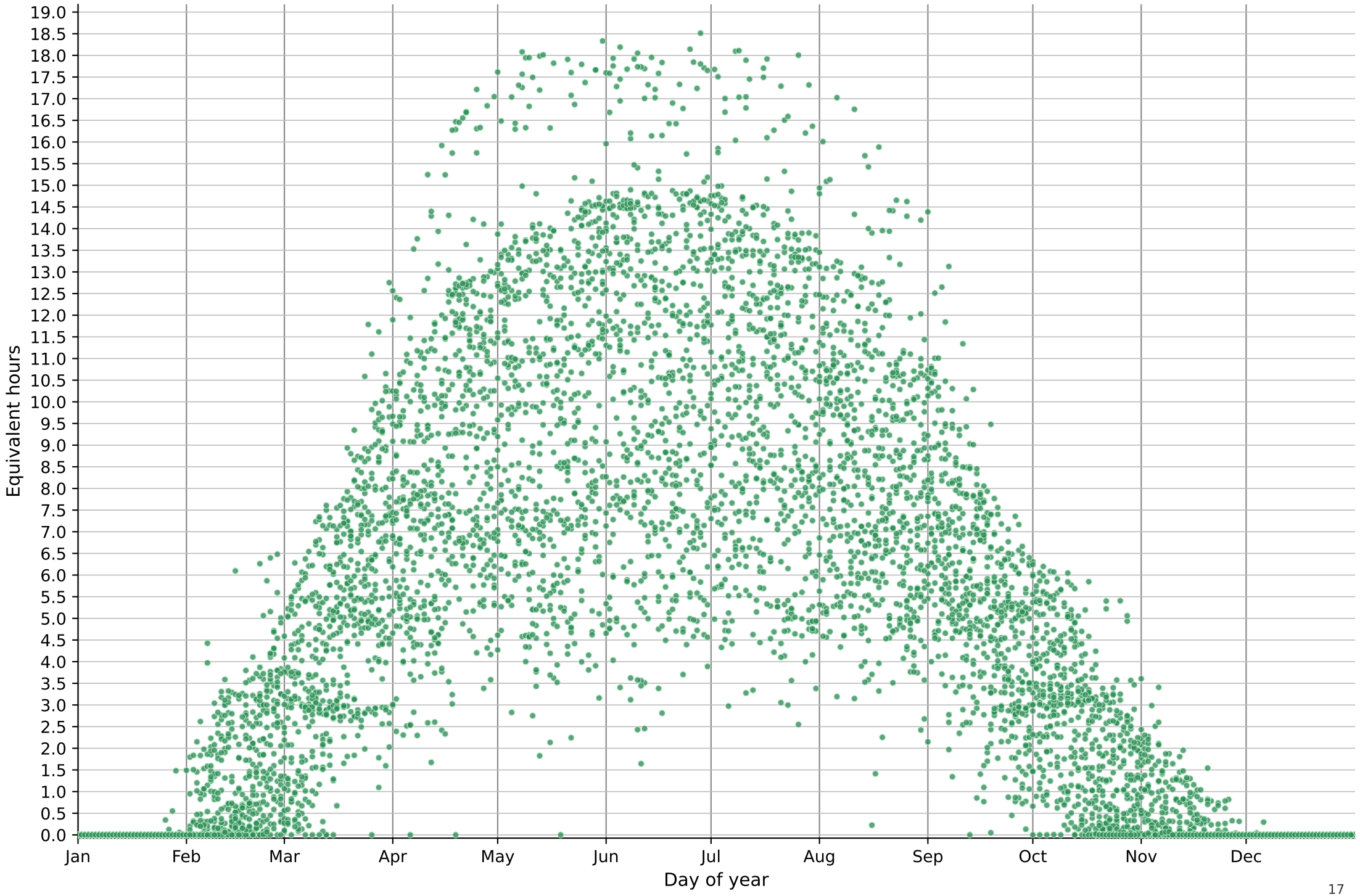
Month / year		Roof East 22°/-90° 19,800 Wp	Roof West 22°/90° 19,800 Wp	Terrace railing south 90°/0° 4,620 Wp	Terrace railing north 90°/180° 4,620 Wp	share central structure east 8°/-90° 20,460 Wp	share central strucure west p 8°/90° 20,460 Wp	All together
January	Maximum	11.11	10.83	2.07	2.07	10.32	10.19	9.73
	average	8.19	8.04	1.74	1.74	7.77	7.70	7.29
	minimum	4.82	4.60	1.20	1.20	4.61	4.52	4.28
February	Maximum	31.22	28.54	4.83	4.83	29.32	28.16	26.78
	average	21.53	20.75	4.33	4.33	20.82	20.49	19.19
	minimum	14.11	13.63	3.41	3.41	13.70	13.52	12.72
March	Maximum	78.83	84.19	12.49	12.16	80.27	82.48	73.94
	average	58.66	59.23	11.00	10.65	58.74	59.04	53.96
	minimum	46.83	47.12	8.75	8.44	46.90	46.99	43.29
April	Maximum	118.38	117.34	60.62	20.93	119.49	119.10	110.39
	average	99.55	99.94	52.13	17.76	101.23	101.50	93.81
	minimum	78.09	74.32	40.57	15.32	78.07	76.65	72.00
May	Maximum	152.34	158.12	100.38	28.89	158.19	161.07	147.53
	average	124.58	125.92	78.71	26.15	128.29	128.96	119.29
	minimum	98.70	103.74	63.04	23.45	103.42	106.66	97.60
June	Maximum	148.62	156.01	88.28	29.86	154.39	157.85	143.35
	average	128.13	132.18	75.42	26.89	133.05	134.90	123.77
	minimum	113.45	112.76	65.69	23.32	116.09	116.11	107.71
July	Maximum	150.83	157.51	95.23	29.29	157.98	160.83	146.74
	average	122.26	123.60	73.34	27.03	125.93	126.72	116.99
	minimum	103.31	103.85	58.20	22.37	106.44	106.36	98.95
August	Maximum	108.52	109.75	67.91	24.62	111.50	112.06	103.63
	average	98.93	98.13	58.62	22.25	100.48	100.36	93.41
	minimum	84.39	85.69	49.73	19.88	86.87	87.76	81.12
September	Maximum	72.85	75.72	22.42	14.79	73.25	74.47	68.02
	average	66.27	66.56	19.83	13.39	66.62	66.78	61.42
	minimum	57.77	57.87	16.26	12.40	58.81	58.44	54.05
October	Maximum	39.37	47.35	7.37	7.37	40.70	43.99	39.09
	average	33.62	33.44	6.56	6.56	33.04	32.98	30.52
	minimum	26.13	25.59	4.75	4.75	25.68	25.57	23.58
November	Maximum	16.12	15.07	2.78	2.78	14.89	14.27	13.70
	average	10.88	10.93	2.29	2.29	10.53	10.55	9.85
	minimum	7.80	7.90	1.87	1.87	7.57	7.72	7.20
December	Maximum	6.80	6.30	1.24	1.24	6.21	5.94	5.79
	average	5.07	5.05	1.03	1.03	4.80	4.78	4.52
	minimum	3.10	3.37	0.70	0.70	3.12	3.24	2.95
All years	Maximum	820.4	828.1	422.8	167.2	839.2	844.0	776.3
	average	777.7	783.8	385.0	160.1	791.3	794.8	734.0
	minimum	723.9	729.9	356.0	149.9	741.9	743.0	687.5

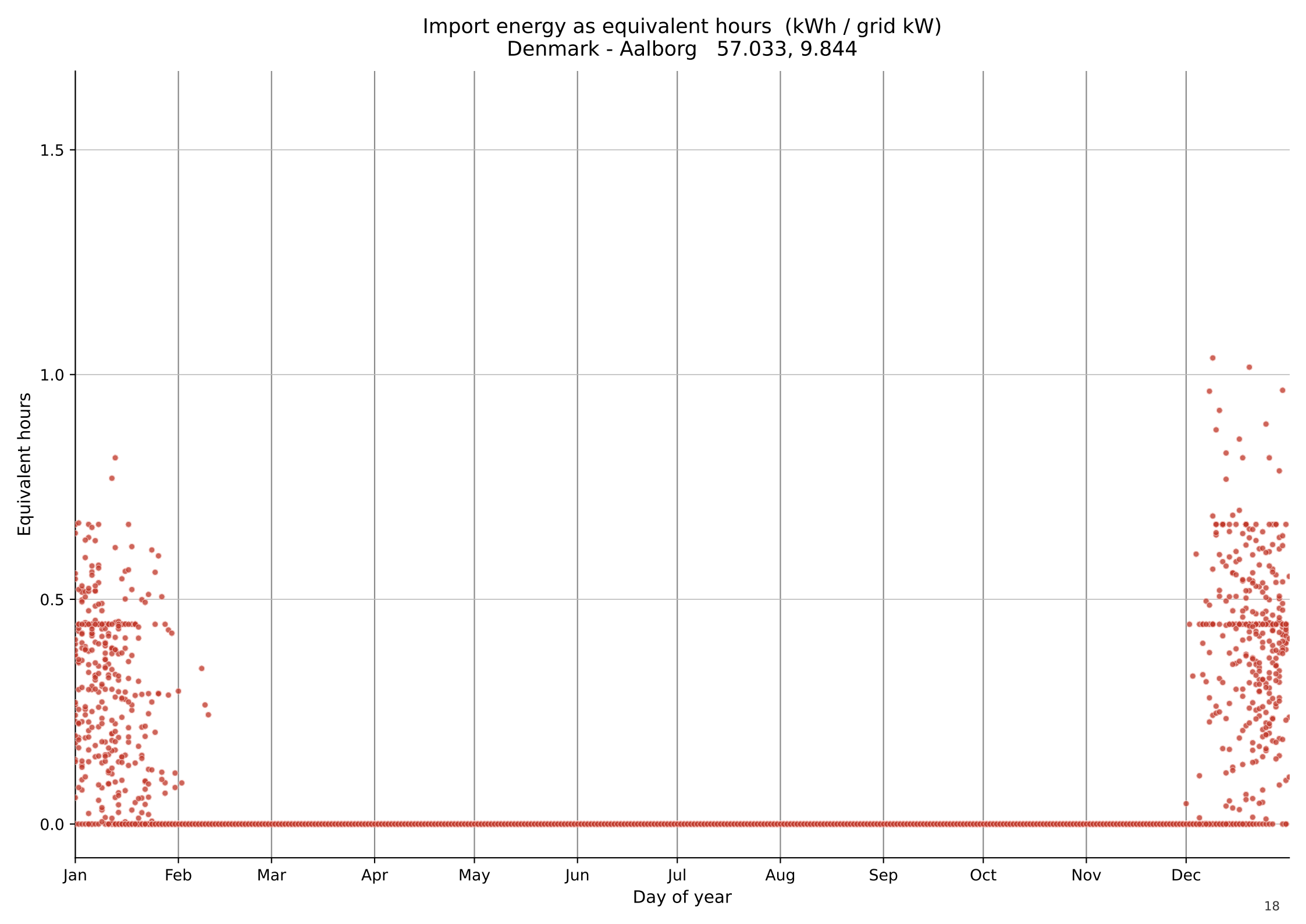
Highest combined yield hour: 2009-06-14 11:11 UTC 59,505.6 W (0.663 W/Wp) of 89,760 Wp installed. Use this hour to size battery charge power.

Monthly and yearly total yield (kWh)
Denmark - Aalborg 57.033, 9.844

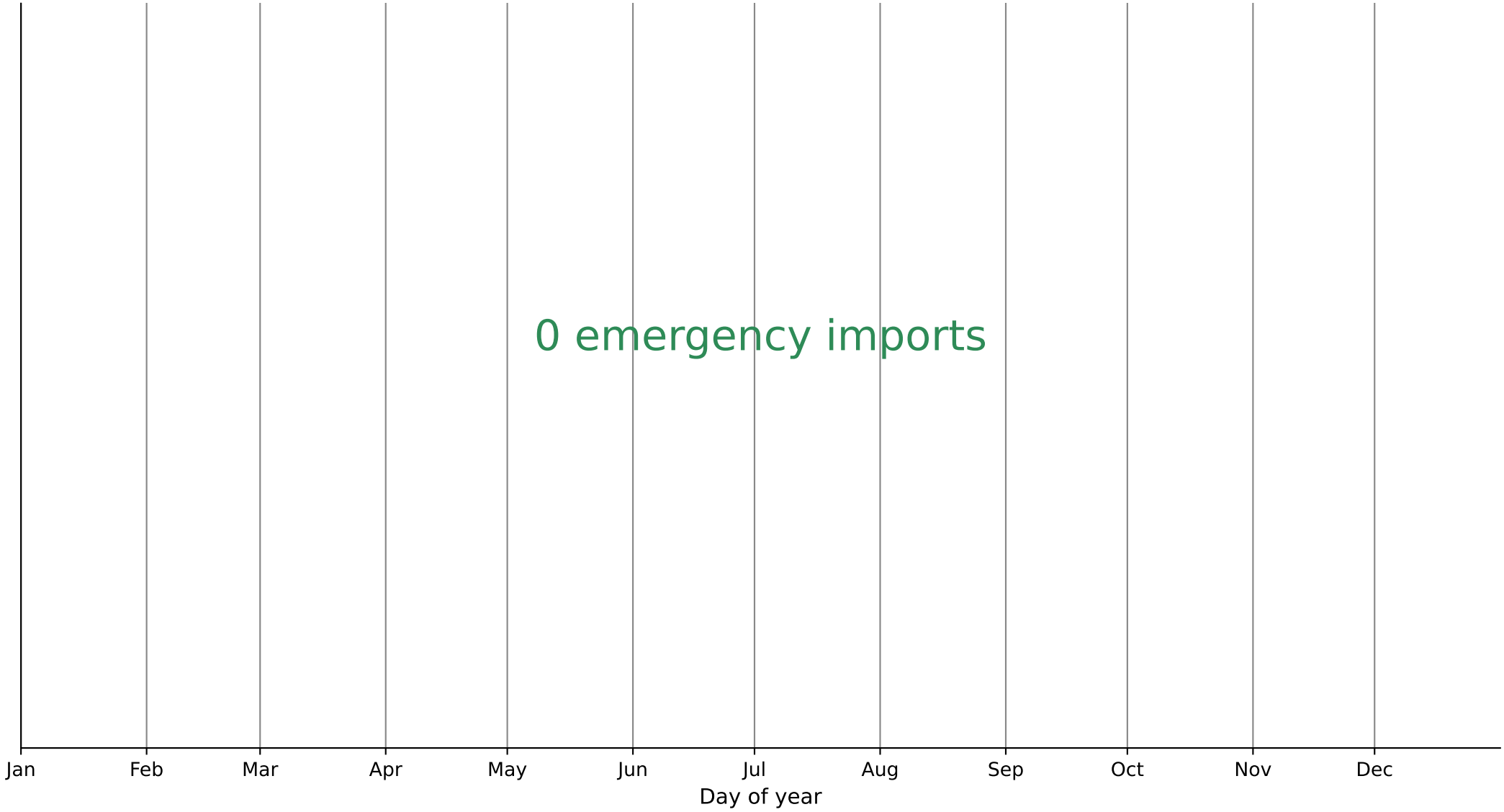
Month / year		Roof East 22°/-90° 19,800 Wp	Roof West 22°/90° 19,800 Wp	Terrace railing south 90°/0° 4,620 Wp	Terrace railing north 90°/180° 4,620 Wp	share central structure east 8°/-90° 20,460 Wp	share central strucure west p 8°/90° 20,460 Wp	All together
January	Maximum	219.90	214.43	9.58	9.58	211.17	208.51	873.17
	average	162.13	159.18	8.05	8.05	159.07	157.62	654.10
	minimum	95.43	91.16	5.56	5.56	94.23	92.40	384.34
February	Maximum	618.14	565.01	22.30	22.30	599.81	576.21	2,403.77
	average	426.20	410.95	19.99	19.99	425.93	419.18	1,722.24
	minimum	279.41	269.96	15.73	15.73	280.23	276.53	1,141.63
March	Maximum	1,560.82	1,667.02	57.70	56.19	1,642.25	1,687.46	6,636.99
	average	1,161.38	1,172.72	50.80	49.21	1,201.85	1,207.88	4,843.85
	minimum	927.22	932.96	40.43	39.01	959.49	961.40	3,885.70
April	Maximum	2,343.85	2,323.27	280.07	96.68	2,444.74	2,436.81	9,908.48
	average	1,971.06	1,978.84	240.83	82.07	2,071.10	2,076.66	8,420.55
	minimum	1,546.27	1,471.60	187.42	70.80	1,597.23	1,568.21	6,462.65
May	Maximum	3,016.25	3,130.84	463.78	133.48	3,236.56	3,295.57	13,242.18
	average	2,466.61	2,493.18	363.66	120.81	2,624.74	2,638.56	10,707.56
	minimum	1,954.21	2,053.99	291.26	108.36	2,116.03	2,182.35	8,760.77
June	Maximum	2,942.65	3,089.07	407.85	137.94	3,158.79	3,229.55	12,867.27
	average	2,537.07	2,617.09	348.43	124.22	2,722.24	2,760.13	11,109.19
	minimum	2,246.27	2,232.70	303.51	107.74	2,375.20	2,375.67	9,668.29
July	Maximum	2,986.35	3,118.68	439.94	135.30	3,232.30	3,290.55	13,171.18
	average	2,420.78	2,447.37	338.81	124.89	2,576.57	2,592.70	10,501.12
	minimum	2,045.46	2,056.14	268.89	103.36	2,177.82	2,176.12	8,881.53
August	Maximum	2,148.77	2,173.10	313.74	113.74	2,281.22	2,292.75	9,301.44
	average	1,958.80	1,942.96	270.83	102.81	2,055.82	2,053.46	8,384.68
	minimum	1,670.86	1,696.73	229.73	91.87	1,777.42	1,795.49	7,281.58
September	Maximum	1,442.48	1,499.26	103.59	68.33	1,498.76	1,523.72	6,105.31
	average	1,312.14	1,317.89	91.60	61.84	1,363.08	1,366.27	5,512.82
	minimum	1,143.83	1,145.90	75.14	57.30	1,203.27	1,195.74	4,851.77
October	Maximum	779.53	937.58	34.03	34.03	832.76	899.97	3,509.12
	average	665.70	662.06	30.31	30.31	675.94	674.84	2,739.16
	minimum	517.31	506.71	21.92	21.92	525.44	523.11	2,116.41
November	Maximum	319.21	298.29	12.84	12.84	304.72	291.95	1,229.77
	average	215.49	216.48	10.60	10.60	215.39	215.90	884.45
	minimum	154.40	156.34	8.62	8.62	154.92	157.95	646.24
December	Maximum	134.71	124.81	5.75	5.75	127.08	121.44	519.35
	average	100.29	100.02	4.78	4.78	98.15	97.77	405.78
	minimum	61.45	66.77	3.21	3.21	63.85	66.34	264.83
All years	Maximum	16,243.1	16,395.7	1,953.5	772.7	17,170.4	17,268.3	69,682.0
	average	15,397.6	15,518.7	1,778.7	739.6	16,189.9	16,261.0	65,885.5
	minimum	14,333.1	14,451.8	1,644.7	692.3	15,178.6	15,201.2	61,706.3

Highest combined yield hour: 2009-06-14 11:11 UTC 59,505.6 W (0.663 W/Wp) of 89,760 Wp installed. Use this hour to size battery charge power.


Export energy as equivalent hours (kWh / grid kW)
Denmark - Aalborg 57.033, 9.844
Equivalent hours
19.0
18.5
18.0
17.5
17.0
16.5
16.0
15.5
15.0
14.5
14.0
13.5
13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Import energy as equivalent hours (kWh / grid kW)
Denmark - Aalborg 57.033, 9.844
Equivalent hours
1.5
1.0
0.5
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

Emergency import hours: 0 days with an emergency: 0
Denmark - Aalborg 57.033, 9.844



Emergency = this hour’s grid import is above the month’s max import kW. 2 kW means up to 48 kWh in 24 hours. More than 2 kW in an hour is the higher grid fee.
Import inside that cap is not an emergency. Preferred cheap hours are 00:00–06:00 and 09:00–15:00 winter time.

Energy in kWh
Denmark - Aalborg 57.033, 9.844

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export to grid													
month Maximum	69	1,515	5,614	8,089	10,056	9,683	10,197	7,664	5,003	2,647	495	9	53,885
month average	4	926	3,945	6,902	8,352	8,591	8,480	7,050	4,470	1,908	231	0	50,860
month minimum	0	438	3,051	5,259	6,902	7,642	7,319	6,056	3,884	1,329	10	0	47,236
day Maximum	40.0	175.0	344.3	464.8	495.0	499.8	489.0	459.7	354.4	170.4	97.4	7.9	499.8
day average	0.1	32.8	127.3	230.1	269.4	286.4	273.6	227.4	149.0	61.5	7.7	0.0	139.3
day minimum	0.0	0.0	0.0	0.0	0.0	44.4	68.8	6.1	0.0	0.0	0.0	0.0	0.0
Import from grid													
month Maximum	346	23	0	0	0	0	0	0	0	0	0	342	554
month average	152	2	0	0	0	0	0	0	0	0	0	201	356
month minimum	56	0	0	0	0	0	0	0	0	0	0	53	192
day Maximum	22.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	28.0
day average	4.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	1.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total energy used for house													
month Maximum	724	649	698	615	596	545	531	525	538	616	642	722	7,296
month average	674	615	661	596	575	519	512	515	524	593	610	658	7,051
month minimum	640	588	637	570	532	497	492	505	502	573	592	626	6,934
day Maximum	24.6	24.9	24.3	22.3	22.0	22.6	20.4	20.0	19.3	21.5	23.9	25.1	25.1
day average	21.7	21.8	21.3	19.9	18.5	17.3	16.5	16.6	17.5	19.1	20.3	21.2	19.3
day minimum	16.0	19.8	18.6	15.8	15.3	15.3	15.1	15.1	15.5	16.4	17.8	18.7	15.1

Month rows: kWh in that month. Day rows: best / average / worst day.
Total energy used for house = household + car + heating + cooling + DHW + direct electric.
PV not exported and not marked wasted is still in the battery, or could not leave because the grid was already full. It is not house use.

Energy by price
Denmark - Aalborg 57.033, 9.844

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export													
month Maximum	10	284	893	933	996	955	1,009	933	793	494	98	2	6,632
month average	1	174	672	851	894	890	909	869	708	365	46	0	6,377
month minimum	0	82	529	735	813	839	813	779	622	255	2	0	6,073
day Maximum	4.8	36.5	45.9	48.2	49.4	48.8	48.2	48.9	41.8	35.6	21.4	1.7	49.4
day average	0.0	6.2	21.7	28.4	28.8	29.7	29.3	28.0	23.6	11.8	1.5	0.0	17.5
day minimum	0.0	0.0	0.0	0.0	0.0	7.6	6.9	0.7	0.0	0.0	0.0	0.0	0.0
Import													
month Maximum	81	6	0	0	0	0	0	0	0	0	0	80	130
month average	36	0	0	0	0	0	0	0	0	0	0	48	84
month minimum	13	0	0	0	0	0	0	0	0	0	0	13	45
day Maximum	5.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0
day average	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.2
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak grid fee													
month Maximum	13	13	0	0	0	0	0	0	0	0	0	13	38
month average	13	1	0	0	0	0	0	0	0	0	0	13	27
month minimum	13	0	0	0	0	0	0	0	0	0	0	13	25
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Import incl. peak fee													
month Maximum	94	18	0	0	0	0	0	0	0	0	0	93	155
month average	48	2	0	0	0	0	0	0	0	0	0	60	110
month minimum	25	0	0	0	0	0	0	0	0	0	0	25	70
day Maximum	5.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0
day average	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.2
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Balance													
month Maximum	-25	284	893	933	996	955	1,009	933	793	494	98	-23	6,515
month average	-48	172	672	851	894	890	909	869	708	365	46	-60	6,267
month minimum	-94	82	529	735	813	839	813	779	622	255	2	-93	5,969
day Maximum	4.8	36.5	45.9	48.2	49.4	48.8	48.2	48.9	41.8	35.6	21.4	1.7	49.4
day average	-1.1	6.2	21.7	28.4	28.8	29.7	29.3	28.0	23.6	11.8	1.5	-1.5	17.2
day minimum	-5.2	-2.2	0.0	0.0	0.0	7.6	6.9	0.7	0.0	0.0	0.0	-7.0	-7.0

Currency in Your units. Import and export use the cent/kWh of that hour. Peak fee 6.33 / kW / month is the highest import hour of the month (hourly stand-in for the 15-minute peak) and is added to that month's
Sell only when export is above 0. At 0 cent, export PV yield only, not the battery. Do not sell when the earning is negative.

Export in kWh during price hours
Denmark - Aalborg 57.033, 9.844

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export total													
month Maximum	69	1,515	5,614	8,089	10,056	9,683	10,197	7,664	5,003	2,647	495	9	53,885
month average	4	926	3,945	6,902	8,352	8,591	8,480	7,050	4,470	1,908	231	0	50,860
month minimum	0	438	3,051	5,259	6,902	7,642	7,319	6,056	3,884	1,329	10	0	47,236
day Maximum	40.0	175.0	344.3	464.8	495.0	499.8	489.0	459.7	354.4	170.4	97.4	7.9	499.8
day average	0.1	32.8	127.3	230.1	269.4	286.4	273.6	227.4	149.0	61.5	7.7	0.0	139.3
day minimum	0.0	0.0	0.0	0.0	0.0	44.4	68.8	6.1	0.0	0.0	0.0	0.0	0.0
Export during high price hours													
month Maximum	63	1,302	3,877	3,514	3,290	3,044	3,238	3,491	3,617	2,405	490	9	25,971
month average	3	806	3,084	3,297	3,010	2,882	3,051	3,322	3,265	1,772	225	0	24,718
month minimum	0	359	2,396	3,121	2,782	2,745	2,901	3,158	2,833	1,216	10	0	24,017
day Maximum	39.3	159.9	158.4	156.7	148.3	153.3	146.7	154.3	157.1	160.7	97.4	7.9	160.7
day average	0.1	28.6	99.5	109.9	97.1	96.1	98.4	107.2	108.8	57.2	7.5	0.0	67.7
day minimum	0.0	0.0	0.0	0.0	0.0	36.0	31.8	6.1	0.0	0.0	0.0	0.0	0.0
Export during medium price hours													
month Maximum	6	213	1,718	4,315	5,933	5,776	5,932	3,982	1,738	242	16	0	25,551
month average	0	120	856	3,275	4,605	4,867	4,765	3,457	1,186	136	6	0	23,272
month minimum	0	61	297	1,949	3,326	4,079	3,918	2,497	630	82	1	0	20,550
day Maximum	3.4	22.1	216.4	307.7	319.7	321.0	319.7	309.0	223.8	35.6	5.1	0.0	321.0
day average	0.0	4.3	27.6	109.2	148.5	162.2	153.7	111.5	39.5	4.4	0.2	0.0	63.7
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Export during low price hours													
month Maximum	0	0	22	568	1,276	1,198	1,127	513	55	0	0	0	3,985
month average	0	0	5	331	737	842	665	271	19	0	0	0	2,870
month minimum	0	0	0	86	287	636	361	66	0	0	0	0	2,079
day Maximum	0.0	0.0	18.7	67.0	101.1	99.1	98.1	73.8	27.0	0.0	0.0	0.0	101.1
day average	0.0	0.0	0.2	11.0	23.8	28.1	21.4	8.7	0.6	0.0	0.0	0.0	7.9
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

kWh exported while that price band was active. Not the money. Winter time. High 06:00–09:00 and 17:00–20:00, sold first. Low 09:00–15:00, sold last. Medium is the rest.

Heat pump
Denmark - Aalborg 57.033, 9.844

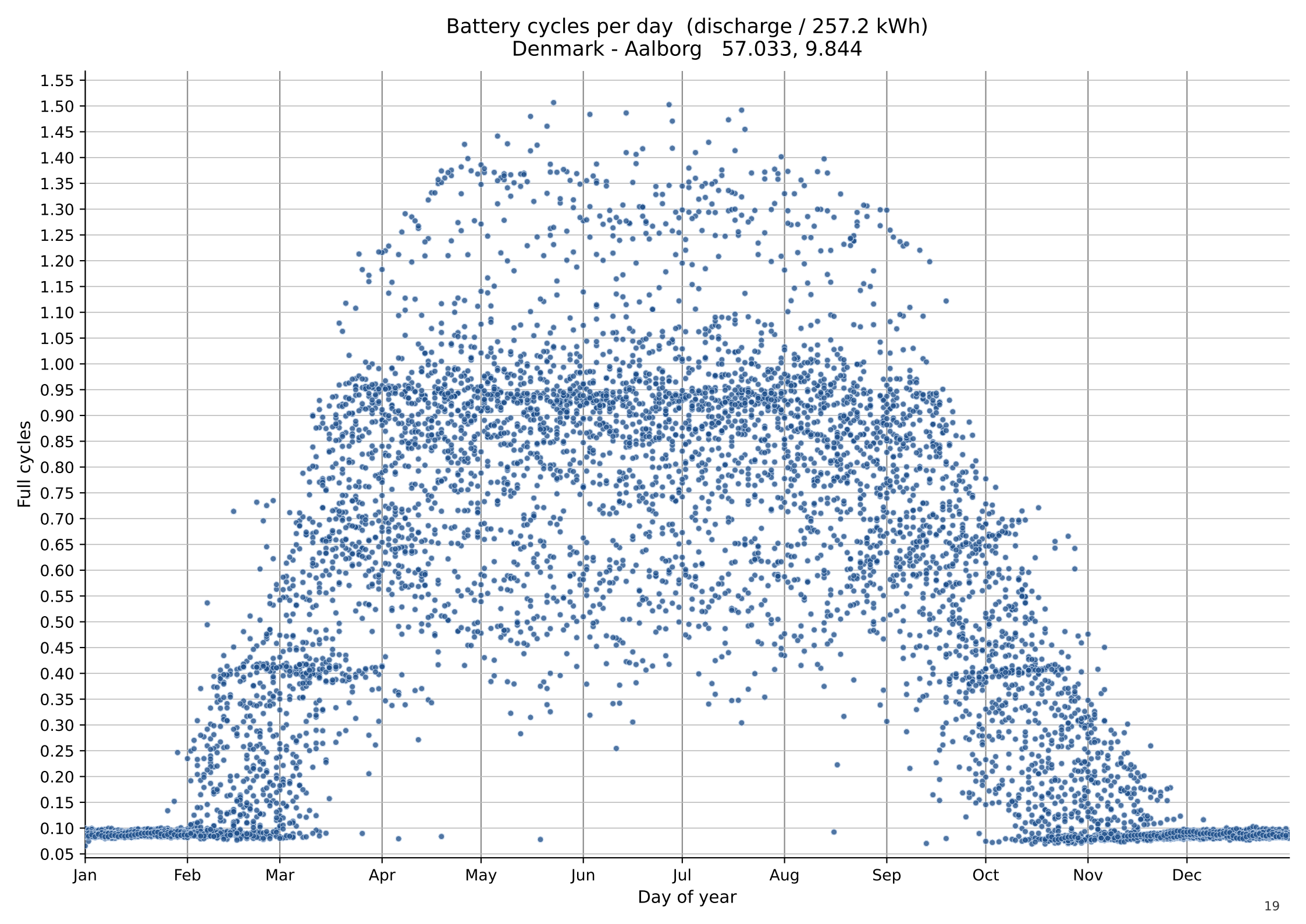
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Heating													
month Maximum	228	199	202	142	109	77	56	50	76	126	167	231	1,567
month average	178	164	165	124	90	53	38	41	63	104	135	167	1,323
month minimum	143	140	142	100	52	33	21	32	43	86	118	135	1,214
day Maximum	8.6	8.9	8.3	6.5	6.5	6.9	5.0	4.7	3.8	5.7	8.1	9.3	9.3
day average	5.7	5.8	5.3	4.1	2.9	1.8	1.2	1.3	2.1	3.4	4.5	5.4	3.6
day minimum	0.0	3.8	2.8	0.2	0.0	0.0	0.0	0.0	0.2	0.9	2.1	3.0	0.0
Cooling													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DHW													
month Maximum	62	58	62	53	53	48	41	41	42	56	55	57	623
month average	62	57	62	52	51	46	39	40	41	55	55	57	615
month minimum	62	56	62	50	46	43	37	39	39	53	54	57	605
day Maximum	2.0	2.0	2.0	1.8	1.8	1.7	1.4	1.4	1.5	1.8	1.8	1.8	2.0
day average	2.0	2.0	2.0	1.7	1.6	1.5	1.3	1.3	1.4	1.8	1.8	1.8	1.7
day minimum	2.0	2.0	1.8	1.5	1.3	1.3	1.1	1.1	1.2	1.5	1.6	1.8	1.1
Direct electric													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0
month average	0	0	0	0	0	0	0	0	0	0	0	0	0
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

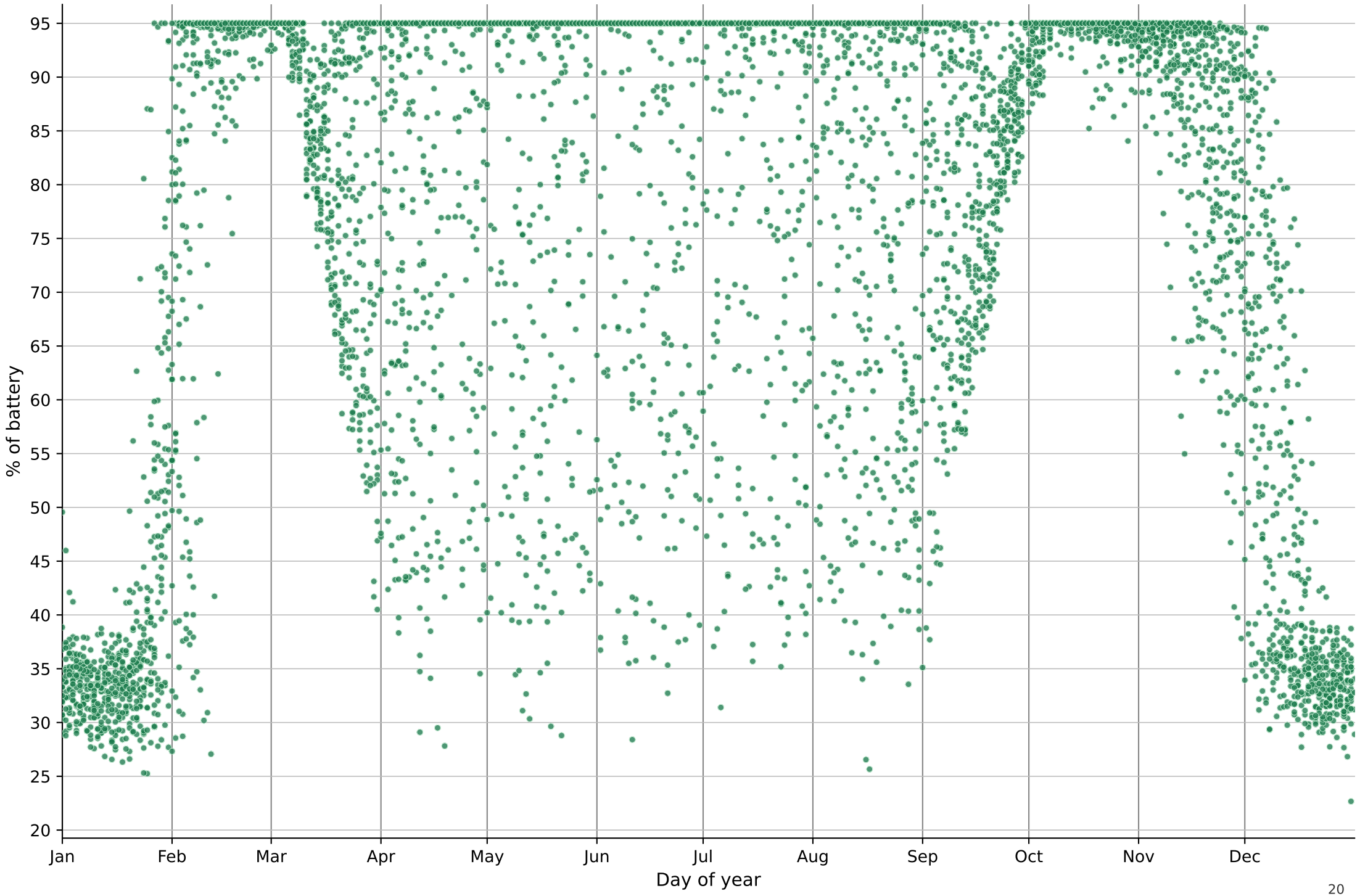
Heating, cooling and DHW are electricity. Direct electric is the part the heat pump could not cover.

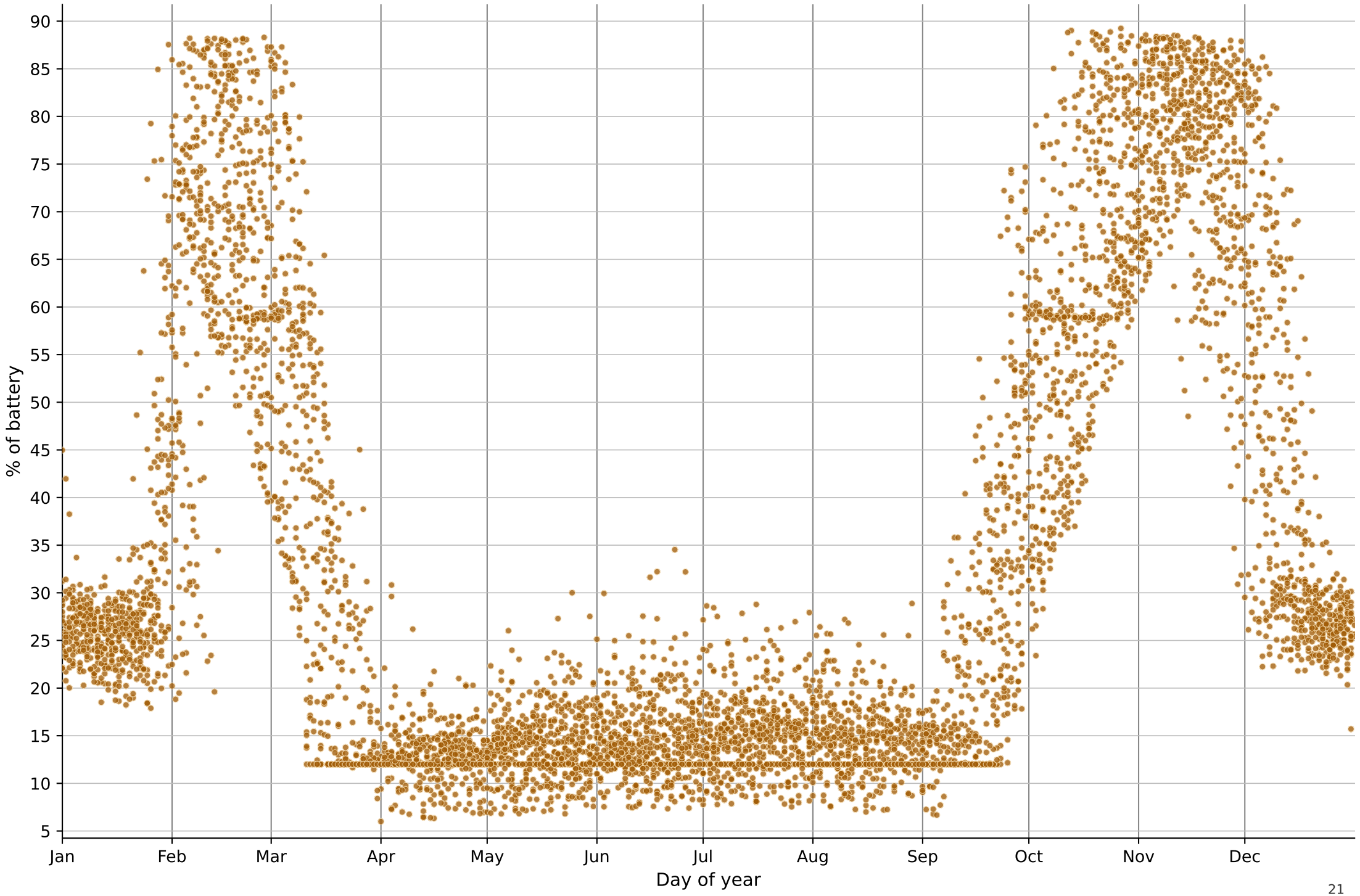
Battery
Denmark - Aalborg 57.033, 9.844

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Wasted													
month Maximum	0	0	8	739	2,094	2,180	1,938	617	36	0	0	0	6,219
month average	0	0	2	413	1,207	1,451	947	292	11	0	0	0	4,324
month minimum	0	0	0	134	747	915	314	98	0	0	0	0	3,115
day Maximum	0.0	0.0	4.2	126.1	190.3	207.6	184.2	107.9	28.5	0.0	0.0	0.0	207.6
day average	0.0	0.0	0.1	13.8	38.9	48.4	30.6	9.4	0.4	0.0	0.0	0.0	11.8
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full cycles													
month Maximum	3	8	24	27	29	28	29	27	22	12	5	3	201
month average	3	6	18	25	27	26	27	26	20	10	3	3	193
month minimum	3	4	15	22	25	24	25	23	17	8	2	3	185
day Maximum	0.2	0.7	1.2	1.4	1.5	1.5	1.5	1.4	1.3	0.8	0.5	0.1	1.5
day average	0.1	0.2	0.6	0.8	0.9	0.9	0.9	0.8	0.7	0.3	0.1	0.1	0.5
day minimum	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1
Charge C													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	2
month average	0	0	0	0	0	0	0	0	0	0	0	0	2
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	2
day Maximum	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.2
day average	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.1
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discharge C													
month Maximum	0	0	0	0	0	0	0	0	0	0	0	0	1
month average	0	0	0	0	0	0	0	0	0	0	0	0	1
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	1
day Maximum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
day average	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1
day minimum	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Wasted = PV left when the export price is negative and the battery is full. Full cycles = discharge kWh / 257.2 kWh. Battery export only into hours whose export price is above 0, highest price first. At 0 cent on


Battery cycles per day (discharge / 257.2 kWh)
Denmark - Aalborg 57.033, 9.844
Full cycles
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Battery max charge state per day (257.2 kWh = 100 %)
Denmark - Aalborg 57.033, 9.844
% of battery
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Battery min charge state per day (257.2 kWh = 100 %)
Denmark - Aalborg 57.033, 9.844
% of battery
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
Jan
Feb
Mar
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May
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Jul
Aug
Sep
Oct
Nov
Dec
Day of year