Scenario — PV
GEMINI-60-house-with-garage Germany - Grünheide 52.401, 13.842

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
Garage roof	1	0	10,740	—	front	—	yes
Garage side wall south	90	0	3,475	5 / 4	front	—	yes
Garage side wall north	90	180	3,475	5 / 4	front	—	yes
Garage door side west	90	90	700	5 / 4	front	—	yes
Garage back side east	90	-90	2,540	5 / 4	front	—	yes
Garden fence east	90	-90	6,000	5 / 4	face 1	—	yes
Garden fence east face2	90	90	4,800	5 / 4	face 2	80 %	no
Total counted			75,770				

Location: A workers' village just near the Tesla giga factory would be great. Compare this location with Austria - Fürstenbrunn. What has more effect? More in the north or in the shadow of a mountain?
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 2023-05-08 11:11 local (10:11 UTC) 42,037 W 0.555 W/Wp of 75,770 Wp.
Database gaps: 10 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, 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-with-garage Germany - Grünheide 52.401, 13.842

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	8 °C 10 °C 12 °C 10 °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	176.8 kWh C 0.5 5 / 95 / 50 %
	Nameplate	—
	Charge / discharge η	95 % / 90 %
Grid	Inverter / grid connection	34.0 kW / 17.0 kW
	Max export	17.0 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 @ 40.0 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
Germany - Grünheide 52.401, 13.842

PV	2023-05-08 10:11	2009-06-13 10:11	2021-05-30 10:11	2009-06-13 11:11	2023-05-09 10:11	2023-05-17 10:11	2023-05-08 11:11	2011-05-03 10:11	2023-05-17 11:11	2020-05-15 10:11
Roof East	14,769	14,948	14,835	13,969	14,639	14,600	13,423	14,265	13,413	14,337
Roof West	12,194	12,487	12,462	14,276	12,098	12,217	13,930	11,752	13,894	12,006
Terrace railing south	2,697	2,232	2,347	2,339	2,651	2,505	2,767	2,723	2,583	2,504
Terrace railing north	150	185	161	157	149	190	149	207	189	171
Garage roof	7,876	7,979	7,940	8,211	7,809	7,806	7,976	7,587	7,938	7,665
Garage side wall south	2,029	1,679	1,766	1,759	1,994	1,884	2,082	2,048	1,943	1,884
Garage side wall north	113	139	121	118	112	143	112	156	143	129
Garage door side west	23	28	24	70	23	29	71	31	77	26
Garage back side east	604	616	596	87	596	604	82	626	104	595
Garden fence east	1,427	1,456	1,408	204	1,408	1,426	194	1,479	246	1,405
Garden fence east face2	156	192	168	478	155	197	487	215	531	178
Watt at record	42,037	41,943	41,829	41,669	41,633	41,600	41,274	41,089	41,062	40,901
Percent of installed peak	55.5	55.4	55.2	55.0	54.9	54.9	54.5	54.2	54.2	54.0

Values are watts at that hour. Date and time are UTC. Record 42,037 W (55.5 % of 75,770 Wp).

Hours at or above a share of the record
Germany - Grünheide 52.401, 13.842

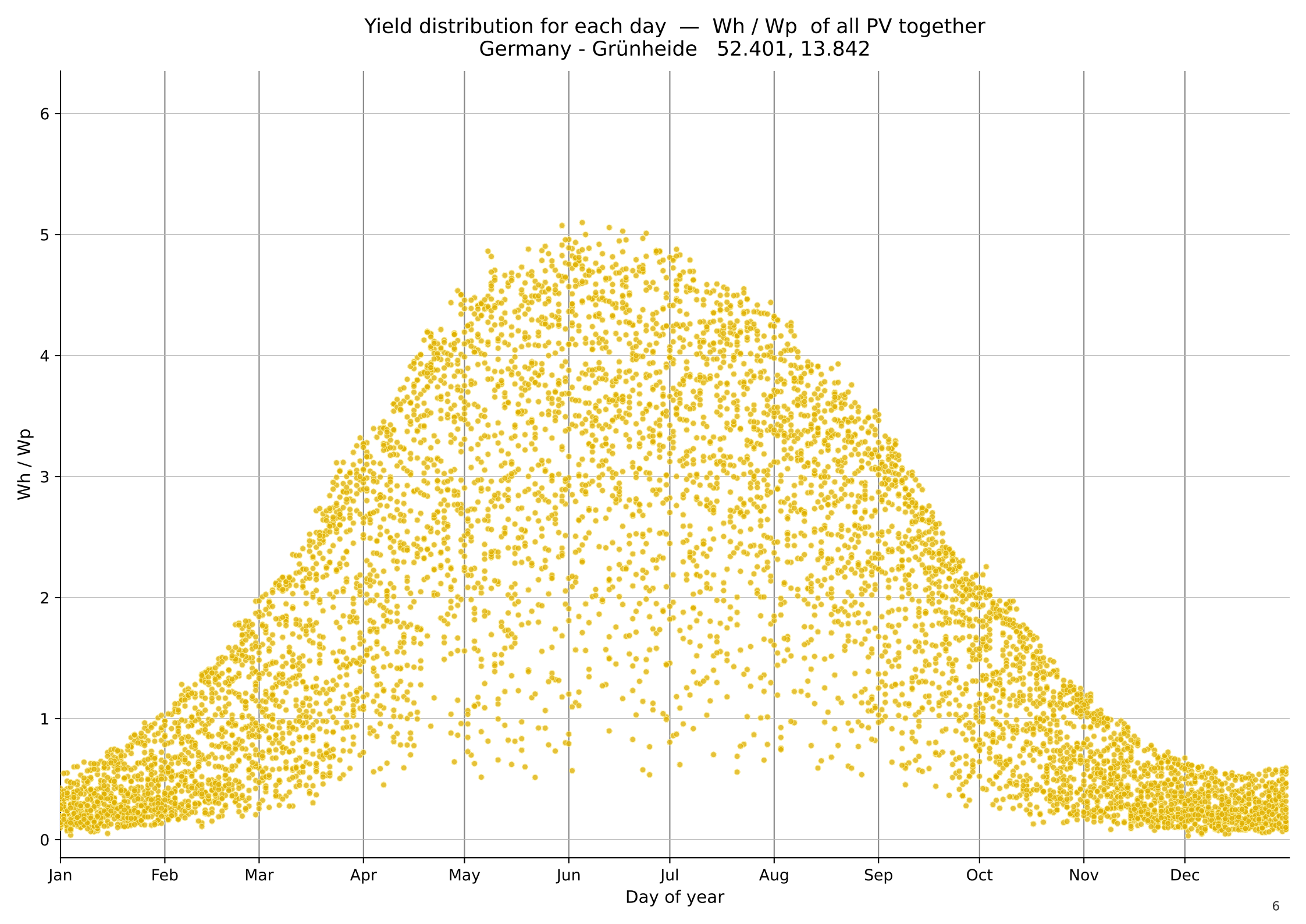
Of the record	Hours	Watts
98 %	7	41,196 W
96 %	34	40,355 W
94 %	130	39,514 W
92 %	359	38,674 W
90 %	732	37,833 W

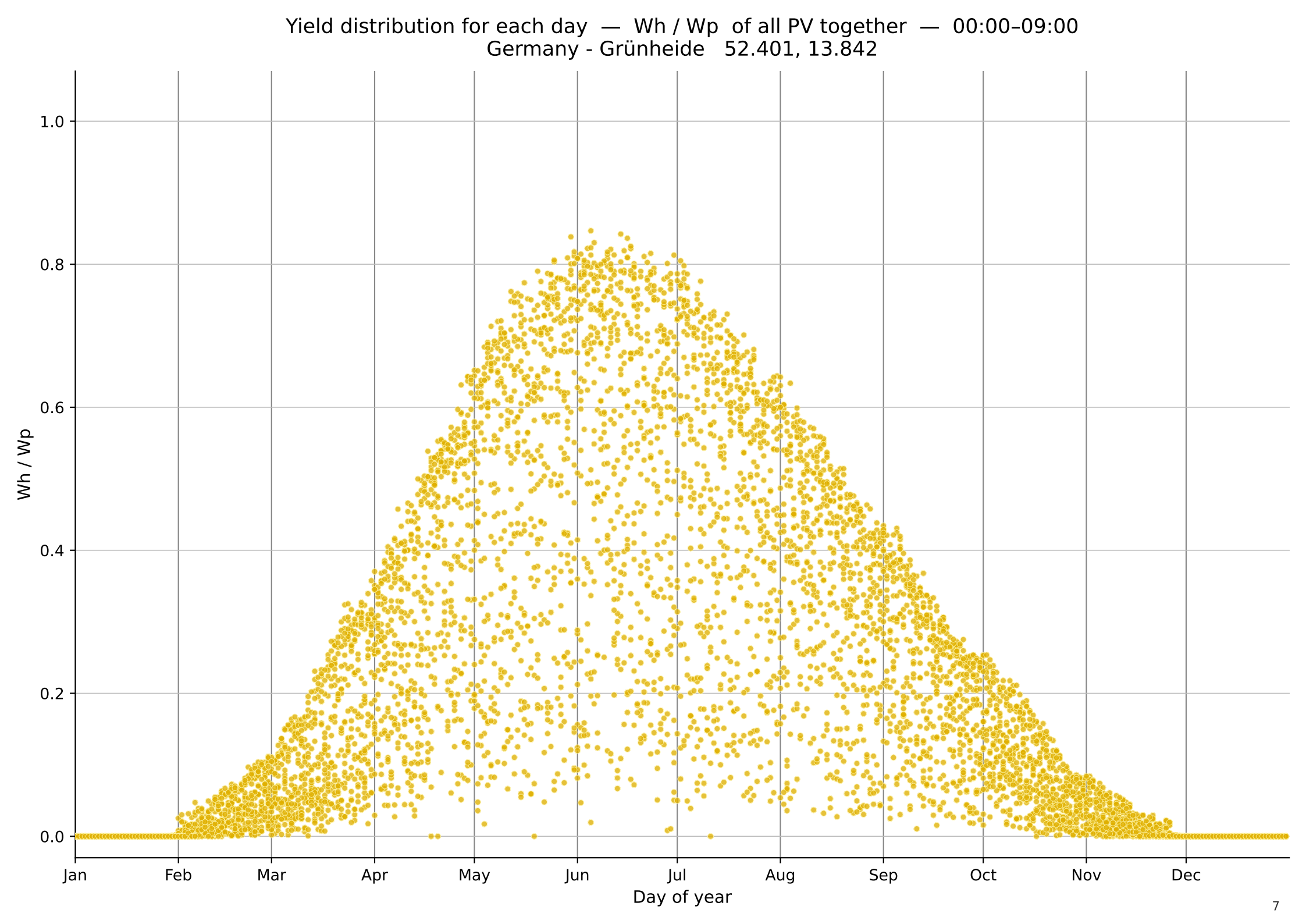
Record hour = 42,037 W combined.

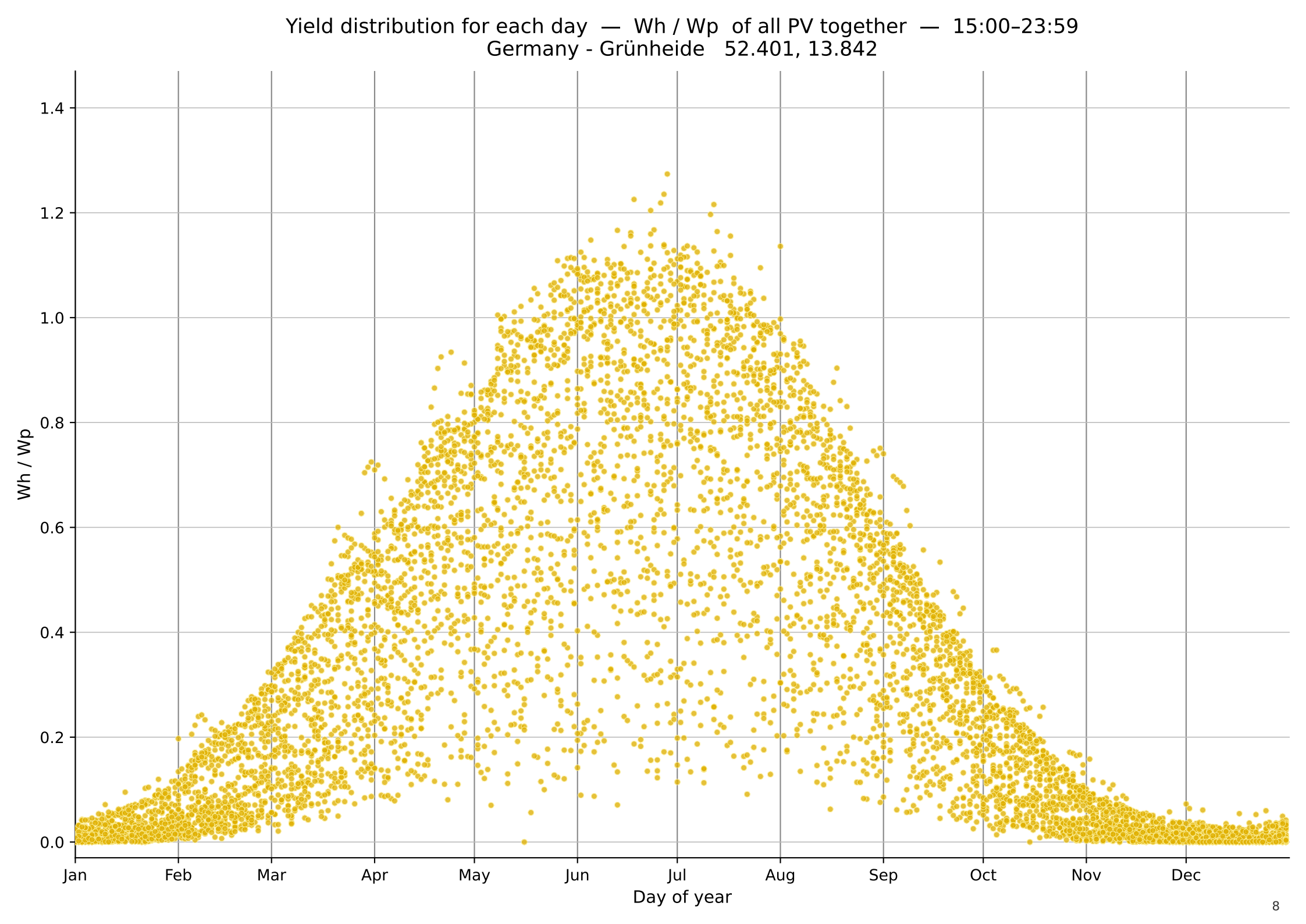
Records of each photovoltaic field
Germany - Grünheide 52.401, 13.842

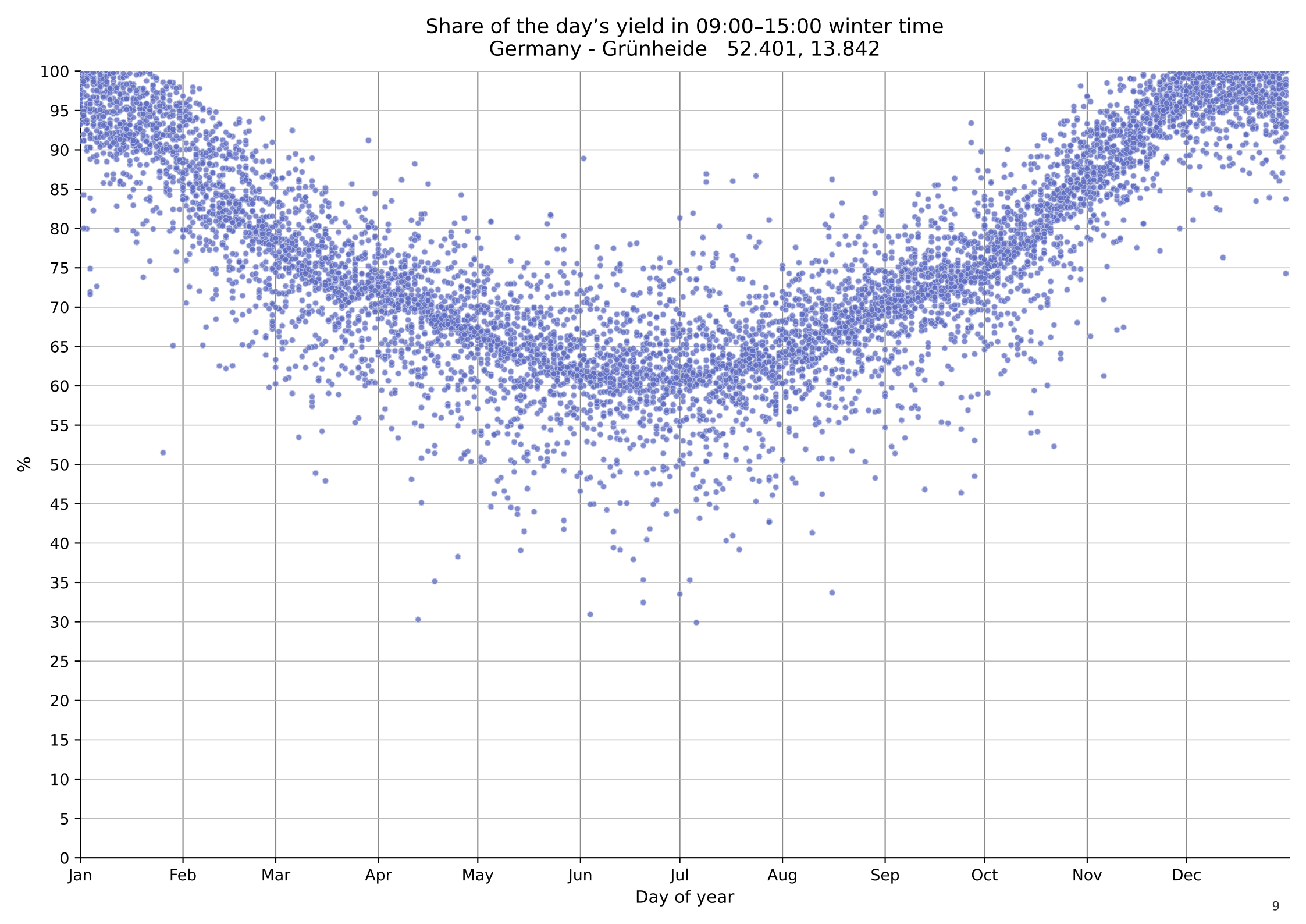
PV	Date	Watts	%	h ≥98%	h ≥96%	h ≥94%	h ≥92%	h ≥90%
Roof East	2009-06-13 09:11	15,293	77.2	4	21	82	211	424
Roof West	2014-05-31 13:11	15,107	76.3	5	25	92	197	400
Terrace railing south	2013-03-26 11:11	3,634	78.7	1	1	6	6	17
Terrace railing north	2018-07-01 05:11	793	17.2	7	17	37	61	97
Garage roof	2009-06-13 11:11	8,211	76.5	1	7	31	105	253
Garage side wall south	2013-03-26 11:11	2,733	78.7	1	1	6	6	17
Garage side wall north	2018-07-01 05:11	596	17.2	7	17	37	61	97
Garage door side west	2023-05-08 14:11	449	64.2	3	6	18	42	79
Garage back side east	2023-05-08 08:11	1,584	62.4	4	12	24	78	181
Garden fence east	2023-05-08 08:11	3,899	65.0	4	15	40	130	261

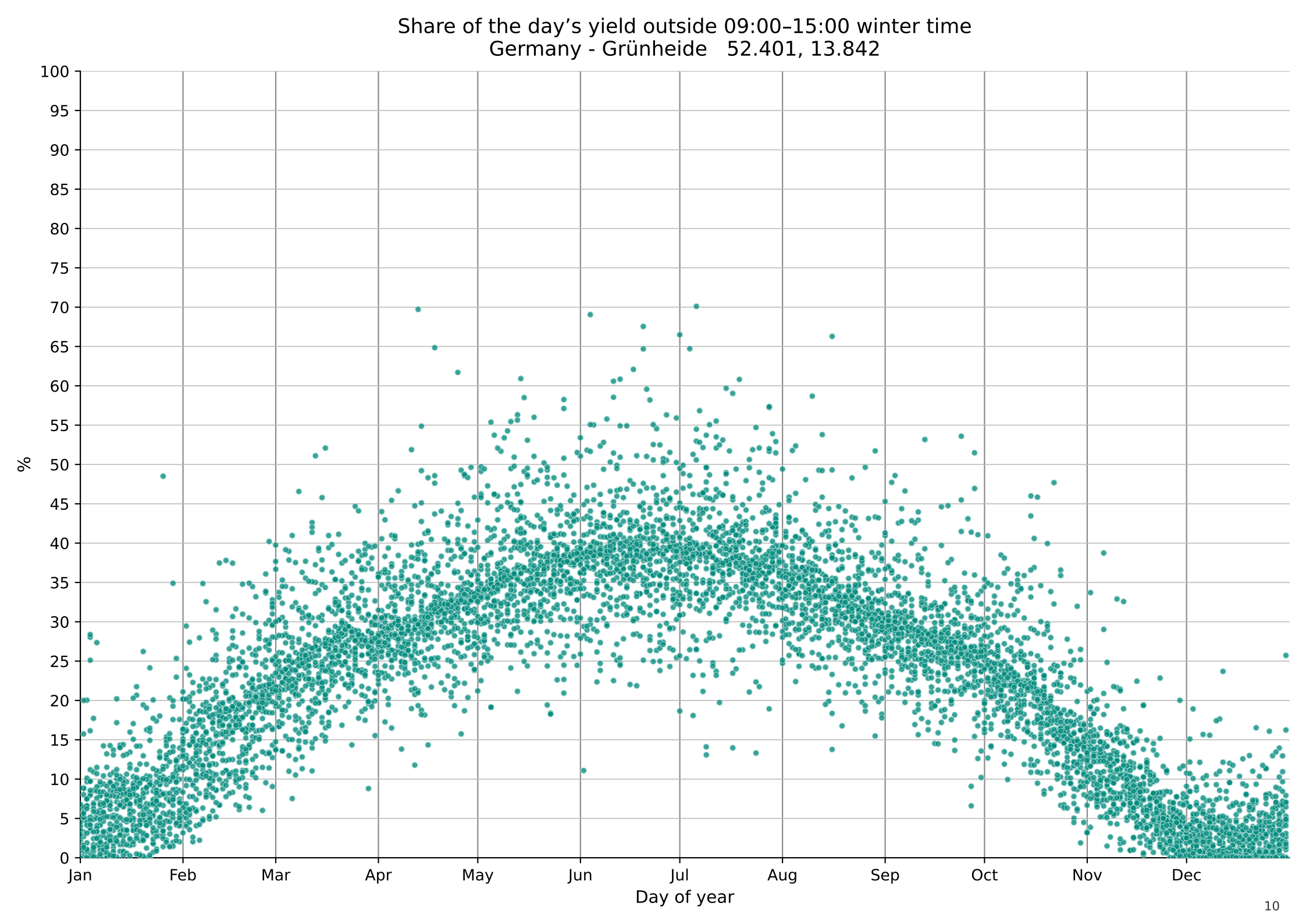
Watts is the highest hour of that field. % is of its own Wp. Hours are the count of hours at or above that share of its own record. Use this to size the MPPT or the inverter for that field.

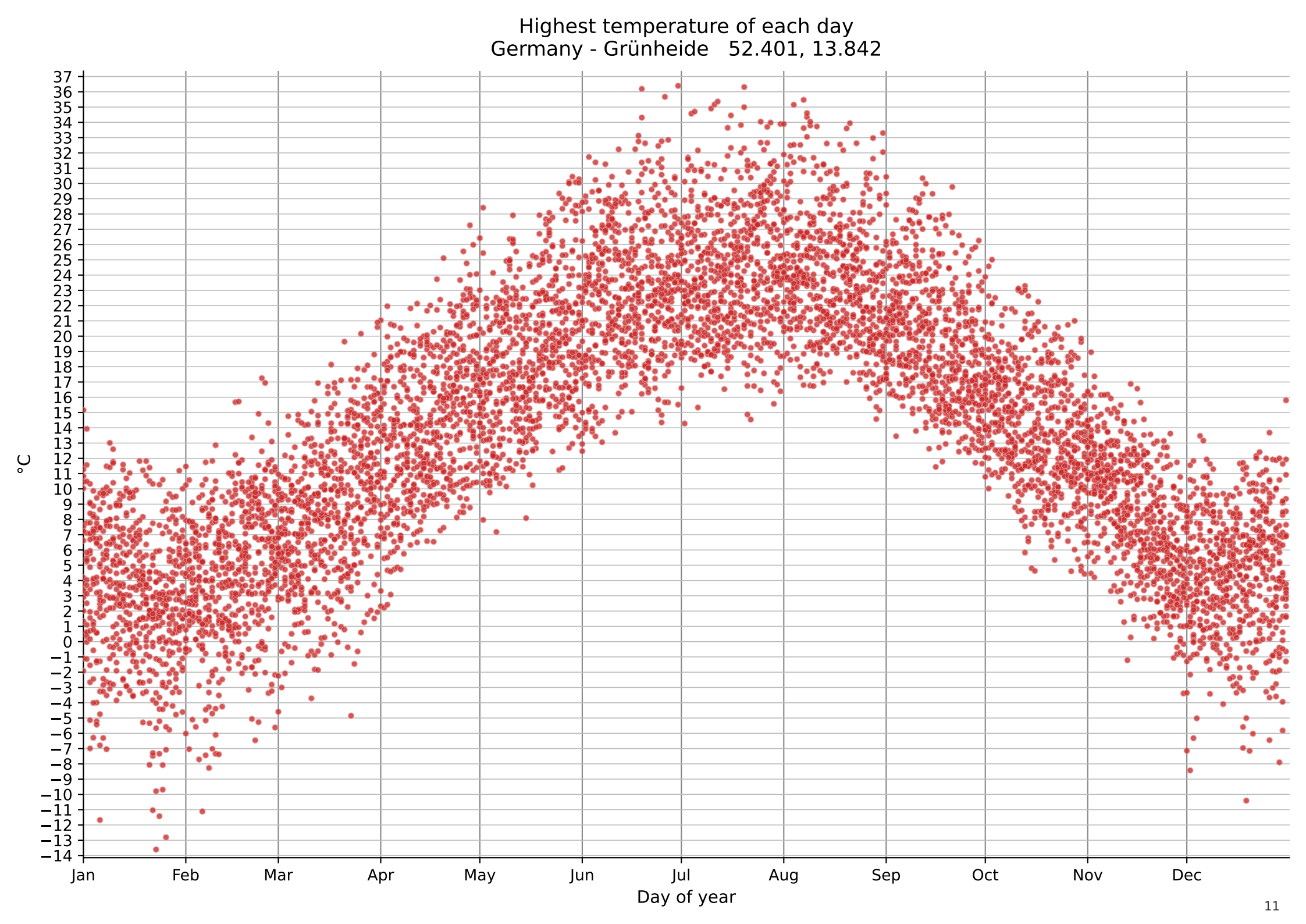

Yield distribution for each day — Wh / Wp of all PV together
Germany - Grünheide 52.401, 13.842
Wh / Wp
0
1
2
3
4
5
6
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

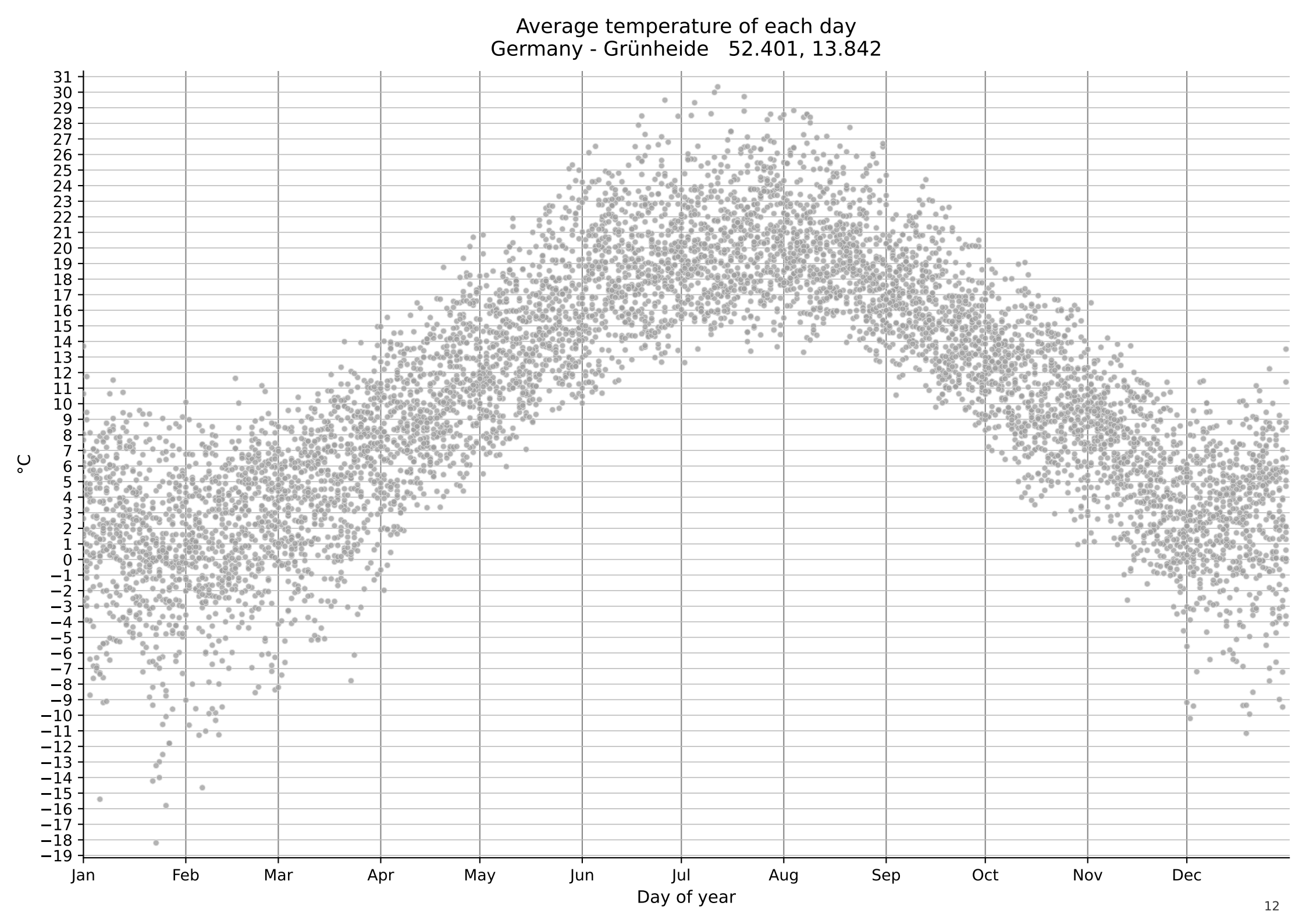

Yield distribution for each day — Wh / Wp of all PV together — 00:00–09:00
Germany - Grünheide 52.401, 13.842
1.0
0.8
0.6
0.4
0.2
0.0
Wh / Wp
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

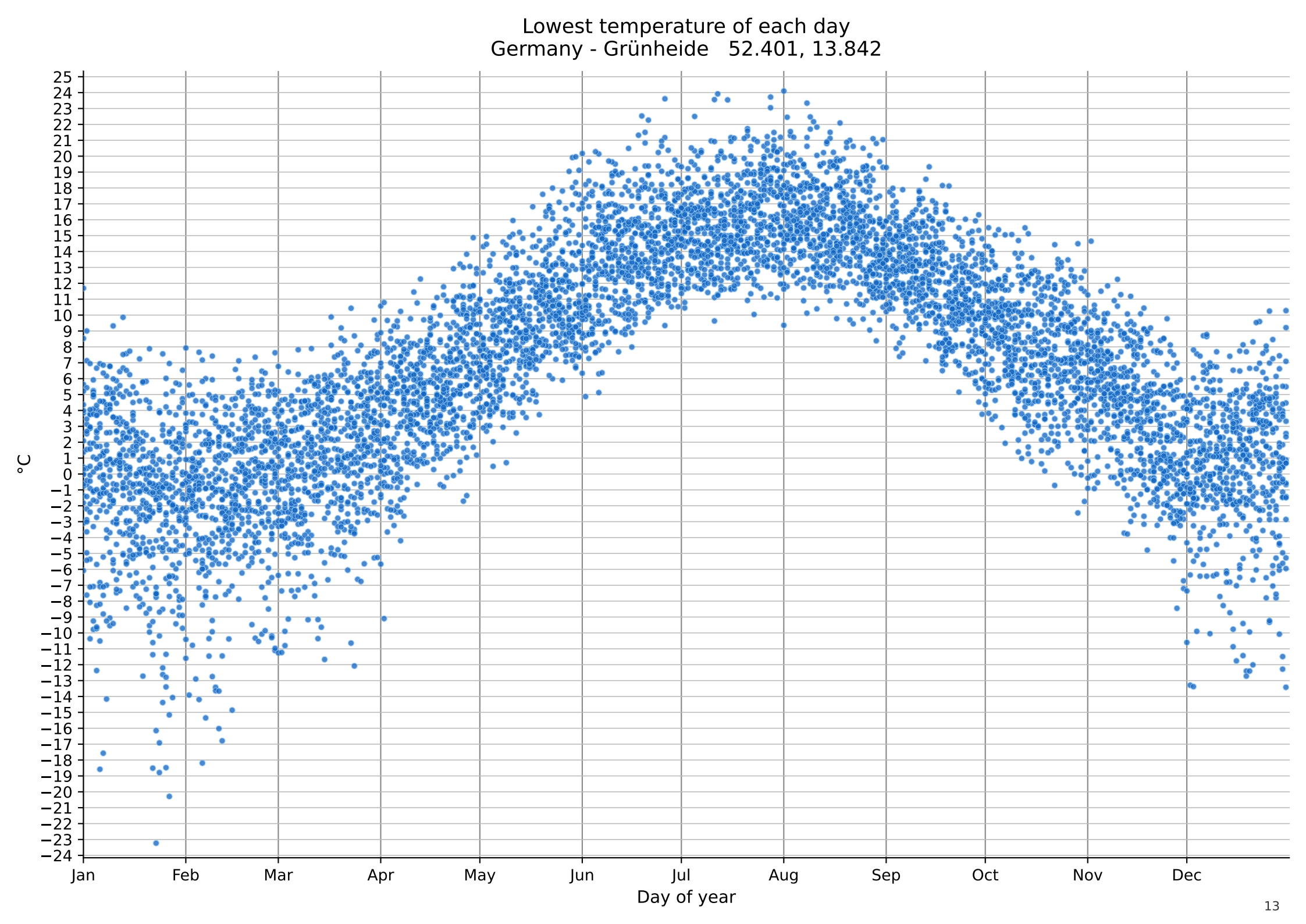

Yield distribution for each day — Wh / Wp of all PV together — 15:00–23:59
Germany - Grünheide 52.401, 13.842
Wh / Wp
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

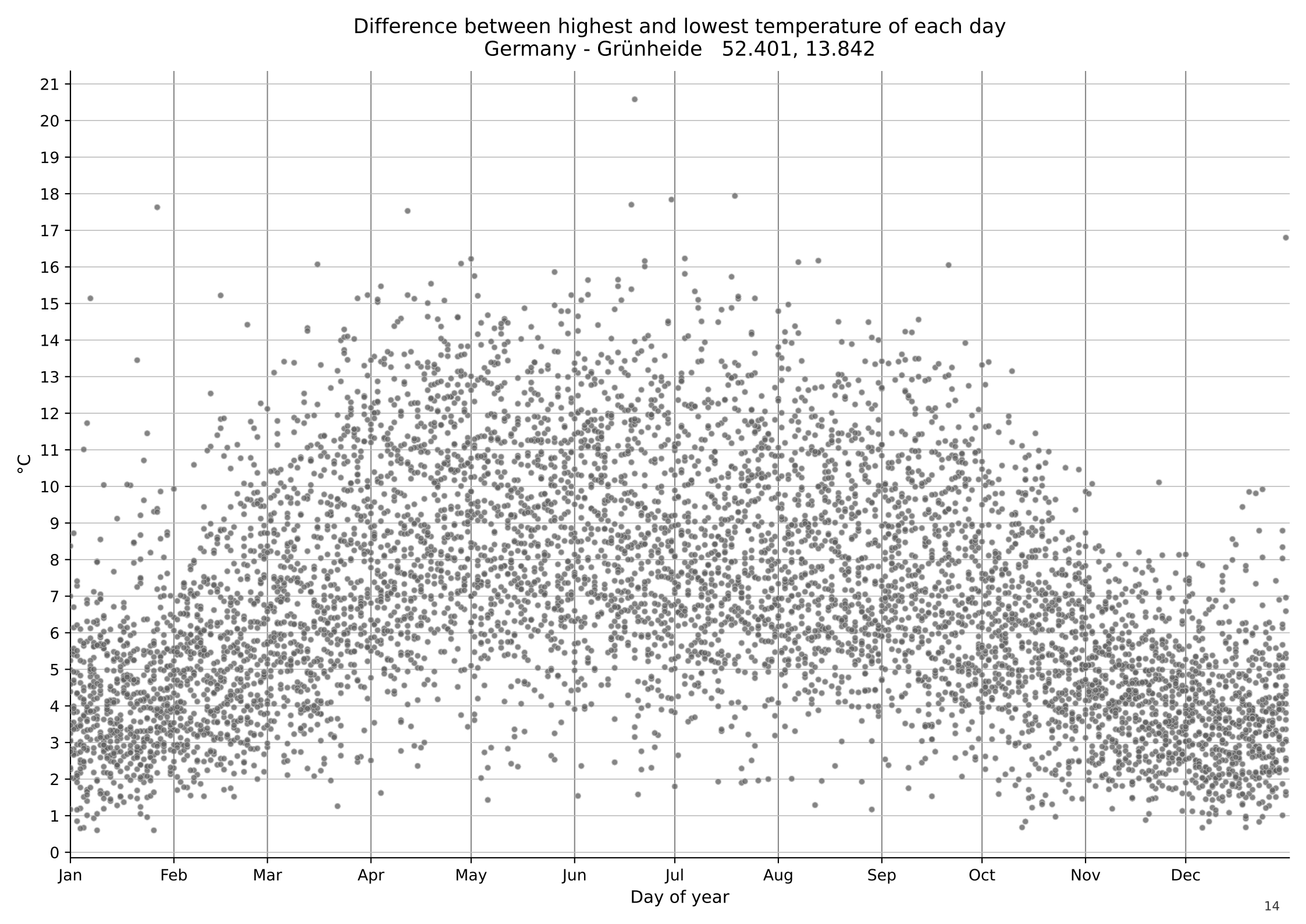

Share of the day’s yield in 09:00–15:00 winter time
Germany - Grünheide 52.401, 13.842
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Share of the day’s yield outside 09:00–15:00 winter time
Germany - Grünheide 52.401, 13.842
%
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
Germany - Grünheide 52.401, 13.842
°C
37
36
35
34
33
32
31
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
−10
−11
−12
−13
−14
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Average temperature of each day
Germany - Grünheide 52.401, 13.842
°C
31
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
−10
−11
−12
−13
−14
−15
−16
−17
−18
−19
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Lowest temperature of each day
Germany - Grünheide 52.401, 13.842
°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
−12
−13
−14
−15
−16
−17
−18
−19
−20
−21
−22
−23
−24
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Difference between highest and lowest temperature of each day
Germany - Grünheide 52.401, 13.842
°C
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year

Monthly and yearly specific yield (kWh/kWp = Wh/Wp)
Germany - Grünheide 52.401, 13.842

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	Garage roof 1°/0° 10,740 Wp	Garage side wall south 90°/0° 3,475 Wp	All together
January	Maximum	20.16	18.91	3.76	3.76	19.70	3.76	14.40
	average	14.84	14.23	3.30	3.30	14.72	3.30	11.10
	minimum	10.53	11.23	2.31	2.31	11.07	2.31	8.25
February	Maximum	44.95	41.24	7.15	7.15	43.98	7.15	31.60
	average	30.54	29.64	5.98	5.98	30.56	5.98	22.64
	minimum	21.53	19.68	5.16	5.16	20.52	5.16	16.16
March	Maximum	87.48	84.29	23.43	13.84	88.81	23.43	63.30
	average	62.69	61.94	18.39	12.22	64.12	18.39	47.67
	minimum	49.45	47.99	14.69	10.63	50.29	14.69	38.37
April	Maximum	124.16	123.55	77.10	21.79	128.82	77.10	98.74
	average	100.05	97.80	60.12	19.65	102.54	60.12	80.08
	minimum	81.51	79.77	45.74	15.53	83.24	45.74	65.66
May	Maximum	153.12	144.55	88.40	30.15	155.08	88.40	120.65
	average	121.83	118.06	71.07	26.56	124.57	71.07	98.63
	minimum	73.62	76.00	42.22	23.70	77.15	42.22	62.65
June	Maximum	152.64	151.42	78.56	30.50	159.19	78.56	121.81
	average	126.50	124.72	66.05	28.34	130.75	66.05	102.32
	minimum	107.53	101.58	56.73	25.71	108.35	56.73	86.67
July	Maximum	150.14	145.20	81.86	32.29	154.39	81.86	119.94
	average	122.45	121.02	67.93	29.21	126.71	67.93	100.06
	minimum	98.44	99.71	54.22	25.66	102.62	54.22	81.46
August	Maximum	122.23	123.81	83.09	25.32	128.99	83.09	100.54
	average	105.74	103.17	65.77	22.56	108.33	65.77	85.77
	minimum	90.42	87.59	53.88	19.70	91.99	53.88	73.47
September	Maximum	91.39	88.12	39.64	16.45	91.99	39.64	68.48
	average	77.01	74.54	32.67	14.24	78.25	32.67	59.05
	minimum	61.07	59.22	25.89	12.66	61.52	25.89	47.58
October	Maximum	52.17	60.38	8.98	8.96	56.82	8.98	40.79
	average	43.03	42.25	8.45	8.43	43.55	8.45	32.13
	minimum	27.53	26.07	7.12	7.11	27.43	7.12	20.90
November	Maximum	27.57	28.14	4.46	4.46	28.14	4.46	20.33
	average	18.38	18.37	3.97	3.97	18.60	3.97	13.99
	minimum	13.22	12.66	3.47	3.47	13.26	3.47	10.20
December	Maximum	14.22	13.28	2.90	2.90	13.94	2.90	10.43
	average	11.33	11.43	2.49	2.49	11.35	2.49	8.70
	minimum	8.09	7.87	2.07	2.07	7.96	2.07	6.20
All years	Maximum	910.7	895.0	444.0	183.6	936.4	444.0	718.5
	average	834.4	817.2	406.2	176.9	854.0	406.2	662.1
	minimum	780.8	761.3	379.0	168.8	796.6	379.0	621.3

Highest combined yield hour: 2023-05-08 10:11 UTC 42,036.6 W (0.555 W/Wp) of 75,770 Wp installed. Use this hour to size battery charge power.

Monthly and yearly specific yield (kWh/kWp = Wh/Wp)
Germany - Grünheide 52.401, 13.842

Month / year		Garage side wall north 90°/180° 3,475 Wp	Garage door side west 90°/90° 700 Wp	Garage back side east 90°/-90° 2,540 Wp	Garden fence east 90°/-90° + 90°/90° 6000 Wp bifacial ×80%	All together
January	Maximum	3.76	4.73	4.23	7.94	14.40
	average	3.30	4.18	3.66	7.00	11.10
	minimum	2.31	2.90	2.56	4.87	8.25
February	Maximum	7.15	9.06	7.81	14.81	31.60
	average	5.98	7.70	6.64	12.80	22.64
	minimum	5.16	6.55	5.76	11.00	16.16
March	Maximum	13.84	16.65	15.82	28.78	63.30
	average	12.22	15.28	14.45	26.68	47.67
	minimum	10.63	13.99	12.99	24.18	38.37
April	Maximum	21.79	31.26	31.26	54.72	98.74
	average	19.65	28.57	28.84	51.70	80.08
	minimum	15.53	25.96	25.45	46.21	65.66
May	Maximum	30.15	48.05	48.50	85.61	120.65
	average	26.56	41.24	43.17	76.17	98.63
	minimum	23.70	30.17	29.96	54.10	62.65
June	Maximum	30.50	47.81	46.95	84.23	121.81
	average	28.34	43.37	43.49	78.19	102.32
	minimum	25.71	39.59	40.50	72.33	86.67
July	Maximum	32.29	46.98	50.06	87.64	119.94
	average	29.21	42.92	44.18	78.52	100.06
	minimum	25.66	36.25	35.22	64.23	81.46
August	Maximum	25.32	37.90	38.32	68.24	100.54
	average	22.56	34.17	34.63	61.96	85.77
	minimum	19.70	30.59	31.57	56.06	73.47
September	Maximum	16.45	19.45	21.36	36.76	68.48
	average	14.24	17.44	18.49	32.44	59.05
	minimum	12.66	16.12	16.69	29.73	47.58
October	Maximum	8.96	10.30	11.25	19.45	40.79
	average	8.43	9.59	10.33	18.01	32.13
	minimum	7.11	7.83	8.16	14.43	20.90
November	Maximum	4.46	5.37	5.77	10.06	20.33
	average	3.97	4.68	5.02	8.77	13.99
	minimum	3.47	4.01	4.29	7.50	10.20
December	Maximum	2.90	3.31	4.56	7.10	10.43
	average	2.49	2.90	3.60	5.92	8.70
	minimum	2.07	2.35	2.54	4.42	6.20
All years	Maximum	183.6	262.2	269.1	478.9	718.5
	average	176.9	252.0	256.5	458.2	662.1
	minimum	168.8	241.6	247.2	441.2	621.3

Highest combined yield hour: 2023-05-08 10:11 UTC 42,036.6 W (0.555 W/Wp) of 75,770 Wp installed. Use this hour to size battery charge power.

Monthly and yearly total yield (kWh)
Germany - Grünheide 52.401, 13.842

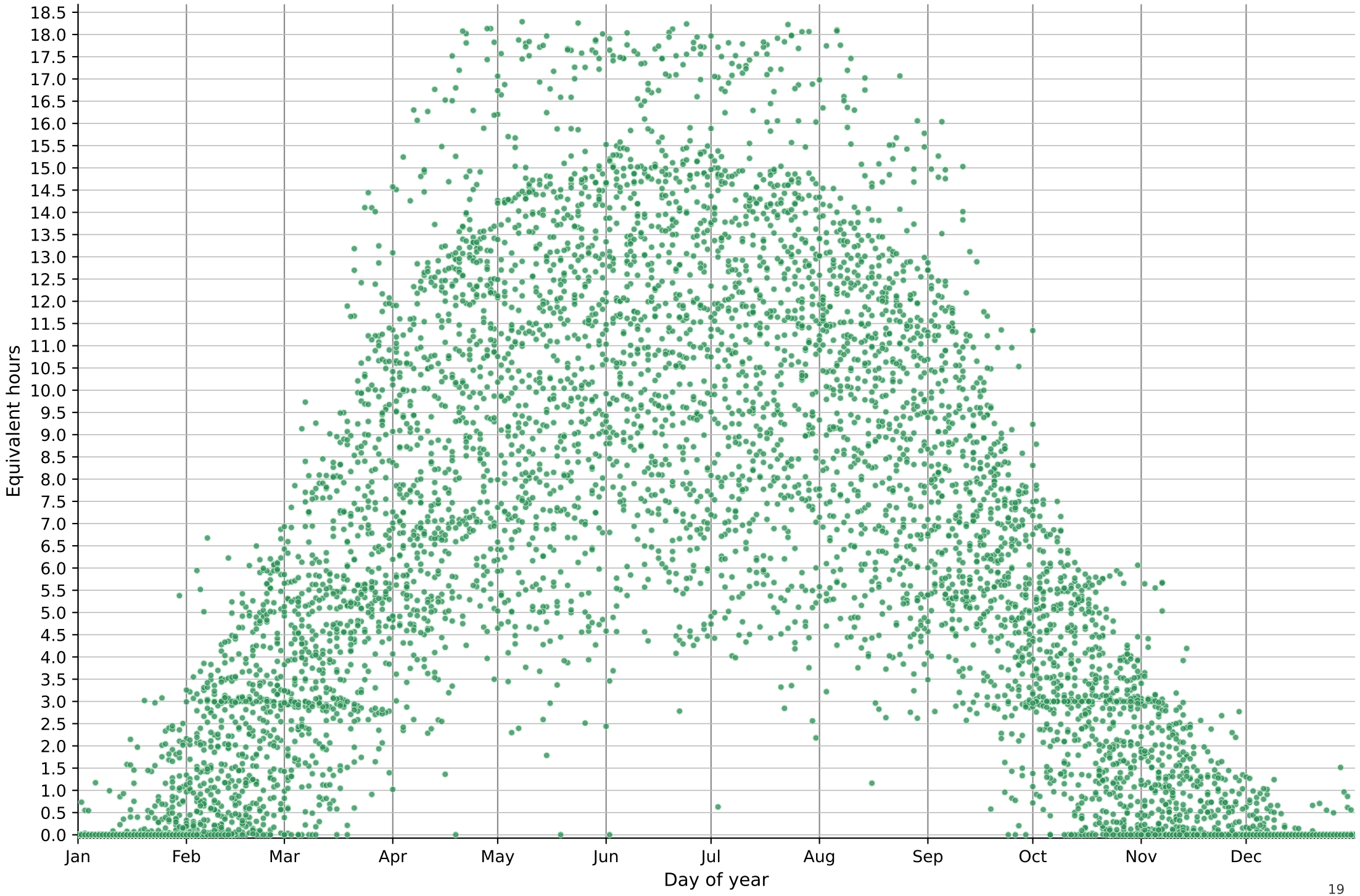
Month / year		Roof East 22°/-90° 19,800 Wp	Roof West 22°/90° 19,800 Wp	Terrace railing south 90°/0° 4,620 Wp	Terrace railing north 90°/180° 4,620 Wp	Garage roof 1°/0° 10,740 Wp	Garage side wall south 90°/0° 3,475 Wp	All together
January	Maximum	399.14	374.41	17.38	17.38	211.54	13.07	1,090.73
	average	293.79	281.81	15.23	15.23	158.05	11.46	841.24
	minimum	208.40	222.37	10.66	10.66	118.94	8.02	624.84
February	Maximum	889.96	816.47	33.02	33.02	472.33	24.84	2,394.09
	average	604.64	586.80	27.61	27.61	328.18	20.77	1,715.46
	minimum	426.38	389.67	23.83	23.83	220.43	17.92	1,224.71
March	Maximum	1,732.12	1,668.87	108.26	63.92	953.79	81.43	4,796.52
	average	1,241.30	1,226.39	84.97	56.46	688.68	63.91	3,611.65
	minimum	979.20	950.17	67.86	49.09	540.14	51.04	2,907.60
April	Maximum	2,458.38	2,446.22	356.19	100.68	1,383.52	267.91	7,481.30
	average	1,981.03	1,936.49	277.75	90.77	1,101.28	208.91	6,067.99
	minimum	1,613.96	1,579.52	211.33	71.75	894.02	158.95	4,975.09
May	Maximum	3,031.83	2,862.00	408.42	139.29	1,665.55	307.20	9,141.48
	average	2,412.24	2,337.59	328.36	122.68	1,337.87	246.98	7,473.51
	minimum	1,457.76	1,504.79	195.04	109.49	828.59	146.70	4,747.24
June	Maximum	3,022.32	2,998.12	362.95	140.90	1,709.65	273.00	9,229.79
	average	2,504.80	2,469.51	305.13	130.93	1,404.30	229.51	7,752.62
	minimum	2,129.02	2,011.32	262.11	118.78	1,163.70	197.15	6,567.28
July	Maximum	2,972.70	2,875.05	378.20	149.18	1,658.13	284.47	9,087.65
	average	2,424.43	2,396.29	313.83	134.96	1,360.82	236.05	7,581.28
	minimum	1,949.02	1,974.22	250.51	118.56	1,102.10	188.43	6,172.21
August	Maximum	2,420.14	2,451.40	383.85	117.00	1,385.31	288.72	7,618.02
	average	2,093.73	2,042.68	303.86	104.21	1,163.50	228.55	6,498.53
	minimum	1,790.31	1,734.23	248.93	91.02	988.01	187.24	5,566.51
September	Maximum	1,809.47	1,744.70	183.11	76.01	988.01	137.73	5,188.47
	average	1,524.78	1,475.79	150.93	65.81	840.38	113.53	4,474.51
	minimum	1,209.18	1,172.59	119.63	58.47	660.70	89.98	3,605.08
October	Maximum	1,032.87	1,195.55	41.50	41.38	610.20	31.22	3,090.88
	average	852.07	836.62	39.05	38.96	467.71	29.37	2,434.12
	minimum	545.19	516.15	32.89	32.85	294.64	24.74	1,583.93
November	Maximum	545.85	557.23	20.58	20.58	302.24	15.48	1,540.33
	average	363.99	363.67	18.35	18.35	199.74	13.80	1,060.37
	minimum	261.80	250.62	16.02	16.02	142.38	12.05	772.97
December	Maximum	281.50	262.91	13.38	13.38	149.71	10.07	790.43
	average	224.30	226.37	11.48	11.48	121.86	8.64	659.45
	minimum	160.12	155.76	9.57	9.57	85.46	7.20	469.52
All years	Maximum	18,031.7	17,721.9	2,051.1	848.3	10,057.3	1,542.8	54,439.1
	average	16,521.1	16,180.0	1,876.6	817.5	9,172.4	1,411.5	50,170.7
	minimum	15,459.1	15,073.1	1,750.8	780.0	8,555.5	1,316.9	47,078.4

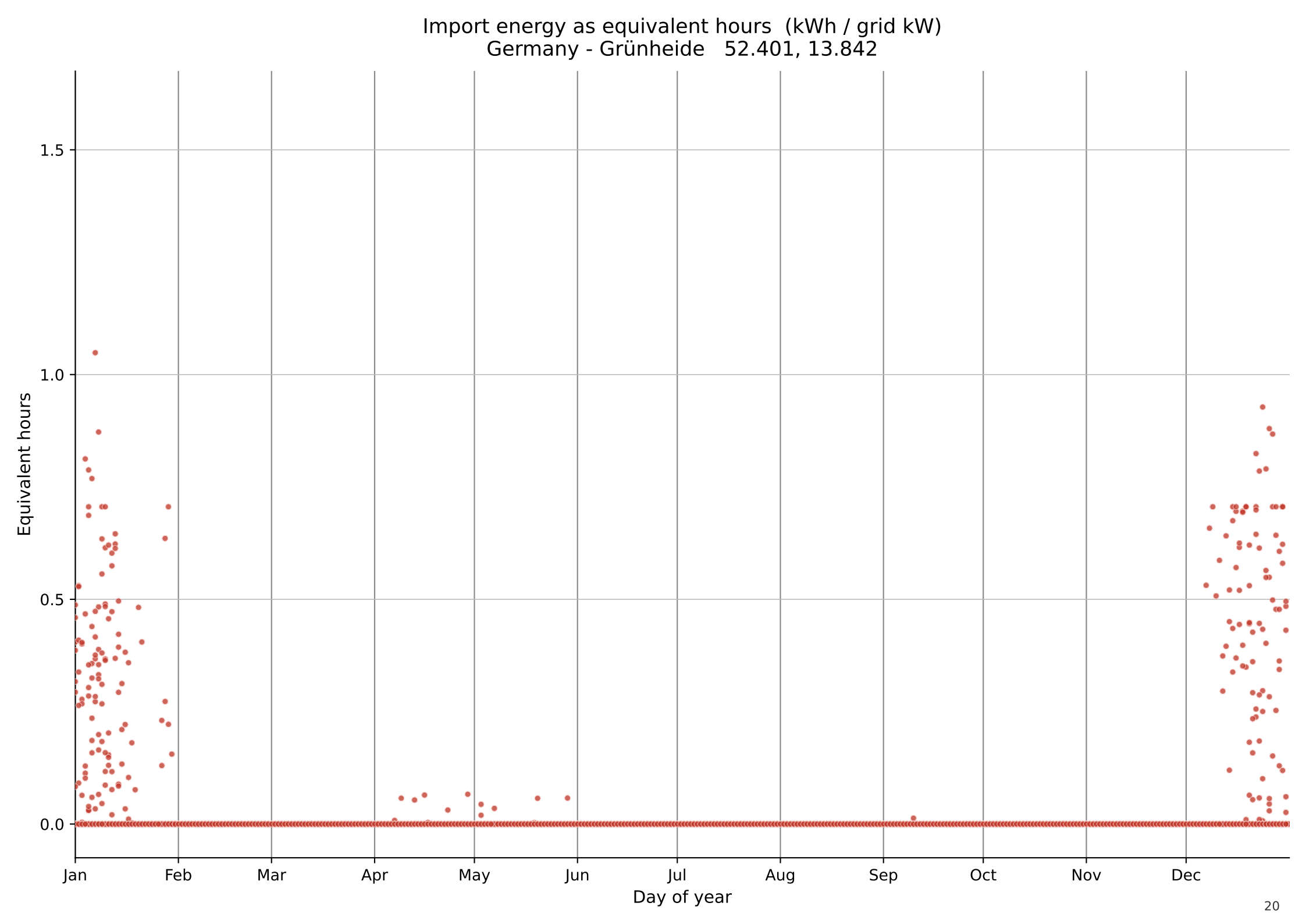
Highest combined yield hour: 2023-05-08 10:11 UTC 42,036.6 W (0.555 W/Wp) of 75,770 Wp installed. Use this hour to size battery charge power.

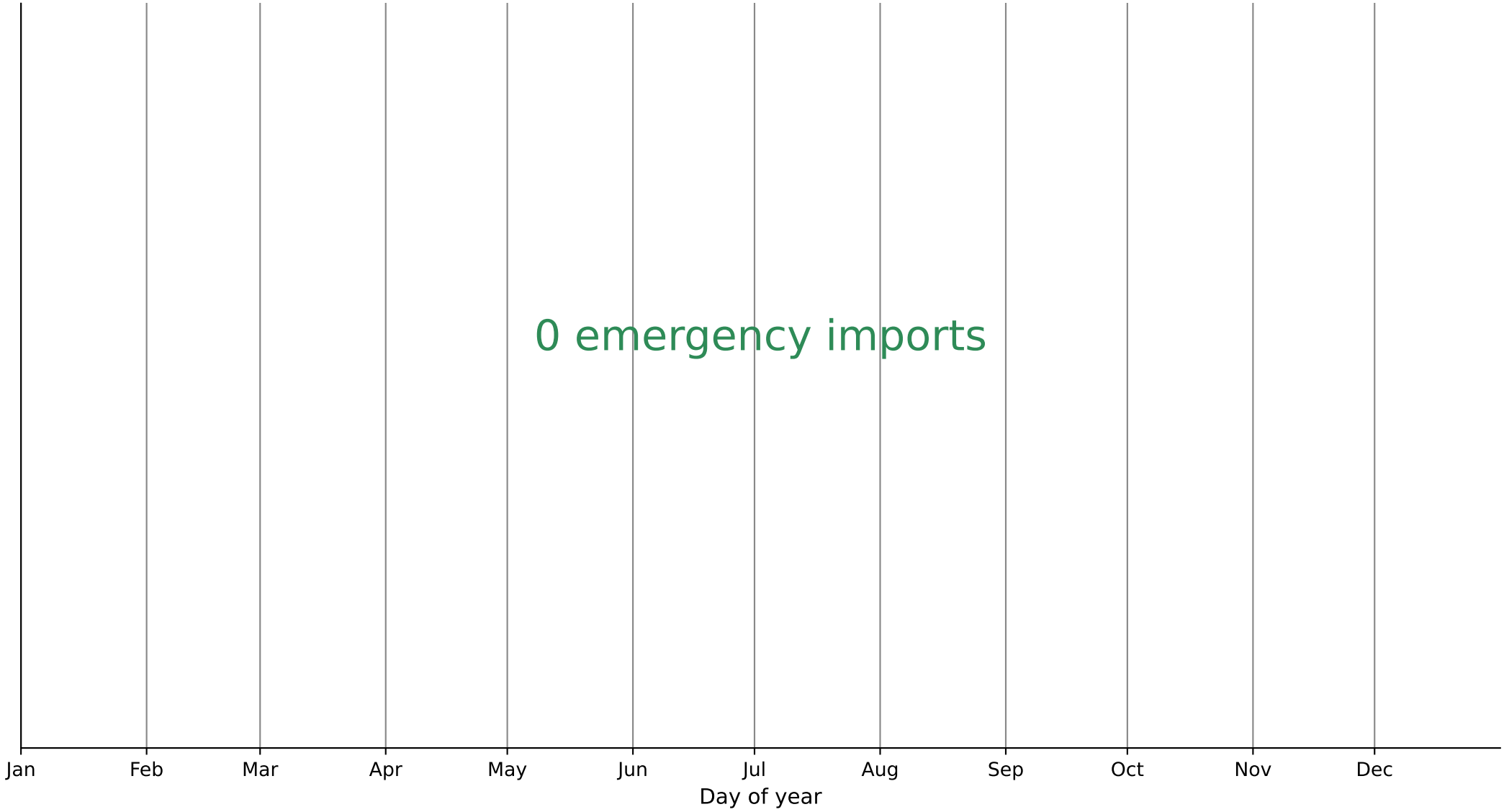
Monthly and yearly total yield (kWh)
Germany - Grünheide 52.401, 13.842

Month / year		Garage side wall north 90°/180° 3,475 Wp	Garage door side west 90°/90° 700 Wp	Garage back side east 90°/-90° 2,540 Wp	Garden fence east 90°/-90° + 90°/90° 6000 Wp bifacial ×80%	All together
January	Maximum	13.07	3.31	10.73	47.66	1,090.73
	average	11.46	2.92	9.29	42.00	841.24
	minimum	8.02	2.03	6.49	29.25	624.84
February	Maximum	24.84	6.34	19.85	88.88	2,394.09
	average	20.77	5.39	16.88	76.81	1,715.46
	minimum	17.92	4.59	14.62	65.99	1,224.71
March	Maximum	48.08	11.66	40.19	172.69	4,796.52
	average	42.47	10.70	36.70	160.06	3,611.65
	minimum	36.93	9.79	32.99	145.06	2,907.60
April	Maximum	75.73	21.88	79.40	328.31	7,481.30
	average	68.28	20.00	73.27	310.22	6,067.99
	minimum	53.97	18.17	64.64	277.28	4,975.09
May	Maximum	104.77	33.63	123.18	513.69	9,141.48
	average	92.28	28.87	109.66	456.99	7,473.51
	minimum	82.36	21.12	76.10	324.59	4,747.24
June	Maximum	105.98	33.47	119.26	505.38	9,229.79
	average	98.48	30.36	110.47	469.13	7,752.62
	minimum	89.34	27.71	102.88	433.98	6,567.28
July	Maximum	112.21	32.89	127.16	525.87	9,087.65
	average	101.51	30.05	112.22	471.11	7,581.28
	minimum	89.18	25.38	89.47	385.36	6,172.21
August	Maximum	88.00	26.53	97.33	409.41	7,618.02
	average	78.38	23.92	87.95	371.76	6,498.53
	minimum	68.46	21.41	80.19	336.36	5,566.51
September	Maximum	57.17	13.62	54.25	220.57	5,188.47
	average	49.50	12.21	46.96	194.63	4,474.51
	minimum	43.98	11.29	42.38	178.39	3,605.08
October	Maximum	31.12	7.21	28.59	116.70	3,090.88
	average	29.31	6.72	26.25	108.06	2,434.12
	minimum	24.71	5.48	20.73	86.55	1,583.93
November	Maximum	15.48	3.76	14.66	60.39	1,540.33
	average	13.80	3.28	12.76	52.63	1,060.37
	minimum	12.05	2.80	10.91	44.99	772.97
December	Maximum	10.07	2.32	11.58	42.62	790.43
	average	8.64	2.03	9.14	35.50	659.45
	minimum	7.20	1.65	6.45	26.53	469.52
All years	Maximum	638.1	183.6	683.5	2,873.2	54,439.1
	average	614.9	176.4	651.5	2,748.9	50,170.7
	minimum	586.7	169.1	627.8	2,647.5	47,078.4

Highest combined yield hour: 2023-05-08 10:11 UTC 42,036.6 W (0.555 W/Wp) of 75,770 Wp installed. Use this hour to size battery charge power.


Export energy as equivalent hours (kWh / grid kW)
Germany - Grünheide 52.401, 13.842
Equivalent hours
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)
Germany - Grünheide 52.401, 13.842
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 = 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
Germany - Grünheide 52.401, 13.842

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export to grid													
month Maximum	259	1,567	3,836	5,694	6,562	6,526	6,711	5,860	4,233	2,264	753	92	39,497
month average	93	988	2,767	4,673	5,565	5,804	5,799	5,180	3,556	1,626	363	26	36,440
month minimum	0	551	2,122	3,720	3,640	5,072	4,626	4,425	2,700	840	147	0	33,674
day Maximum	91.4	116.8	245.5	308.3	310.9	310.0	309.8	307.8	272.7	192.8	96.5	25.8	310.9
day average	3.0	35.0	89.3	155.8	179.5	193.5	187.1	167.1	118.5	52.4	12.1	0.8	99.8
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	10.7	19.7	0.0	0.0	0.0	0.0	0.0
Import from grid													
month Maximum	104	0	0	2	1	0	0	0	0	0	0	170	184
month average	35	0	0	0	0	0	0	0	0	0	0	38	74
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	17.8	0.0	0.0	1.1	1.0	0.0	0.0	0.0	0.2	0.0	0.0	15.8	17.8
day average	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	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
Total energy used for house													
month Maximum	738	660	698	602	574	512	511	511	531	607	627	723	7,124
month average	676	611	644	572	546	492	495	495	509	581	609	660	6,889
month minimum	639	581	616	540	518	471	482	477	479	557	593	621	6,776
day Maximum	27.3	26.3	24.5	22.6	22.0	22.1	21.1	20.1	19.6	21.7	23.3	25.2	27.3
day average	21.8	21.6	20.8	19.1	17.6	16.4	16.0	16.0	17.0	18.7	20.3	21.3	18.9
day minimum	15.9	18.7	17.5	15.4	15.3	15.3	15.2	15.2	15.2	16.1	16.9	17.9	15.2

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
Germany - Grünheide 52.401, 13.842

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export													
month Maximum	55	301	566	578	617	588	615	610	543	419	155	19	4,609
month average	18	188	448	529	563	562	581	572	492	300	74	5	4,332
month minimum	0	108	378	462	451	522	507	525	403	153	27	0	4,039
day Maximum	19.8	23.5	29.8	29.3	29.9	29.7	32.1	30.2	28.8	26.5	21.2	5.7	32.1
day average	0.6	6.6	14.4	17.6	18.2	18.7	18.7	18.4	16.4	9.7	2.5	0.2	11.9
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.4	0.0	0.0	0.0	0.0	0.0
Import													
month Maximum	24	0	0	1	0	0	0	0	0	0	0	40	43
month average	8	0	0	0	0	0	0	0	0	0	0	9	17
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	4.5	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.1	0.0	0.0	3.9	4.5
day average	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	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
Peak grid fee													
month Maximum	13	0	0	7	6	0	0	0	1	0	0	13	32
month average	11	0	0	1	1	0	0	0	0	0	0	8	21
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
Import incl. peak fee													
month Maximum	37	0	0	8	6	0	0	0	1	0	0	52	68
month average	19	0	0	1	1	0	0	0	0	0	0	17	38
month minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
day Maximum	4.5	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.1	0.0	0.0	3.9	4.5
day average	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	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
Balance													
month Maximum	55	301	566	578	613	588	615	610	543	419	155	19	4,541
month average	-0	188	448	528	562	562	581	572	492	300	74	-11	4,294
month minimum	-24	108	378	462	445	522	507	525	403	153	27	-52	4,018
day Maximum	19.8	23.5	29.8	29.3	29.9	29.7	32.1	30.2	28.8	26.5	21.2	5.7	32.1
day average	0.3	6.6	14.4	17.6	18.2	18.7	18.7	18.4	16.4	9.7	2.5	-0.1	11.8
day minimum	-4.5	0.0	0.0	0.0	0.0	0.0	1.3	2.4	0.0	0.0	0.0	-3.9	-4.5

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
Germany - Grünheide 52.401, 13.842

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Export total													
month Maximum	259	1,567	3,836	5,694	6,562	6,526	6,711	5,860	4,233	2,264	753	92	39,497
month average	93	988	2,767	4,673	5,565	5,804	5,799	5,180	3,556	1,626	363	26	36,440
month minimum	0	551	2,122	3,720	3,640	5,072	4,626	4,425	2,700	840	147	0	33,674
day Maximum	91.4	116.8	245.5	308.3	310.9	310.0	309.8	307.8	272.7	192.8	96.5	25.8	310.9
day average	3.0	35.0	89.3	155.8	179.5	193.5	187.1	167.1	118.5	52.4	12.1	0.8	99.8
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	10.7	19.7	0.0	0.0	0.0	0.0	0.0
Export during high price hours													
month Maximum	249	1,401	2,185	2,027	1,931	1,780	1,954	2,087	2,232	2,027	749	92	16,927
month average	87	901	1,940	1,889	1,780	1,676	1,804	1,960	2,066	1,488	356	26	15,974
month minimum	0	465	1,693	1,778	1,654	1,572	1,666	1,857	1,822	776	136	0	14,834
day Maximum	89.0	102.0	98.5	94.4	93.4	90.4	94.7	94.0	98.6	98.6	96.2	25.8	102.0
day average	2.8	31.9	62.6	63.0	57.4	55.9	58.2	63.2	68.9	48.0	11.9	0.8	43.7
day minimum	0.0	0.0	0.0	0.0	0.0	0.0	10.7	19.7	0.0	0.0	0.0	0.0	0.0
Export during medium price hours													
month Maximum	17	166	1,624	3,288	3,979	4,093	4,191	3,356	1,988	283	31	2	19,721
month average	5	87	790	2,462	3,215	3,477	3,455	2,881	1,417	138	7	0	17,935
month minimum	0	38	308	1,761	1,662	3,004	2,513	2,208	777	49	1	0	16,014
day Maximum	4.1	23.8	167.0	203.0	203.7	203.9	202.3	203.3	185.9	122.3	6.4	2.4	203.9
day average	0.2	3.1	25.5	82.1	103.7	115.9	111.5	92.9	47.2	4.4	0.2	0.0	49.1
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
Export during low price hours													
month Maximum	0	0	99	600	930	850	854	487	138	0	0	0	3,095
month average	0	0	37	323	570	651	540	339	72	0	0	0	2,532
month minimum	0	0	0	96	172	312	271	196	32	0	0	0	2,094
day Maximum	0.0	0.0	26.2	51.0	65.0	68.0	61.8	51.0	34.0	0.0	0.0	0.0	68.0
day average	0.0	0.0	1.2	10.8	18.4	21.7	17.4	11.0	2.4	0.0	0.0	0.0	6.9
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
Germany - Grünheide 52.401, 13.842

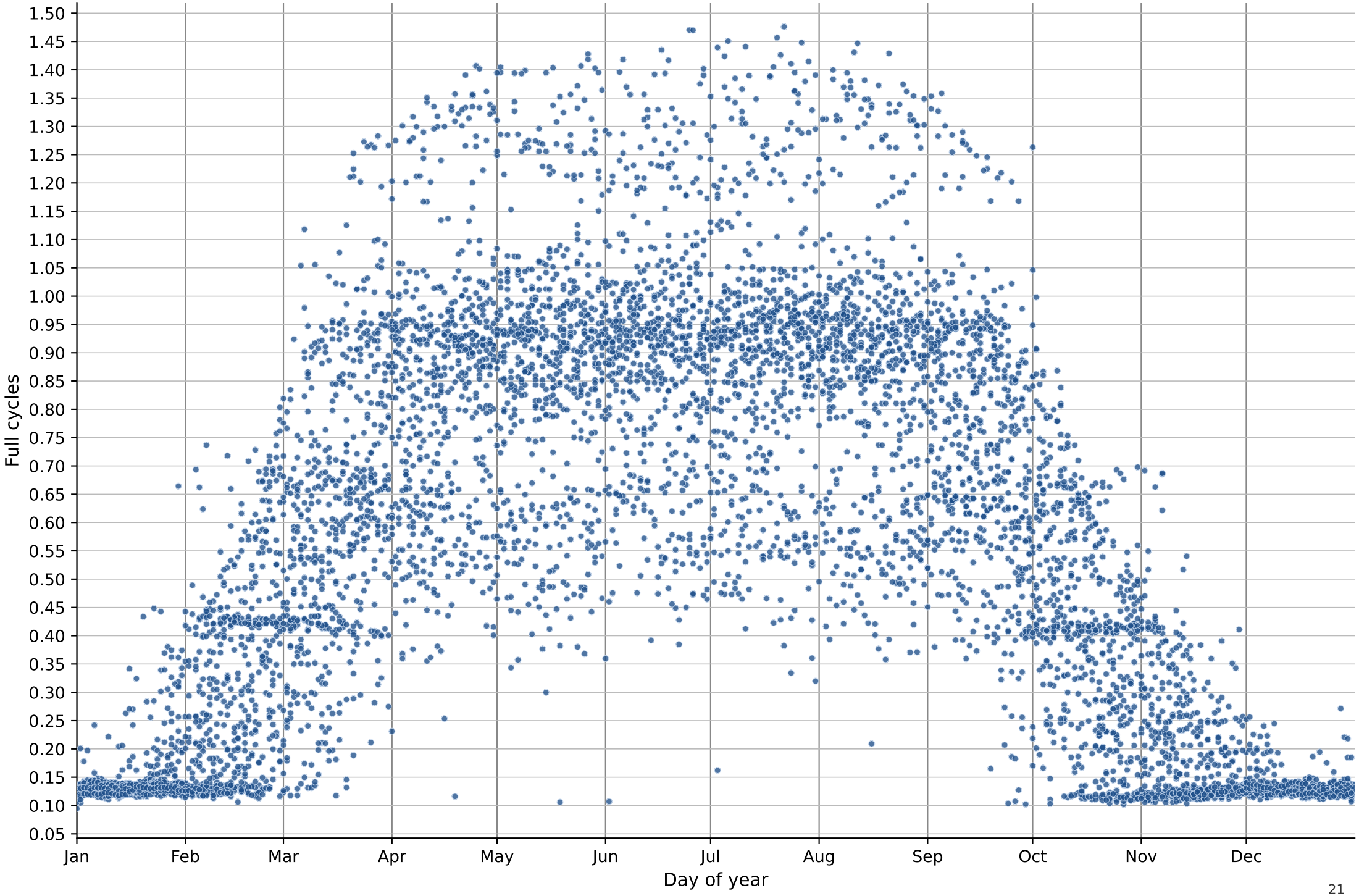
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Heating													
month Maximum	246	199	205	130	89	47	34	34	67	120	154	234	1,412
month average	184	163	152	103	64	29	20	19	47	95	136	171	1,182
month minimum	147	133	125	73	40	10	4	3	20	74	121	133	1,076
day Maximum	11.4	10.4	8.6	6.9	6.4	6.5	5.8	4.7	4.1	6.0	7.5	9.4	11.4
day average	5.9	5.8	4.9	3.4	2.1	1.0	0.6	0.6	1.6	3.1	4.5	5.5	3.2
day minimum	0.0	3.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.4	2.3	0.0
Cooling													
month Maximum	0	0	0	0	0	1	7	6	1	0	0	0	9
month average	0	0	0	0	0	0	1	1	0	0	0	0	2
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	1.3	3.0	3.0	1.1	0.0	0.0	0.0	3.0
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	59	55	59	52	51	45	42	42	44	54	53	55	600
month average	59	53	58	50	48	43	40	41	42	52	53	55	592
month minimum	58	52	57	47	45	40	38	39	39	49	52	55	581
day Maximum	1.9	1.9	1.9	1.8	1.8	1.7	1.6	1.5	1.6	1.8	1.8	1.8	1.9
day average	1.9	1.9	1.9	1.7	1.5	1.4	1.3	1.3	1.4	1.7	1.8	1.8	1.6
day minimum	1.7	1.7	1.6	1.3	1.3	1.3	1.2	1.2	1.2	1.4	1.5	1.6	1.2
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

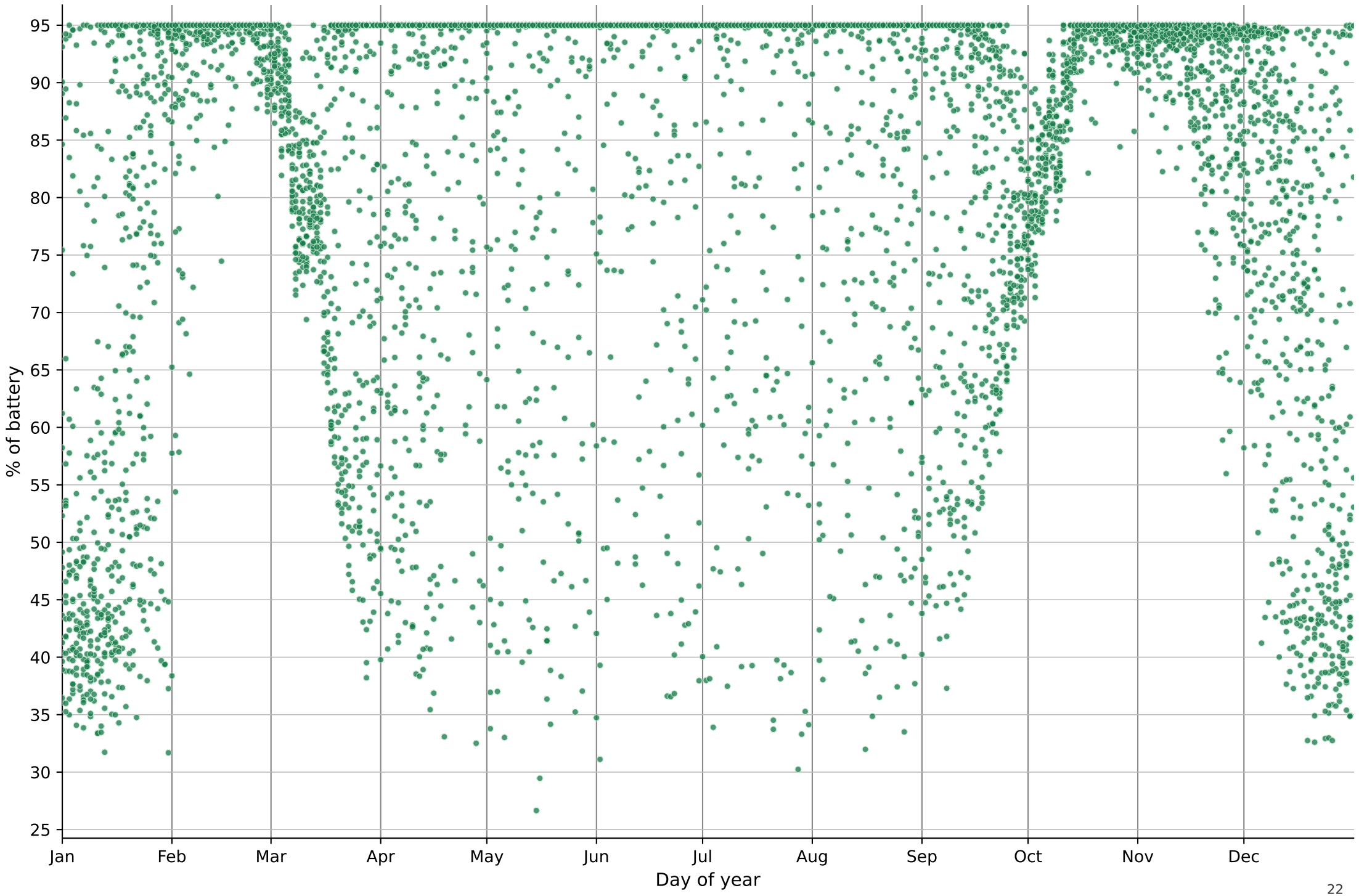
Heating, cooling and DHW are electricity. Direct electric is the part the heat pump could not cover.

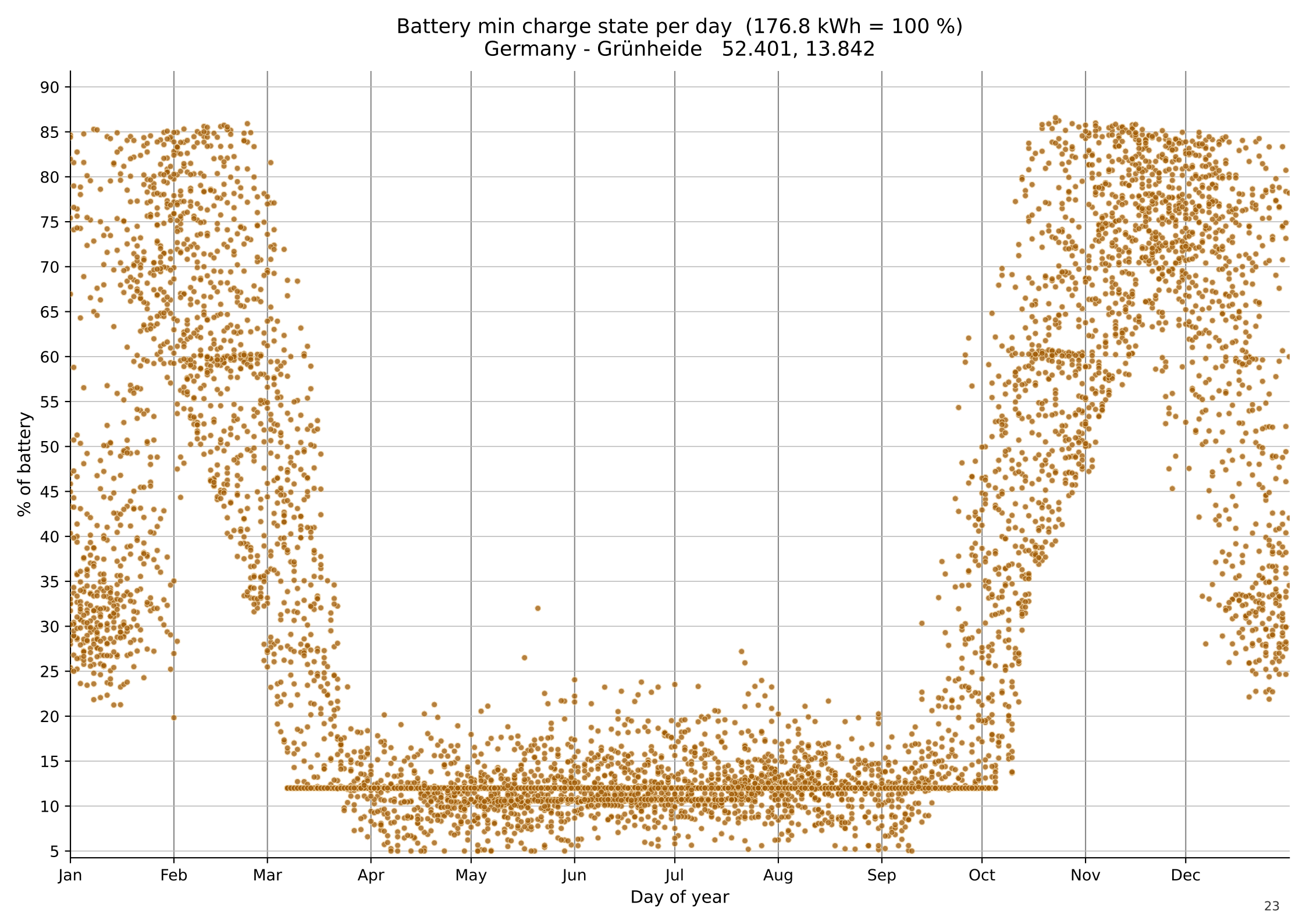
Battery
Germany - Grünheide 52.401, 13.842

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Wasted													
month Maximum	0	0	28	871	1,645	1,760	1,454	866	79	0	0	0	5,143
month average	0	0	8	452	966	1,076	884	454	43	0	0	0	3,883
month minimum	0	0	0	157	263	601	599	231	9	0	0	0	3,136
day Maximum	0.0	0.0	12.2	119.7	152.0	142.5	134.1	102.7	38.6	0.0	0.0	0.0	152.0
day average	0.0	0.0	0.3	15.1	31.2	35.9	28.5	14.6	1.4	0.0	0.0	0.0	10.6
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	6	12	25	27	29	28	29	29	25	16	8	4	222
month average	5	9	19	25	27	27	28	27	22	13	6	4	212
month minimum	4	6	16	23	22	26	23	25	18	8	4	4	200
day Maximum	0.7	0.8	1.3	1.4	1.4	1.5	1.5	1.4	1.4	1.3	0.7	0.3	1.5
day average	0.1	0.3	0.6	0.8	0.9	0.9	0.9	0.9	0.7	0.4	0.2	0.1	0.6
day minimum	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	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	0.1	0.2
day average	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	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	0.1	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	0.0	0.1	0.1	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 / 176.8 kWh. Battery export only into hours whose export price is above 0, highest price first. At 0 cent on


Battery cycles per day (discharge / 176.8 kWh)
Germany - Grünheide 52.401, 13.842
Full cycles
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 (176.8 kWh = 100 %)
Germany - Grünheide 52.401, 13.842
% of battery
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year


Battery min charge state per day (176.8 kWh = 100 %)
Germany - Grünheide 52.401, 13.842
% of battery
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year