



UNIVERSITÀ
DEGLI STUDI DI TRIESTE



Rapporti OM

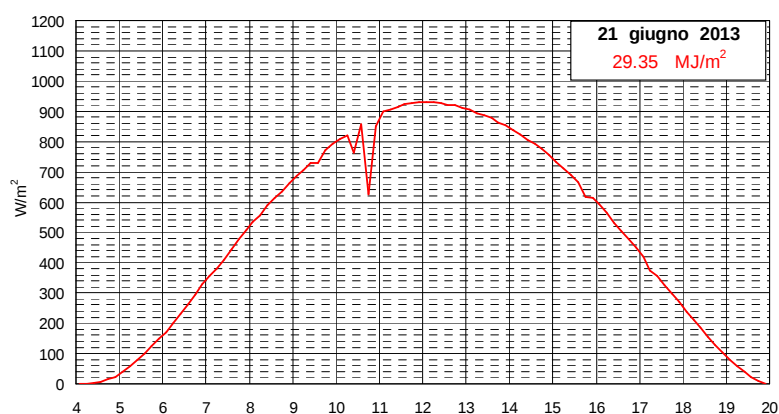
N. 159

Franco Stravisi
Stefano Cirilli

TRIESTE

Irradianza solare globale

2013



Trieste 2014

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*Stazione DMG di Trieste, tetto dell'ISIS Nautico, piazza Hortis, 1:
piranometro Kipp&Zonen CM11.*

TRIESTE

Irradianza solare globale 2013

Franco Stravisi, Stefano Cirilli

Questo rapporto aggiorna i dati orari di irradianza solare globale a tutto il 2013; il piranometro è lo stesso (Kipp&Zonen CM11 n. 882127) usato negli anni precedenti presso la stazione meteorologica di Trieste del Dipartimento di Matematica e Geoscienze (piazza Hortis n. 1, ISIS Nautico). Il supporto del piranometro, collocato sul palo di sostegno degli anemometri, guarda a sud (fig. 1). I dati di irradianza media su intervalli successivi di 10 minuti sono memorizzati da un datalogger Nesa TMF500; la costante di calibrazione usata (Stravisi 2004 c) è $4.95 \text{ mV}/(\text{W}/\text{m}^2)$.

Correzioni. La serie annuale è corretta per l'eventuale deriva dello zero, sommando giornalmente una costante in modo che i dati notturni risultino pari al loro valore medio di $-4 \text{ W}/\text{m}^2$; successivamente i dati degli intervalli di 10 min notturni (elevazione del sole sull'orizzonte astronomico $\leq -1.5^\circ$) sono posti uguali a zero.

I dati di irradianza solare globale medi in 10 min sono memorizzati come numeri interi espressi in watt al metro quadrato (W/m^2); successivamente sono convertiti in dati di irradiazione totale in 10 min, espressi in kilojoule al metro quadrato (kJ/m^2) ed arrotondati all'intero. I totali giornalieri di irradiazione sono espressi in megajoule al metro quadrato (MJ/m^2) ed arrotondati a due decimali. L'ultima riga di ogni mese riporta l'irradiazione totale mensile. E' usato il tempo medio dell'Europa centrale CET = UTC+1 pari al tempo coordinato universale (tempo medio di Greenwich) più un'ora, ovvero l'ora solare locale.

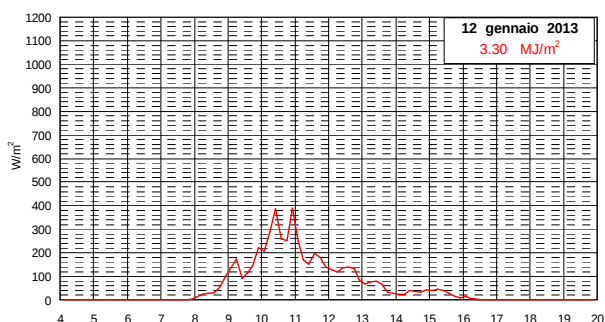
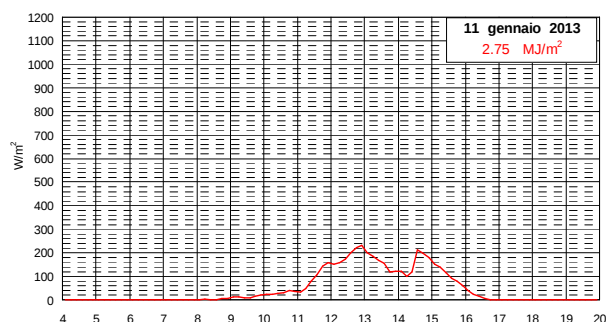
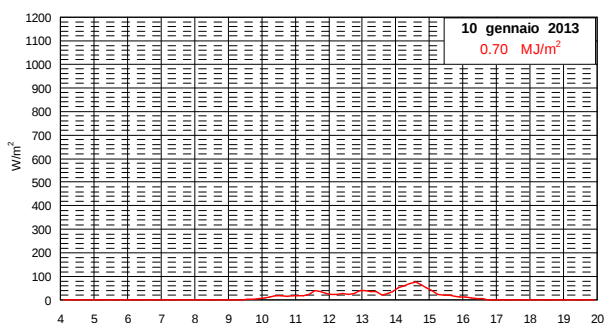
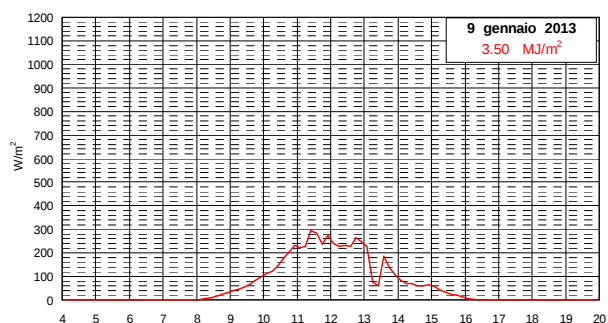
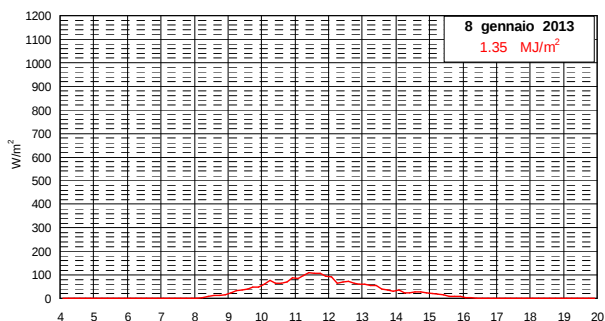
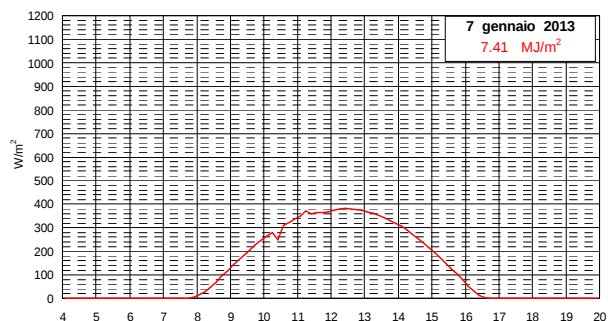
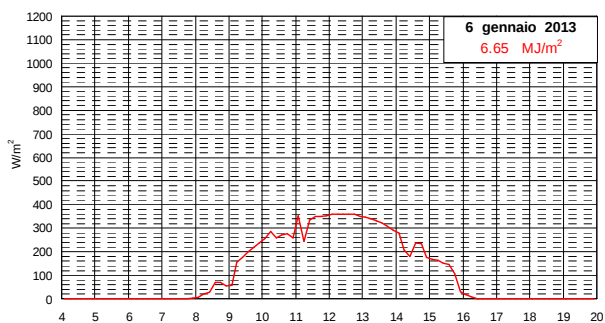
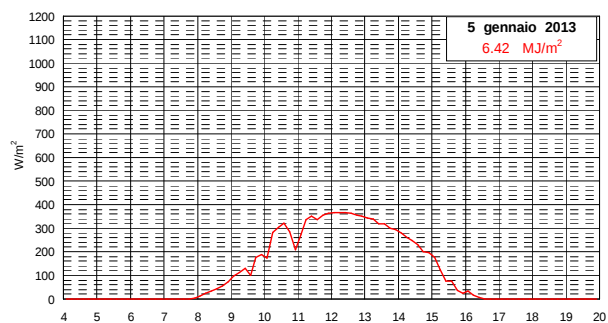
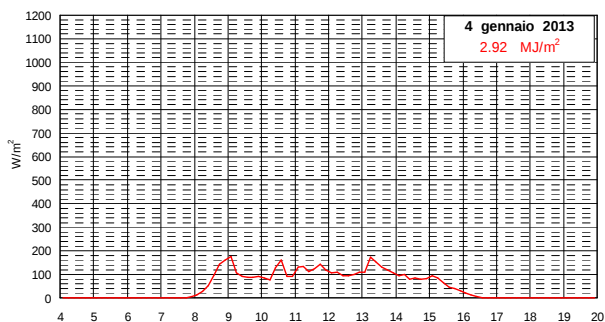
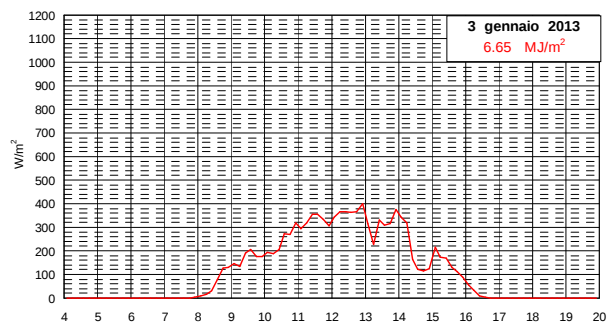
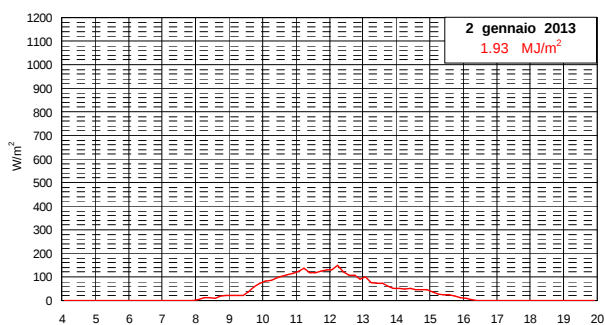
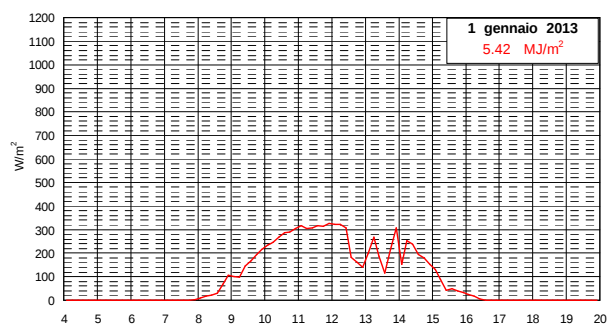
Sono riportati anche i grafici 2013 della serie di irradianza solare globale consistente in dati medi su intervalli consecutivi di 10 minuti (Stravisi, 2004 d).

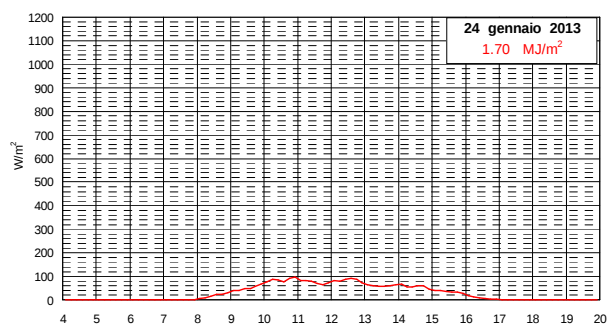
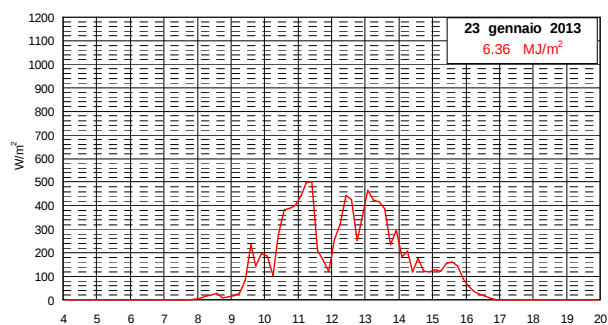
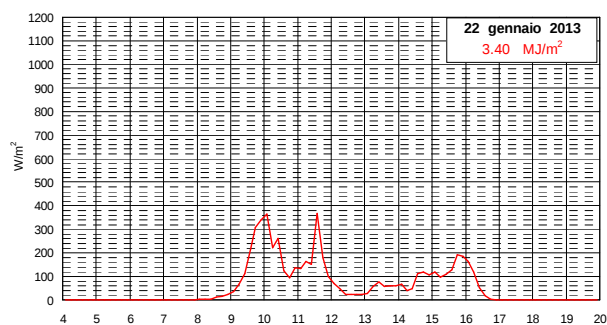
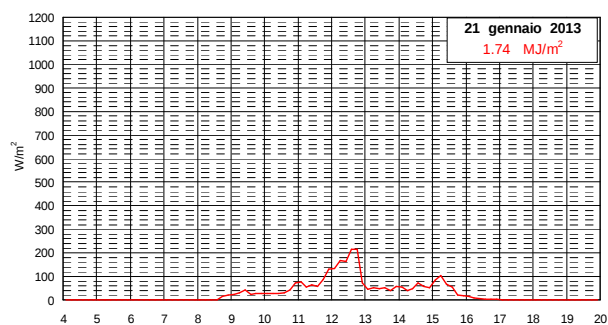
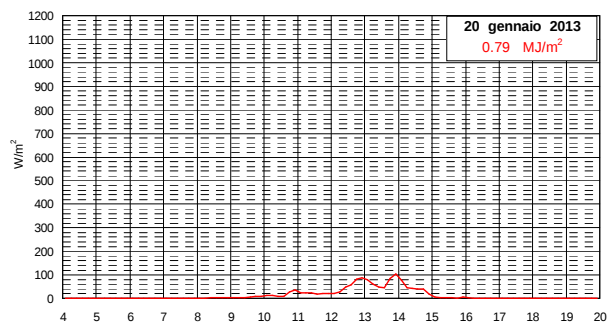
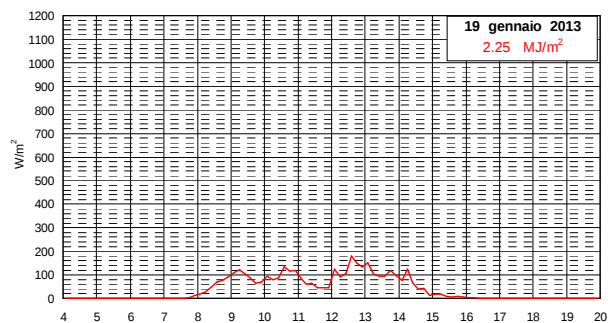
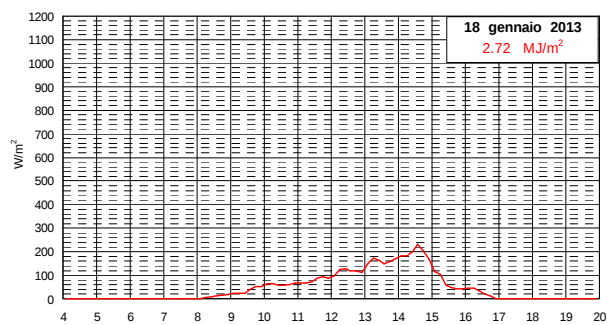
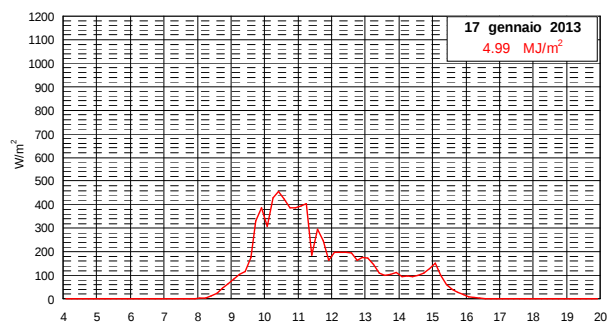
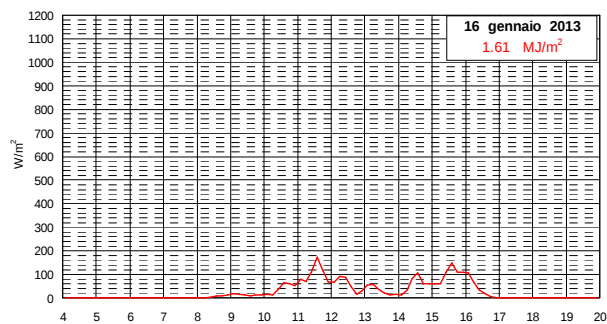
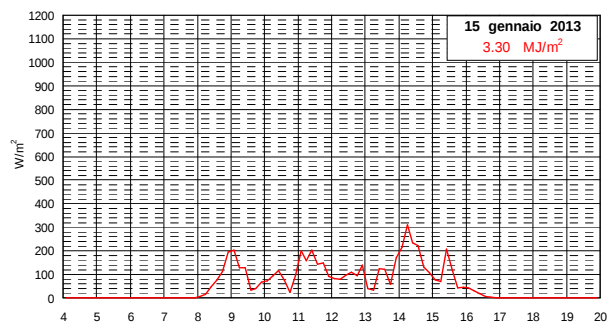
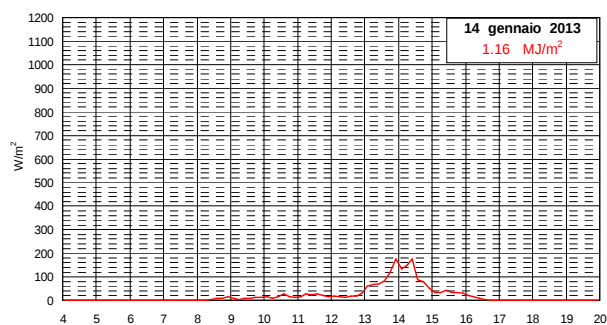
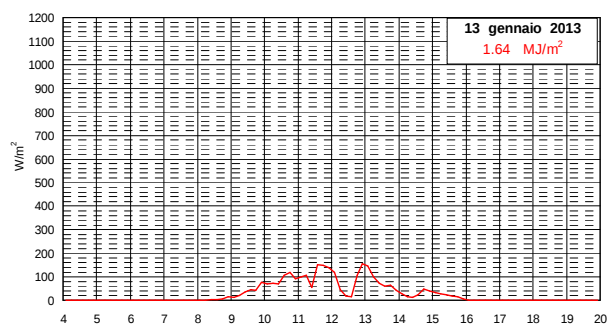
Riferimenti

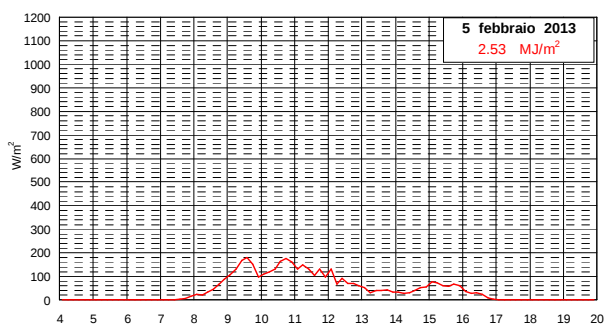
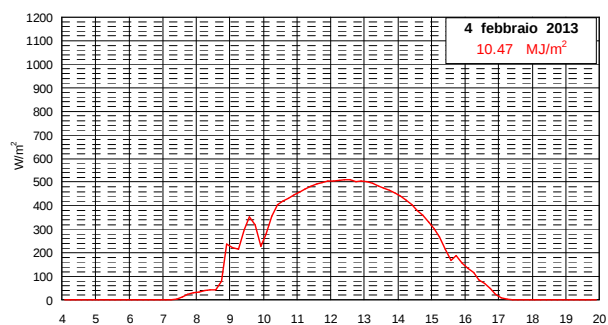
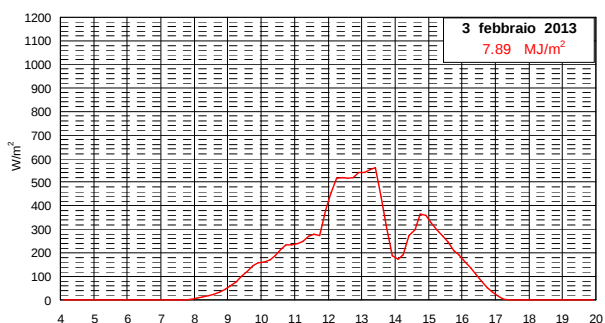
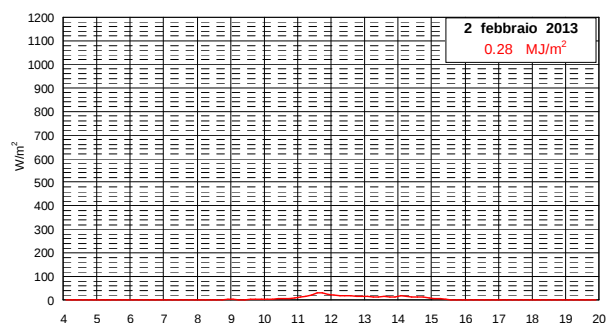
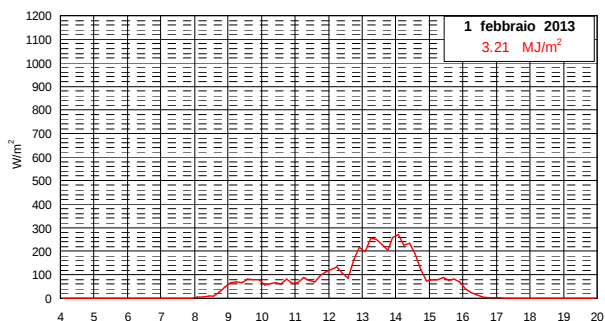
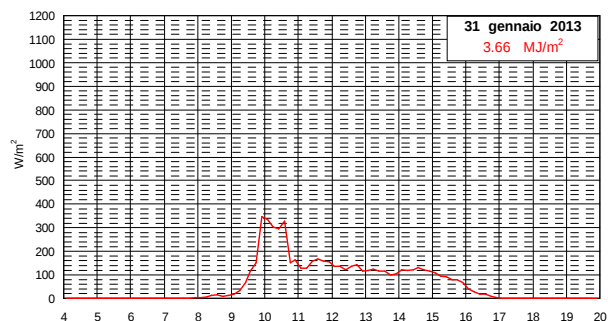
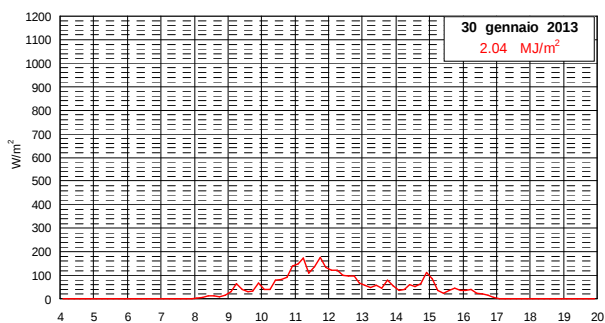
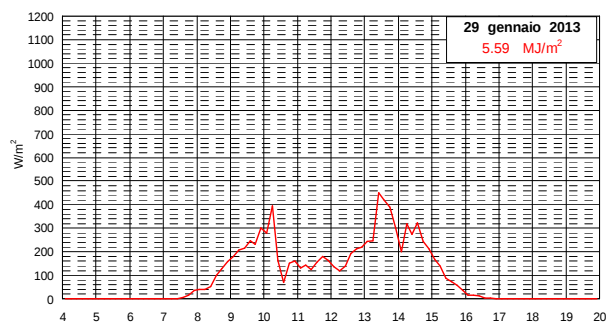
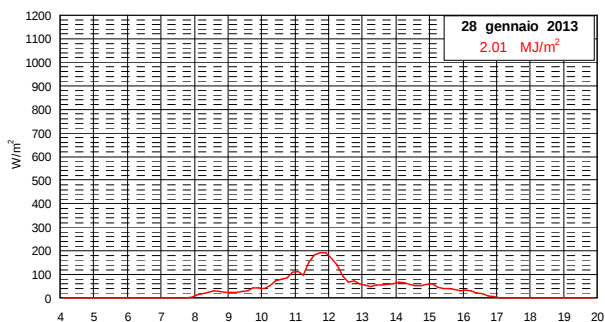
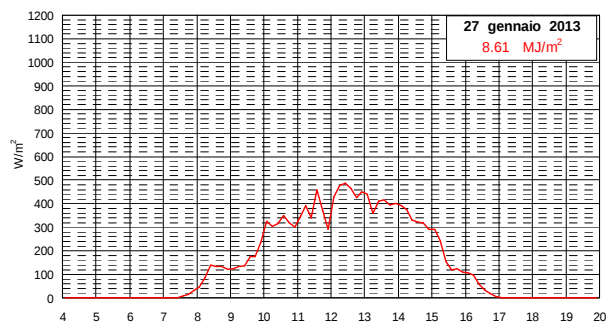
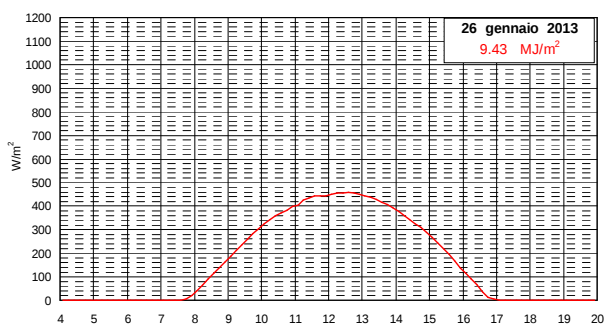
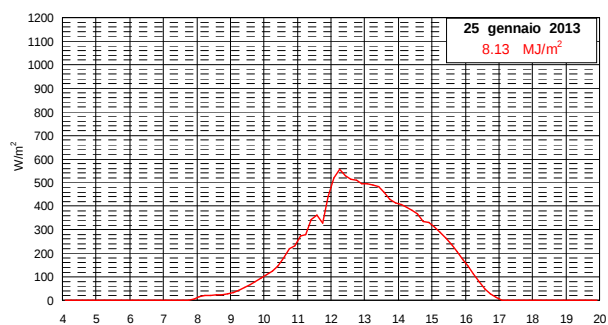
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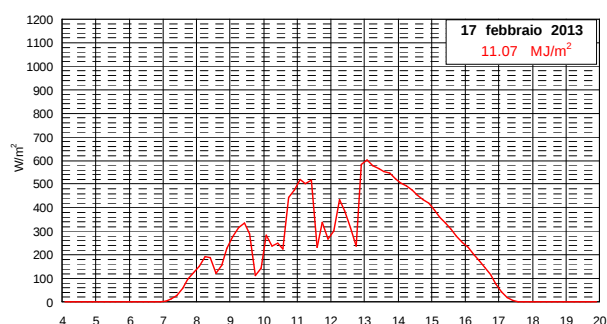
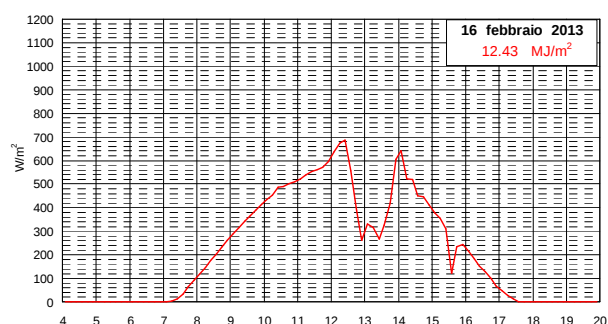
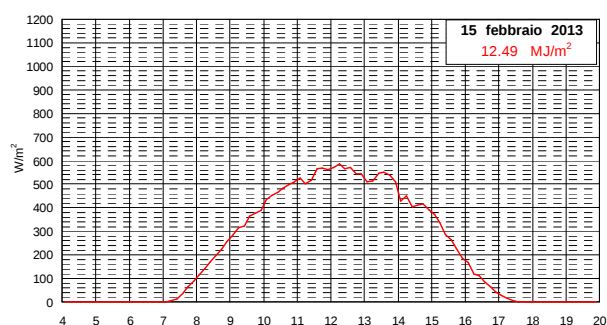
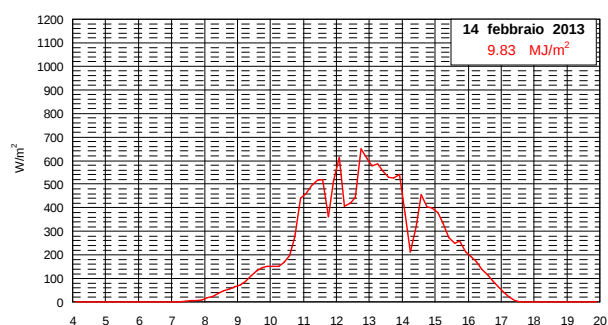
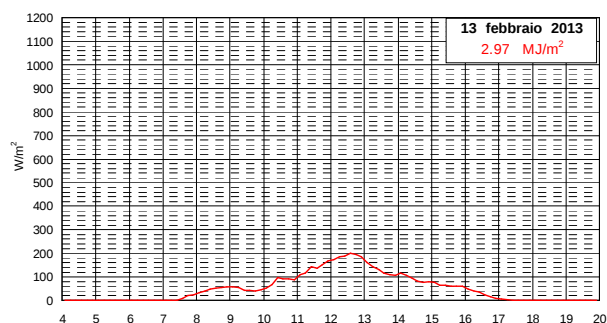
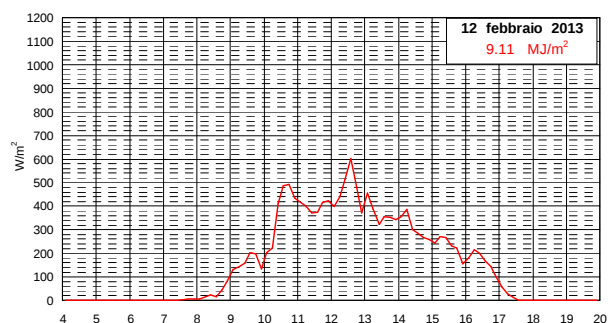
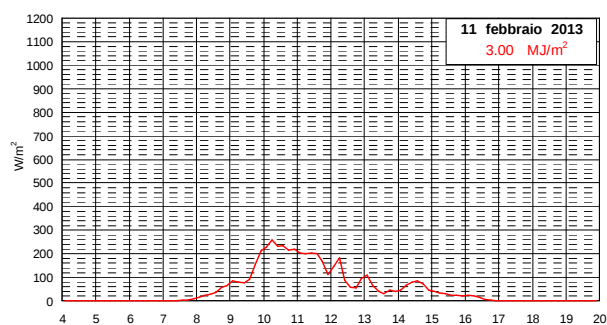
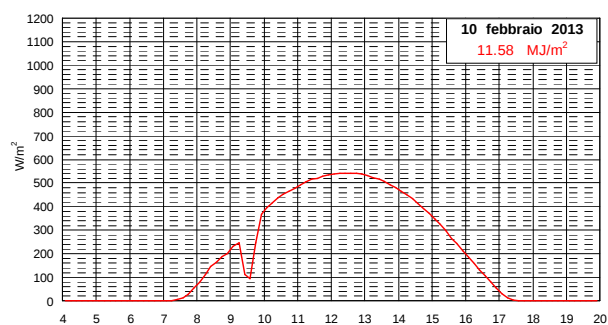
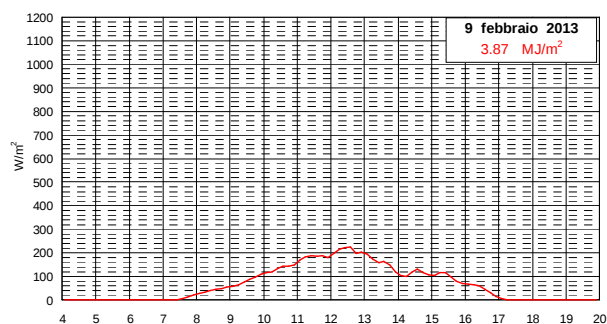
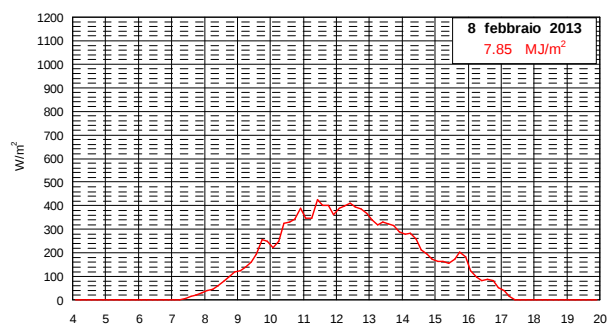
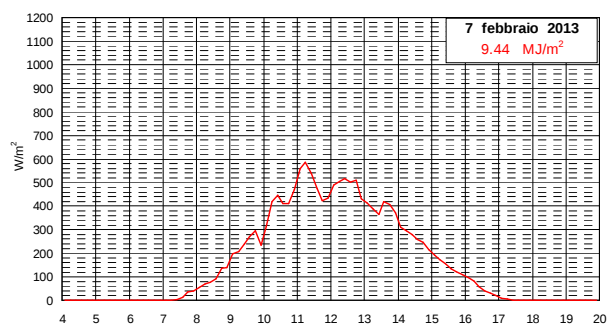
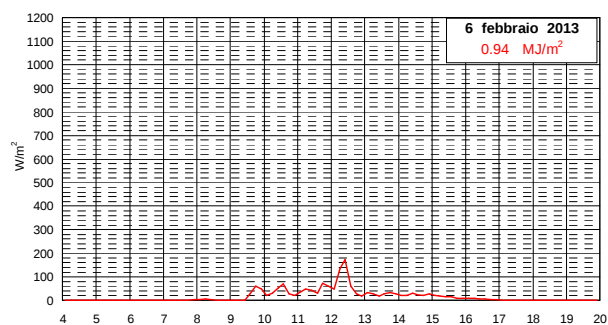
Università di Trieste, Dipartimento di Matematica e Geoscienze Stazione meteorologica di TRIESTE ANNO 2013	
	<i>Irradiazione solare globale I(MJ/m²)</i>
GEN	120.12
FEB	215.22
MAR	286.60
APR	494.78
MAG	564.88
GIU	753.77
LUG	773.75
AGO	682.08
SET	448.60
OTT	233.34
NOV	153.64
DIC	144.01
anno	4870.79

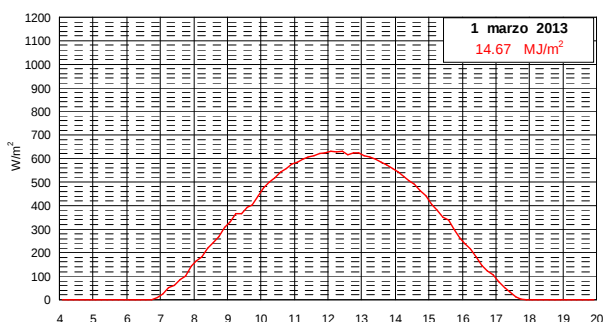
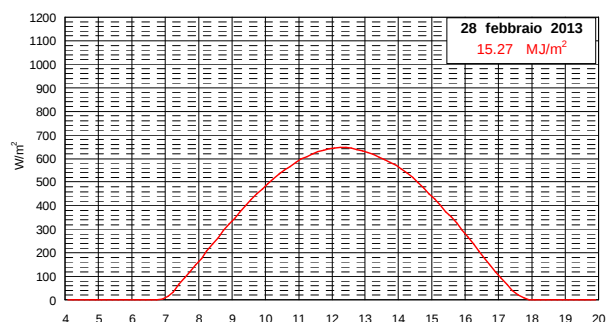
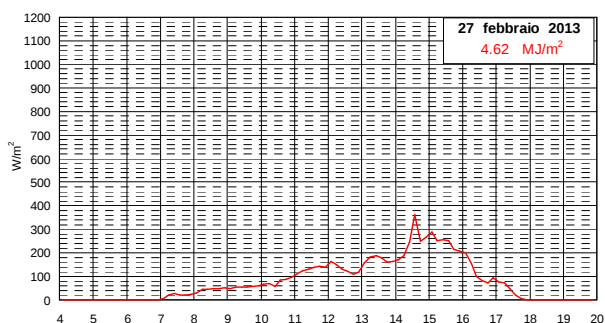
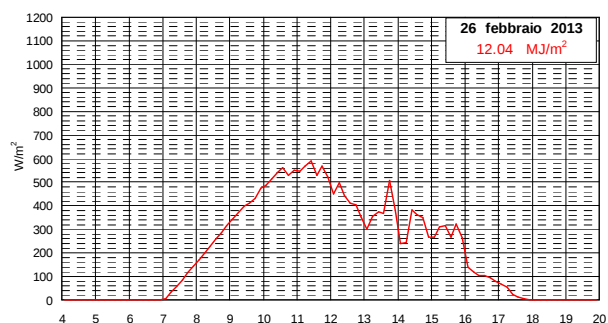
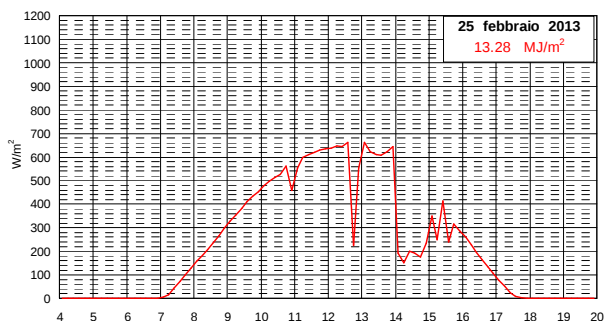
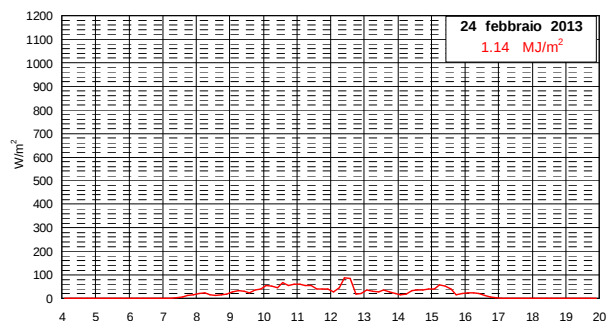
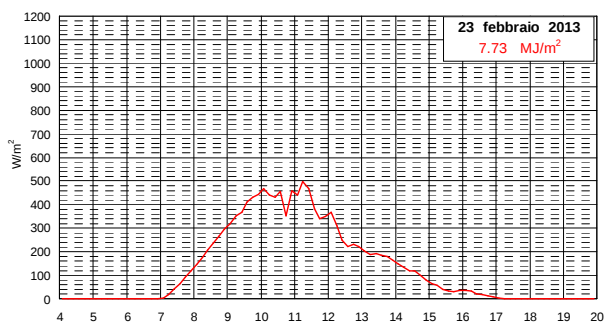
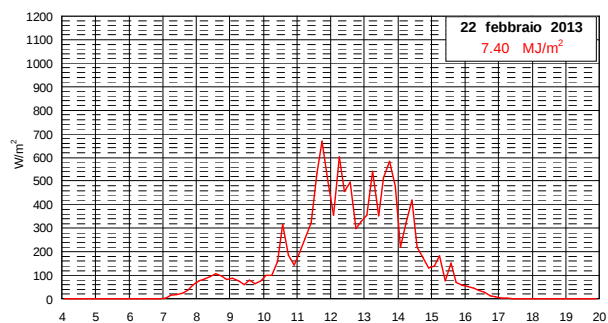
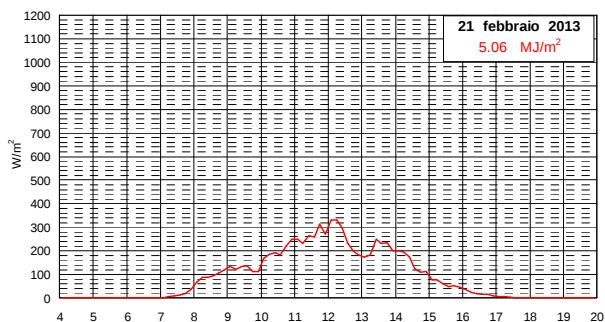
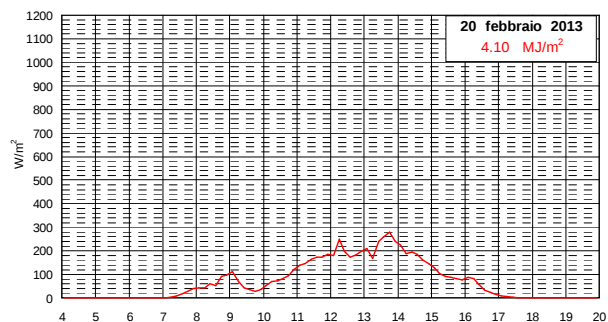
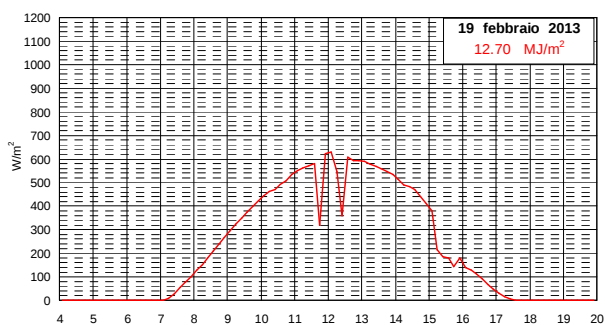
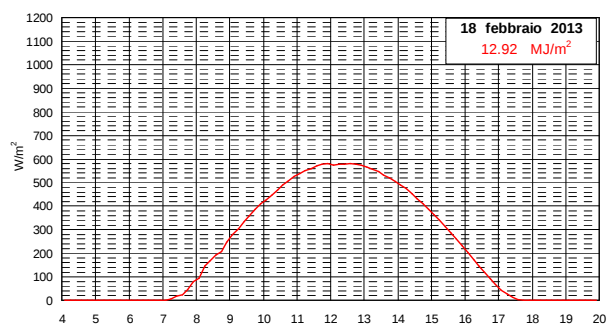
Università di Trieste, Dipartimento di Matematica e Geoscienze Stazione meteorologica di TRIESTE Valori normali 2001 - 2010				
	<i>Irradiazione solare I(MJ/m²)</i>		<i>rapporto d/g</i>	<i>Eliofania /h</i>
	<i>globale</i>	<i>diffusa</i>	%	
GEN	138.74	58.79	42.4	102.9
FEB	206.51	85.64	41.5	125.6
MAR	352.30	151.09	42.9	160.9
APR	479.66	190.69	39.8	195.7
MAG	626.73	236.07	37.7	266.7
GIU	674.76	248.10	36.8	274.4
LUG	719.98	224.72	31.2	319.3
AGO	606.89	198.66	32.7	287.3
SET	438.81	158.46	36.1	216.9
OTT	274.07	114.28	41.7	146.1
NOV	142.92	66.94	46.8	99.6
DIC	120.63	49.84	41.3	103.7
anno	4782.01	1783.28	37.3	2299.0

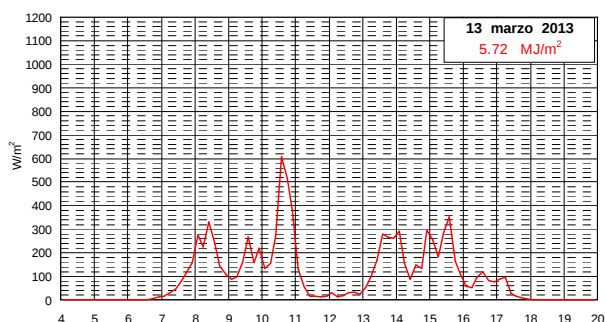
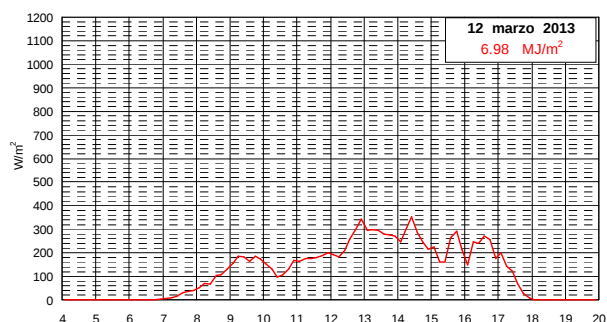
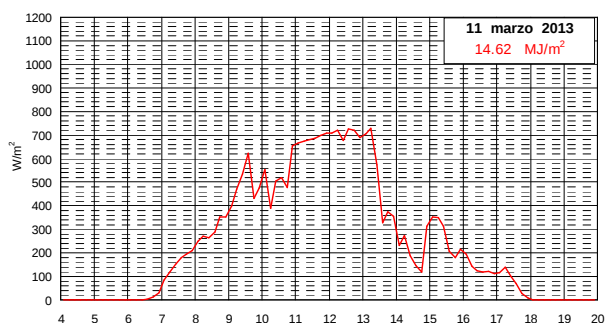
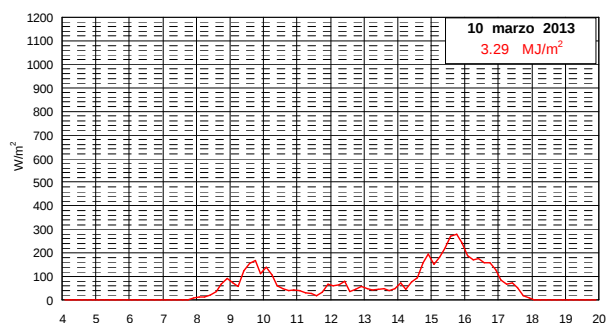
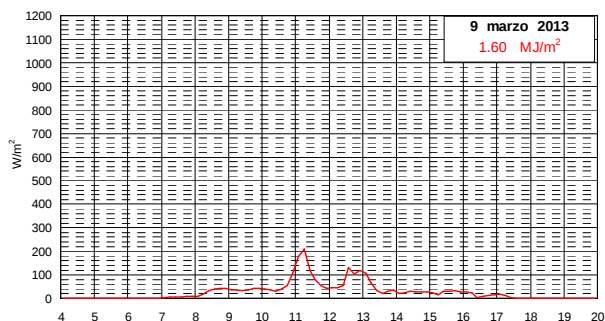
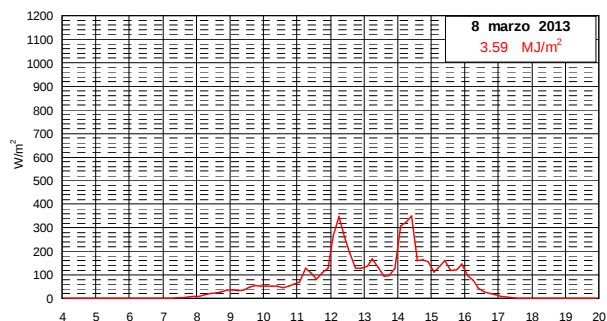
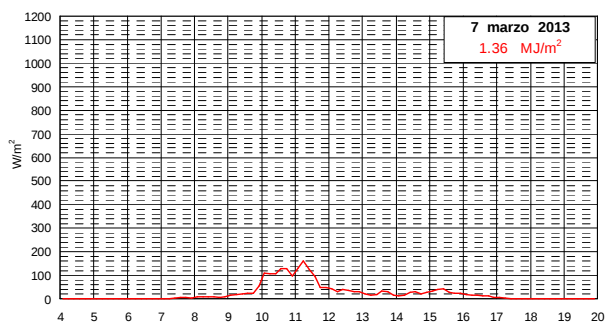
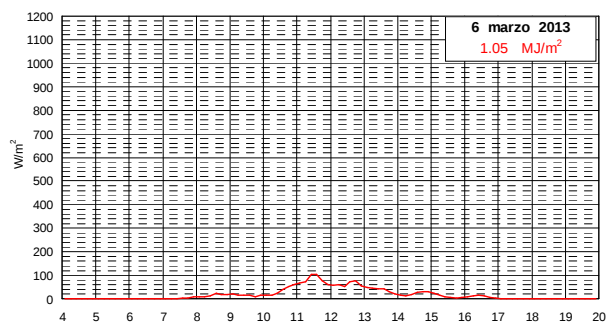
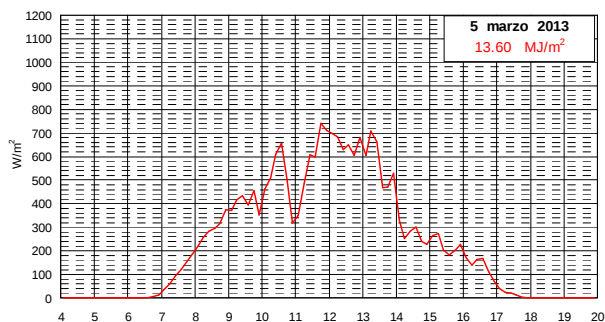
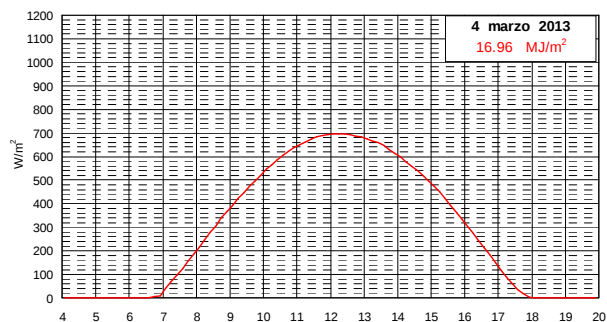
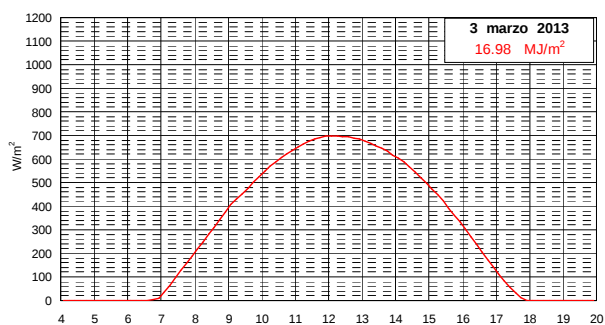
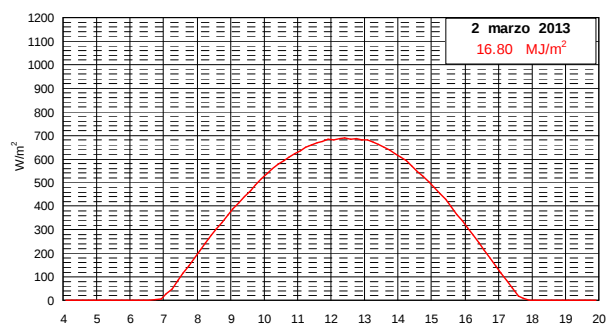


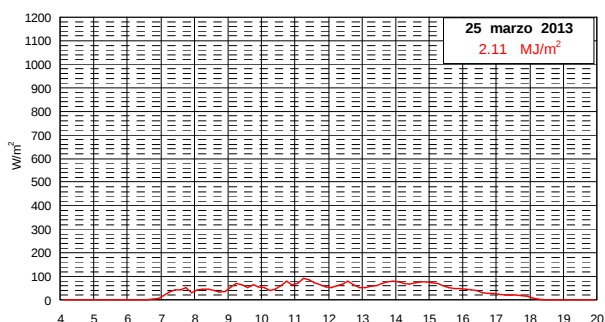
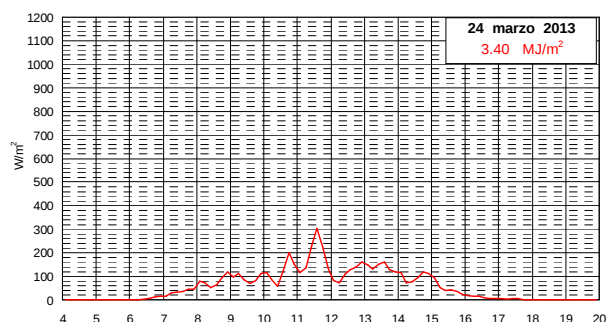
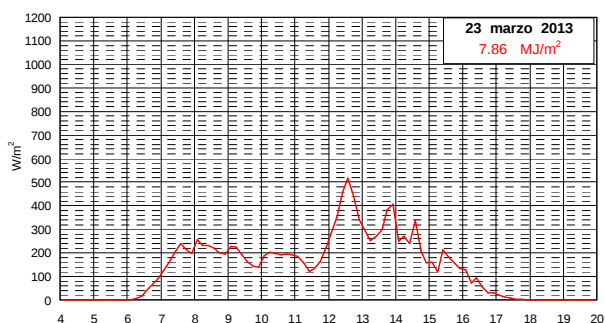
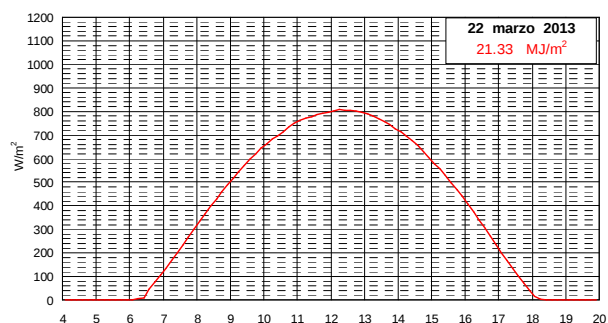
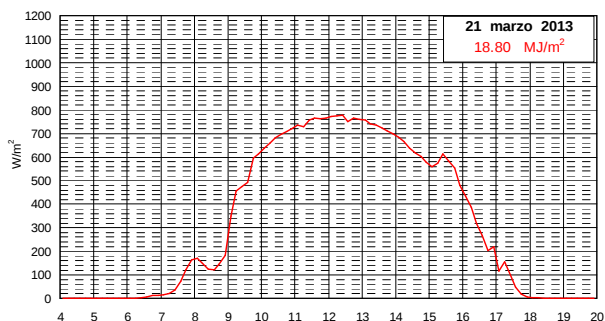
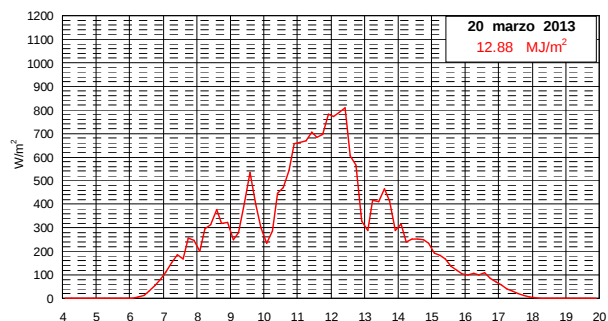
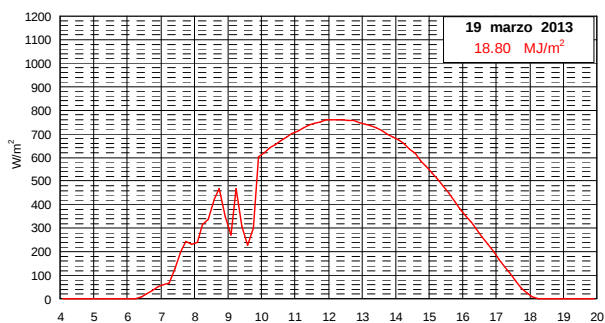
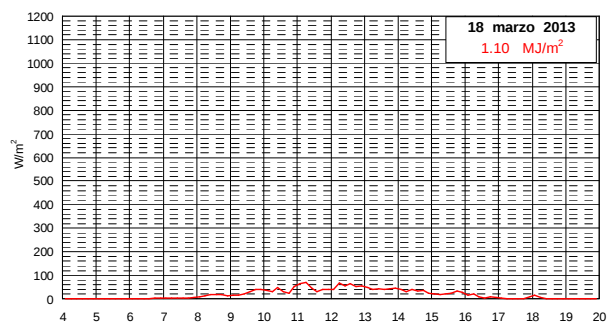
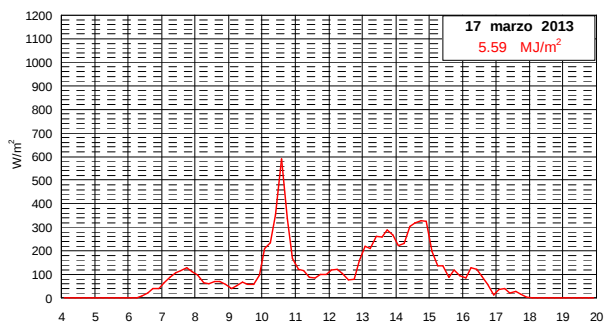
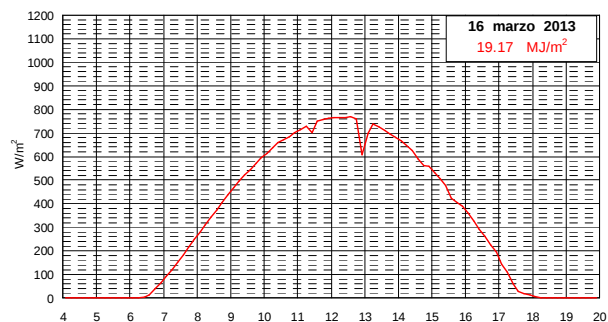
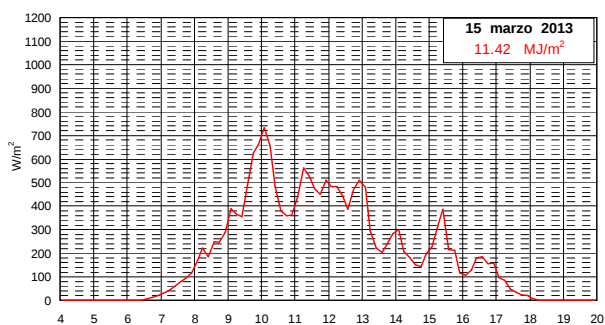
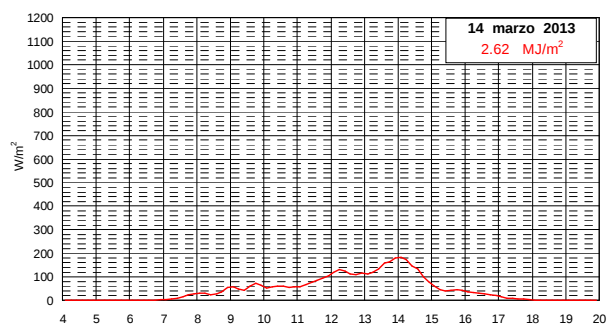


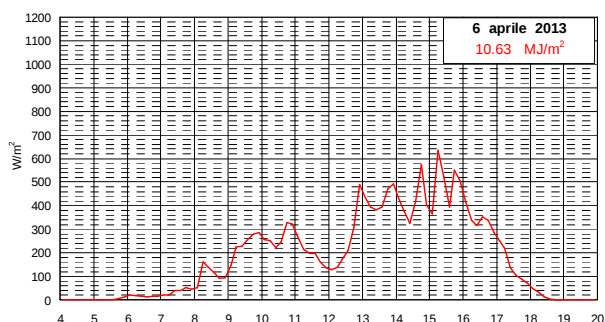
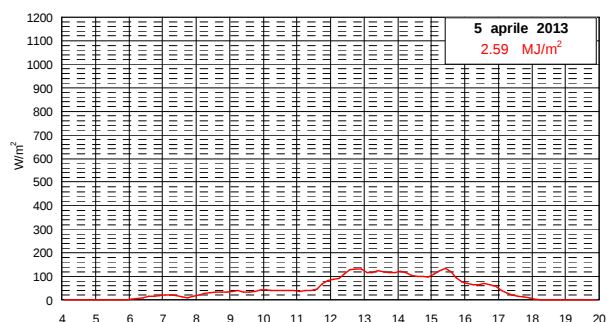
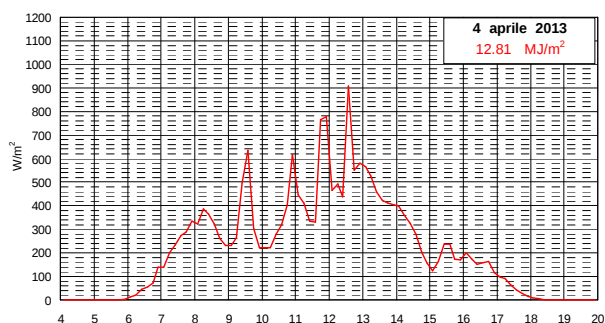
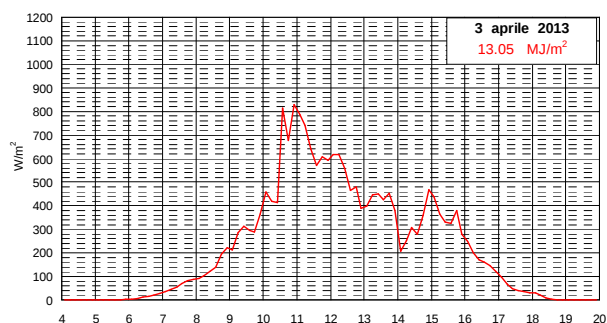
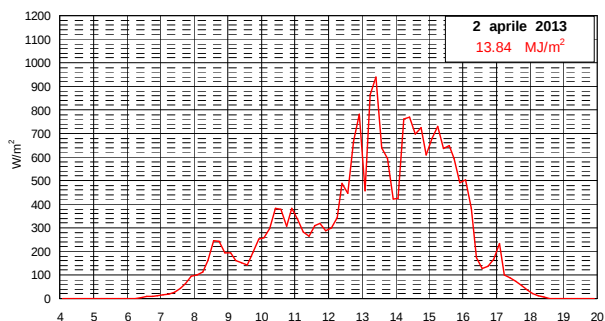
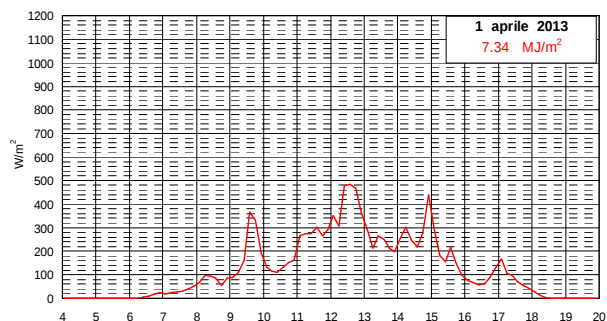
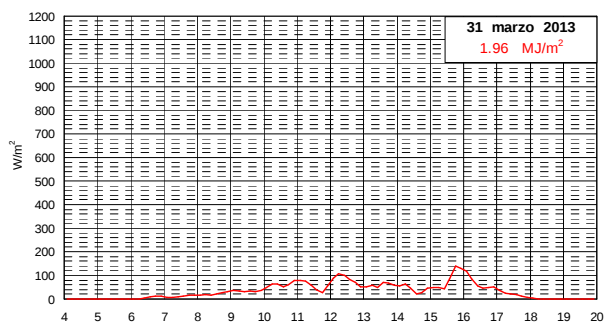
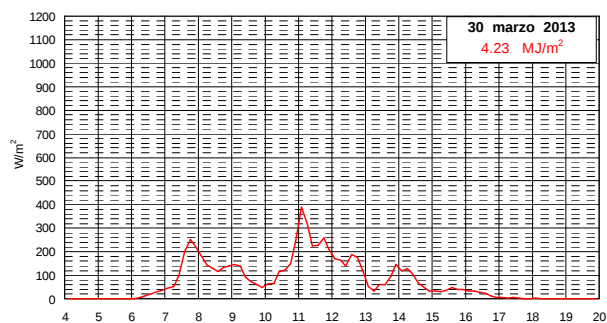
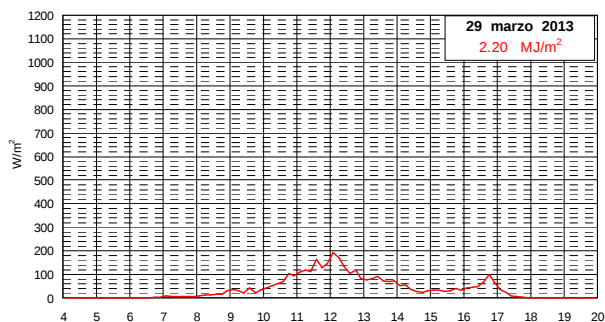
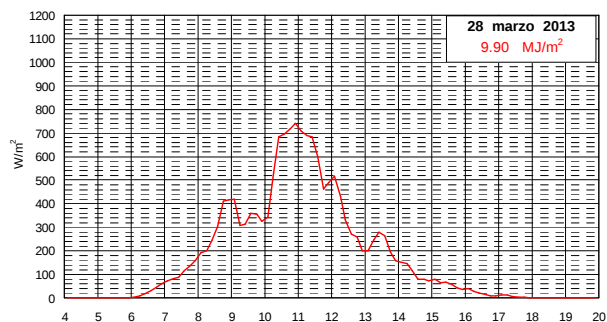
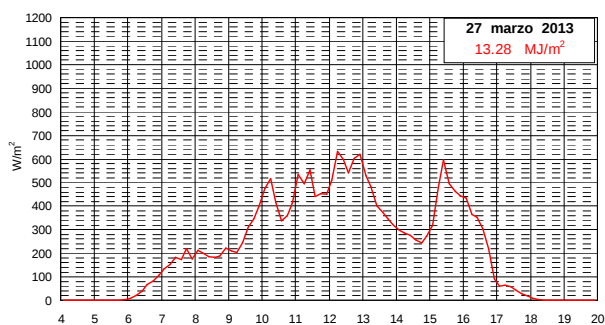
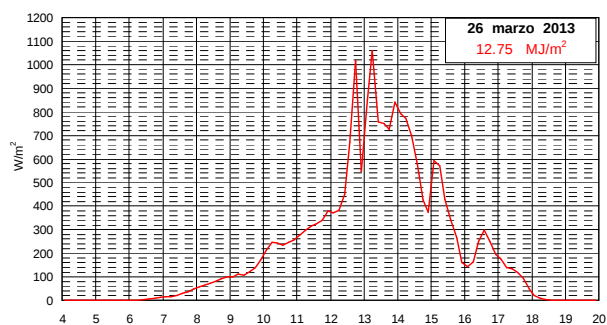


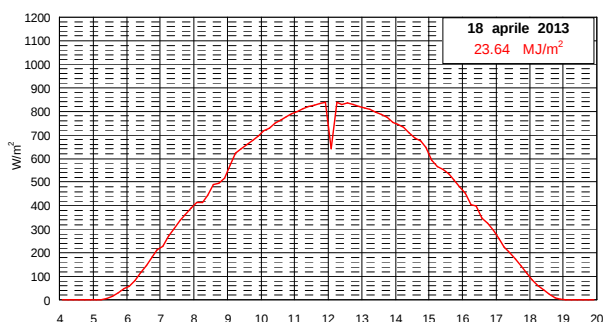
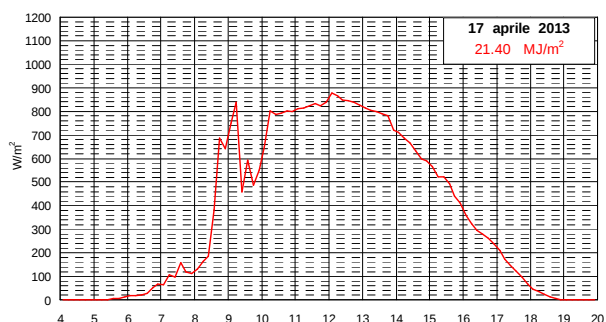
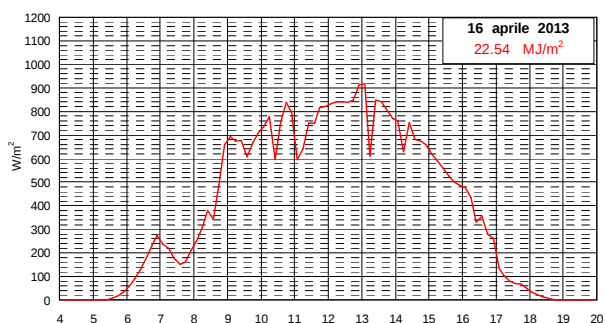
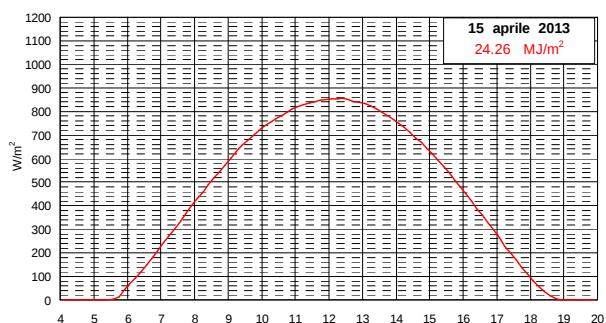
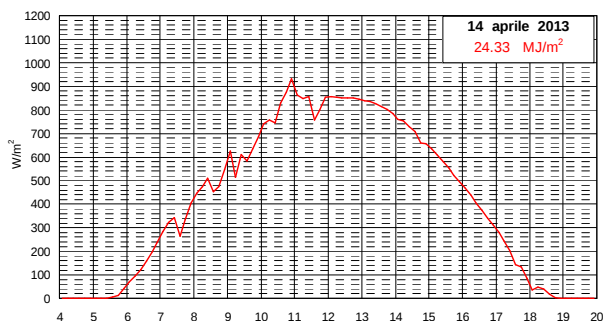
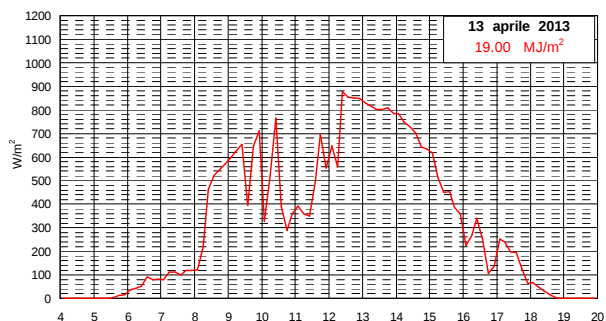
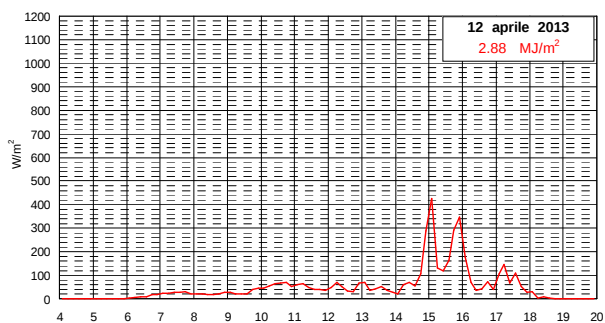
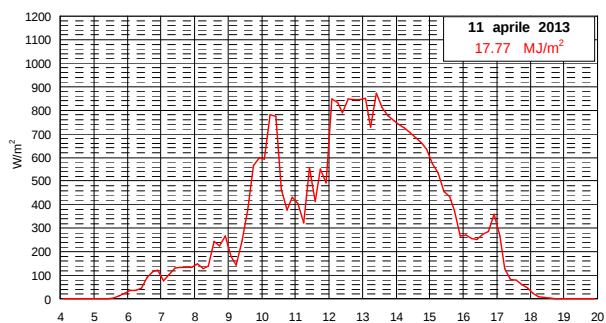
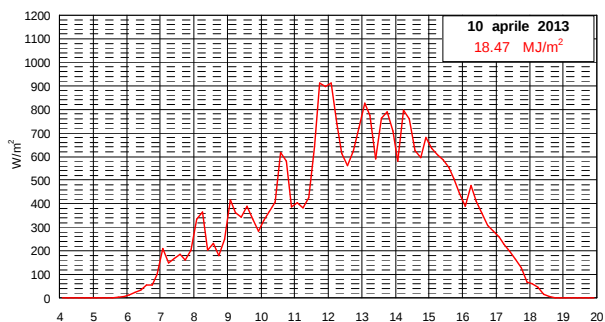
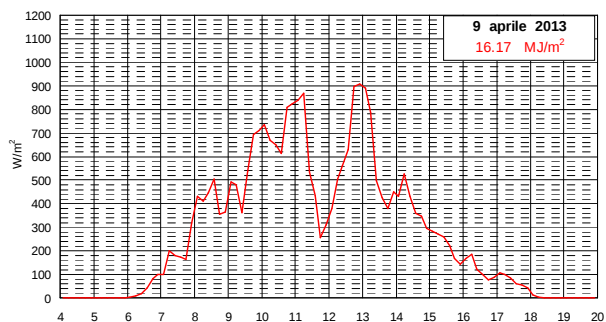
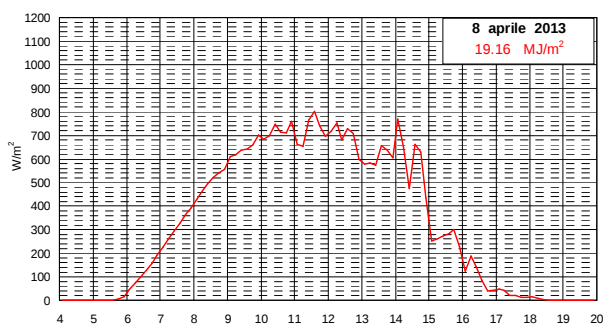
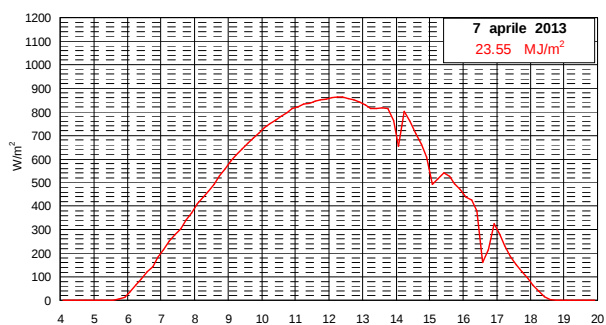


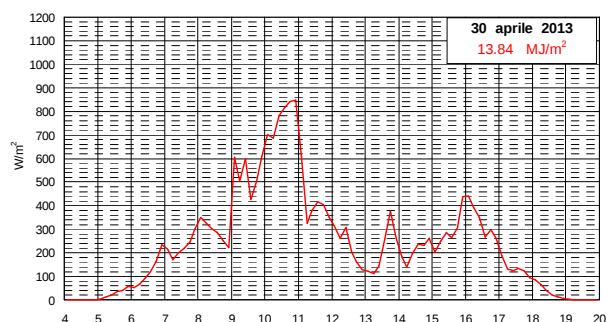
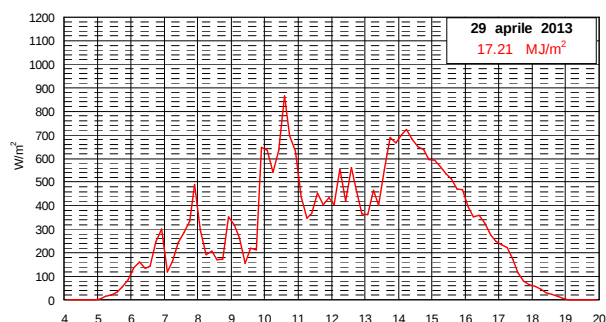
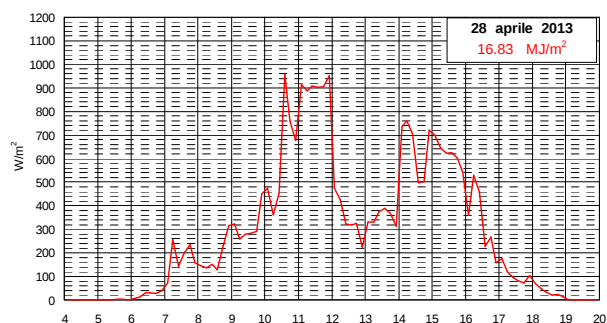
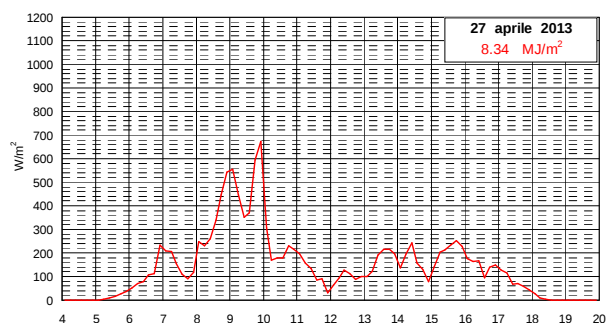
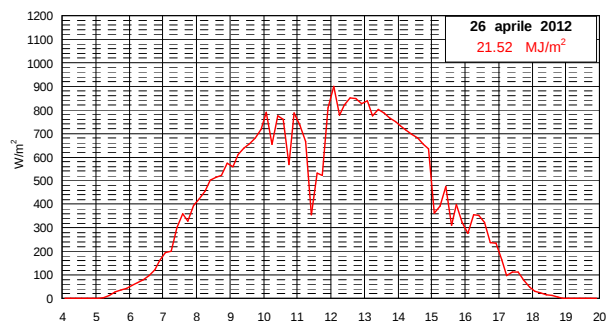
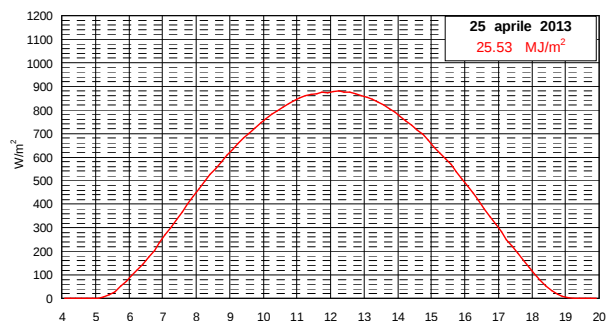
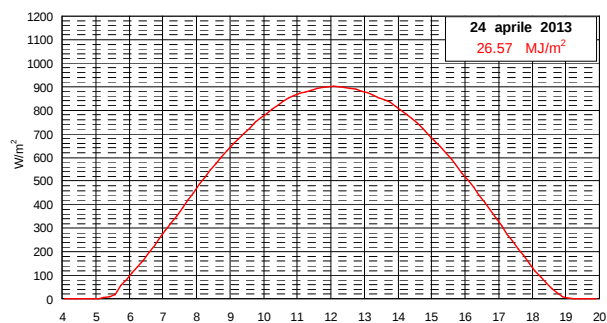
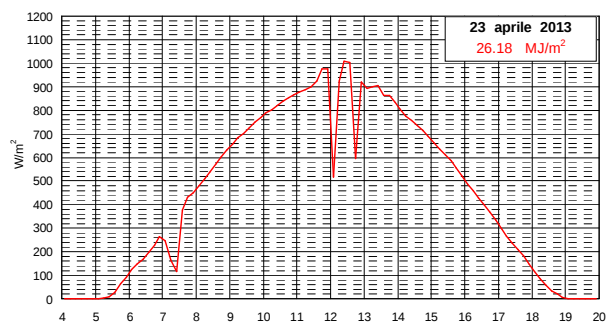
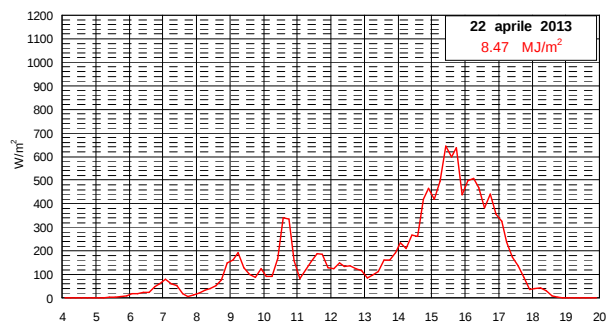
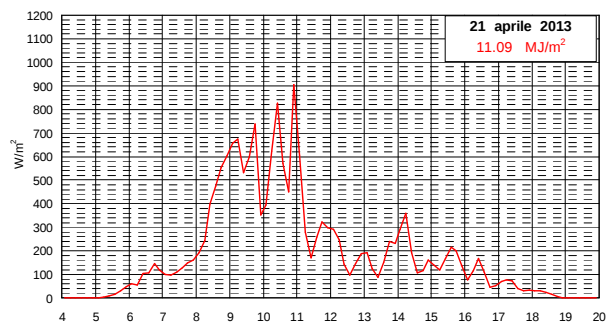
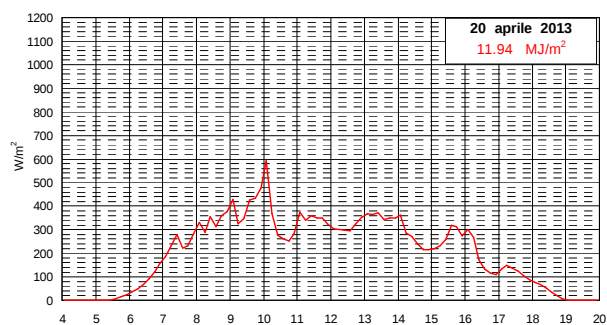
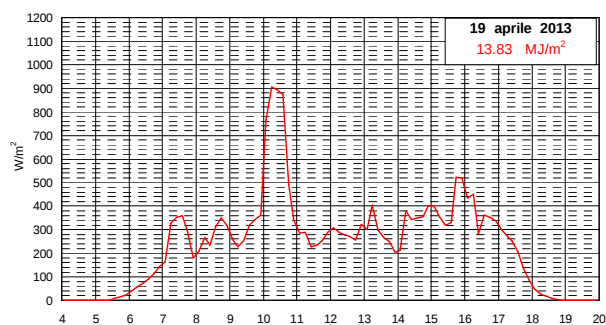


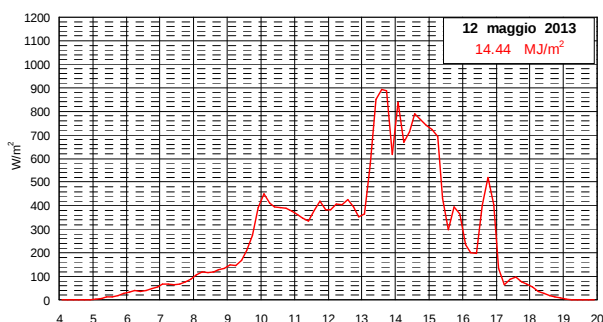
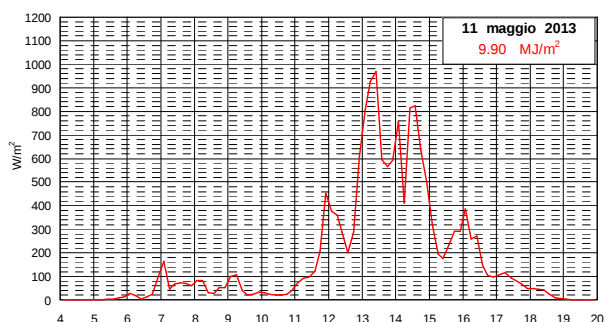
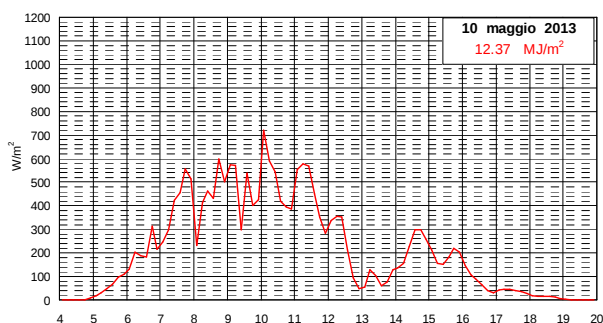
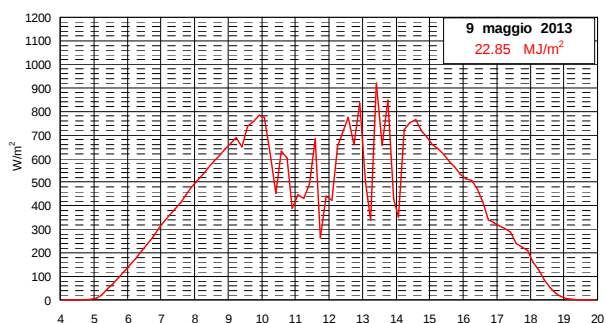
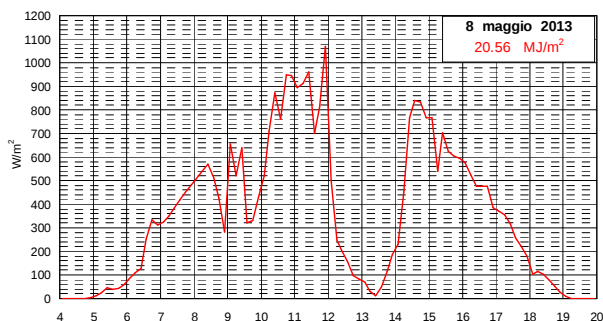
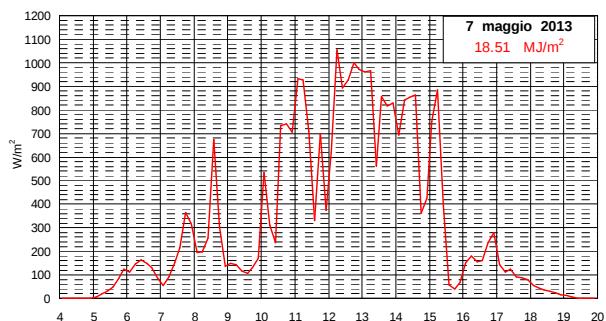
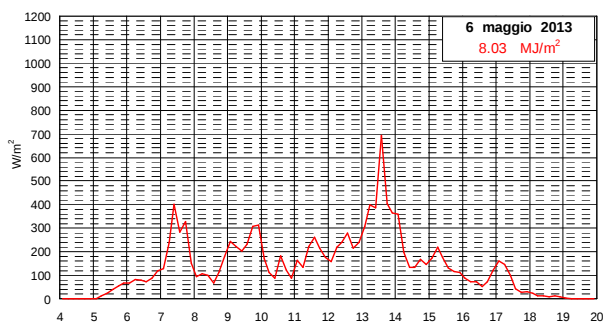
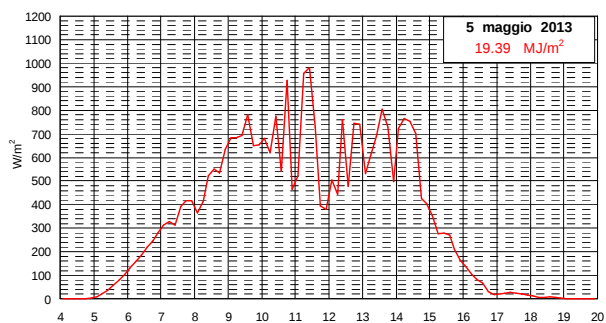
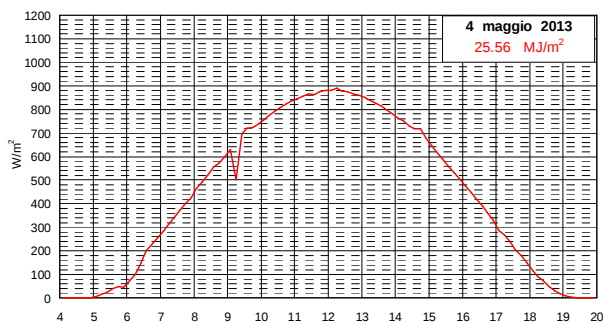
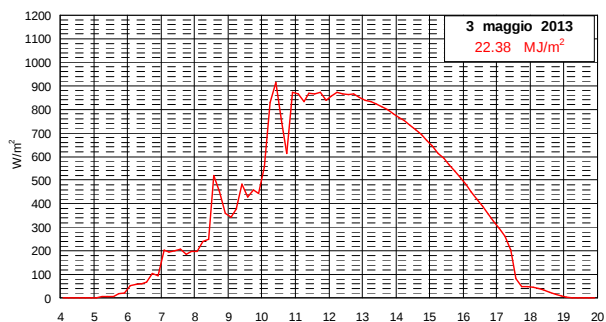
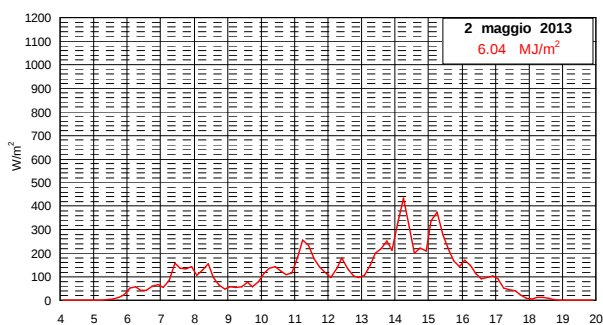
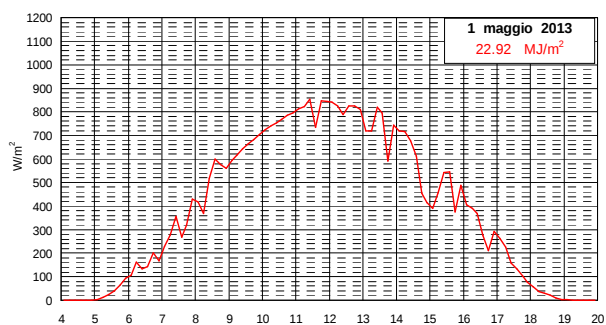


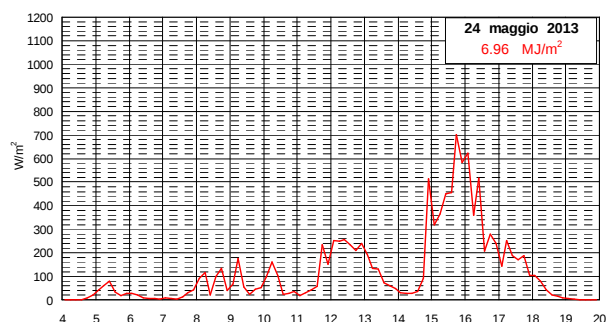
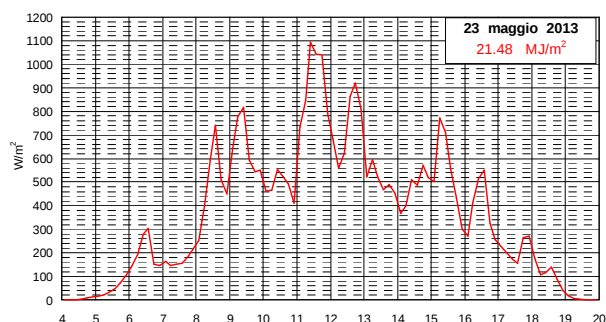
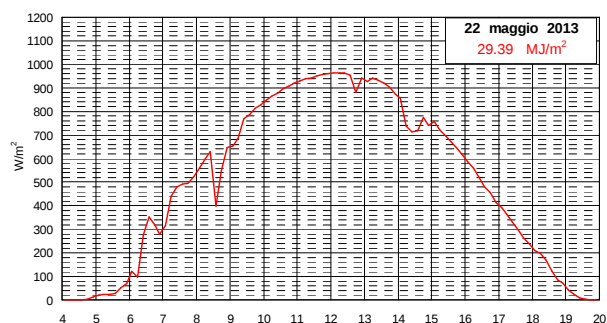
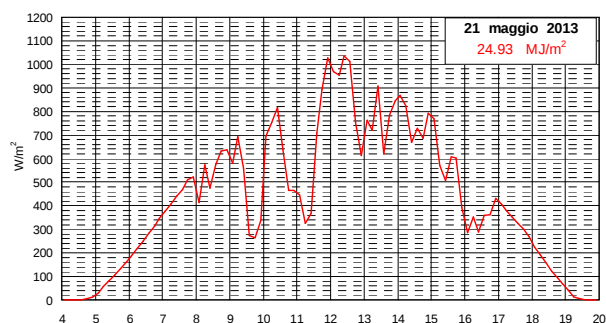
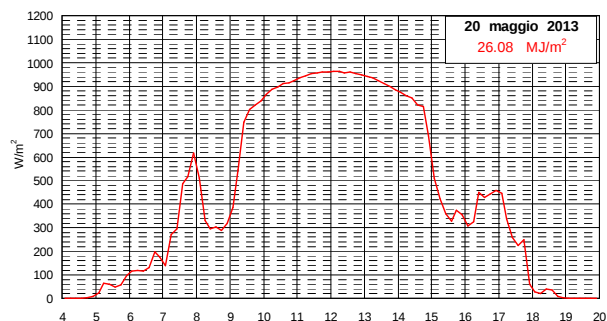
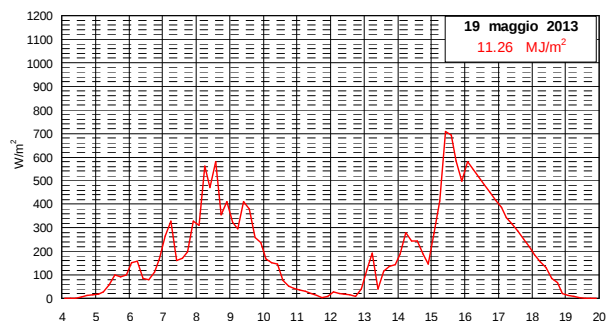
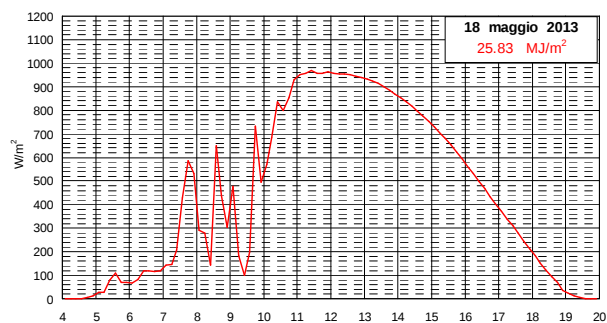
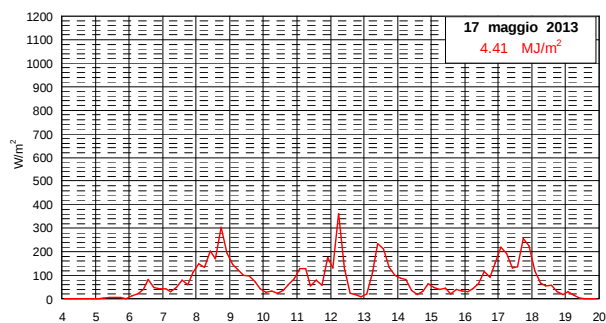
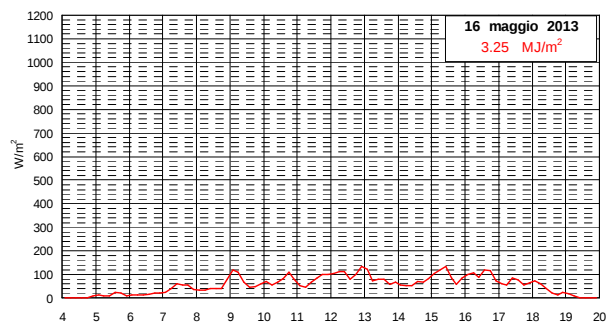
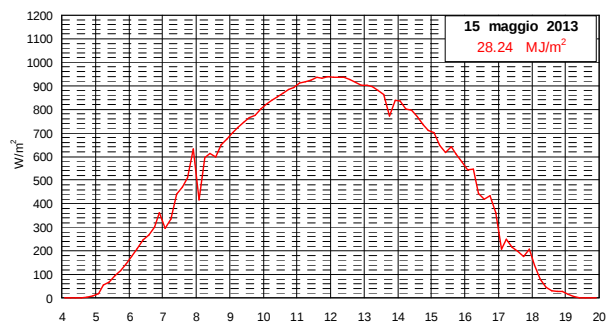
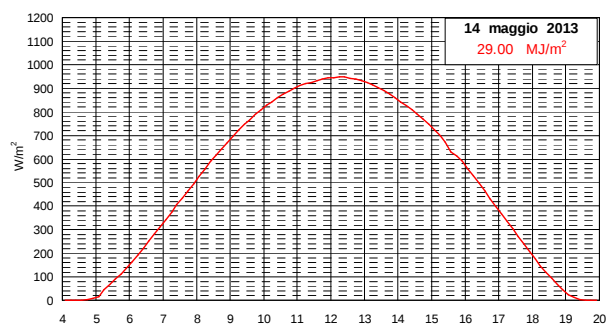
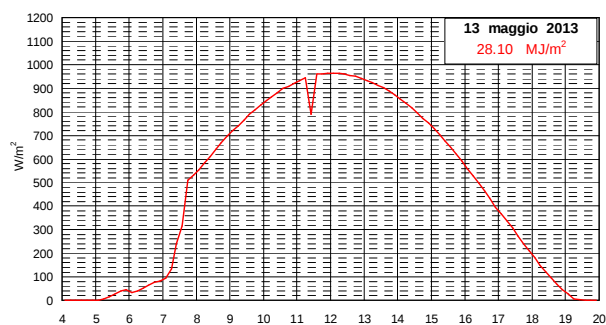


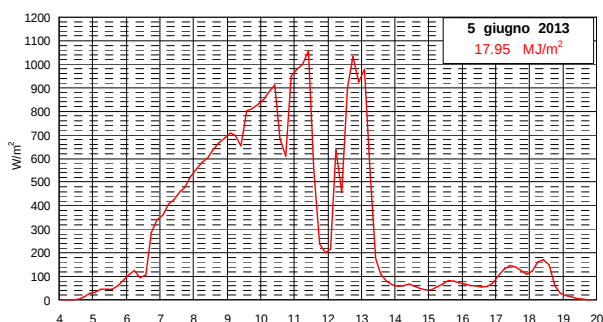
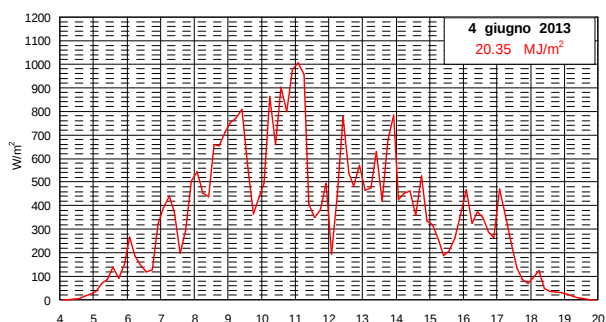
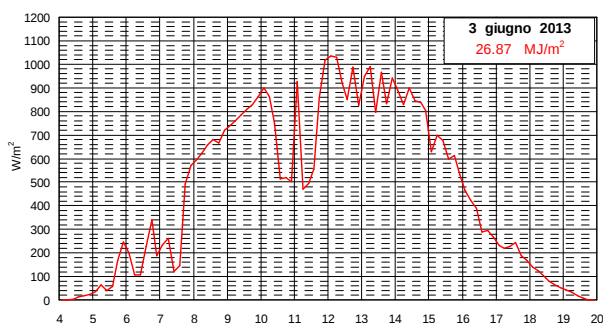
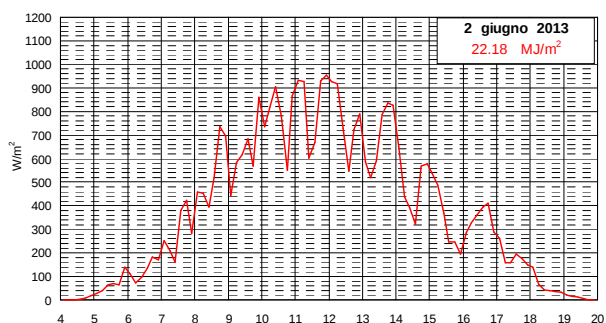
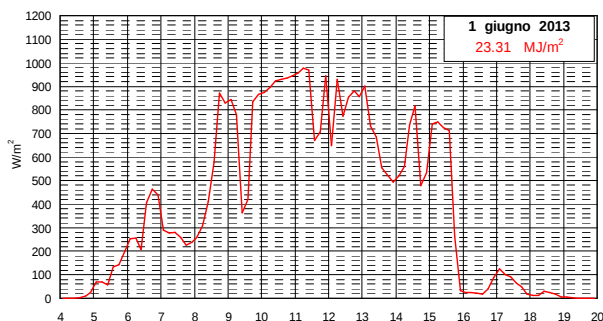
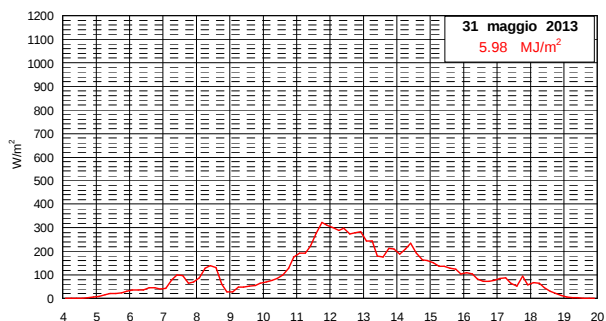
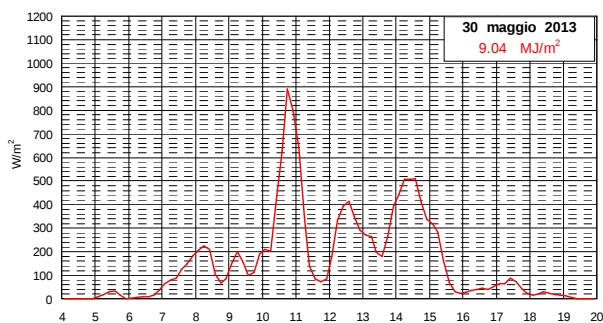
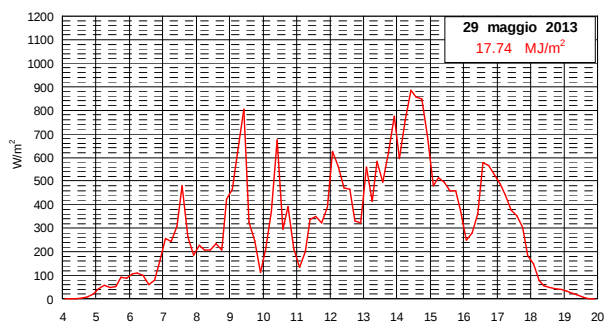
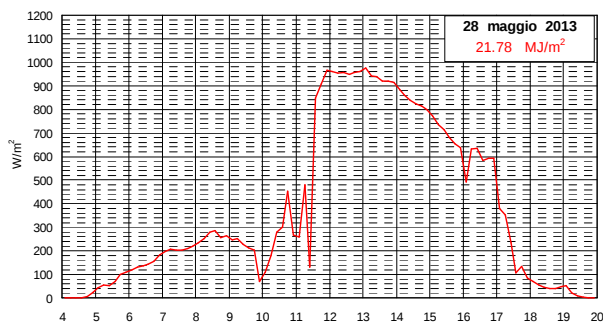
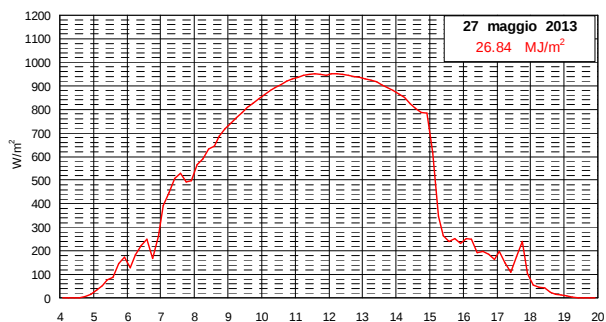
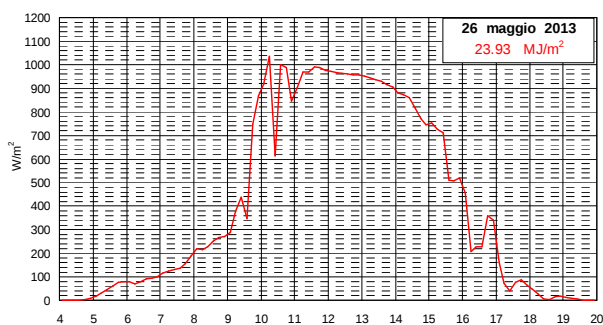
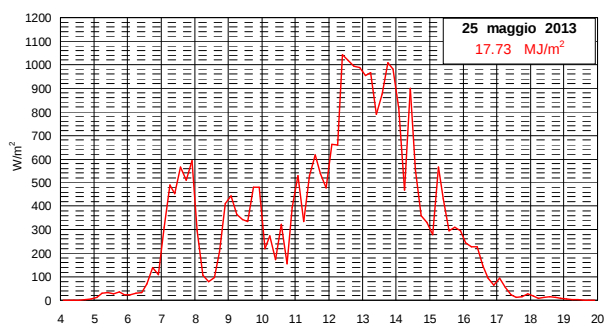


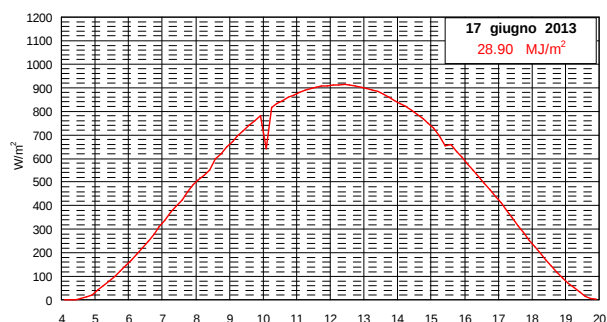
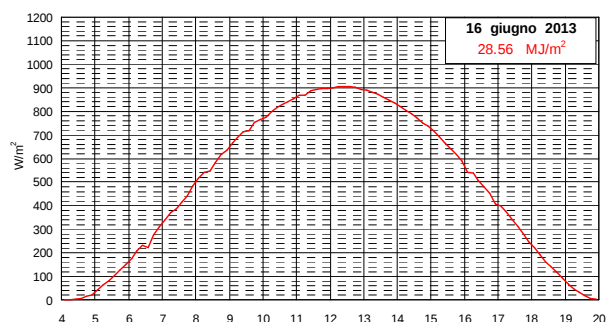
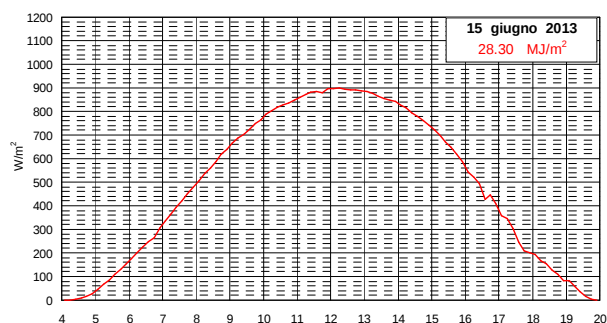
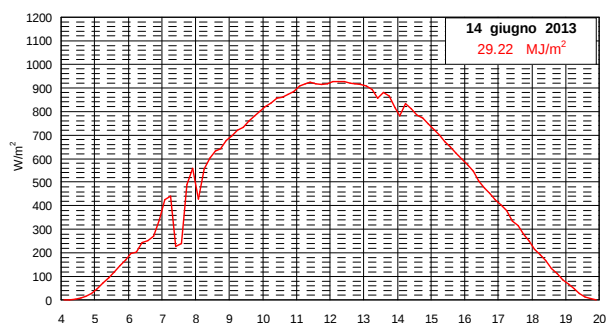
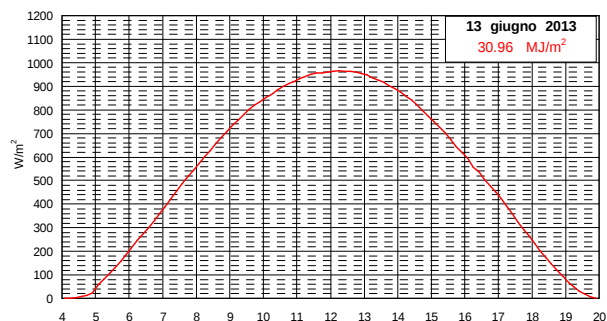
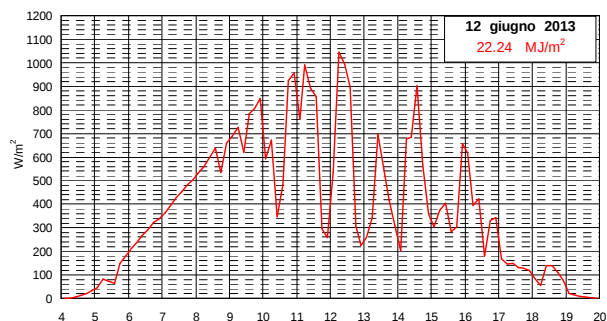
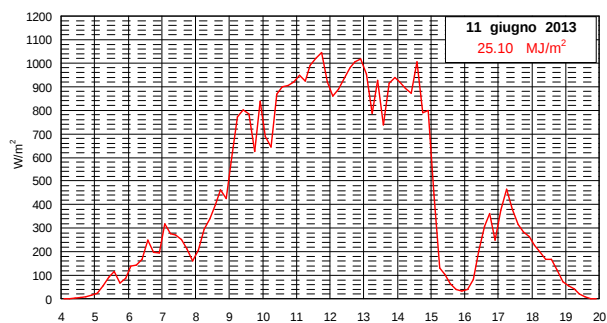
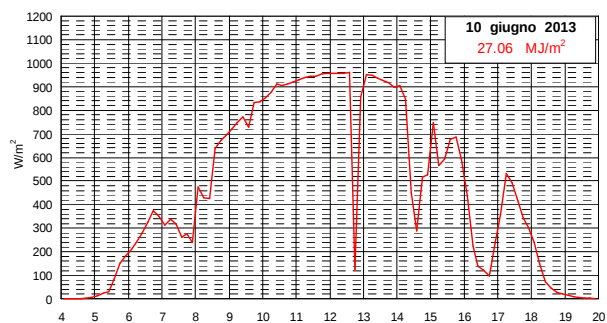
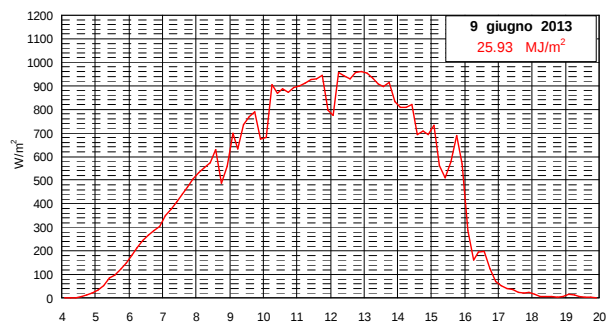
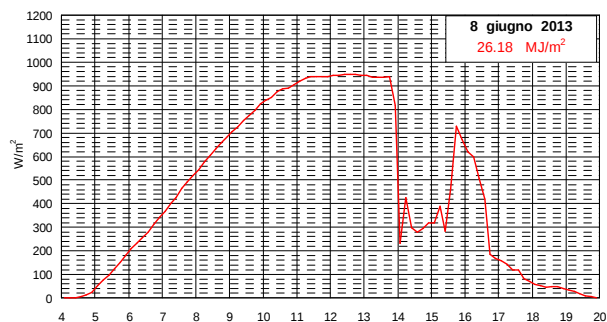
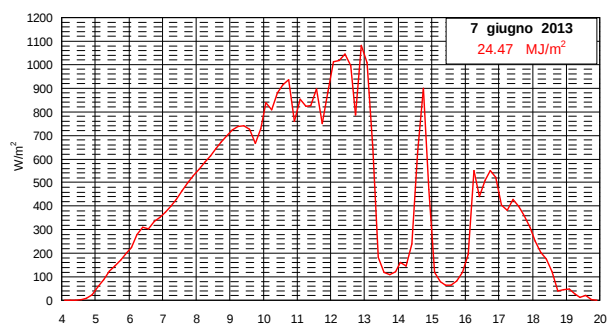
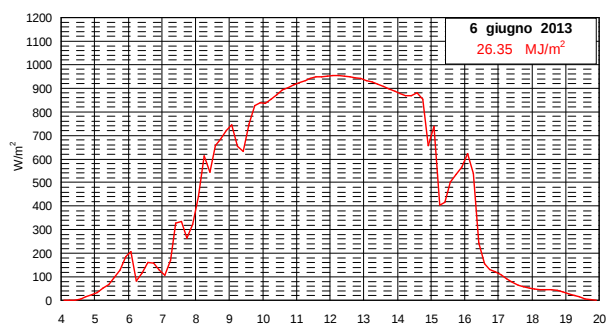


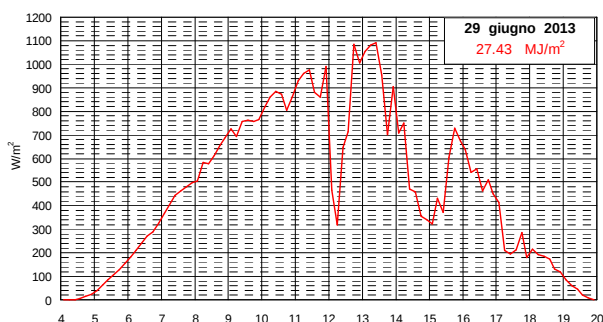
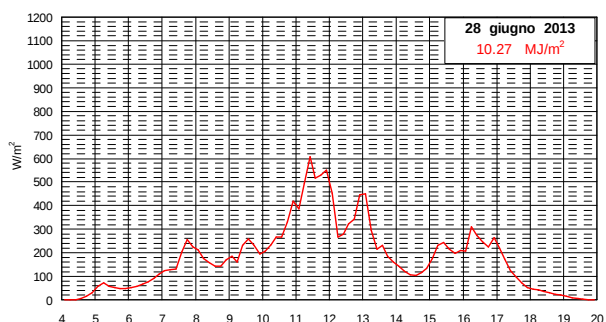
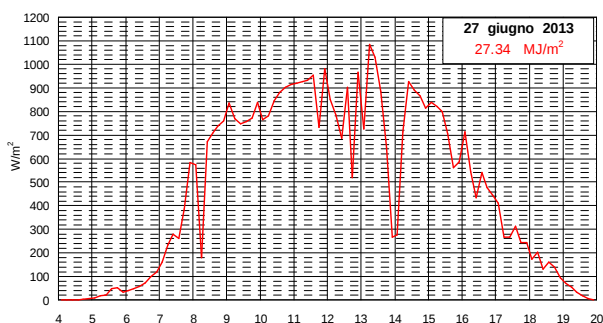
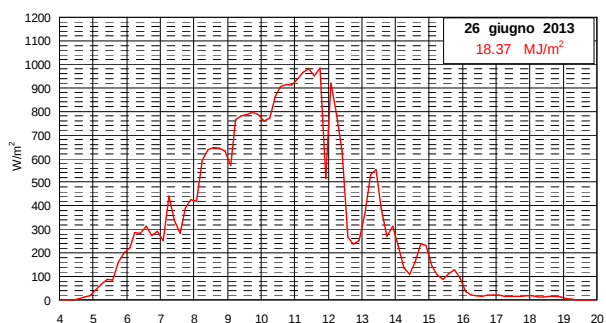
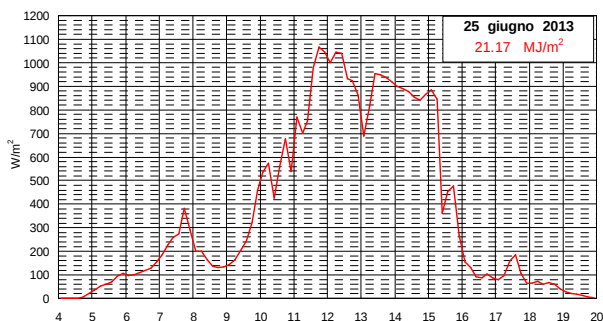
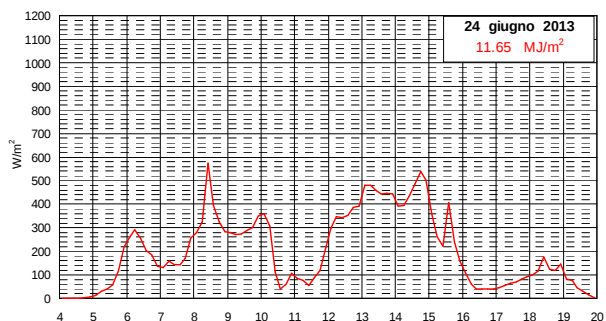
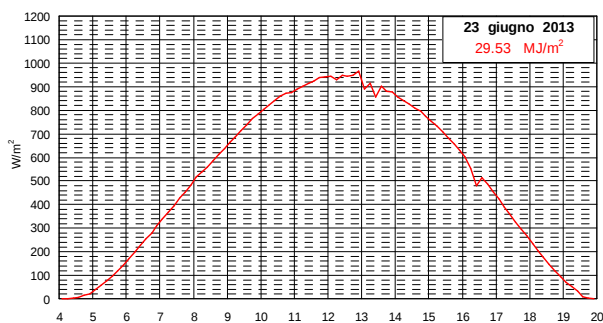
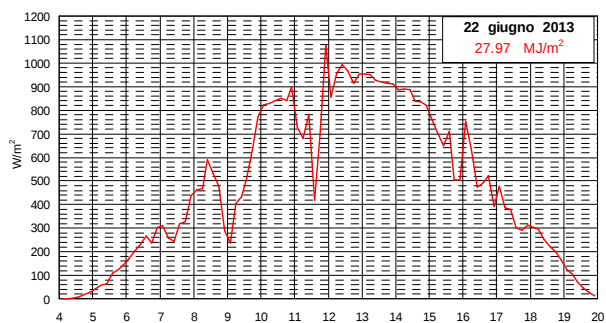
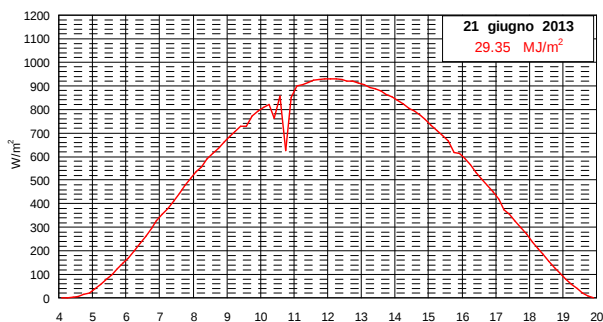
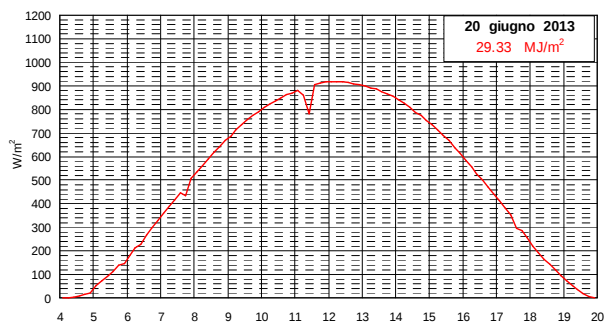
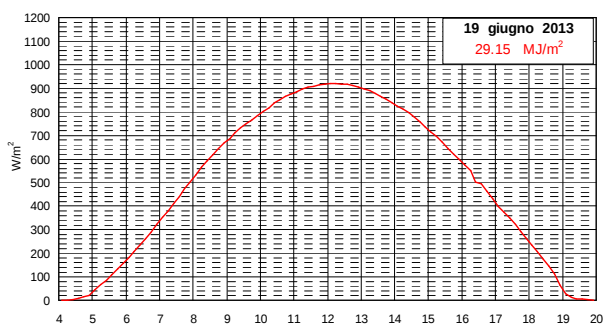
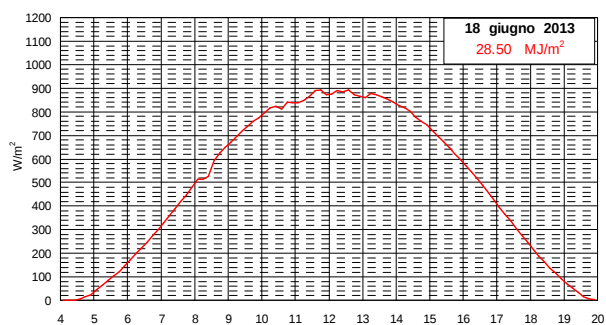


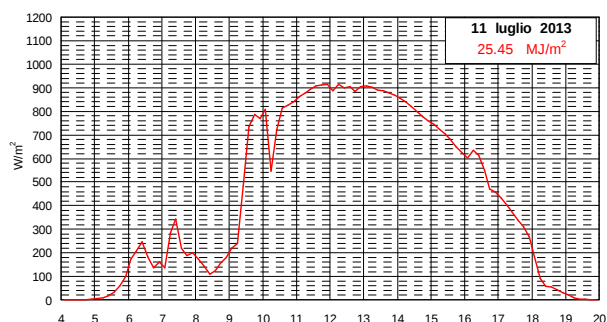
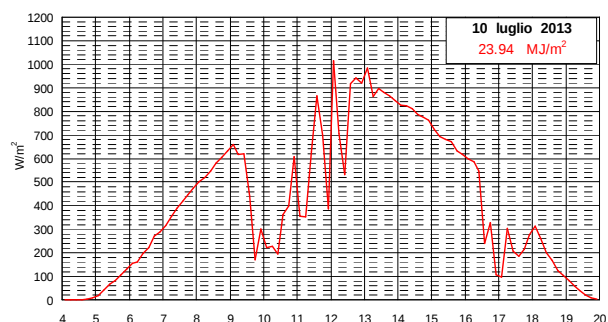
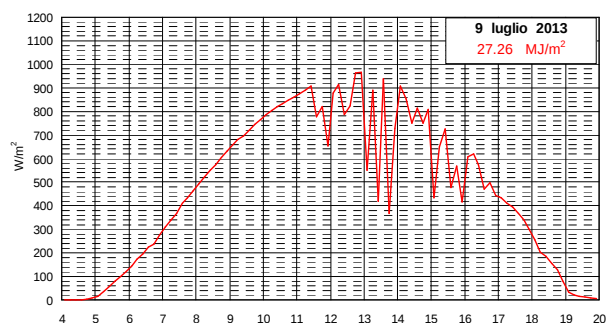
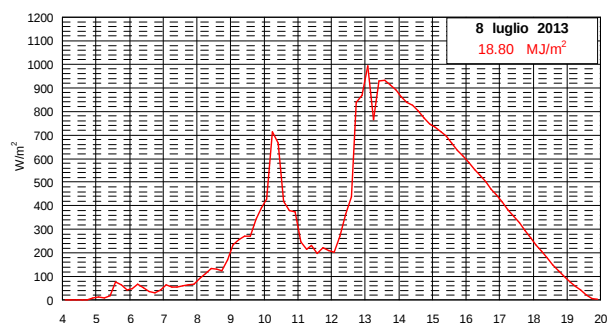
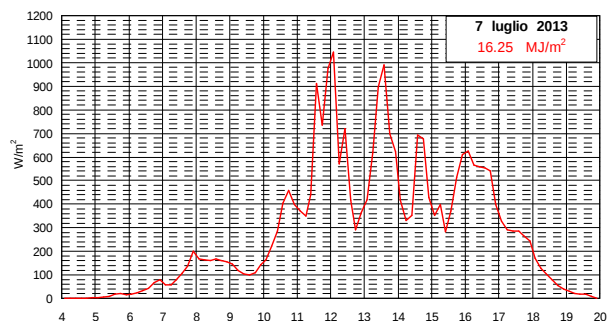
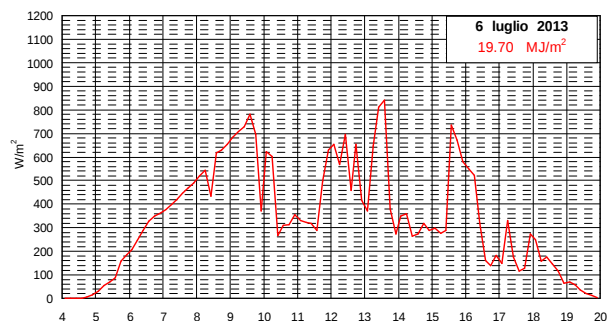
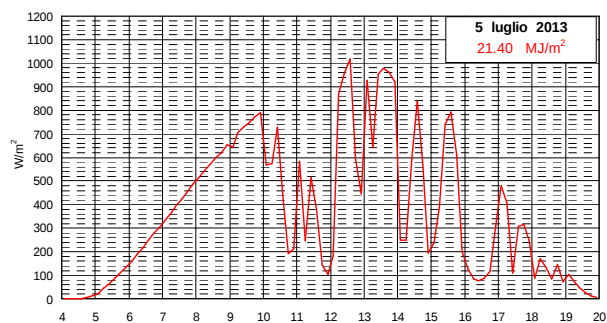
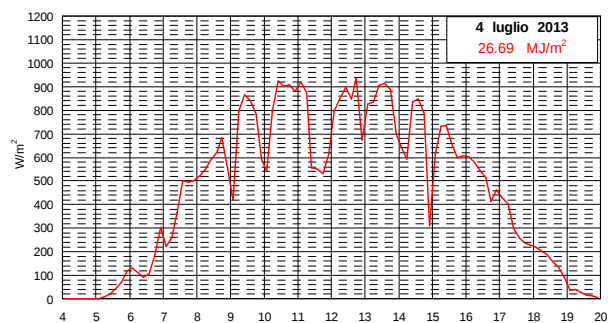
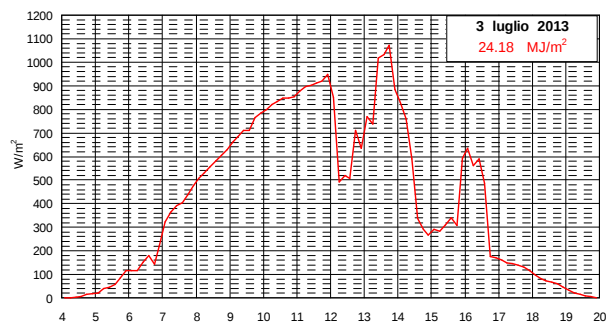
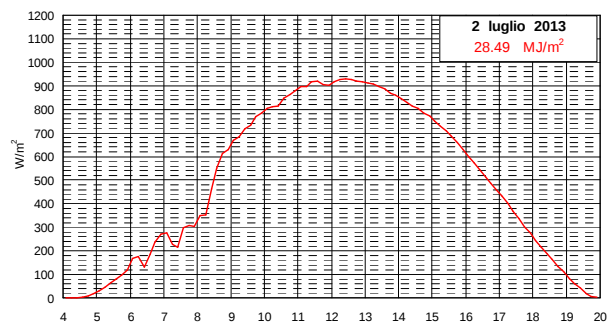
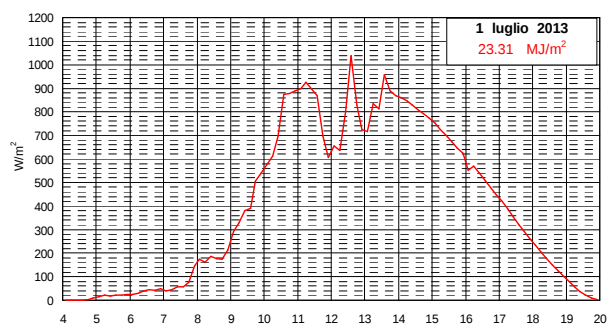
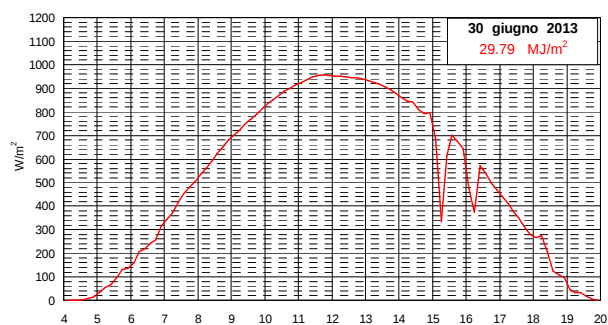


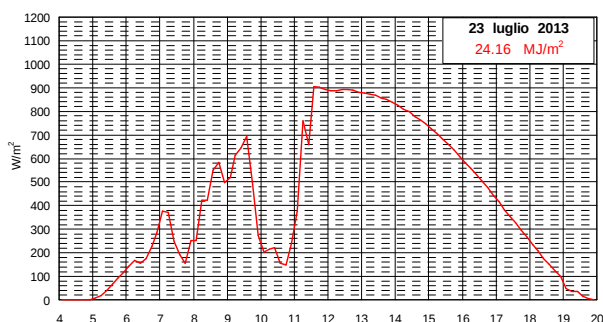
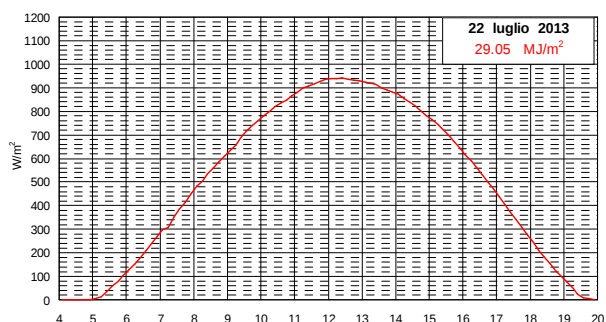
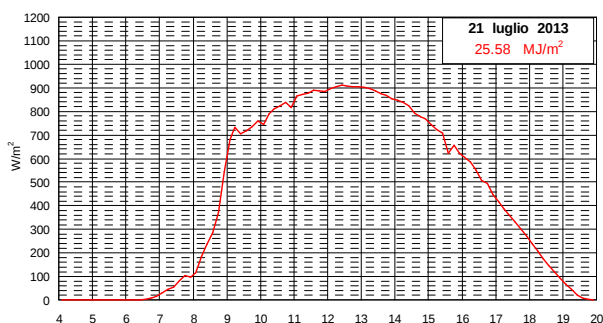
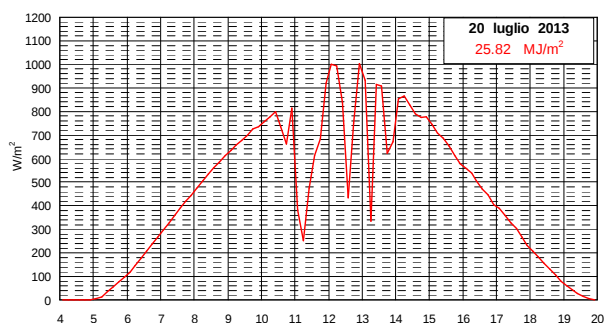
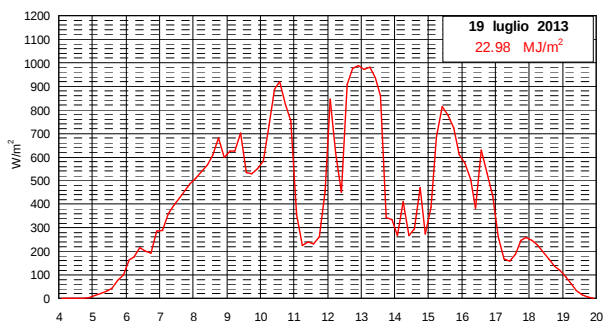
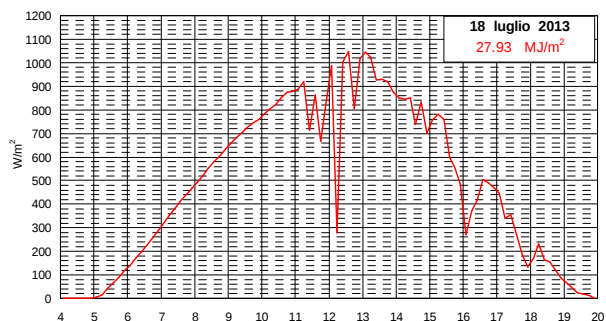
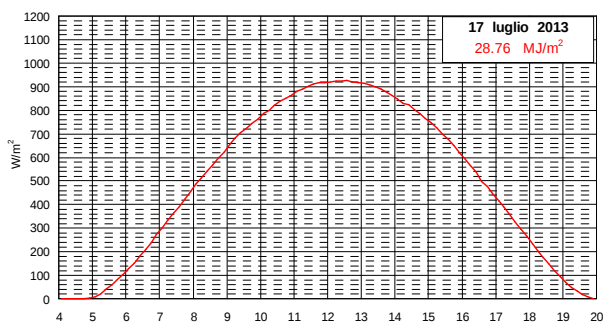
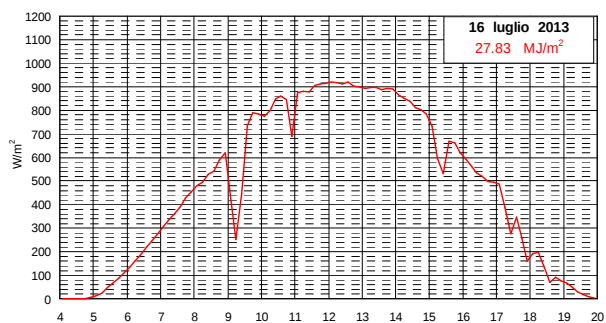
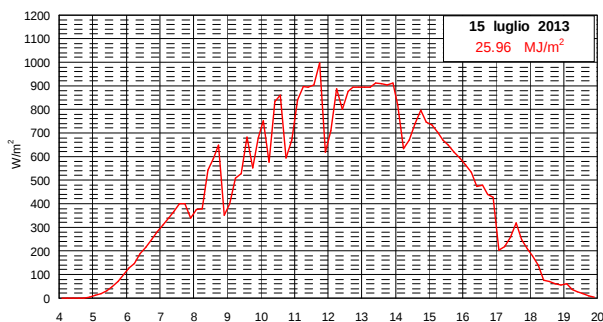
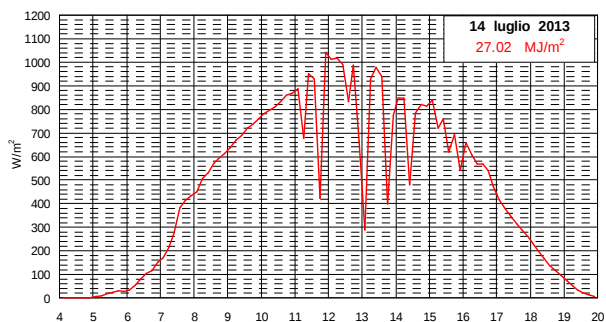
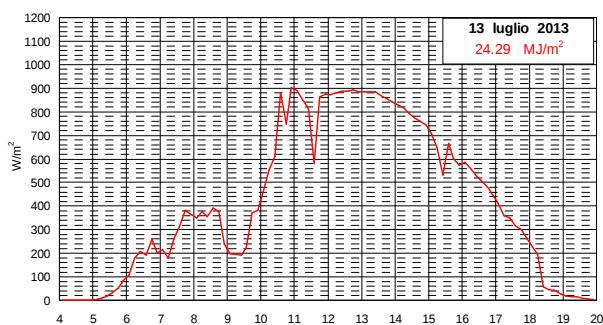
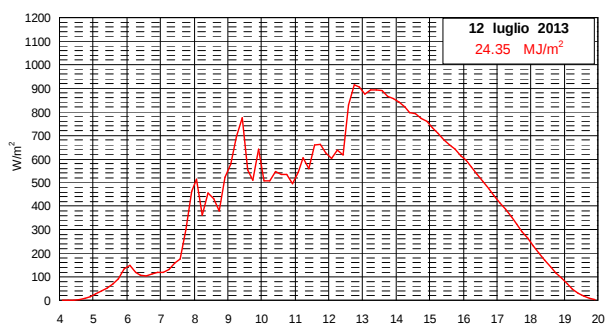


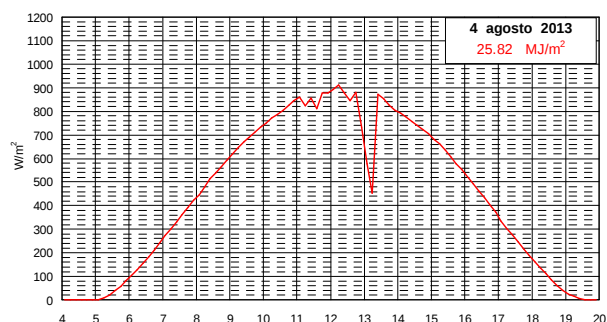
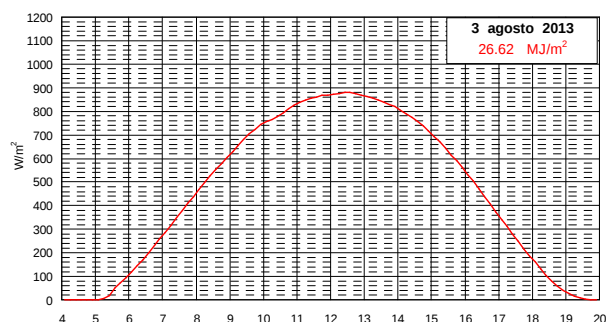
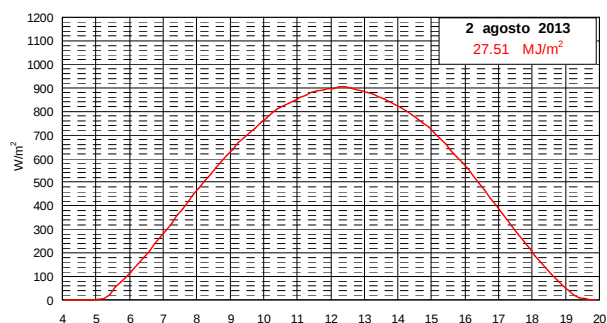
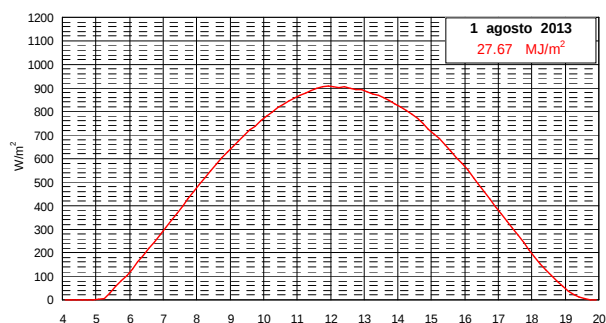
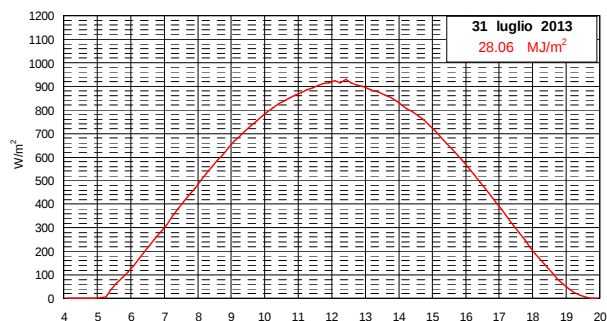
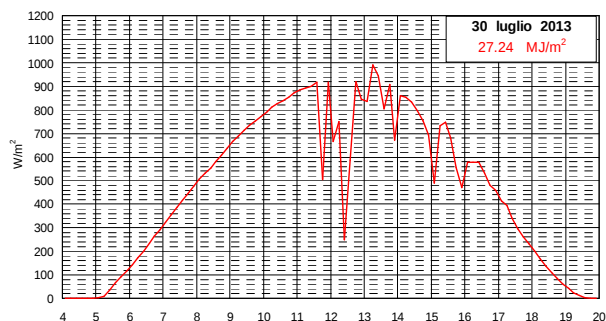
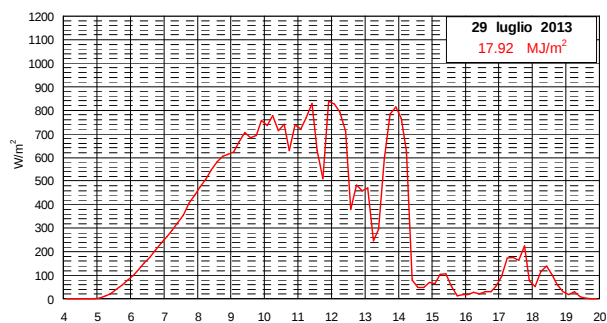
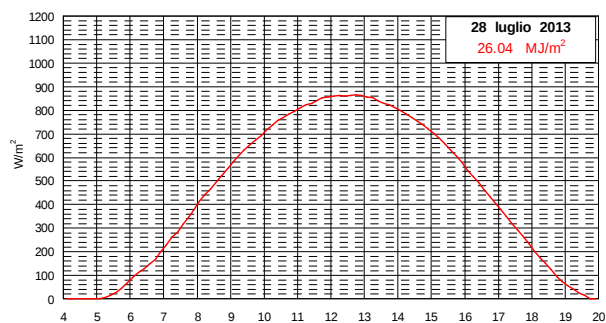
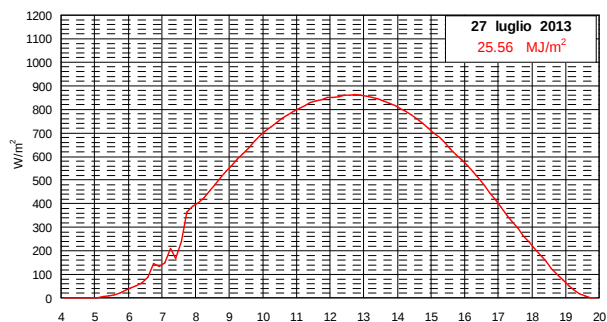
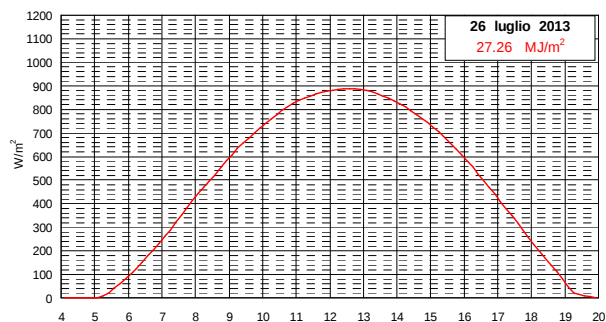
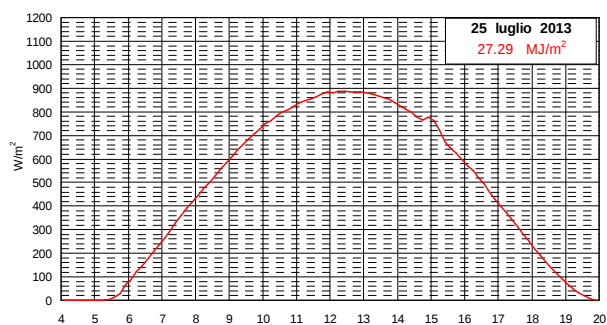
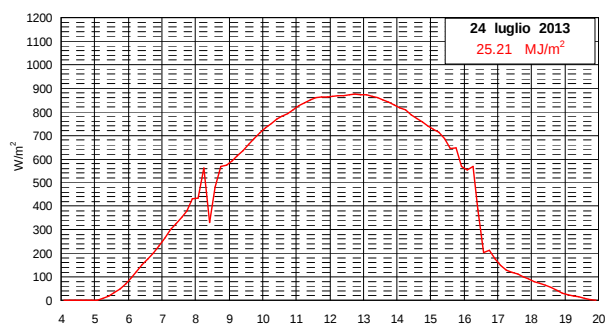


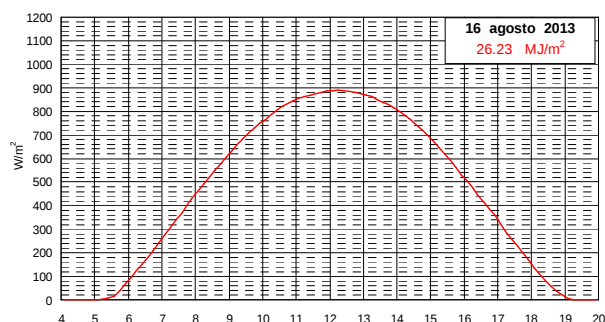
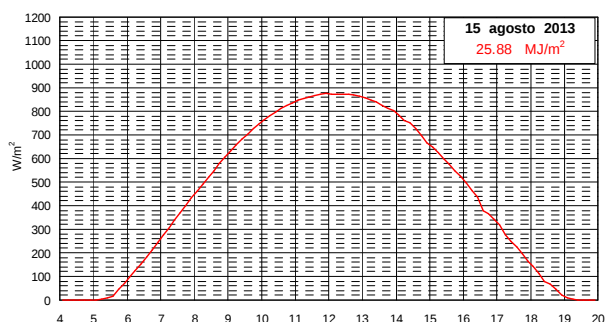
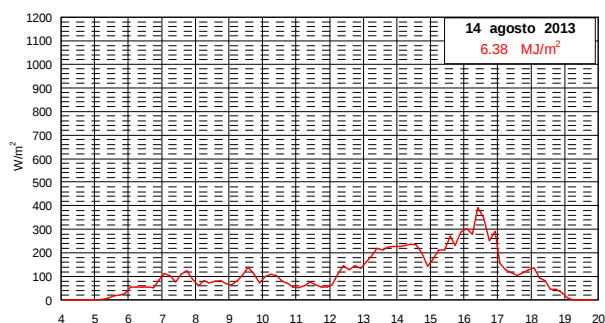
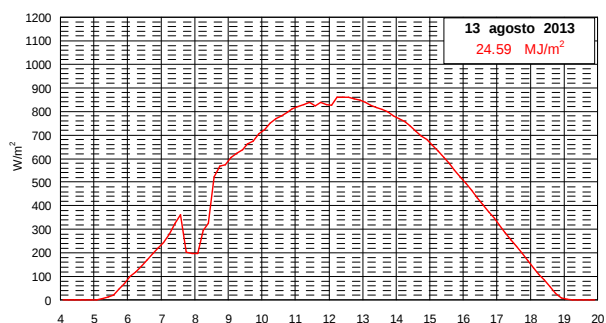
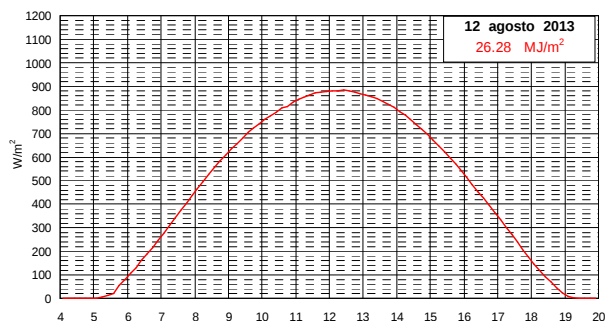
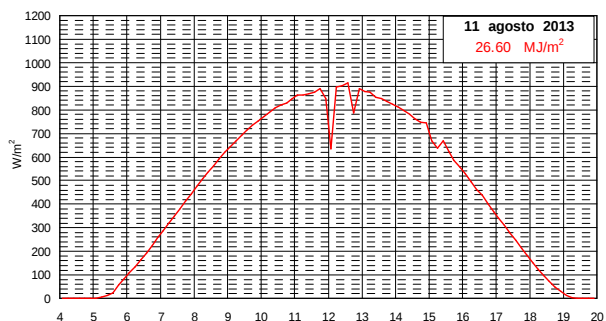
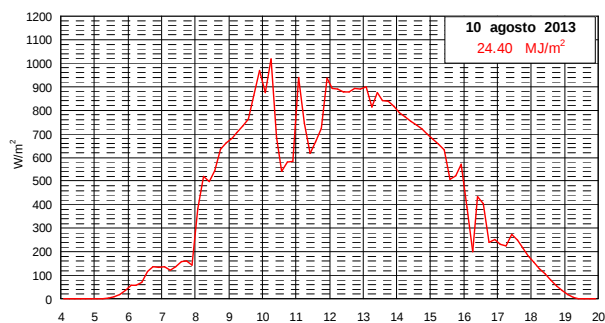
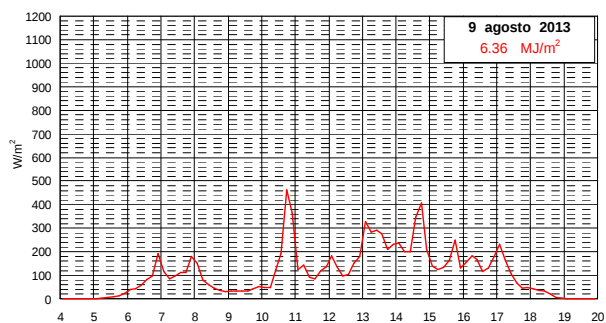
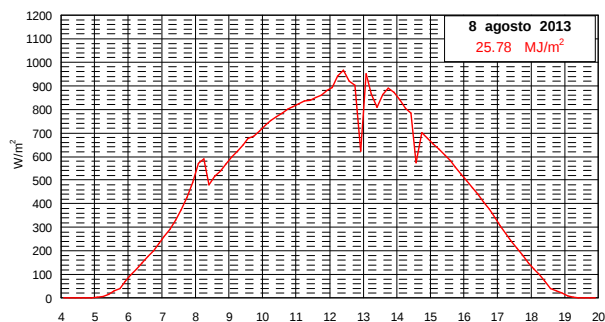
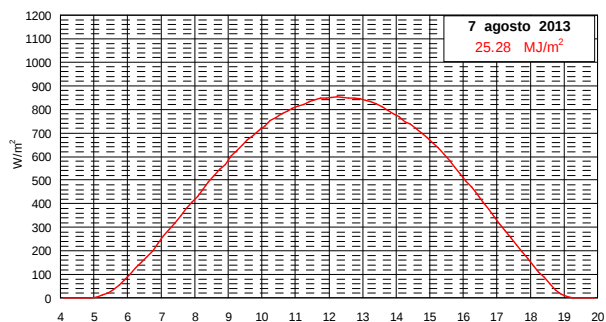
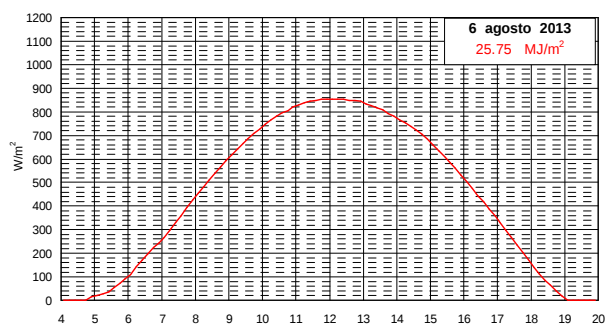
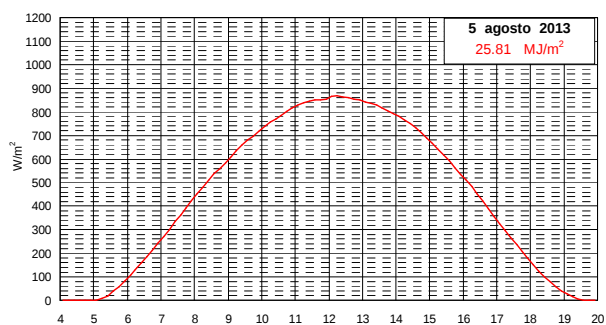


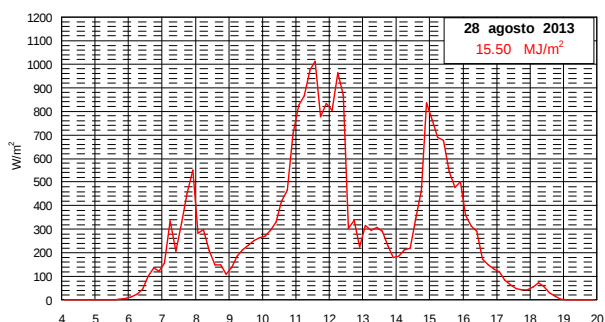
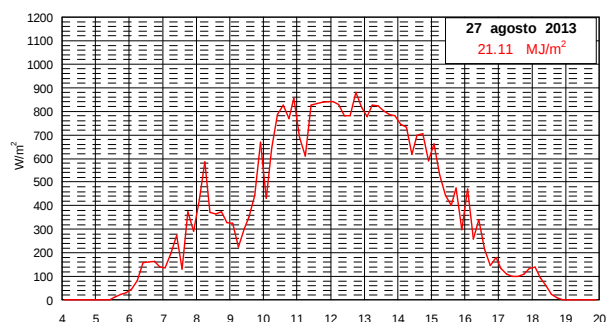
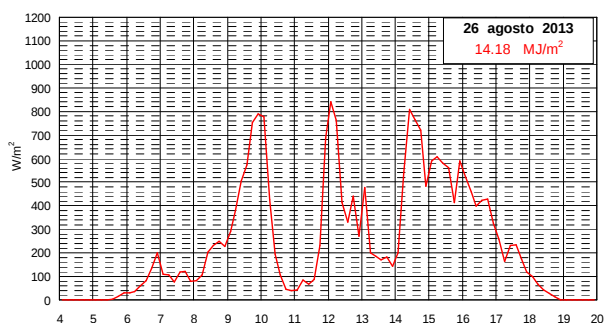
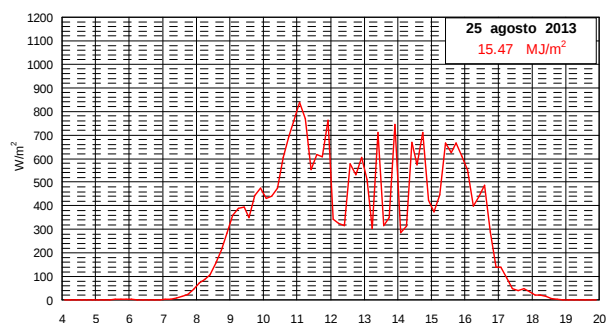
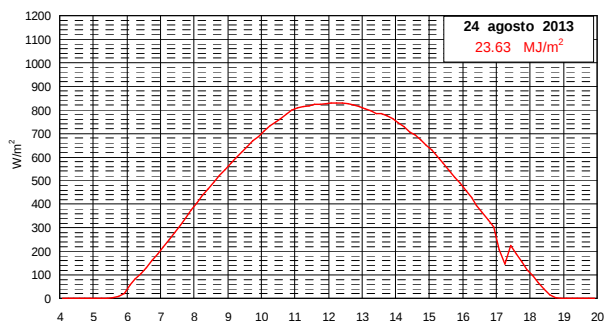
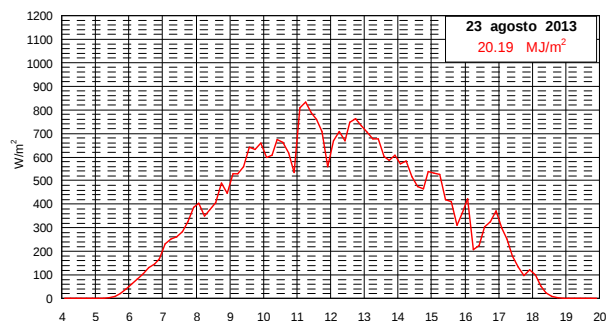
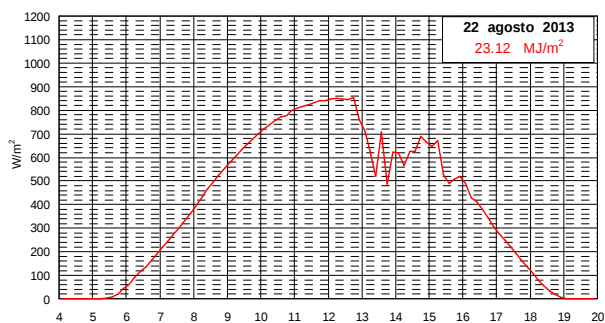
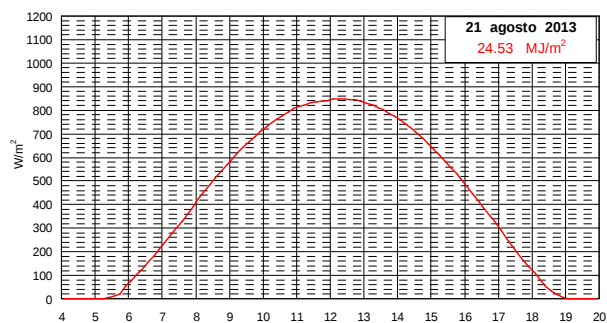
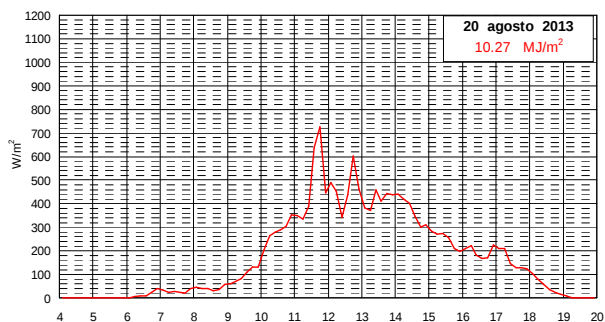
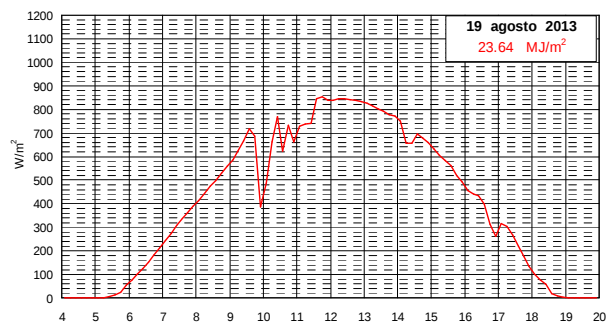
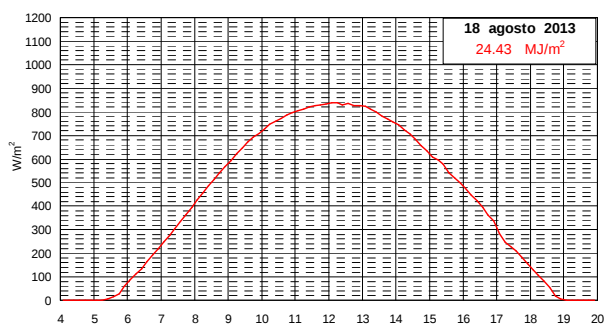
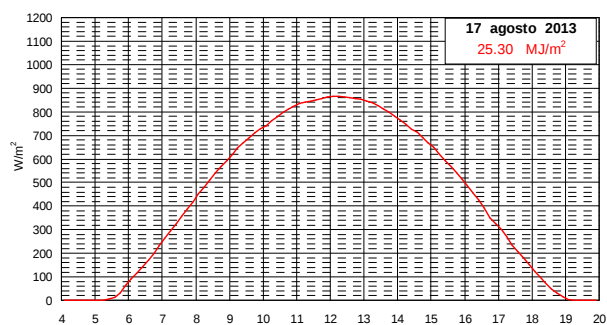


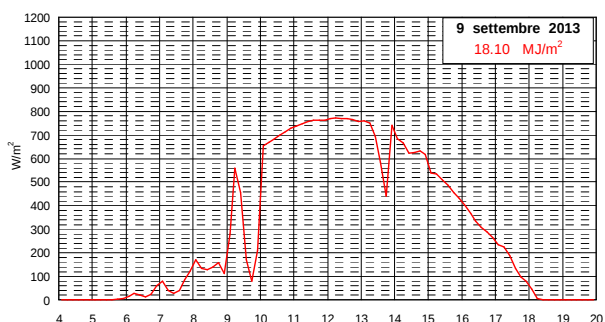
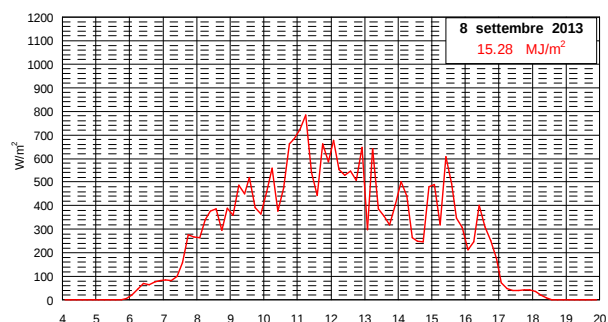
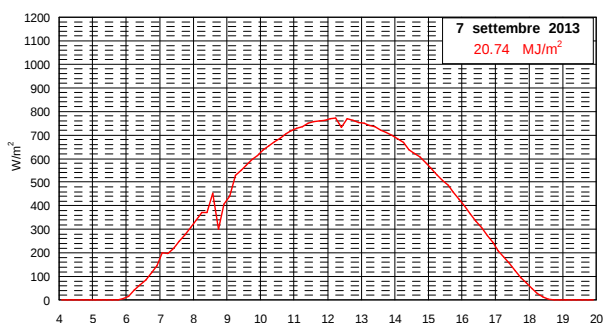
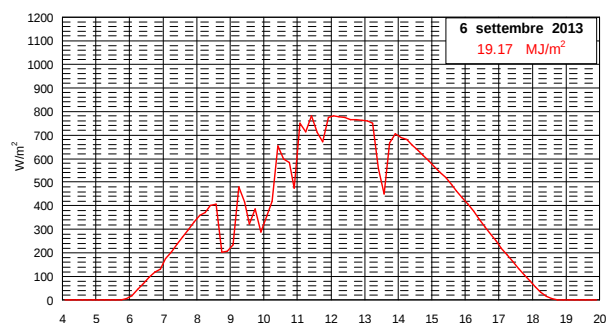
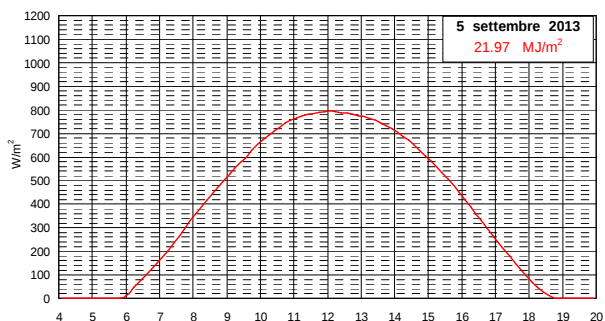
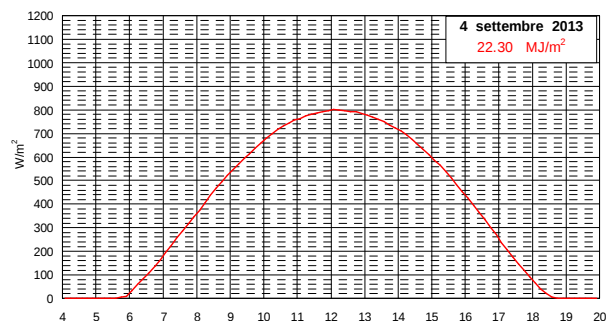
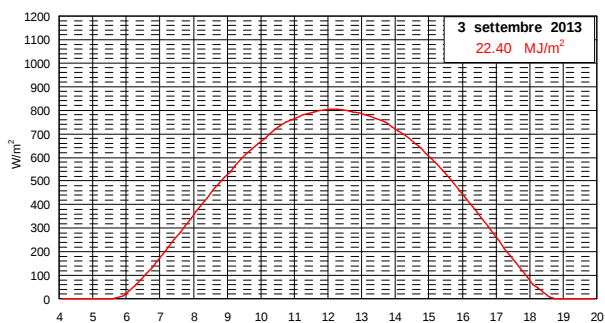
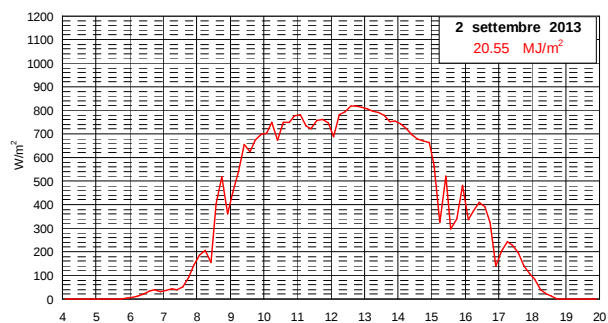
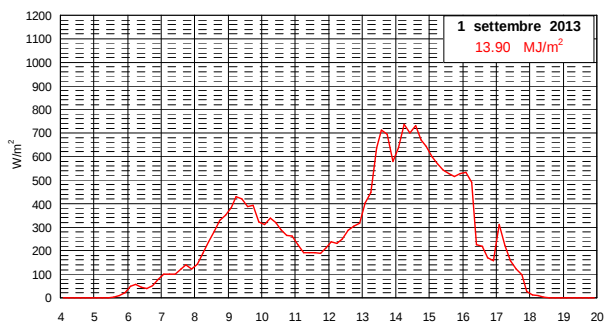
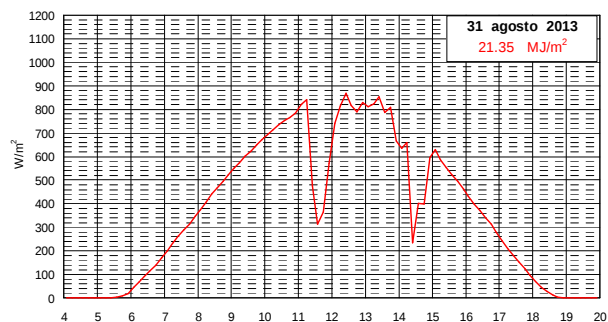
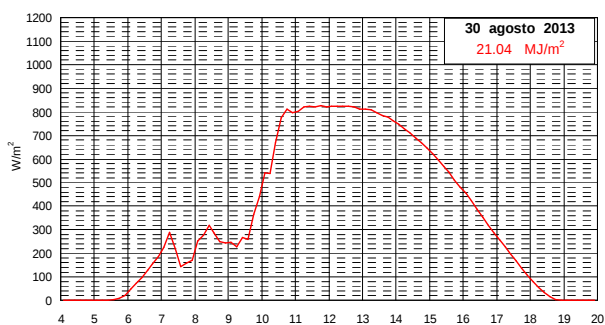
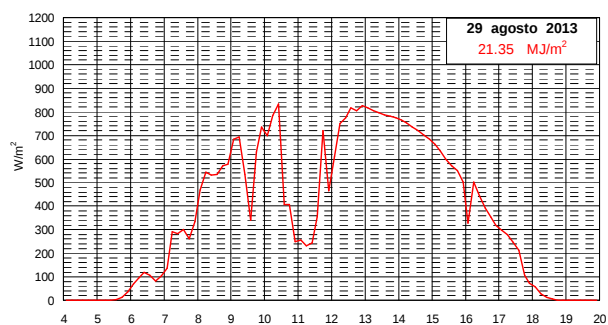


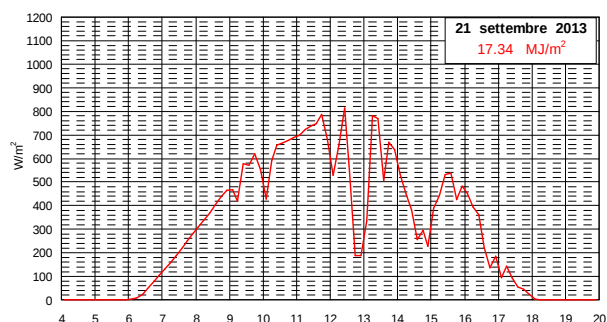
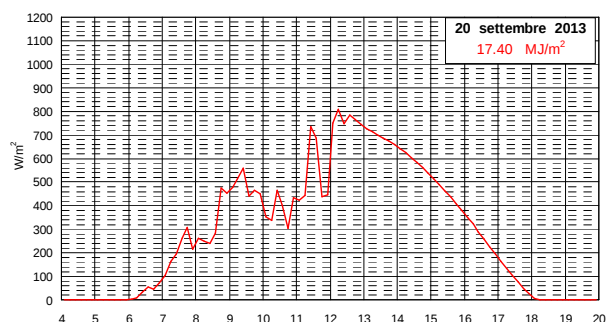
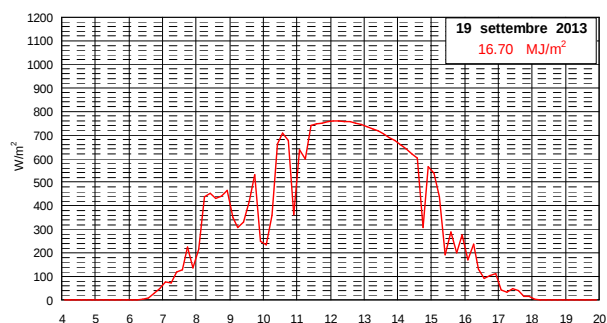
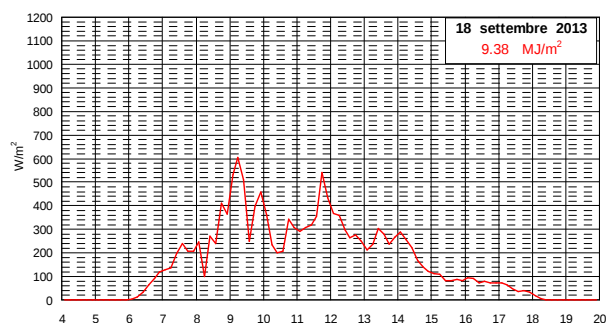
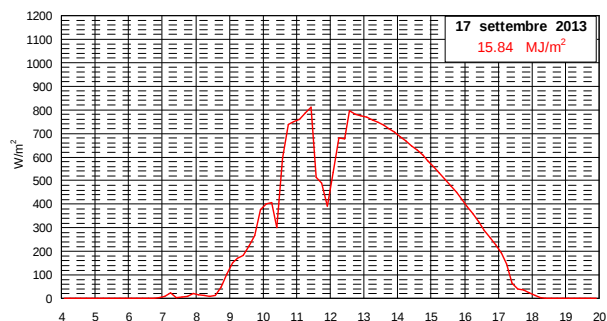
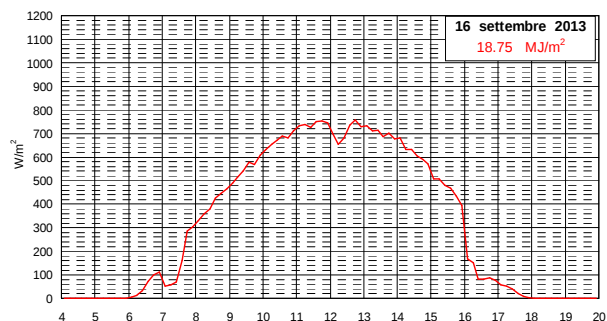
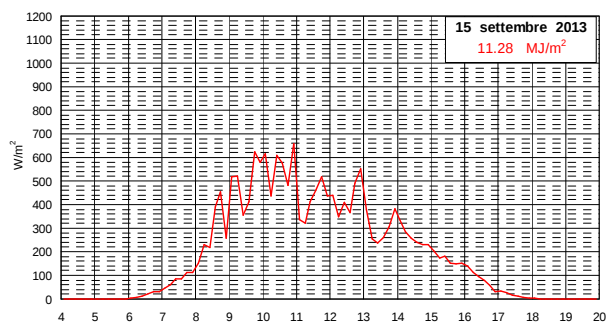
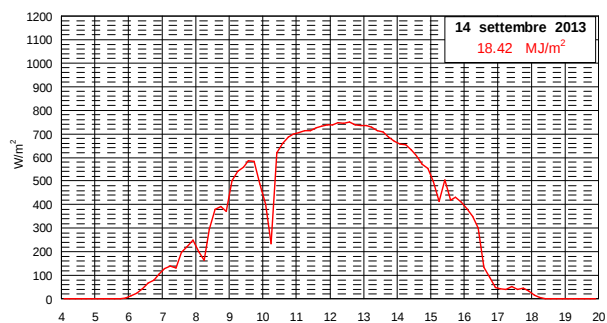
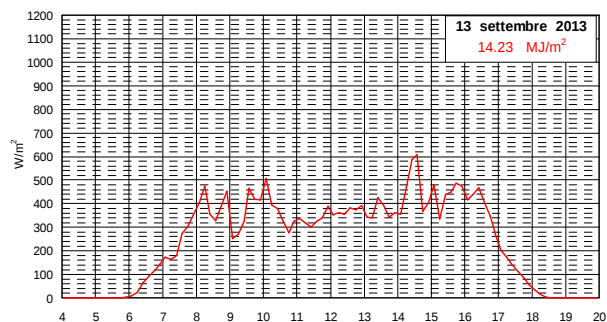
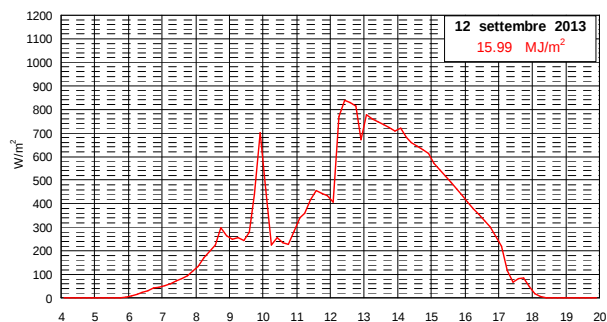
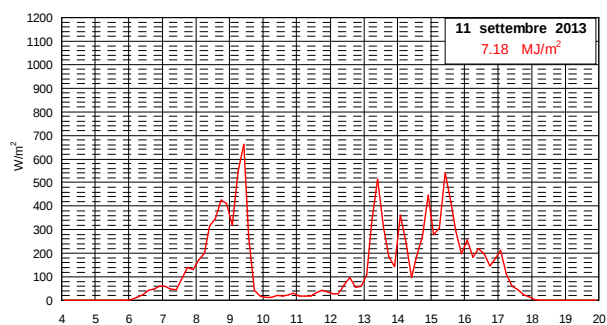
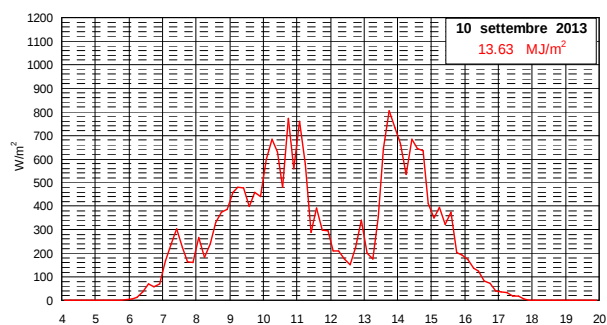


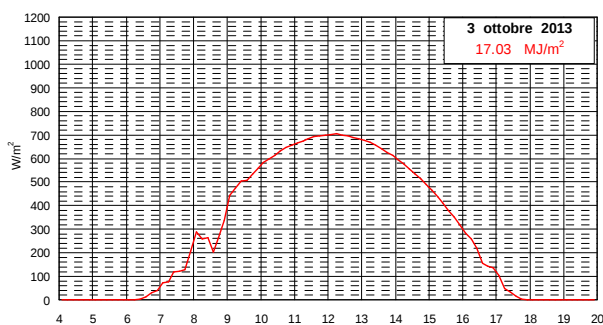
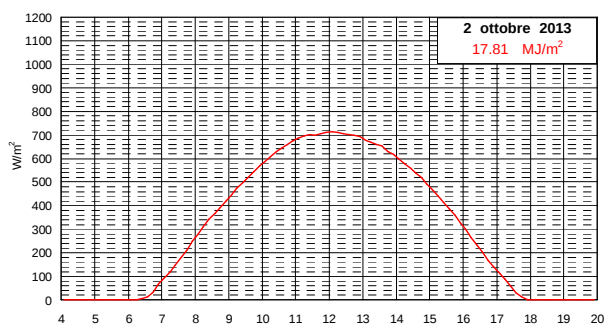
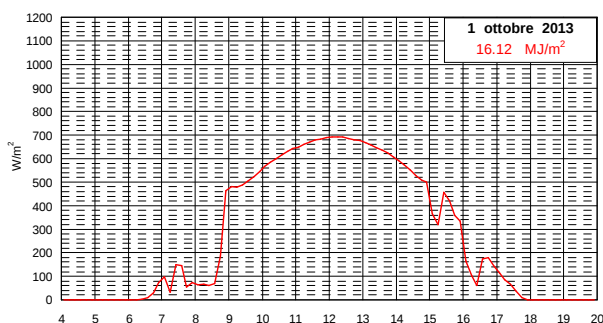
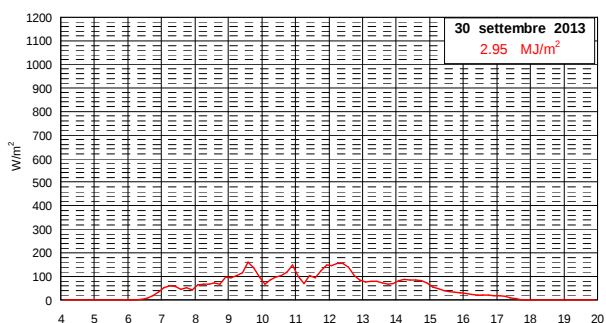
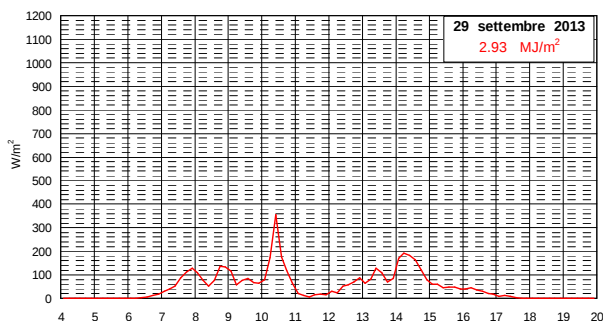
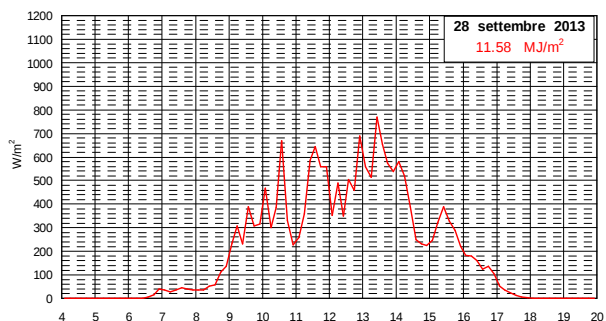
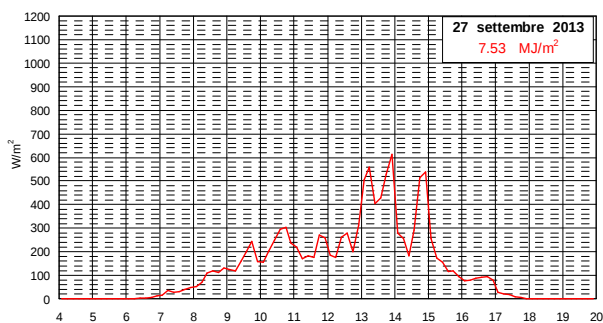
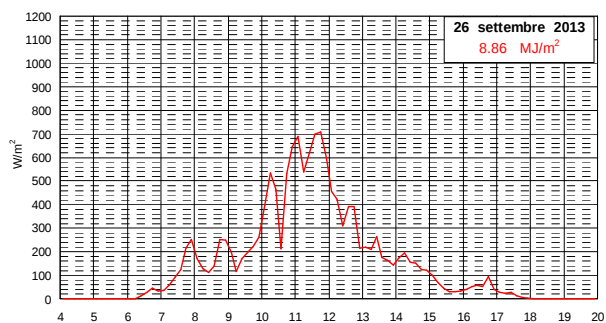
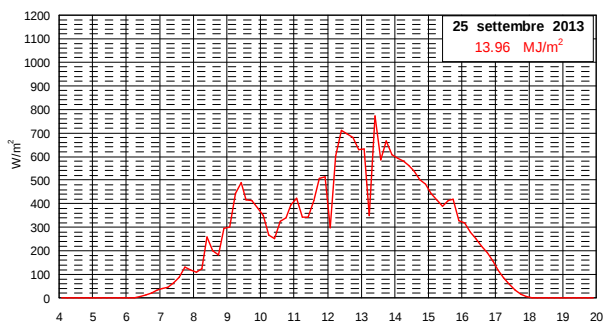
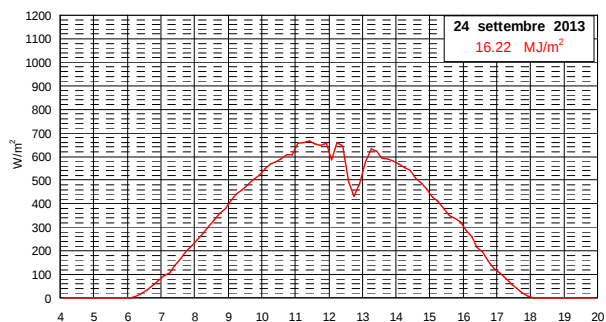
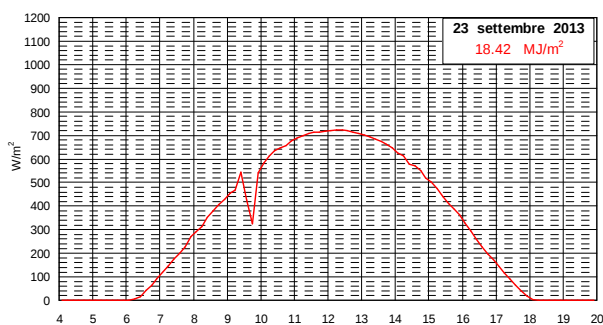
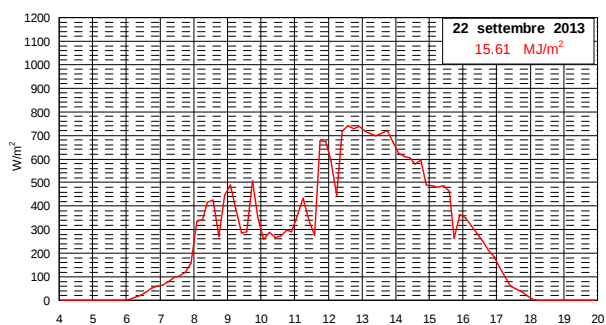


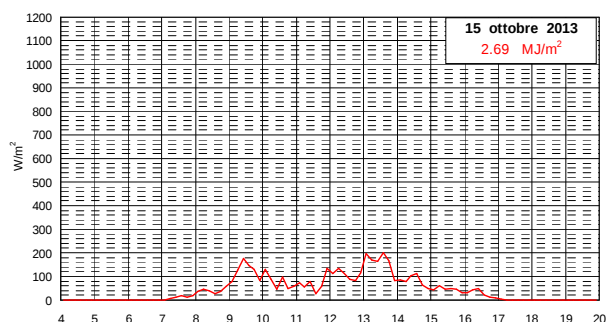
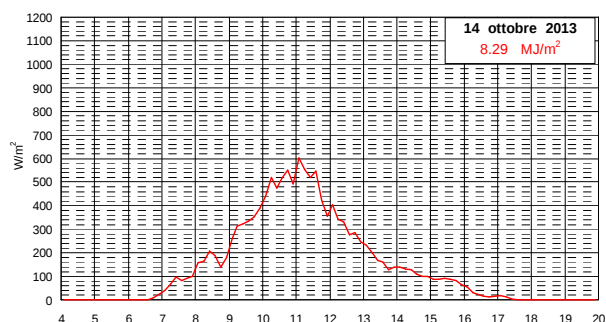
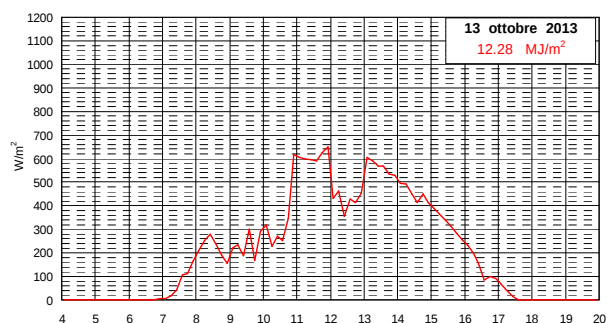
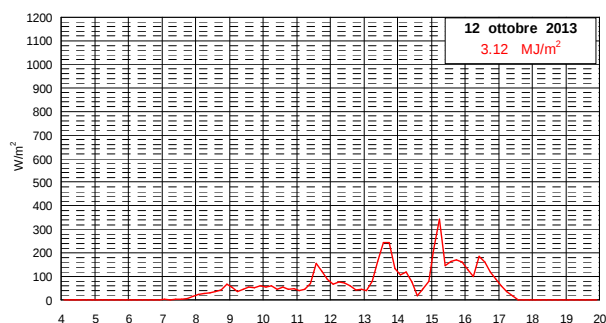
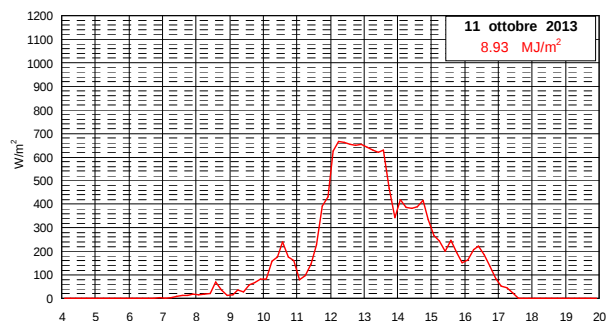
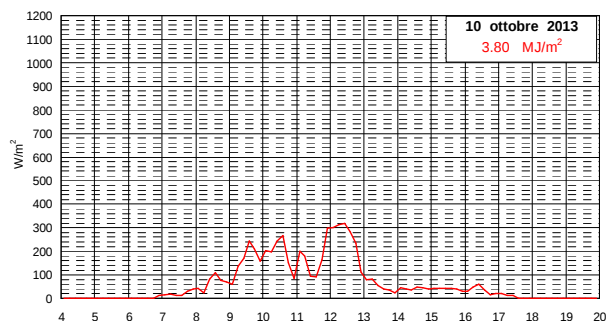
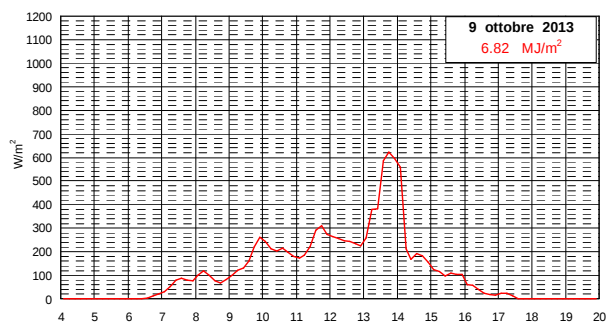
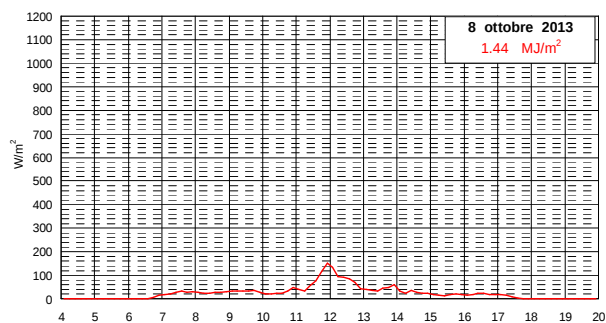
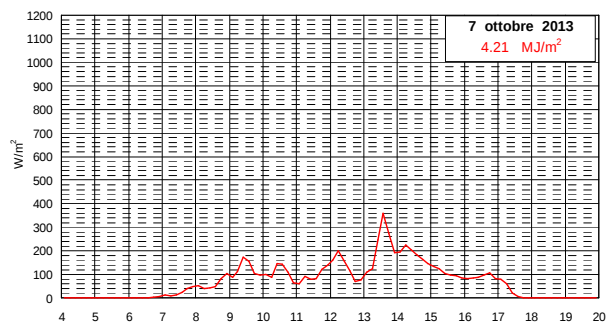
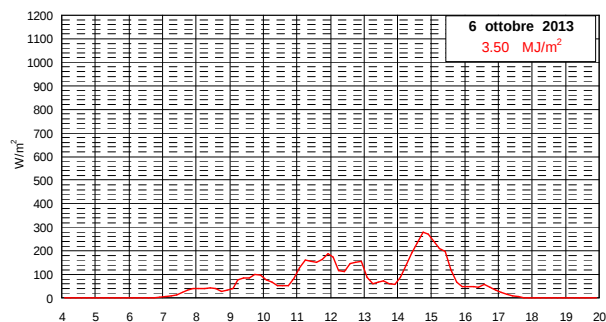
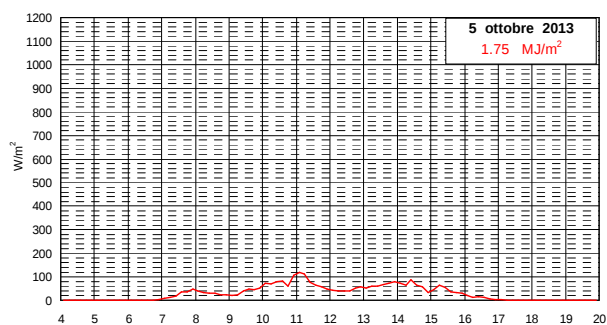
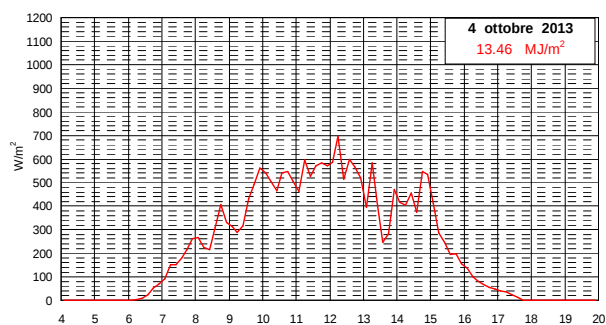


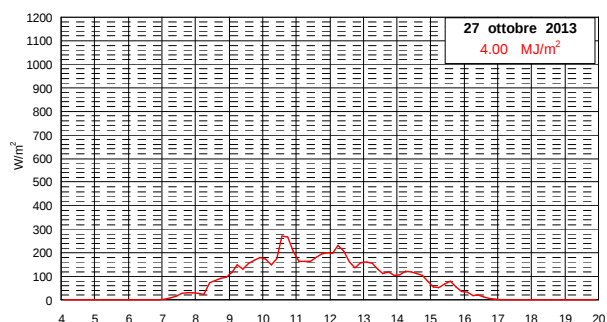
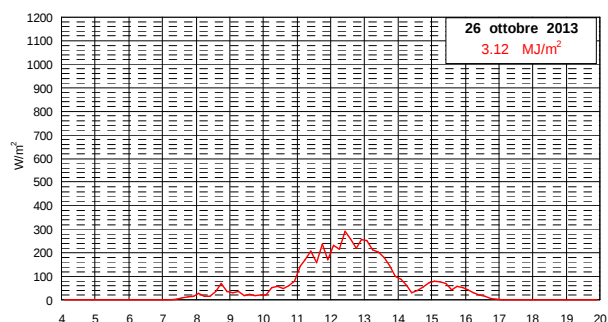
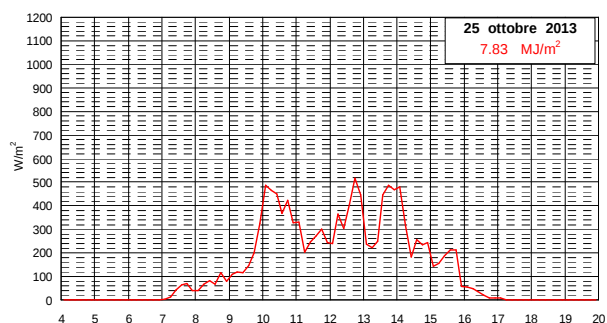
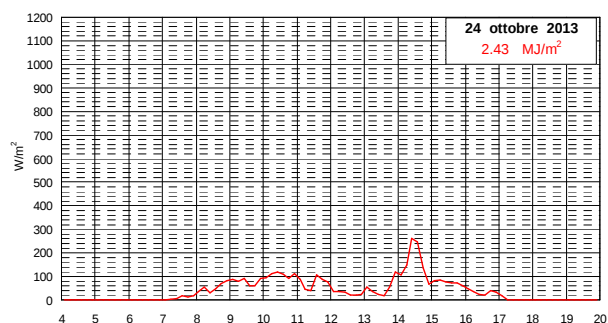
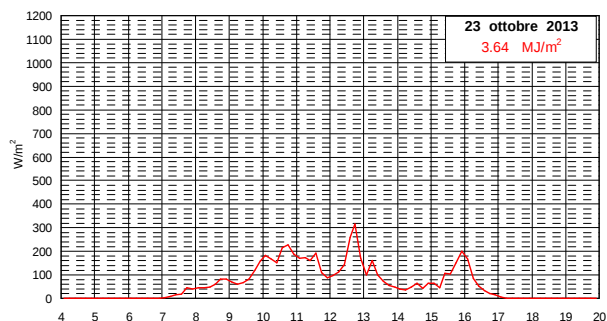
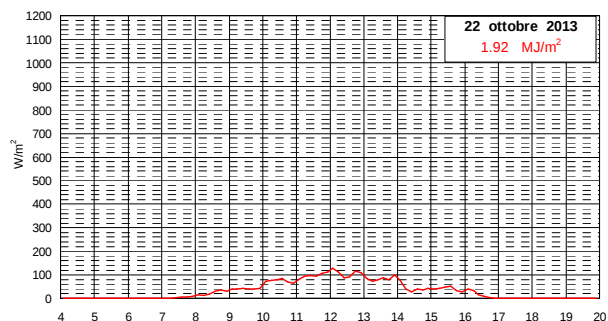
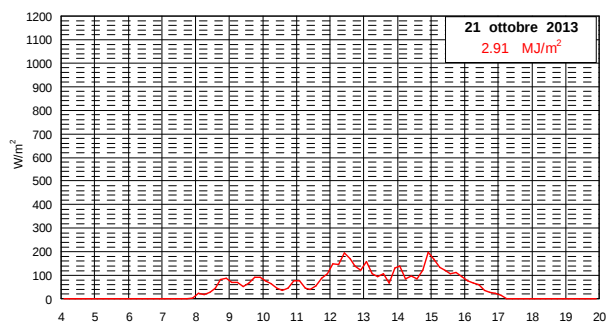
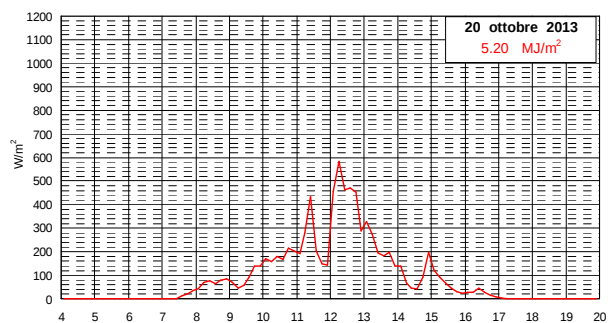
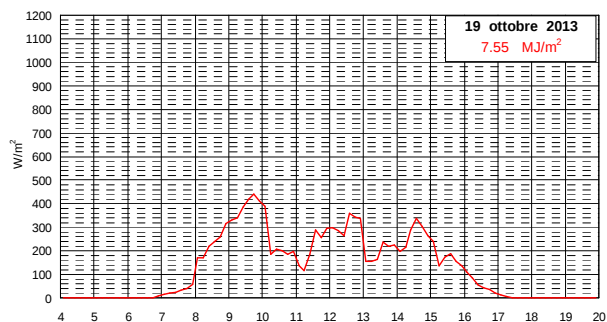
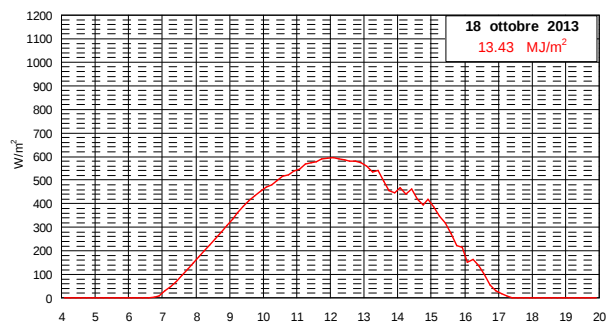
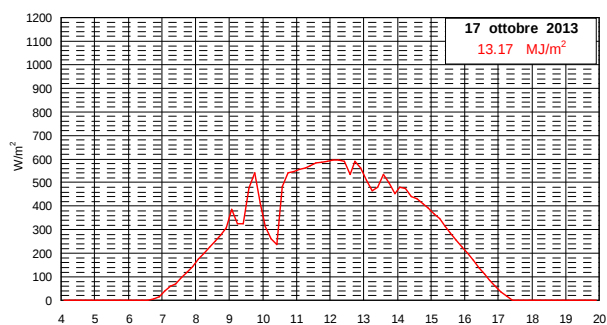
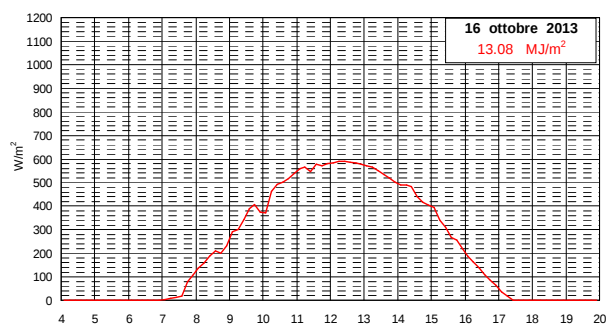


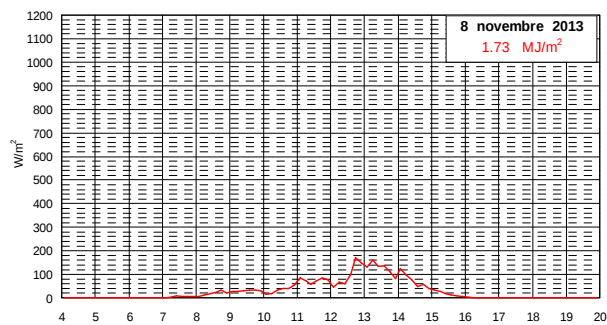
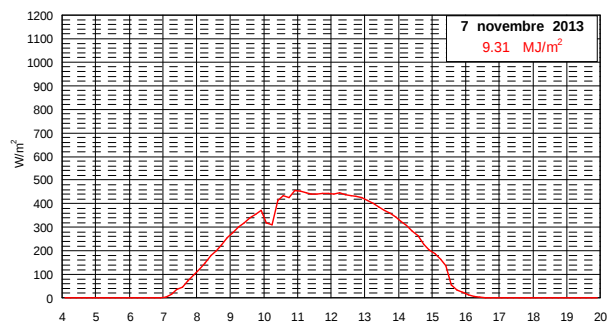
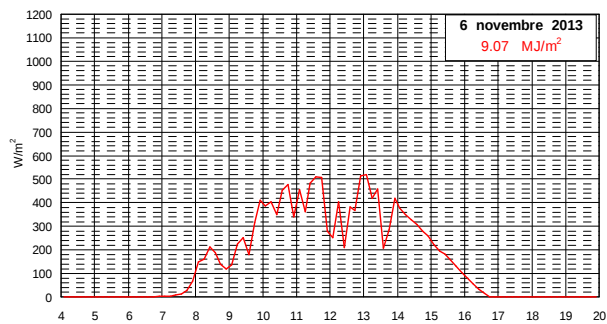
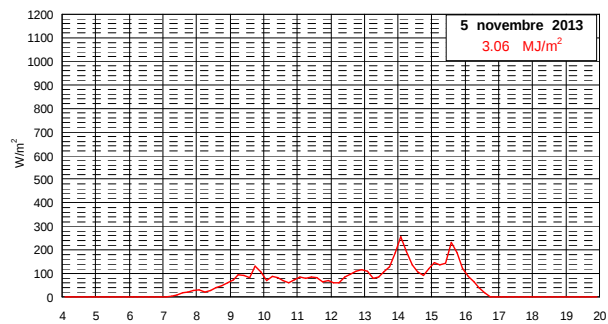
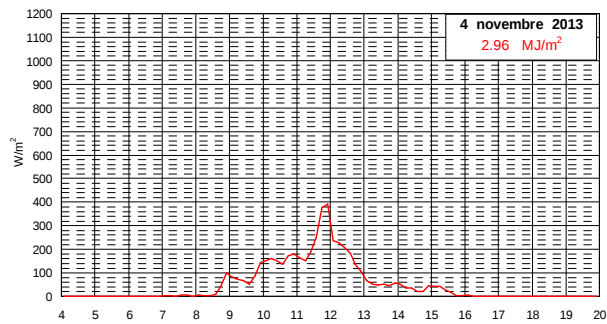
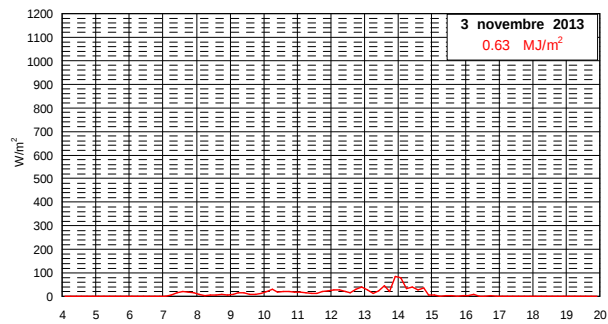
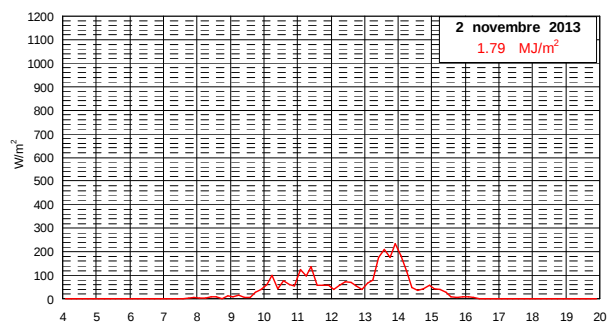
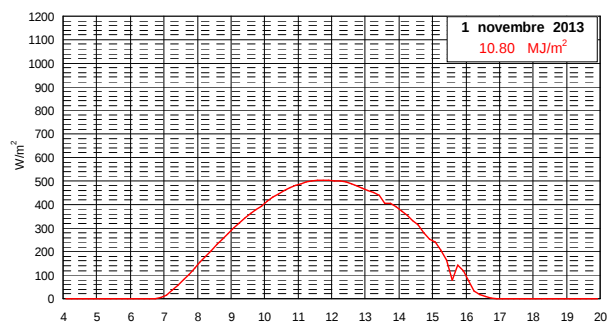
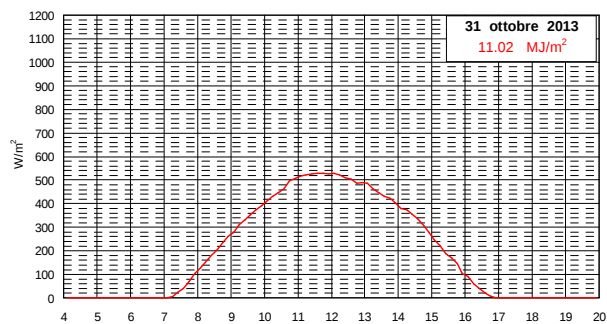
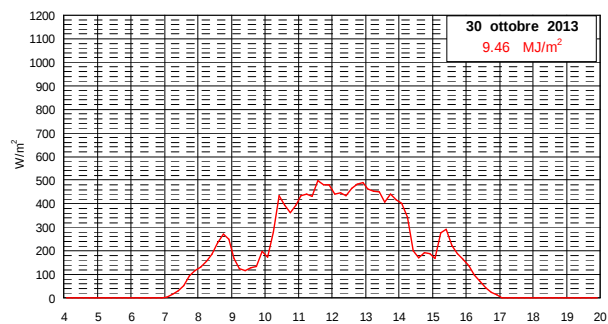
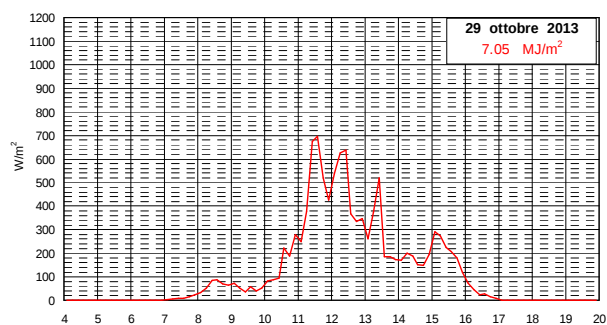
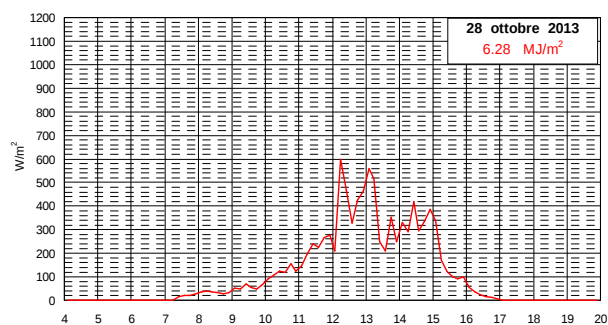


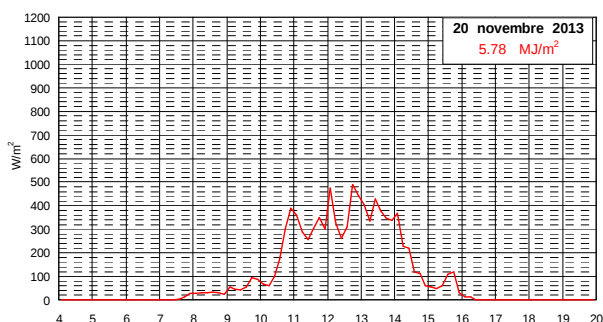
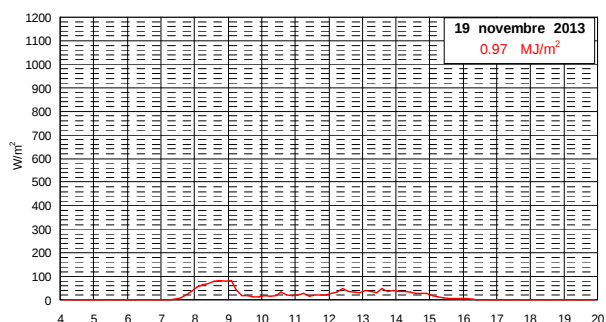
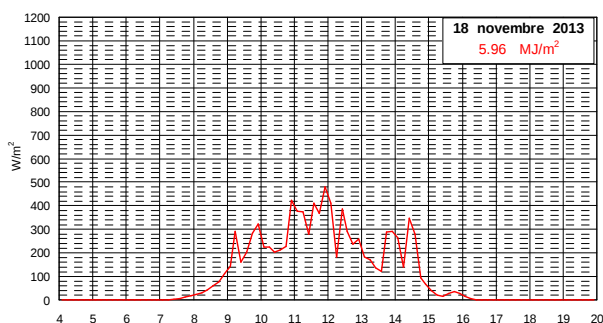
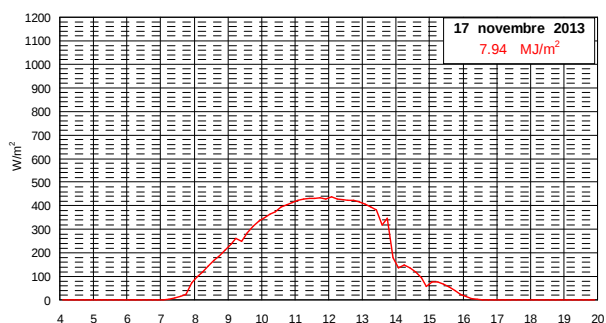
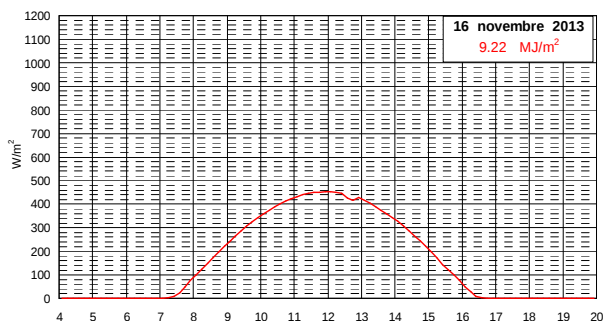
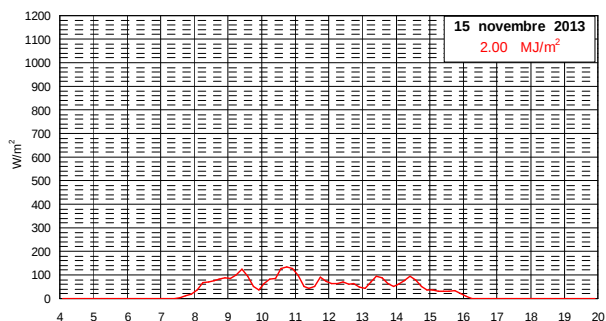
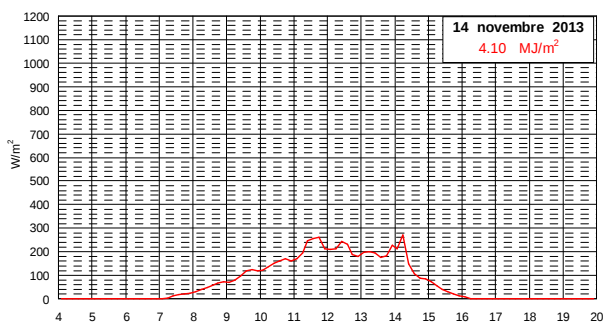
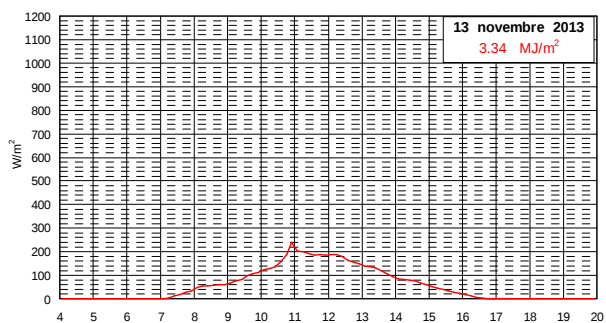
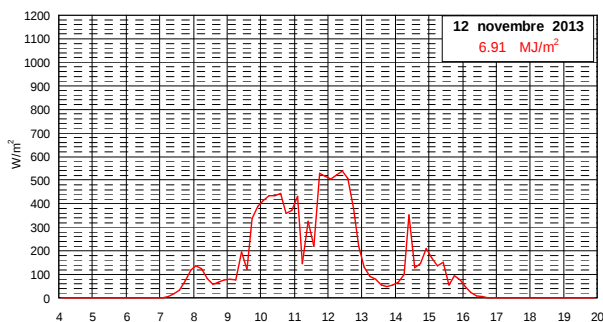
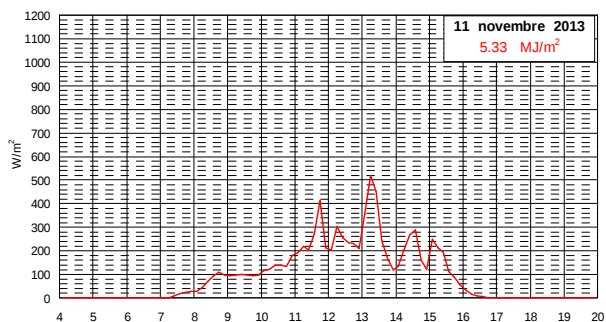
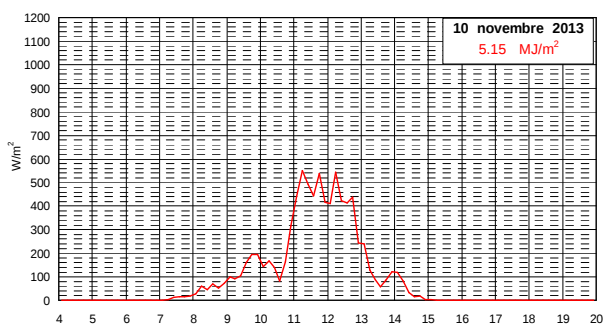
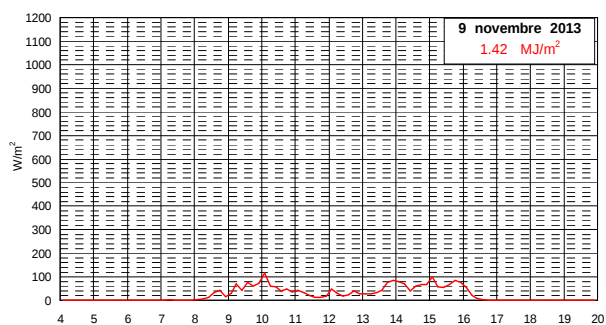


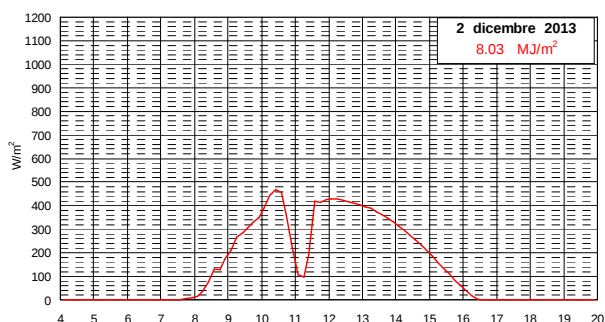
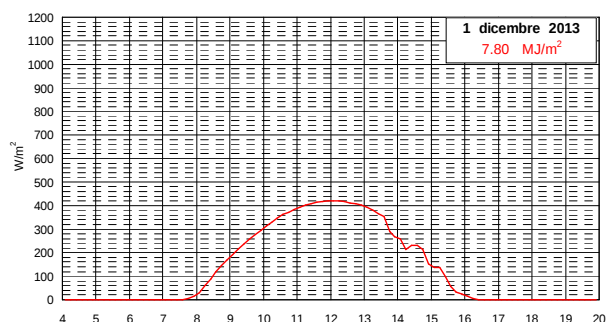
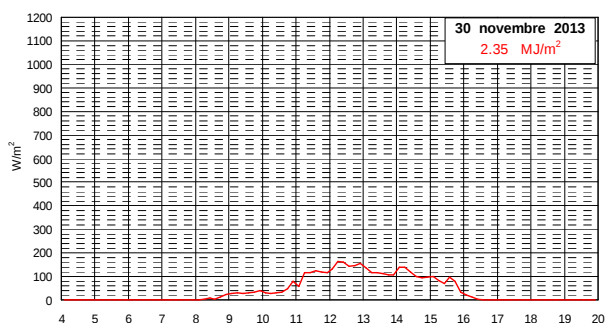
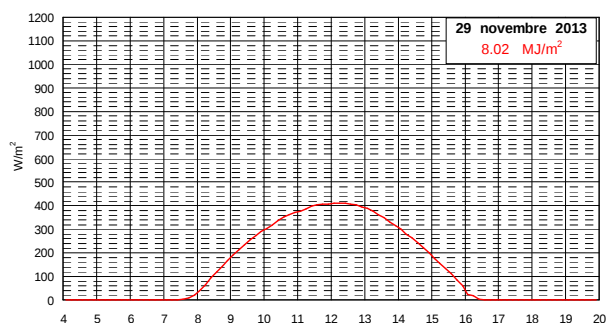
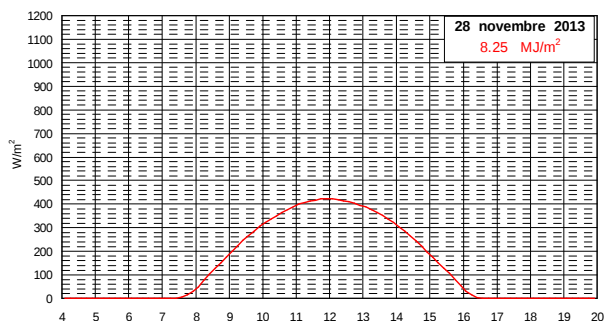
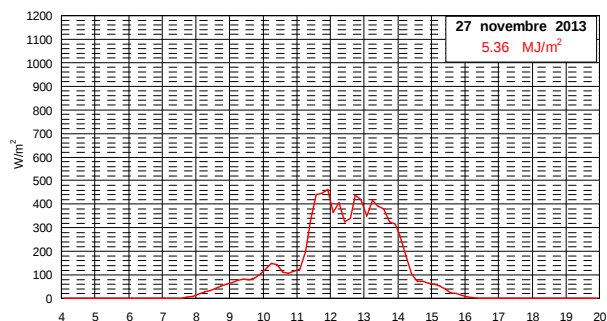
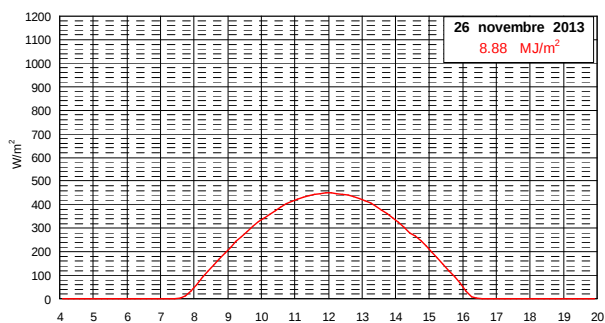
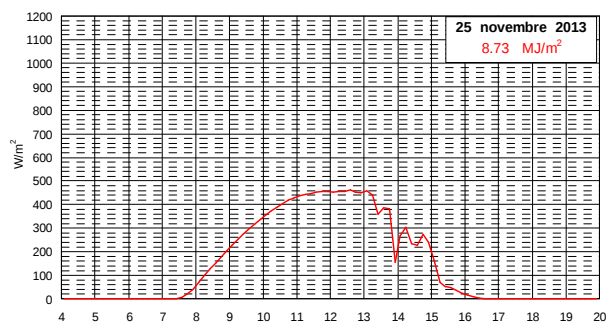
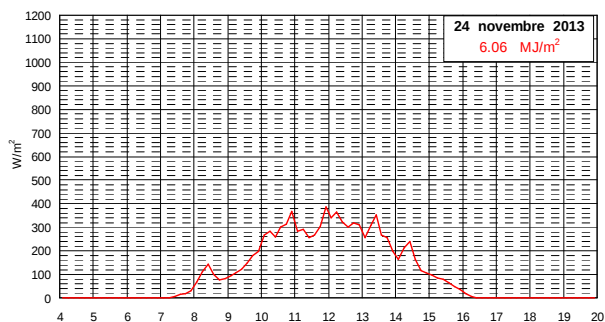
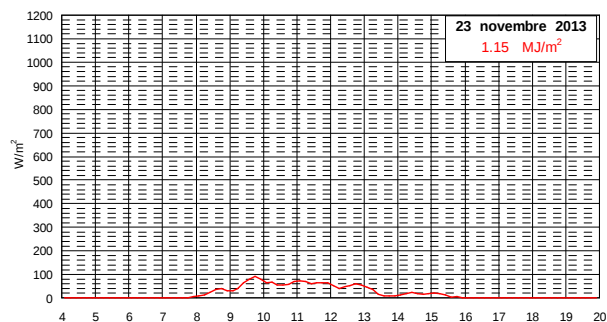
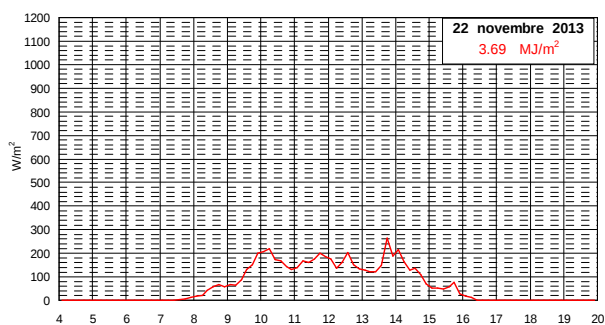
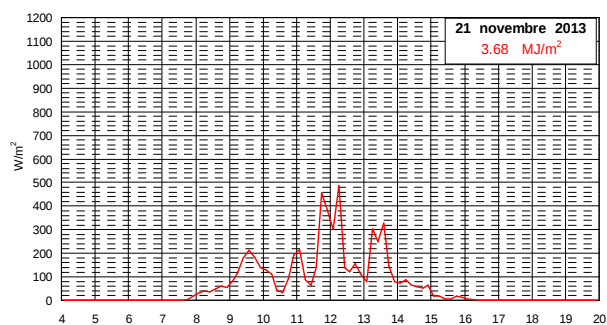


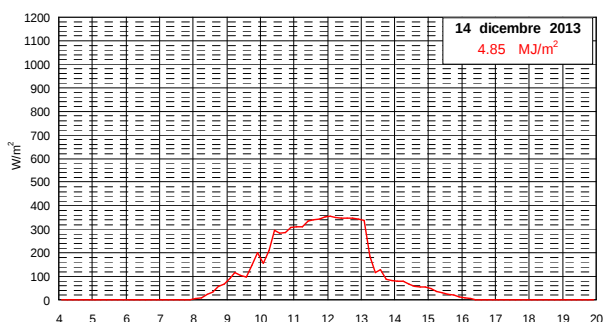
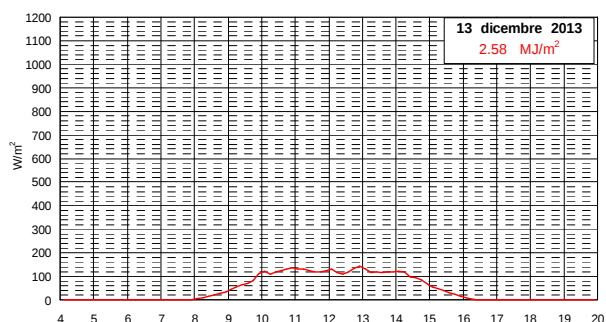
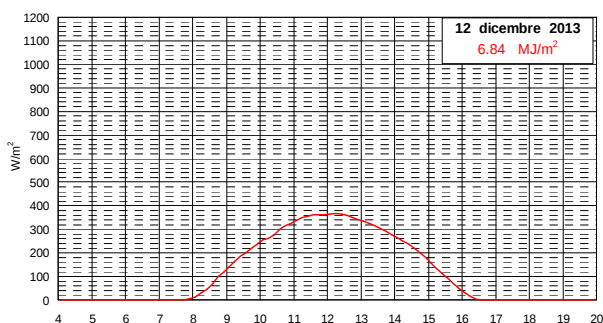
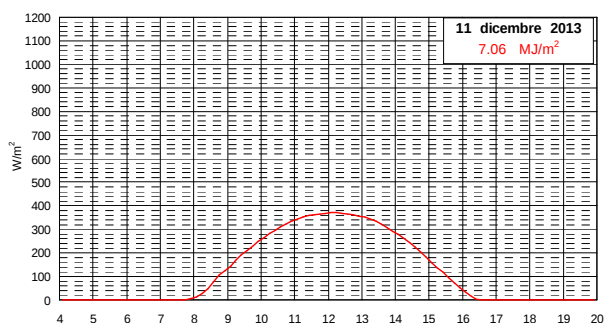
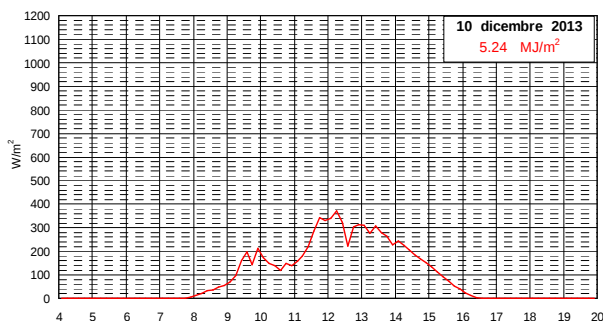
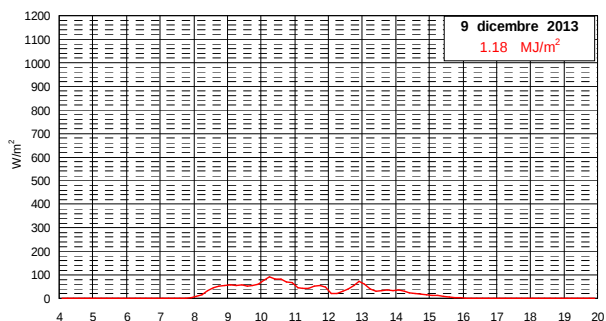
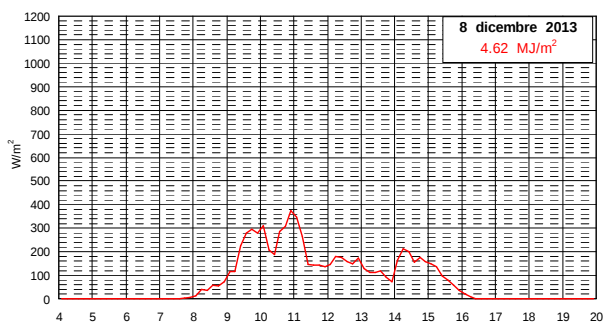
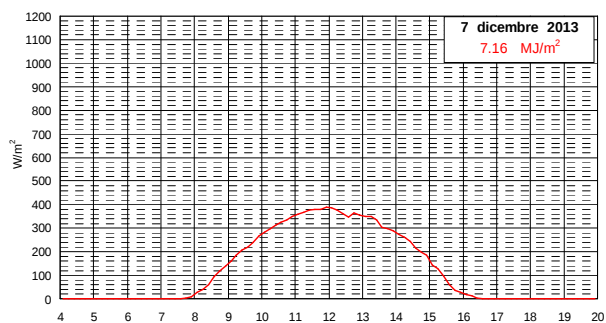
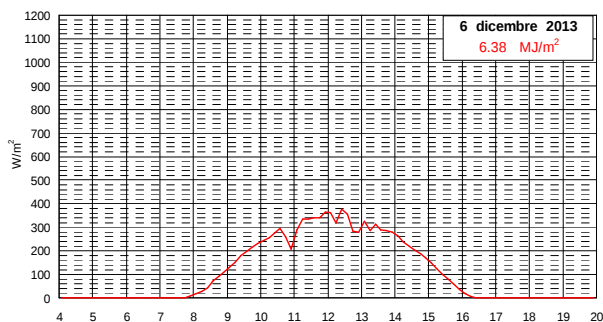
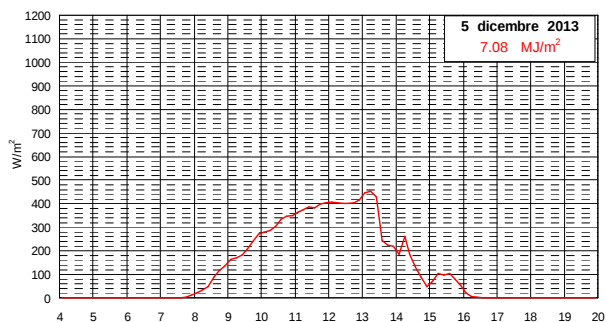
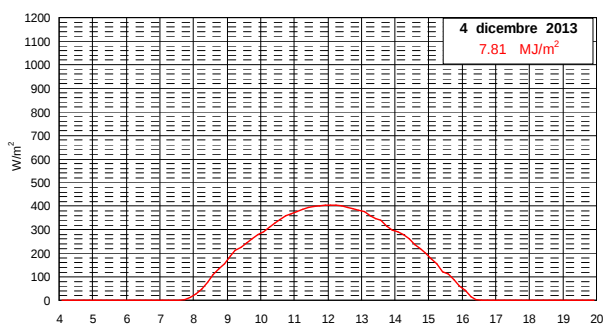
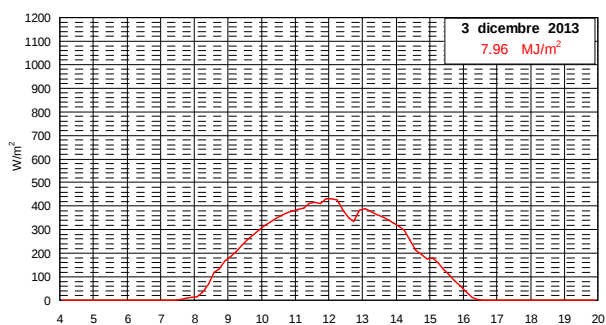


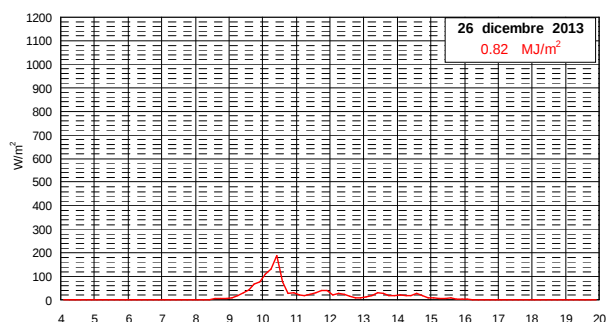
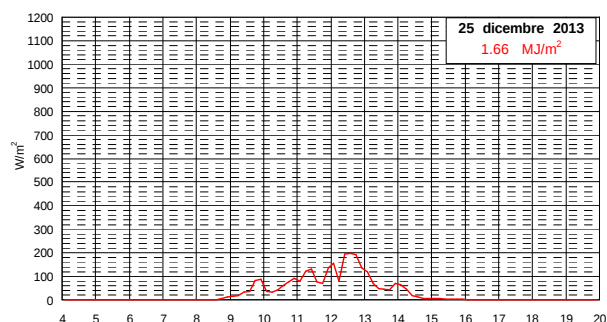
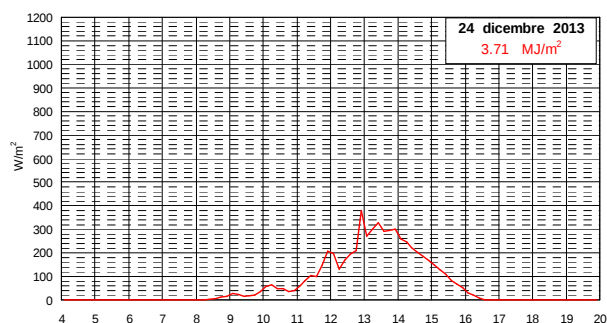
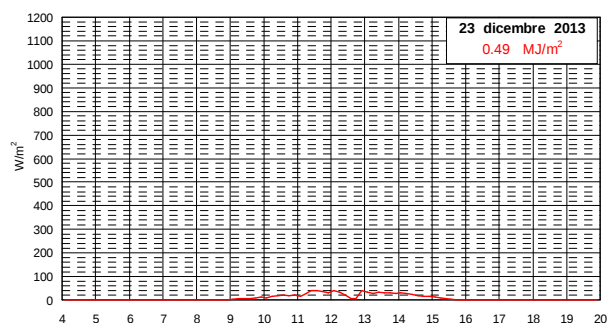
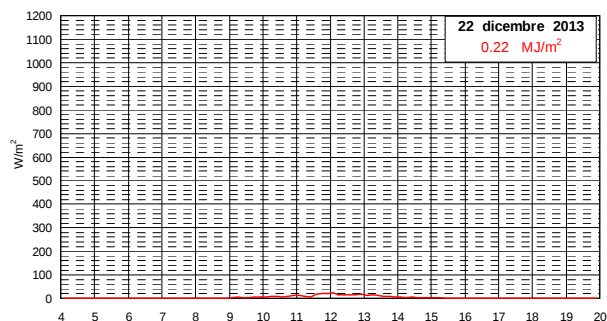
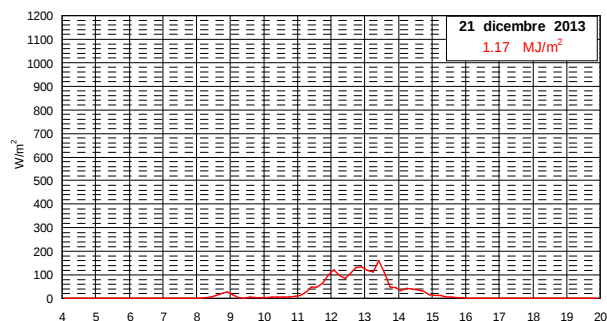
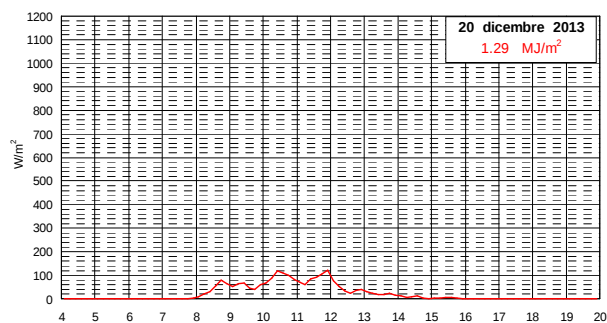
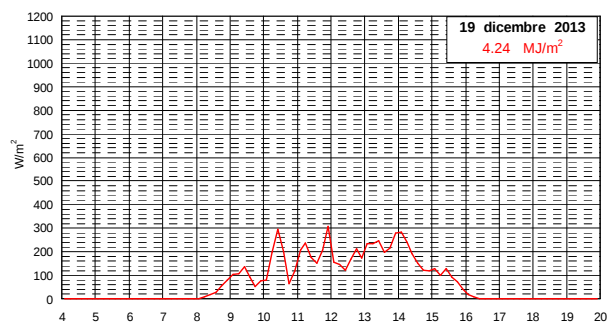
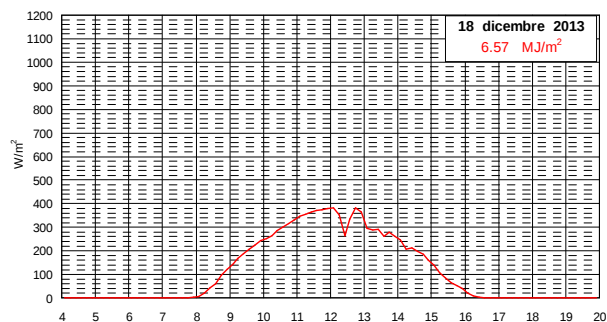
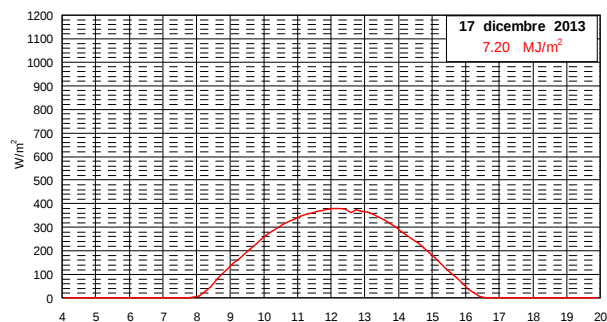
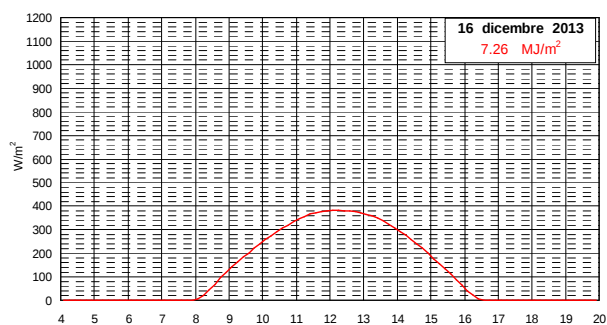
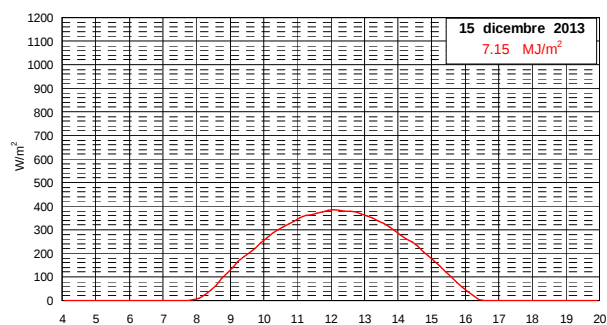


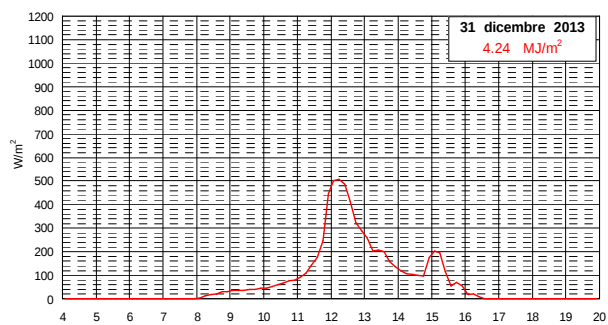
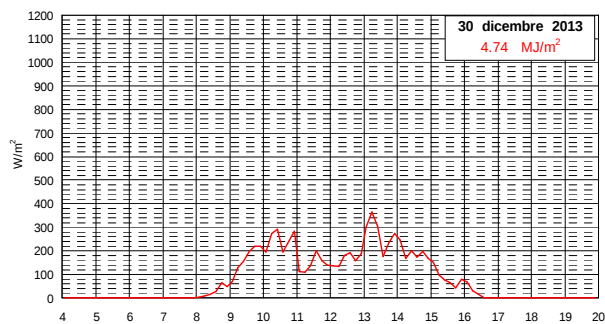
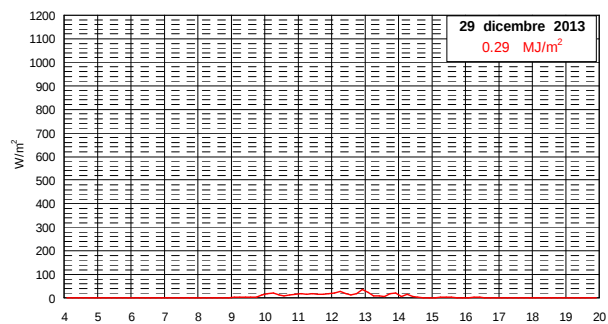
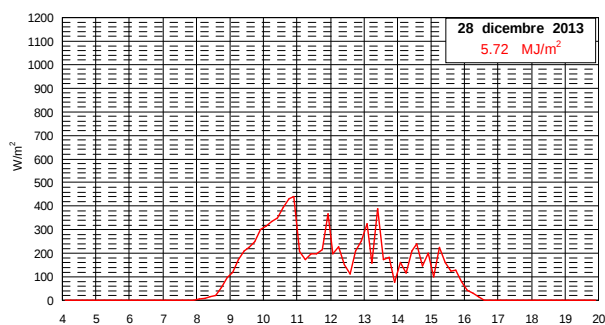
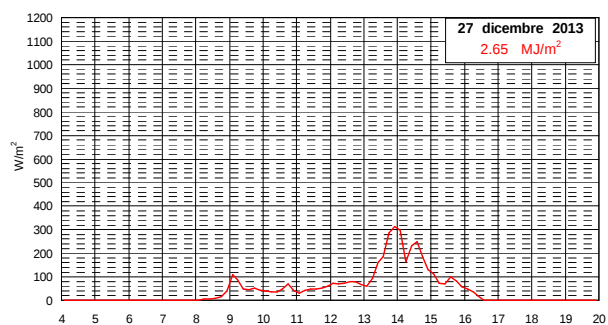












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TRIESTE 2013 Irradiazione solare globale giornaliera /(MJ/m²) 4870.79 MJ/m²

	GEN	FEB	MAR	APR	MAG	GIU	LUG	AGO	SET	OTT	NOV	DIC
1	5.42	3.21	14.67	7.34	22.92	23.31	23.31	27.67	13.90	16.12	10.80	7.80
2	1.93	0.28	16.80	13.84	6.04	22.18	23.49	27.51	20.55	17.81	1.79	8.03
3	6.65	7.89	16.98	13.05	22.38	26.87	24.18	26.62	22.40	17.03	0.63	7.96
4	2.92	10.47	16.96	12.81	25.56	20.35	26.69	25.82	22.30	13.46	2.96	7.81
5	6.42	2.53	13.60	2.59	19.39	17.95	21.40	25.81	21.97	1.75	3.06	7.08
6	6.65	0.94	1.05	10.63	8.03	26.35	19.70	25.75	19.17	3.50	9.07	6.38
7	7.41	9.44	1.36	23.55	18.51	24.47	16.25	25.28	20.74	4.21	9.31	7.16
8	1.35	7.85	3.59	19.16	20.56	26.18	18.80	25.78	15.28	1.44	1.73	4.62
9	3.50	3.87	1.60	16.17	22.85	25.93	27.26	6.36	18.10	6.82	1.42	1.18
10	0.70	11.58	3.29	18.47	12.37	27.06	23.94	24.40	13.63	3.80	5.15	5.24
11	2.75	3.00	14.62	17.77	9.90	25.10	25.45	26.60	7.18	8.93	5.33	7.06
12	3.30	9.11	6.98	2.88	14.44	22.24	24.35	26.28	15.99	3.12	6.91	6.84
13	1.64	2.97	5.72	19.00	28.10	30.96	24.29	24.59	14.23	12.28	3.34	2.58
14	1.16	9.83	2.62	24.33	29.00	29.22	27.02	6.38	18.42	8.29	4.10	4.85
15	3.30	12.49	11.42	24.26	28.24	28.30	25.96	25.88	11.28	2.69	2.00	7.15
16	1.61	12.43	19.17	22.54	3.25	28.56	27.83	26.23	18.75	13.08	9.22	7.26
17	4.99	11.07	5.59	21.40	4.41	28.90	28.76	25.30	15.84	13.17	7.94	7.20
18	2.72	12.92	1.10	23.64	25.83	28.50	27.93	24.43	9.38	13.43	5.96	6.57
19	2.25	12.70	18.80	13.83	11.26	29.15	22.98	23.64	16.70	7.55	0.97	4.24
20	0.79	4.10	12.88	11.94	26.08	29.33	25.82	10.27	17.40	5.20	5.78	1.29
21	1.74	5.06	18.80	11.09	24.93	29.35	25.58	24.53	17.34	2.91	3.68	1.17
22	3.40	7.40	21.33	8.47	29.39	27.97	29.05	23.12	15.61	1.92	3.69	0.22
23	6.36	7.73	7.86	26.18	21.48	29.53	24.16	20.19	18.42	3.64	1.15	0.49
24	1.70	1.14	3.40	26.57	6.96	11.65	25.21	23.63	16.22	2.43	6.06	3.71
25	8.13	13.28	2.11	25.53	17.73	21.17	27.29	15.47	13.96	7.83	8.73	1.66
26	9.43	12.04	12.75	21.52	23.93	18.37	27.26	14.18	8.86	3.12	8.88	0.82
27	8.61	4.62	13.28	8.34	26.84	27.34	25.56	21.11	7.53	4.00	5.36	2.65
28	2.01	15.27	9.90	16.83	21.78	10.27	26.04	15.50	11.58	6.28	8.25	5.72
29	5.59		2.20	17.21	17.74	27.43	17.92	21.35	2.93	7.05	8.02	0.29
30	2.04		4.23	13.84	9.04	29.79	27.24	21.04	2.95	9.46	2.35	4.74
31	3.66		1.96		5.98		28.06	21.35		11.02		4.24
	120.12	215.22	286.60	494.78	564.88	753.77	773.75	682.08	448.60	233.34	153.64	144.01