

Figure S1. P&ID.

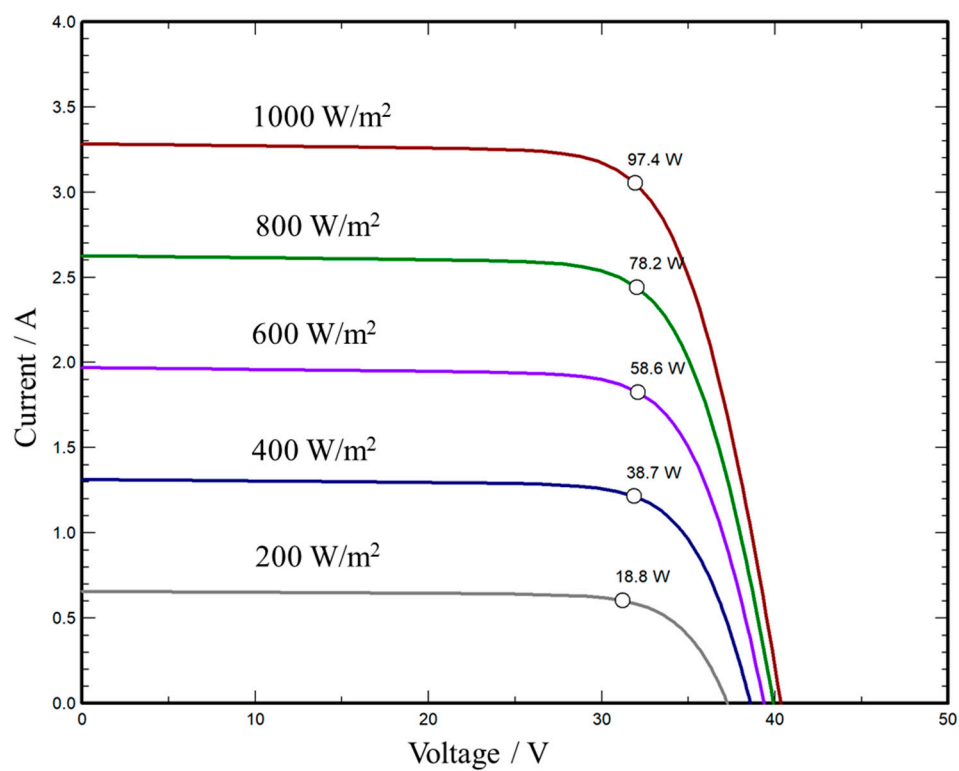


Figure S2. I-V characteristic curves of Solartec SST72 110 24 106W module

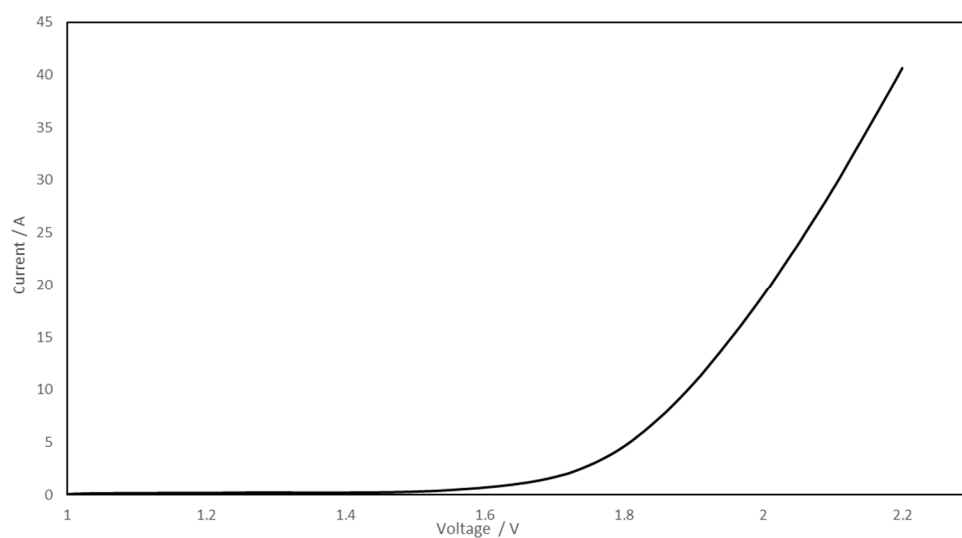


Figure S3. I-V curve of the experimental AEMWE of 50 cm^2 .

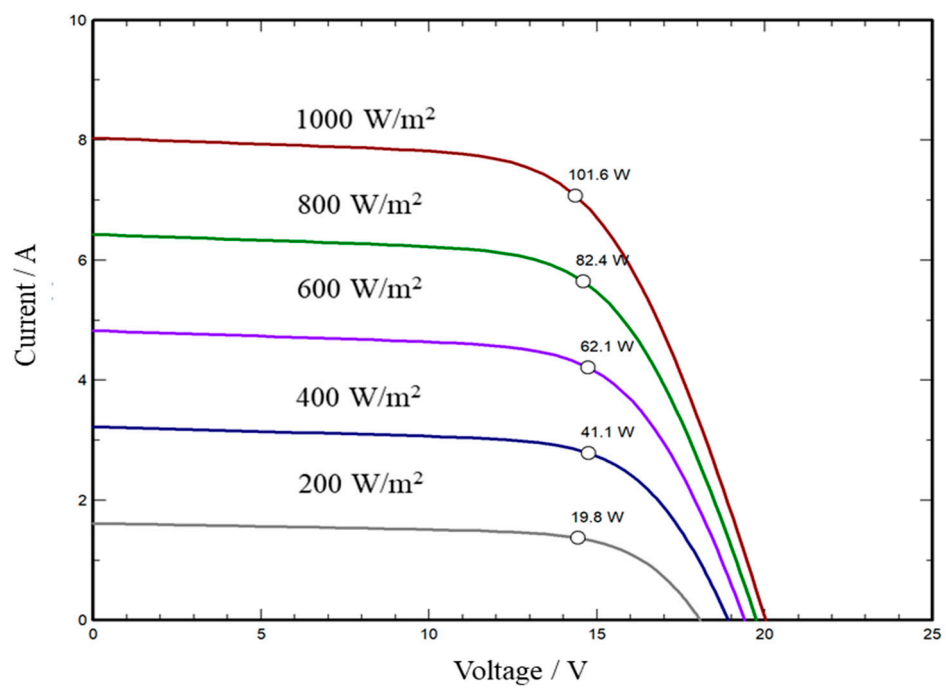


Figure S4. I-V characteristic curves of Solartec SSW72 08 108Wp module.

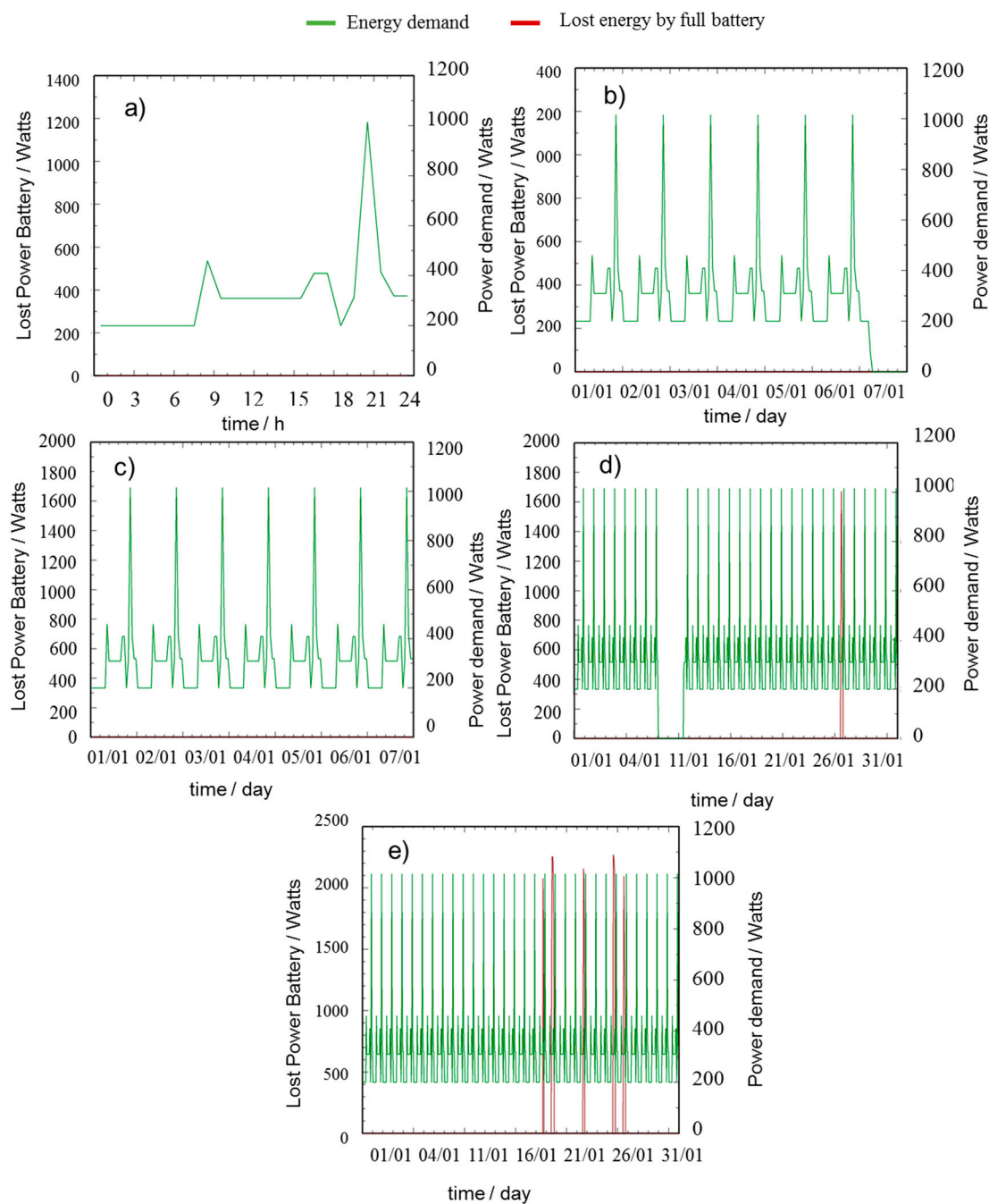


Figure S5. January supplied electrical demand by a) three PV string for the 1st b) three PV string for the first week c) four PV string for the first week d) four PV string for the full month e) five PV string for the full month.

Type	PEM (Proton Exchange Membrane) fuel cell stack	
Typical Performance: ¹	Rated Power	41.1 W/cell
	Rated current	65.3 Amps
	DC voltage	660 mV/cell
Fuel	Hydrogen	99.95% or better
	Fuel supply pressure	0.16 to 0.56 bar g
	Fuel flow rate	~0.5 slpm/cell ²
Oxidant/Coolant	Coolant	Air
	Coolant flow rate	~50 slpm/cell ²
Temperatures	Operating temperature	-40°C to 52°C
	Start up temperature	≥-10°C to 52°C
Physical Characteristics: (56-cell stack)	Length x width x height	363 x 103 x 351 mm
	Mass	11.0 kg
Product Certification	CAN/CSA-C22.2 No. 62282-2 Fuel Cell Modules	

Figure S6. Datasheet of Fcgen-1020ACS fuel-cell.

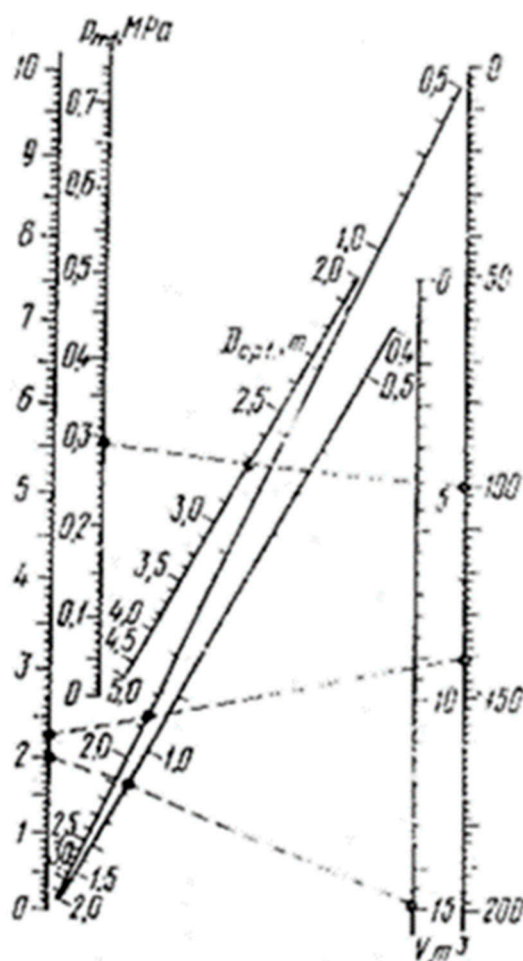


Figure S7. Mijalev monogram.

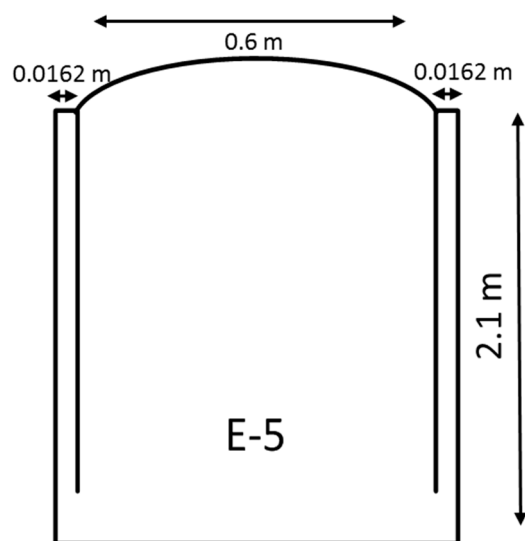


Figure S8. Hydrogen tank with dimensions.

Table S1. Output photovoltaic panel energy and electrolyzer energy.

t (days)	$E_{o,PV90m}$ (KWh/day)	$E_{i,EL}$ (kWh/day)	$E_{o,PV1m}$ (kWh/day)
1	42.000	17.314	0.4667
2	20.430	0.000	0.2270
3	13.839	0.000	0.1538
4	21.063	0.000	0.2340
5	40.950	16.362	0.4550
6	19.794	0.000	0.2199
7	5.091	0.000	0.0566
8	17.370	0.000	0.1930
9	22.584	0.000	0.2509
10	14.814	0.000	0.1646
11	14.649	0.000	0.1628
12	47.340	22.155	0.5260
13	49.530	24.141	0.5503
14	14.394	0.000	0.1599
15	31.500	7.793	0.3500
16	30.420	6.814	0.3380
17	55.590	29.636	0.6177
18	18.705	0.000	0.2078
19	26.073	2.872	0.2897
20	10.791	0.000	0.1199
21	34.350	10.377	0.3817
22	30.210	6.623	0.3357
23	16.740	0.000	0.1860
24	34.350	10.377	0.3817
25	22.671	0.000	0.2519
26	25.587	2.432	0.2843
27	4.305	0.000	0.0478
28	4.071	0.000	0.0452
29	4.779	0.000	0.0531
30	53.550	27.786	0.5950
31	60.720	34.287	0.6747

Table S2. Hydrogen initial conditions.

P (Pa)	3000000
P _c (Pa)	1317225
T (K)	298
T _c (K)	32.82
R _u (J/molK)	8.3143
a	0.02385
b	0.00002589
n (mol)	900

Table S3. Vian Method.

INVESTMENT	DEFINATION	RANGE
I1	Installation Costs	X
I2	Operation and Maintenance Cost	0.02 X
I3	Pipe and Valve	0.6 X
I4	Control Instruments	0.5-0.3 X
I5	Calorific Insulation	0.03-0.1 X
I6	Electrical Installation	0.1-0.2 X
I7	Land and Building	0.12-0.15 X
I8	Auxiliary Installations	0.25-0.7 X
Y	Physical Capital	ΣI
I9	Project Fees	0.2-0.3 Y
Z	Direct Capital	I9 + Y
I10	Work Contract	0.04-0.1 Z
I11	Incidentals	0.1-0.3 Z
TOTAL		Z+I10+ I11

Table S4. Economical Evaluation of both systems: conventional system with battery and electrolyzer-fuel cell system without battery.

SYSTEM	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
EL-FC	FCI	-14366																				
	WCI	-1437																				
	IF	-15803																				
	Amortization		718	718	718	718	718	718	718	718	718	718	718	718	718	718	718	718	718	718	718	718
	Benefits		1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215
	CF(€)		1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934
	C(€)	-15803	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934
	NPV(€)	-15803	-14045	-12447	-10994	-9673	-8472	-7381	-6389	-5487	-4666	-3921	-3243	-2627	-2067	-1558	-1095	-674	-292	56	372	660
BATTERY	FCI	-12135																				
	WCI	-1213																				
	IF	-13348																				
	Amortization		607	607	607	607	607	607	607	607	607	607	607	607	607	607	607	607	607	607	607	607
	Benefits (€)		1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215
	CF(€)	-13348	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822
	C(€)	-13348	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822	1822
	NPV(€)	-13348	-11692	-10186	-8817	-7573	-6441	-5413	-4478	-3628	-2855	-2152	-1514	-933.1	-405.3	74.515	510.72	907.26	1267.8	1595.5	1893	2164