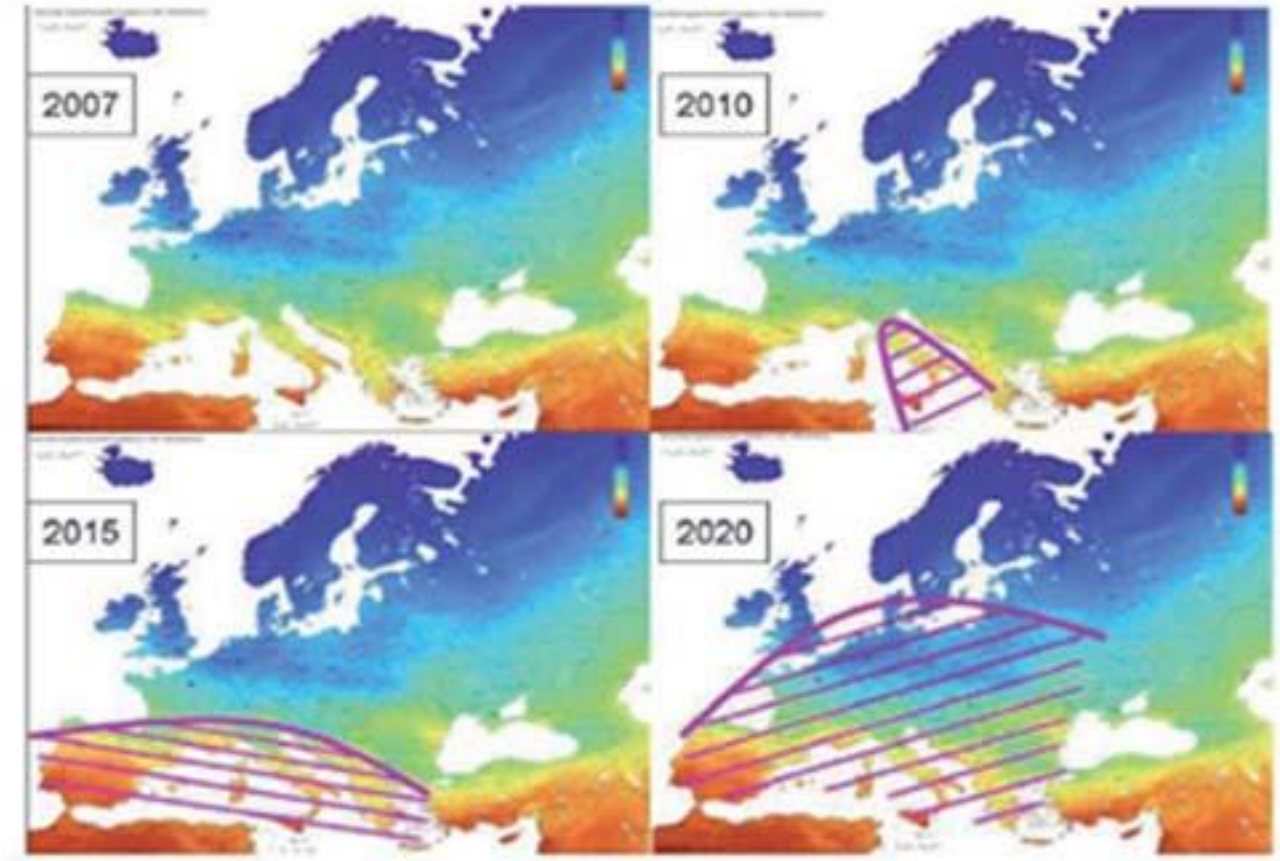
Installed system in ECREEE's headquarters

GRID PARITY IN EUROPE

Grid Parity of PV electrical energy, geographically



Source: EPIA

GRID PARITY IN CAPE VERDE?? (AND IN WEST AFRICA?)

MORE SOLAR RESOURCE!!

+

END USER TARIFF THREE TIMES HIGHER 0,30 EURO/KWH

INTRODUCTION

Project characteristics:

January 2011: Approval of RE Law in Cape Verde

9,9 kW PV roof-top system for ECREEE's office consumption

Battery bank with 10 hours of autonomy

Project schedule:

February 2011 ToR elaboration

April 2011 tender process

August 2011 contract signature with PROSOLIA

November 2011 installation completed, connection to the grid as back-up

April 2012 connection to the grid to feed-in and bidirectional counter

ELECTRICITY DEMAND EVALUATION

	Equipments	Capacyty (W)	Hour Utilization / Day.	Utilization days/ Month. (KWh)	Unit. Consumption/ Month (KWh)	Num. installed Equipments	Average Consumption/ Month. (KWh/M)	Average Consumption/ Year (KWh/Y)
	Telephone Eschange (1,3A,220V)	280	4	22	25	1	25	296
	Server	220	4	22	19	1	19	232
	Desktop Computers & Printers	300	4	22	26	9	238	2,851
	Laptops	65	1	22	1		0	0
	Printers	50	1	22	1	14	15	185
	Photocopier & Printer	920	2	22	40	1	40	486
	Photocopier (big)	920			0	1	0	0
	Internet Router (12V; 1A)	12	8	22	2	1	2	25
	Fax Machine	50	1	22	1	2	2	26
	Lights Flourescente 36 W	36	8	22	6	23	146	1,749
	Lights Flourescente 18 W	18	8	22	3	23	73	874
	Lights Globes	11	8	22	2	6	12	139
	Refrigerator (small)	370	2	30	22	3	67	799
	Bebedouro	123	2	30	7	2	15	177
	Air Conditioners 18.000 BTH/h	1,100	6	22	145	3	436	5,227
	Air Conditioners 9000 BTH/h	870	6	22	115	11	1,263	15,159
					Total (without AC)		653	7,840
					Total (A.cond.)		1,699	20,386
					TOTAL (with AC)		2,352	28,226

AC share 72%

PV system operation:

The system will operate as follows:

• The PV system is connected to the grid and to the battery bank;

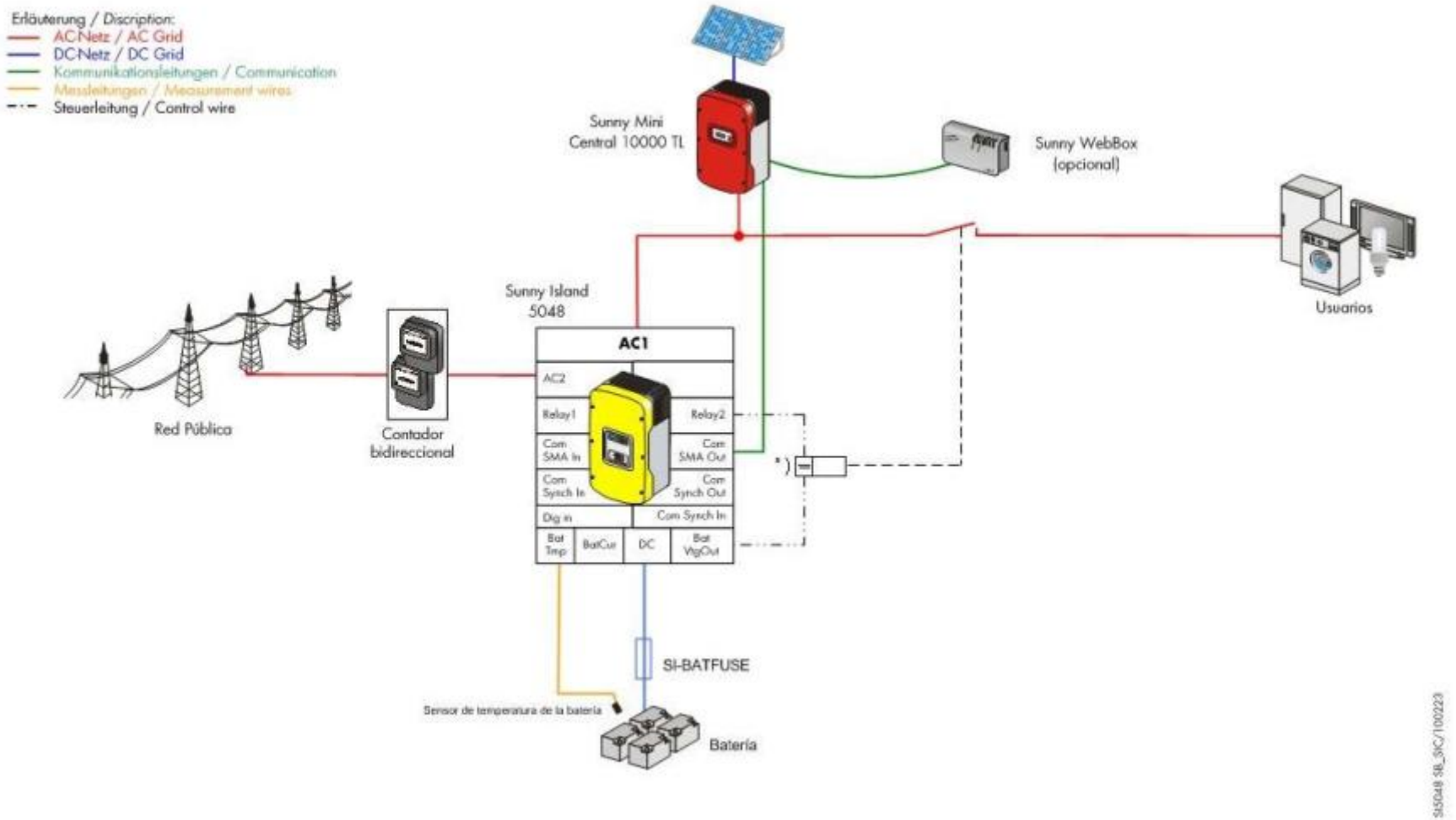
• As a priority, the photovoltaic system recharges the batteries, enabling them to be always loaded and available in case of grid electricity failure;

• After charging the batteries, the system connects automatically to the grid, supplying electricity directly to the building through a bidirectional counter, registering the energy supplied by the solar system to the grid;

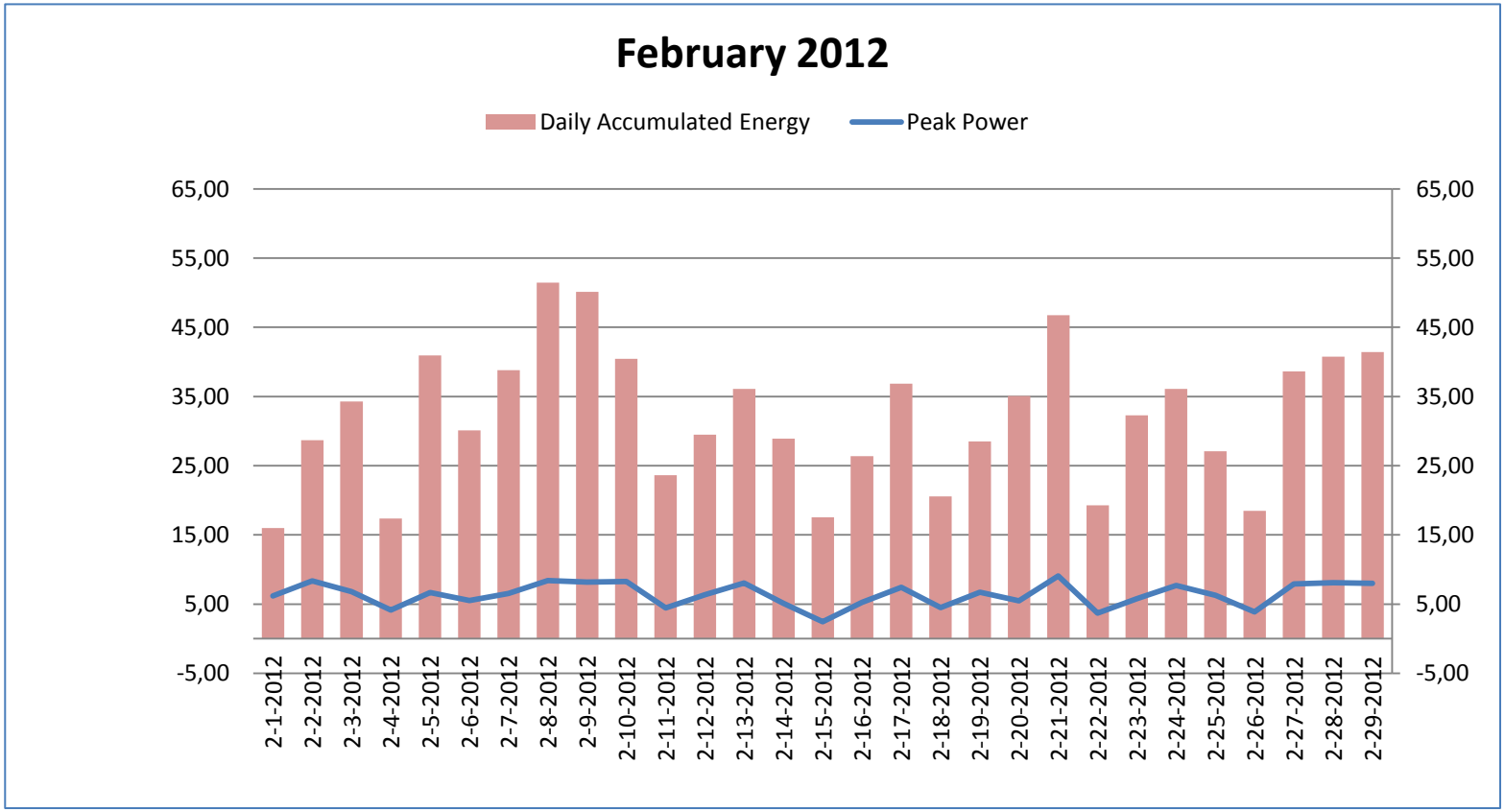
• In case of electricity failure, the building will be powered by battery bank, which should guarantee the energy supply to the building for at least 10 hours;

• The PV system should again give priority to recharge the batteries, then repeating the cycle of operation.

PV SYSTEMS OPERATION (CONT.)



Real production/consumption



Tariff calculation

Parameters	
Capacity (kWe)	9.9
Full load hours/year	2190
Investment cost (€/kWe)	5500
Operation and maintenance cost (€/kWe/year)	40
Interest rate *r (per cent)*	0.065
Duration of support *t (years)*	20
Feed-in tariff (€/kWh)	?

FIT 0.2465

NPV = Σ* [(INCOME/year – COST/year) / (1+ r)t] - INVESTMENT COSTS

EXISTING END-USER TARIFF = 0.30 EURO / kWh

Case of household in CV (2,2 kW PV without storage)

RETScreen Financial Analysis - Power project

Financial parameters		
General		
Fuel cost escalation rate	%	8.0%
Inflation rate	%	8.0%
Discount rate	%	10.0%
Project life	yr	25
Finance		
Incentives and grants	€	0
Debt ratio	%	80.0%
Debt	€	8,644
Equity	€	2,161
Debt interest rate	%	8.00%
Debt term	yr	20
Debt payments	€/yr	880
Income tax analysis	☐	

Annual income		
Electricity export income		
Electricity exported to grid	MWh	5
Electricity export rate	€/MWh	300.00
Electricity export income	€	1,445
Electricity export escalation rate	%	3.0%
GHG reduction income	☐	
Net GHG reduction - yr 1 to 4	tCO2/yr	4
Net GHG reduction - yr 5 + beyond	tCO2/yr	3
Net GHG reduction - 25 yrs	tCO2	83

Project costs and savings/income summary			
Initial costs			
Feasibility study	4.6%	€	500
Engineering	4.6%	€	500
Power system	67.8%	€	7,323
Balance of system & misc.	23.0%	€	2,482
Total initial costs	**100.0%**	€	**10,804**
Annual costs and debt payments			
O&M		€	0
Fuel cost - proposed case		€	0
Debt payments - 20 yrs		€	880
Total annual costs		€	**880**
Periodic costs (credits)			
Inverter-controler - 10 yrs		€	1,506
Annual savings and income			
Fuel cost - base case		€	0
Electricity export income		€	1,445
Total annual savings and income		€	**1,445**

Financial viability		
Pre-tax IRR - equity	%	31.9%
Pre-tax IRR - assets	%	6.4%

Yearly cash flows			
Year	Pre-tax	After-tax	Cumulative
#	€	€	€
0	-2,161	-2,161	-2,161
1	608	608	-1,552
2	653	653	-899
3	699	699	-200
4	746	746	546
5	795	795	1,341
6	846	846	2,187
7	897	897	3,084
8	951	951	4,035
9	1,006	1,006	5,040
10	-2,190	-2,190	2,850
11	1,120	1,120	3,971
12	1,180	1,180	5,151
13	1,242	1,242	6,394
14	1,306	1,306	7,699
15	1,372	1,372	9,071
16	1,439	1,439	10,510
17	1,509	1,509	12,019
18	1,580	1,580	13,599
19	1,654	1,654	15,253
20	-5,291	-5,291	9,962
21	2,689	2,689	12,651
22	2,770	2,770	15,421
23	2,853	2,853	18,274
24	2,938	2,938	21,212
25	3,026	3,026	24,238

Case of household in CV (2,2 kW PV without storage)

Net GHG reduction - yr 1 to 4	tCO2/yr	4
Net GHG reduction - yr 5 + beyond	tCO2/yr	3
Net GHG reduction - 25 yrs	tCO2	83

Customer premium income (rebate) ☐

Other income (cost) ☑

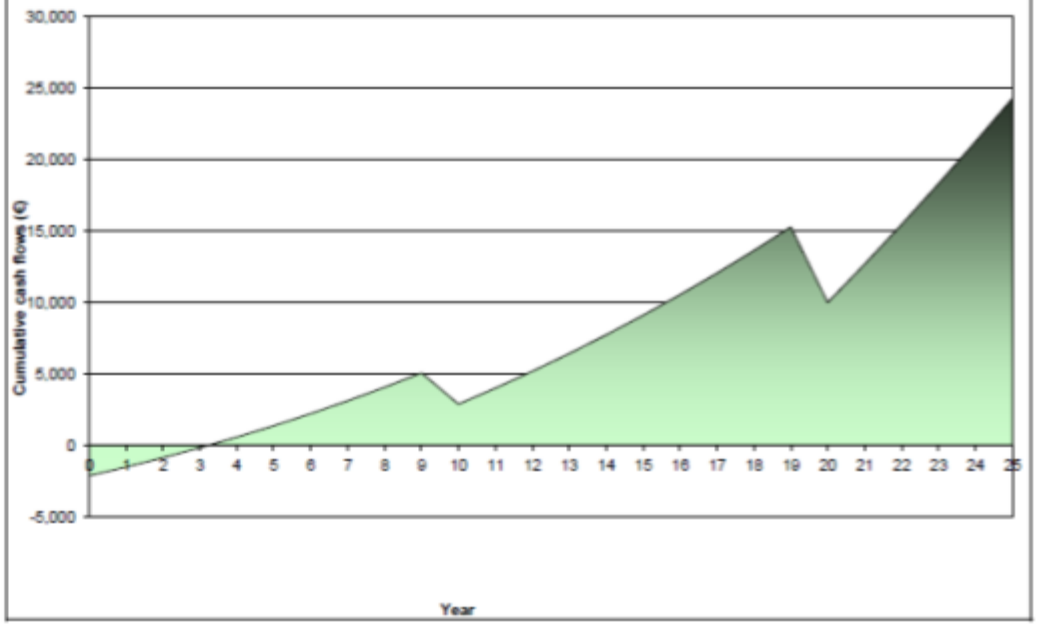
Energy	MWh	
Rate	€/MWh	
Other income (cost)	€	0
Duration	yr	
Escalation rate	%	

Clean Energy (CE) production income ☐

Financial viability

Pre-tax IRR - equity	%	31.9%
Pre-tax IRR - assets	%	6.4%
After-tax IRR - equity	%	31.9%
After-tax IRR - assets	%	6.4%
Simple payback	yr	7.5
Equity payback	yr	3.3
Net Present Value (NPV)	€	5,205
Annual life cycle savings	€/yr	573
Benefit-Cost (B-C) ratio		3.41
Debt service coverage		1.69
Energy production cost	€/MWh	209.00
GHG reduction cost	€/tCO2	(174)

Cumulative cash flows graph



Some pictures

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Merci! Thank you! Muito Obrigado!

Visitez notre site web www.ecreee.org