Stand Alone System: Simulation parameters

Project : **LOW off grid cottage**

Geographical Site **Ottawa** **Country** **Canada**

Situation Latitude 45.2°N Longitude 76.0°W
Time defined as Legal Time Time zone UT-5 Altitude 100 m
Monthly albedo values

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.80	0.80	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.60

Meteo data : Ottawa, Synthetic Hourly data

Simulation variant : **Pole mount 12 module**

Simulation date 13/03/13 14h55

Simulation parameters

Coll. plane: Seasonal tilt adjustment Azimuth 0° Winter season O-N-D-J-F-M
Summer Tilt 25° Winter Tilt 60°

Models used Transposition Perez Diffuse Measured

PV Array Characteristics

PV module Si-poly Model **SW 235 Poly**
Manufacturer SolarWorld
Number of PV modules In series 3 modules In parallel 4 strings
Total number of PV modules Nb. modules 12 Unit Nom. Power 235 Wp
Array global power Nominal (STC) **2820 Wp** At operating cond. 2488 Wp (50°C)
Array operating characteristics (50°C) U mpp 81 V I mp p 31 A
Total area Module area **20.1 m²**

PV Array loss factors
Thermal Loss factor Uc (const) 20.0 W/m²K Uv (wind) 0.0 W/m²K / m/s
=> Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.) NOCT 56 °C
Wiring Ohmic Loss Global array res. 44 mOhm Loss Fraction 1.5 % at STC
Array Soiling Losses Loss Fraction 5.0 %
Module Quality Loss Loss Fraction 1.5 %
Module Mismatch Losses Loss Fraction 2.0 % at MPP
Incidence effect, ASHRAE parametrization IAM = 1 - bo (1/cos i - 1) bo Parameter 0.05

System Parameter System type **Stand Alone System**

Battery Model **PVX-2580L**
Manufacturer Concorde
Battery Pack Characteristics Voltage 48 V Nominal Capacity 472 Ah
Nb. of units 4 in series x 2 in parallel
Temperature Fixed (20°C)
Regulator Model FLEXmax 80 - 48V
Manufacturer Outback
Technology MPPT converter Temp coeff. -5.0 mV/°C/elem.
Converter Maxi and EURO efficiencies 97.5/96.3 %
Battery Management Thresholds Charging 54.7/52.3 V Discharging 47.0/50.4 V
Back-Up Genset Command 47.3/51.6 V

User's needs : Daily household consumers Constant over the year

Stand Alone System: Detailed User's needs

Project : **LOW off grid cottage**

Simulation variant : **Pole mount 12 module**

Main system parameters	System type	**Stand alone**		
PV Field Orientation	Seasonal tilt: summer/winter	25° / 60°	azimuth	0°
PV Array	Nb. of modules	12	Pnom total	**2820 Wp**
Battery	Model	PVX-2580L	Technology	vented, vehicle starting
battery Pack	Nb. of units	8	Voltage / Capacity	**48 V / 472 Ah**
User's needs	Daily household consumers	Constant over the year	global	2427 kWh/year

Daily household consumers, Constant over the year, average = 6.6 kWh/day

Annual values

Use 2 days a week	Number	Power	Use	Energy
Other uses	1	130 W tot	24 h/day	3120 Wh/day
Stand-by consumers		240 W tot	24 h/day, 7days/7	5760 Wh/day
Total daily energy				8880 Wh/day

Stand Alone System: Main results

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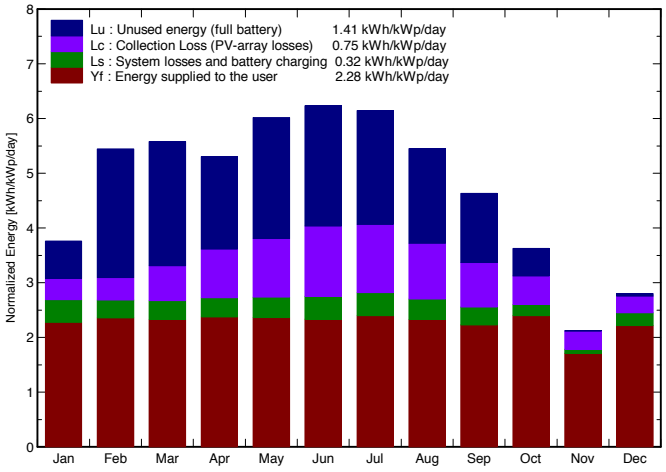
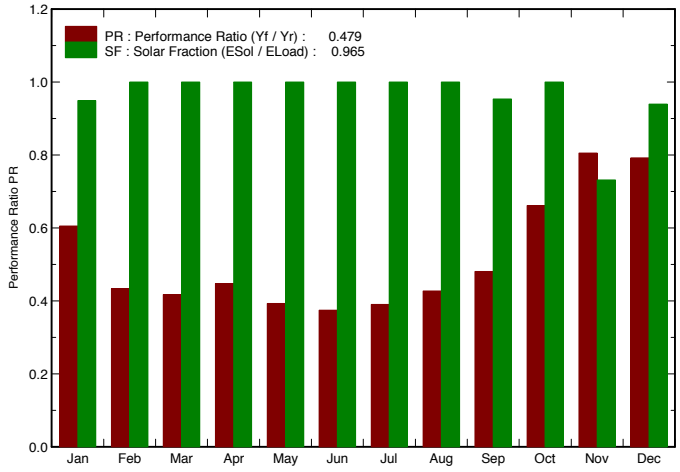
Main simulation results

System Production	**Available Energy**	**3979 kWh/year**	Specific prod.	1411 kWh/kWp/year
	Used Energy	2345 kWh/year	Excess (unused)	1453 kWh/year
	Performance Ratio PR	47.9 %	Solar Fraction SF	96.5 %
Loss of Load	Time Fraction	3.3 %	Missing Energy	85 kWh/year

Normalized productions (per installed kWp): Nominal power 2820 Wp



Performance Ratio PR and Solar Fraction SF



Pole mount 12 module

Balances and main results

	GlobHor kWh/m²	GlobEff kWh/m²	E Avail kWh	EUnused kWh	E Miss kWh	E User kWh	E Load kWh	SolFrac
January	52.0	113.7	283.8	59.2	10.63	199.1	209.8	0.949
February	78.0	148.4	388.2	185.3	0.00	186.2	186.2	1.000
March	123.0	167.5	420.3	198.2	0.00	203.5	203.5	1.000
April	142.0	154.1	360.6	142.8	0.00	200.9	200.9	1.000
May	180.0	180.9	417.4	193.0	0.00	206.6	206.6	1.000
June	187.0	181.1	404.9	185.9	0.00	197.8	197.8	1.000
July	187.0	184.5	413.1	181.7	0.00	209.8	209.8	1.000
August	156.0	163.7	372.8	151.0	0.00	203.5	203.5	1.000
September	117.0	134.5	310.1	107.0	9.23	188.5	197.8	0.953
October	78.0	109.5	258.5	44.1	0.00	209.8	209.8	1.000
November	40.0	62.2	141.7	0.6	53.05	144.7	197.8	0.732
December	39.0	84.9	207.5	3.9	12.50	194.1	206.6	0.939
Year	1379.0	1684.9	3978.8	1452.8	85.41	2344.6	2430.0	0.965

Legends:

GlobHor	Horizontal global irradiation	E Miss	Missing energy
GlobEff	Effective Global, corr. for IAM and shadings	E User	Energy supplied to the user
E Avail	Available Solar Energy	E Load	Energy need of the user (Load)
EUnused	Unused energy (full battery) loss	SolFrac	Solar fraction (EUsed / ELoad)

Stand Alone System: Loss diagram

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Loss diagram over the whole year