Worksheet for Determining Capacity of a Solar Panel Array to Meet Power Consumption Requirements

Input fields in gray

Daily Power Consumption Analysis

Appliance	Amps	Hours at Anchor	Hours on Passage	Daily AH * at Anchor	Daily AH on Passage
Refrigeration	5	8	8	40	40
Radar	4		4	0	16
Computer - Laptop	3	1	10	3	30
Autopilot	4		10	0	40
Cabin Lights (LED)	1	4		4	0
Nav/Anchor Lights	0.2	10	10	2	2
Stereo	1	3	3	3	3
VHF Radio	0.5	8	8	4	4
Instruments	1		8	0	8
Pressure Water	6	0.25	0.1	1.5	0.6
Phone Charger	1	2	2	2	2
Other				0	0
Other				0	0
Total Amp Hours				**59.5**	**145.6**
Equipment going through an Inverter (Multiply by 1.2 for inverter inefficiency)					
Microwave	80	0.1		9.6	0
Windlass **				0	0
Other				0	0
Other				0	0
Total Amp Hours				**9.6**	**0**
Total Amp Hours Consumed per Day				**69.1**	**145.6**

* AH - Amp Hours - Amps of current consumed in one hour

** Windlass is often not considered because engine alternator is running when used

Battery Charging Voltage	14		
Watt Hours per Day to Replenish Battery Bank		**967.4**	**2,038.4**

PV Solar Panel Capacity Analysis

Average Hours of Sun per Day	5		
Watts per Day of Solar to Replenish Battery Bank		**193.5**	**407.7**

Note: 5 is a good number for horizontal panels, 7 for panels with tilt & rotate

Solar Panel Capacity (Watts) Calculation - 4 Scenarios

	Scenarios A	B	C	D
Amp Hrs Consumed per Day	30	69	69	146
Days at Anchor	1	3	3	1
Amp Hrs Required	30	207	207	146
Battery Bank Rated Amp Hrs.	240	240	240	240
Battery Draw Down %	0%	40%	0%	0%
Battery Amps Drawn	-	96	-	-
Amp Hr. Deficit	30	111	207	146
Amp Hr. Deficit per Day	30	37	69	146
Watt Hr. Deficit per Day	420	518	967	2,044
Average Hours of Sun per Day	5.0	5.0	5.0	5.0
Watts per Day of Solar Req'd	**84**	**103.6**	**193.5**	**408.8**
With MPPT Controller				
Watts of Solar Needed	**88.2**	**108.8**	**203.2**	**429.2**
With PWM Controller				
Solar Panel Voltage (Vmp)	20.0	20.0	20.0	20.0
Solar Panel Amps (Imp)	6.0	7.4	13.8	29.2
Watts of Solar Needed	**120**	**148**	**276**	**584**

Scenarios

A. On a mooring with refrigeration
B. 3 days at anchor supplement with 40% of battery capacity
C. 3 days at anchor with no battery supplement
D. All power from solar with max power usage

1. Determine your daily power consumption
2. Assess your battery capacity
3. Calculate solar capacity required
4. Select solar panel(s) and controller

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