

Derate Values			Component
optimal	guess	worst	
1.05	1.03	0.95	Kyocera 135GX-LPU solar panel <ul style="list-style-type: none"> • 135 watts under STC (irradiance 1000W/m2, AM 1.5 spectrum, cell temperature 25°C) • on 3/13/2011 panels achieved 819W according to charge controller after wire losses
0.95	0.92	0.85	Xantrex MS3000 inverter <ul style="list-style-type: none"> • > 85% efficiency at full load • > 90% peak efficiency
			Xantrex MS3000 battery charger <ul style="list-style-type: none"> • takes 110V AC from Honda generator and charges 12V batteries • > 85% typical efficiency
			Xantrex C60 PV module battery charger <ul style="list-style-type: none"> • regulates power from solar panels
0.995	0.995	0.995	Mismatch <ul style="list-style-type: none"> • occurs due to differences in PV module current-voltage characteristics • panels are in parallel so this is likely very very low
0.997	0.997	0.997	Connections <ul style="list-style-type: none"> • occurs due to resistive losses in electrical connections • very few connections, dielectric grease used to coat pre-cleaned surfaces
0.973	0.958	0.945	DC wiring from PV module to battery <ul style="list-style-type: none"> • 45' of #2 copper transmission wire • each panel has 29.9" - 72.4" of #10 AWG wire with MC4 connector • 97.3% at 13.5V / 20A • 95.8% at 13.5V / 30A • 94.5% at 13.5V / 40A • 93% at 13.5V / 50A
0.9995	0.9995	0.992	DC wiring from batteries to inverter <ul style="list-style-type: none"> • 2-5' of #2 copper wire battery to buss bar, • 5' of #4/0 buss bar to inverter • 99.95% at 12V / 20A • 99.2% at 12V / 150A
0.999	0.999	0.9905	AC wiring from garage to cabin <ul style="list-style-type: none"> • 40' of #6 aluminum 3-phase 120V burial • 99.05% at 120V / 20A • 99.90% at 120V / 2A
1	1	0.98	Soiling <ul style="list-style-type: none"> • how dirty the panels are • panels mounted high above dust, soot free air, great exposure to rain
96.1%	89.9%	72.9%	Derating for system from PV to AC outlet
0.85	0.5	0.45	Battery Charge Efficiency (internal resistance et al.) <ul style="list-style-type: none"> • 91% from 0-81% SOC • 55% from 79-84% SOC • <50% from >90% SOC
81.7%	45.0%	32.8%	Derating for system from PV to battery to AC outlet
69.5%	38.2%	27.9%	Derating for system from generator to battery to AC outlet
largest variables: MS3000 inverter efficiency (could use Victron BMV 600s battery monitor alongside Kill-A-Watt meter to establish inverter efficiency under specific loads)			
Actual solar panel output under STC			
Actual charge efficiency of Xantrex C60 battery charger			
source: National Renewable Energy Laboratory: Renewable Resource Data Center - PVWatts			
http://www.nrel.gov/rredc/pvwatts/			