# **Costing Estimates for Different Solar Setups**

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#### Notes:

1) ALL COSTS ARE ESTIMATES! Prices change, you will need to ask vendors for current prices.

- 2) Using Notebook computers instead of desktops <u>significantly</u> reduces the costs to use solar.
- 3) These costing sheets do not include prices for the computers.
- 4) Printers are not included.
- 5) These sheets <u>do not</u> include costs of installation or regular maintenance.
- 6) Solar panel estimates assume full sun each day with a 5.5 power factor for solar panel power generation. (In other words, a "100W" solar panel produces 100\*5.5 = 550Wh each day, the approximate daily average for The Gambia)

All worksheets use this exchange rate for Gambian Dalasis per US dollar: 22

## **Overview of Estimated Costs for each setup:**

	\$ US	GMD	Description of Setup
daghtang	\$6,807	GMD 149,750	Solar Setup for: 10 Lights (8hrs/day), TV/VCR (2hrs/day), 2 desktop computers (4 hrs/day)
desktops:	\$13,793	GMD 303,450	Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 5 desktop computers (4 hrs/day)
l and an a	\$2,880	GMD 63,350	Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 2 laptop computers (4 hrs/day)
laptops:	\$3,975	GMD 87,450	Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 5 laptop computers (4 hrs/day)

Solar Setup for: 10 Lights (8hrs/day), TV/VCR (2hrs/day), 2 desktop computers (4 hrs/day)

## Maximum Estimated Power Needed (per day)

200	item	number	Per-Item Watt Hour (Wh) use each hour	Total Watt hour (Wh) use for all items	Hours Used Per Day	total Watt Hours (Wh) per day	
	Desktop Computer (220V @ 2A = 440W)	2	440	880	4	3520	
	Laptop Computer (avg 75W)	0	75	0	4	0	
	TV (estimated Watts: 80W)	1	80	80	2	160	
	VCR (estimated Watts: 70W)	1	75	75	2	150	
	Lamps (5W Florescent)	10	5	50	8	400	
	Lamps (11W Florescent)	0	11	0	0	0	
	future	0	0	0	0	0	
	future	0	0	0	0	0	
	Overflow / future budgeting	1	100	100	1	100	
	TOTAL:	15		1185		4330.00	۷

4330.00 Watt Hours (Wh) Per Day 4979.50 Watt Hours (Wh) Per Day

Total Amps used each hour from a 12V Battery:

414.96 Amp Hours (Ah) used Each Day

% of Battery useable:

75% (Gell/Solar Batteries are 75% useable, Lead-Acid are 50% useable)

Total <u>Labeled</u> 12V Battery Amp Hours (Ah) Required: 553.28 Amp Hours Hours (Ah) Required:

user-changeable rows

6 pieces 12V, 100 Amp-Hour (Ah) Batteries

	9	Costs:	E	xchange R	ate US Dolla	bian Dalasis: 22\$ / GMD	
	ſ	TOTAL ESTIMATED COST:	USD\$6,807 GMD 149,750			49,750	
	Ī				CHANGEABLE FIELD		
		item	quantity	cost per item (GMD)	Include? (1=yes, 0=no)	total cost (GMD)	
So	lar	Panels					
>	•	"100W" panels [generally last 5-20 years], In Gambia, average = 550W/day	10	10000	1	100,000	Note: Prices may differ depending on panel sizes, generally bigger panels are cheaper than several smaller ones.
>							
Ch	arg	ge Controller					
>		Estimated Cost for a Good Charge Controller, Prices Vary	1	5000	1	5,000	
,		•					
ва	ittei	ries					
>	(	Gell Batteries [generally last 3-10 years] (Cost / 100 Amp Hours)	6	4000	1	24,000	Note: Reccomended as they will last longer and have a lower total amortized cost/year vs. Lead Acid batteries
>	(	Lead Acid Batteries [generally last 1-2 years] (Cost / 100 Amp Hours)	6	1800	0	0	
>	•						
ln۱	/ert	ers (Note: online prices to ship in America	are SIGNIFI	CANTLY chea	per than the lo	cal estimate	ed prices used here)
>	(	H&M "American" 1500W	1	20000	1	20,000	Note: Must support total Watts/hour maximum above
>	(	H&M "American" 2400W	1	35000	0	0	Note: Must support total Watts/hour maximum above
>	•						
Ch	arg	gers (require 220V AC source)					
>	(	20 Amp Charger (H&M)	1	2500	0	0	
>	•						
Ch	arg	ging Inverters (require 220V AC source)					
>	•	MP Trading 500W Inv / 8A Charger	0	3500	0	0	
>	(	MP Trading 1000W Inv / ?A Charger	0	5400	0	0	
>	•	MP Trading 1500W Inv / ?A Charger	0	7300	0	0	

Plua	s and Wiring					
х	THICK wiring and connectors for batteries	6	100	1	600	Note: assumes 100D/battery
X	1.5mm core Red Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
х	1.5mm core Black Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Green Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
х	APC Power Strips with Surge Protectors	3	600	0	0	
x	Male Plugs	0	25	0	0	
x	1-Socket Female w/ Casing	0	35	0	0	
x	2-Socket Female w/ Casing	0	90	0	0	
x	_					
Volta	ge Stabalizers (only necessary with connecti	ons to AC	power source	, optional for fu	ılly solar D	C system)
x	EMKAY 500VA	0	450	0	0	
x	1000VA	0	700	0	0	
x	2000VA	0	1500	0	0	
UPS	(Uninterruptable Power Supplies) (optional b	ut highly	reccomended	one for each co	omputer)	
x	APC 500VA	0	4000	0	0	
x						
Misc	elaneous					
x	Voltmeter / Multimeter	1	150	1	150	
x						
Insta	llation					
x	Battery Installation	0		0	0	
x	Charger & Inverter Installation	0		0	0	
x	Wiring to each outlet	0		0	0	
x	Plugs, Switches, and Sockets	0		0	0	
	tenance					
x	Battery Checks (oce every month)					
X	Gell Battery Replacement (once every 3-10 year					
X	Lead-Acid Battery Acid Replacement (once ever	y 9-12 mon	ths)			
X	Lead-Acid Battery Replacement (1-2 years)					

Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 5 desktop computers (4 hrs/day)

## Maximum Estimated Power Needed (per day)

item	number	Per-Item Watt Hour (Wh) use each hour	Total Watt hour (Wh) use for all items		total Watt Hours (Wh) per day	
Desktop Computer (220V @ 2A = 440W)	5	440	2200	4	8800	
Laptop Computer (avg 75W)	0	75	0	4	0	
TV (estimated Watts: 80W)	1	80	80	2	160	
VCR (estimated Watts: 70W)	1	75	75	2	150	
Lamps (5W Florescent)	10	5	50	8	400	
Lamps (11W Florescent)	0	11	0	0	0	
future	0	0	0	0	0	
future	0	0	0	0	0	
Overflow / future budgeting	1	100	100	1	100	
TOTAL:	18		2505		9610.00	٧

Including DC/AC Conversion Loss (15%):

9610.00 Watt Hours (Wh) Per Day 11051.50 Watt Hours (Wh) Per Day

Total Amps used each hour from a 12V Battery:

920.96 Amp Hours (Ah) used Each Day

% of Battery useable:

75% (Gell/Solar Batteries are 75% useable, Lead-Acid are 50% useable)

Total <u>Labeled</u> 12V Battery Amp 1227.9 Amp Hours (Ah) Required:

Charging Inverters (require 220V AC source)

MP Trading 500W Inv / 8A Charger

MP Trading 1000W Inv / ?A Charger

MP Trading 1500W Inv / ?A Charger

X

user-changeable rows

X

X

4 Hours

0

0

3500

5400

7300

0

0

0

0

13 pieces 12V, 100 Amp-Hour (Ah) **Batteries** 

Costs: Exchange Rate US Dollars / Gambian Dalasis: 22\$ / GMD TOTAL ESTIMATED COST: USD\$13,793 GMD 303,450 CHANGEABLE Include? total cost cost per item quantity item (GMD) (GMD) (1=ves. 0=no) Solar Panels "100W" panels [generally last 5-20 years], In Note: Prices may differ depending on panel sizes, generally Gambia, average = 550W/day 21 10000 bigger panels are cheaper than several smaller ones х Charge Controller Estimated Cost for a Good Charge Controller, X 5,000 Prices Vary х **Batteries** Gell Batteries [generally last 3-10 years] Note: Reccomended as they will last longer and have a lower total 52,000 (Cost / 100 Amp Hours) 4000 amortized cost/year vs. Lead Acid batteries 13 Lead Acid Batteries [generally last 1-2 years] (Cost / 100 Amp Hours) 13 1800 0 Inverters (Note: online prices to ship in America are SIGNIFICANTLY cheaper than the local estimated prices used here) H&M "American" 1500W 20000 0 Note: Must support total Watts/hour maximum above 0 х H&M "American" 2400W X 35000 35.000 Note: Must support total Watts/hour maximum above Chargers (require 220V AC source) X 20 Amp Charger (H&M) 2500 0 0

Plug	s and Wiring				1	
x	THICK wiring and connectors for batteries	13	100	1	1,300	Note: assumes 100D/battery
x	1.5mm core Red Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Black Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Green Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	APC Power Strips with Surge Protectors	3	600	0	0	
x	Male Plugs	0	25	0	0	
x	1-Socket Female w/ Casing	0	35	0	0	
x	2-Socket Female w/ Casing	0	90	0	0	
x						
Volta	ge Stabalizers (only necessary with connecti	ons to AC	power source	, optional for fu	ılly solar D	C system)
x	EMKAY 500VA	0	450	0	0	
x	1000VA	0	700	0	0	
x	2000VA	0	1500	0	0	
UPS	(Uninterruptable Power Supplies) (optional b	ut highly		one for each co	omputer)	
x	APC 500VA	0	4000	0	0	
x						
Misc	elaneous					
x	Voltmeter / Multimeter	1	150	1	150	
x						
Insta	llation					
x	Battery Installation	0		0	0	
x	Charger & Inverter Installation	0		0	0	
x	Wiring to each outlet	0		0	0	
x	Plugs, Switches, and Sockets	0		0	0	
-	tenance					
x	Battery Checks (oce every month)					
x	Gell Battery Replacement (once every 3-10 years	,				
X	Lead-Acid Battery Acid Replacement (once ever	y 9-12 mon	ths)			
X	Lead-Acid Battery Replacement (1-2 years)					

Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 2 laptop computers (4 hrs/day)

#### Maximum Estimated Power Needed (per day)

user-cnang	item	number	Per-Item Watt Hour (Wh) use each hour	Total Watt hour (Wh) use for all items	Hours Used Per Day	total Watt Hours (Wh) per day	
x	Desktop Computer (220V @ 2A = 440W)	0	440	0	4	0	
x	Laptop Computer (avg 75W)	2	75	150	4	600	ı
x	TV (estimated Watts: 80W)	1	80	80	2	160	ı
x	VCR (estimated Watts: 70W)	1	75	75	2	150	ı
x	Lamps (5W Florescent)	10	5	50	8	400	ı
x	Lamps (11W Florescent)	0	11	0	0	0	ı
x	future	0	0	0	0	0	ı
x	future	0	0	0	0	0	ı
x	Overflow / future budgeting	1	100	100	1	100	L
	TOTAL:	15		455		1410.00	۷

Including DC/AC Conversion Loss (15%):

1410.00 Watt Hours (Wh) Per Day 1621.50 Watt Hours (Wh) Per Day

Total Amps used each hour from a 12V Battery:

135.13 Amp Hours (Ah) used Each Day

% of Battery useable:

75% (Gell/Solar Batteries are 75% useable, Lead-Acid are 50% useable)

Total Labeled 12V Battery Amp 180.17 Hours (Ah) Required:

Hours

2 pieces 12V, 100 Amp-Hour (Ah) **Batteries** 

Costs: Exchange Rate US Dollars / Gambian Dalasis: 22\$ / GMD TOTAL ESTIMATED COST: USD\$2,880 GMD 63,350 CHANGEABLE Include? total cost cost per item quantity item (GMD) (GMD) (1=ves. 0=no) Solar Panels "100W" panels [generally last 5-20 years], In Note: Prices may differ depending on panel sizes, generally Gambia, average = 550W/day 3 10000 bigger panels are cheaper than several smaller ones х Charge Controller Estimated Cost for a Good Charge Controller, X 5,000 Prices Vary 5000 х **Batteries** Gell Batteries [generally last 3-10 years] Note: Reccomended as they will last longer and have a lower total 8,000 (Cost / 100 Amp Hours) 2 4000 amortized cost/year vs. Lead Acid batteries Lead Acid Batteries [generally last 1-2 years] (Cost / 100 Amp Hours) 1800 0 Inverters (Note: online prices to ship in America are SIGNIFICANTLY cheaper than the local estimated prices used here) H&M "American" 1500W 20000 20,000 Note: Must support total Watts/hour maximum above х H&M "American" 2400W X 35000 0 0 Note: Must support total Watts/hour maximum above Chargers (require 220V AC source) X 20 Amp Charger (H&M) 2500 0 0 Charging Inverters (require 220V AC source) X MP Trading 500W Inv / 8A Charger 0 3500 0 0 MP Trading 1000W Inv / ?A Charger 0 5400 0 0 MP Trading 1500W Inv / ?A Charger 7300

Plug	s and Wiring					
x	THICK wiring and connectors for batteries	2	100	1	200	Note: assumes 100D/battery
x	1.5mm core Red Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Black Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Green Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	APC Power Strips with Surge Protectors	3	600	0	0	
x	Male Plugs	0	25	0	0	
x	1-Socket Female w/ Casing	0	35	0	0	
x	2-Socket Female w/ Casing	0	90	0	0	
x						
Volta	ge Stabalizers (only necessary with connecti	ons to AC	power source	, optional for fu	ully solar D	C system)
x	EMKAY 500VA	0	450	0	0	
x	1000VA	0	700	0	0	
x	2000VA	0	1500	0	0	
UPS	(Uninterruptable Power Supplies) (optional b	out highly i		one for each co	omputer)	
x	APC 500VA	0	4000	0	0	
x						
Misc	elaneous					
x	Voltmeter / Multimeter	1	150	1	150	
×						
	llation					
x	Battery Installation	0		0	0	
X	Charger & Inverter Installation	0		0	0	
X	Wiring to each outlet	0		0	0	
X	Plugs, Switches, and Sockets	0		0	0	
-	tenance					
X	Battery Checks (oce every month)	- 1				
X	Gell Battery Replacement (once every 3-10 year		ila = \			
X	Lead-Acid Battery Acid Replacement (once ever	y <del>y</del> -1∠ iiiont	115)			
X	Lead-Acid Battery Replacement (1-2 years)					

Solar Setup for: 10 Lights (8 hrs/day), TV/VCR (2hrs/day), 5 laptop computers (4 hrs/day)

## **Maximum** Estimated Power Needed (per day)

user-chang	item	number	Per-Item Watt Hour (Wh) use each hour	Total Watt hour (Wh) use for all items		total Watt Hours (Wh) per day
x	Desktop Computer (220V @ 2A = 440W)	0	440	0	4	0
x	Laptop Computer (avg 75W)	5	75	375	4	1500
x	TV (estimated Watts: 80W)	1	80	80	2	160
x	VCR (estimated Watts: 70W)	1	75	75	2	150
x	Lamps (5W Florescent)	10	5	50	8	400
x	Lamps (11W Florescent)	0	11	0	0	0
x	future	0	0	0	0	0
x	future	0	0	0	0	0
X	Overflow / future budgeting	1	100	100	1	100
	TOTAL:	18		680		2310.00

Including DC/AC Conversion Loss (15%): 2656.50 Watt Hours (Wh) Per Day

Total Amps used each hour from a 12V Battery: 221.38 Amp Hours (Ah) used Each Day

% of Battery useable: 75% (Gell/Solar Batteries are 75% useable, Lead-Acid are 50% useable)

Total <u>Labeled</u> 12V Battery Amp Hours (Ah) Required: 295.17 Hours

Charging Inverters (require 220V AC source)

x MP Trading 500W Inv / 8A Charger

X

х

MP Trading 1000W Inv / ?A Charger

MP Trading 1500W Inv / ?A Charger

3 pieces 12V, 100 Amp-Hour (Ah) Batteries

Costs: Exchange Rate US Dollars / Gambian Dalasis: 22\$ / GMD **FOTAL ESTIMATED COST:** USD\$3,975 GMD 87,450 CHANGEABLE FIELD Include? cost per total cost item quantity item (GMD) (1=yes, 0=no) (GMD) Solar Panels "100W" panels [generally last 5-20 years], In Note: Prices may differ depending on panel sizes, generally X Gambia, average = 550W/day 10000 50,000 bigger panels are cheaper than several smaller ones. **Charge Controller** Estimated Cost for a Good Charge Controller, 5.000 Prices Vary 5000 X **Batteries** Gell Batteries [generally last 3-10 years] Note: Reccomended as they will last longer and have a lower total х (Cost / 100 Amp Hours) 4000 12,000 amortized cost/year vs. Lead Acid batteries Lead Acid Batteries [generally last 1-2 years] (Cost / 100 Amp Hours) 3 1800 0 0 Inverters (Note: online prices to ship in America are SIGNIFICANTLY cheaper than the local estimated prices used here) Note: Must support total Watts/hour maximum above H&M "American" 1500W 1 20000 20.000 X H&M "American" 2400W 35000 0 0 Note: Must support total Watts/hour maximum above Х Chargers (require 220V AC source) 20 Amp Charger (H&M) X 2500 0 0

0

0

n

3500

5400

7300

0

0

0

0

0

n

Plugs	s and Wiring					
x	THICK wiring and connectors for batteries	3	100	1	300	Note: assumes 100D/battery
x	1.5mm core Red Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Black Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	1.5mm core Green Wire Spools (100yards)	2	550	0	0	Note: used to connect from Charge Controller to devices
x	APC Power Strips with Surge Protectors	3	600	0	0	
x	Male Plugs	0	25	0	0	
x	1-Socket Female w/ Casing	0	35	0	0	
x	2-Socket Female w/ Casing	0	90	0	0	
x						
Volta	ge Stabalizers (only necessary with connect	ions to AC	power source	, optional for fu	lly solar D	C system)
x	EMKAY 500VA	0	450	0	0	
x	1000VA	0	700	0	0	
x	2000VA	0	1500	0	0	
	(Uninterruptable Power Supplies) (optional l					
x	APC 500VA	0	4000	0	0	
X						
	elaneous					
X	Voltmeter / Multimeter	1	150	1	150	
X	Daties.					
	llation					
X	Battery Installation	0		0	0	
X	Charger & Inverter Installation	0		0	0	
X	Wiring to each outlet	0		0	0	
x	Plugs, Switches, and Sockets	0		0	0	
Main	tenance					
X	Battery Checks (oce every month)					
x	Gell Battery Replacement (once every 3-10 year	re)				
X	Lead-Acid Battery Acid Replacement (once ever	•	ne)			
X	Lead-Acid Battery Replacement (1-2 years)	y 5-12 111011(I	13)			
•	Lead-Acid Dattery Hepiacement (1-2 years)					