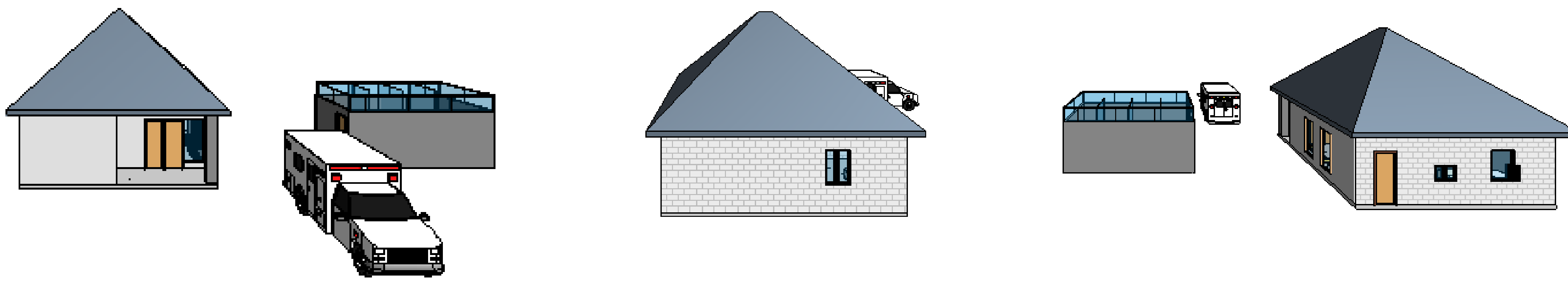


Primary Care Medical Health Center

Sierra Leone

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EGR 343: Green Architectural Engineering
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PV System

Loads	Quantity	Days/Week	Hours/Day	Watts	Wh/day	Ah/day	Corr Ah/day†
Small Medical Refrigerator	2	7	6	100	600	25.00	27.14
Ceiling Fan	5	7	6	75	450	18.75	20.35
Water Pump	1	7	1	100	100	4.17	4.52
CFL Light Bulb	10	7	8	150	1200	50.00	54.28
Desktop Computer	1	7	4	100	400	16.67	18.09
Monitors	1	7	4	40	160	6.67	7.24
Inkjet Printer	1	7	0.25	25	6.25	0.26	0.28
Sterilizer	1	7	1	500	500	20.83	22.62
Oxygen Concentrator	1	7	1	460	460	19.17	20.81
Clock	4	7	24	10.8	259.2	10.80	11.72
Totals				1560.8	4135.45	172.31	187.05
Worst Case psh:	V(Battery)	99% D	C(T)*	C(ch)**	****	E(load)	E(battery)
	5.05	24	7.71	1.00	0.88	0.80	2049.38
Total AC Load Power:							
	1285.8						
Total DC Load Power:							
	275						

- Maximum of 3kW total wattage generated by PV system
- Off-Grid system
- Loads estimated; total wattage and $E_{battery}$ calculated while following derating factors, peak sun hours for location, etc.
- Some DC loads used in order to save wattage (highlighted in green), less loads running through inverter
- AC loads must run through inverter
- The number of panels selected (8) are able to all fit on the South facing side of thatched roof. Set at 20 degree tilt

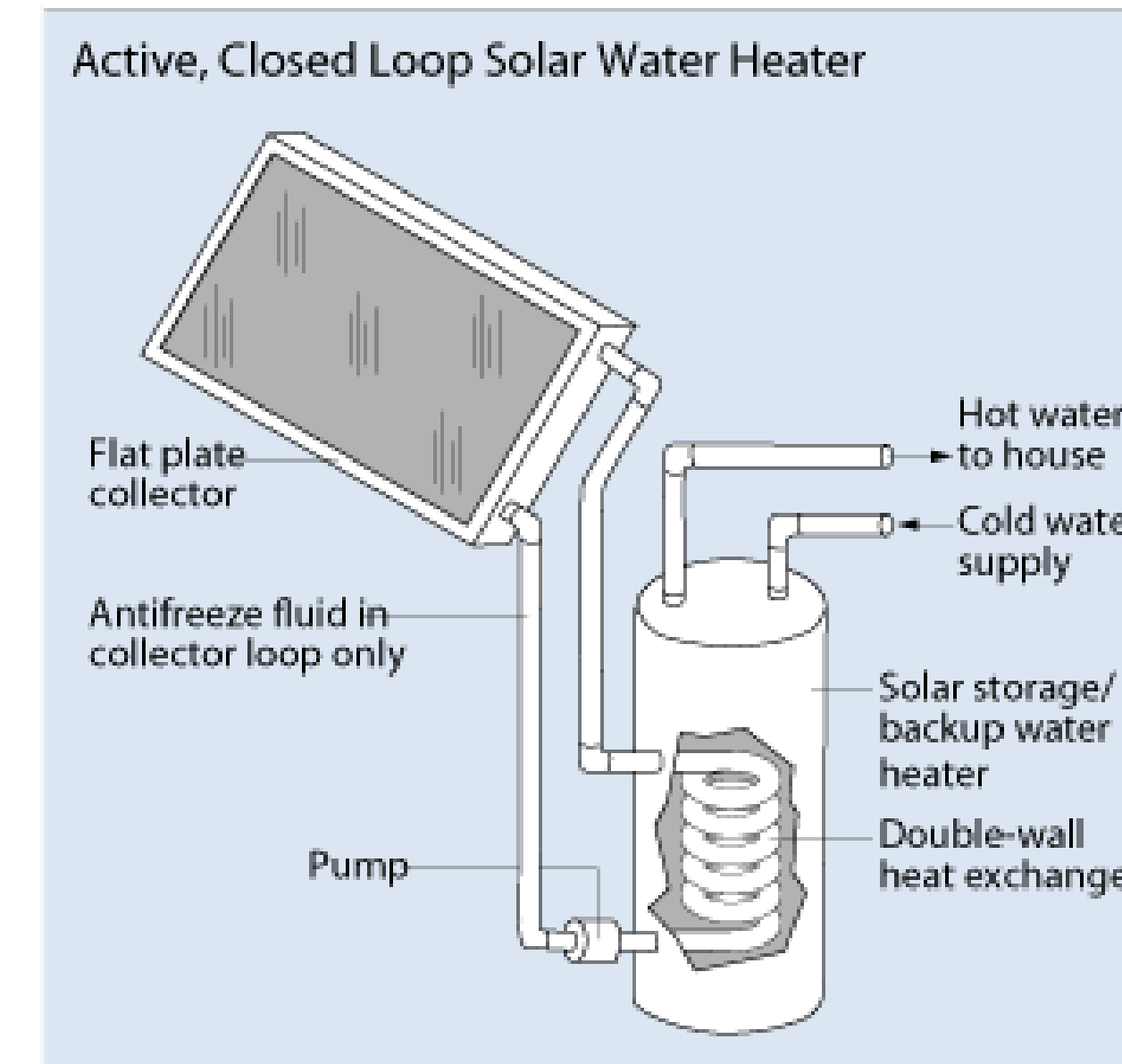
- Wattage found to be less than 3kW maximum
- Theoretical solar panel voltages and maximum currents compared to find nominal number of panels to match load
- 8 250W solar panels chosen
- Battery voltage set at 24V, $E_{battery}$ requires 2049Ah. Battery selected fulfills needs
- Inverter and charge controller selected accordingly

PV System Items	Quantity	Price/Item	Total Cost
24 V, 1160 Ah SolarOne HUPS Battery	2	\$ 7,790.00	\$ 15,580.00
Canadian Solar 250W Module	8	\$ 237.20	\$ 1,897.60
24 V, 1500W Cotek ST1500-124 Inverter	1	\$ 479.00	\$ 479.00
80A Outback 24V MPPT Charge Controller	1	\$ 589.84	\$ 589.84
Total Cost			\$ 18,546.44

	Module 1	Module 2	Module 3
Maximum Modules in Parallel	5	6	5
Maximum Modules in Series	2	2	2
Total Modules	10	12	10
Total Potential Wattage	2500	3300	2650
Total Wattage Necessary	1560.8	1560.8	1560.8
Maximum Number of Panels	7	6	6
Ideal Array Size (Series)	2	2	2
Ideal Array Size (Parallel)	4	3	3
Cost	\$ 1,660.40	\$ 1,871.34	\$ 1,706.34
Wattage Produced	2000	1650	1590

Water Heating

- Uses method of solar water heating
- Solar collectors positioned on top of roof collect solar energy and heat specialized water tank heating system
- Energy efficient, requires no excess wattage



Non-Electrical Equipment Items	Quantity	Price/Item	Total Cost
Desks	2	\$ 200.00	\$ 400.00
Chairs	5	\$ 50.00	\$ 250.00
Waiting Room Sofa	2	\$ 350.00	\$ 700.00
Exam Tables	3	\$ 500.00	\$ 1,500.00
Stretchers	2	\$ 150.00	\$ 300.00
Medical Cabinets	2	\$ 400.00	\$ 800.00
1000 Gallon Water Tank	1	\$ 750.00	\$ 750.00
Total Cost			\$ 4,700.00

Materials Used

Roof: Thatch

- Ventilation
- Rain proof
- Insulation- warm in winter, cool in summer (thermally efficient)
- Local manufacturing

Walls: Bricks

- Local manufacturing and commonly installed
- Sturdy
- Low cost

Floor/Interior: Cement

- Easily hosed off or mopped (painted pale yellow)
- In sterilization and treatment room, observation room, and consolation room there will be ceramic tile

