

Power After The Storm?

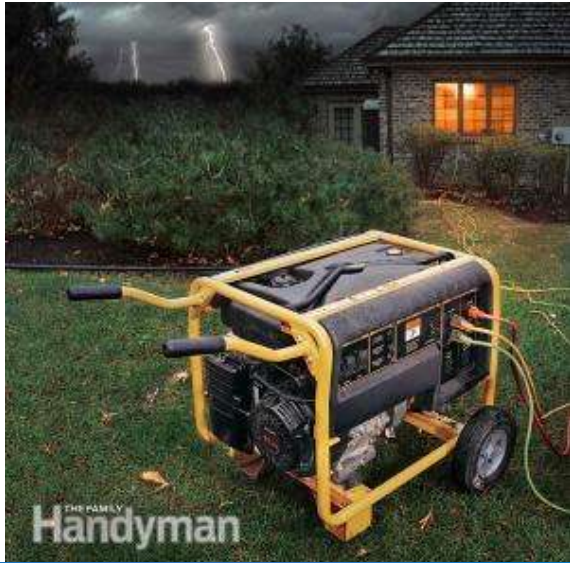


Our utility lines are above ground and somewhat antiquated...
We experience high wind events on a regular basis...
Our power goes out...



What are current our options?

Gas generators

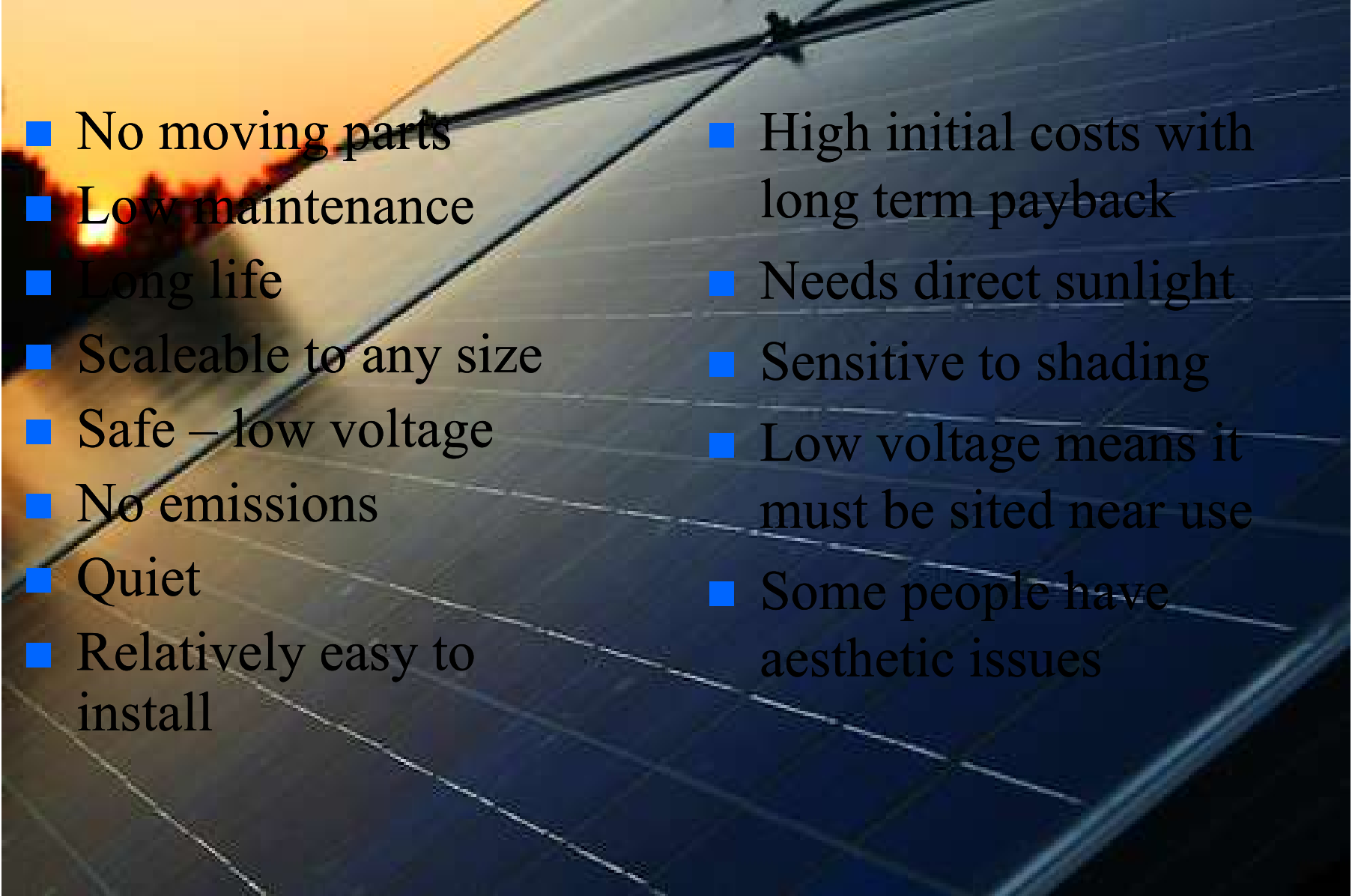


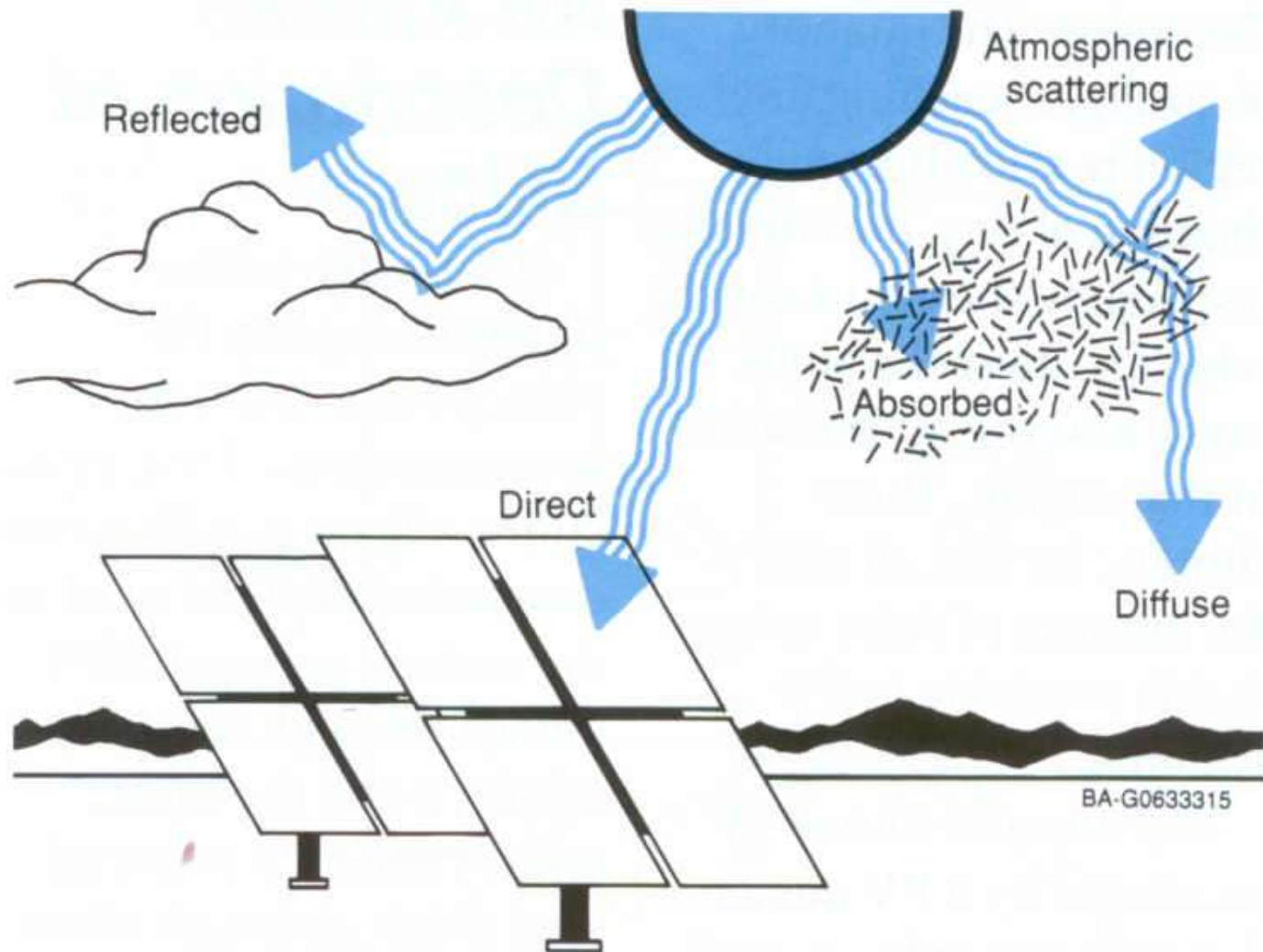
- Be sure that these are used outside of the home.
- Exhaust should be pointed away from the dwelling, and sited at least 15 feet from doors and windows.
- Be sure to check Carbon Monoxide alarms too.
- Never back-feed power from a generator into a plug as it can kill line men working to fix the power lines.



Natural gas generators may be connected through National Grid even during their moratorium on gas connections on the Cape.

PV Advantages & Disadvantages

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- No moving parts
 - Low maintenance
 - Long life
 - Scaleable to any size
 - Safe – low voltage
 - No emissions
 - Quiet
 - Relatively easy to install
 - High initial costs with long term payback
 - Needs direct sunlight
 - Sensitive to shading
 - Low voltage means it must be sited near use
 - Some people have aesthetic issues



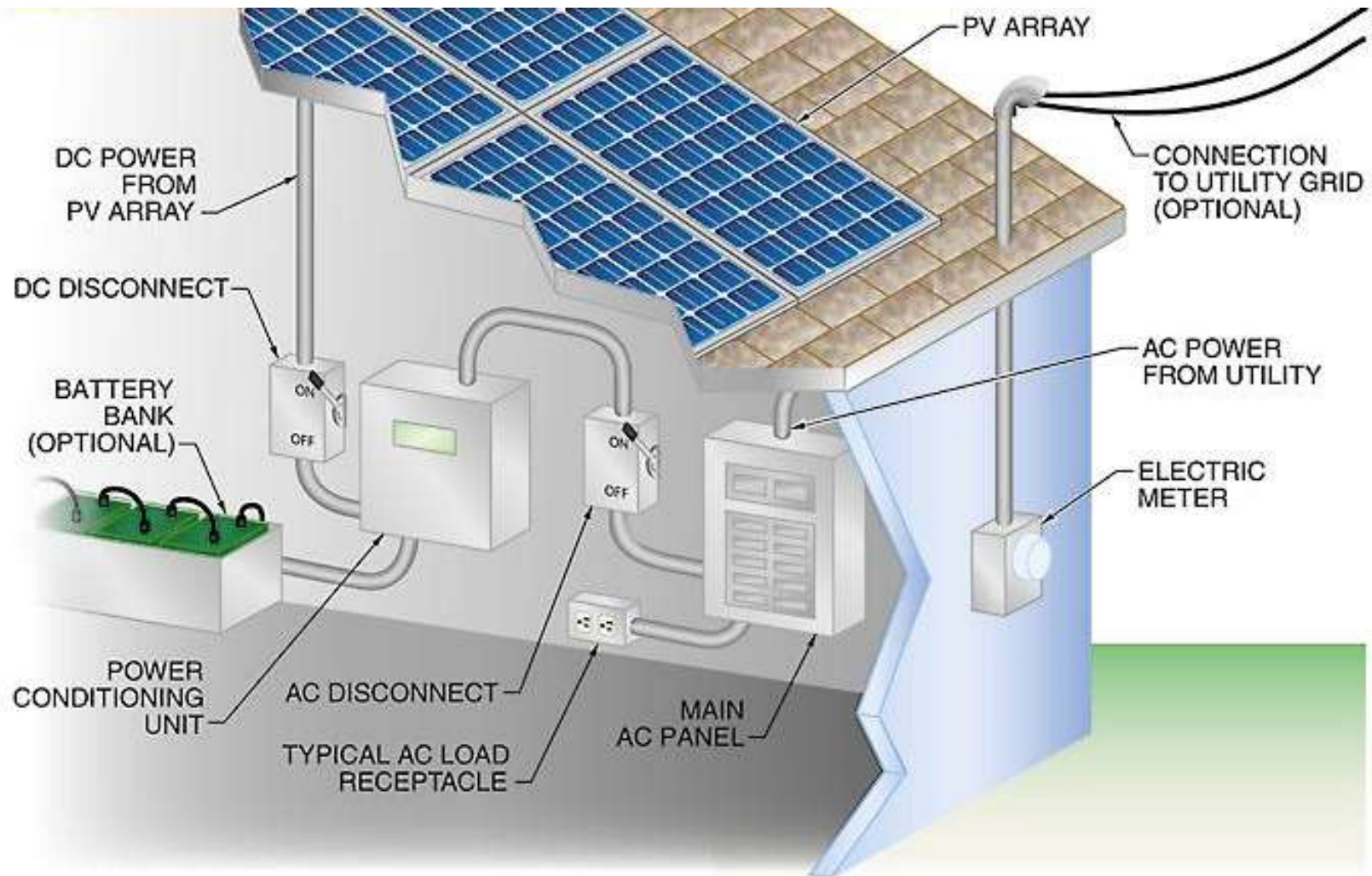


What about power outages?

- SunnyBoy TL inverter is one option.
- This inverter allows for a circuit to be powered when grid power is down and the sun is out.
- No batteries required



Typical Residential PV System



Traditional Battery Back-up



Mounting Techniques



Ground-mounted system



Roof mounted – can be flush to roof pitch, mounted on a fixed rack for proper angle, mounted on adjustable rack

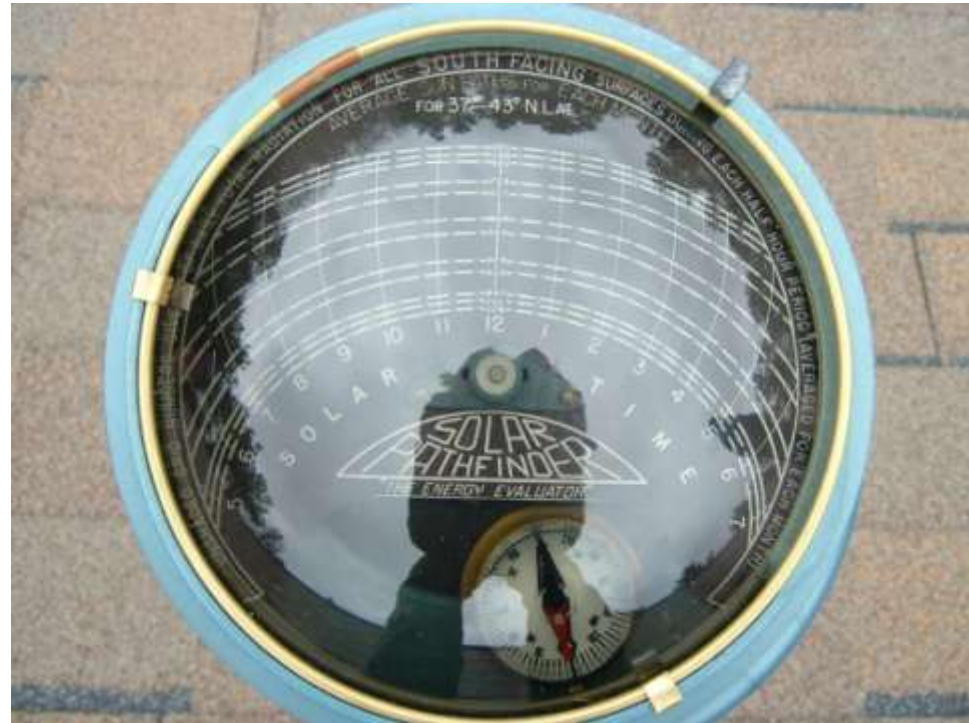


Hmmmm...



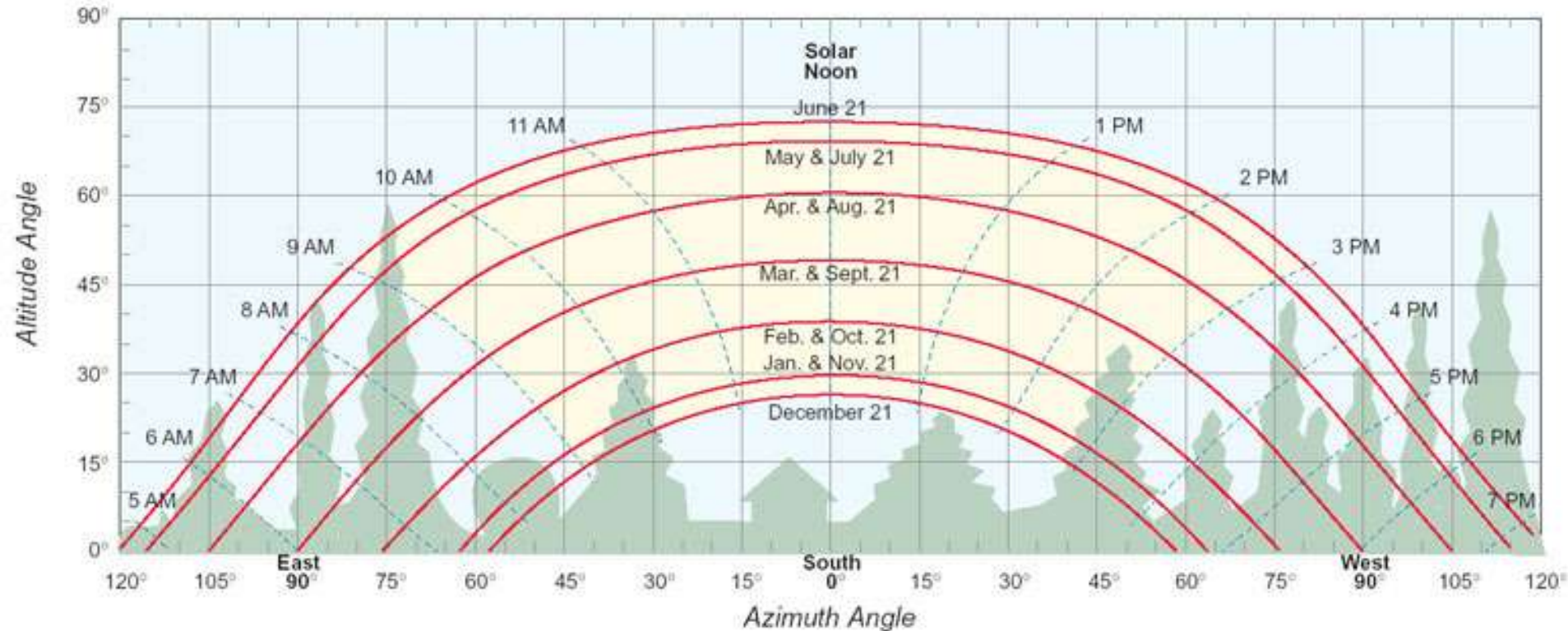
Siting Considerations

- South facing
- No Shading during most of the day
- Angle is important
- Fixed, adjustable, or tracking mount
- Must be close to loads
- Should have airflow behind panels



Sun Path Charts

Sun Path Chart for 40° North Latitude



To use this chart for southern latitudes, reverse horizontal axis (east/west & AM/PM)

Residential PV System - Microinverters



Example Cost of Residential Photovoltaic Installation

Example 5 kilowatt System

- 5kW Capacity (approx. 480ft² of roof space)
- Installed Cost : \$18,000 (\$3.60/Watt)
- 30% Federal tax credit: \$5,400
- \$1,000 State tax credit in MA
- Annual production ~ 6,500 kWh
- Minimum SREC value in yr 1: (.20/kWh) \$1,300
- Electricity value in yr 1: \$1,495
- \$?+/- year savings on Electricity & REC sales \$2,795
- Payback in 4.15 years
- Solar Loan through the Mass Clean Energy Center



Net Metering

What is net metering?

Net metering enables a renewable energy system to feed back to the grid and give the system owner credit for that power.

Massachusetts allows net metering for a name plate rating of 2 megawatts and under. Whether one gets retail credit or wholesale varies state to state and utility to utility.

Renewable Energy Credits



- Solar RECs in Massachusetts are worth a guaranteed price per MWh. The market may bear a higher price, but it is MARKET driven.
- There are a number of new aggregators coming into the marketplace that broker SRECs. Be very careful when choosing one. Ask A LOT of questions before you or your clients sign a contract with them.
- The big question is what is their fee (in %).

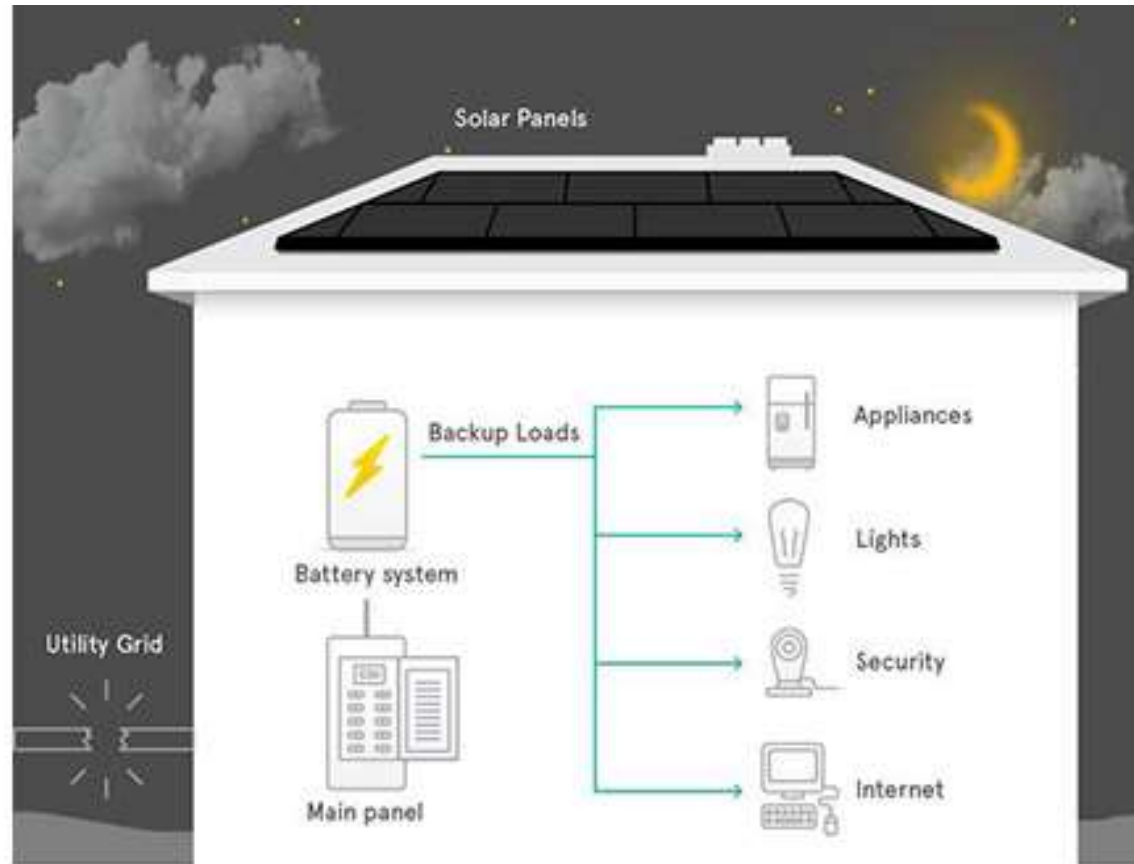
It isn't all about the money

People decide to invest in solar for many different reasons.

Climate change, rising energy costs, war in unstable countries where our interest in fossil fuel is high, doing the right thing, leaving a better place for future generations, setting a good example today and a vague sense of responsibility for one's carbon footprint has helped people make the the investment in renewable energy systems.

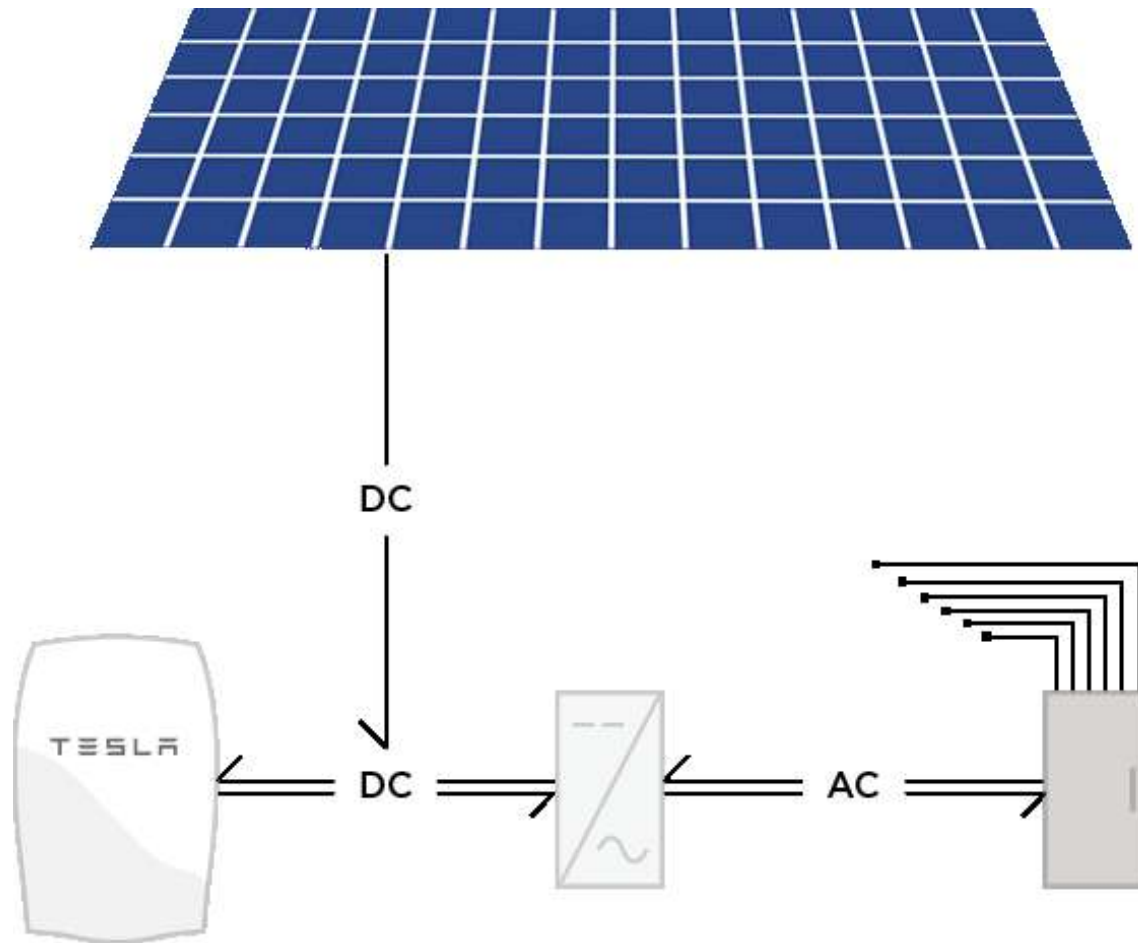


Tesla PowerWall Battery System

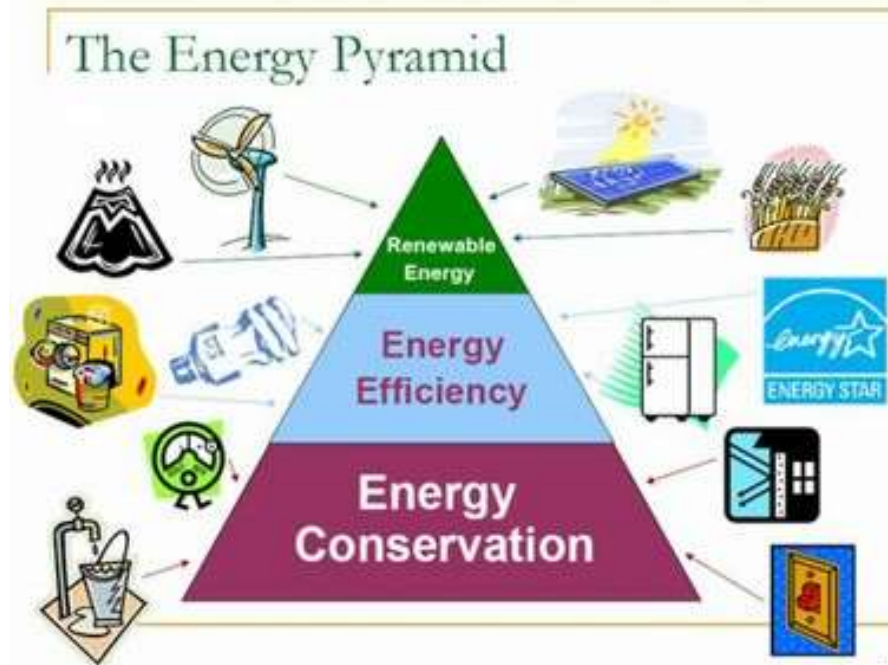


Tesla's PowerWall

10kW Battery: \$3,500: For back-up applications



So, please remember...



- Renewable Energy is often the first thing considered, but...it is the crown that the efficient building gets after implementing energy efficiency and conservation measures to reduce energy consumption.

Questions?

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