Solar Energy

By Heran and Isha

What is Solar Energy?

- **Solar power** is **energy** from the sun that is converted into thermal or electrical **energy**.
- **Solar energy** is the cleanest and most abundant renewable **energy** source available
- The large magnitude of solar energy available makes it a highly appealing source of electricity.

Various modern technology can harness this Solar Energy for a variety of uses including:

- Generating electricity providing light or a comfortable interior environment
- Can provide heating water for domestic, commercial, or industrial use.

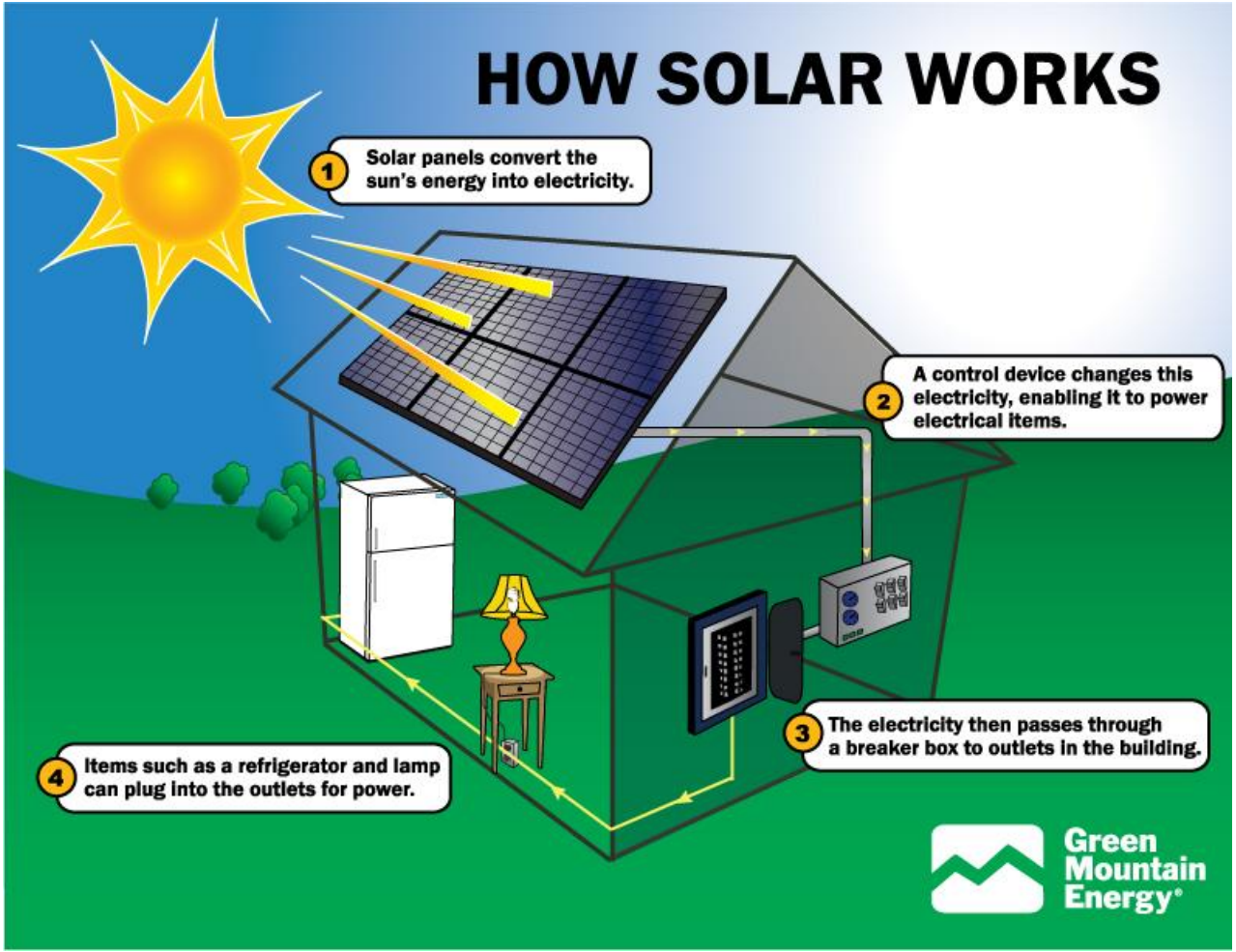
- Today, the Solar Energy produces *less* than **1/10** of **1%** of global energy demand.

How is energy created using Solar Energy?

The amount of Energy received by the earth in **30 minutes** is the equivalent to ***all*** the power used by humans in **1 year**.

- If we are able to effectively harness this energy than we will be able to yield very large benefits.

1. Photovoltaic (PV) cells convert sunlight to direct current (DC) electricity. Panels placed roofs. Panels will be north facing, or north-east or north-west facing, so that the **most energy** possible is captured.
2. The inverter converts *DC* into alternating current (AC) electricity.
3. The electrical panel sends **power** to your lights and appliances.
4. The utility meter measures the **energy** you draw and feed back to the grid.


HOW SOLAR WORKS
1 Solar panels convert the sun's energy into electricity.
2 A control device changes this electricity, enabling it to power electrical items.
3 The electricity then passes through a breaker box to outlets in the building.
4 Items such as a refrigerator and lamp can plug into the outlets for power.
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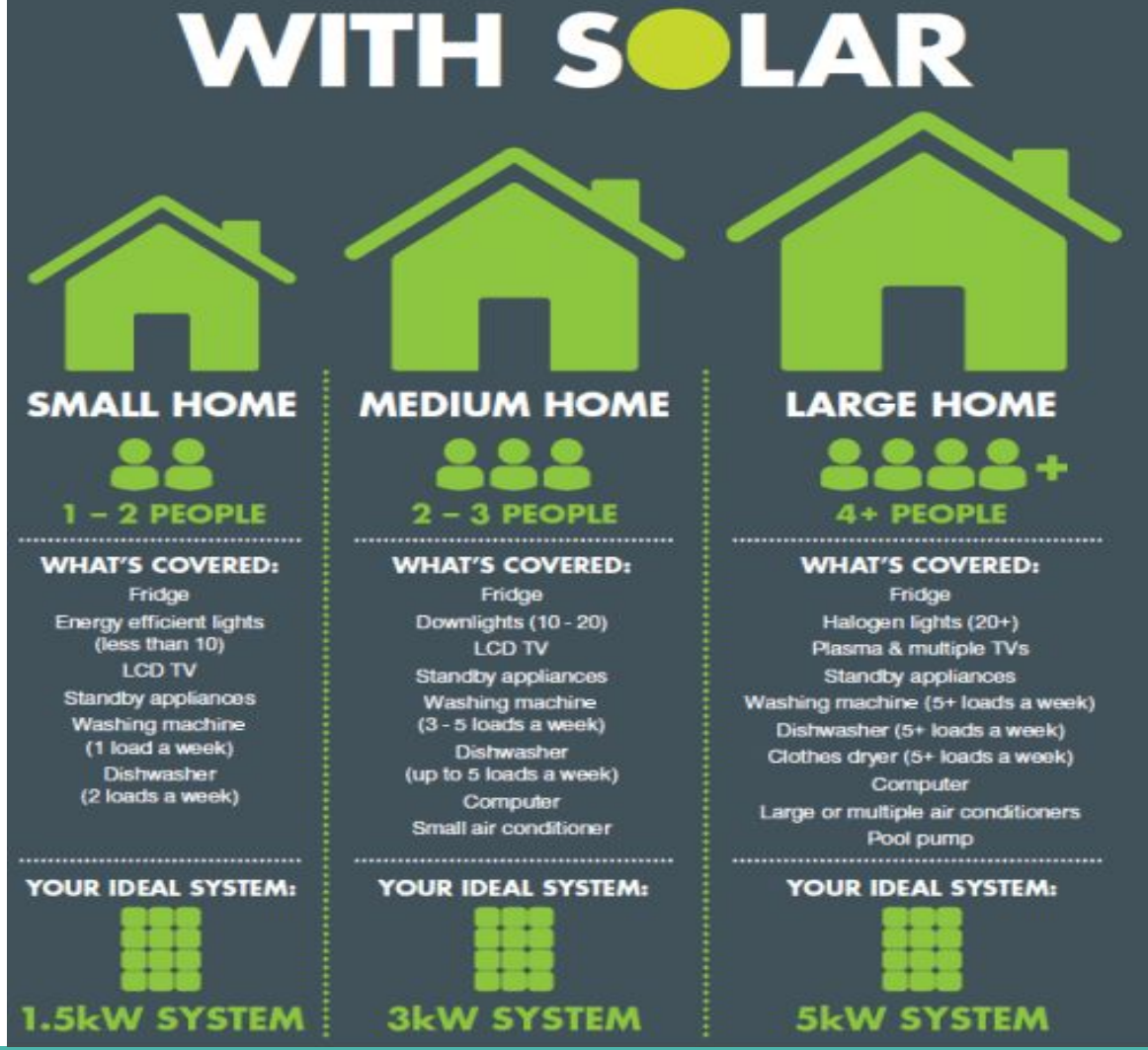
Average energy used per home using solar energy:



Trends Related to Solar Energy:

What percentages come from the source?

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Major Sources of Energy Production:

- Germany has produced **21.58%** of the solar energy globally in 2014.

- Germany has met over **50%** of the nation's daily energy needs from solar power.

Advantages of Solar Energy:

1. **Renewable Energy Source**
    a. Can not run out (renewable).
2. **Reduces Electricity Bill**
    a. Since you will be meeting some of your energy needs with the electricity your solar system has generated, your energy bills will drop.
    b. Surplus of Energy.
3. **Diverse Applications**
    a. You can generate electricity (photovoltaics) or heat (solar thermal).
4. **Low Maintenance Costs**
    a. No moving parts, thus, no wear and tear. (The inverter is usually the only part that needs to changed after 5-10 years)
5. **Technology Development**
    a. Solar power industry is constantly advancing and improvements will intensify in the future.

Disadvantages of solar Energy:

1. **Cost**
   a. The initial cost for purchasing a solar system is fairly high.
   b. Each unit of electricity generated by solar energy currently costs 4-10 times as much as that derived from fossil fuels.
2. **Weather Dependant**
   a. Solar panels are dependent on sunlight to effectively gather solar energy. Therefore, a few cloudy, rainy days can have a noticeable effect on the energy system.
3. **Solar Energy Storage Is Expensive**
4. **Uses A Lot Of Space**
   a. Solar panels require a lot of space and some roofs are not big enough to fit the number of solar panels that you would like to have.
5. **Associated with Pollution**
   a. There are also some toxic materials and hazardous products used during the manufacturing process of solar photovoltaics, which can indirectly affect the environment.

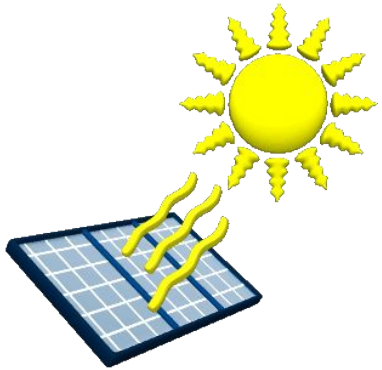
Future of Solar Energy:

How *feasible* is Solar Energy in the future ?

- The future of Solar Energy looks very bright...
- Solar Energy as an alternative source of energy is feasible.
- Solar Energy holds a vast amount of potential.
  - Yields several benefits

Progress:

- Germany plans to use **nothing** but renewable energy by **2050**.
- Solar Energy is increasing at a rate of **15-20%** per year. (Which is not enough)
  - Because currently *annual* production of photovoltaic (PV) cells is only enough to power on small city.
- **10 %** of Spain's energy comes from solar power, which is 5 times more than the average of **2 %** in the rest of the world.



How Feasible: Price

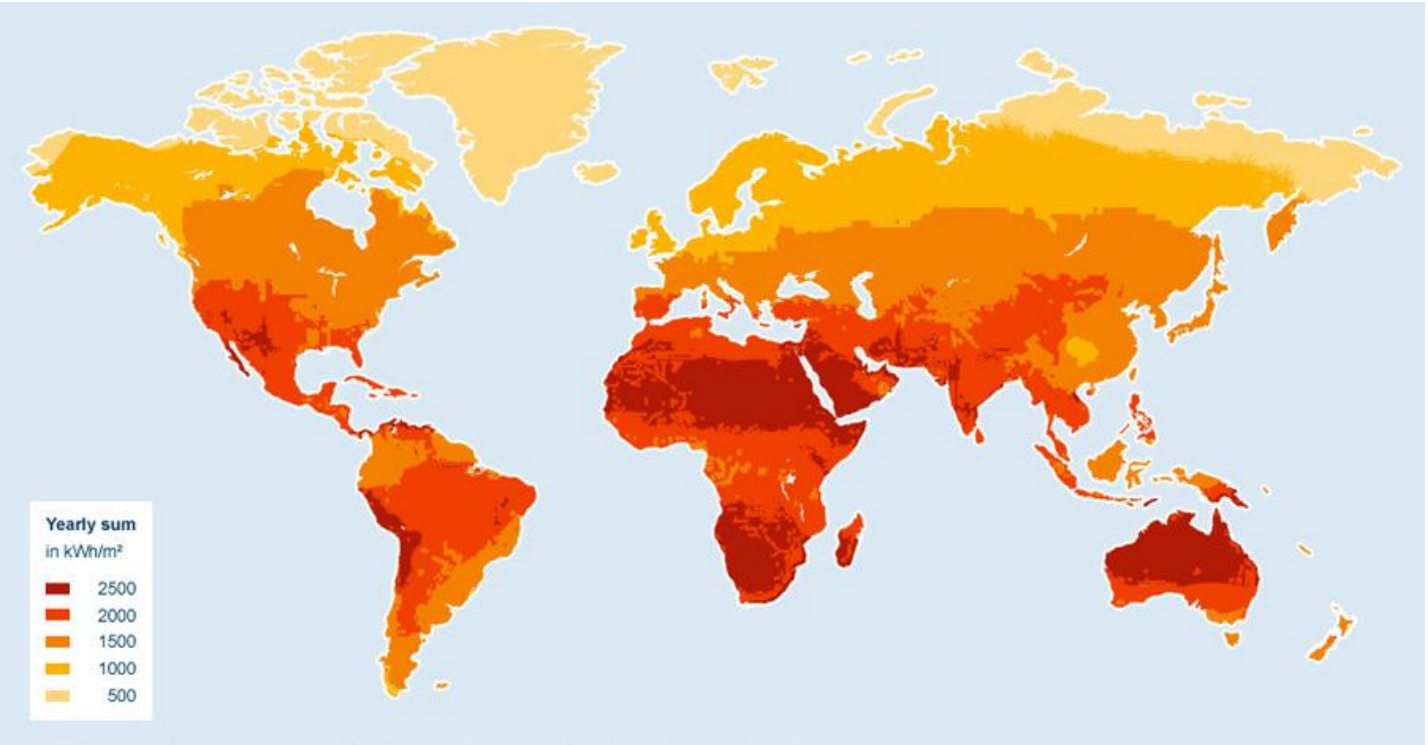
Costs

Total Costs	$19,500
System	**$9,000**
Solar Panels	$6,500
Balance of System	$2,500
Installation	**$7,500**
Labor	$3,000
Permits, Inspection Fees	$4,500
Operational Costs	**$3,000**

How Feasible: Solar Energy + Location

"Where in the world is the potential of solar energy the greatest?

Insolation Map:



Warmer colors indicate higher solar energy density (insolation, solar radiation, sunlight).

As you can see from the map, insolation tends to be higher the closer we get to the equator.

More Sunlight = More Energy

→ Allocate Solar Panels

Further Information

- The largest solar power plant in the world is located in the **Mojave Desert in California**, covering **1000 acres.**
- The electricity generated by all **three** plants is enough to serve more than **140,000** homes in California during the peak hours of the day.

Works Cited

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