

# Green Energy

# RENEWABLE VS. NON- RENEWABLE ENERGY

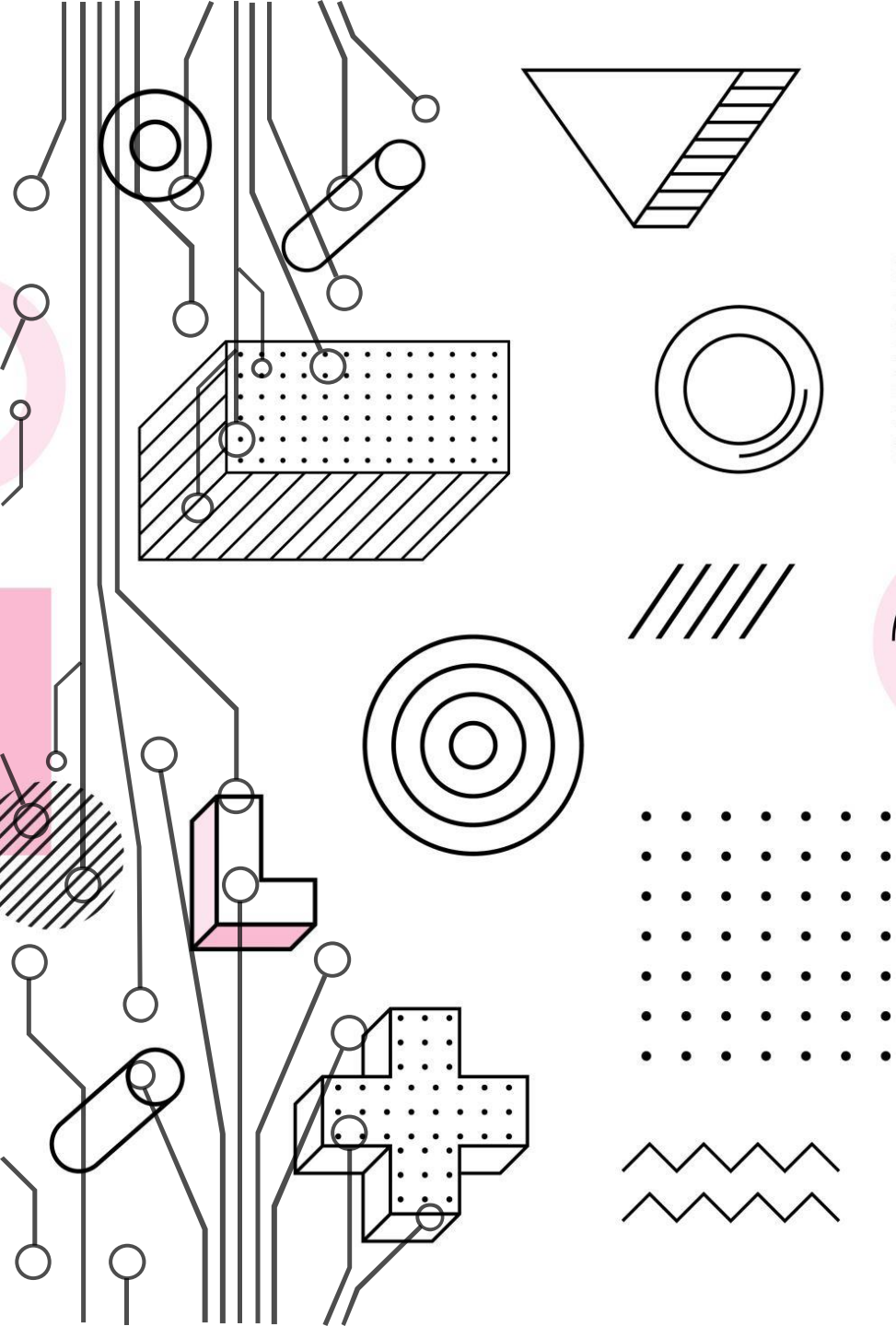
## Renewable

- Constantly replenished
- Does not have significant pollutant emissions
- Renewables cost money so you must weigh benefits.
- Solar

VS.

## Non-renewable

- Draws on finite sources which will eventually run out
- Pollutants are of concern (greenhouse gases).
- Fossil Fuels such as coal, oil, natural gas

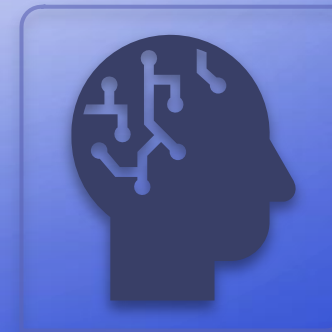


# USES OF RENEWABLE ENERGY

- Direct uses
  - Direct: Converted directly into useful energy
  - Absorbed in solar collectors providing space heating or hot water
  - Concentrated by mirrors to provide high heat for electrical production
  - Converted directly into electricity using PV module
- Indirect uses
  - Converted into useful energy indirectly through other energy forms
  - Hydropower: Energy extracted from dams and turbines
  - Wind: Energy extracted from air movement
  - Wave: Wind moving over long stretches of the ocean creating waves
  - Bioenergy: Through photosynthesis in plants
- Non Solar Renewables
  - These are renewable, not depending on solar radiation.
  - Tidal: This is not wave energy; the power of tides is harnessed.
  - Geothermal: Heat from within the earth

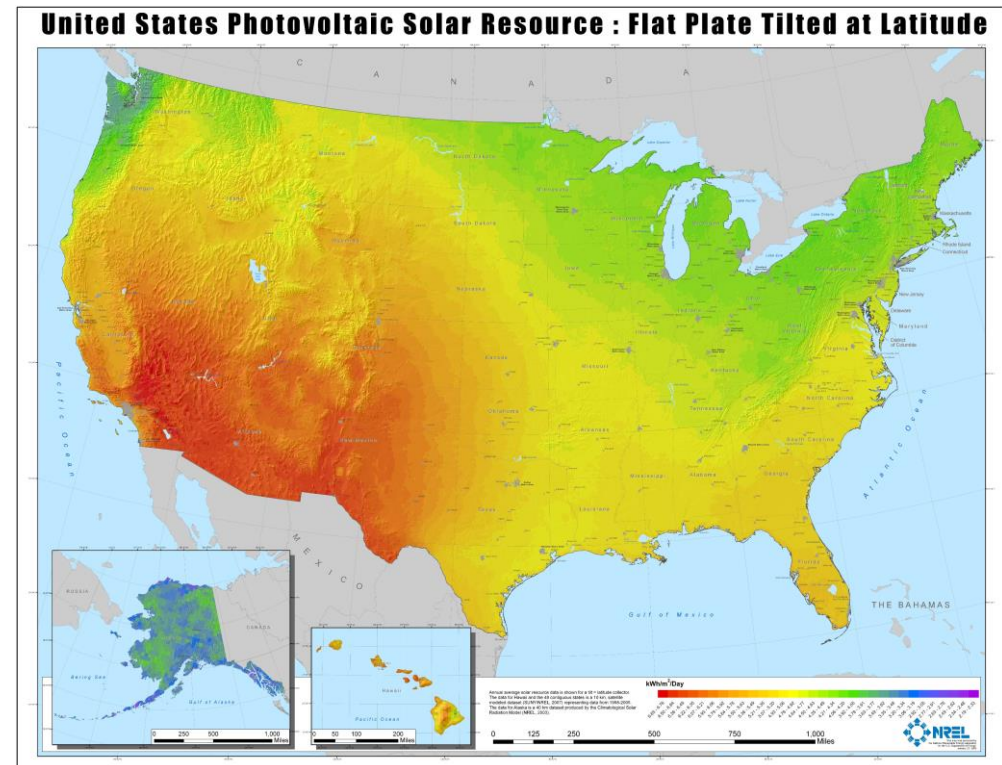
# GEO THERMAL

- One of the most sustainable sources of alternative energy
- Geothermal does not contribute to global warming.
- The earth's crust is the medium for transferring energy in the concept of geothermal.
- A form of renewable source that is independent of the sun. The ultimate source of geothermal energy comes from within the earth.
- Enthalpy: Amount of heat content in a substance. In studying geothermal, recognize that temperature and enthalpy go hand- in-hand.



# SOLAR THERMAL

- Solar thermal could be used in any area.
- Works more efficiently in some areas
- Depends upon insolation, which is the amount of electromagnetic energy that, in the form of solar radiation, hits the surface of the earth. In other words, the available sunshine hitting the earth.





# WIND ENERGY

- Kinetic energy from the wind is turned into mechanical energy, which is turned into electrical energy.
- Air is the fluid that makes a turbine turn.
- Wind is created by the uneven heating of the earth's surface, so it could be considered a solar energy source.
- Average wind speed over a year's time is the critical factor in wind energy.
- Betz limit defines maximum output of a turbine.
- Blades utilize an air foil design for lift and drag.

# BIOENERGY

- Bioenergy is the general term for energy derived from materials such as wood, straw, or animal wastes.
- Biomass:
  - An organic material which has stored sunlight in the form of chemical energy
  - One of the largest renewable energy sources in use today
  - Raw Biomass
  - Secondary Biomass
- Biofuels Liquid
  - Renewable transport fuels
  - Bioethanol, Biodiesel
- Solid Biofuels
  - Wood, charcoal, biomass pellets



# REFERENCES

- [https://www.generationgenius.com/renewable-and-nonrenewable-energy-for-kids/?type=pmax&gclid=CjwKCAiAkrWdBhBkEiwAZ9cdcP27CSFTHoRcWUjHKDwKbWQg9wrSJ4QXK3ERLgcbH-bhSljCyNAP6RoCnQQQAvD\\_BwE](https://www.generationgenius.com/renewable-and-nonrenewable-energy-for-kids/?type=pmax&gclid=CjwKCAiAkrWdBhBkEiwAZ9cdcP27CSFTHoRcWUjHKDwKbWQg9wrSJ4QXK3ERLgcbH-bhSljCyNAP6RoCnQQQAvD_BwE)
- [https://www.nicc.edu/media/nicc/documents/bcs/open-education-resources/3\\_Basic\\_Renewable\\_Energy.pptx](https://www.nicc.edu/media/nicc/documents/bcs/open-education-resources/3_Basic_Renewable_Energy.pptx)
- <https://www.keslerscience.com/nonrenewable-energy-resources-lesson-plan-a-complete-science-lesson-using-the-5e-method-of-instruction/>