

# Renewable energies – three different approaches

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# Geothermal energy

- use of heat generated in the center of the earth
- heat can be used directly for homes or to generate electricity
- some countries can directly access it (like geysirs in Iceland), others need to drill (like Germany, USA)



# Geothermal energy: pros

- very reliable, always available
  - low risk
  - only minor impact on the landscape
  - can be used for cooling/heating the earth
  - creates a lot of jobs
  - renewable
- reduces the emission of green house gases

# Geothermal energy: cons

- location-specific
- gases are released into the atmosphere during digging
- risk of triggering earthquakes
- energy fluids need to be pumped back → management is required to maintain sustainability





# Solar energy

- Created by sun with help of solar panel
- Starts in the sun with the nuclear fusion due to a lot of temperature (4 mio °C)
- With light the electrons inside the panel start moving (photovoltaic)
- Most waves are invisible to us
- Most energy arrives as infrared energy

## Advantages

- Doesn't emit greenhouse gases
- New job possibilities
- Sun can't run out of light like fossil fuels
- Doesn't harm the environment
- Enough energy to produce excess

## Disadvantages

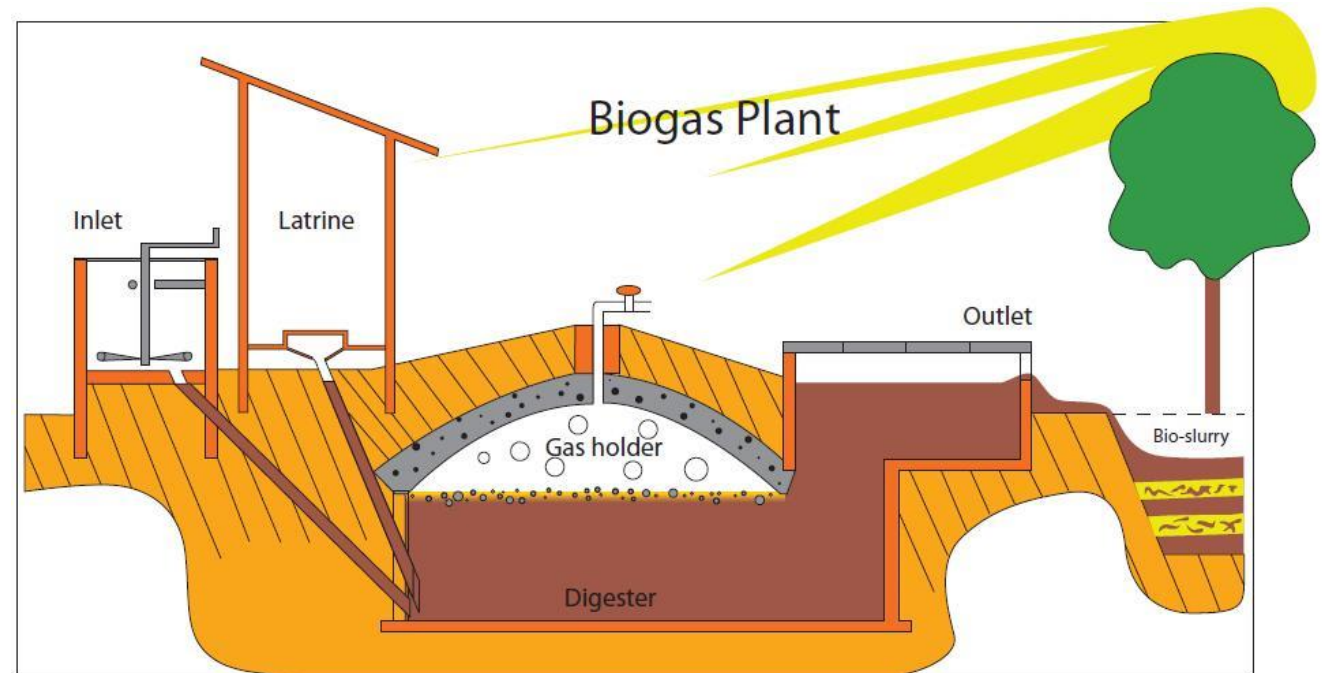
- Expensive because of the heavy equipment
- Depends on climate and cloud coverage
- The sun variability on Earth makes it difficult to decide if solar energy makes sense

# What is biomass?

Biomass is organic matter that comes from plants and animals. Organic waste such as wood, crop waste, animal waste, food waste, yard waste, wood waste can all be used as sources of biomass energy.

Biomass can be used as a source of energy in two ways:

- Burning organic materials directly to create heat
- Converting biomass into a liquid biofuel that can then be burned for energy
- When biomass is burned directly, it is used to create steam, which turns a turbine to create electricity.



# Advantages:

## 1. Renewable

- biomass supply can be regenerated within a human lifetime  
-> makes biomass renewable

## 2. Reliable

Biomass is a reliable resource that can produce energy at any time. This is an advantage over other renewable energy

- resources, like wind and solar energy, which are intermittent.
- can be turned on and off at any time to meet energy demand  
-> As long as there is biomass material available, electricity can be produced



# Advantages:

## 3. Abundant

- biomass is abundant
- you can find biomass nearly everywhere on the planet
- 4. Waste reduction
- much of the waste we make is biodegradable
- turn it into electricity

## 5. Carbon-neutral

Biomass is considered a carbon-neutral energy source because it fits into the natural carbon cycle

# Disadvantages:

## 1. Expensive

The production of biomass energy can come with a high price tag

- construction biomass energy plants
- cost of harvesting
- storage

## 2. Requires space

- power plant itself needs space
  - some power plant grow their own material
- > space for fields is needed

# Disadvantages:

## 3. Greenhouse gas emissions

- no carbon-zero technology

## 4. Environmental impact

- Could lead to devastation  
deforestation
- Monoculture of crops

## 5. Inefficient

- Biomass energy is not as efficient as other renewable energy sources

# Image sources

- [https://commons.wikimedia.org/wiki/File:NesjavellirPowerPlant\\_edit2.jpg](https://commons.wikimedia.org/wiki/File:NesjavellirPowerPlant_edit2.jpg)
- [https://commons.wikimedia.org/wiki/File:As\\_solar\\_firmengebaude.jpg](https://commons.wikimedia.org/wiki/File:As_solar_firmengebaude.jpg)
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