# Renewable energy and alternatives

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## Definition

Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale for example:















#### **Renewable energies are used for 4 important areas:**

Electricity generation	Air and water heating/cooling
Transport	Rural energy services

## **Important information**

> The worldwide investments in renewable technologies: 286 billion US Dollar.

> There are 7,7 million jobs worldwide in the renewable energy sector.

#### **Destination:**

> National renewable energy markets are projected to continue to grow strongly in the coming years.

 $\rightarrow$  in Iceland and Norway generate all their electricity using renewable energy.

 $\rightarrow$  in Denmark, the entire energy supply will be converted to 100% renewable energies until 2050.

## **Important information**

> The most renewable energies supply electricity, it has some advantages;

 $\rightarrow$  Electricity can be converted to heat and can be converted into mechanical energy.

## **Types of renewable energies**



## **Biomass**

Biomass is organic material that comes from plants and animals, and it is a renewable source of energy



<u>Wood</u>: Burned to heat and generate electricity

Animal manure and human sewage: Biogas and burned as a fuel

Sources

<u>Agriculture and Waste</u> <u>Materials:</u> Burned as fuel or liquid biofuels

Food, yard and wood waste: electricity in power plants or biogas in landfills

## **Biomass in Norway**

The current energy production based on biomass in Norway is about 10% of the stationary energy consumption.

About one-half is produced and used in forest industries.

The main Firewood in stoves.





#### Advantages & Disadvantages

Widely Available	Not Totally Clean When Burned
Can be Used in Many Forms	Can Lead to Deforestation
Helps Reduce Waste	Requires Lot of Space
Renewable	Expensive
Carbon Neutral	

## Geothermal

#### Geothermal energy is the heat from the Earth. It's clean and sustainable.

<u>Resources</u>  $\rightarrow$  shallow ground to hot water and hot rock found a few miles down the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma.



# **Geothermal in Norway**

Norway is among world leading countries utilizing geothermal energy by use of geothermal heat pumps.

CGER, Norwegian Center for Geothermal Energy Research

Depending on winter temperatures, the proportion of energy used for heating varies from 40 to 50 percent of a household's stationary energy consumption



## Geothermal

#### Advantages & Disadvantages

Reservoirs are naturally replenished	Environmental issues associated
Massive potential	Cause earthquakes
Great for heating and cooling	Very location specific
Stable	Expensive

## Solar energy

Solar technology uses the **sun's energy**, rather than fossil fuels, to **generate environmentally friendly energy**. There are 2 types of solar energy:



Thermal energy	Photovoltaic energy
This energy is used to	
heat water or other	This energy is used to
fluids, and can also	generate electricity
power solar cooling	rather than heat
systems.	

### Advantages & Disadvantages

Clean and renewable source	High costs
Easy production	Water issue
Endless and power generating 24-7	Limited locations and areas
Do not cause pollution	Ecological and cultural issues
Not noise at all	
Not almost maintenance needed	



Tidal power is a form of hydropower that converts the **energy** obtained **from tides** into useful forms of power, mainly **electricity**.



#### Advantages & Disadvantages

More predictable than wind or sun	Environmental effects
Renewable	Constant rotating or noise-making
Green	Degrade water quality and disrupt sediment processes
Effective at low speeds	Close to land
Long useful life	Expensive

## Hydroelectric power

Hydroelectric plants use the energy of rivers to operate turbines that drive an electric generator.

One of the most important quantitatively in the structure of renewable energy resources is from hydroelectric facilities; a clean and indigenous energy resource but is needed to build the necessary infrastructure to tap the potential available with zero fuel cost.



## Hydroelectric power

#### **Advantages and disadvantages**

Stable	Affects nature, natural water flows, and the construction of roads and power lines
Flexible	Cycle of life of fishes
Safe compared with nuclear or fossils	Construction is very expensive and hard

## Hydroelectric power in Norway

Over 99% of the electricity production in mainland Norway is from hydropower plants.

## Norway is Europe's largest producer of hydropower and the 6th largest in the world to consumer it.



Top Ten Countries by Hydroelectric Generation @2009 "Ranking America" (http://rankingamerica.wordpress.com)



Top Ten Countries by Hydroelectric Consumption ©2009 "Ranking America" (http://rankingamerica.wordpress.com)

Data from IEA http://www.iea.org/Textbase/publications/free\_new\_Desc.asp?PUBS\_ID=1199 Data from British Petroluem http://www.bp.com/sec**biotogtakiri୍ଟର୍ମ୍ୟାର**ିଥିo?categoryId=9023753

# Wind power

Wind energy is the energy obtained from the wind using the kinetic energy generated by air currents.

The most widespread application is at the wind farms for electricity production, where is having a higher growth due to the cheaper of its price.



Many people believe that wind does not constitute an alternative to current energy sources because it does not generate power when the wind blows.



## Wind power Advantages and disadvantages

Safe, renewable and one of the cheapest energies	It produces visual impact and noise
It does not produce emissions into the atmosphere or generate waste	It is not reliable because the wind changes its direction
The soil can still be used in other activities	It could change the life of the animals.
It avoids the contamination that entails the transportation of fuels and prevents accidents.	lt can't be stored
The electricity produced by a wind turbine prevents thousands of litres of oil from being burned daily	

# Wind power in Norway

Norway imports electricity when excess wind production in Denmark and the Netherlands drives prices down there.

Norway's potentials for wind power are excellent and the electricity production usually exceeds national own use



## Conclusion

 $\rightarrow$  Renewable energy systems are becoming more efficient and cheaper.

Growth in consumption of coal and oil could end by 2020 because to increased uptake of renewables and natural gas.

## Webgraphy

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