

Renewable Energy: Survey
Saptarshi Gupta^{*1}, Pomali Bose²

^{*1}Department of Electronics & Communication Engineering, All Nations University College, Koforidua, Ghana, West Africa

²The Global Open University, Dimapur, Nagaland, India
preetydahiya0310@gmail.com

Abstract

Every step in human life the electricity become necessary needs. Electricity can be generated from fired stations using coal, electromechanical generators using fuel, natural gas etc. But due to the shortage of these resources in environment we need to look for some alternative arrangements for future purpose. Renewable energy or Green energy source is the best alternatives to them. This paper presents the survey on different types of renewable energy sources, production techniques and limitations.

Keywords: Electricity, Green Technology, Renewable Energy.

Introduction

Renewable energy is energy that comes from resources which are continually replenished such as sunlight, wind, rain, tides, waves and geothermal heat [1]

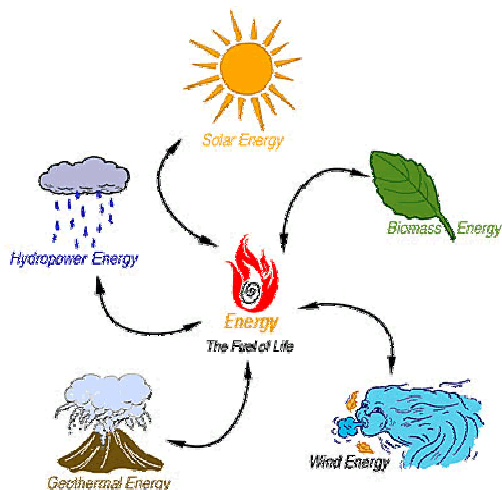


Figure 1. Renewable energy sources [2]

Types of Renewable Energy Source

Mainly five types of energy source shown in Figure 1 are solar energy, biomass energy, wind energy, geothermal energy and hydropower energy.

Solar Energy System

Solar power is the conversion of sunlight into electricity directly using photovoltaic (PV), or

indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic convert light into electric current using photoelectric effect [3].

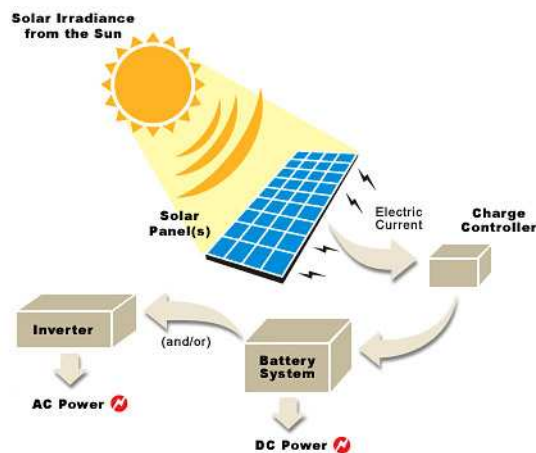


Figure 2. Stages from sunlight to electricity [4]

The above configuration consist mainly four stages: solar panel, charge controller, battery system and inverter. When sunlight falls on the solar panel photoelectric effect takes place and light energy is converted into electric current and we can store the DC current into battery. To prevent battery to be

overloaded charge controller is used before battery block. Battery always store dc power. Inverter converts DC to AC according to the needs of the user.

Solar energy can be used as various applications such as electricity generation, boiling of water, cooking etc.



Figure 3. Solar panel

Limitations of solar energy system are:

- Cloudy weather creates difficulty to charge battery through solar panel and it can increase the battery charging time.
- Rain water can reduce the lifetime of solar panel.
- Need skilled technician for maintenance.

Biomass Energy

The main source of biomass energy is living animal or environmental life.

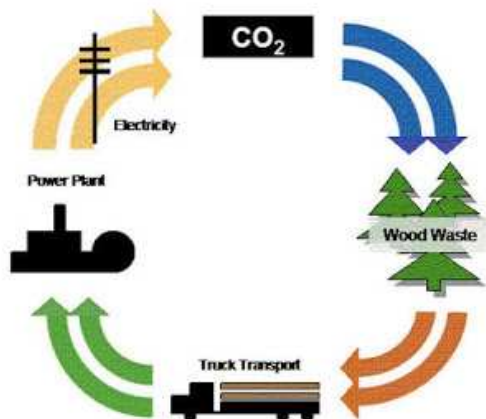


Figure 4. Steps of biomass energy production [5]

Biomass energy in simple terms is actually derived either by running steam engines from the combustion heat or by direct combustion of wood, waste, alcohol fuels, dead part of plants and animals etc. This type of combustion requires special furnaces

for combustion [5]. Pig fat can also be used to produce biodiesel.

Limitations of biomass energy production are:

- This process releases carbon dioxide and carbon mono oxide to the atmosphere which can pollute the environment.
- Biomass energy generation plant produces dirty smell which creates air pollution to the surrounding areas.

Wind Energy

Flow of air is called wind. Wind energy can be used to generate electricity using wind turbines.



Figure 5. Picture of wind turbines

Wind turbine acts as a transducer. Kinetic energy of wind is converted into mechanical energy and that mechanical energy is converted into electrical energy. When the shaft of the turbine rotates it generates electricity and we can send that electricity to power stations for supplying to the users.

Limitations of wind turbines are:

- If wind speed is less power generation also less.
- More wind turbines are needed to serve more users.
- Sometime it generates noise and creates disturbance to the home users.
- Due to heavy mechanical movement the maintenance after some interval is needed.

Geothermal Energy

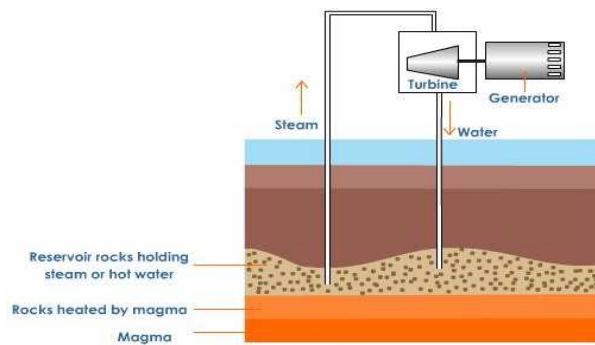


Figure 6. Geothermal plant [6]

The temperature of the earth core is very high and that can be used to generate electricity. Geothermal heat steam is used to heat water to turn the turbine of a generator. The generator produces electricity and we can send to power grid for transmission.

Limitations of geothermal power generation are:

- It may cause global warming, acid rain etc.
- Hot water from geothermal plant may contain toxic elements.

Hydropower Energy

Energy cannot be destroyed it can only change from one form to another. Water always flows upstream to downstream due to the gravitational force and generates kinetic energy. We can use that kinetic energy to produce electricity. Electricity generated from flow of water is called Hydroelectricity.

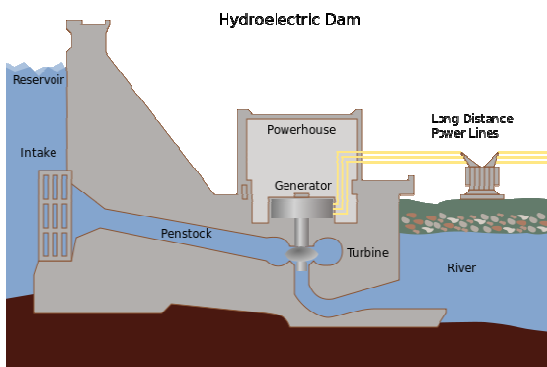


Figure 7. Hydroelectric dam [7]

Hydroelectric dams are always constructed nearer to the river or lake where large amount of water can be stored like reservoir and at the basement we keep turbine and generator. Once the water hits

the blades of turbine the turbine rotates in high speed and the kinetic energy of the water flow changes in to mechanical energy. In the Generator attached with the turbine the mechanical energy is converted in to electrical energy. We can send that electrical energy to the power grid for distributing to the users.

Limitations of the Hydroelectricity generation are

- If the amount of water is less inside the reservoir or blockage at the flow path, the water pressure may decrease and the turbine rotation speed also decreases and which results less production of electricity.
- Earthquake can damage the reservoir wall and it can destroy the functionality of hydroelectric dam.

Conclusion

In this survey paper we have discussed, different types of renewable energy sources and their limitations. There are many advantages in using the renewable energy sources compared to the non renewable energy sources. It creates less environmental pollution compared to non renewable energy sources and easily available in nature. Renewable energy sources will be able to solve many of the problems people facing now, mainly environmental impact and availability issues.

References

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