



## POWER GENERATION USING THERMAL, HYDROELECTIC POWER PLANT, WIND ENERGY AND SOLAR ELECTRIC: A REVIEW

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**Abstract:-** Electricity consumption are suppose to comprise an growing share of global energy demand in next two decades. Raising prices of fossil fuels & concerns regarding environmental consequences of gas of greenhouse emissions has risen to chances of development of other energy resource. It is also renewing interest in development of energy resources in present years. Fukushima Daiichi accident has been considered as a turning point to raise the demand of alternative energy sources. Renewable energy has been considered far better source of fuel as compare to nuclear power because of absence of risk & disasters. It has been considered that main element of greenhouse gases is know as carbo dioxide.

There has been a global concern regarding minimizing emissions of carbon. Several policies could be applied to minimizing carbon emissions in this regard. Just like enhancing renewable energy deployment & encouraging technological innovations. Two main solutions might be implemented to reduce carbon dioxide emissions & overcome issues related to climate change. First is replacing fossil fuels with renewable energy sources as much as possible. Second is enhancing energy efficiency. The discussion has been made on alternative technologies in order to use renewable energy deployment & energy use efficiency un this paper.

**KEYWORD:** - HYDROELECTIC, SOLAR ELECTRIC, WIND ENERGY, THERMAL POWER, [1] INTRODUCTION

The Electricity is usually produced at energy station using electromechanical generators. It is performed chiefly driven by heat engines that have been fuelled by burning or nuclear fission but also by other means such as kinetic energy of flowing water & wind. The another power sources involve solar photovoltaics & geothermal power. The Electricity generation is procedure of generating electric energy from sources of main energy. For electric utilities in electric power industry, it is first stage in delivery of electricity to end users, other stages being transmission, distribution, energy storage & recovery, using pumped-storage methods.

### Electricity generation, transmission, and distribution

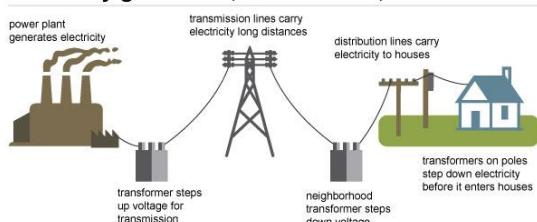


Fig 1 Electricity generated

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A characteristic of electricity is that it is not a primary energy freely present in nature in remarkable amounts & it must be produced. Production is carried out in power plants. Power system is most frequently produce at a power station by electromechanical generators, principally driven by heat engines fueled by combustion or nuclear fission but also by other means such as kinetic energy of flowing water & wind. The another power sources involve solar photovoltaics & geothermal power.

1. Thermal energy generated from: fossil fuels; coal. petroleum. natural gas. solar thermal energy. geothermal energy. nuclear energy.
2. Potential energy from falling water in a hydroelectric facility.
3. Wind energy.
4. Solar electric from solar cells.
5. Chemical energy from: fuel cells. batteries.

### [2] LITERATURE REVIEW



**Duane C. Et al. (2003) "A Study of Hydroelectric Power: From a Global Perspective to a Local Application"**

Researcher explore several effect of a hydroelectric system authors were able to decide viability of employ a hydroelectric plant at Flat Rock Dam. The because some environmental related stem from creation of dam, this area would not be greatly concern by installation of a hydropower generating facility.

**European Wind Energy Association (2009) presented "The economics of Wind energy"**

This research represents a systematic framework for economic dimension of wind energy. It focused on energy policy debate during comparison various power generation technologies. In this research second contribution is to put fuel price risk directly into analysis. analysis is made on optimal choice of energy sources to generate power.

**G.K. Singh (2013) "Solar power generation by PV (photovoltaic) technology: A review"**

The various forms of solar energy e solar heat, solar photovoltaic, solar thermal electricity, & solar fuels offer a clean, climate-friendly, very abundant & in-exhaustive energy resource to mankind. Solar power is conversion of sunlight into electricity, either directly using photovoltaic, or indirectly using concentrated solar power. The research had been in progress since some beginning for expansion of an affordable, in thorough & clean solar power technology for longer term advantage.

**Anurag Pandey, et al. (2014) "Power Generation from Waste Sources of Thermal Plant",**

Pollution, population, electricity, transportation these are some words everyone talk about this every day that he is facing this problem or other but one we must know problems are create by us. The current days an growing related to environmental problem of emissions, in sepcial global warming & limits of power resources has resulted in extensive research into novel technologies of producing electrical power.

**Shahrouz A., et al (2014) "A Review of Re latest able power Supply & power Efficiency Technologies",**

Electricity consumption would comprise an increasing share of global power demand during next two decades. In recent years, increasing prices of fossil fuels & concerns about environmental consequences of greenhouse gas emissions have re

latest interest in development of alternative power resources. In particular, Fukushima Daiichi accident was a turning point in call for alternative power sources. Re latest able power is now considered a more desirable source of fuel than nuclear power due to absence of risk & disasters.

**Anuja R. Jadhav (2016) "Review Paper on Solar Powered Energy Management System for Electric Vehicle",**

Solar energy technology & its uses are very important for developing countries. Many countries are adopting green machine concept in automotive sectors. Electrical Vehicle plays important role to saves non-renewable sources such as petrol, diesel. Batteries are easily charged using solar systems which results in saving of electrical energy.

The solar cooling in SAV reduces required energy for AC. Using Energy Management System efficiency of EV's could be further increased.

### [3] ENERGY SUPPLY TECHNOLOGIES

Energy technology has been interdisciplinary engineering science that is working on safe, efficient, environmentally friendly. It is also economical extraction, transportation, conversion, storage & utilization of energy and has been targeted to yield high efficiency whilst skirting side effects on nature, humans & environment.

For people, energy is an overwhelming need & as a scarce resource it has been an underlying cause of political conflicts & wars. gathering & use of energy resources could be harmful to local ecosystems & might have global outcomes.

#### 3.1 HEAT THERMAL ENERGY

Thermal energy is termed as energy which has been possessed by system or object because of movement of particles within object or system. Thermal energy is one of various types of energy, where energy could be defined as 'the ability to do work.' Work is movement of an object due to an applied force. A system is simply a collection of objects within some boundary. Therefore, thermal energy could be described as ability of something to do work due to movement of its particles.

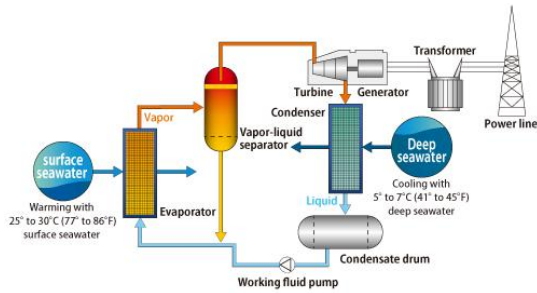


FIG 2 Thermal energy

Because thermal energy is due to movement of particles, it is a type of **kinetic energy**, which is energy due to motion. Thermal energy results in something having an internal temperature, & that temperature could be measured - for example, in degrees Celsius or Fahrenheit on a thermometer. faster particles move within an object or system, higher temperature that is recorded.

### 3.2 HYDRO POWER

Hydro power is currently largest renewable energy source for power generation around world. Hydro electricity generation has had a strong increase over past 50 years. It was 340 terawatt-hour (TWh) in 1950 & covered about one-third of global electricity demand. It increased to 1,500 TWh in 1975 & further to 2,994 in 2005. We could compare this to global consumption of 15,000 TWh of electricity with a global production of 18,306 TWh in 2005 (Ngô & Natowitz, 2009). Currently, hydro power development is difficult due to a large initial fixed investment cost & environmental concerns. Additionally, hydro power has caused problems for local residents associated with need to relocate large populations, as well as construction of dams is permanent with a sunk cost of utilities which cannot be removed. environment is also influenced by hydro power construction because of large engineering works. Hydro power has been considered attractive because of a pre existing supply of water in case of agriculture as well as household & industrial use. Hydro power is clean. It enables storage of both water & energy. Stored energy could be used in case of application of both base-load & peak time power generation.

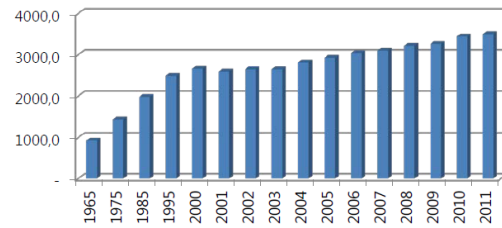


Fig 3 Worldwide hydro electricity consumption, 1965-2011 (in TWh)

The total hydropower capacity has been forecasted to raise from 1,607 GW in 2011 to 1,680 GW in 2035. As stated by World Economic Outlook 2012 report, China has been expected to increase its capacity to double by 2035.

### 3.3 WIND POWER

The installed capacity of wind power has increased from 4.8 MW in 1995 to more than 239 GW in 2011. Today, each wind turbine could generate as much electricity as a conventional power plant. Wind energy has made its most significant contributions in China, US & Germany, where cumulative installed capacities are 62, 47 & 29 GW, respectively.

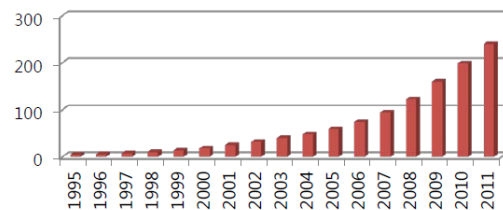


Fig 4 Cumulative installed wind turbine capacity, 1995-2011 (in gigawatt)

The trend shows that wind capacity installation has increased continuously throughout last two decades. IEA has estimated that global capacity is going to raise from 238 in 2011 to almost 1,100 gigawatt by 2035, of which eighty percent would be derived in case of onshore wind turbines. According to this report, offshore wind capacity is expected to grow fairly quickly from 4 gigawatt in 2011 to 175 gigawatt by 2035 as a result of public support. This target would be achieved if required investment is made based on design plan.

### 3.4 SOLAR POWER

During two last decades, economic feasibility of solar power for residential, commercial & industrial consumption has been investigated by researchers. Industrial countries such as Germany and Japan have been looking for alternative sources



of energy like solar power because there is limited availability of natural primary energy sources. In early 1990s, Japan started to take advantage of large-scale electricity generation by solar photovoltaic (PV), & was soon followed by Germany. Currently, both countries have taken lead in manufacture & production of solar power technologies. More recently, China has developed an extensive solar power capacity due to cheap labor & government subsidies, in turn, decreasing cost of solar power generation.

Moreover the reduction of cost in power that has been generated through tradition solar PV technologies, advancement, & increase in efficiency, of solar power technologies in United State has further minimized the cost of electricity in solar power industry. There are also some negative effects due to solar technologies. It impacts on buildings' aesthetics. Accidental releases of chemicals, land use solar photovoltaic market has experienced extraordinary growth. It has occurred in just last five years. Market has increased from 9,564 Megawatt in 2007 to 69,371 megawatt in 2011.

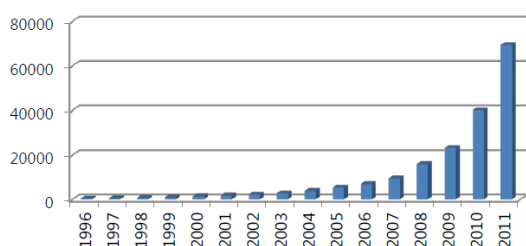


Fig 5 Cumulative installed solar PV capacity, 1996-2011 (Megawatt)

Almost 30 Gigawatt of new capacity was installed worldwide in 2011, leading to an increase in total world capacity to 69 GW. A major part of this new capacity has been due to tariff support policies, expiration date of some policies & price reductions, all towards end of year.

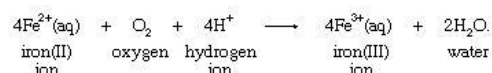
### 3.5 CHEMICAL ENERGY

Energy stored in bonds of chemical compounds is termed as **Chemical energy**. Chemical energy could be released at the time of chemical reaction. It usually form heat. This type of reactions is known as exothermic. Reactions that require an input of heat to proceed might store some of that energy as chemical energy in recently generated bonds. Chemical energy in food has been

converted by body in heat and mechanical energy. Chemical energy in coal usually get converted in electrical energy. It occurs at a power plant. Chemical energy in a battery could also supply electrical power by means of electrolysis.

During 19th century, evolving field of electrochemistry led to a broadened view of oxidation. It was possible, for instance, to produce ferric, or iron(III), ion from ferrous, or iron(II), ion at anode of an electrochemical cell, according to equation:

Molecular oxygen might effect transformation, as per to equation:



### [4] FUTURE SCOPE

Such review of renewable energy generation & efficiency technologies is going to provide descriptive & significant data which could be utilized during decision making of various stakeholders in quickly developing market.

All technologies have both advantages & disadvantages that may vary according to availability, place, technological capability of producers, environmental considerations and financial limitations. Every region, municipality or country has various initial circumstances that set the energy mix that might be produced at minimum cost during minimizing harm made to environment. There is no particular solution in case of every energy need & issues. Still upcoming researches are looking for optimal location.

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