

Renewable energy technology transfer for green environmental sustainability

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ABSTRACT

“Environmental sustainability”, “Eco friendly” and “Climate Change” are the slogans commonly used in all the places in the world to protect the environment. To avoid the unfavourable global warming and climate change, environment should free from pollutants, ozone depleting substances (ODS). The “Pancha Boothas” like Water, Land, Fire, Wind and Sky are very much helped us for utilization of the resources efficiently. Basically the technology development started from the living environment. But due to new education system Technology developments are occurring in Educational Institutions and laboratories. Now we transfer the technology for green environmental sustainability without affecting the environment. In this way renewable energy sources are very much helpful to protect the environment. This paper explore how the renewable energy sources like solar energy, bio energy and wind energy etc., are used for green environmental sustainability.

Key words: Climate change, Pollutants, renewable energy sources, transfer of technology. Green Environmental sustainability, Environmental protection

Introduction

Environment is the natural habitat for the human beings. Recent technological development applications are mostly used in the urban areas for their better living. Initially people in the habitat areas developed the new things and innovative ideas by using the available resources. Basically the technology development started from habitat areas without affecting the environment and climate change. Examples are Water pumping, Rainwater harvesting and Agricultural techniques



Figure.1.



Figure.2.

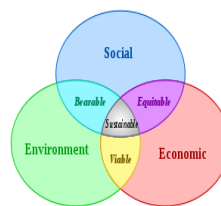


Figure.3.



Figure.4.

Climate Change: Now a days, based on the utility, people do not bother about the environment and pollute it for their temporary benefit. They are using ozone depleting substances (ODS) like CFCs in refrigerators & air conditioners; spray/aerosol based cosmetic health products and industrial products. Automobile and industries are emitting more pollutant gases. Due to these ODS and polluting gases, global warming may be occurred and finally unfavourable climate change may be occurred.

Villages and Urban Areas: Due to the industrial revolution, electrical energy applications and comfortable living environment divide the country into villages and urban areas. Due to the above reasons technological development occurred in the urban areas only. In most of the villages the people are living in below the poverty line. They are having more than sufficient manpower, knowledge and natural resources but due to the poverty, they are not getting the modern living environment for thinking to invent the new technological concepts now. So the recent technological development should be sent to the habit areas for their and economical development.

Renewable Energy Sources and habitat development: Renewable energy sources having the more roles for the habit development & Environmental sustainability of the country. Mainly renewable energy sources are used for rural electrification and make comfortable living environment. India having the lot of potential in renewable energy sources field. During the past 20 years, the renewable energy programmes in India has involved the habitat development to protect environment. Initially the renewable energy concepts are developed in national laboratories and educational institutions. After these concepts and applications were sent to the villages by subsidy driven extension activities mainly in the field of biogas generation, improved Cook stoves, solar street lighting systems and solar water heating systems. The following table indicating the potential of renewable energy sources in India. Renewable Energy Sources Potential and installed capacity in India as on 31 March 2013

Table.1.

Sl.no	Source	Potential MW (Approx)
1	Wind power	49130
2	Small Hydro power	15399
3	Biomass	17538
4	Cogeneration on Bagasse	5000
5	Waste to Energy	2707

Solar Energy: Solar Energy is the parent energy for all other sources of energy like wind and Bio Energy, etc., solar energy is abundantly available in India. The daily average solar energy incidence varies from 4-7 kWh/m². There are approximately 300 clear sunny days in most part of the country. The potential of solar energy is meeting the growth energy needs of the country.

Solar Photovoltaic: India has the world's largest solar program and solar energy is being used for a large number of applications.

Presently, solar photovoltaic (PV) power systems are being used for a variety of applications such as

- ❖ Railway signaling Equipment
- ❖ Water pumping sets for micro irrigation & Drinking water supply.
- ❖ Community Radio & Television sets.
- ❖ Weather monitoring,
- ❖ Battery charging,
- ❖ Street lighting



Figure.5.



Figure.6.

Solar Photovoltaic applications are mainly used for rural electrification. Rural households are major important category of users of PV devices for lighting. So far about 9,30,813 solar lanterns, 8,92,974 home lighting systems and 2,26,502 street lighting systems, 8,792 solar pumping systems have been installed in the country as on 31.03.2013.

Solar Thermal: Various Solar thermal systems have been developed by various research institutions as well as by industry. These systems are used for public usage such as Solar Water heating and Solar Cookers.

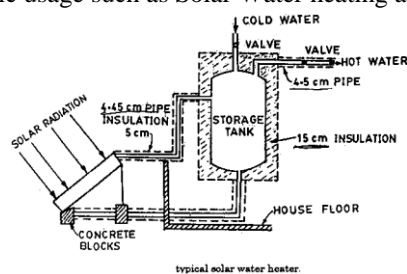


Figure.7.



Figure.8.

Solar water heaters are used in the domestic sector particularly in rural energy development as well as in large commercial establishments like hotels, hospitals, government buildings and in industry such as textile, paper and food processing and dairy.

Bio Energy: India is an agricultural based country. It has more potential in the field of Bio-Energy. Biomass is an organic material produced by plants both terrestrial and aquatic. Generally agro and forest residues like rice husk, saw dust, bagasse are used in bio energy applications. Bio Energy applications are

- ❖ Combustion
- ❖ Gasification
- ❖ Pyrolysis
- ❖ Biogas production

India has the largest cattle population in the world. Most of the families in villages own 4 or more cattle, which are sufficient to operate a small size biogas unit. Biogas is produced by the anaerobic decomposition of organic materials like cattle dung and other wastes. So far about 4,545,182 Biogas plants have been installed in the country as on 31.03.2013. The biogas plants used for rural development are

- ❖ Khadi Village Industries Commission (KVIC) Biogas Plant (Floating Dome)
- ❖ China type Biogas Plant (Fixed Dome)

- ❖ Deenabandu type Biogas plant
- ❖ Oil Drum type (Indonesia) type
- ❖ Pragathi Biogas plant

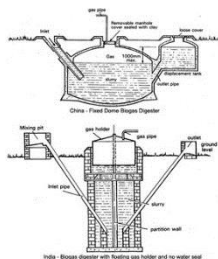


Figure.9.



Figure.10.

Biomass gasifiers also used for power generation for rural electrification

Wind Energy: Wind energy was used in the earlier period for sailing the boat, water pumping, and crushing. India has more wind energy potential due to southwest monsoon and northeast monsoon.



Figure.11.

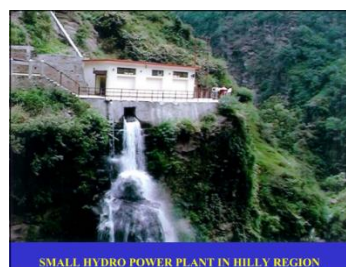


Figure.12.

Now wind energy is mainly used for power generation. Nearly 49,000MW power potential in the area of wind. Wind power capacity of 14,000 MW has been installed in the country. The map indicating the wind speeds in different areas and months.

Small Hydro Power: In India, most of the small hydropower projects in India are used for providing power supply for rural areas and power grid.

New Technologies: Indian government promoting a number of researches in new technologies in the field of renewable energy sources through scientific & academics institutes, universities and national laboratories and industries. So these new technological concepts will be sent gradually to rural people for their development for green environment.

Government agencies for renewable energy sources: The following are the authorized agencies for the development of renewable energy sources; they are giving the loan assistance, guidance, and subsidies for the development of renewable energy sources in rural areas.

IREDA (Indian Renewable Energy Development Agency)

MNRE (Ministry of New and Renewable Energy Sources Sources)

C-WET (Centre for Wind Energy Technology)

TEDA (Tamilnadu Energy Development Agency)

CONCLUSION

In India, over 70% of population is in villages. Technological concepts in the field of solar, wind, bio and small hydropower are sent to the rural areas for their development. Some rural areas developed using the renewable energy sources. The existing and new technological concepts in renewable energy sources will be sent gradually to all the rural areas, the line between rural and urban will be eliminated definitely and get the green environment.

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