



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY**

**RENEWABLE ENERGY OPPORTUNITIES SUPPORTING INDIAN AGRICULTURAL
SECTOR**

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ABSTRACT

Energy is the main concern in front of mankind, many forms of conventional energy resources are soon to be vanished and hence there is a need of emergence of renewable energy forms. It is observed that many renewable energy forms are not popular because of their high installation cost. Many people cannot afford renewable energy sources like wind energy, solar energy for the same reasons. So there is a need of affordable renewable energy sources which can also supports the lifestyle and business of people.

This paper provides a review on energy opportunities which can also supports the agricultural sector in India which is a main business population.

KEYWORDS: Solar energy, Wind energy, Renewable energy, Agricultural sector

INTRODUCTION

Farming is the main business in India. Most of the Indian population is dependent on farming. Agricultural sector is the important one major factor which decides the growth of the economy of country. As we know that the agricultural sector has different types of energy consumption like electricity, fossil fuels, wind energy, solar energy, Biomass energy and animal energy. But due to increasing prices of fossil fuels and electricity economical balance of farming get disturbed. To avoid this use of renewable energy sources can be proved as effective solution. Renewable energy resources like wind, solar, thermo chemical energy resources can be proved effective for agricultural use like agricultural processes, water pumping, farmhouses etc.[1],[2]

SOLAR ENERGY

Solar energy can be used for different applications on farm and it is used for thousands of year unknowingly, and as it is free of cost it will support the economy of farming.[3]

1. Water Pumping: Use of solar energy for pumping water for irrigation purposes is increasing slowly. Using solar energy for irrigation will be helpful in the situations like increase in electricity rates or power cuts. But high installation cost is the main problem with this technology.
2. Solar Dryer: Solar energy process is used conventionally for drying agricultural goods but in this process lot of waste of goods and time occurs. By using solar dryers for drying agricultural goods will save time and reduce waste of goods. Many different types of solar dryers are available for different sizes and products in the agriculture.
3. Heaters: Solar energy can be also used for water heating and space heating purpose in farms. This heated water can be used in farmhouses for different applications. As farms have lot of free space available there will not be any additional space require for installations of the solar equipments. But it is observed that the utilization of solar energy at farms is minimum.

WIND ENERGY

Wind can provide both mechanical and electrical energy. Wind turbines operate on a simple principle: Wind turns blades of the rotating element, which drive an electric generator, turning the kinetic energy of the wind into electrical energy. The wind is a renewable energy source, and windmills do not produce harmful environmental emissions.

Many forms of wind energy can be used in the farms for various purposes,

1. Electricity production: Electricity production in the farm can be achieved by installing small size wind mills in the farm. As farms are situated away from population and obstacles noise pollution will be minimum also required velocity of wind will be available in the farm. In Indian agricultural sector electricity production at farms is almost zero. Hence by installing small size windmills this potential can be untapped.
2. Agricultural processes: Wind was used for agricultural processes from thousand years. In this new era we can use wind mills for different agricultural processes like pumping water with the help of windmills, cleaning grains etc. By using new wind use technologies instead of conventional use of wind, one can achieve better work.

BIOMASS ENERGY

Biomass energy is produced from plants and organic wastes-everything from crops, trees, and crop residues to manure. Crops grown for energy could be produced in large quantities, just as food crops are.

1. Direct Combustion: Every year a considerable amount of biomass in the form of crop residue is available in farming. Deforestation is becoming a serious issue in many areas. Major part of this wood is utilized for burning purpose. Hence by using crop residues for producing heat energy will be effective solution for deforestation problem. This leads to increase in profit of farming because these crop residues will then have some market value which was otherwise wasted.
2. Biogas: Biogas production is the main source of farmhouse cooking fuel in many areas. Biogas can be produced by using agricultural waste, cattle waste etc. In Indian agricultural sector many farms are equipped with different types of biogas powerplants but major potential of Indian farming sector is remained untapped. There is a huge opportunity for increasing biogas production in Indian agricultural sector.
3. Compost Heat Recovery: Compost heat recovery is the relatively new technology. In almost every farm compost is generated by using animal and agricultural waste through aerobic digestion. In this process all this waste is kept in a pit and after 2/3 months, compost is produced. In all this period a continuous heat is generated due to aerobic digestion, which increases the temperature of pit. This increase in temperature results into slowing the reaction of digestion. If this heat is recovered and used for some useful means it can be useful for composting also. Recovered heat can be used for process heating, water heating, space heating or green house heating.[4]

BIOFUELS

Biofuels are the liquid fuels which can be produced from biomass like biodiesel and ethanol. Biofuels can be produced from agricultural product by carrying some chemical processes. No doubt that Biofuels are environment friendly than petroleum products and can be used as replacement for petrol and diesel. Biofuels are primarily used as transportation fuels for cars, trucks, bus etc. Ethanol can be distilled from sugar hence it can be produced from sugarcane, beet, corn and other sweet agricultural products. By installing small processing plant at farm itself production of Biofuels can be done. Which will be supportive to the agricultural economy and farmers can get a profit through sell of Biofuels.[5]

CONCLUSIONS

It can be concluded from this work that Indian agricultural sector has huge opportunities to use renewable energy in farm and farmhouses but due to technical and economical problems as well as due to lack of awareness this potential of Indian agricultural sector to produce renewable energy is remained untapped. Hence by providing technical and economical support to the farmers and by increasing awareness among them to increase use of the renewable energy sources this potential of Indian agricultural sector can be utilized for sustainable growth of Nation's economy and energy sector.

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