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ROLE OF RENEWABLE ENERGY ON AGRICULTURE

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ABSTRACT

Energy is one of the major parameters for establishing growth and progress of the country, rather the standard of living depends directly upon the per capita energy consumption. Most of energy on the earth is received from the sun. Solar energy creates circulation of wind and ocean water, causes water evaporation and consequent precipitation. Plants use solar energy for photosynthesis and store carbohydrates, protein, fats, oils, alcohols, cellulose and lignin.. In agricultural systems, energy is available from different sources as human, animal, sun, wind, biomass, coal, fertilizer, seed, agro-chemicals, petroleum products, electricity etc. Energy sources that release available energy directly to the system are classified as direct energy sources. Renewable energy and farming are a winning combination. Wind, solar, and biomass energy can be harvested forever, providing farmers with a long-term source of income. This paper is an overview of renewable energy uses for farmers and ranchers on how they can help make renewable a growing source of energy and rural income in India.

KEYWORDS: *photosynthesis, yard, manure, agrochemicals*

I. INTRODUCTION

Use of renewable energy in farming systems can mean several different things. For example, fossil fuels such as oil are non-renewable, so finding alternative ways of fertilising the land and controlling pests that do not depend on chemicals, will normally involve the use of renewable resources. Such methods reduce farmers' vulnerability to the rising price of oil. Renewable energy also includes generation of power to do a number of farm tasks: pumping water for irrigation, for livestock or for domestic use; lighting farm buildings; powering processing operations and others. These forms of renewable energy include solar energy, wind and water power, oil from plants, wood from sustainable sources, other forms of biomass (plant material), and biogas (gas produced from fermentation of manure and crop residues).

II. SOLAR ENERGY

Widespread use of solar energy for domestic, agricultural and agro-industrial activities has been practiced almost since the development of civilization. Increasing threat of acute shortage of the commercial sources of energy coupled with serious environmental pollution problems has accelerated interest in the scientific exploitation of renewable sources of energy. Energy available from the sun is inexhaustible and environment friendly. Therefore, the solar energy technologies are likely to play an important role in the near future through a variety of thermal applications and decentralized power generation and distribution systems. The power from the sun intercepted by the earth is approximately 1.8 x lOll MW. This makes it one of the most promising unconventional energy sources. Solar energy is available in abundance in most part of our country throughout the year. In India,' the annual average daily solar radiation received over the whole of the country is around 1800 J/cm2/day. Drying of various agricultural produce in open sunlight is an age-old practice. Development of various solar

devices for thermal applications such as water heating and space heating, drying, cooking and power generation began during the most century.

Fig1. shows solar pv panels providing green energy for agricultural growth

2.1. Solar cookers

Two different types of solar cookers i.e. indirect and direct focusing type have beendeveloped in the country. The indirect type solar cookers consisting of an insulated box with transparent window through which sunlight enters into the box have been satisfactorily developed and commercially exploited for domestic cooking. Such solar cookers are being marketed on commercial scale in most of the states through State Energy Development Corporations or other nodal agencies of the Ministry of Non-conventional Energy Sources (MNES), Government of India.

2.2. Solar dryers

Open sun drying of various agricultural produce is the most common application of solar energy. With the objective of increasing the drying rate and improving quality of the produce, natural convection and forced convection type solar dryers have been developed for various commodities. The movement of air in the forced convection solar dryer is through a power blower whereas in natural convection solar dryer air moves through the produce due to natural thermal gradient.

Fig2. shows rice grains dried using solar Dryer

2.3. Solar water heater

Water heating is one of the most common applications of solar energy for domestic and industrial applications. Similar to solar dryers, water heating systems are also available in natural convection and forced convection designs. Natural convection water heating system also known as thermo

syphon water heating system consist of a flat plate solar collector, insulated water storage tank and necessary insulated pipe fittings.

Fig3. shows Solar Water Heating system

2.4. Solar photovoltaic systems

In solar photovoltaic (SPV) technology the solar radiation falling on a device called solar cellis converted directly into electricity without any environmental pollution. Spy pumping systems are ideal for lifting water for drinking and irrigation without harming the environment. These pumps can be installed in boreholes, tanks, cisterns or rivers. DC surface pumps are designed for high flow rates at low heads. DC floating pumps are suitable for wide range of flow and head situations

III. HOW WIND ENERGY CAN HELP FARMERS

Farmers and ranchers are in a unique position to benefit from the growth in the wind industry. To tap this market, farmers can lease land to wind developers, use the wind to generate power for their farms, or become wind power producers themselves. Farmers and ranchers can generate their own power from the wind .Small wind generators, ranging from 400 watts to 40 kilowatts or more, can meet the needs of an entire farm or can be targeted to specific applications. In Texas and the West, for example, many ranchers use wind generators to pump water for cattle. Electric wind generators are much more efficient and reliable than the old water-pumping fan-bladed windmills. They may also be cheaper than extending power lines and are more convenient and cheaper than diesel generators.
"Net metering" enables farmers to get the most out of their wind turbines. When a turbine produces more power than the farm needs at that moment, the extra power flows back into the electricity system for others to use, turning the electric meter backwards. When the turbine produces less than the farm is using, the meter spins forward, as it normally does. At the end of the month or year, the farmer pays for the net consumption or the electric company pays for the net production. Net metering rules and laws are in place in most states.

Fig4. shows wind farms as a source of energy for the farmers

IV. EFFECTIVE UTILISATION OF HYDRO ENERGY ON AGRICULTURE

Hydroelectric power comes from the natural flow of water. The energy is produced by the fall of water turning the blades of a turbine. The turbine is connected to a generator that converts the energy into electricity. The amount of electricity a system can produce depends on the quantity of water passing through a turbine (the volume of water flow) and the height from which the water 'falls' (head). The greater the flow and the head, the more electricity produced.

Hydropower is a clean, domestic, and renewable source of energy. It provides inexpensive electricity and produces no pollution. Unlike fossil fuels, hydropower does not destroy water during the production of electricity. Hydropower is the only renewable source of energy that can replace fossil fuels' electricity production while satisfying growing energy needs.

Hydroelectric systems vary in size and application. Micro-hydroelectric plants are the smallest types of hydroelectric systems. They can generate between 1 kW and 1 MW of power and are ideal for powering smaller services such as processing machines, small farms, and communities. Large hydroelectric systems can produce large amounts of electricity. These systems can be used to power large communities and cities.

4.1. Water use for irrigation

Agriculture is by far the largest water use at global level. Irrigation of agricultural lands accounted for 70% of the water used worldwide. In several developing countries, irrigation represents up to 95% of all water uses, and plays a major role in food production and food security. Future agricultural development strategies of most of these countries depend on the possibility to maintain, improve and expand irrigated agriculture

On the other hand, the increasing pressure on water resources by agriculture faces competition from other water use sectors and represents a threat to the environment.

Water is a resource that may create tensions among countries down and upstream. Irrigated agriculture is driving much of the competition since it accounts for 70-90% of water use in may of these regions.

Water used for agriculture comes from natural or other alternative sources.

Natural sources include rainwater and surface water (lakes and rivers). These resources must be used in a sustainable way.

Rain water resources rely on the atmospheric conditions of the area. Surface water is a limited resource and normally requires the construction of dams and reservoirs with a significant environmental impact.

Alternative sources of irrigation water are the reuse of municipal wastewater and drainage water.

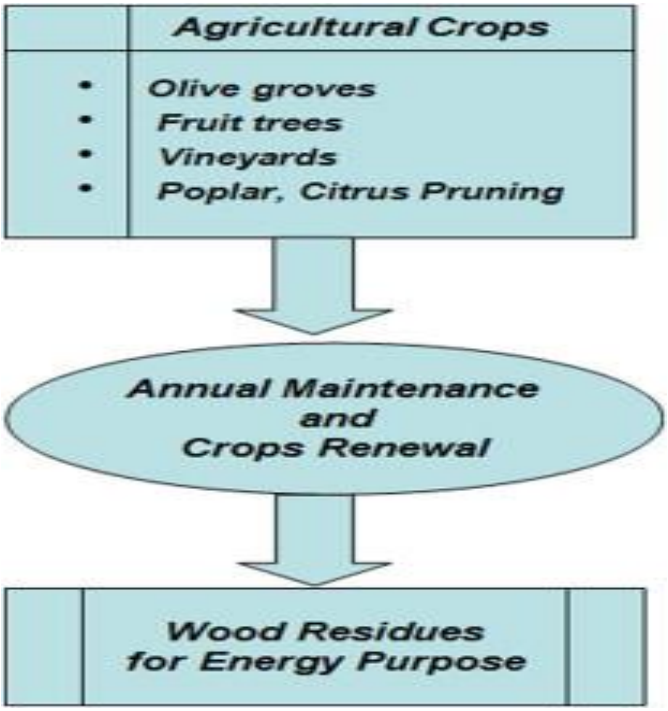
However the use of recycled water for irrigation may have some adverse impacts on the public health and the environment. This will depend on the recycled water application, soil characteristics, climate conditions and agronomic practises. Therefore it is important that all these factors are taken into account in the management of recycled water.

Fig5. shows how hydro energy(water from dams) are used for irrigation purpose.

Water reuse for irrigation is a normal practice worldwide. In Europe, for example there is a large project in Clermont-Ferrand, France since 1997 where more than 10.000m^3/day of tertiary treated urban wastewater are reused for irrigation of 700Ha of maize. In Italy more than 4000 Ha of various crops are irrigated with recycled water. Spain also counts with several similar projects. The water quality used for irrigation is essential for the yield and quantity of crops, maintenance of soil productivity, and protection of the environment. For example, the physical and mechanical properties of the soil, ex. soil structure (stability of aggregates) and permeability, are very sensitive to the type of exchangeable ions present in irrigation

V. ROLE OF BIOMASS

Authorities studies reveal that that the forest cover of country is depleting every year at a rate more than 1.5 million hectares. The situation is particular grave in rural areas. This rate of deforestation is alarming. Much of the wood felled is used as fuel for cooking. Charring and briquetting technologies reduce various problems associated with the management and lltilization of biomass in domestic and industrial sectors. Briquetting of some of the crop residues has becomes cost competitive and the briquettes being used as replacement of firewood in many regions of the country.



Domestic biogas plants instal1ed in our country use cattle dung mixed with an equal quantity of water to maintain 8-9% total solids concentration (TSC) in the influent sl7urry. The effluent discharged from the plants is, in general, col1ected into the slurry pits or spread on to the ground for drying before transportation to fields for use as organic manure.

Fig6. shows unloading of Rice Husks

VI. CONCLUSION

The only realistic solution to the problem go non-renewable is to find sources of renewable energy to replace today's dwindling supplies of affordable and usable fossil energy. Solar energy is the only source of truly renewable energy – renewable at least for the next few billion years. Windmills, falling water, solar collectors, and photovoltaic cells are all sources of renewable solar energy. The most common solar energy collectors are green plants. After all, plants were the original collectors of today's fossil energy. So, it's only logical to look to agriculture as a renewable source of alternative energy for the future. However, we need to be realistic about the extent to which energy from agriculture can replace our current use of fossil energy. While the energy experts may not agree on specific quantities or percentages, the overall limits on energy from agriculture are fairly basic and straightforward.

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