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Renewable energy sources and technologies

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Abstract
There is significant potential for agricultural involvement in the production and consumption of solar, wind, geothermal, and biomass energy. Renewable resources are abundant and widely distributed throughout the India. A number of commercial technologies are available to harness these resources, and with appropriate support, additional technologies – some potentially paradigm-shifting – could be brought to market. Renewable energy and farming are winning combination. Wind, solar, and biomass energy can be harvested forever, providing farmers with a long-term source of income. Renewable energy can be used on the farm to replace other fuels or sold as a "cash crop."While the global economy maintains its low-level growth, the Indian economy continues on its high growth trajectory. The year 2016-17 has seen a paradigm shift in the way India's economy will function by focusing on laying the infrastructure for widespread inclusion of all economic activity on the digital platform. Power sector plays a vital role in the growth of Indian economy and it is growing at rapid pace. Renewable technologies are now supplying or supplementing many on-farmenergy requirements, from water pumping to space heating. Increasingly, farmers and ranchers are selling energy (e.g., electricity generated from wind turbines, biofuels, and products from biomass). This is contributing to greater energy security in agriculture through increased diversity of energy sources, more self-supply of energy, and reduced environmental impact The total installed capacity has reached to 310 GW with generation mix of Thermal (69.4%), Hydro (13.9%), Renewable (14.8%) and Nuclear (1.9%). It is evident that the renewable power has secured 2nd position after Thermal and is spreading its wings rapidly in India.

Keywords: Additional technologies, Turbines, Economy

Introduction
There is significant potential for agricultural involvement in the production and consumption of solar, wind, geothermal, and biomass energy. Renewable resources are abundant and widely distributed throughout the India. A number of commercial technologies are available to harness these resources, and with appropriate support, additional technologies – some potentially paradigm-shifting – could be brought to market. Renewable energy and farming is a winning combination. Wind, solar, and biomass energy can be harvested forever, providing farmers with a long-term source of income. Renewable energy can be used on the farm to replace other fuels or sold as a "cash crop." While the global economy maintains its low level growth, the Indian economy continues on its high growth trajectory. The year 2016-17 has seen a paradigm shift in the way India's economy will function by focusing on laying the infrastructure for widespread inclusion of all economic activity on the digital platform. Power sector plays a vital role in the growth of Indian economy and it is growing at rapid pace. Renewable technologies are now supplying or supplementing many on-farm energy requirements, from water pumping to space heating. Increasingly, farmers and ranchers are selling energy (e.g., electricity generated from wind turbines, biofuels, and products from biomass). This is contributing to greater energy security in agriculture through increased diversity of energy sources, more self-supply of energy, and reduced environmental impact The total installed capacity has reached to 310 GW with generation mix of Thermal (69.4%), Hydro (13.9%), Renewable (14.8%) and Nuclear (1.9%) till 2018. It is evident that the renewable power has secured 2nd position after Thermal and is spreading its wings rapidly in India.

Renewable Energy Potential

India has an estimated renewable energy potential of about 900 GW from commercially exploitable sources *viz.* Wind – 102 GW (at 80 metre mast height); Small Hydro – 20 GW; Bioenergy – 25 GW; and 750 GW solar power, assuming 3% wasteland is made available. The Ministry had taken up a new initiative in 2014 for implementation of wind resource assessment in uncovered / new areas with an aim to assess the realistic potential at 100 m level in 500 new stations across the country under the National Clean Energy Fund (NCEF).

National Institute of Wind Energy has used advanced modelling techniques and revised the estimate the wind power potential at 100 metre at 302 GW. Preliminary estimates of offshore wind energy potential indicate potential in Tamil Nadu and Gujarat. Under off-grid applications, there exists significant potential for meeting hot water requirement for residential, commercial and industrial sector through solar energy and also for meeting cooking energy needs in the rural 4 areas through biogas.

Renewable Energy Targets

The Government has up-scaled the target of renewable energy capacity to 175 GW by the year 2022 which includes 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro-power. The target of 100 GW capacity set under the National Solar Mission (NSM) will principally comprise of 40 GW Rooftop and 60 GW through Large and Medium Scale Grid Connected Solar Power Projects. With this target, India will become one of the largest Green Energy producers in the world, surpassing several developed countries. Government of

India in its submission to the United Nations Framework Convention on Climate Change on Intended Nationally Determined Contribution (INDC) has stated that India will achieve 40% cumulative Electric power capacity from non-fossil fuel based energy resources by 2030. The Secretariat of International Solar Alliance is being hosted by Government of India. The Government has provided land and $30 million (Rs.175 crore) for this secretariat, and also to support it for five years. The participants, mostly in Latin America and Africa including the US, China, and France, would work together to increase solar capacity across emerging markets.

The Framework Agreement of the ISA was opened for signature on 15 November, 2016 in Marrakech, Morocco on the side-lines of 22nd Conference of Parties to the UNFCCC. So far 24 countries including India have signed the Framework Agreement. With Cabinet approval on 28 December, 2016, India has become the first country to ratify the ISA treaty. A target of 16660 MW grid renewable power (wind 4000 MW, solar 12000 MW, small hydro power 250 MW, bio-power 400 MW and waste to power 10 MW), has been set for 2016-17. Besides, under off-grid renewable system, targets of 15 MW eq. waste to energy, 60 MW eq. biomass non-bagasse cogeneration, 10 MW eq. biomass gasifiers, 1.0 MW eq. small wind/hybrid systems, 100 MW eq. solar photovoltaic systems.

Different renewable technologies are at different points in their development. Some are commercially available or nearly so, and others have potential for the longer term. Unfortunately, many benefits that renewable energy can provide are not monetized — they cannot be perceived through price signals. Policies are needed to push or pull these new technologies to full commercial development. This article examines the domestic status and opportunities for a number of renewable energy technologies — solar, wind, geothermal, and biomass.

Research methodology

Data: Secondery data
Study: Descriptive

Objectives

1. To study impacts of technologies used in agricutlre.
2. To make suggestions for efficicent use of energy in agriculture.

Finding and Anylysis

Objective 1: To study impacts of technologies used in agricutlre.

Solar: Solar technologies produce electrical or thermal energy. Photovoltaic (PV) cells (or "solar cells") that convert sunlight directly into electricity are made of semiconductors such as crystalline silicon or various thin-film materials. Solar thermal technologies collect heat from the sun and then use it directly for space and water heating or convert it to electricity through conventional steam cycles, heat engines, or other generating technologies. In the future, solar energy could produce hydrogen to provide transportation fuels, chemicals, and electricity, and to serve as energy storage at times when the sun is not shining. As a result of technological advances, the costs of these technologies have been steadily decreasing, and high electricity costs can bridge the gap further. Although solar resources are greatest in the Southwest (about 25 percent higher than the national average), solar electricity may be more cost effective in states with high electricity costs. In agriculture, PV can economically provide electricity where the distance is too great to justify new power lines. Solar electric systems are used to provide electricity for lighting, battery charging, small motors, water pumping, and electric fences. The number of solar energy applications is expected to grow as new technologies increase solar cell efficiency and reduce costs. New "quantum dot" materials could theoretically more than double efficiency, converting 65 percent of the sun's energy into electricity, as compared to the best commercially available solar cells today, which have conversion efficiencies of up to 30 percent. Research is also being conducted to reduce the cost of solar water heating systems through the use of materials like plastics instead of metals and glass.

Wind Energy Wind technologies provide mechanical and electrical energy. Wind turbines operate on a simple principle: Wind turns rotor blades, 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. Utility-scale turbines range in size from 750 kilowatts (kW) to 5 megawatts (MW), Small wind systems can serve agriculture in traditional ways, such as using mechanical energy to pump water or grind grain. As costs decrease, small systems used to generate electricity may also become economically efficient by avoiding the expense of installing transmission wires, especially in more remote applications. Where connected to the electricity distribution grid, small windmills can generate revenue through electricity sales when generation exceeds internal requirements. Decentralized wind systems can be combined with other energy sources to create a hybrid energy system, geothermal energy has many agricultural applications. Vegetables, flowers, ornamentals, and tree seedlings are raised in 43 greenhouse operations heated by geothermal

energy. Forty-nine geothermal aquaculture operations raise catfish, tilapia, shrimp, alligators, tropical fish, and other aquatic species. Agri-industrial applications include food dehydration, grain drying, and mushroom culture. The drying of onions and garlic is the largest industrial use of geothermal energy Ground source heat pumps can be applied in most rural areas. In the future, new technologies such as enhanced geothermal systems (EGS) promise to reduce the cost of geothermal power. These can be developed by fracturing rock to increase underground fluid flow and permit heat extraction.

Biorefineries

Discussion of renewable energy from biomass centers on the concept of the "biorefinery," where new technologies are being used to extract energy and other valuable products from biomass resources.In a sense, biorefineries already exist. They process corn into ethanol, corn syrup, animal feed, and other products, or transform trees into a variety of wood products, electricity, and heat, to name two examples. For the next generation of biorefineries, researchers are developing processes for exploiting the large amount of energy contained in plant cellulose - a difficult but potentially rewarding goal. In one biochemical process (referred to as the sugar platform), enzymes are used to break apart cellulose molecules, creating sugars that can be fermented into ethanol or processed further to create industrial and consumer products.

Objective 2: To make suggestions for efficicent use of energy in agriculture.

Expanding the Potential of Renewable Energy

Renewable energy technologies are being used in a variety of applications on farms and ranches and there are many opportunities to expand their use in the future. For example, renewable, farm-based biomass and other renewable energy sources may be able to fuel hydrogen production; agricultural vehicles running on hydrogen could have the same efficiency and environmental benefits planned for light-duty cars and trucks; and hydrogen fuel cell technology could provide power for remote locations and communities. courage renewable sources of energy that are important to agriculture, such as solar, wind, geothermal, and biomass? The development of a new energy future will require research, development, demonstration, deployment, and commercialization of new technologies. Each of these activities must function as part of a continuum flowing from the research bench to commercial application, with feedback loops among the various steps. Collaboration, education, and policy will all be important.

Conclusion

The paper has been revealed different kind of technologies that are coming up since last few years but still there vast gap between technology and their implimentation. The intermittent nature of wind and solar energy is all the more peculiar in India, owing to the relative weakness of the transmission network, the evening peak in power demand and the measurable seasonality in solar and wind output that comes with the monsoon. Renewable energy forms an integral part of India's current and future energy policy. If India follows the ambitious plan it has volunteered for, it can accomplish the dual goal of economic development and green-energy production, which is certainly within the realms of possibility. Though the technology costs are going low for wind and solar energy, yet these things are not enough to get the subsidies or opportunites for the same. The repower wind turbines are also having high capital cost. The different types of reneable energy sources are also facing some issues like land, finance, Purches, places distribution etc.

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