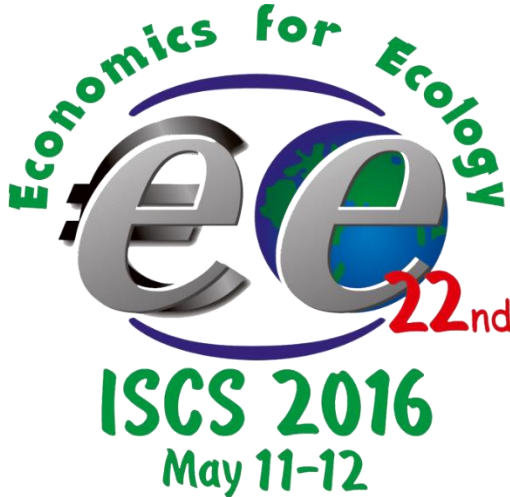


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Економіка для екології

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RENEWABLE ENERGY IN INDIA

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Renewable energy in India comes under the purview of the Ministry of New and Renewable Energy. India was the first country in the world to set up a ministry of non-conventional energy resources, in early 1980s. India's cumulative grid interactive or grid tied renewable energy capacity (excluding large hydro) has reached about 42 GW, of which 66% comes from wind, while solar PV contributed nearly 14.59% along with biomass and small hydro power of the renewable energy installed capacity in India.

The development of wind power in India began in the 1990s, and has significantly increased in the last few years. Although a relative newcomer

to the wind industry compared with Denmark or the US, domestic policy support for wind power has led India to become the country with the fifth largest installed wind power capacity in the world. As of December 2013, the installed capacity of wind power in India was 20149.50 MW, mainly spread across Tamil Nadu (7162.18 MW), Maharashtra (3021.85 MW), Gujarat (3174.58 MW), Karnataka (2135.50 MW), Rajasthan (2684.65 MW), Madhya Pradesh (386.00 MW), Andhra Pradesh (447.65 MW), Kerala (35.10 MW), West Bengal (1.10 MW), other states (3.20 MW). Wind power accounts for 6% of India's total installed power capacity, and it generates 1.6% of the country's power. In its 12th Five Year Plan (2012-2017), the Indian Government has set a target of adding 18.5 GW of renewable energy sources to the generation mix out of which 11 GW is Wind Energy. Indian Wind Energy Alliance (IWEA) is the apex body for the wind energy industry in India [2].

Table 1.Total Renewable Energy Installed Capacity (31 Nov 2015) [3].

Source	Total Installed Capacity (MW)
Wind Power	26,744.0
Solar Power (SPV)	6,763.0
Biomass Power (Biomass & Gasification and Bagasse Cogeneration)	4,550.0
Small Hydro Power	4,161.0
Waste to Power	127.0
Total	42,345

India is densely populated and has high solar insolation, an ideal combination for using solar power in India. Much of the country does not have an electrical grid, so one of the first applications of solar power has been for water pumping, to begin replacing India's four to five million diesel powered water pumps, each consuming about 3.5 kilowatts, and off-grid lighting. Some large projects have been proposed, and a 35,000 km² area of the Thar Desert has been set aside for solar power projects, sufficient to generate 700 to 2,100 gigawatts [4].

The Indian Solar Loan Programme, supported by the United Nations Environment Programme has won the prestigious Energy Globe World award for Sustainability for helping to establish a consumer financing

program for solar home power systems. Over the span of three years, more than 16,000 solar home systems have been financed through 2,000 bank branches, particularly in rural areas of South India where the electricity grid does not yet extend.

Table 2. Largest wind farms in India [5]

Wind Farm	Producer	State	Current Capacity (MW)
Muppandal Wind Farm	Muppandal Wind	Tamil Nadu	1500
Jaisalmer Wind Park	Suzlon Energy	Rajasthan	1275
Brahmanvel Wind Farm	Parakh Agro Industries	Maharashtra	528
Dhalgaon Wind Farm	Gadre Marine Exports	Maharashtra	278
Chakala Wind Farm	Suzlon Energy	Maharashtra	217
Vankusawade Wind Park	Suzlon Energy	Maharashtra	189
Vaspeta Wind Farm	ReNew Power	Maharashtra	144

India is ranked number one in terms of solar electricity production per watt installed, with an insolation of 1,700 to 1,900 kilowatt hours per kilowatt peak (kwh/kwp). As of 31 March 2016, the installed grid connected solar power capacity is 6762.85 MW and India expects to install an additional 10,000 MW by 2017, and a total of 100,000 MW by 2022 [1].

Every year, about 55 million tonnes of municipal solid waste (MSW) and 38 billion litres of sewage are generated in the urban areas of India. In addition, large quantities of solid and liquid wastes are generated by industries. Waste generation in India is expected to increase rapidly in the future. As more people migrate to urban areas and as incomes increase, consumption levels are likely to rise, as are rates of waste generation. All cities anywhere have garbage disposal as a major problem. It is produced in large quantities, and has nowhere to go, except mostly in landfills. This is attracting attention of city planners lately and measures are being

considered towards making the garbage disposal fruitful and productive. One of the major areas of interest is the use of garbage for energy.

India had a long involvement with anaerobic digestion and biogas technologies. Wastewater treatment plants in the country have been established which produce renewable energy from sewage gas, however there is significant un-tapped potential. Also wastes from the distillery sector are on some sites converted into biogas to run in a gas engine to generate onsite power.

Investments in India's Renewable Energy

Over \$1 Billion PE Investment Recorded In India's Renewable Energy Sector In 2015.

Global investors and renewable energy project developers have responded with optimism to the change in regulatory and financial environment in India.

By 2022, India aims to have 100 GW of solar power, 60 GW of wind energy, and 15 GW of other renewable energy capacity. This means that over the next 7 years around 140 GW capacity needs to be added across the country.

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