



FACTSHEET

RENEWABLE ENERGY

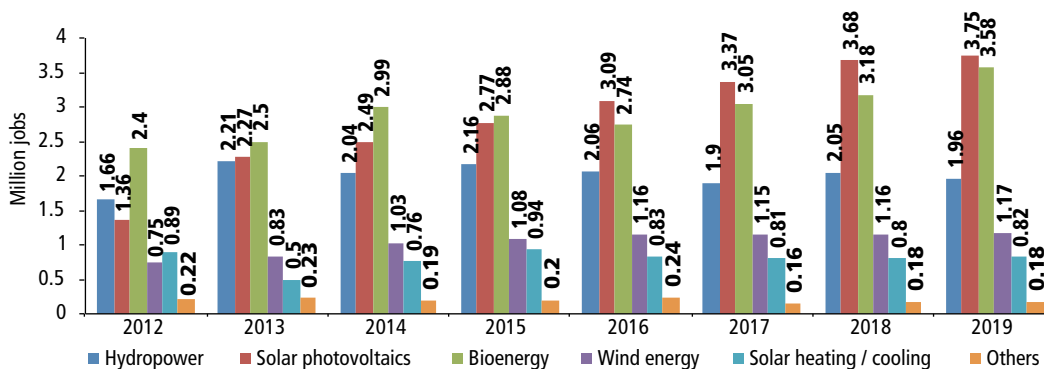
EMPLOYMENT OPPORTUNITIES



1. In April 2018, the World Bank's South Asia Economic Focus (SAEF) report highlighted the jobless growth in India and underlined the need to create 8.1 million jobs a year to maintain the employment rate. The World Bank data highlighted the continuously decreasing employment-to-population ratio since 2005—from 55 to 46.5 per cent in 2020. Covid-19 has exposed the cracks in the present job structure and employment system as well as a glaring migrant issue in the country. As per the SAEF, fall 2020 report, unemployment will be further exacerbated as India's Gross Domestic Product (GDP) is expected to contract by 9.6 per cent in the fiscal year 2020–21. The compounding issues raise the importance of creating non-farm jobs in rural areas, given that 65 per cent of India's population lives in villages.
2. Renewable energy can be seen as a potential sustainable-job-creating sector for two reasons: i) the sector exhibited resilience and endurance during the Covid-19 disruption; and ii) the growth it is experiencing in India and worldwide both because of gained competitiveness in the energy market and as an alternative to polluting fuels to drive energy transition. The prominence of RE in the global energy mix is increasing. In 2019, renewables accounted for 72 per cent share in net capacity expansion in terms of installed capacity of electricity, of which 90 per cent was associated with solar and wind.
3. Government data about the number of people employed in the renewable energy sector is available at the national level—a further break-up is not available. The Centre for Science and Environment (CSE) analysed the information available in the public domain. The 2020 annual review report of International Renewable Energy Agency (IRENA)—an intergovernmental organisation that supports countries in their transition to a sustainable-energy future—estimates renewable energy employment, analyses opportunities for local value-chain creation, measures the socio-economic footprint of the energy transition and assesses the state of gender equity in renewable energy. In its latest Renewable Energy and Jobs Annual Review 2020 released in September 2020, IRENA maintains that energy employment will be increasingly driven by renewables and offers insights for selected regions and countries, including India.
4. Only a few other reports by the organizations working at the grassroots level bring data from the ground and discuss the importance of clean energy in creating jobs. These include *Powering Jobs Census 2019: The Energy Access Workforce by Power for All; Light and Livelihood: A Bright Outlook for Employment in the Transition from Fuel-Based Lighting to Electrical Alternatives 2014* by GOGLA; *Powering Jobs Growth with Green Energy 2019* and *Greening India's Workforce 2017* both by Council on Energy, Environment and Water (CEEW), Natural Resources Defense Council (NRDC), and Skills Council for Green Jobs (SCGJ). The COBENEFITS Study, *Future skills and job creation with renewable energy in India 2019* explored further synergies.
5. According to IRENA's Renewable Energy and Jobs Annual Review 2020, solar photovoltaics (PV) and bioenergy account for 33 per cent and 31 per cent respectively of the total renewable energy workforce of 11.46 million in 2019 worldwide (see *Graph 1*). China accounts for 38 per cent of the total jobs, followed by the European Union (11.5 per cent), Brazil (10 per cent) and India (7 per cent).

Graph 1: Technology-wise renewable energy employment

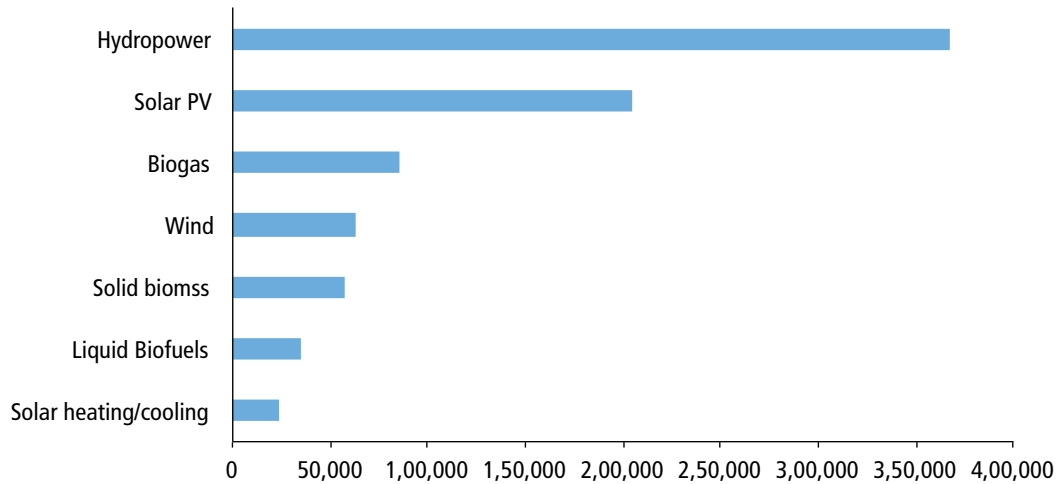
Employment in the wind sector has been stagnant for the last four years



6. In India, the hydropower sector employs 44 per cent of the total renewable energy workforce, followed by solar PV at 25 per cent and solid biomass and biogas together at 17 per cent (see *Graph 2*).

Graph 2: Industry-wise renewable energy workforce (direct and indirect) in India 2018–19

Total jobs in the Indian RE sector stood at 8.3 lakhs in 2019, up by 15 per cent from 2018

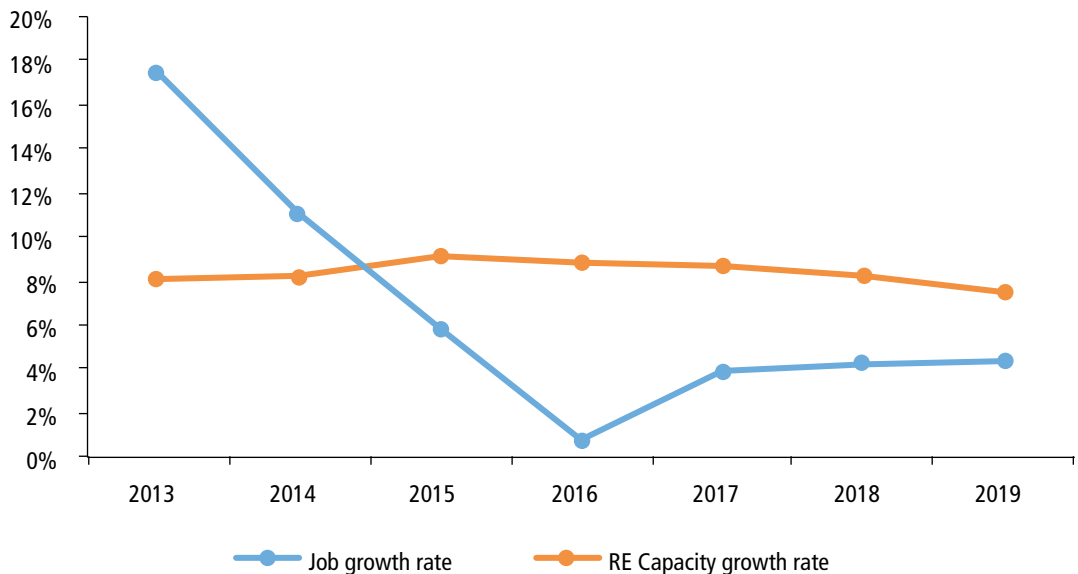


Source: IRENA, Renewable Energy and Jobs – Annual Review 2020

7. Globally, the number of jobs in the renewable sector has been rising and increased at a Compounded Annual Growth Rate (CAGR) of 6.7 per cent during 2012–19. However, this growth was less than the renewable energy CAGR for the same period, which was 8.4 per cent. The growth of employment generation was not proportional to the addition to renewable energy (see *Graph 3*). This indicates incremental share of large utility-scale development and usages of Information Technology in pre- and post-commissioning activities of projects of such scale.

Graph 3: Comparison of growth rates of jobs and renewable energy

RE is growing quite constantly but this is not reflected in job generation

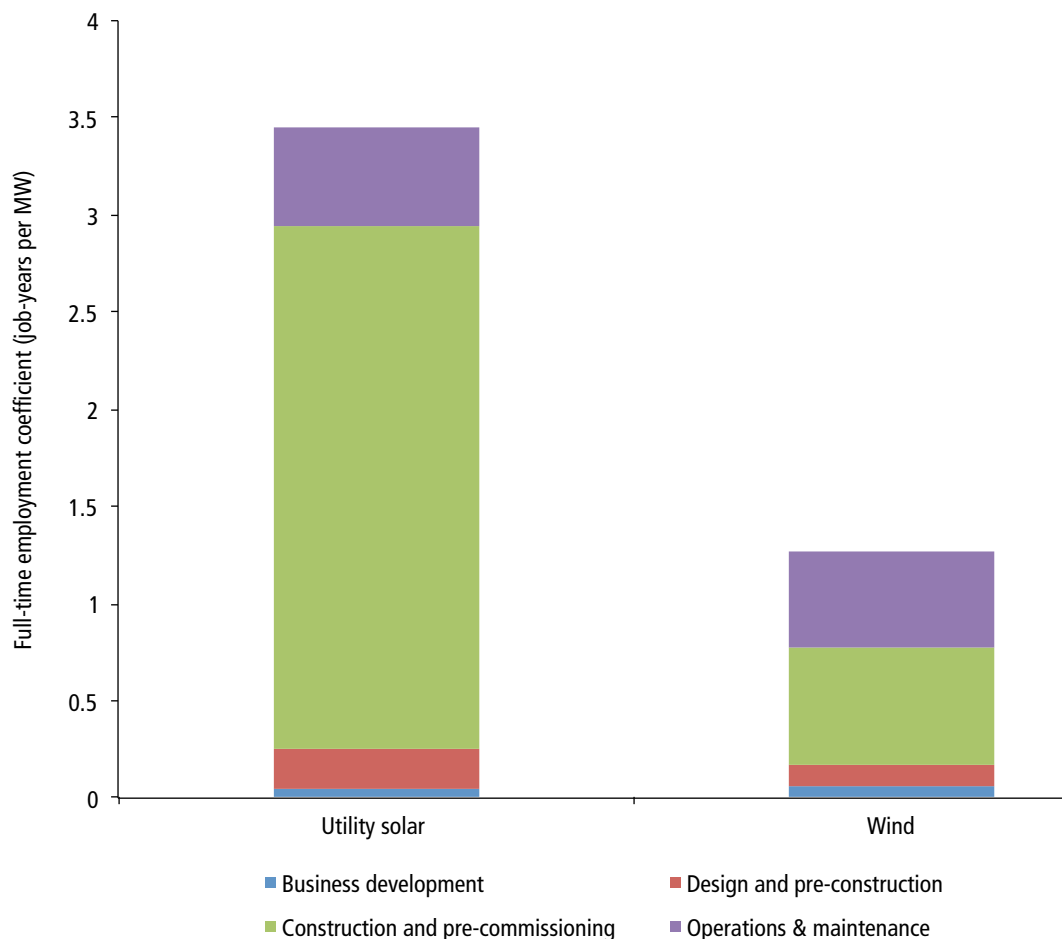


Source: CSE analysis based on data from IRENA on RE capacity and jobs

8. Reasonably, the growth of renewable energy stems from large-scale installations of solar and wind energy plants, which obviate the direct requirement for labour except during project development (business development and project design), erection and commissioning. The requirement for labour for operations and maintenance (O&M) for such projects is minimal. Such a model of deployment is predominant in India. According to CEEW-NRDC Greening India Workforce 2017 report, most of the jobs created in solar and wind sectors are one-time. However, for the purpose of standardisation and comparison, full-time employment coefficient is used, which gives the number of full-time job-years per megawatt (MW) or full time job equivalent per MW (see *Graph 4*).

Graph 4: Employment generation potential of two major sectors

Per MW employment generation potential is minuscule



Source: CEEW, NRDC, SCGJ, Greening India's Workforce 2017

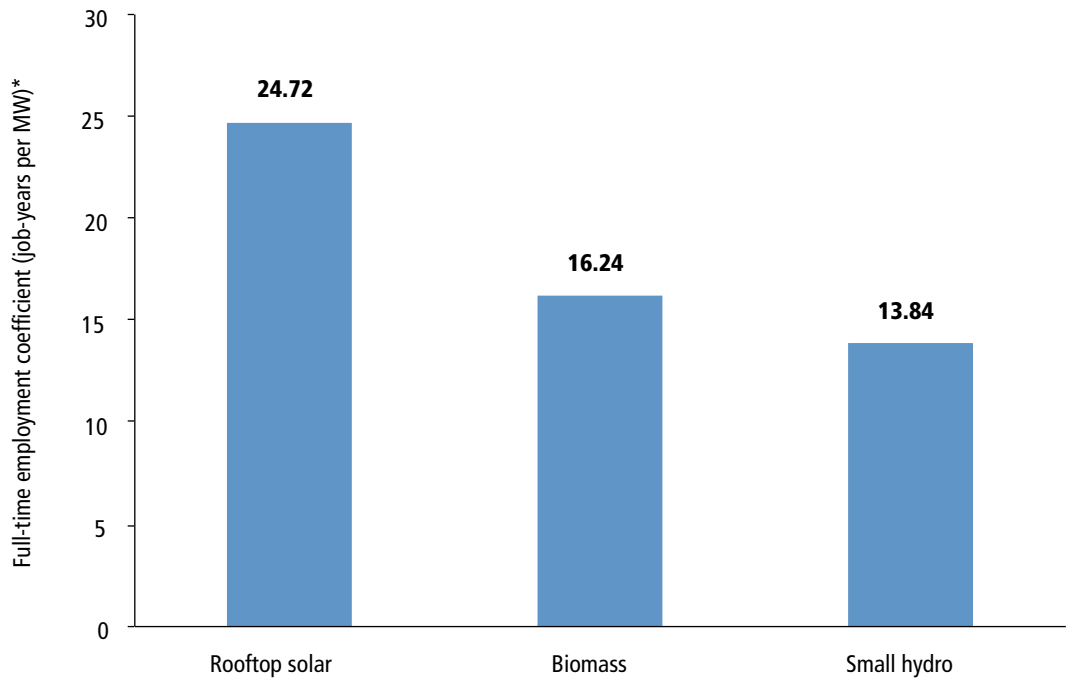
9. Reduction in wind deployments and a decrease in wind manufacturing with reducing portfolio of turbine manufacturers make the job creation profile of the wind sector even grimmer in India. Solar, the major growth sector, is almost devoid of manufacturing in India and has so far been import-dependent. In the process, India is outsourcing all the manufacturing jobs to China, while developing its own solar energy sector.
10. Under Atma-Nirbhar Bharat Abhiyaan (Self-Reliant India Movement), the Government of India is now giving impetus to domestic solar cell and photovoltaic module manufacturing. But the issue is that manufacturing solar panels and wind turbines are highly mechanized processes and require minimum human intervention. The requirement for labour per-megawatt decreases as production capacity increases.

11. Various estimates assess the potential of solar domestic manufacturing for direct job creation to be of the order of 45,000–50,000 over five years while indirect jobs will be 2.5 times higher. With both direct and indirect jobs included, this is less than 2.7 jobs per MW of solar manufacturing.

So does that mean renewables are not employment-friendly?

12. According to IRENA, for every \$1 million investment, renewables generate 7.5 full-time jobs on an average as against fossil fuels which generate almost a third at 2.65.
13. Within renewables, the Distributed Renewable Energy (DRE) sector—including rooftop solar, mini-grids and allied sector involved in manufacturing of inverters, solar lights, aluminium frames etc. –enhances prospects of employment generation. Other DRE sectors also have higher employment generation coefficient (see *Graph 5*).

Graph 5: Employment generation potential of other RE sectors
4–20 times higher jobs than utility-scale solar and wind



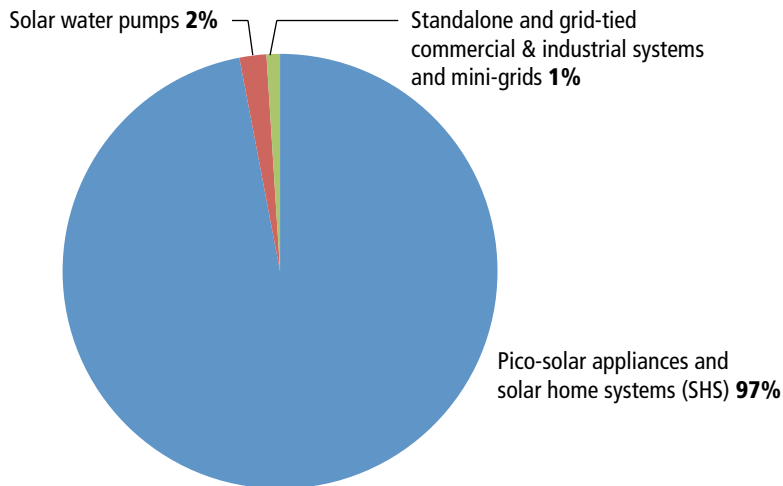
Source: COBENEFITS Study, Future skills and job creation with renewable energy in India 2019

14. Despite having a share of 0.3 per cent in total solar capacity, off-grid applications employ 10 per cent of the total global solar workforce in Asia and Africa alone. According to *Power for All, Powering Jobs Census 2019* in 2017–18, the off-grid DRE sector in India provided 95,000 direct formal jobs and 210,000 informal jobs. In India, 90 per cent of the formal jobs in DRE sector are full time. It is projected that, direct, formal and full-time equivalent jobs in the DRE sector in India will almost double by 2022–23, under the condition of a high mini-grid penetration scenario. Globally, by 2030, the entire DRE value chain, including sales, installation, service, appliances, and O&M is expected to create 4.5 million jobs.

15. India is a major manufacturer of pico-solar appliances and solar lanterns, with a 14 per cent share of the total units sold globally. Global companies are manufacturing inverters, cables etc. in India as per the GOGLA study. The companies are responsible for maximum DRE-based employments in the solar sector (see *Graph 6*).

Graph 6: Share of various components in job creation in India

Most of the employment generation comes from manufacturing and sales of appliances



Source: Power for all, Powering Jobs Census 2019: The Energy Access Workforce

16. Jobs are not restricted to manufacturing, sale and installations. In India, for the sale of every 1,000 DRE, three skilled personnel are required to educate people and spread consumer awareness; for every 1 MW of installation and operation of DRE products five advocacy, education and research-based jobs are created. The DRE sector requires a skilled workforce. According to the report *Power for All, Powering Job Census 2019*, 82 per cent of the jobs in India are skilled. The skills of sales and distribution help sustain the sector, while management skills help explore gaps for unravelling further sectoral growth.
17. The National Institute of Solar Energy (NISE), an autonomous institute under the Ministry of New and Renewable Energy (MNRE), is entrusted with skill impartation through its Suryamitra Skill Development Programme. So far, over 30,000 professionals have been trained and another 50,000 Suryamitras are targeted by 2019–20 for the country for employment in solar power projects. For FY 2019–20, NISE has listed 223 Suryamitra Training Centres spread throughout the country.
18. Participation of youth and women in the DRE workforce is skewed as underscored by IRENA:
- Youth (age group 15–24 years, which makes 25 per cent of the population in India) in the direct, formal DRE workforce is as high as 44 per cent against the world average of 40 per cent. Youths are employed at a high rate in manufacturing and upstream supply chain.
 - Worldwide, participation of women in the renewable energy workforce is about one-third but in India women account for a quarter of the total. Gender-based discriminations, cultural and socio-economical biases, and lack of adequate training facilities impede enrolment of women in the workforce. The ratio decreases for the leadership roles. IRENA Renewable Energy and Job Annual Review 2019 highlighted that the solar rooftop sector employs 11 per cent women. However, the mini-grid sector employs just 2 per cent women in the workforce according to Power for All study.

19. The government has to redirect its clean energy agenda in the favour of DRE as it has the highest job creation potential. The biomass sector can create up to 2 million jobs by 2050 if developed if it is used for a balancing role over coal. Public investment should be prioritised in the distributed energy sector, and efforts to be made to streamline the flow of small private investments. This should not affect the investment in the centralised energy system which is responsible for overall development of the country but the decentralized renewable energy system should be brought to the central stage to ensure that the development reaches to all the remotest corners of the country.
20. Moreover, the Government of India should also organize efforts for the development of a recycling sector for solar panels and old wind turbines. This will create a skilled labour-intensive industry and solve the issue of the environmental impact of the renewable energy sector.

Potential of renewables in job creation based on productive use

Apart from the direct involvement in the renewable sector, people also benefit socio-economically from the effects of electricity accessibility through DRE installations or components. There are numerous examples and models that are empowering people in rural India, and the major beneficiaries are the women. Some examples are:

- **Agri-voltaics (agriculture powered from solar PV) is helping boost agricultural productivity (drying and cooling of produce, cooking and lighting, agro-processing and pre-made food packaging). Productivity gains along with operating efficiencies in storage, drying and agro-processing can help to scale up a business profitably, which translates into dividends of jobs and incomes.**
- **DRE-induced micro-businesses such as sewing-houses and handlooms are creating avenues for low-scale traditional textiles and job opportunities in rural areas. Many women self-help groups are benefitting from such initiatives and facilitating women to join the workforce.**
- **A 2018 study conducted by SELCO Foundation for 1,500 standalone solar home system users in 50 livelihood areas concluded that the use of DRE technology had positive economic benefits in nine different rural value chains. The additional value created was in the range of 20-400 per cent.**
- **According to Smart Power India, for every new mini-grid, three new enterprises are set up employing three people each, reflecting in the creation of 9 productive use jobs.**

In 2017–18, productive-use jobs, at 470,000, were estimated to be five times higher than direct, formal jobs created.