

# Executive Summary



## Future skills and job creation with renewable energy in India

Assessing the co-benefits of decarbonising the power sector

India has made significant progress in utilising its abundant renewable energy (RE) resources. The country has emerged as one of the leaders of the global energy transition, with a cumulative renewable energy installed capacity of 74 gigawatts (GW) at the end of 2018, and has ambitions to meet a target of 175 GW by the year 2022. Further, as recently announced by India's Ministry of New and Renewable Energy (MNRE), the government seeks to procure approximately 500 GW of additional RE capacity by the year 2028, resulting to a 40 percent share of installed capacity of non-fossil fuel sources in the power sector by 2030. Notwithstanding these targets, the employment effects of the resulting changes in the power sector still need to be properly understood.

This study analyses the employment effects of different plans for expanding power generation in India; this was carried out in the context of the COBENEFITS project with the aim of assessing the co-benefits<sup>1</sup> of a low-carbon energy transition in the country. Four different scenarios<sup>2</sup> are analysed for future development of the power sector in India with varying shares of renewable energy:

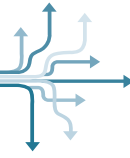
**Business-as-usual (BAU)** scenario, which represents India's climate policy until 2016; **Nationally Determined Contribution (NDC)** scenario, which maps the strategies required to achieve India's NDCs targets; **NDC PLUS (NDC PLUS)** scenario, which is a deeper decarbonisation plan above the NDC scenario; and the **International Renewable Energy Association (IRENA) REmap (REmap)** scenario, which provides a power sector decarbonisation pathway for India to contribute towards limiting global temperature rise to well below 2° Celsius by 2100.

The study presents a value-chain-based approach by developing employment coefficients (full-time-equivalent jobs/MW/year) to analyse the workforce involved at various stages of the entire life cycle of different power generation technologies. The study also provides an initial assessment of the skill requirements, attainment levels and technical training required for India's present power sector plans and future low-carbon power sector ambitions. The four scenarios assessed considered a consistent timeline between 2020 and 2050.

- **Key policy message 1:** India can significantly boost employment through the power sector by increasing the share of renewables. With the government's pledge under the NDC to scale up renewables in the country, net employment (measured in full-time employees) can be expected to increase by an additional 30% by 2030. But there is abundant room to achieve more; by following IRENA's ambitious REmap pathway, employment through the power sector can be almost doubled.
- **Key policy message 2:** By electrifying the rural areas in the country with distributed renewable energy technologies, such as small hydro, rooftop solar and biomass, the employment impact per installed capacity of these technologies is about 25 times greater than fossil-fuel based power generation.
- **Key policy message 3:** Following the historical development in India's coal sector, with a shift towards an ambitious decarbonised power sector in India, coal-sector-based employment is expected to decline by about 52% between 2020 and 2050. This transition, however, needs to be efficiently managed politically to mitigate negative impacts on displaced workers and communities.

<sup>1</sup> The term 'co-benefits' refers to simultaneously meeting several interests or objectives resulting from a political intervention, private-sector investment or a mix thereof (Helgenberger et al., 2019). It is thus essential that the co-benefits of climate change mitigation are mobilised strategically to accelerate the low-carbon energy transition (IASS 2017a).

<sup>2</sup> The Energy and Resources Institute (TERI) applying the MARKAL model developed the first three scenarios. The International Renewable Energy Agency (IRENA) developed the fourth scenario.



#### KEY FIGURES:

- Up to 3.5 million people can be employed in the Indian power sector by 2050.
- More than 3.2 million people can be employed in the renewable energy sector by 2050.
- The renewable energy sector could employ five times more people by 2050 than the entire Indian fossil-fuel sector employs today.

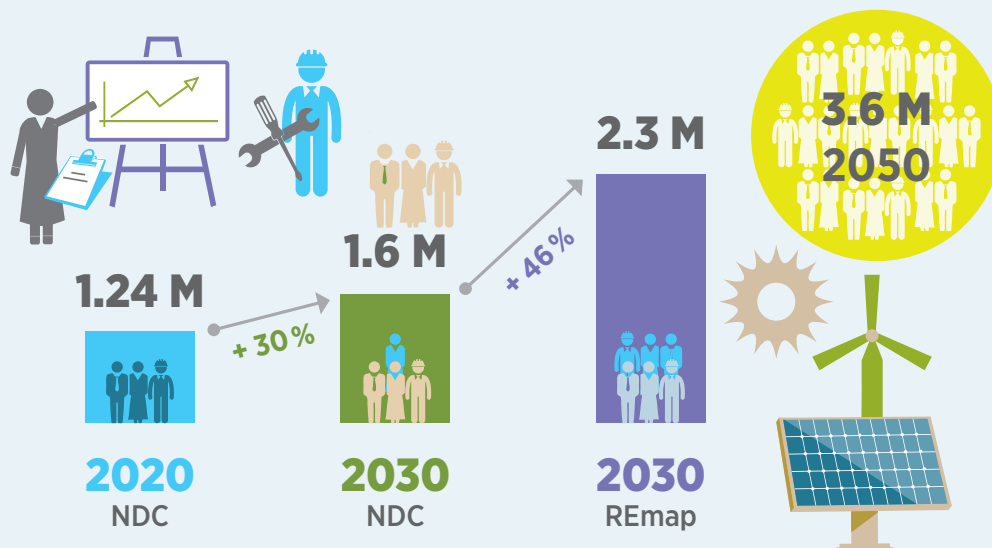
**COBENEFITS**  
Future skills and job  
creation with renewable  
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Assessing the co-benefits  
of decarbonising the  
power sector

available on  
[www.cobenefits.info](http://www.cobenefits.info)

#### KEY FINDINGS:

- In all scenarios, the workforce required in the Indian power sector will increase considerably and may reach 3.5 million by 2050.
- Renewable energy technologies tend to be more labour intensive than conventional energy technologies. At the same time, distributed renewables such as small-scale hydro, rooftop solar and biomass create maximum employment for every MW of installed capacity. Rooftop solar employs 24.72 persons, small hydro employs 13.84 persons and biomass employs 16.24 persons for constructing and running a one-megawatt plant.
- The renewable energy sector will be the largest employee in the future Indian power sector. Already in 2020, 264,000 supplementary renewable energy jobs can be created by shifting from BAU to the NDC scenario. Under the REmap scenario, more than 3.2 million people would be employed in the renewable energy sector by 2050.
- Biomass and solar energy will be the major drivers of employment, with up to 2 million and 1.1 million employees, respectively, by 2050.
- Skilling is the primary future challenge. According to the NDC PLUS scenario, India would require 143,000 skilled experts and approximately 410,000 semi- and low-skilled technicians in the solar sector. This number would increase to 250,000 skilled jobs and more than 850,000 semi- and low-skilled technicians under the REmap scenario.
- The number of employees in the coal sector has already decreased considerably in past decades due to increasing mechanisation. In the coal-mining sector alone, approximately 105,000 jobs have been lost due to mechanisation between 2000 and 2015.

India can almost double the number of jobs through the power sector by **2030** by following an ambitious decarbonisation pathway.



**NDC:** Scenario that highlights the strategies necessary for achieving the targets laid out in India's international climate commitment (NDC)

**REmap:** High ambition renewable energy roadmap for India by the International Renewable Energy Agency (IRENA)