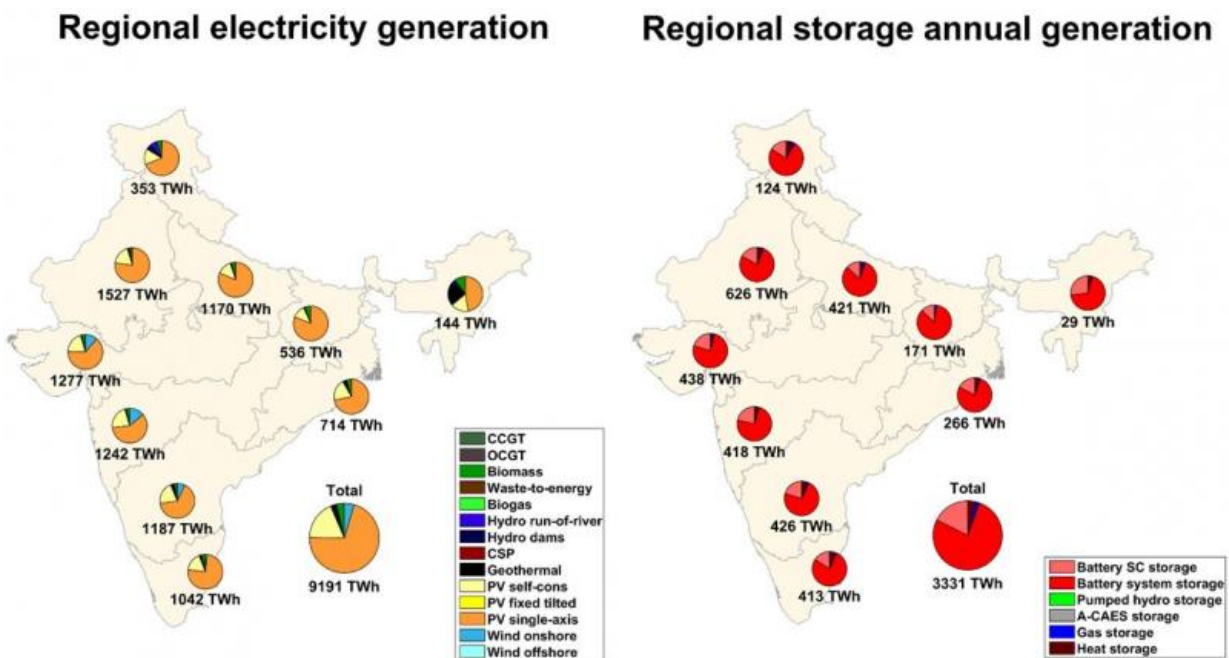


# Fully renewable India in 2050 can take a shortcut to emission-free future

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India Country-wide scenario for 2050. Credit: Lappeenranta University of Technology, LUT

India can function on a fully renewable electricity system in 2050. This is the result of a new research by Lappeenranta University of Technology (LUT). The study shows that developing countries that have an abundance of renewable resources do not need to take the path of the western countries where increasing living standards have been coupled

with heavy emissions from electricity generation and other industry. They can move straight to renewable systems and do it cheaply.

The suggested renewable [energy](#) system works mainly on solar energy and batteries. Solar photovoltaics is the most economical [electricity](#) source and batteries satisfy the night-time [electricity demand](#). In addition to covering India's electricity demand for power, the system simulation also covers for seawater desalination and synthetic natural gas in three decades.

"The possibility that a country like India could move to a fully renewable electricity system within three decades and do it more economically than the current system, shows that the developing countries can skip the emission intensive phase in their economic development. It is a competitive advantage to not to take the road of the developed world", says Principal Scientist Pasi Vainikka.

India's idiosyncratic feature is its [monsoon season](#). The monsoon period in India is the only time of the year when [solar power](#) is reduced. In the renewable system the lack of solar power would be compensated with increased wind and hydro resources as well as solar power from less monsoon affected neighbouring regions via power lines. This way the system stays functional during the monsoon season.

The proposed system is cheaper than India's current system, which runs primarily on coal. The cost of electricity in the renewable system would be 3640 Indian rupees (52 euros) per megawatt-hour (MWh) in 2050 when only the power sector is taken into account. When the demand for seawater desalination and industrial gas sectors are taken into account, the cost is 3220 Indian rupees (46 euros) per MWh. In comparison, the cost of the current system is 57 euros per MWh.

In order to achieve its renewable energy goals, India needs to invest in

solar and wind energy technologies. The total investment needed would be around 3380 billion euros. This reflects the strong demand increase from 1720 million MWh in 2015 to about 6200 million MWh in 2050.

People are at the heart of the proposed energy system. The system creates solar self-consumption for end-users such as private households, commercial companies and industry. They are the so-called PV prosumers. They will close the supply gap by creating a more distributed and resilient energy system. Prosumers can contribute to about 15-20 percent of the total electricity demand of India. This may also enable a faster transition to electric vehicles, which is set as an ambitious target by the government.

"Given India's burgeoning electricity demand and the persistent supply demand gap along with the summer shortages and outages, solar PV prosumers will have a crucial role in enabling the country's transition to a fully sustainable energy system," emphasises Professor Christian Breyer.

India would benefit in multiple of ways from the suggested system. Firstly, it would help the country to meet its climate change targets. Secondly, there are also real benefits for people. Moving to a fully renewable [system](#) would bring also improvements in health conditions.

"Not to mention benefits from reduced health costs or even substantial reduction of pre-mature deaths due improved air quality", says researcher Ashish Gulagi.

This is the first time when researchers have been able to demonstrate India's transition towards 100% renewables in full hourly resolution and high geographic detail.

**More information:** The Demand For Storage Technologies In Energy Transition Pathways Towards 100% Renewable Energy For India.

[www.researchgate.net/publication/318061111](https://www.researchgate.net/publication/318061111) ble Energy For India

Ashish Gulagi et al. Electricity system based on 100% renewable energy for India and SAARC, *PLOS ONE* (2017). DOI: [10.1371/journal.pone.0180611](https://doi.org/10.1371/journal.pone.0180611)

Solar-Wind Complementarity with Optimal Storage and Transmission in Mitigating the Monsoon Effect in Achieving a Fully Sustainable Electricity System for India. [www.researchgate.net/publication/318061111](https://www.researchgate.net/publication/318061111) ity System for India

Role of solar PV prosumers in enabling the energy transition towards a fully renewables based power system for India. [www.researchgate.net/publication/318061111](https://www.researchgate.net/publication/318061111) wer system for India

Provided by Lappeenranta University of Technology, LUT

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