



The Solar Surge: India's Bold Leap Toward a Net Zero Future

"Green Future, Net Zero" aren't just fancy words but reflect India's need and commitment, making it the best destination for investment and innovation in renewable energy.¹

- Prime Minister Narendra Modi

August 18, 2025

Key Takeaways

- India ranks 4th globally in *Renewable Energy Installed Capacity*, 4th in Wind Power, and 3rd in Solar Power capacity, (IRENA RE Statistics 2025)
- India made 1,08,494 GWh of solar power, more than Japan's 96,459 GWh, and became the world's third-biggest solar energy producer.
- India's solar module manufacturing capacity jumped from 38 GW to 74 GW during FY 2024–25.
- Renewables now make up 50.07% of India's total installed power capacity of 484.82 GW – a COP26 commitment achieved five years ahead of the 2030 target

Introduction

Just a decade ago, India's solar landscape was in its infancy, with panels dotting only a few rooftops and deserts. Today, the nation has raced ahead to script history: India has officially surpassed Japan to become the **world's third-largest** solar power producer. According to the International Renewable Energy Agency (IRENA), India generated an impressive **1,08,494 GWh** of solar energy, leaving Japan behind at **96,459 GWh²**.

India's cumulative solar power capacity stood at **119.02 GW** as of July 2025. This includes **90.99 GW** from ground-mounted solar plants, **19.88 GW** from grid-connected rooftop systems, **3.06 GW** from hybrid projects, and **5.09 GW** from off-grid solar installations, reflecting the country's diverse approach to expanding renewable energy.³



¹<https://cmogujarat.gov.in/en/latest-news/pm-shri-narendra-modi-inaugurates-4th-global-renewable-energy-investors-2024-summit-and>

²<https://www.ibef.org/news/india-becomes-third-largest-solar-energy-generator-union-minister-of-new-and-renewable-energy-mr-pralhad-joshi>

India's progress in the renewable energy sector reflects the country's focused policies and strategic planning under national leadership. As part of the pledge made at COP26, efforts are being directed towards reaching the target of **500 GW** of non-fossil fuel electricity capacity by **2030**. This commitment is seen as a key step in India's clean energy transition and its broader climate goals.

Record Surge in India's Solar Capacity

India lies in the tropical region, with the Tropic of Cancer passing through many states. This gives the country a high potential for solar power generation. The total solar sector potential of the Indian continent is **748 GW**. States/ UTs like Rajasthan, Jammu and Kashmir, Maharashtra, Madhya Pradesh, and Andhra Pradesh have some of the highest solar potential in the country, making them key drivers of India's clean energy growth.⁴

Region	Major High-Potential States
Northern & Western	Rajasthan, Gujarat
Southern & Central	Karnataka, Tamil Nadu, Andhra Pradesh
Eastern & Other	Maharashtra, Chhattisgarh, Odisha ⁵

In July 2025, India's solar power capacity had increased by 4,000%, and the country's total renewable energy capacity reached **227 GW**. **Palli village in Jammu & Kashmir** became a notable example, emerging as India's first carbon-neutral panchayat by running entirely on solar power. Emphasis was placed on the need for energy storage and adoption of new technologies to meet future energy demands. Government schemes like the PM Surya Ghar Yojana and PM Kusum Yojana are playing a key role in helping households and farmers transition to clean solar energy⁶

Boost in Domestic Solar Manufacturing

India's solar manufacturing sector includes key components like **solar modules, solar PV cells, and ingots and wafers**. Producing these within the country supports the domestic economy and reduces dependence on imports. In just one-year, solar module manufacturing capacity nearly doubled—from **38 GW in March 2024 to 74 GW in March 2025**. Similarly, solar PV cell manufacturing rose from **9 GW to 25 GW**. A big milestone was the start of India's first ingot-wafer manufacturing facility (2 GW), further strengthening the entire solar supply chain.⁷

This rapid growth in domestic capacity is strongly supported by government policies. To promote Indian-made solar products, the government has made it mandatory for projects under schemes like the Rooftop Solar Programme, PM-KUSUM, and CPSU Scheme Phase II to use panels and cells made in India. To make this shift more effective, a **Basic Customs Duty (BCD)** was introduced in April 2022 on imported solar cells and modules. This makes imports more expensive and encourages the use of Indian alternatives—boosting local manufacturing and reducing reliance on foreign suppliers.⁸

³<https://mnre.gov.in/en/physical-progress/>

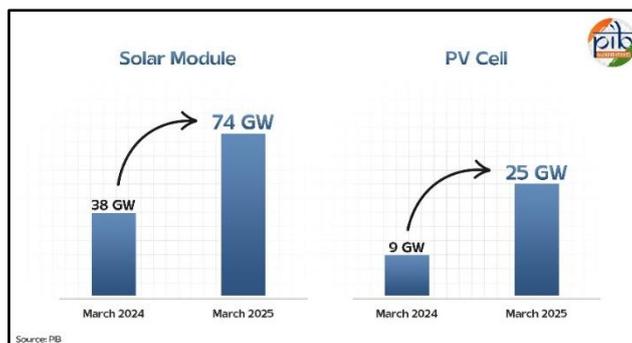
⁴<https://iced.niti.gov.in/energy/fuel-sources/solar/potential>

⁵ Graph- <https://iced.niti.gov.in/energy/fuel-sources/solar/potential>

⁶<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2143701>

⁷<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2117501>

⁸<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1909955>



KEY FLAGSHIP INITIATIVES IN SOLAR ENERGY:

The government has launched several flagship initiatives to promote the adoption and development of solar energy across the country.

1. PM Surya Ghar: Muft Bijli Yojana

The infographic features a dark blue background with white text and icons. It lists four benefits: 'Free electricity for households', 'Reduced electricity costs for the government', 'Increased use of renewable energy', and 'Reduced carbon emissions'. The background also includes illustrations of wind turbines and solar panels. The source is cited as PIB.

PM Surya Ghar Muft Bijlee Yojana is a central scheme with an outlay of Rs. **75,021 crores** to help one crore Indian households to get up to **300 units of free electricity** every month by installing rooftop solar panels. The government provides a subsidy of **₹30,000 for 1 kW, ₹60,000 for 2 kW, and ₹78,000 for 3 kW** rooftop solar systems or higher. Even if a family takes a loan to install the system, they can still save about ₹15,000 every year on electricity bills after paying the monthly loan EMI.

Application Process for PM Surya Ghar is as follows:

- 1 To apply, citizens can visit www.pmsuryaghar.gov.in, where they can check system size, use a benefits calculator, and choose from rated vendors.
 - 2 After registration, they need to submit an application, get approval, install the system, and apply for a net meter.
 - 3 Once it's set up and verified, the subsidy is transferred to their bank account **within 30 days**.
 - 4 Households can also take collateral-free loans at about **6% interest** to make solar power more affordable.
- Source: PIB

2. PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyaan)

The **PM-KUSUM Scheme** supports farmers in using solar energy instead of diesel. Farmers can get a **30% to 50% subsidy** to install new solar pumps or convert old pumps to solar. They can also build **solar power plants up to 2 MW** on their own land and earn money by selling electricity to local DISCOMs. The scheme is carried out by state implementing agencies⁹. Moreover, it is aimed at ensuring energy security for farmers in India, along with honouring India's commitment to increase the share of installed capacity of electric power from non-fossil fuels sources to **50% by 2030** as part of Intended Nationally Determined Contributions (INDCs).¹⁰

3. Solar Parks Scheme

The government is running a scheme called “**Development of Solar Parks and Ultra Mega Solar Power Projects**” to set up large solar power plants connected to the electricity grid, with a target of **40 GW by March 2026**. So far, **53 Solar Parks** with a total capacity of about **39,323 MW** have been approved in **13 states**. Out of these, **18 parks** (10,856 MW) are fully developed, where **10,756 MW** of solar power projects are already working. Another **3140 MW** of solar projects are running in **8 parks** (10,043 MW). In total, **13896 MW** of solar power projects have started operating in **26 Solar Parks**, while the remaining parks are still being developed. India's clean energy growth isn't just reducing carbon emissions—it's changing lives. Large solar parks now provide low-cost electricity, while wind farms in Gujarat and Tamil Nadu meet evening power needs. Bioenergy projects are boosting rural incomes through job creation.¹¹

4. PM JANMAN: Empowering PVTG Communities through Solar Electrification

The **Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM JANMAN)** was launched to address the development needs of **Particularly Vulnerable Tribal Groups (PVTGs)** through 11 critical interventions across 9 Ministries. A key initiative under this mission and **Dharti Aaba Janjatiya Gram Utkarsh Abhiyan (DA JGUA)** is the **New Solar Power Scheme**, with an outlay of **₹515 crore**, aimed at electrifying **one lakh un-electrified households** in Tribal and PVTG habitations across **18 states**, promoting inclusive growth and sustainable energy access in remote tribal areas.¹²

5. Increase in Solar PV Manufacturing Capacity¹³

Since 2014, India's capacity to make solar PV cells has grown about 21 times, going up from **1.2 GW in 2014** to about **25 GW by March 2025**. Similarly, the capacity to make solar PV modules has grown more than **34 times**, rising from 2.3 GW in 2014 to about 78 GW by March 2025

Other Important initiatives

⁹<https://pmkusum.mnre.gov.in/#/landing>

¹⁰<https://www.india.gov.in/spotlight/pm-kusum-pradhan-mantri-kisan-urja-suraksha-evam-utthaan-mahabhiyan-scheme>

¹¹<https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154545&ModuleId=3>

¹²<https://mnre.gov.in/en/notice/new-solar-power-scheme-for-pvtg-habitation-villages-under-pm-janman>

¹³<https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NoteId=154717&id=154717>

- **Floating Solar Projects:**

The Omkareshwar Floating Solar Park in Madhya Pradesh is one of Asia's largest floating solar parks, with a planned capacity of **600 MW**. It costs **₹330 crore**, with ₹49.85 crore support from the Centre. These solar projects are set up on water bodies to save land and work more efficiently.¹⁴



- **Agrivoltaics:**

Agrivoltaics use solar panels and allow farming underneath, increasing land use and farmer income. Projects like the Sun master Plant in Delhi and a 105 KW system by ICAR in Jodhpur show India's progress in clean energy.¹⁵



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India's Global Solar Leadership: ISA & OSOWOG

International Solar Alliance (ISA): Launched by India and France at COP21 in 2015, the ISA is a global alliance of 100+ countries working to combat climate change through solar energy. It aims to mobilise \$1 trillion in investments by 2030, reduce technology and financing costs, and promote affordable solar solutions. With a special focus on Least Developed Countries (LDCs) and Small Island

¹⁴<https://www.pib.gov.in/inPressReleasePage.aspx?PRID=2090177>

¹⁵<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2120941>

¹⁶ Image- <https://www.agrivoltaics.in/news>

Developing States (SIDS), the ISA seeks to drive low-carbon growth through cost-effective and transformational energy solutions.¹⁷

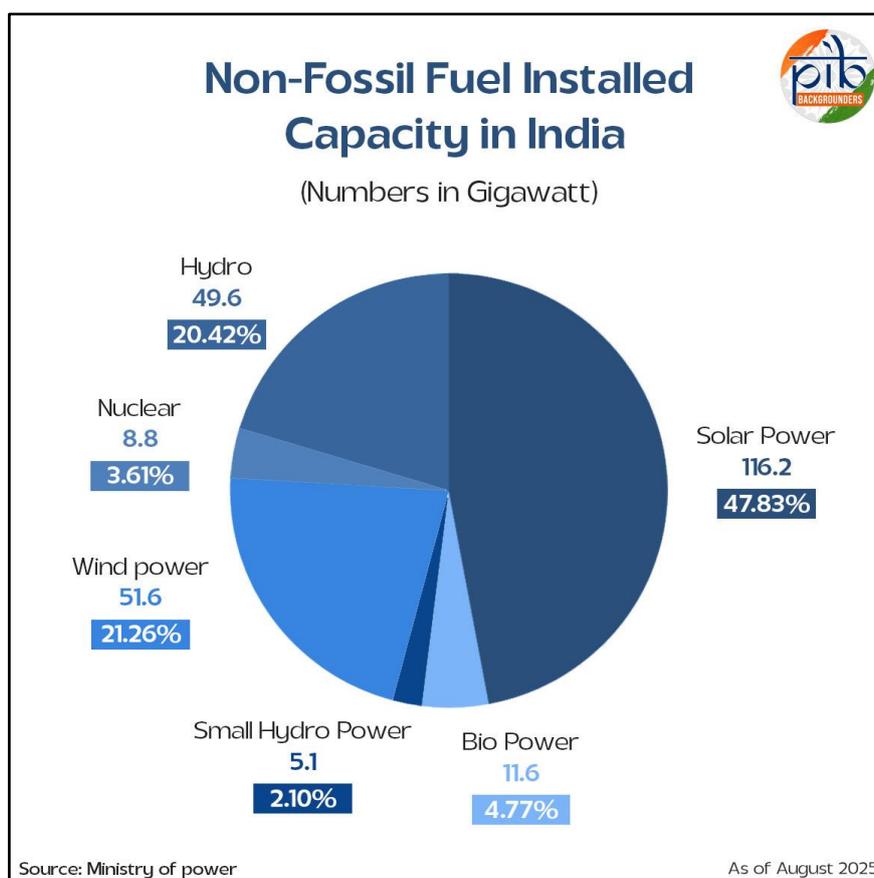
ONE SUN- ONE WORLD- ONE GRID (OSOWOG): The 'One Sun, One World, One Grid' (OSOWOG) initiative, launched by India at the ISA Assembly in 2018, envisions a global solar grid under the idea that 'the sun never sets.' Led by ISA, it aims to connect solar resources across regions from South Asia to Africa and Europe, with studies and frameworks already underway

India's Renewable Sector: An Overview

India's energy sector uses many different sources to produce electricity. These include fossil fuel sources like coal, gas, lignite, diesel, etc, as well as non-fossil fuel sources like solar, wind, hydro, nuclear and biomass. India's total power capacity has now reached around 485 GW. Out of this, 242 GW comes from thermal power, 116 GW from solar, and 51.6 GW from wind. This shows India's strong move towards clean energy and better energy security.¹⁸

In the last 11 years, India has made significant progress in renewable energy. To meet the goal set at COP26, the Ministry of New & Renewable Energy (MNRE) is working to reach **500 GW of non-fossil fuel capacity by 2030**.

By **June 2025**, India has installed **242.8 GW** of non-fossil fuel installed capacity, including **233.99 GW of renewable energy** and **8.8 GW of nuclear power**. This now makes up **50.07% of the country's total power capacity of 484.82 GW**. Renewable energy alone has grown almost **three times**, from **76.37 GW in 2014 to 233.99 GW in 2025**, showing a strong move toward a cleaner and sustainable future.¹⁹



¹⁷ https://isa.int/about_uss

¹⁸ <https://www.pib.gov.in/PressNoteDetails.aspx?id=154717&NotelId=154717&ModuleId=3>

¹⁹ <https://www.pib.gov.in/PressNoteDetails.aspx?id=154717&NotelId=154717&ModuleId=3>

India added a record 29.52 GW of renewable energy in FY 2024–25, boosting total clean power capacity to 220.10 GW, up from 190.57 GW last year. This progress brings India closer to its goal of 500 GW non-fossil capacity by 2030, in line with the “Panchamrit” climate targets set by the Prime Minister.²⁰

India stands **4th** globally in **Renewable Energy Installed Capacity**, **4th in Wind Power capacity** and **3rd in Solar Power** capacity (as per IRENA RE Statistics 2025).²¹

India’s Renewable Energy Growth: 2014–2025

The renewable energy sector in India consists of solar energy, wind energy, hydro power, and bioenergy, all of which help reduce dependence on fossil fuels and support sustainable development. Installed RE capacity has grown from **76.37 GW in March 2014** to **233.99 GW in June 2025**, an increase of nearly **3 times**.²²

1. Wind Energy

India added **4.15 GW** of wind energy in FY 2024–25, taking the total installed capacity to **51.6 GW**.

India ranks **4th globally** in onshore wind with **52.14 GW** installed (as of 31 July 2025), and **30.10 GW** is under implementation²³. Wind power generated 83.35 billion units from Apr 2024 to March 2025, contributing **4.56%** to total electricity. The country has a wind potential of 1164 GW and an annual manufacturing capacity of 18 GW. Offshore wind development is guided by the National Offshore Wind Energy Policy (2015), with MNRE as the nodal ministry for projects along India’s 7600 km coastline²⁴.

2. Bioenergy

India has 11.60 GW of bioenergy capacity (including 0.55 GW from off-grid and waste-to-energy) and 5.10 GW from small hydro, with 0.46 GW under construction²⁵. To support this, the National Bioenergy Programme (2021–2026) was launched with a ₹1715 crore budget, offering central financial help for setting up bioenergy projects across the country under the following components.²⁶

1. Waste to Energy Programme (Programme on Energy from Urban, Industrial and Agricultural Wastes /Residues)

²⁰<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2120729>

²¹<https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NotelId=154717&id=154717>

²²<https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NotelId=154717&id=154717>

²³<https://mnre.gov.in/en/wind-overview/>

²⁴<https://mnre.gov.in/en/off-shore-wind/>

²⁵<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2120729>

²⁶<https://mnre.gov.in/en/notice/national-bio-energy-programme-phase-i/>

2. Biomass Programme (Scheme to Support Manufacturing of Briquettes & Pellets and Promotion of Biomass (non-bagasse) based cogeneration in Industries)

3. Biogas Programme (Programme to support setting up of small (1 m³ to 25 m³ biogas per day) and medium size Biogas plants i.e., above 25 m³ to 2500 m³ bio gas generation per day)

Biofuel (Ethanol) Blending

India is now the world's third-largest ethanol producer and consumer. Ethanol blending in petrol increased from 10% in June 2022 to 17.98% by February 2025. The government aims to reach 20% blending by 2025–26, ahead of the earlier 2030 target²⁷. This is supported through subsidies, lower GST, and long-term purchase deals. Ethanol and biodiesel, made from biomass, are key biofuels that help reduce dependence on fossil fuels for transport²⁸.

4. Hydro Energy

In India, hydro projects up to **25 MW** are called Small Hydro Power. The country has a potential of **21.1 GW from 7,133** sites, mostly in hilly states²⁹. India already has **5.11 GW** installed, with more under development. Large hydro and pumped storage projects are also growing, with 133.4 GW hydro and 181.4 GW pumped storage potential³⁰. The government supports these with benefits like tariff help and transmission charge waivers.

Green Hydrogen

Green hydrogen is made by splitting water into hydrogen and oxygen using solar or wind energy. It will replace fossil fuels in industries like steel and transport, and provide long-term clean energy storage. The demand for green hydrogen is growing fast because it can help reduce emissions and pollution in many areas like transport, shipping, and steel production. It can take the place of petrol and diesel in vehicles, which are big causes of harmful emissions. In factories, green hydrogen can be used to make things like ammonia, methanol, and steel, which now depend a lot on fossil fuels. It can also store energy and act as a backup for solar and wind power, making sure there's always a steady supply of clean energy.³¹

The National Green Hydrogen Mission was launched by the Government of India to cut carbon emissions and make India a global leader in green hydrogen. **By 2030**, the goal is to produce **5 million tonnes** of green hydrogen every year, bringing in **₹8 lakh crore** investments, creating **6 lakh jobs**, and saving **₹1 lakh crore** in fossil fuel imports. The mission focuses on production, pilot projects, electrolyser manufacturing, skill training, infrastructure, and research, with plans to replace fossil fuels in steel, transport, and fertilizer sectors.³². To push this forward three major ports namely **Kandla, Paradip and Tuticorin ports** have been identified by Ministry of Ports, Shipping and Waterways (MoPSW) to be developed as Green Hydrogen hubs.³³

²⁷<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2113234>

²⁸<https://www.energy.gov/eere/bioenergy/biofuel-basics>

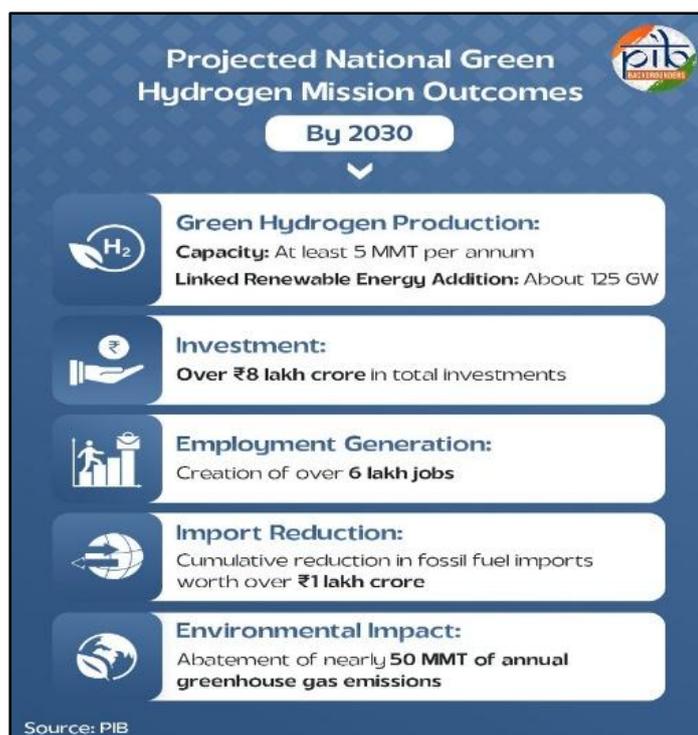
²⁹<https://mnre.gov.in/en/small-hydro-overview/>

³⁰<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2079832>

³¹<https://mnre.gov.in/en/hydrogen-overview/>

³²<https://www.pib.gov.in/PressNoteDetails.aspx?NotelId=154545&ModuleId=3>

³³<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2129952>



RECENT POLICY DECISIONS

- On **July 16, 2025**, Union Minister Prahlad Joshi reaffirmed India's **500 GW** non-fossil capacity goal by 2030. The Cabinet cleared a **₹7,000 crore exemption for NLC India Ltd** to strengthen its renewable arm, NLC India Renewables Limited (NIRL). This step will speed up big solar and wind projects, with NIRL set to expand from **2 GW now to 10 GW by 2030 and 32 GW by 2047**, supporting India's COP26 and net-zero targets.³⁴
- India focuses on five key priorities to achieve its **2030 target of 500 GW** non-fossil capacity.³⁵
 - Better Contracts:** Long-term power deals to attract investors.
 - Stronger Grids:** Modern grids and battery storage for steady power supply.
 - Make in India:** Boosting local production of solar panels and wind turbines.
 - Smart Land Use:** Using land wisely with floating solar and solar on farms.
 - Easy Financing:** Making funds available to support clean energy projects.

India's rapid transition to clean energy is positioning the country ahead of schedule in meeting its **Paris Agreement** commitments. By accelerating the growth of non-fossil fuel capacity, India is enhancing energy security, reducing coal imports, creating jobs, and strengthening reliable power supply. This progress underscores India's leadership role in the global fight against climate change³⁶.

³⁴<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2145148>

³⁵<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2147982>

³⁶<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2144627>

The **Paris Agreement** was adopted under United Nations Framework Convention on Climate Change (**UNFCCC**) in **2015**³⁷. Under its Paris Agreement Nationally Determined Contributions (NDCs), India committed to reducing carbon intensity of the economy by **45% by 2030**, over **2005 levels** and the target of achieving **50%** of cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 is now being met ahead of schedule³⁸.

Conclusion

India is moving strongly towards a green future. After crossing 100 GW of solar power, the country is on track to reach 500 GW of clean energy by 2030 and **net-zero by 2070**. Projects like large solar parks, rooftop solar, and the PM Surya Ghar Muft Bijli Yojana are helping households become self-reliant in energy.

India has reached a significant milestone—**50% of its installed electricity capacity now comes from non-fossil fuel sources**, achieving these five years **early** against its Paris Agreement goal. This shows that **development and sustainability can go hand in hand**. India's energy journey over the past decade reflects a strategic shift towards self-reliance, sustainability, and innovation. From green hydrogen to solar rooftops, rural electrification to digital procurement, every initiative underscores India's vision of **inclusive, secure, and clean** energy for all. As the nation moves forward, its balanced and forward-looking energy strategy continues to power economic growth and a sustainable future.

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