नवीन एवं
नवीकरणीय ऊर्जा मंत्रालय
MINISTRY OF
**NEW AND
RENEWABLE ENERGY**

सत्यमेव जयते

THE INDIA STORY

A GREEN INVESTMENT HANDBOOK

JANUARY 2026

सम्-गच्छ-ध्वम्

सम्-व-दद्वम्

सम् वो मानसि जानताम्।

~ संगठन सूक्त, ऋग्वेद

May you progress in harmony,
May you speak in unison,
May your minds be unified
in purpose and knowledge.

~ Mantra of Unity in Rig Veda,
the oldest of the four Vedas

From India’s National Statement
at the UNFCCC COP26 in Glasgow, UK

delivered by
H.E. Shri Narendra Modi
Prime Minister of India

2 November 2021

Produced by

नवीन एवं
नवीकरणीय ऊर्जा मंत्रालय
MINISTRY OF
NEW AND
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In partnership with

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CEEW

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Contact

Ministry of New and Renewable Energy
Atal Akshaya Urja Bhawan, Pragati Vihar
New Delhi – 110003, India
mnre.gov.in | x.com/mnreindia

ISA | isa.int | x.com/isolaralliance
CEEW | ceew.in | CEEW LinkedIn

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Contents

India’s Climate Action Panchamrit

On 2 November 2021, H.E. Shri Narendra Modi, Prime Minister of India, delivered India’s National Statement at the UNFCCC COP26 in Glasgow.

Prime Minister Modi spoke of India’s five-point climate action agenda as a Panchamrit, referencing the sacred mixture of five nectars (panch=five, amrit=nectar).

Excerpts from his address:

“Friends,

Amidst the global brainstorming on climate change, on behalf of India, I present five nectar elements—Panchamrit—to deal with this challenge.

First – India will reach 500 GW non-fossil fuel capacity by 2030

Second – India will meet 50% of its energy requirements from renewable energy by 2030

Third – India will reduce its total projected carbon emissions by 1 bn tonnes from now to 2030

Fourth – By 2030, India will reduce the carbon intensity of its economy by 45%

Fifth – By 2070, India will achieve its target of Net Zero

This Panchamrit will be an unprecedented contribution of India to climate action.”

Namaste!

India's vision of becoming Viksit Bharat by 2047 is guided by our ancient principle of Vasudhaiva Kutumbakam—One Earth, One Family, One Future.

Our journey, as a green energy leader, is rooted in affordable, inclusive, resilient, and sustainable energy systems.

We are committed to achieving 500 GW non-fossil fuel capacity by 2030, and Net Zero by 2070.

India today has 267+ GW of non-fossil fuel capacity. We reached our Paris Agreement commitment of 50% non-fossil capacity in 2025, five years before target. The clean energy sector needs USD 300+ bn to meet generation, distribution, manufacturing, and storage demand for the full 500 GW.

Stable policies and transparent markets make India attractive for clean energy investment. We are building a reliable and resilient power system with future-friendly storage, smart technologies, and state-of-the-art Green Energy Corridors.

We are enhancing self-reliance while supporting global supply chains by scaling domestic solar, wind, battery, and electrolyser ecosystems. The India Energy Stack will help build unified, secure, and interoperable digital infra.

Our people-centred energy vision is empowering youth, women, farmers, and families.

Our international cooperation includes technology sharing, low-cost finance, capacity building, and harmonisation of standards, especially to help developing countries achieve their clean energy aspirations.

The India Story of energy is more than numbers. It is about people, opportunities, and a shared, sustainable future.

I invite you to join us on this exciting journey of innovation and inclusion.

H.E. Shri Pralhad Joshi
Minister for New and
Renewable Energy
Government of India

Viksit Bharat envisions India as a developed country by 2047, the centenary of its Independence

4

India's rank among the world's largest economies, with USD 4.2 tn GDP and sovereign rating of BBB+ by R&I Japan in 2025, set for 7.4% growth in FY2026-27

USD 701+ bn

Historic high forex reserve in Jan 2026 covering 94% of external debt and 11 months of imports

2.2%

Record low NPA levels; all-time low Net NPA ratio of 0.48%

USD 30+ tn

Target size of Indian economy by 2047; est. USD 7 tn by 2030

Viksit Bharat (Developed India) 2047 is building a prosperous and self-reliant nation, focusing on youth, women, farmers, and the poor, and systemic changes.

India's strong macroeconomics and domestic drivers, boosted by future-friendly clean energy and digital infra, will gain from its 'demographic dividend' of the world's largest working-age population for the next 25 years.

LiFE (Lifestyle for Environment) urges 'Pro-Planet People' to shift from 'mindless consumption' to 'mindful utilisation' by saving water and energy, reducing waste, and adopting healthy food and lifestyles.

Viksit Bharat @2047 seeks high and resilient growth amidst global volatility; LiFE ensures that this growth is sustainable.

India's clean energy opportunity is a long-term partnership of vision, scale, and inclusion

India is at a defining moment in its energy journey, with a clear long-term vision of scale, policy certainty, and inclusive growth.

At the start of 2026, India's 267 GW installed non-fossil fuel capacity comprises 136 GW solar, 54 GW wind, and other clean sources. Building on this, India aims to install 500 GW of non-fossil capacity by 2030.

The 2030 milestone, one of the world's most ambitious clean energy goals, will be a stepping stone for India's 2047 Viksit Bharat Vision, which provides a connected and scalable avenue to power a Developed India.

Vision 2047 includes expansion of non-fossil capacity to 1,800 GW by 2047, with a backbone of renewable energy (~1,200 GW solar and 400 GW wind).

Investment scale and market depth: Capitalising our future

IREDA estimates that 500 GW non-fossil capacity by 2030 will need investments of USD ~364 bn in renewables and related infra. Of this, solar and wind will need USD ~180 bn, illustrating the depth and bankability of India's core renewable markets.

India's resource-rich landscape supports its clean energy goals. The National Institute of Solar Energy (NISE) has assessed ground-mounted solar potential of 3,343 GWp.

The National Institute of Wind Energy (NIWE) projects onshore wind potential of 1,164 GW at 150m hub height, plus offshore wind potential of 71 GW at identified sites along the western and southern coasts.

Manufacturing at scale: From production to value chains

To support the solar scale-up, India has established a clean technology manufacturing base with operational capacities of 144 GW solar modules and 27 GW cells. The planned ~40 GW ingot and wafer manufacturing capacity needs investment of USD ~3.3 bn. India is expanding upstream manufacturing to become a global hub.

This shift reflects India's intent to strategically secure supply chains, reduce imports, and offer investors an integrated manufacturing ecosystem.

Grid modernisation and energy storage: The next frontier

India is investing in grid modernisation, storage, and ancillary services to match its rising renewables penetration.

India will need 411 GWh energy storage capacity by 2032, including 175 GWh from Pumped Storage Projects (PSP) and 236 GWh from Battery Energy Storage Systems (BESS), worth an estimated USD ~54 bn in investment.

This expansion will also see the deployment of next-gen grid technology and stability solutions such as grid forming inverters and STATCOMs.

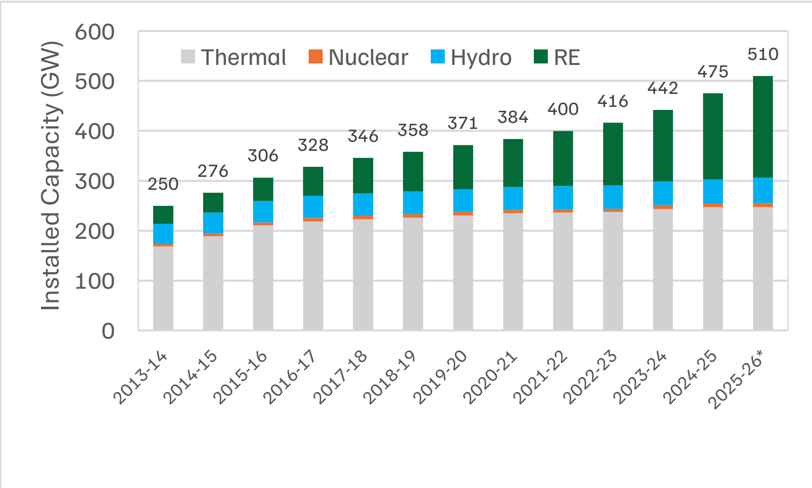
Opportunities offer scale, diversification, and enduring growth across the full clean energy value chain spanning technology, engineering, and asset ownership.

You're invited!

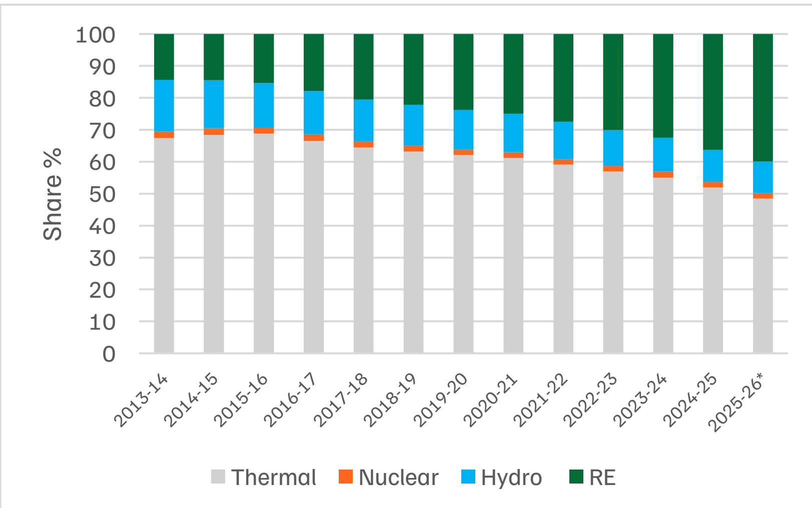
India's vast renewable resource base, clear long-term targets, stable and adaptive policy framework, and sustained execution momentum make it one of the world's most attractive clean energy investment destinations.

India invites global investors, technology leaders, and visionary partners to join this transformation, deploying next-gen solutions, co-creating resilient supply chains, and generating competitive returns as a part of one of the world's largest and most consequential clean energy economies.

Installed capacity of major energy sources



Share of major energy sources in total capacity



AT A GLANCE | INVESTMENT NEEDED FOR 500 GW NON-FOSSIL FUELS

Sector	Capacity Addition	Investment
	(expected, approx., rounded)	
Renewable Energy (GW)		USD bn
Solar	226	137
Wind (Onshore + Offshore)	57	50
Large Hydro	12	17.5
Small Hydro	0.4	0.3
PSP	14	14.5
BESS	42	37
Biomass and WTE	4	4.5
Other major technologies		
Bioethanol	17 mn litre pa	5
Bio-Diesel	7 mn litre pa	
Compressed Biogas	15 MMT	11
Manufacturing Investments (Solar, Electrolyser, Wind & Battery)	Solar PLI 48 GW Electrolyser 10 GW	24
Transmission	50,890 cKM + 433,575 MVA + Green Energy Corridors	31
Green Hydrogen (w/o renewables)	5 MTPA	33
Total expected investments (w/o Large Hydro)		346
Total expected investments (with large hydro)		364

AT A GLANCE | FINANCING OPPORTUNITIES TO SCALE DEPLOYMENT

USD ~350 bn

Needed to achieve 500 GW non-fossil fuel by 2030

USD 150 bn

Total investment received for renewables, 2015-H1 2025

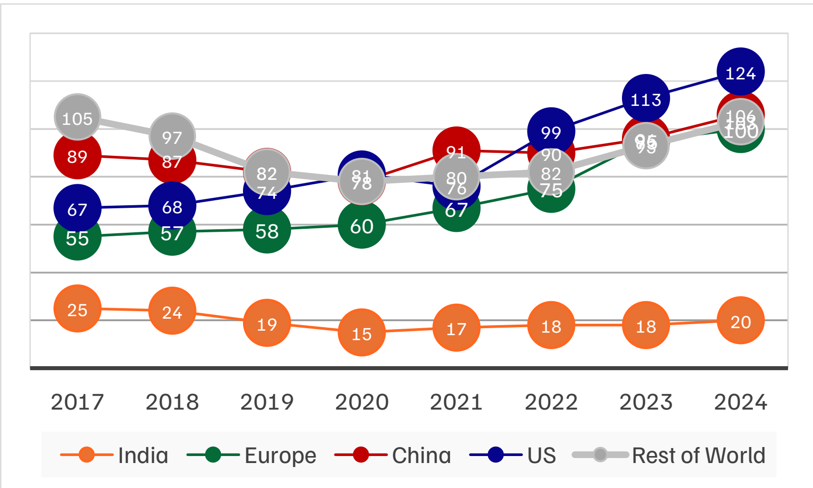
USD 19.5 bn

Received via FDI

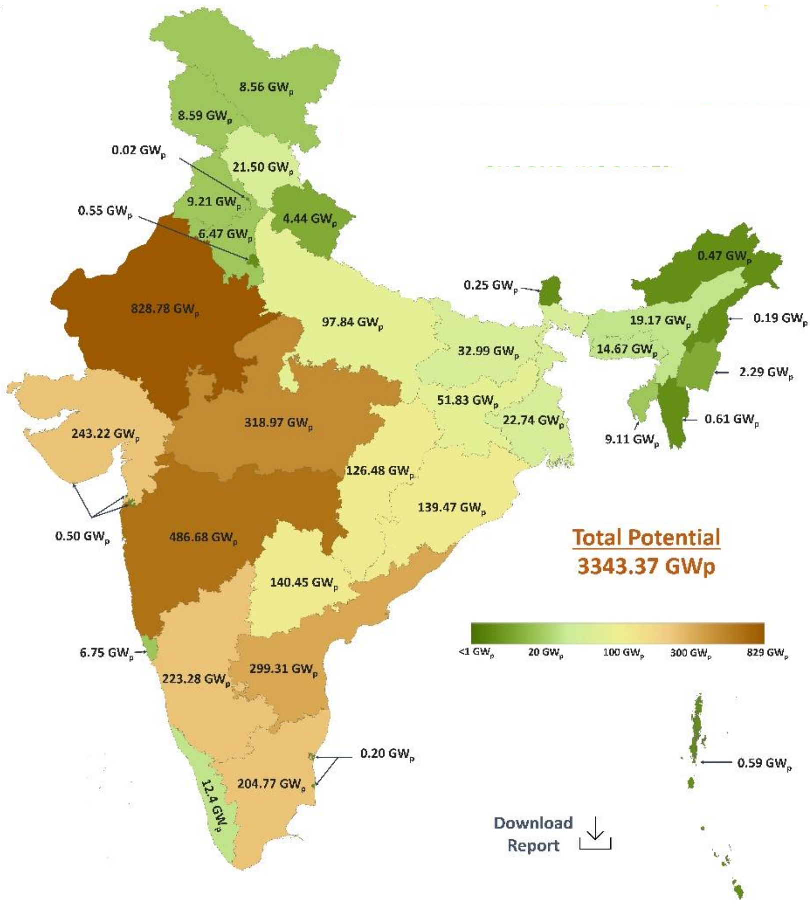
Estimated green financing gap
2030 | USD 179 bn
2050 | USD 1.3 tn
2070 | USD 3.3 tn

India is exploring a National Green Financing Institution as a subsidiary of the National Bank for Financing Infrastructure and Development.

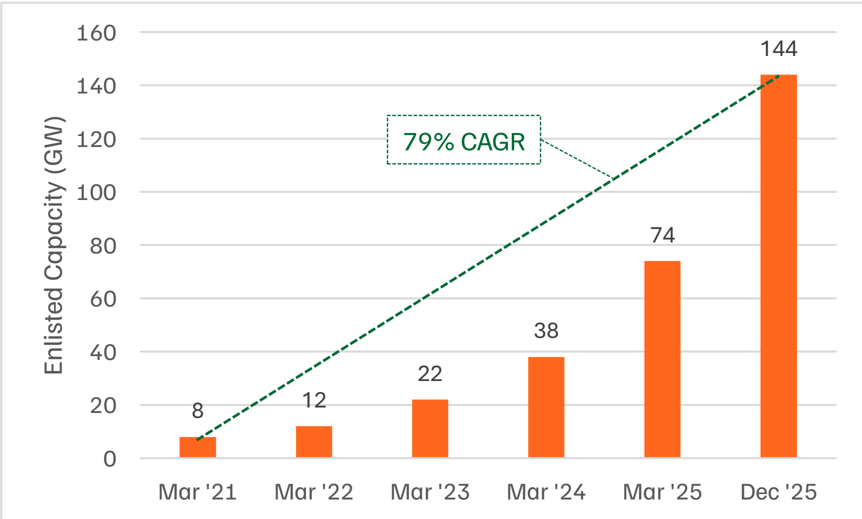
Investment gap in grid and storage, USD bn (IEA)



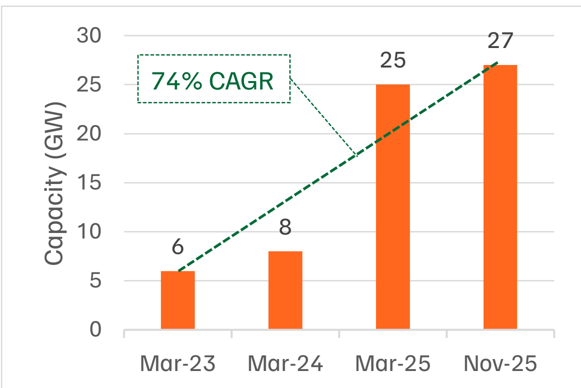
AT A GLANCE | INDIA'S GROUND-MOUNTED SOLAR PV POTENTIAL



Solar module manufacturing capacity



Solar cell manufacturing capacity



Imports reduced between 2023-24 and 2025-26, till Sep 25

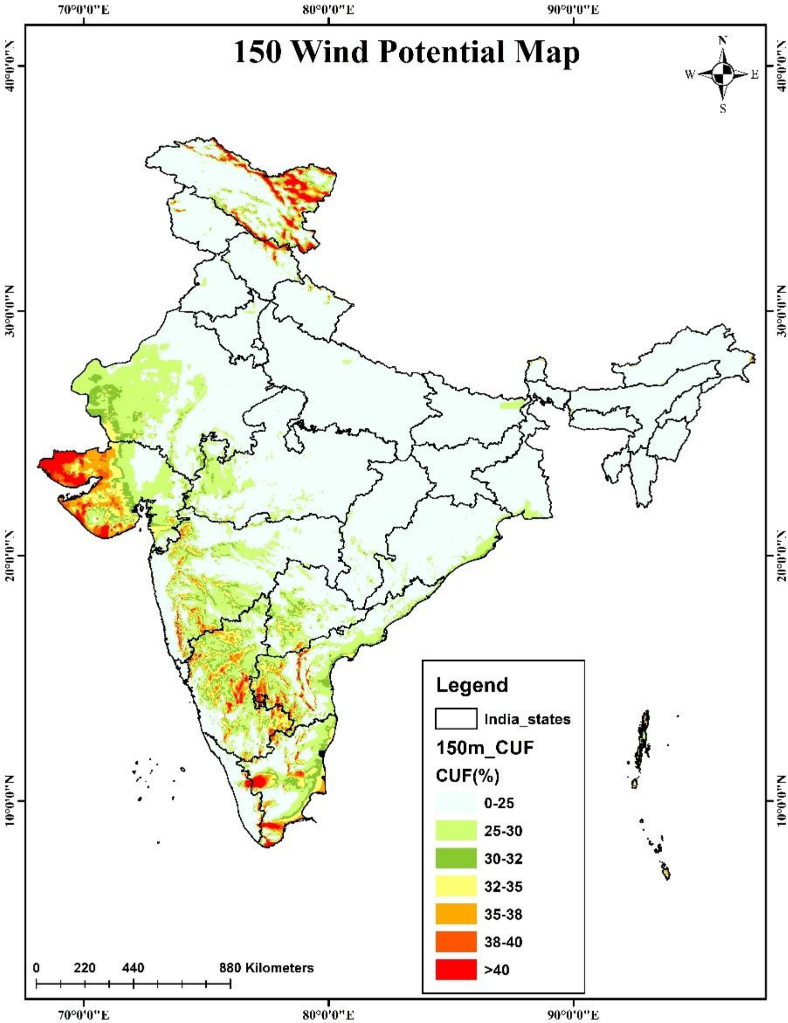
Solar modules
USD 4,354 mn to USD 386 mn

Solar cells
USD 1,853 mn to USD 1,291 mn

Import costs reduced
USD 6.2 bn to 3.8 bn

Chart scales are indicative.

AT A GLANCE | INDIA'S WIND ENERGY POTENTIAL AT 150m AGL



India has set up multipronged support for local manufacturing of clean energy equipment

Solar
Solar glass
Aluminium frames
Inverters (PCB)

Wind
Forgings and castings
Carbon fibre, pultrusion
Special grade steel

Bioenergy
Biogas purification equipment
Agitators, slurry pumps (CBG)
Grates (waste-to-energy)

Electrolysers
Electrodes
Catalyst-Coated Membrane (CCM)
Power electronics components

Battery Storage
Battery cell components
Refining technologies

India has Domestic Content Requirements for major solar missions such as PM Surya Ghar (rooftop solar for homes) and PM KUSUM (solar agri-pumps), and Central Public Sector schemes. A 20% Basic Customs Duty on solar modules and cells disincentivise cheap imports while allowing scale-up.

Local firms are promoted via Approved List of Models and Manufacturers. Production Linked Incentives (PLI) are mobilising manufacturers of High-Efficiency Solar PV modules and ACC batteries. New schemes have been proposed for ingot-wafer and polysilicon manufacturing.

UNIVERSAL ACCESS TO ELECTRICITY

India has achieved UN SDG 7.1.1 with universal access to reliable, affordable, and modern energy

300+ mn

Total electrified households, with 99.6-100% electrification

22.6 hr/day

Average rural electricity supply (23.4 hr/day for urban areas) in 2025, up from 12.5 hr in 2014

~61%

Surge in per capita electricity consumption from 957 kWh in 2014 to 1,538 kWh in 2024 (global average 3,486 kWh)

USD 9 bn

Financial outlay that catalysed the modernisation of the rural electricity distribution network

The SAUBHAGYA (Pradhan Mantri Sahaj Bijli Har Ghar Yojana) Scheme (2017- 2022) helped India achieve universal household electrification by connecting all un-electrified existing and willing rural, and all poor urban, households.

The DDUGJY (Deen Dayal Upadhyaya Gram Jyoti Yojana) (2015-2022) achieved 100% rural electrification of inhabited villages, adding 18,374 un-electrified villages to the grid.

SAUBHAGYA and DDUGJY grid-connected 28.6 mn homes.

The Revamped Distribution Sector Scheme (2021-2026) is using USD 7.7 mn to grid 1.3 mn left-out/new households. The PM-JANMAN Scheme provides off-grid solar to Particularly Vulnerable Tribal Groups.

NATIONAL GRID EXPANSION AND UPGRADE

The All-India Synchronous Grid is one of the world's largest integrated power systems

Within India's 'One Nation, One Grid' vision, the national grid synchronises all five regional grids into one frequency and manages the high volume and variability of renewable power alongside conventional sources.

The Green Energy Corridor's Intra-State Transmission System pools renewable power into the high voltage Inter-State Transmission System, which carries power between states.

India is implementing Market-Based Economic Despatch to meet power demand from the cheapest available plant in the national pool, favouring solar and wind's low marginal costs.

The 2015 National Smart Grid Mission is using digital tech to transform the one-way grid into a two-way 'smart' network.

USD 2.9 bn

Cost of the Inter-State (USD 1.4 bn) and Intra-State (USD 1.5 bn) Transmission Systems

259 GW

Non-fossil capacity connected to the grid; 2030 RE evacuation target of Inter-State TS is 172 GW, Intra-State TS 152 GW

55 GW

Renewables covered by 11 RE Management Centres—1 national, 3 regional, 7 state; Indian Railways has 1 REMC

250 mn

Smart meters to be installed by 2027-28; 53 mn installed

UTILITY-SCALE SOLAR

Solar is India's second largest source of installed power, and key to its energy transition

~136 GW

Installed solar capacity as of November 2025, up from 2.8 GW in 2014

80%

Reduction in solar power tariff per unit between 2014-25, from INR 7 to 2.6-2.8 (11.5 to 3 cents)

90%

Utility-scale solar addition today driven by the private sector

USD 85-100 bn

Foreign Direct Investment (FDI) and domestic private capital in India's solar sector between 2014-15 and 2025-26

India is the world's third largest solar market. Since 2014, solar in India has transformed from an expensive experiment, used in streetlights and rural homes, to core energy, making up ~26% of India's installed power capacity of 510 GW.

In 2015, India upped its 2010 target of 20 GW solar capacity by 2022 to 100 GW. Utility-scale solar rapidly grew due to factors such as lower global panel prices, aggressive reverse bidding to reach tariff parity with coal, policy and regulatory support from central and state ministries, innovations such as Ultra Mega Solar Parks, and private and foreign investments.

Solar has helped India reach its Paris Agreement NDC of 50% non-fossil fuel power five years ahead of its 2030 deadline.

PM Surya Ghar (Solar Home) has made residential rooftops the fastest-growing solar sector

India has emphasised rooftop solar (RTS) since its 2014 National Solar Mission Grid Connected Rooftop Solar Programme, which targeted 40 GW RTS by 2022. However, it achieved only ~6 GW by 2022 Residential uptake lagged due to low awareness, high costs, and complex regulations.

In 2024, the PM Surya Ghar: Muft Bijli Mission turbo-charged the sector with central subsidies and low-interest loans, fixed rates covering ~60% of small systems cost, a digital National Portal, and subsidy credits to customers' bank accounts.

The Mission also shifted the narrative from adoption of green energy to 300 units of free electricity to appeal to price-sensitive citizens.

USD 9 bn

Government outlay of PM Surya Ghar Yojana for residential RTS

30 GW

Target installed residential RTS by 2026-27; 8 GW achieved

10 mn

Target households for RTS; 2.7 mn households achieved

~3-5 GW/yr

Installed residential RTS capacity per year, up from 0.5-1 GW/year before 2024

SOLAR-POWERED IRRIGATION

Indian farmers are producing food *and* clean energy, growing incomes and lowering emissions

USD 3.8 bn

Central Financial Support for PM-KUSUM, including service costs of implementing agencies

1.4 mn

Targeted installation of off-grid solar agriculture pumps by 2026, 0.9 mn installed

3.5 mn

Targeted solarisation, including feeder level, of grid-connected agri-pumps; 1.2 mn achieved

USD ~720/yr

Diesel cost saved by farmers, assuming 4.6 litres/ day use at INR 87/litre cost

India's push for solar irrigation pumps is rooted in its efforts to reduce transmission losses and grid load, 'de-dieselise' the farm sector, improve water security, and augment farmer's income through power sale.

The 2019-2026 PM-KUSUM *(Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan)* Scheme is aiming for 10,000 MW of decentralised grid-connected solar/other RE-based power plants in rural areas to help farmers monetise uncultivable land. PM-KUSUM also promotes installation of off-grid and solarisation of grid-connected solar agri-pumps.

Farmers can break even within a year of replacing diesel pump with solar pump, and can earn USD ~300/acre/year by leasing barren land for solar projects.

Solar module recycling can reduce India's need for imported critical minerals

Building a domestic module recycling ecosystem needs informed policies and robust regulations. The industry needs an online, real-time, integrated knowledge system, modern technologies, and markets for recovered materials.

By 2047, India will need ~299 recycling facilities, each with 3,600 tonnes pa processing capacity, to manage its solar waste. This can help recover 656 kt of materials, including critical minerals such as silicon, copper, cadmium, and tellurium.

Solar module recycling will strengthen local manufacturing and offers a market opportunity of USD 440 mn. It could help avoid 37 $MTCO_2$ emissions.

11,220+

Kilo tonnes of solar waste likely to be created by India by 2047

92%

Share of India's solar waste from crystalline silicon modules, 8% from CT thin-film modules

38%

Solar material demand between 2026-47 that could be met from module recycling

USD 500 mn

Estimated capital for 299 solar recycling facilities by 2047

India's wind sector saw a historic resurgence in 2025, with record 6.3 GW capacity addition

3

Third largest wind market and third largest turbine maker

54.5 GW

Installed wind capacity, fourth highest globally; another 30+ GW being installed as of 2026

USD 8+ bn

Annual investment potential

71 GW

Offshore wind potential at identified sites, mostly along western and southern coasts

India aims to install 100-140 GW of wind capacity by 2030 at a rate of at least 10-15 GW per year. The sector can avail 100% FDI via automatic route.

The states of Gujarat (12.5 GW) and Tamil Nadu (11.5 GW) own about half of India's onshore wind capacity.

India is a net exporter of high-tech wind equipment, with 20 GW annual capacity. Capacities of turbines range from 225 kW to 5.3 MW. India will meet 10% of global demand by 2030.

India's integrated bioenergy vision extends beyond fuels and power to socio-economic gains

Bioenergy in India has evolved from primarily bagasse-based cogeneration to a wide range of feedstocks for various types of biofuels and biogas.

India's National Bioenergy Programme (NBP) 2021-2026 offers financial assistance to set up agri, industrial and urban waste-to-energy projects; biomass projects to produce briquettes and pellets and promote non-bagasse industrial co-generation, and small and medium (1-2500 cu.m per day) biogas plants for clean cooking fuel, lighting, and small needs.

India's 2025 Sustainable Aviation Fuel (SAF) Feasibility Study has a policy framework to support SAF production and use, with Indicative blending of 1% by 2027 up to 5% by 2030 in traditional aviation fuel.

USD 210 mn

Total budget of two-phase NBP; Phase I is on with USD 105 mn

19+%

Average ethanol blending in petrol in ESY 2024-25, with foreign exchange savings of USD 4.8-5.1 bn in that year

62 MMTPA

Estimated CBG potential; 920 MT produced daily by 132 plants under SATAT as of 2026

20-25 MTPA

Potential emissions reduction via SAF blending in traditional aviation fuel for all flights

GREEN HYDROGEN

India aims to be a global hub for the production, use, and export of green hydrogen

5 MMTPA

Target green hydrogen production capacity by 2030

~125 GW

New renewables capacity needed for hydrogen production

600,000+

Workforce to be skilled by 2030

USD 92-115 bn

Target investment for 5 MMTPA green hydrogen capacity, covering renewables capacity, electrolyser manufacturing, and infrastructure and logistics

The 2023 National Green Hydrogen Mission (NGHM) has outlaid USD ~2.4 bn by 2030 for four strategic activities.

First, the Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme provides financial incentives to produce electrolysers, green hydrogen, and its derivatives like green ammonia, focusing on global quality and local value addition.

Second, creating demand from hard-to-abate sectors such as fertilisers, steel, and refineries, and building high-volume Green Hydrogen Hubs.

Third, investing in R&D, pilots logistics, and the ecosystem.

Fourth, strengthening the regulatory framework, and skilling a specialised workforce.

NUCLEAR POWER

India is scaling up its nuclear power capacity as an energy security imperative

India's 2025 Nuclear Energy Mission positions nuclear as a baseload for solar and wind power. The 2025 Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act is set to liberalise the sector, reform its legal and regulatory frameworks, encourage private players, and ramp up scale.

India is entering the second of its 3-stage nuclear programme, with a 500 MW Prototype Fast Breeder Reactor (PFBR) set to be commissioned by late-2026. This will pave the way for India to use its vast thorium reserves.

India is also promoting Small Modular Reactors as "plug-and-play" captive power plants to decarbonise heavy industries such as steel and aluminium.

3%

Share of nuclear energy in India's power generation

100 GW

Target nuclear capacity by 2047, up from 8.8 GW in 2025

USD 2.4 bn

Budgetary allocation to design, develop and operationalise 5 indigenous SMRs by 2033

USD 215+ bn

Estimated investment needed to install 100 GW nuclear by 2047, adding ~4GW at USD 10–12 bn per year over next two decades

LARGE AND SMALL HYDROPOWER

India's hydropower sector is integral to balancing solar and wind with 'firm' renewables

~10%

Share of hydropower in India's power mix

21 GW

Estimated SHP potential; 5.1 GW capacity installed, 2025

70 GW

Large hydropower capacity target by 2030; 51 GW installed, with ~7 GW Pumped Storage Projects (PSPs)

USD 1.5 bn

Specialised central financial package to support hydropower development between 2024-25 and 2031-32

India classifies hydro projects of upto 25 MW as Small Hydro Power (SHP), and 25+ MW as large hydropower. Most of the 145 GW untapped hydro potential is in the Himalayan region and the Northeast.

SHP do not need extensive land acquisition and deforestation, have low carbon footprints, help socio-economic growth of rural areas and the fully indigenous SHP equipment ecosystem, and limit out-migration via long-term local jobs. India is designing a scheme to scale SHP between 2026-27 and 2030-31 with USD 1.8 bn in private and public investment. This could create 9,000 70+ year jobs and~20 mn construction man-days.

India also aims to install 15 GW Pumped Storage Hydropower (Water Batteries) by 2032.

NATURAL GAS

India aims to increase natural gas share in its primary energy mix to 15% by 2030 (~7% now)

India consumed ~71 BCM natural gas in 2024-25, up ~10% from the previous year. Of this, about half was produced domestically and half was imported as LNG.

India's natural gas is primarily used by the fertiliser industry (~32%), City Gas Distribution (CGD) (~20%), power generation (13-15%), and refineries and petrochemicals (12%), with the balance consumed by other industries.

CGD comprises of Compressed Natural Gas (CNG) for transport and Piped Natural Gas (PNG) for household cooking. It is the primary growth driver for natural gas and is expected to maintain a CAGR of 10-13% from 2025 to 2030.

25,429 km

India's operational natural gas pipelines as of June 2025, up from 15,340 km in 2014

~16mn

Domestic PNG connections, up from 2.5-2.8 mn in 2014-15; 2034 target 126 mn

8,475+

CNG stations, up from ~1000 in 2014-15; 2030 target 17, 700+

USD 13.5-14.5 bn

India's 2024-25 LNG import bill; five-year average share of imports is up to 49% in 2019–24, from 33% in 2011-16

India is in mission-mode to reduce its import reliance for critical minerals

50

Overseas mining assets to be acquired by public sector (26) and private firms (24) by 2031

1,200

Domestic critical mineral exploration projects via NCMM

USD 4+ bn

Expected expenditure during NCMM—USD 1.94 bn via the Mission and USD 2.14 bn from PSUs and other stakeholders

USD 178.5 mn

NCMM incentive to boost critical minerals recycling from e-waste and battery scrap

The 2025 National Critical Mineral Mission (NCMM) aims to secure India's availability of 30 critical minerals from local and foreign sources. The 7-year mission, set to run from 2024-25 to 2030-31, will lower import reliance—currently over 80% for most critical minerals.

The NCMM expects to improve mineral exploration, mining, beneficiation, processing, and recycling by strengthening technological, regulatory, and financial ecosystems.

The Geological Survey of India (GSI) has intensified exploration with 195 projects to identify and assess critical mineral deposits. Over 100 critical mineral blocks are set to be auctioned.

India is building integrated systems to design, develop, deploy, and adopt clean energy systems and services

PRODUCTION LINKED INCENTIVES

India's PLI Schemes are reducing imports by catalysing domestic solar and battery manufacturing

48+ GW

Fully or partly integrated High Efficiency Solar PV module manufacturing capacity awarded, with USD 2.9 bn PLI

USD ~6.5 bn

Private investment catalysed for solar modules since 2021-22

50 GWh

ACC battery manufacturing capacity targeted via National Programme; 40 GWh awarded

USD 5.4 bn

Direct private investment targeted via USD ~2.2 bn PLI outlay for ACC batteries

Since 2021-22, the PLI Scheme for High Efficiency Solar PV Modules has upped module and cell making capacities from 8 GW and 3 GW before 2021, to 144 GW and 27 GW as of 2025.

The HE-SPV PLI Scheme offers selected companies post-commissioning incentives in two tranches for five years. It prioritises Local Value Addition with higher incentives for end-to-end processes (polysilicon-ingot-wafer-cell-module). It has created ~13,300 direct jobs.

The National Programme on Advanced Chemistry Cell (ACC) Battery Storage aims to create a domestic tech-agnostic 'giga-factory' ecosystem. It mandates at least 25% LVA in two years, scaling to 60% in five. The 50 GWh capacity could create 50,000 to 100,000 jobs.

India's target of 500 GW renewables by 2030 needs 3.4 mn 'green collar jobs'

By 2030, the solar and wind sectors could employ 1+ mn workers; with construction and Operations & Maintenance, this would add up to 3.4 mn jobs.

Investing in high-tech training could improve productivity by 15–20%. The industry-led Skill Council for Green Jobs has 50+ globally benchmarked National Occupational Standards for solar, wind, waste-to-energy.

The national Suryamitra Skill Development Programme trains thousands of solar technicians annually (66,500+ since 2015).

The Vayumitra Programme trains wind technicians, the Jal Urjamitra Programme trains Small Hydropower workers, and Varunmitra Programme, solar agri-pump operators.

100,000

RTS technicians to be trained for 10 mn PM Surya Ghar solar-powered homes; solar makes up 40% of total 385,000–400,000 renewables jobs

600,000

Potential jobs in green hydrogen ecosystem by 2030

USD 1.5-2 bn

Needed for clean energy sector vocational training, digital tools, and infrastructure by 2030

35-48 mn

Jobs expected to be created by India's green economy by 2047

CLEAN COOKING

UJJWALA is one of India's most prolific, socially relevant clean energy transition initiatives

106+ mn

UJJWALA LPG connections as of December 2025, with another 2.5 mn connections planned

4.5

Average per capita cylinders in 2024-25, up from 3 in 2019-20

USD ~6.2 bn

Expenditure between 2016-26, including existing subsidies and cost of new connections

USD ~3.6 bn

Government compensation for public sector oil companies for keeping LPG prices affordable despite global market volatility

UJJWALA (Pradhan Mantri Ujjwala Yojana – PMUY) is a national flagship initiative started in 2016 to provide subsidised cooking gas (LPG) connections to women from rural and low-income homes to replace polluting cooking fuels like firewood and dung cakes.

The transition to cleaner energy is improving household health and empowering women.

UJJWALA provides one-time INR 1600 benefit per deposit-free connection and subsidises INR 300/cylinder for 9 refills a year. The first refill and gas stove are also given free of cost now.

UJJWALA achieved its target—at first 50 mn, revised to 80 mn to meet demand—well ahead of its 2020 deadline, and has since been extended.

India's DRE ecosystem is powering livelihoods via productive use appliances

MNRE's 2022 Framework for Promotion of Decentralised Renewable Energy (DRE) for Livelihood Applications aims to integrate renewable energy into livelihood activities such as agriculture, food processing, textiles, and small industry, with a focus on rural areas, women, and marginalised groups.

The Framework is helping build a market-oriented ecosystem to attract the private sector to develop and deploy DRE-based livelihood products and improve access to end-user finance via existing or new instruments.

The government also facilitates pilots to test and validate DRE solutions, recommending viable models for scale-up via state agencies and the private sector.

USD 50+ bn

India's DRE market potential, covering agriculture, food processing, textiles, and retail

70+%

Users report higher household income after adopting DRE tech

~4x

Rise in income of women in the silk value chain by eliminating physically taxing work with DRE appliance like solar silk reelers

20-30%

Post-harvest perishables loss that could be prevented by DRE-powered solar cold storages

India is the world's largest market for electric 3-wheelers, and second for e-2-wheelers

USD 1.3 bn

PM e-DRIVE outlay supporting 2.83+ mn EVs

72,300+

Public fast chargers planned with PM e-DRIVE grant of USD ~238 mn to alleviate range anxiety (e-2, 3W: 48,400, e-4W: 22,100, e-bus: 1,800)

10 mn

Target annual EV sales by 2030

USD 238 bn

Projected e-mobility market in India by 2030, including vehicles, components, and charging infrastructure

The 2024 PM e-DRIVE scheme is accelerating mass mobility electrification through upfront incentives for 2 and 3-Wheelers and commercial and public transport EVs, and grants for e-buses and public charging infra.

PM e-DRIVE excludes private cars and adds two segments: e-ambulances for zero-emission emergency medical services, and e-trucks to transition from polluting commercial vehicles.

PM e-DRIVE succeeded the 2019-24 FAME-II scheme. With an outlay of USD 1.4 bn, FAME-II incentivised EVs with Advanced Chemistry Cells (Lithium-Ion) instead of Lead-Acid batteries, and subsidised companies with high Local Value Addition. It increased EV adoption from 0.7% in 2019-20 to 7.5% in 2024-25.

Indian Railways has the world's largest electrified broad gauge train network

Indian Railways is the 4th largest railway network in the world, with 70,000+ km broad gauge route length, and over 135,000 km of track length. It is the second-largest rail freight carrier globally.

Indian Railways is the single largest energy consumer in India, with an annual demand of ~21 Billion Units. It aims to achieve Net Zero by 2030 by meeting most of its projected 33 BU demand through solar and other renewable sources.

The Railways' energy use is split into traction (70%) and non-traction (30%). Traction power is used by the 25 kV Overhead Equipment to run the trains. Non-traction power is used for railway establishments such as platforms, workshops, offices and colonies.

99%+

Electrified broad gauge network

7.35 bn

Annual passenger journeys on in 2024-25, averaging 23 mn passengers daily

~15 km/day

New track added in 2025, totalling over 5,000 km

20 GW

Solar capacity to be installed by 2030 by Indian Railways on its ~51,000 ha land; current own installed capacity is ~900 MW

Indian households could own 450-500 mn ACs by 2040, doubling to 1 bn units by 2050

57%

Building energy demand from cooling, maximum from offices

70-75 mn sq ft

Grade-A office space being added annually, driven GCCs

30%

Less energy used by District Cooling Systems (DCS) than building ACs; projected 12 mn TR DCS capacity by 2038 could save USD ~10.5 bn in infra costs

USD 13.7 bn

India's 2025-26 HVAC (Heating, Ventilation, and AC) market, growing at ~16% CAGR

Extreme heat and humidity, a growing middle-class, and universal electrification has shifted cooling from a 'luxury' to a 'critical urban utility' in India.

Cooling is the largest consumer durables sector, growing to a USD ~22 bn market by 2035. India's 2017 bulk procurement of 100,000 super-efficient ACs from reputed brands reduced prices by aggregating demand.

India is Asia-Pacific's leader in new Grade-A office space. Older offices offer a market of USD 5+ bn to retrofit 350+ mn sq. ft. DCS and Cooling as a Service (CaaS) are major investment options.

The 2019 India Cooling Action Plan has targeted 20-25% less cooling demand, 25-30% less refrigerants, and 25-40% less energy for cooling by 2037-38

COLD CHAINS

India's cold chain hyper-growth is driven by pharma, organised retail, and quick commerce

Dairy and frozen desserts have ~24% market share worth USD ~6 bn. Pharmaceuticals are the fastest growing high value sector. Refrigerated transport is the fastest growing service, worth USD 4 bn.

India has a storage gap of ~35 MMT for perishables like fruits and vegetables, almost equal to its existing capacity of 40 MMT. The PM Kisan SAMPADA Yojana is creating modern 'farm gate to retail outlet' infrastructure and efficient supply chains to lower post-harvest losses, supported by the USD 12 bn Agriculture Infrastructure Fund.

Solar-powered cold rooms and natural refrigerants are cutting energy costs, which are 30–40% of opex. Smart Cold Chains are using AI for route planning and real-time monitoring.

USD 24.6 bn

India's 2025 cold chain market, up from USD 10.5 bn in 2024, going to USD 74.5 bn by 2033 at segment CAGRs of 11-18%

USD 11-12 bn

Annual loss of agricultural produce due to lack of storage

174,000

Jobs created by 300+ integrated cold chain projects with 2.5 MMTPA preservation capacity

100%

FDI via automatic route, drawing global logistics leaders

Industrial energy efficiency and decarbonisation were codified in India since early 2000

13

Energy-intensive PAT sectors with ~1,333 units, up from Cycle 1's 478 units in 8 sectors, with ~24 MTOE energy savings

10.3+ mn

Tradeable ESCerts issued across completed PAT cycles

~26 MTOE

Energy savings from the first 7 PAT cycles, as of 2022-23

USD 100 bn

Estimated investment across all PAT cycles by modernising DCs

The Perform, Achieve and Trade (PAT) scheme is a regulatory and market-based mechanism of the National Mission for Enhanced Energy Efficiency (NMEEE). Since 2012, PAT has worked in 3-year cycles to lower Specific Energy Consumption in energy-intensive industries by triggering private investment in energy-efficient systems.

Designated Consumers (DCs, aka units) exceeding energy-saving targets get certificates (ESCerts) to trade on power exchanges with nonachievers. PAT has built an ecosystem of 11,000+ certified Energy Auditors and Energy Managers for Monitoring & Verification.

In a pivot from energy intensity to emissions intensity, 9 PAT sectors are transitioning to the Carbon Credit Trading Scheme.

India is championing sustainable and resilient growth globally with initiative and cooperation

INTERNATIONAL SOLAR ALLIANCE

The ISA is deploying solar to improve energy access, ensure security, and drive transition

125

Member + Signatory countries

9.5 GW

Solar capacity demand aggregated for 44 countries

USD 5.5 bn

Active solar project pipeline developed; USD 9.5 mn secured in Multi Donor Trust Fund

5400+

Professionals in 55 countries who have received structured technical training via the ISA

https://isa.int

The International Solar Alliance was co-founded by India and France at COP21 in Paris in 2015. It is a treaty-based IGO headquartered in India.

The ISA drives projects on mini-grids, rural electrification, and solar financing. It promotes scale-led efficiencies by pooling demand, lowering procurement costs, and improving market confidence for large-scale solar.

The ISA's catalytic Africa Solar Facility (ASF) has mobilised investment worth USD 71 mn, over 10% of USD 700 mn potential, to accelerate scalable, market-ready solar deployment across Africa.

The ISA is supporting 27 pilots in 22 LDCs and SIDS in areas such as healthcare, water pumps, cold storage, and infra.

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

The CDRI helps countries build infrastructure that is resilient to natural hazards and disasters

The Coalition for Disaster Resilient Infrastructure was founded in 2019 by India. It is an International Organisations headquartered in New Delhi.

The CDRI aims to drive USD 10 trillion into new and existing infrastructure investments and services by 2050 to make them resilient to natural hazards, climate change, and disasters.

The CDRI enhances capacity, informs policy, and improves planning and management through technical expertise, innovation, financial support, and risk governance.

Its Infrastructure for Resilient Island States (IRIS) initiative provides direct funding and technical support to vulnerable Small Island Developing States.

64

CDRI members: 53 countries, 12 partner organisations

14%

Annual global GDP at risk from infrastructure losses to climate change and disasters

80%

Risk concentrated in power, transport and telecom sectors

USD 22 mn

Funding disbursed by CDRI across 183 projects globally

https://cdri.world

The GBA is an experts' hub and catalyser of biofuel production, trade and use

33
Member countries

14
International Organisations

85%
Global biofuel production share of founding members, led by the USA, Brazil, and India

USD 226 bn
Projected biofuels market by 2028, up from about USD 167 bn in 2023, at a CAGR of 6+%

https://biofuelsalliance.com

The Global Biofuels Alliance was founded in 2023 by India, Argentina, Bangladesh, Brazil. Italy, Mauritius, Singapore, the UAE, and the USA.

The GBA is an alliance of governments, International Organisations, and industry. It promotes biofuels as integral to energy transition and socio-economic growth.

The GBA will help knowledge exchange and capacity building across the biofuels value chain, support national biofuel programmes, and promote sustainable biofuels.

In 2024, India signed a Host Country Agreement with the GBA, setting its formal legal status akin to an international organisation, and instituted its permanent secretariat in India.

You're invited!
Be a part of
The India Story
of green growth
and innovation.

Non-fossil capacity
500 GW / 2030
1800 GW / 2047
Net Zero / 2070

Abbreviations

ACC	Advanced Chemistry Cell
BCM	Billion Cubic Metre
bn	billion
CAGR	Compounded Annual Growth Rate
CBG	Compressed Biogas
cu.m	cubic metre
DVA	Domestic Value Addition
ESY	Ethanol Supply Year
FDI	Foreign Direct Investment
FY	Financial Year
GBA	Global Biofuels Alliance
GW	Giga Watt
GWh	Giga Watt hours
ha	Hectare
IGO	intergovernmental Organisation
INR	Indian Rupee
kt	Kilo Tonne
kWh	Kilo Watt Hour
LPG	Liquefied Petroleum Gas
LNG	Liquefied Natural Gas
LVA	Local Value Addition
MMT	Million Metric Tonne
MMTPA	Million Metric Tonnes Per Annum
mn	million
$MTCO_2$	Million Tonne of Carbon Dioxide
MTOE	Million Tonne of Oil Equivalent
MW	Mega Watt
PSP	Pumped Storage Project
RE	renewable energy
RTS	rooftop solar
SAF	Sustainable Aviation Fuel
SIDS	Small Island Developing State
sq. ft	square foot
tn	trillion
TR	Tonne of Refrigeration
USD	US Dollar

Disclaimer

This handbook contains indicative data and analysis intended to provide an overview of India's clean energy ecosystem.

Information has been sourced from official and public Government of India repositories, including ministry and agency websites, scheme portals, Press Information Bureau notes, and Invest India analysis; official websites and reports of International Organisations, and independent, peer-reviewed, published and free-to-access research by the Council on Energy, Environment and Water. Gemini Pro AI was used for select secondary reference.

Numbers have been rounded off for quick and easy reference. INR values have been converted to USD @ 1 USD=INR 83/84, except in historic or specific cases where noted. These conversions, combined with varying time frames of reporting, may lead to minor discrepancies that do not impact the intended overview.

Please email queries to ir.mnre@nic.in.

THE INDIA STORY

A GREEN INVESTMENT HANDBOOK

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