Understanding the Drivers of Energy Demand Growth

Insights from India's growth and development trends

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Impacting sustainable development at scale with data, integrated analysis, and strategic outreach

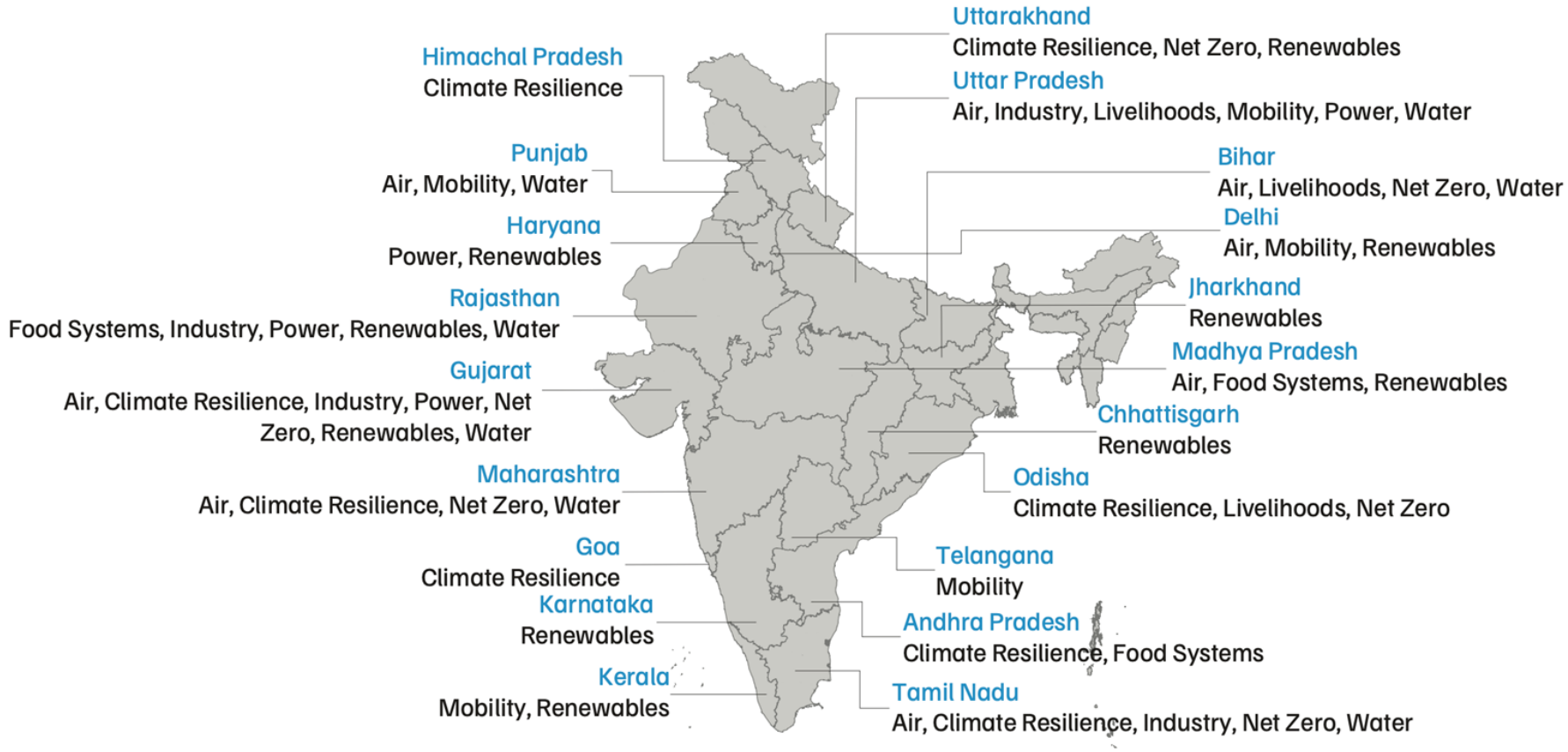
Strategic pillars

- Clean electricity penetration
- Low-carbon industrialisation & circularity
- Fuels of the future
- Sustainable livelihoods & green economy
- Quality of life of citizens
- Sharing lessons

CEEW in numbers

- **390+** team members
- **550+** peer-reviewed studies
- **700+** convenings
- **400+ mn** lives impacted
- **62,000+** livelihoods directly supported

20 Indian states supported



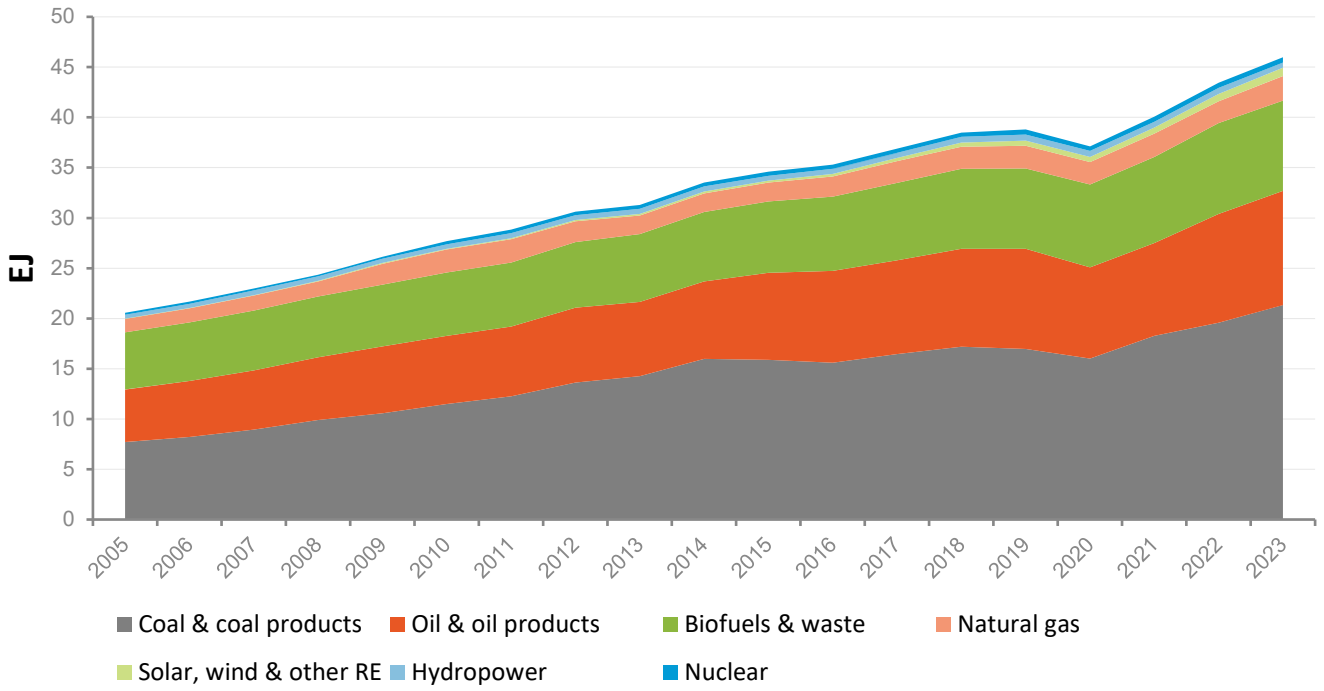
India is the third largest energy consumer accounting for 7% of global energy demand

3.5×
Per capita GDP growth (2005→2023)

~7-8% p.a.
Average annual GDP growth rate

+25%
Population growth (2005→2023)

29% → 35%
Urban share of population

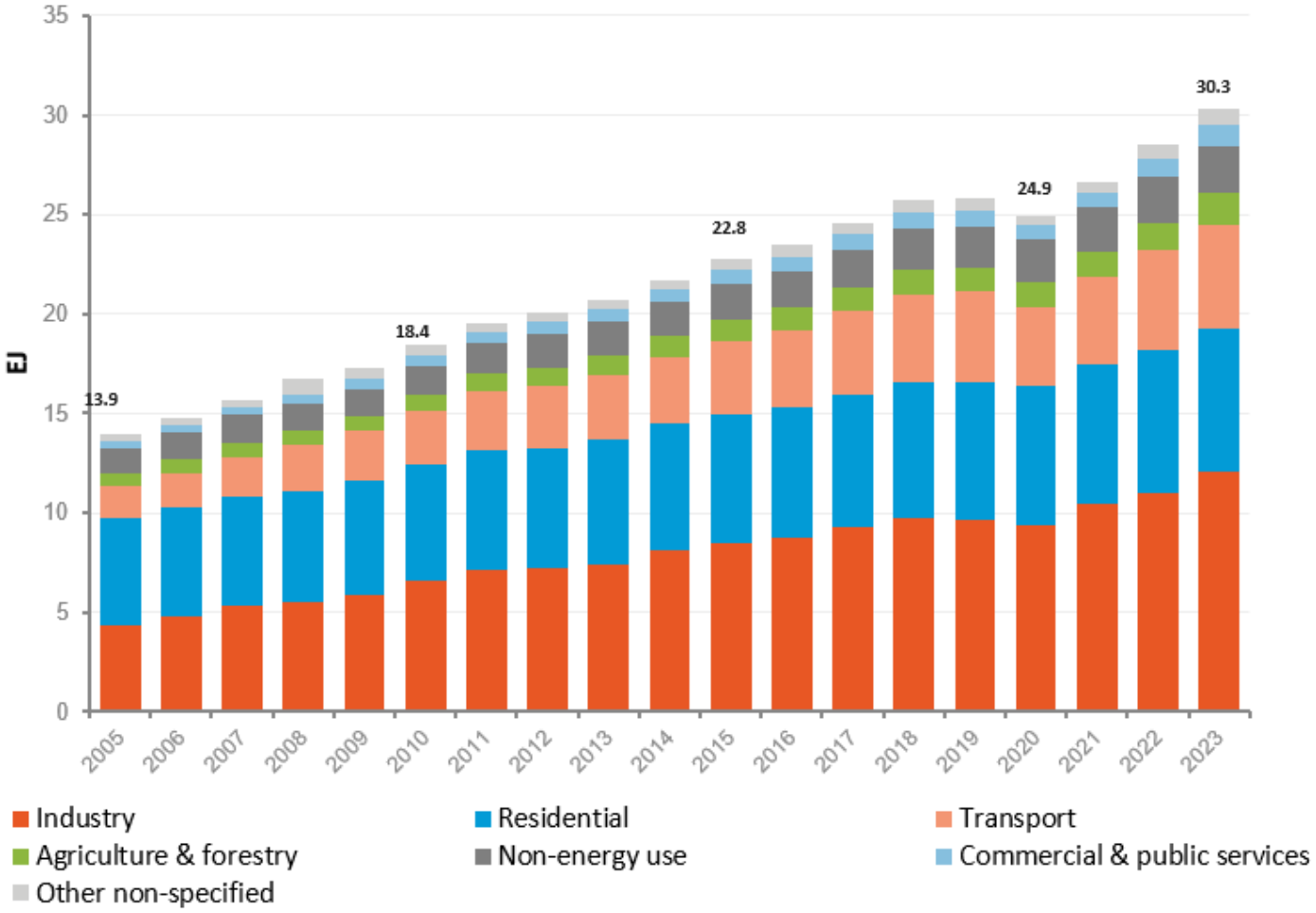


- Driven by population and income growth, India's primary energy has more than doubled between 2005 and 2023, reaching 46 EJ.
- Per capita energy consumption stands at just 27 GJ — well below the world average of 77 GJ.
- Coal dominates the mix at 46% of total supply, followed by oil at 25%.

Coal & coal products 2.8×	Oil products 2.2×	Natural gas 1.8×
Solar, wind &other RE 31×	Biofuels & waste 1.6×	Nuclear 2.8×

- Source: IEA, World Bank, The Energy Institute

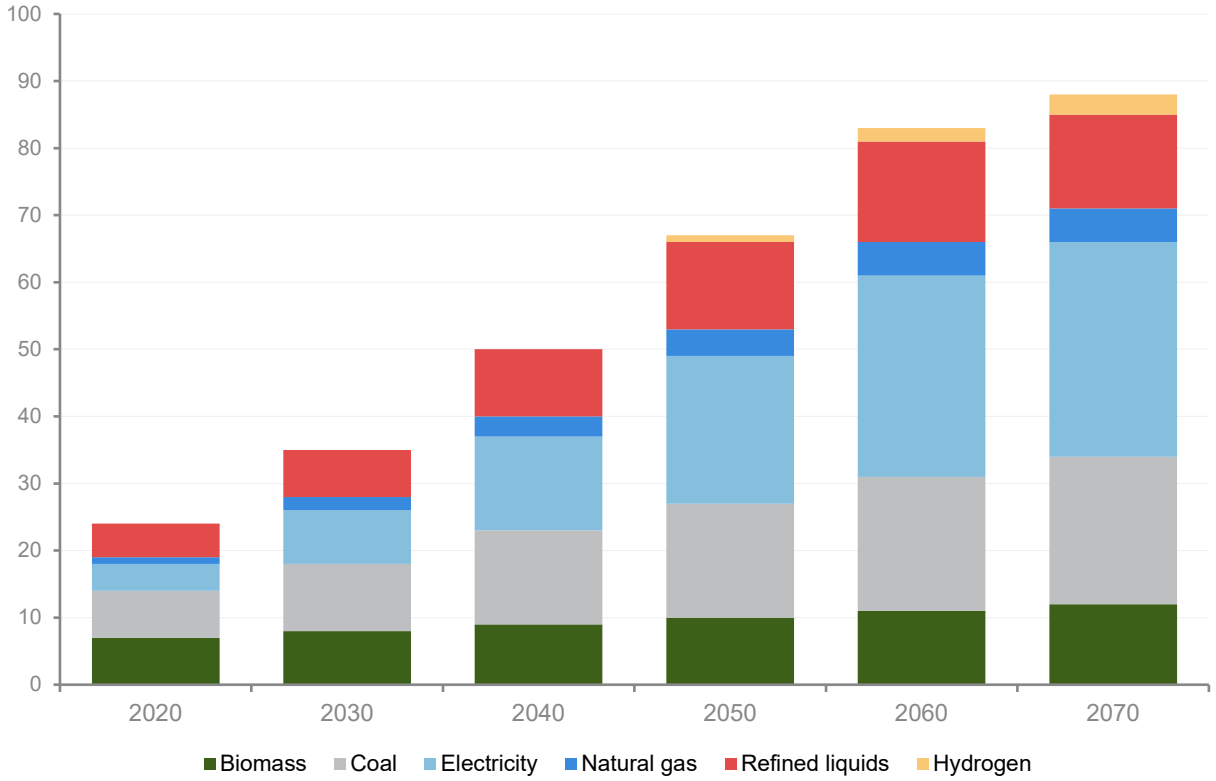
Industry and residential sectors dominate India's final energy consumption



- Total final energy consumption reached 30.3 EJ in 2023, with the industry sector accounting for 40%, followed by residential and transport at 24% and 17% respectively.
- Between 2005 and 2023, energy consumption in the transport sector grew 3.2×, driven by rising incomes and growing demand for mobility services.
- In terms of source, electricity accounts for 19% of total final energy consumption in 2023
- Power consumption the country has grown more than 3× during this period reaching ~1700 TWh in 2023.

Source: IEA , Ministry of Power, Government of India

With per capita income growing 11× and urbanisation accelerating, India's energy demand is projected to more than triple by 2070



01 **3.3×**
Final energy growth by 2070
GDP grows 11× but final energy only 3.3× — reflecting efficiency gains and demand saturation across sectors.

02 **43%**
Electricity share in 2070
Electricity becomes the largest fuel by 2070, up from ~17% in 2020, driven by electrification of industry, buildings and EVs.

03 **9,037 BU**
Electricity demand by 2070
Electricity demand reaches 9,037 BU by 2070 (vs ~3,390 BU in 2040), with per capita demand rising to 5,547 kWh — from ~1,200 kWh today.

Source: (Das et al. 2025, doi:10.1016/j.egycc.2025.100192) , CEEW analysis

What drives India's future energy demand?

Industry

4×

Steel demand by 2050

Steel output expected to nearly quadruple — driven by infrastructure, housing and manufacturing.

3×

Cement demand by 2050

Cement demand triples as India builds out roads, bridges and urban housing stock.

2×

Fertiliser demand by 2050

Rising food demand and agricultural modernisation double fertiliser consumption.

Industry already accounts for >50% of projected energy demand growth to 2050..

Buildings

85%

Of 2047 building stock yet to be built

India's construction wave is ahead of it — most of the built environment does not yet exist.

9×

AC ownership rise by 2050

Currently only 24 ACs per 100 households — set to expand 9× as incomes and heat rise.

130–150M

New ACs added 2025–2035

Each new AC adds ~1.5 kW to peak demand — a major grid planning challenge.

Residential floor space nearly triples from <20B m^2 to >50B m^2 by 2040.

Transport

201

Cars per 1,000 people by 2070

4-wheeler ownership rises 6× from ~34 today as the middle class expands rapidly.

350M

Two-wheelers on road by 2050

2W fleet doubles from 175M in 2023 — affordable personal mobility remains dominant.

3×

Road freight by 2040

25 million extra trucks on India's roads by 2040 as manufacturing and consumption rise.

India could become the world's 3rd largest aviation market by 2030 (IATA). Air travel grows ~14× by 2070. Transport oil demand rises by 4 million barrels/day by 2040.

Agriculture

270M

New urban residents by 2040

Urbanisation reshapes food demand patterns — more processed food, cold chain, refrigeration.

33%

Electricity share in agriculture by 2070

Electricity doubles from 17% to 33% — irrigation pumps and mechanisation are the main drivers.

2×

Agriculture energy demand by 2070

Total sector energy doubles as pump sets electrify, cold chain expands and farm machinery grows.

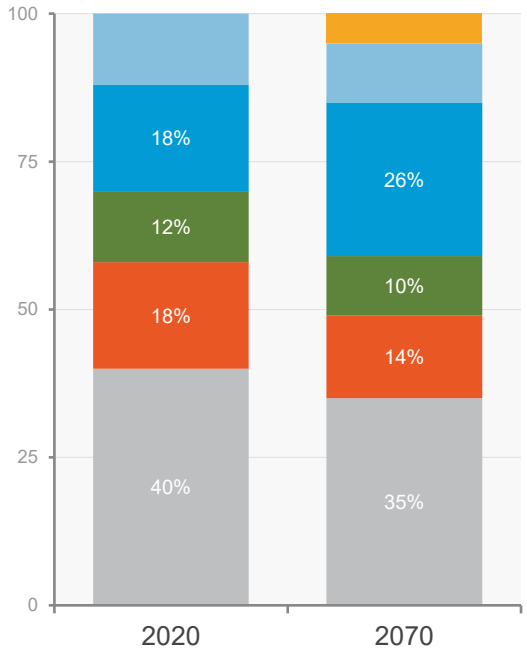
Despite being the smallest energy-consuming sector today, agriculture's energy demand roughly doubles by 2070 — with electricity increasingly displacing diesel in irrigation.

Source; IEA, (Das et al. 2025, doi:10.1016/j.egycc.2025.100192) CEEW, Global Energy monitor, CLASP, McKinsey Global Institute, SIAM, IATA, World Bank, UN World Urbanization Prospects

Energy Demand Grows Across Sectors, but Fossil Fuels Remain Dominant Under BAU

Industry

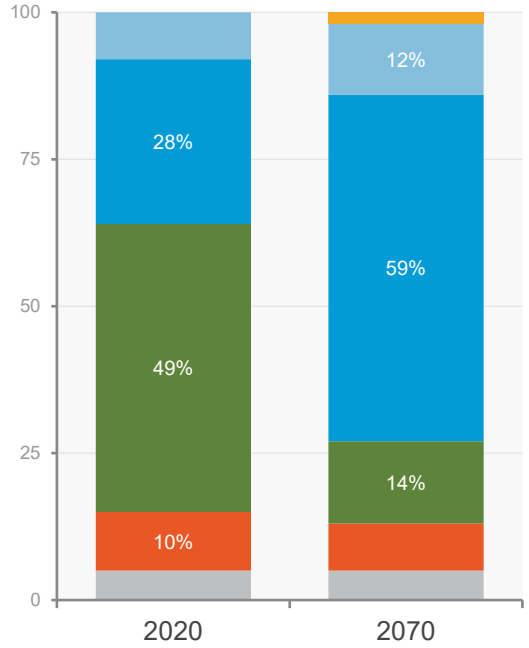
8.5 EJ — 5.0× — 42.5 EJ



Industry 5× by 2070. Coal remains dominant but electricity rises from 18% to 26%. Green hydrogen emerges at 5%.

Buildings

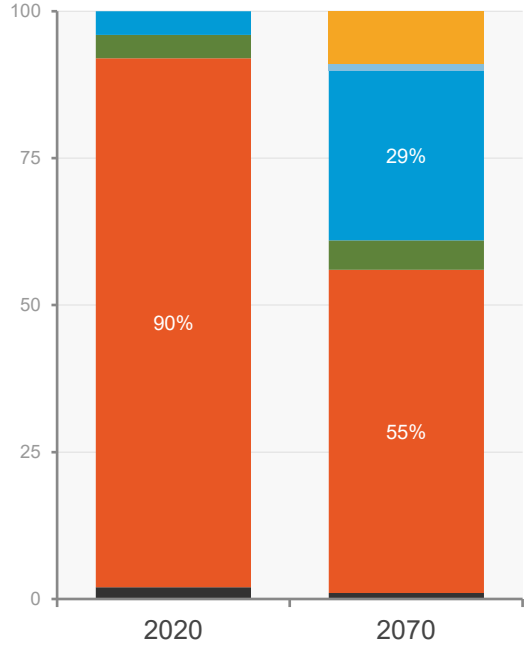
7.3 EJ — 2.5× — 18.5 EJ



Buildings see the biggest fuel shift — biomass drops from 48% to 14% as households electrify. Electricity becomes dominant at 59%.

Transport

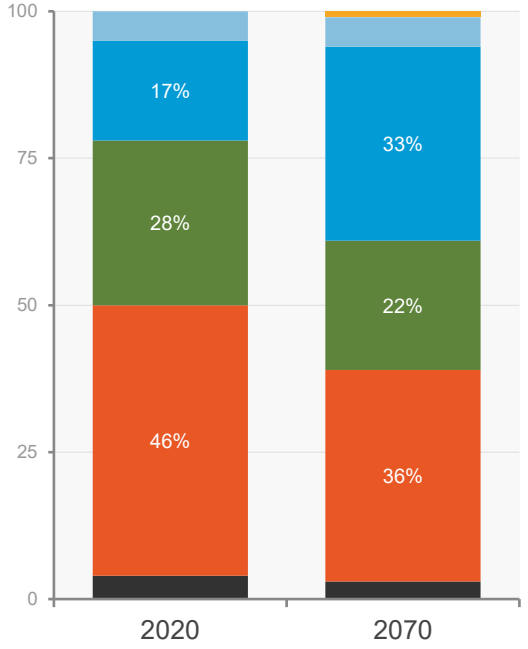
5 EJ — 3.5× — 17.3 EJ



Transport 3.5× growth. Oil dominates but falls from 90% to 55% as EVs push electricity to 29% and hydrogen emerges at 9%.

Agriculture

1.8 EJ — 2.0× — 3.6 EJ



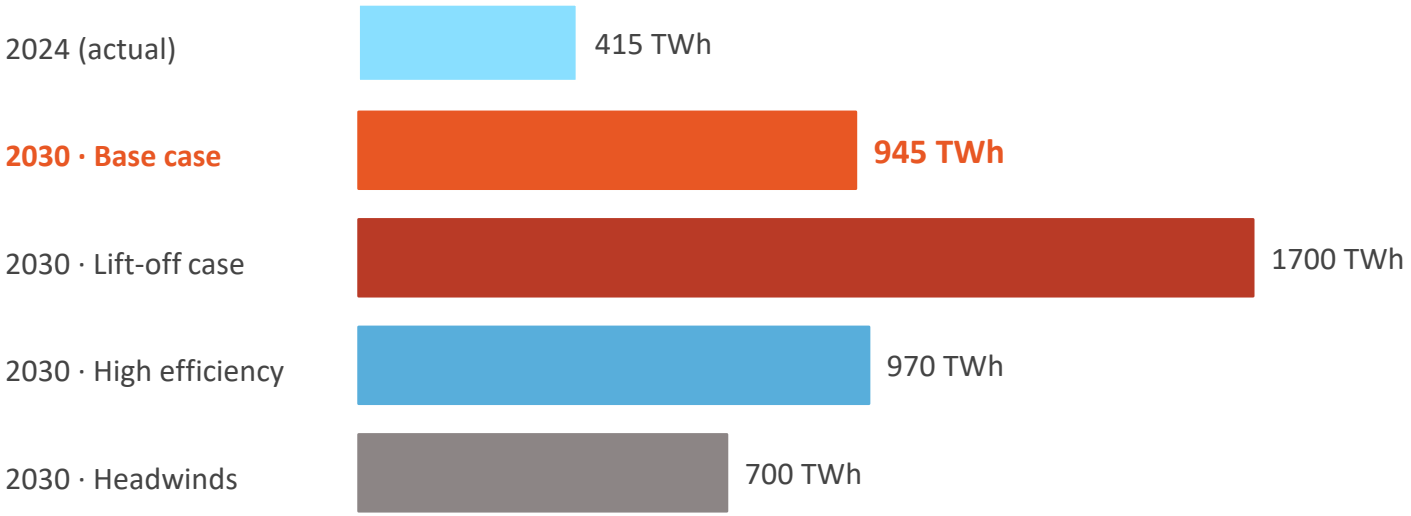
Agriculture doubles by 2070. Electricity rises from 17% to 33% driven by irrigation pumps and mechanisation.

Refined liquids | Coal | Electricity | Biomass | Natural gas | Hydrogen

Source: (Das et al. 2025, doi:10.1016/j.egycc.2025.100192) CEEW analysis

Data Centre electricity demand to double, reaching 3% of world electricity consumption by 2030

Global data centre electricity demand by scenario (TWh/yr)



Growth by region, 2024 → 2030 (TWh/yr)

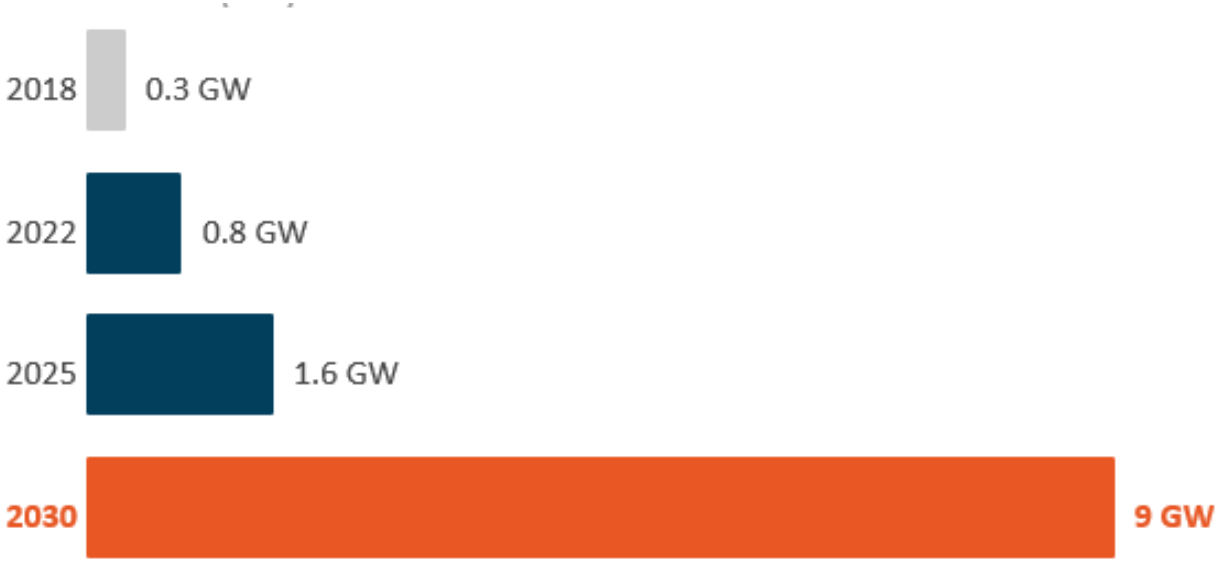
United States	China	Europe	SE Asia*
180 → 420	102 → 277	62 → 107	28 → 60
+130%	+170%	+70%	>+100%

- 8,000+ data centres globally: US 33%, EU 16%, China 10%, India is at 3% today but is one of the fastest-growing markets.
- Hyperscale sites use 100 MW+, equal to powering 350k–400k EVs or a mid-sized city.
- US tops AI power use: now 540 kWh per person, rising to 1,200 kWh by 2030 (~10% of average home use).
- SE Asia emerging as next hub: data-centre electricity demand set to more than double by 2030, centred on Singapore and southern Malaysia.

Data centre power demand is projected to grow 4× faster than all other electricity-using sectors, expanding at 15% annually through 2030.

Source: IEA, IEEFA

With ~5–8x growth in capacity, power demand of data centres in India is set to expand significantly



- Mumbai (49%) and Chennai together account for ~70% of installed capacity
- Water use will more than double — 150 to 358 billion litres by 2030. Cities hosting data centres already face acute stress

- India's data centre capacity is expected to grow from around ~1–1.6 GW today to nearly 9–10 GW by 2030, driven by AI, cloud, and digitalisation demand
- Electricity consumption from data centres is projected to reach ~57 TWh by 2030, increasing almost 4–5 times from current levels
- Data centres could account for ~3–5% of India's total electricity demand by 2030
- Capacity is highly concentrated in key hubs such as Mumbai, Chennai, and NCR, leading to localized grid stress and uneven infrastructure burden across regions
- Supporting this expansion will require ~$200 billion in investments across power generation, grid infrastructure, and real estate

Source: IEEFA, CEEW, Industry reports

Even as energy demand surges, India is moving decisively towards clean energy — targets and policies already in place

NDC COMMITMENTS ·

2015 — 1st NDC
Targets for 2030

- −33–35% emissions intensity vs 2005
- 40% non-fossil installed capacity
- Carbon sink 2.5–3 $BtCO_2eq$

2022 — Updated NDC
Raised ambition for 2030

- −45% emissions intensity vs 2005
- 50% non-fossil installed capacity

✓ *50% non-fossil achieved June 2025 — 5 years early*

2026 — New NDC
New targets for 2031–35

- −47% emissions intensity vs 2005 by 2035
- 60% non-fossil installed capacity by 2035
- Carbon sink 3.5–4 $BtCO_2eq$ by 2035

Approved 25 March 2026 · Submitted to UNFCCC

CURRENT PROGRESS

220 GW
RE installed (March 2025) — record 29.5 GW in FY2024–25

52.6%
Non-fossil share of installed capacity — Feb 2026

~36%
Emissions intensity cut from 2005

KEY POLICIES ALREADY IN PLACE

Policy	Sector	Target / Status
PM-KUSUM	Agriculture	Solar pumps for 3.5M farmers — replacing diesel irrigation
FAME II / PM e-Drive	Transport	EV subsidies — 10M EVs targeted by 2030
Green Hydrogen Mission	Industry	5 MT/yr green H_2 by 2030 · $2.3B outlay
PLI — Solar & Batteries	Manufacturing	Incentives for solar modules, batteries, electrolysers
Energy Conservation Act 2022	Cross-sector	Carbon markets, BEE efficiency standards
ISTS Waiver	Power	Free interstate transmission for solar, wind, green H_2
National Solar Mission	Power	100 GW solar crossed Jan 2025 — ahead of target

MNRE 2025 · PIB · Union Cabinet · Carbon Brief · Down to Earth · March–April 2026

India's commitments are aligned with vision of Viksit Bharat @2047 and Net-Zero by 2070.

Source: Government of India

15 CEEW THE COUNCIL

Achieving net zero by 2070 requires a fundamental transformation of India's energy system

- Electricity demand rises to ~15,000 TWh by 2070 under NZ — higher than the 9,037 TWh under BAU
  Although complimentary policy and behavior change reduces this by upto 30%

- Agriculture, buildings and transport must largely electrify — industry needs electricity and green hydrogen
  Fossil fuel use must significantly decline across all sectors. Industry is the exception — hard-to-abate processes such as steel and fertilisers require green hydrogen alongside electrification.

- Total power generation must grow ~8–9x — installed capacity must increase 14 times from today
  Under BAU, coal still accounts for 44% of generation in 2070. Under NZ, coal is progressively replaced by solar, wind and nuclear.

- Solar 3,320–5,500 GW · Wind 970–1,825 GW · Nuclear 304–340 GW · Battery storage ~3,000 GW
  Non-fossil sources to supply 98% of power generation by 2070. Storage is critical for grid stability with high variable RE.

- $14.23 trillion in power sector investment alone — $22.7 trillion total
  At ~$500 billion per year through 2070. The gap cannot be closed from domestic sources alone and requires concessional international capital.

Source: (Das et al. 2025, doi:10.1016/j.egycc.2025.100192) CEEW, NITI Aayog

Emerging economies face the same trilemma — and cross-country learnings are critical

- Emerging and developing economies drive 80% of global energy-demand growth, yet have received less than 10% of clean-energy investment since 2021.
- Clean-energy investment exceeded $300 billion in 2024, but the annual financing gap remains $2.2 trillion versus what's needed for a net-zero pathway.
- Financing costs 5–7× higher than in advanced markets make renewables far more expensive in emerging economies, highlighting the need for affordable global capital and climate-finance support.

Rising incomes, urbanisation, industrialisation, and electrification are signs of progress in emerging economies. The question is not whether demand will grow, but whether the energy powering that growth will be affordable, reliable, and clean.

Source: WEF, IEA

Thank you

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