



PATHWAYS TO ATMANIRBHAR BHARAT

HARNESSING INDIA'S RENEWABLE EDGE FOR
COST-EFFECTIVE ENERGY INDEPENDENCE BY 2047

SUMMARY FOR POLICYMAKERS



Prime Minister Modi's commitment to Atmanirbhar Bharat aims to make India energy independent by 2047. However, India currently imports 90% of its oil and 80% of industrial coal. Price and supply volatility in global energy markets, as witnessed in recent years, strain India's foreign exchange reserves, resulting in economy-wide inflation. Recent dramatic declines in clean energy costs provide India an opportunity to lower energy imports through investment in renewable energy, battery storage, EVs, and green hydrogen.

This study assesses a pathway for India to meet its growing energy needs and achieve near-complete energy independence by 2047, focused on India's three largest energy consuming sectors –power, transport, and industry – which collectively account for more than 80% of energy consumption and energy-related CO₂ emissions. Key findings are as follows:

1. Energy independence involves investment in renewables, electric vehicles, and green hydrogen.

Since much of India's infrastructure is yet to be built, we find that it is critical to ensure that most of the new energy assets are clean. This would involve installing more than 500 GW of non-fossil electricity generation capacity by 2030, an 80% clean grid by 2040 and 90% by 2047. Nearly 100% of new vehicle sales could be electric by 2035. Heavy industrial production shifts primarily to green hydrogen and electrification: 90% of iron and steel, 90% of cement, and 100% of fertilizers by 2047.

2. India can achieve energy independence through clean technology by 2047. The transition to electric vehicles could save crude oil imports by over 90% (or \$240 billion) by 2047, while green hydrogen based and electrified industrial production would reduce industrial coal imports by 95%. Lithium needed for manufacturing new electric vehicles and grid-scale battery storage systems (~2 million tons cumulative between 2023 and 2040) could be produced domestically using newly discovered reserves.

3. Energy independence is economically advantageous. Clean energy will reduce and inflation-proof India's energy expenditure as renewables, EV batteries, and hydrogen infrastructure are capital assets with rapidly falling costs. A shift to electric transportation will create \$2.5 trillion (INR 19 million crores) in net consumer savings by 2047. Indian industry, to remain globally competitive, must also transition to clean technologies like green steel manufacturing, as major export markets (ex. EU) make carbon neutrality commitments.

4. The clean energy transition would have minimal impacts on tax revenues. Fossil fuel taxes, duties, and royalties contribute ~12% of state and central government revenue. Despite an aggressive clean energy transition, fossil fuel consumption and associated tax revenues will not drop below 2020 levels until the mid-2030s.

5. A rapid expansion of clean energy infrastructure will be needed. Because of transport, industrial electrification and green hydrogen production, electricity demand could increase nearly fivefold – from 1300 TWh/yr to over 6600 TWh/yr by 2050. This would require a massive scale-up of renewable energy deployment to 40 GW/year through 2030, ramping up to about 100 GW/year between 2030 and 2050. Clean energy deployment will be more capital-intensive, needing a net additional investment of \$1.5-2 trillion (INR 11-15 million crores) between 2023-2047, compared with business-as-usual.

6. Achieving energy independence could offer environmental and public health benefits without compromising economic growth. With an aggressive clean energy transition, over 4 million air pollution-related premature deaths could be avoided between 2023-2047. India’s CO₂ emissions will peak in the early 2030s, before dropping to ~800 million tons/year by 2047 (85-90% of the way to net-zero emissions).

7. Managing the clean energy transition would require significant policy support. The policy ecosystem needs to have five pillars: deployment mandates for commercial / cost-effective clean technologies that provide the economies of scale, financial support for emerging technologies, long-term infrastructure planning, accelerating/scaling domestic manufacturing, and planning for a just transition as summarized in the table below.

SECTOR	MANDATES	INCENTIVES	DOMESTIC MANUFACTURING	INFRASTRUCTURE PLANNING	UPFRONT CONSIDERATION OF A JUST TRANSITION
Power	Renewable Purchase Obligation / Storage Purchase Obligation	Long duration storage, offshore wind	Production Linked Incentive + Strategic Alliances for manufacturing solar panels, batteries, electrolyzers etc	Cross-sectoral least-cost investment planning	Safety Nets Worker Retraining Social Dialogue
Transport	Zero Emissions Vehicle Sales Mandate	Public EV Procurement (e.g. buses)		Public Fast Charging + Low-Cost Solar Charging	Economic Diversification
Industry	Clean Mandate on new Industrial Facilities and Hydrogen Production, energy and material efficiency standards (e.g. expand PAT)	Green hydrogen pilots, RD&D		Hydrogen Infrastructure and Low-Cost Solar PPAs	

