

India's Transition Story: Investment opportunities from India's energy transition

April 2024



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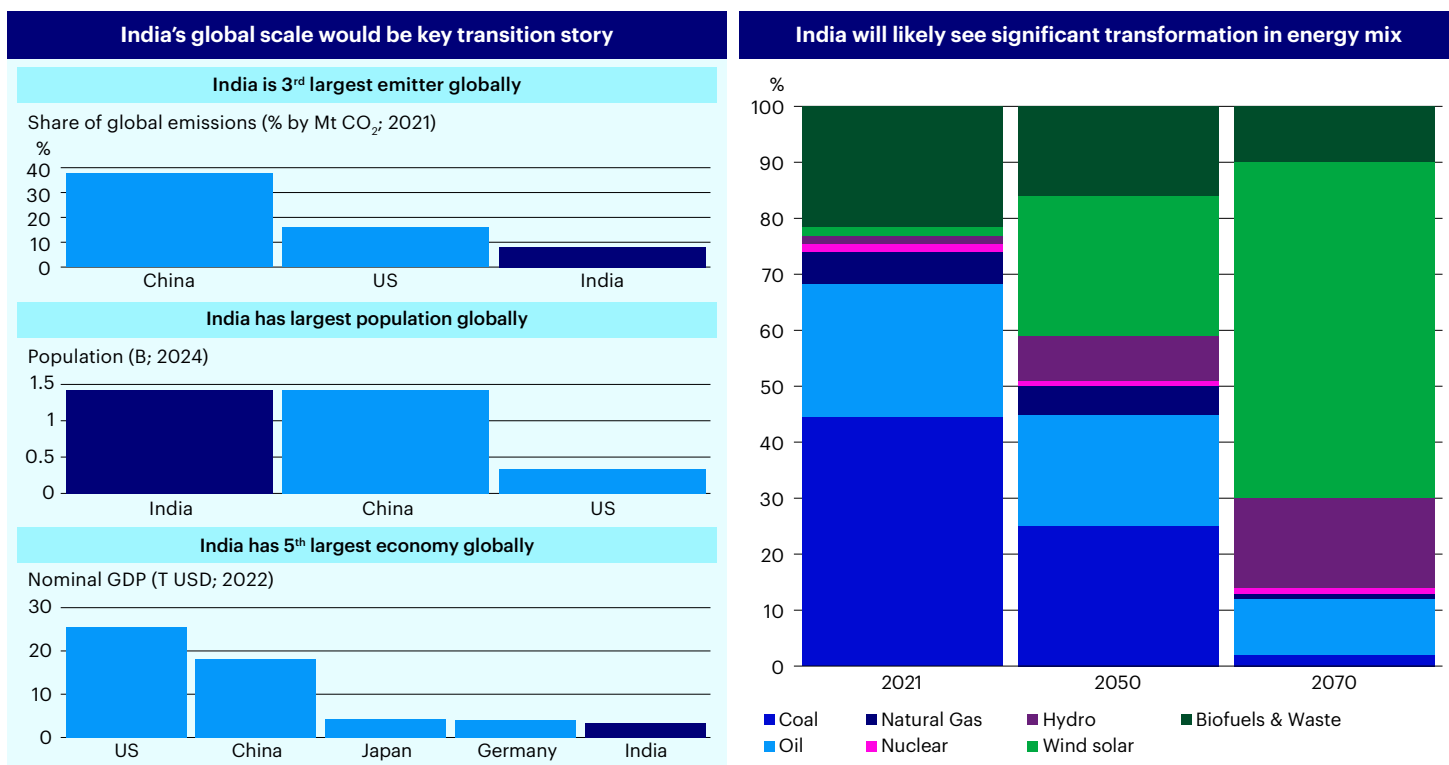
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In 2023, India was one of the top investment stories in Asia given its fast economic growth and favorable demographics. When considering India's energy transition journey, the scale of India's economy and corresponding emissions have created significant investment opportunities and risks.

India's has the largest population and fifth largest economy globally and is the fastest growing country in Asia. ¹ Alongside economic transformation, India is in the midst of an energy transition and green transformation and boasts one of the most significant transition stories globally. While India's emissions per capita is lower than many countries, as a whole India is the world's third largest emitting country and third largest consumer of energy globally. ²

Scale of India's transition

Figure 1 - India's transition story: global scale will see significant transition opportunities and risks



Sources: IEA; World Data; Investopedia; McKinsey.

1. Invesco Indian equities - the fundamentals, trends and beyond (Part 1) - AP Institutional | Invesco
2. S&P India's Energy Transition: More Energy, Fewer Emissions | S&P Global (spglobal.com)

India's Transition Story: Investment opportunities from India's energy transition

April 2024

Anticipated GDP growth of over 6% per annum³ from 2024 to 2031 is expected to create corresponding increases in energy demand by 30% by 2030 and 90% by 2050.⁴ Energy transition is expected to facilitate growth in alternative energy sources like renewables and hydrogen while also enabling the transformation of emission intensive sectors, unlocking new growth opportunities.

Drivers for India's transition

We outline three major drivers for India's energy transition:

- **Government Policies:** India has progressively increased its climate policies⁵ including setting a 2070 net zero commitment with interim 2030 targets of reducing emissions intensity by 45% (from 2005 level) and having a 50% electricity requirement from renewables.⁶ These commitments have been translated to sectoral level policies such as India's National Solar Mission, state-level renewable energy purchase obligations, and subsidies to encourage electric vehicle (EV) purchases.⁷
- **Financing:** India is estimated to require US \$10 trillion in climate financing to achieve its 2070 net zero commitments⁸ from both public and private capital. Public and development financing through blended financing vehicles could catalyze greater private investments and capital for climate investing. India's government issued a US \$1 billion sovereign green bond in 2023⁹ while the World Bank has also approved US \$1.5 billion in financing to accelerate India's development of low-carbon energy.¹⁰
- **Infrastructure:** India is expected to increase infrastructure investments from 2024 to 2030 by up to an estimated 143 trillion rupees with green infrastructure taking a key share.¹¹ The government's National Infrastructure Pipeline envisages US \$1.33 trillion in infrastructure capital expenditure from 2020 to 2025¹² including roads, urban infrastructure, railways and energy projects. This includes a significant allocation to electricity generation incorporating solar and hydrogen, and the building of transmission, energy storage, and grid capacity projects.¹³

3. S&P India's Energy Transition: More Energy, Fewer Emissions | S&P Global (spglobal.com)

4. Columbia SIPA COP28: Assessing India's Progress Against Climate Goals - Center on Global Energy Policy at Columbia University SIPA | CGEP %

5. Columbia SIPA COP28: Assessing India's Progress Against Climate Goals - Center on Global Energy Policy at Columbia University SIPA | CGEP %

6. IMF

7. WEF India is making strides on climate policy that others could follow | World Economic Forum (weforum.org)

8. IFC Blended Finance for Climate Investments in India (ifc.org)

9. CBI India's debut in the sovereign green bond market: first deal landed a greenium! | Climate Bonds Initiative

10. World Bank World Bank Approves \$1.5 Billion in Financing to Support India's Low-Carbon Transition

11. CRISIL India's infrastructure spending to double to Rs 143 lakh crore between fiscals 2024 and 2030, compared with 2017-2023 (crsil.com)

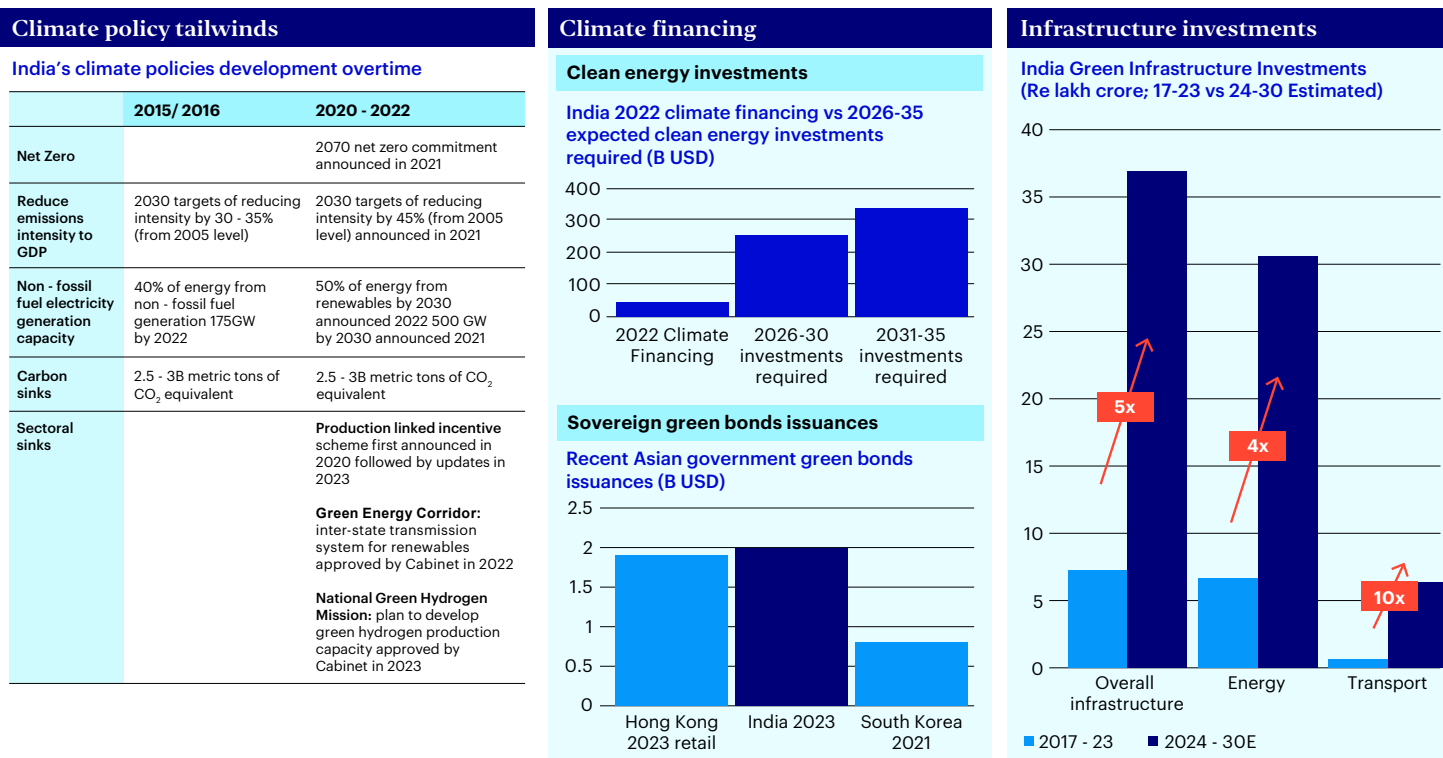
12. WSJ India's Infrastructure Push Is Key to Taking on China - WSJ

13. India Investment Grid

India's Transition Story: Investment opportunities from India's energy transition

April 2024

Figure 2 - Drivers for India's transition: policy, financing, infrastructure tailwinds



Sources: Columbia SIPA (COP28: Assessing India's Progress Against Climate Goals - Center on Global Energy Policy at Columbia University SIPA | CGEP %); IFC; SCMP; CBI; LSEG; CRISIL (India's infrastructure spending to double to Rs 143 lakh crore between fiscals 2024 and 2030, compared with 2017-2023 (crisil.com)).

India's climate investment opportunities and implications

Taking our global climate investing thesis of mitigation, adaptation, and transition, we see relevant opportunities in the India market.

Mitigation: Renewables, hydrogen, EVs

- **Renewables:** India ranks fourth globally for total renewable power capacity additions¹⁴ and we believe the government target of reaching 500GW of renewables capacity by 2030¹⁵ will continue to drive solar and wind installations. We see opportunities to identify players in power generation, storage, distribution, and in cell and module manufacturing. Differentiating factors include economies of scale and likely consolidations, energy production costs through captive power plants, and access to cheaper cost of capital.
- **Hydrogen:** The National Green Hydrogen Mission targets to produce 5 million metric tons of hydrogen¹⁶ by 2030, with potential for export opportunities. Green hydrogen has high application demand particularly for industrial uses and transportation. The key ahead is in assessing the speed of improving economics, which is particularly dependent on electrolyzers capex and relevant government support.

14. Invest India Renewable Energy in India: (investindia.gov.in)

15. Economic Times India to achieve 500 GW renewables target before 2030 deadline: RK Singh - The Economic Times (indiatimes.com)

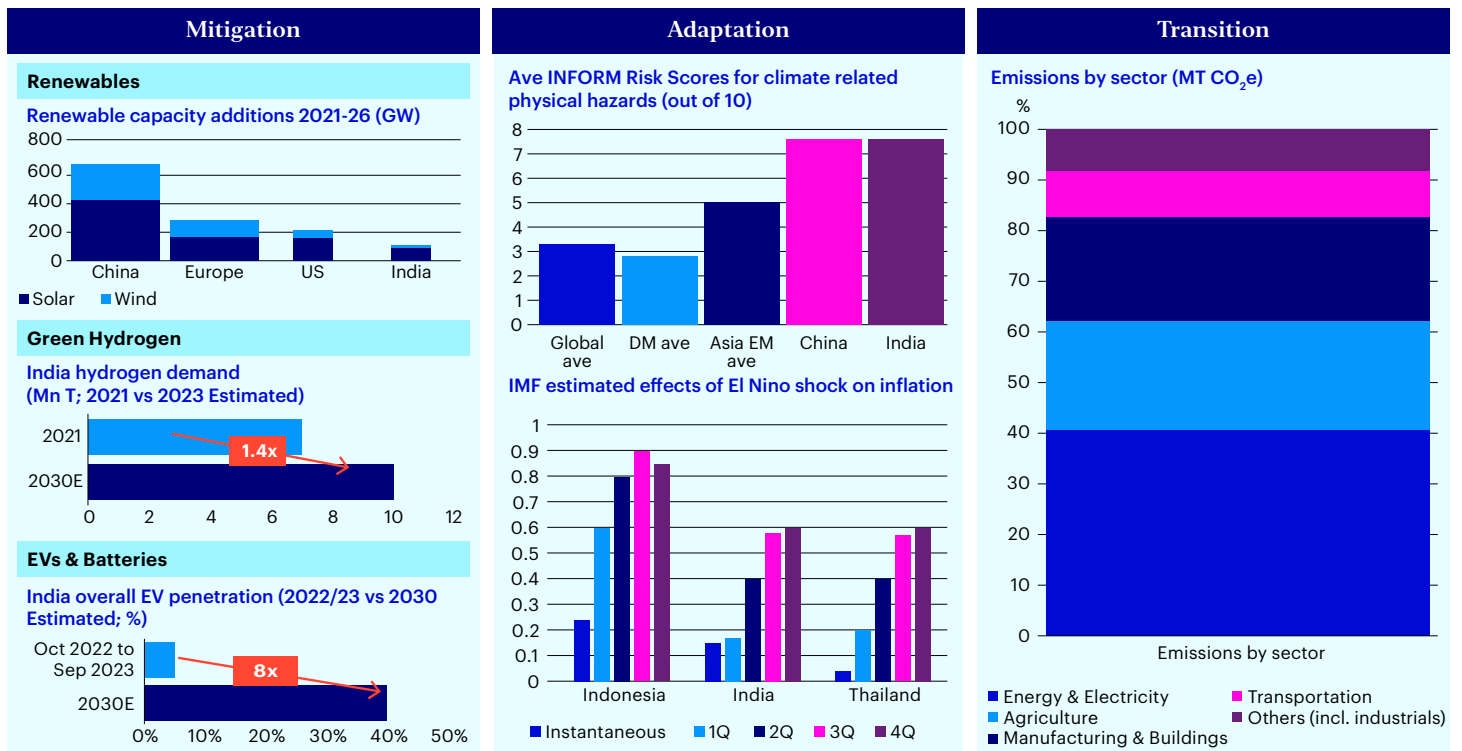
16. National Portal of India National Green Hydrogen Mission | National Portal of India

India's Transition Story: Investment opportunities from India's energy transition

April 2024

- **EVs:** Compared to Europe or China, much of India's market will be focused on two- and three-wheelers which occupies more than 90% of all EVs in the market.¹⁷ The government's target is to achieve 30% electrification of the country's vehicle fleet by 2030¹⁸ with the EV target share for two- and three-wheelers at 80%.¹⁹ However, the market currently lacks pure play names and the focus is more on incumbents expanding their coverage in the EV space. Similarly for wider battery supply chains and components, one could look towards incumbents that have secured production-linked incentives.

Figure 3 - India's climate investing opportunities: across mitigation, adaptation, transition



Source: IEA/ Bernstein Analysis; Bain (India Electric Vehicle Report 2023 | Bain & Company); INFORM Scores; Morgan Stanley Research; IMF, CLSA Analysis; WEF.

17. AP India is one of the world's fastest-growing EV markets. This is why | AP News

18. Invest India India's Electric Vehicle (EV) Revolution: Growth, Policies, and Future Trends (investindia.gov.in)

19. India ITDP How this State in India is Envisioning a Future for Electric Vehicles - Institute for Transportation and Development Policy (itdp.org)

India's Transition Story: Investment opportunities from India's energy transition

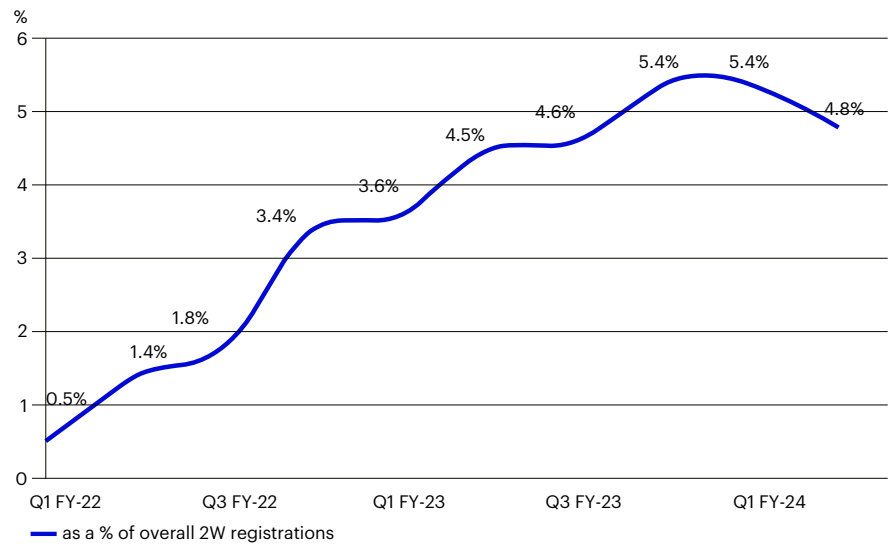
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Deep dive on India's electric two-wheeler sector

Globally, India is the second largest two-wheeler (2W) market in terms of domestic sales volumes. The value of the 2W domestic market size in India was 1.4 to 1.6 trillion rupees (US \$17-20 billion) in FY23. The segment is projected to show strong growth in volume at around 11% CAGR over the next five years, which we expect will enable the domestic 2W market to reach 2.8 to 3.6 trillion rupees (US \$35-45 billion) by FY28.²⁰

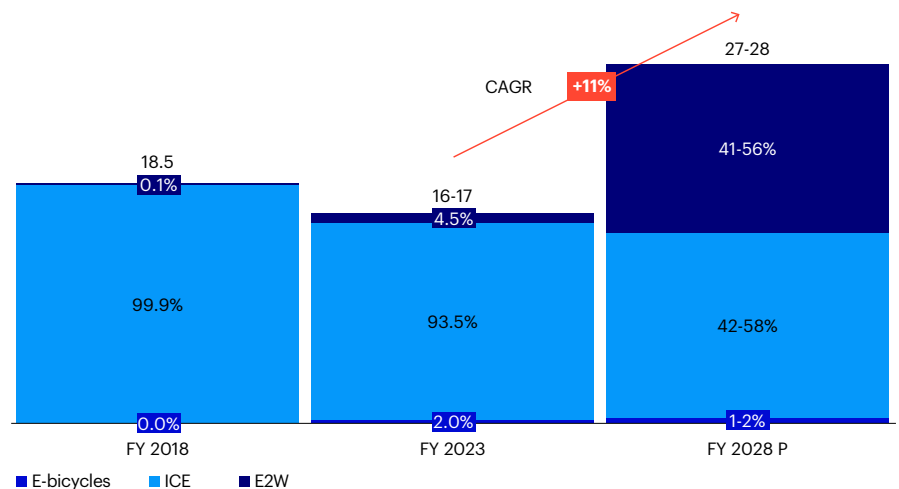
Electric two-wheeler (E2W) adoption has grown rapidly to reach around 5.1% of all 2W registrations in H1FY24, primarily led by scooters. We believe EVs could account for almost half of the domestic 2W sales volumes by FY28.

Figure 4 - Electric 2W penetration in India (Q1 FY22 to Q2 FY24)



Source: Ola Electric, December 2023.

Figure 5 - Electric 2W penetration projection



Source: Ola Electric, December 2023.²¹

20. Ola Electric Mobility DRHP, Redseer research. (DRHP = Draft Red Herring Prospectus)

21. Ola Electric Mobility DRHP, Redseer research. (DRHP = Draft Red Herring Prospectus)

India's Transition Story: Investment opportunities from India's energy transition

April 2024

We expect the key drivers of steep adoption of E2Ws in India to be as follows:

1. Consistent government push: Persistent regulatory support across supply, demand, infrastructure, and financing etc. is expected to continue.
2. Lower total cost of ownership versus internal combustion engine (ICE) 2Ws: Lower fuel costs and other savings (maintenance, subsidies etc.) as well as declining E2W prices are being driven by a reduction in material costs and increasing economies of scale by E2W original equipment manufacturers (OEMs).
3. Easier access to charging stations and improving driving range: The leaner charging and infrastructure requirements for E2Ws over E4Ws also contributes to faster adoption.
4. Serving a variety of use-cases: Designing specific products to serve B2B use such as swappable batteries, greater carrying space, etc.
5. Service and maintenance: E2Ws require a lower number of moving parts for service and repair to meet customer demand.

Adaptation: Increasing agriculture, food, and water security

As per our previous piece on climate adaptation in Asia, India is highly vulnerable to physical risks be it floods and rainfall, extreme heat and wildfires, and rising sea levels. Previously India has spent over 13.35 trillion rupees on climate adaptation over 2021 to 2022 at just over 5.5% of GDP.²²

- **Agriculture and Food:** El Nino in 2023 has affected agriculture supply which can lead to potential declines in yields and rising input costs. Additionally, India's government price controls on agriculture could further exacerbate supply shortages. Export restrictions were placed on rice, wheat, and sugar which has led to rising prices in other Asian countries.²³ Adaptation opportunities exist in helping agriculture to be more climate resilient and increase crop yields such as in weather warning systems, improving soil quality and irrigation, and other methods of agriculture digitization.
- **Water security:** India is one of the most water-stressed regions in the world where the country despite having 18% of world's population only holds 4% of its water resources.²⁴ Persistent droughts will continue to exacerbate challenges in ensuring clean water supply and sanitation. Given agriculture's share of India's economy, water security also impacts broader food security and economic growth. Challenges relate to the lack of proper water management systems, inefficient irrigation, and insufficient wastewater treatment facilities.²⁵ We expect demand for adaptation financing opportunities to grow in relevant urban infrastructure and water sanitation and management projects that can also help improve health and productivity.

22. Indian Express Spending on adaptation to climate change 5.6% of GDP: India puts on record | World News - The Indian Express

23. WSJ

24. World Bank

25. The Water Diplomat

India's Transition Story: Investment opportunities from India's energy transition

April 2024

Transition: Transition planning across high-emitting sectors

The number of Indian companies committing to science-based targets has grown from 89 in June 2022²⁶ to near 300 as of February 2024.²⁷ In line with global trends, transition planning will be critical for companies across high-emitting sectors. From an investment perspective, investors can consider assessing companies on financially material risks and opportunities based on transition progress in each sector:

- **Power and energy:** Electricity generation accounts for 40% of India's total emissions.²⁸ Capex for utilities and power corporates will increase given the move toward renewables. India's deployment of renewables is targeted to reach 7400GW of estimated capacity by 2070.²⁹ Oil and gas companies could increase existing production efficiencies and recovery rates while also exploring carbon capture technologies alongside developing green hydrogen.
- **Agriculture:** Agriculture currently accounts for around 20 to 25% of total electricity consumed³⁰, primarily for irrigation purposes. Carbon sequestration and carbon sinks are required while also considering adaptation financing to ensure food security.
- **Manufacturing and industrials:** These sectors account for around 20% of India's total emissions³¹; including energy-intensive sectors like iron, steel, cement, and chemicals, which requires manufacturing and production to shift towards electrification and building out of hydrogen-based infrastructure. Specific levers also exist for each sector including electric arc furnace and scrap recycling for steel and improving clinker efficiency for cement.³²
- **Transport:** Around 10% of India's total emissions are primarily from road transport,³³ In addition to the electrification of two- and three-wheelers, the increase in infrastructure development would also facilitate a transportation shift from roads to railroads driving further electrification and energy efficiency.

Investing into India's transition story

As the India story continues to take off amidst trends of digitization, discretionary consumption and manufacturing boom, we believe the energy transition could also be a longer-term secular trend that investors can consider. Relevant investment opportunities exist across climate mitigation, adaptation and transition that can serve as a framework and lens with which to assess companies.

With contributions from Yoshihiko Kawashima and Aditya Ahluwalia.

26. WWF net_zero_roadmap_for_corporates__wwf_india.pdf (panda.org)

27. SBTi Companies taking action - Science Based Targets

28. IMF A Framework for Climate Change Mitigation in India

29. WEF WEF_Mission_2070_A_Green_New_Deal_for_a_Net_Zero_India_2021.pdf (weforum.org)

30. IMF A Framework for Climate Change Mitigation in India

31. IMF A Framework for Climate Change Mitigation in India

32. WEF Green New Deal for Net Zero India

33. IMF A Framework for Climate Change Mitigation in India

India's Transition Story: Investment opportunities from India's energy transition

April 2024

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India's Transition Story: Investment opportunities from India's energy transition

April 2024

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