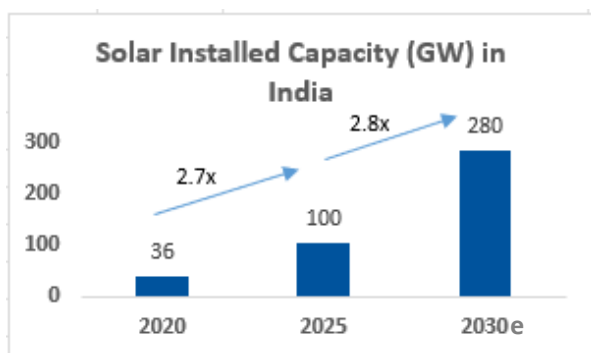


India Capital GROWTH FUND

India's Energy Transition: Capitalising on the Solar Revolution

India stands at the cusp of an energy transformation. Once plagued by power shortages, the country now aims to become a global leader in renewable energy, targeting a massive 500 GW of renewable capacity by 2030, with solar energy contributing 280 GW to this ambitious goal. To give some context, UK's renewable energy capacity stands at 60 GW in 2024¹. Traditionally a coal-driven energy market, this solar-first approach leverages India's natural advantage of abundant sunshine and the continuously declining cost of solar power generation. With solar renewable energy cheaper than coal-fired power, it presents a win-win positioning for India to simultaneously address climate change concerns while meeting the country's growing demand for power.



Source: Govt of India – Press Information Bureau MNRE: Year End Review, Dec 20. MNRE: Press Release: 2100603, Feb 25. Grant Thornton Report, Achieving 500 GW of renewable energy capacity by 2030, 2024. **e** indicates estimate.

The Solar Value Chain in India

The solar industry value chain consists of multiple stages: polysilicon production, ingot and wafer manufacturing, solar cell production, and finally, panel assembly. Currently, most Indian companies operate only in the final stage of solar panel assembly—the least technologically and capital-intensive part of the manufacturing process. This limited participation in the value chain creates significant vulnerability and dependence on imports, particularly from China, which controls approximately 80% of the global solar supply chain.



This dependence is now changing with backward integration into silicon wafer and solar cell manufacturing becoming the new buzzwords among Indian companies. With companies having achieved scale and profitability in panel manufacturing along with end product prices stabilising, companies no

¹ UK Govt, Dept for Energy, Energy Trends Stats release Dec 2024

longer see price declines as a risk to their capital investment and are thus investing in capital expenditure. This vertical integration process is accelerating thanks to the government. Not only has the government provided a long-term vision on the size of the opportunity, but it has also actively incentivised the growth of the industry through various initiatives such as domestic content requirements for government projects, substantial import duties (40% on imported solar panels and 25% on imported solar cells), and Production Linked Incentives (PLI) to encourage manufacturing scale-up. New market opportunities have also been created by incentivising solar pump and rooftop solar projects in both rural and urban India.

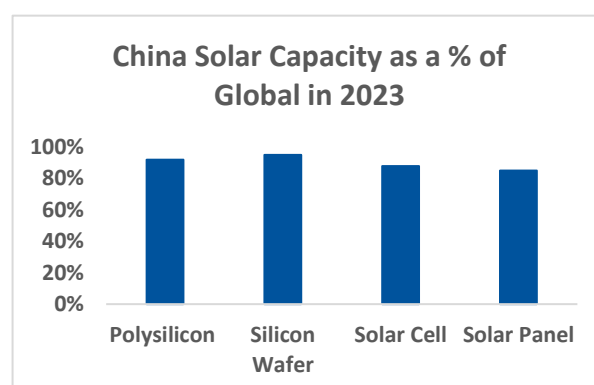
In an effort to understand Indian companies' positioning, we visited the plants of two leading companies, Adani Solar and Waaree Energies and were amazed by the sheer scale and size of the state-of-the-art fully automated plants. Their investments demonstrate the seriousness with which Indian players are approaching vertical integration and technological advancement in this sector.

From an investor's perspective, the Indian market offers diverse investment opportunities across the solar ecosystem with pure-play manufacturers, independent power producers (IPPs) that develop and operate solar plants, as well as engineering, procurement, and construction (EPC) companies that implement solar projects. This variety allows investors to participate in different segments of the value chain according to their risk appetite and return expectations.

The story doesn't stop here. India's vision is to not only be self-reliant but also become an important export hub for renewables in the world for those looking for an alternative source to Chinese solar products. The US is one of the biggest importers of solar cells and panels. With restrictions on China, this opens up a great avenue for India and it is highly profitable too. In FY24, India's solar products exports to the US were almost \$2bn.²

So, is it all Sunshine?

Having interacted with a dozen of the listed companies across the ecosystem, our main concern remains China and its dominance across the value chain ranging from polysilicon to cells.



Source: CLSA, CPIA, Companies, Dec 23

Irrational behaviour can have a domino effect. The dependency is not only in the supply chain but also in technological know-how where China is a leader and innovator. As Indian companies backward integrate, the capital intensity also increases, putting at greater risk the investment whenever there is a change in technology, which typically happens every five years. Our other concern stems from domestic competition. The entry barrier in module manufacturing is low, with

² Institute for Energy Economics and Financial Analysis, Indian Solar PV Exports Report, Nov 2024

the capital expenditure for 1GW of solar module manufacturing capacity at approximately \$31 million (INR 2.5 bn). This has attracted a lot of companies, including first-time entrepreneurs, to set up capacities. Hence, it is a highly competitive industry. With the entire ecosystem backward integrating, the buyer/seller equation is itself undergoing a change. Supply is catching up with demand quickly. Consolidation seems inevitable.

The key question remains how we participate in this theme of renewables. We have

absolutely no doubt that solar renewable energy is the answer to meeting India's rising power demand of 6-7% per annum. Solar addresses all the fundamental requirements of cost, time, ease of usage, scalability and, of course, ample sunshine. As the industry evolves, we are in a wait-and-watch mode, closely tracking the business models and leaving no stone unturned to identify the eventual winners. There also remains an extended ecosystem of transmission, battery, glass and other inputs riding piggyback on the solar growth story.

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