

# Sino-Indian Relations in Light of Green Energy Transition

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*As Asia races toward a greener future, China and India emerge as pivotal players, balancing increasingly fierce competition with potential collaboration in shaping the region's energy transition. Their dynamic interplay holds the key to global low-carbon transformation.*

The risks posed by climate change are becoming increasingly urgent, demanding global action on an unprecedented scale. China and India, as two of the world's most populous nations and largest economies, are pivotal in addressing this looming crisis. Together, these two giants—ranked **first and third** among global greenhouse gas emitters—accounted for approximately 40 percent of global carbon emissions in 2023.

Amid these stark statistics lies a glimmer of hope. Both nations have made international commitments to curb their emissions. China has **pledged** to reach peak carbon emissions by 2030 and achieve carbon neutrality by 2060. India, while operating on a longer timeline, has **committed** to net zero emissions by 2070 and aims for a 45 percent reduction in carbon intensity as an intermediate target.

In pursuing these pledges, China and India—two of the **largest** coal producers and consumers—have embraced the transition to



**clean energy**, aligning their climate goals with domestic policy priorities such as energy security and industrial modernisation. In the lead-up to COP26 in 2021, China released a pivotal **Working Plan** detailing its renewable energy (RE) **targets**: achieving a 25 percent share of non-fossil fuel energy consumption and over 1200 GW of installed wind and solar capacity by 2030, and surpassing 80 percent of non-fossil fuel energy consumption by 2060. Notably, China exceeded its 1200 GW target six years **ahead of schedule** in 2024 and is projected to contribute nearly 60 percent of the global RE capacity by **2030**.

India, with its vast renewable energy potential and urgent need to meet the energy demands of its growing population, is also pursuing an aggressive green energy strategy. At **COP26**, India committed to increasing its non-fossil fuel electricity generation capacity to 500 GW and

fulfilling over half of its energy demand through renewables by 2030.

By 2023, the country had already achieved a significant milestone, with 40 percent of its electricity production capacity coming from renewable sources. These efforts to expand RE capacity have been touted as one of the most **ambitious** clean energy programs in the world.

The rapid advances in green energy by these two powerhouses have profound implications—not only for their bilateral relations but also for the global fight against climate change.

### China: Taking Lead in Global Energy Transition

Over the past two decades, China has made remarkable strides in its green energy transition, progressing from domestic adoption and strong government support to establishing itself as a global leader in investments and **manufacturing**. Since 2013, China has accounted for **over 40 percent** of the world's annual RE capacity additions, and by 2023, it contributed to more than half of the newly installed capacity globally. It is also the world's largest investor in the energy transition, with investments reaching \$676 billion in 2023, driven in large part by the **Belt and Road Initiative**.

Central to China's leadership is its dominance in the global green technology supply chain. The country **leads** in the mining, refining, and manufacturing of transition-critical materials that are

indispensable for RE technologies, particularly cobalt, copper, and nickel.

In **2022**, China alone hosted 80 percent of the global installed manufacturing capacity for solar modules, far surpassing Vietnam (5 percent) and India (3 percent). Furthermore, it has remained the single largest producer at every stage of the global solar supply chain—from polysilicon to wafers and cells. Moreover, China also accounted for over 60 percent of global manufacturing capacity for onshore wind turbine nacelles.

China's dominant position in the global supply chain stems from the significant cost advantages enjoyed by Chinese companies, **driven** by strong market demand from developed countries, decades of strategic policies from both central and local governments, and a relatively low-cost domestic labour force. These factors, in turn, have led to a reduction in the global cost of RE technologies.

### Competition Intensifies as India Catches Up

While the declining costs of clean technologies have benefited global consumers and support climate goals, they have also fuelled tensions when intersecting with geopolitics and emerging conflicts of interest.

Back in the early 2010s, India emerged as one of the **beneficiaries** of falling solar panel prices, driven largely by China's manufacturing overcapacity. As Chinese solar manufacturers sought to absorb their

domestic surplus in overseas markets, India became a key growth area. This dynamic had, at the time, fostered a symbiotic relationship: China found a ready market for its excess capacity, while India benefited from more affordable solar photovoltaic technology, easing its domestic energy security concerns and accelerating progress toward its climate commitments.

However, this once cooperative relationship has become increasingly strained as India's domestic demand for renewable energy surges and concerns about overreliance on Chinese suppliers mount. To meet its target of 500 GW of renewable energy capacity by 2030, India must scale its capacity by approximately **2.5 times** in the next six years. According to the **Energy Research Institute**, India's electricity demand is projected to quadruple between 2020 and 2050, significantly increasing the share of renewables in the country's energy mix. Yet, the lack of a diversified domestic supply chain has emerged as a critical vulnerability, exposing India's energy security to considerable risks.

Geopolitical tensions and strategic **distrust** between India and China have further compounded these challenges. India increasingly views China's dominance in critical minerals and green technology supply chains as a strategic liability. In response, New Delhi has sought to bolster its domestic manufacturing capabilities and reduce dependence on Chinese imports. Since 2018, India has ramped up efforts to secure critical mineral assets abroad, including forging partnerships with Latin

American countries to build a **strategic reserve**.

To incentivise domestic production, the Indian government **imposed** a 40 percent duty on solar modules and a 25 percent duty on solar cells in 2022, signalling a clear pivot toward self-reliance in green technology.

At the same time, India has actively sought to challenge China's dominance in clean energy on the global stage. Under its leadership, the **International Solar Alliance** (ISA) has recently initiated work on developing transnational solar grid, positioning India as a focal point in regional green energy deployment. Furthermore, since 2021, clean energy cooperation has been a central focus of **the Quadrilateral Security Dialogue**—which includes India, Japan, Australia, and the United States—a group that China has denounced as an “**Indo-Pacific NATO**.” As India advances within the global green energy supply chain, competition with China has inevitably intensified, further eroding the alignment of mutual interests between the two countries.

### **Space for Cooperation Remains, but Trust and Communication Are Key**

While Sino-Indian relations are often characterised by great power rivalry and competition, there remains potential for **cooperation** in the energy sector, provided mutual trust is enhanced through improved communication and coordination. One promising avenue for **collaboration** lies in the exchange of technology and market access, particularly through expanded joint

ventures in solar panel manufacturing, wind turbine production, and energy storage solutions. Such collaboration could generate economies of scale, thereby driving down costs for both countries. In the medium term, India could leverage China's technological expertise to bolster its renewable energy infrastructure, while China would benefit from continued access to India's rapidly expanding renewable energy market.

Furthermore, India and China could explore advancing their cooperation within broader platforms such as BRICS, which offers opportunities for joint initiatives in regions where their rivalry is less pronounced. In markets like **Africa**, for instance, China's financial support and technical expertise could complement India's strengths in human resource development, fostering synergies that not only benefit both nations but also contribute to the sustainable development of emerging economies.

From the perspective of collective rationality, however, the competition between China and India may paradoxically serve the global good in the long term. India's growing role in the green energy value chain has the potential to further drive down the costs of clean technologies, enhance supply chain resilience, and, as a result, accelerate the global energy transition.

Conversely, instances of cooperation between the two nations that prioritise preserving fossil fuels in their energy mix—such as their joint stance at **COP26** advocating for a “phase-down” rather than a “phase-out” of coal—risk undermining global efforts to combat climate change.

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