Zero Carbon Analytics

A driving force: Asia's energy transition

REPORT OCTOBER 2023

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- Asian investment in renewable energy has grown exponentially since 2004, with an average annual growth rate of 23%, reaching USD 345 billion in 2022.
- Asia is a global leader in wind and solar, accounting for 52.5% of global capacity in 2022.
- Many countries in the region have set ambitious targets to curb carbon dioxide emissions, including China and India.
- China is playing an outsized role in the energy transition as a leading buyer and manufacturer of solar and wind technologies, electric vehicles, batteries and storage.
- China will have the fastest–growing deployment of wind and solar in the world between 2000 and 2022, doubling its wind capacity about every 1.5 years and its solar capacity about every 2.5 years.
- India's growth in renewable capacity outpaces coal power growth. The country grew its wind capacity by over fivefold and nearly doubled its solar capacity between 2016 and 2022.
- The auto industry is key to India's clean energy transition. Sales of electric motorbikes and scooters in the country have increased by over 3,000% in just seven years to 2022.
- Vietnam increased its solar capacity by 18,380% between 2018 and 2022 and wants wind and solar to meet 31% of its energy needs by 2030.
- Vietnam also is racing ahead in sales of electric motorbikes and scooters, second only to China.

We are at a pivotal moment in our response to climate change. We are off track, but meaningful action is happening, often faster than we think, and momentum is building towards an exponential shift in our energy systems. Some countries are getting ahead of the curve by taking significant steps towards decarbonisation, while at the same time building new industries, creating jobs, reducing dependence on energy imports and insulating consumers from volatile fossil fuel prices. This briefing presents evidence of where and how this is happening.

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Asia poses the world's biggest opportunity for global climate action and will play a pivotal role in efforts to reach net-zero emissions worldwide. The continent accounts for 51% of contemporary total emissions globally, primarily due to a heavy reliance on fossil fuels for electricity generation. However, it has made significant progress in transitioning towards cleaner energy and several countries have made bold commitments to curb emissions and roll out renewables:

- China wants renewables to supply 33% of its electricity consumption by 2025, including 18% from non-hydro sources. The country also wants at least 50% of new electricity demand to come from renewable sources by 2025.
- India has committed to reduce its cumulative emissions by 1 billion tonnes by 2030. The country plans to increase its renewable energy capacity to 500 GW and meet 50% of its energy needs from renewables, primarily solar and wind, by 2030.
- Vietnam has committed to achieving between 30% and 39% renewable energy capacity by 2030, mainly through solar and wind power. The country has also committed to reaching net zero emissions by 2050.
- Japan wants renewable energy to account for between 36% and 38% of power supplies in 2030, doubling the 2019 level.
- Indonesia aims to triple the share of renewables in its energy mix to 34% by 2030.

Asia's clean energy investments

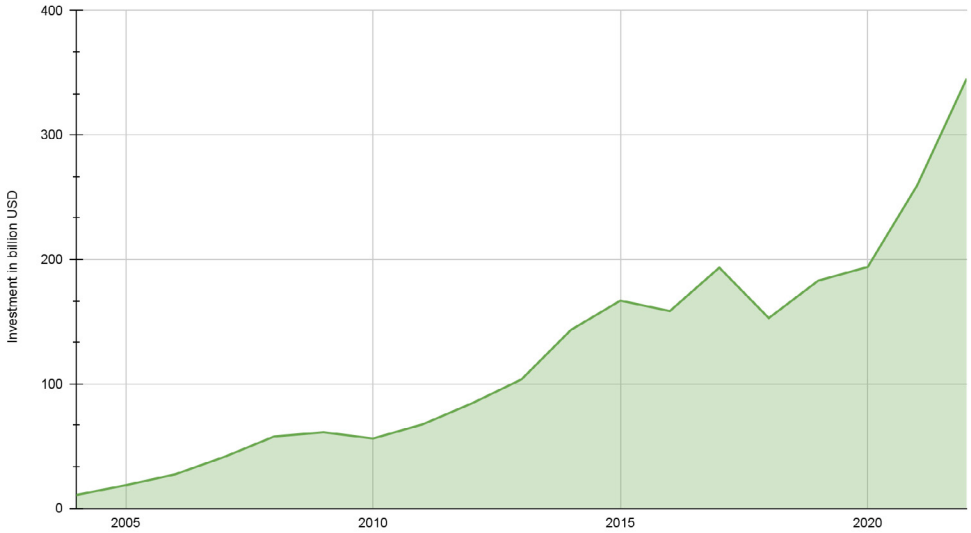
Asia's investments in renewable energy have grown exponentially since 2004, reaching USD 345 billion in 2022 (see Figure 1), of which around 80% came from China.1 The continent's investments have grown by 23% on average each year.

Asia accounted for about 65% of global funding for renewables in 2022, which surged 13% YoY to USD 532 billion. Investments in renewable energy generation in the Asia Pacific (APAC) region are poised to double to USD 1.3 trillion during the current decade to 2030, compared to the previous decade.

In Asia's electricity sector, renewable power deployment since 2000 led to about USD 199 billion in fossil fuel cost savings in 2022, as renewables faced less price hikes and volatility. Clean electricity investments have also surpassed fossil electricity investments in almost all countries in the region.

1: Bloomberg refers to the APAC region, which includes countries outside of Asia. Additional research shows that Asia accounts for USD 345 billion of APAC's USD 356 billion investments in renewable energy.

Fig. 1: Renewable energy investment in Asia



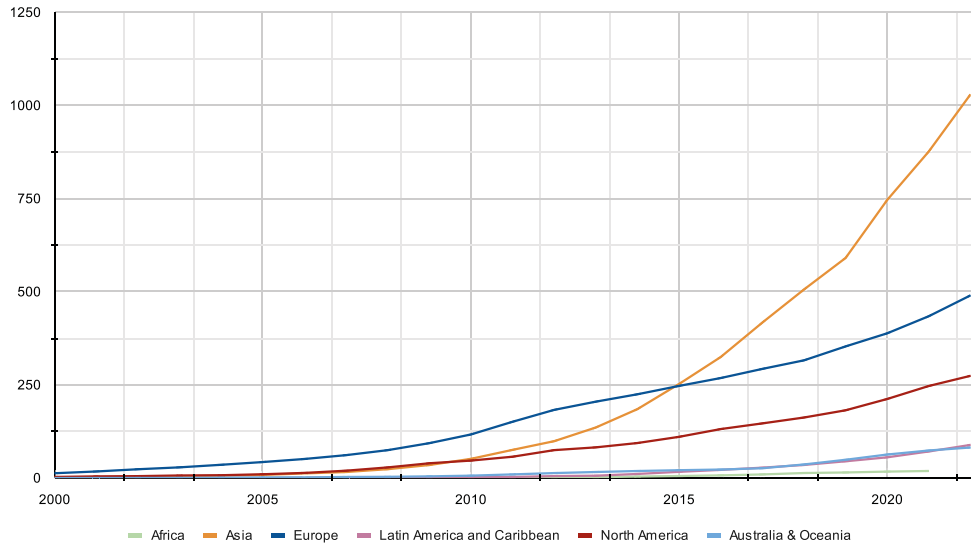
Source: BNEF NEO Net Zero Investment, 2023

Wind and solar capacity

Asia is a global leader in wind and solar, accounting for 52.5% of global capacity in 2022. Its installed wind and solar energy capacity increased by 300% to 1,029 GW since the 2015 Paris Agreement. The expansion was primarily driven by China, which accounts for more than 73% of Asia's total wind and solar capacity. However, other countries such as Vietnam and India are also rapidly increasing their capacity.

By incorporating more renewable energy sources into power generation, Asian countries can reduce carbon emissions and deliver lower cost electricity than that generated by fossil fuels.

Fig. 2: Wind and solar installed capacity (GW)



Source: Ember Electricity Data Explorer, 2022

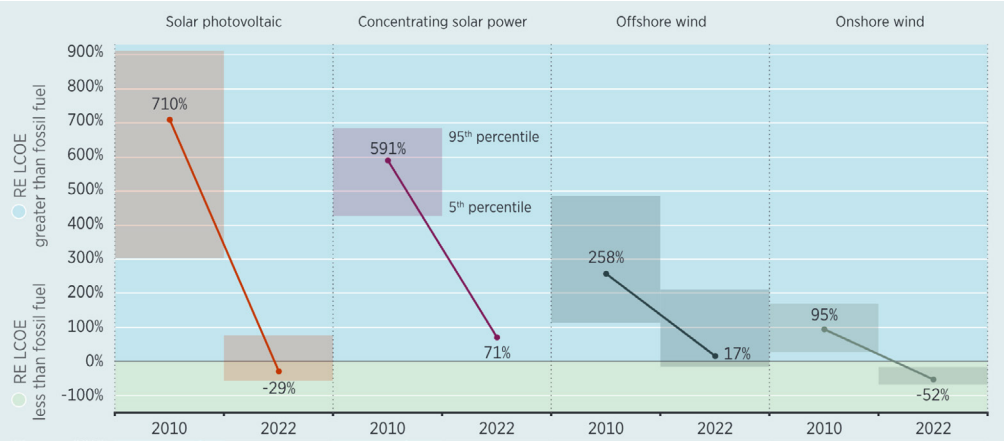
Asia has the fastest exponential growth rate of wind and solar capacity at 35% per year, and it has outpaced other continents since 2015. Europe has annual solar and wind capacity growth of 29%, and North America has seen a 27% rise each year.

Falling cost of renewables

The adoption of renewable energy in Asia is closely tied to significant cost reductions over the past few years, driven by technological advancements, economies of scale and more resilient supply chains. At the end of 2022, an important tipping point was reached, with renewable energy becoming more cost competitive than fossil fuels.

The Levelized Cost of Electricity (LCOEs) for renewable sources, including onshore wind, offshore wind and solar, has decreased by more than 60% over the past 10 years.2 This trend is expected to continue.

Fig. 4: Change in competitiveness of solar and wind by country based on global weighted average LCOE



Source: IRENA, 2023

2: The Levelized Cost of Electricity is the cost of electricity generation over the lifetime of a power plant, based on a calculation of the current value of the costs of building and operating a power plant. It allows a comparison of the costs of different technologies even if they have different fuel costs, life spans, capacities and financial profiles.

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China leads the transition

China has created economic growth and millions of jobs through investments in renewable energy and electric vehicles (EVs). The Asian country has set targets to reach peak carbon emissions before 2030 and achieve net-zero emissions by 2060.

China is a leading buyer and manufacturer of clean energy technology. It hosts the largest market globally for EVs, overtaking Europe in 2015 and accounting for 58% of sales in 2022. China accounts for almost 40% of the world's installed capacity of wind and solar, and the renewable energy boom is reflected at various administrative levels, with provinces and counties developing large-scale solar and wind power projects.[3] China also leads in manufacturing of net-zero technologies, such as wind turbines and heat pumps, with 60% of the global market share.[4]

The country's expansion of renewables led to a 17% reduction in the share of coal power in its electricity generation from 2000 to 2022. Chinese President Xi Jinping has committed to gradually decrease coal consumption between 2026 and 2030 and cease support for new coal power projects overseas.

China's wind and solar expansion

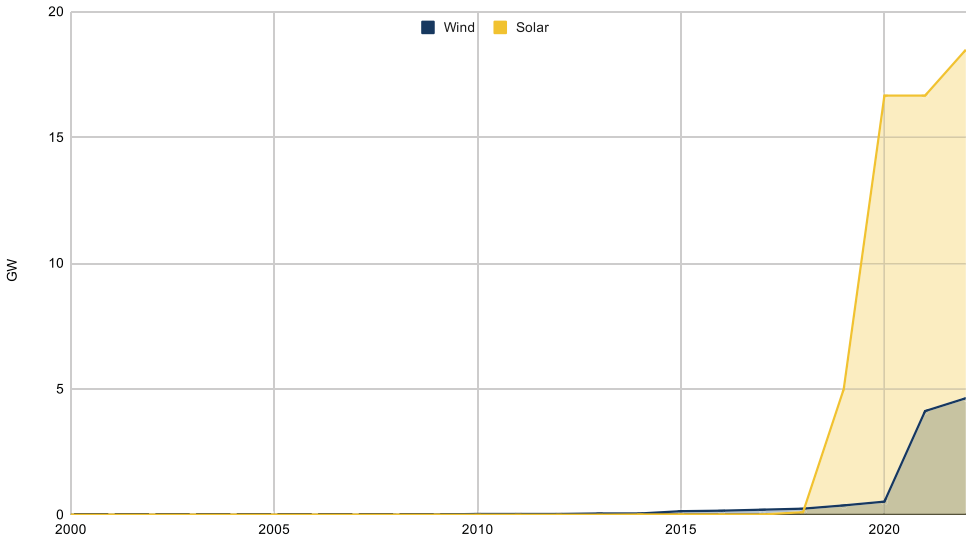
China has expanded its wind and solar capacity exponentially over the past two decades. In 2022, China's wind capacity was 365 GW and its solar capacity reached 393 GW, a significant increase from 0.34 GW of wind and 0.03 GW of solar in 2000 (See Figure 4).

On average, from 2000 to 2022, China doubled its solar capacity every 2.5 years and its wind capacity about every 1.5 years. The country significantly increased capacity following the Paris Agreement, with wind capacity soaring by about 147% between 2016 and 2022, and solar capacity increasing by about 405%. This exponential growth is expected to continue and accelerate.

3: Based on a comparison of installed wind and solar capacity globally and in China, using the Ember Electricity Data Explorer.

4: Net-zero technologies include solar PV and solar thermal, onshore and offshore wind, battery and storage and geothermal energy.

Fig. 4: China wind and solar capacity

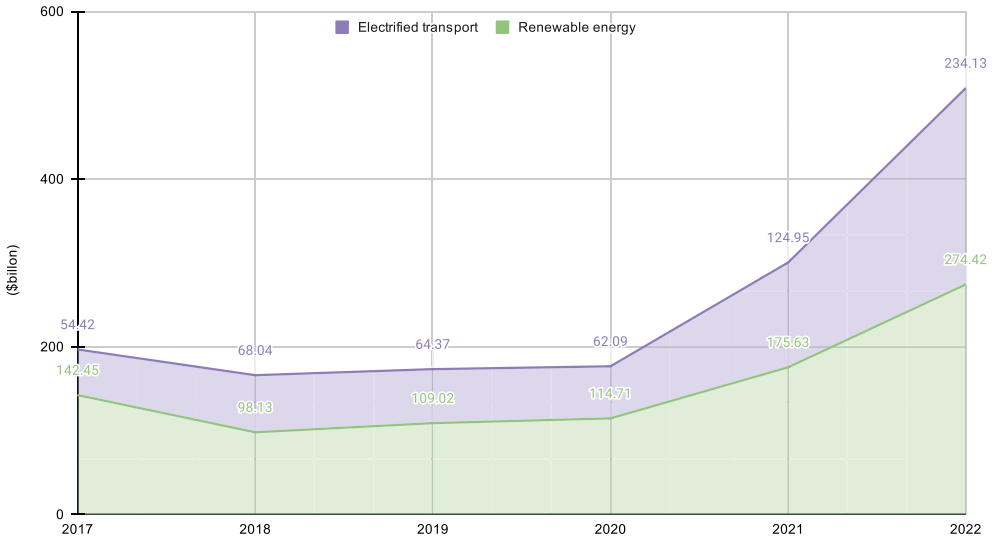


Source: Ember Electricity Data Explorer, 2023

China's energy transition investments

China has focused its investments on decarbonising its energy sector and transforming its transport sector - both of which are significant sources of greenhouse gas emissions and air pollution. China's annual investments in electrified transport rose by 330% between 2017 and 2022, reaching USD 234.1 billion. During the same period, annual investments in renewable energy increased by about 93% to USD 274.4 billion (See Figure 5).

Fig. 5: China's energy transition investments



Source: BNEF - Energy Transition Investment Trends, 2023[5]

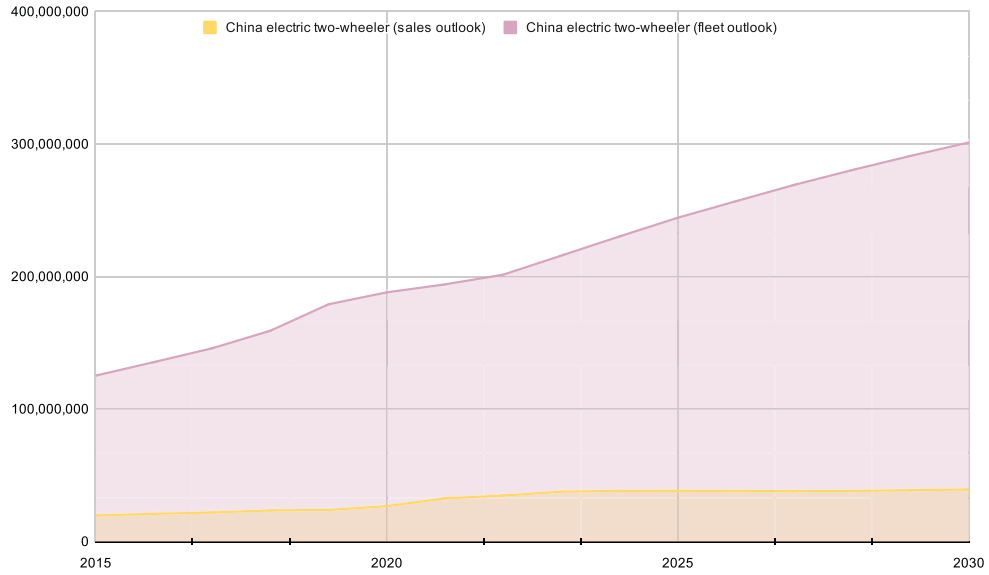
5: BNEF identified key transition technologies as wind (on- and offshore), solar (large- and small-scale), biofuels, biomass & waste, marine, geothermal and small hydro, electrified transport and energy storage.

Investments continued to rise during the Covid-19 pandemic, with electrified transport reaching about USD 175.6 billion and renewable energy reaching about USD 125 billion in 2021.

Growing sales of electric motorbikes

China is the world's leading exporter of electric two-wheelers, such as scooters and motorbikes. Electric two-wheeler sales increased by 77.4% to 34.7 million between 2015 and 2022, while the number of electric two-wheelers on Chinese roads rose by 61% to 201.4 million. The growth is set to continue, with sales expected to increase by 13% to 39.2 million by 2030, and the number of vehicles expected to grow by 50% to about 301 million (see Figure 6).

Fig. 6: Electric two wheeler China



Source: BloombergNEF (171) 2023 Long-Term Electric Vehicle Outlook[6]

China has also overtaken Germany as the world's second-largest exporter of cars after Japan. The growth is mostly driven by surging demand for electric cars, which account for nearly 40% of China's total car exports.

6: Numbers after 2022 are Bloomberg estimates.

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India's green shift

India's investments in the energy transition

India ranked seventh among countries that made the largest investments in their energy transitions in 2021. The country invested about USD 11 billion in renewable energy and USD 1.6 billion in electrified transport. The following year, India doubled investments in electrified transport to about USD 3.5 billion.

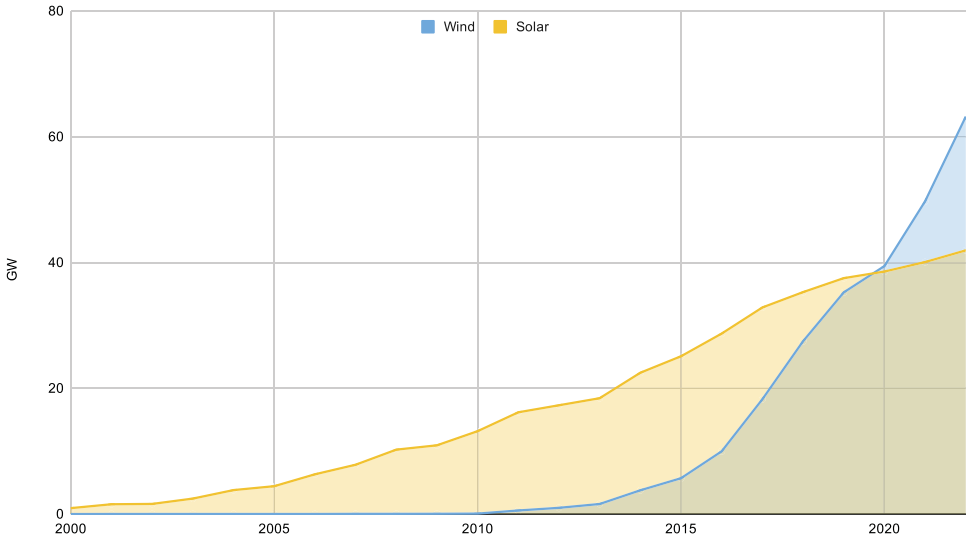
These investments stimulate economic growth and generate employment in the energy and transport sectors. Investments in renewables and electrified transport can also play a significant role in curbing carbon emissions and enhancing urban air quality, particularly in India's densely populated cities.

Renewable energy expansion

From 2000 to 2022, India has increased its wind capacity by an exponential rate of 22% each year and its solar capacity by 18% annually.7 From 2016 to 2022, following the Paris Agreement, India increased its wind capacity by 533.7%, and its solar capacity, which was higher to begin with, by 46.2%.

In 2022, renewable sources accounted for 20.5% of electricity generation, with the share of wind and solar almost doubling from 2017 to 9%. Since 2017, annual additions of renewable capacity have outpaced coal power, and India's coal capacity additions fell to 4 GW in 2021 from 19 GW in 2015.

Fig. 8: India wind and solar capacity

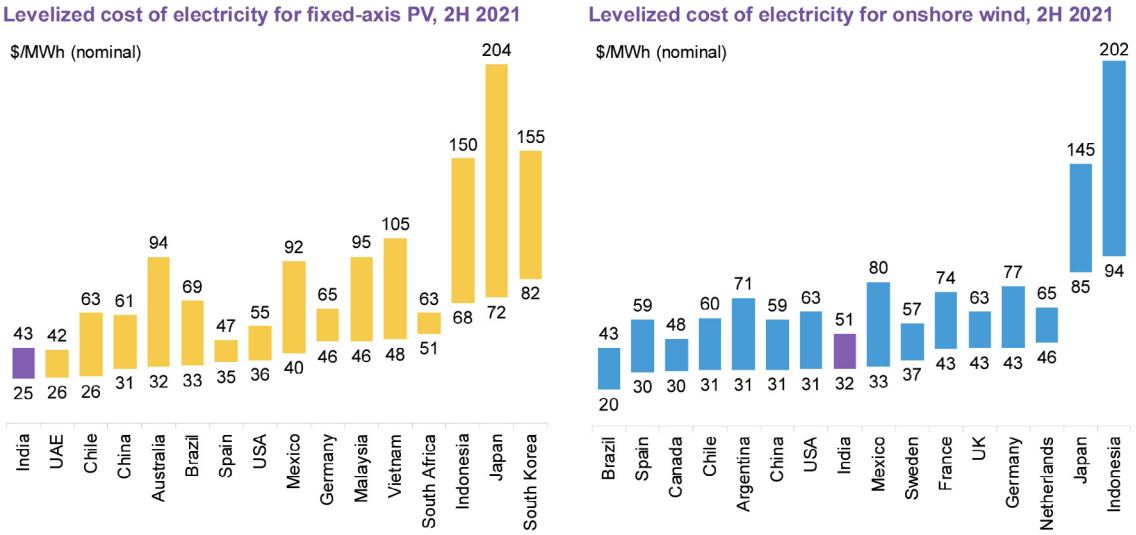


Source: Ember Electricity Data Explorer, 2023

7: Based on an Ember Electricity Data Explorer analysis.

The exponential growth in renewable energy has been driven by favorable government policies and technology advancements, which mean that new solar and onshore wind projects in India have some of the lowest costs in the world. The Indian government wants to continue this growth and aims to have 500 GW of renewables capacity by 2030.

Fig. 9. India's solar and wind costs



Source: Bloomberg NEF, 20228

India's two-wheeler revolution

The Indian government has said that the automotive industry will be key to the country's transition towards cleaner energy, and it is already an important driver of economic growth. India's EV market is projected to grow by 49% from 2022 to 2030, with estimated annual sales of 10 million units, making it one of the fastest-growing EV markets in the world.9 The industry is expected to create 50 million direct and indirect jobs in the country by 2030.

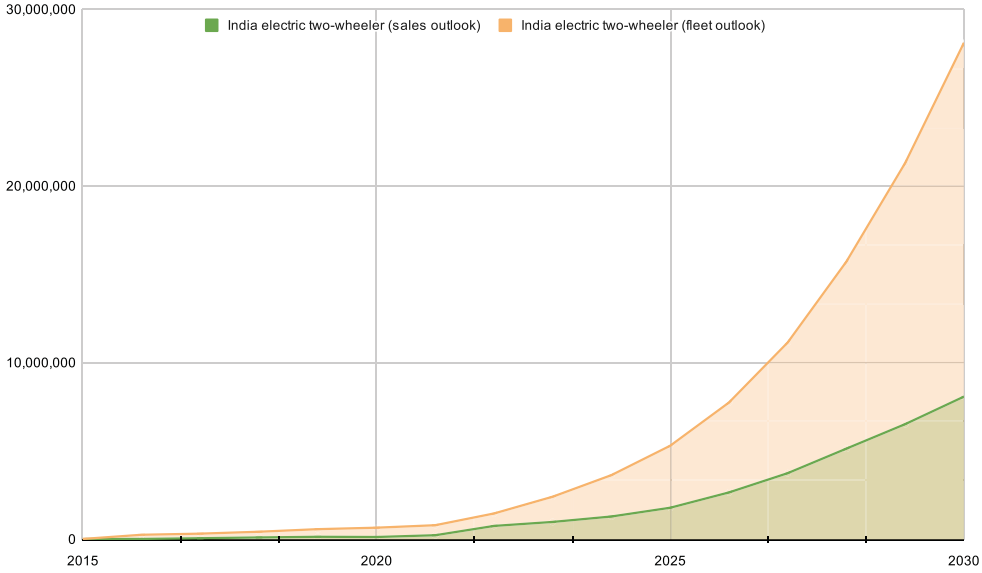
In 2021, India was the largest two-wheeler and three-wheeler vehicle manufacturer globally. It is also a leading manufacturer of electric two-wheelers, which are set to play a major role in the global EV market. The growth of electric two-wheelers in India is expected to continue to grow exponentially until at least 2030 (see Figure 10).

India had 4 million electric two-wheelers on its roads in 2022 with the number expected to grow to 28 million by 2030 (see Figure 10). Between 2015 and 2022, sales of electric two-wheelers in India surged by 3,325%, from 22,211 to 760,777 units. Sales are expected to continue growing on an exponential curve, reflecting growing popularity among Indian consumers.

8: The range of the LCOE represents a range of costs and capacity factors. All LCOE calculations are unsubsidised and exclude curtailments and tax-credits.

9: 49% growth is based on the compound annual growth rate.

Fig. 10: Electric two–wheelers in India



Source: BloombergNEF (171) 2023 Long-Term Electric Vehicle Outlook10

10: Numbers after 2022 are estimates.

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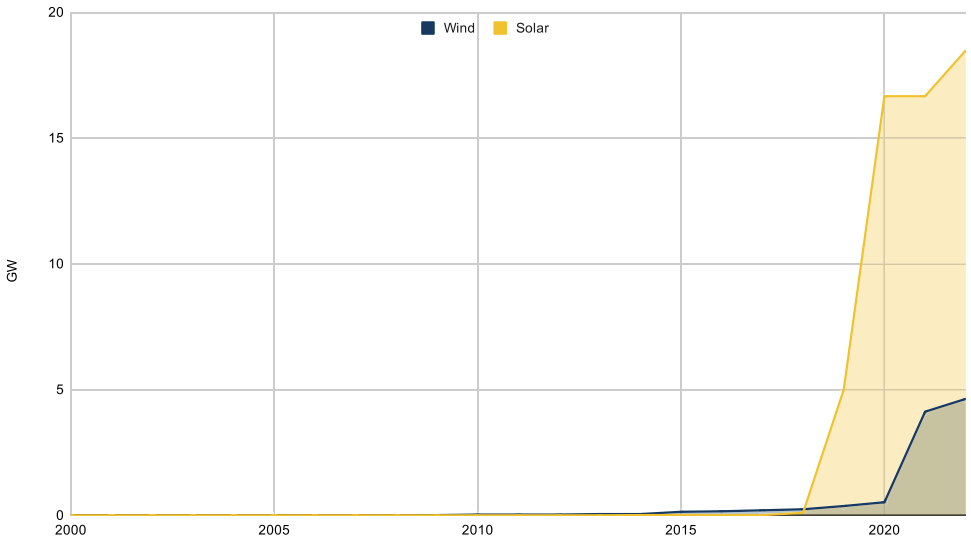
Vietnam's solar and wind expansion

Solar and wind energy have gained momentum in Vietnam in recent years. Solar capacity skyrocketed by about 18,380%, from 0.10 GW in 2018 to 18.48 GW in 2022. This surpassed the government's 2020 target of 850 MW. While capacity remained stagnant in 2020-2021 amid the Covid-19 pandemic, it started to grow again in 2022 following incentives introduced by the Vietnamese government for solar projects. Vietnam has also been steadily developing its wind capacity, which reached about 4 GW in 2020.

This renewables expansion has led to a shift in Vietnam's energy mix, with the share of fossil fuels falling to 42% of installed capacity in 2020 from 83% in 2019. According to the International Renewable Energy Agency, solar has been cheaper than fossil fuels in Vietnam since 2019, and onshore wind energy has been cheaper than fossil fuels since 2020. Now these cost tipping points have been surpassed, the trend is expected to continue, driving further solar and wind expansion in the coming years. The Vietnamese government aims for wind, solar, and other renewable sources, to account for at least 31% of the country's energy needs by 2030, up from about 25% in 2020

Fig. 11: Vietnam's wind and solar capacity



Source: Ember Electricity Data Explorer, 2023

Vietnam's two-wheeler electrification boom

Motorbikes and mopeds are the primary mode of transport in Vietnam, and the country had the fourth highest motorbike sales worldwide in 2019. The country is also the second-largest electric two-wheeler market globally after China. Electric two-wheeler sales in Vietnam rose 45% YoY to nearly 237,000 in 2020. Sales continued to rise during the Covid-19 pandemic, and in 2021, Vietnam secured 10% of the global market share, with nearly 1.8 million electric motorbikes and scooters in operation.

Electric motorbikes could help Vietnam reduce its greenhouse gas emissions and decrease air pollution in cities. The industry also creates green jobs, as local firms such as VinFast, Pega, Anbico, DK Bike, and Detech account for almost 70% of electric two-wheeler sales.

The Vietnamese government has set ambitious targets for the phase-out of new internal combustion vehicle sales by 2040, with both national and regional phase-out targets.