

Asia's decarbonisation potential

Assessing the importance of Asia's energy transition



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Key points

- Rapidly growing energy demand has seen Asia (excluding China) rank consistently among the top contributors to global CO₂ emissions
- Intensive use of coal, which makes up 60% of the region's energy mix, by heavy industrial users and a large transportation fleet has been the main culprit of emissions
- The decarbonisation of Asia's economies will bring many benefits. Apart from reducing environmental costs and risks, it could also improve energy security and trade balances of Asia's energy net importers
- Governments across the region have announced ambitious plans to reduce emissions, with some making explicit pledges to substantially increase the use of renewable energy. But this will take time and require vast investment
- However, there are multiple challenges along the carbon neutral pathway. Due to fossil fuel dependence, many Asian countries still have policies that continue to encourage high levels of CO₂ emissions. Only by phasing out the related subsidies and policies can market distortions be removed

The global climate has evolved over time. Since the beginning of industrialisation, accelerated increases in greenhouse gas (GHG) emissions have led to rapid temperature rises, resulting in global warming.

Asia – home to 60% of the world's population – has also experienced rapid population growth in recent decades. And in their efforts to bring a large swathe of this population out of poverty, Asia's economic drive has relied on carbon-intensive sectors, powered by an overwhelming use of fossil fuels, like coal. These have caused the region to produce more carbon dioxide (CO₂) in recent decades than any other part of the world, leading to heavy pollution, environmental degradation, and more frequent extreme weather events, such as droughts, floods, and typhoons. Therefore, mitigating GHG emissions and managing climate risks are essential for Asia.

So far, more than 190 countries have adopted the Paris Agreement¹. As the world's second largest emitter of GHGs, Asia's (excluding China) actions will be critical to the success of this effort in achieving climate sustainability.

Previously we have written about how China plans to become carbon neutral by 2060². In this report, we look at the rest of Asia, discussing the different commitments and strategies countries have put in place to tackle global warming, and the challenges they face along the path to carbon neutrality.

¹ The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP21 in Paris on 12 December 2015 and entered into force on 4 November 2016. The Agreement aims to keep the increase in global temperatures to below 2°C, or preferably by 1.5°C above pre-industrial levels, by the end of the century.

² Yao, A. and Shen, S., "[China: Path to Net-Zero](#)". AXA IM Research, 18 March 2021.

Size matters

Asia’s substantial land mass and population present a challenge for tackling climate issues. Primary energy use has increased significantly in recent decades, with the region³ accounting for 16.5% of global energy demand in 2021. Most Asian economies have seen energy demand grow at much faster rates than the global average. Vietnam, the Philippines, and India grew at more than triple the world average rate per annum over the past decade, whereas more developed Asian economies such as Korea, Taiwan and Japan fell behind the global average (Exhibit 1).

Exhibit 1: Energy demand grows rapidly in Asia

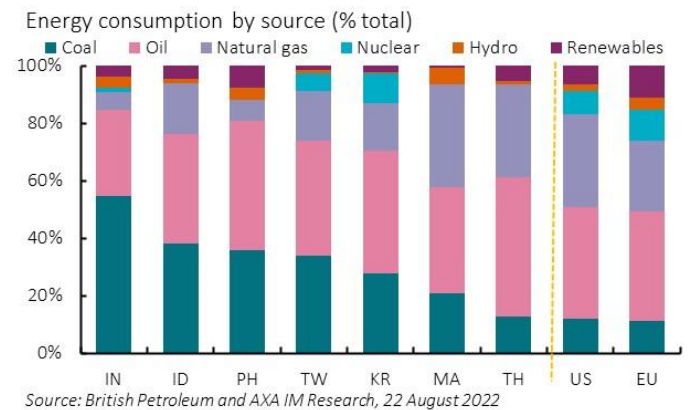


On the back of rapid energy demand, Asia’s growth in CO₂ emissions has been much faster than any other part of the world (Exhibit 2). The region is responsible for almost one-third of total global GHG emissions (Exhibit 3) with India being the highest contributor (Exhibit 4). In fact, India has topped the chart in growth of CO₂ emissions over the past decade while developed economies saw a reduction in CO₂ emissions due to slower energy demand, as their economies moved towards services growth, and a faster pursuit of renewable energy transition.

Facts behind Asia’s massive CO₂ contribution

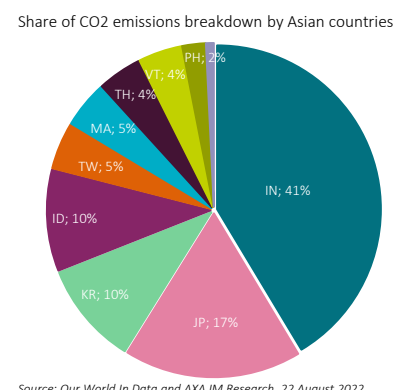
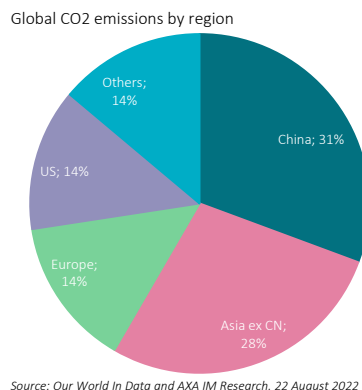
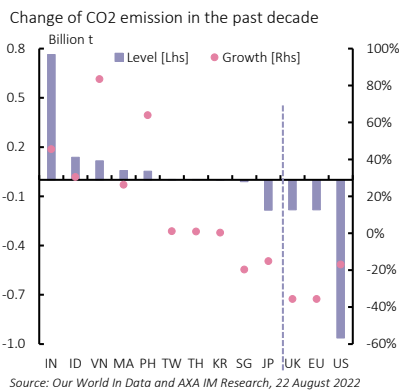
Asia’s high intensity of carbon emissions can be attributed both to its heavy use of fossil fuels and to its reliance on carbon intensive – industrial and manufacturing – growth. By fuel types, the majority of Asia’s CO₂ emissions stem from coal combustion. As the cheapest and most available source of energy, coal dominates electricity generation in Asia, contributing to a significant portion of Asia’s total power mix (Exhibit 5). Coal consumption contributes to the highest proportion of total energy consumption in India (55%) and Indonesia (38%). However, the rest of the region uses more natural gas and oil. By comparison, the United States (US) and European Union (EU) use comparatively more natural gas and nuclear power.

Exhibit 5: Coal and oil are most intensely used in Asia



Moreover, Asia’s reliance on heavy industry is another major cause of carbon emissions. It is a major producer of steel and cement,⁴ making up 18% and 14% of global output respectively (Exhibit 6). In addition, Asia is home to around one-third of the global transport fleet, with Singapore, Japan and Hong Kong together accounting for 23% of the world’s total fleet tonnage.

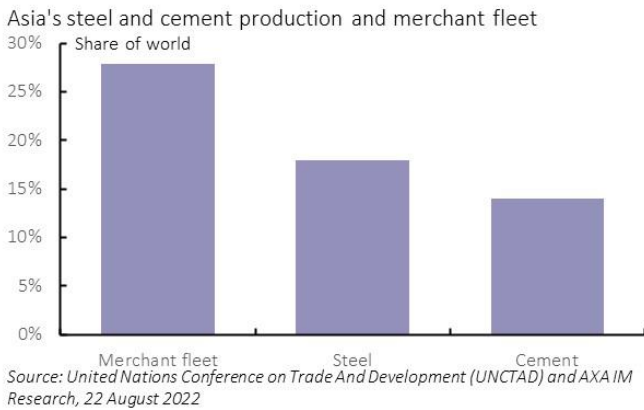
Exhibits 2, 3, and 4: The size and pace of CO₂ emissions in Asia are tremendous



³ Asia (excluding China) in this paper constitutes the major economies in the region: India, Indonesia, Korea, Japan, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam.

⁴ The major Asian economies include India, Indonesia, Korea, Japan, Taiwan, Vietnam, Malaysia, and Thailand.

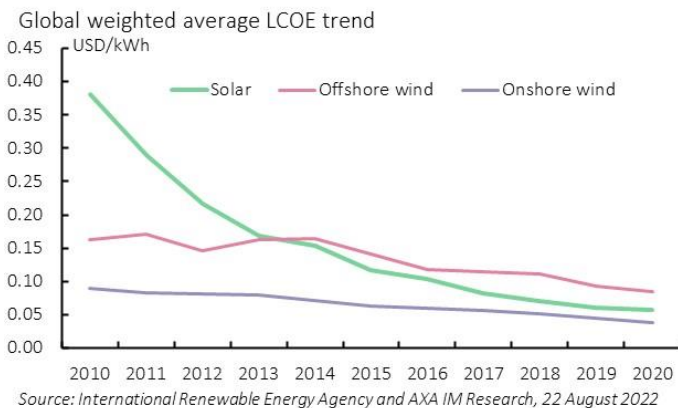
Exhibit 6: Asia plays a significant role in heavy industry and global transport fleet



Decarbonisation brings many benefits

Decarbonisation is not only important for mitigating environmental impacts but can also bring multiple economic benefits. For example, the improving economics of renewable energy have been reflected in their falling costs. The global weighted average levelized costs of electricity (LCOE) for both solar and wind-generated power have fallen substantially, according to calculations by the International Renewable Energy Agency (IRENA). Exhibit 7 shows the cost for solar energy has declined by over 85% over the past decade, while that for wind energy has fallen by 52%. Moreover, the International Energy Agency (IEA) projects these costs will continue to decline in the coming decade, improving the attractiveness of renewable power for Asia’s energy users.

Exhibit 7: Cost of renewable energy has fallen



The benefits of lower renewable energy costs could be especially pronounced for some Asian economies like India, as the value-adjusted cost of electricity of renewables is much cheaper than in the US and EU.⁵ Cheaper labour and

⁵ International Energy Agency “World Energy Model Documentation”, October 2021. The value-adjusted cost of electricity (VALCOE) for solar are US\$5 per megawatt hour (MWh) and \$50/MWh for US and the EU respectively. The

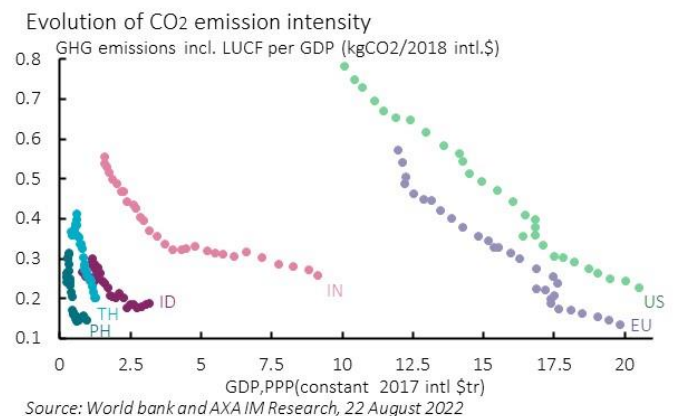
technology component costs involved in installation and maintenance also add to the price advantage of renewables in India.

Another benefit of self-generated renewable power is the potential reduction in fossil fuel imports. Asian countries have historically been highly reliant on imported energy due to a lack of domestic natural resources, and a large power need to run energy-guzzling industries. Over the past decade, coal imports have risen sharply for the regional manufacturing powerhouses like India and Vietnam. However, the Russia-Ukraine conflict has led to rising commodity prices globally. As a result, economies reliant on fossil fuel imports have experienced a terms of trade shock and a deterioration in their current account positions. By shifting towards renewables, Asian countries can become more energy self-sufficient, improving their trade balances and energy security.

Well-positioned in decarbonisation

We assess Asia’s ability to decarbonise on several factors. First, the natural evolution of economies can affect countries’ GHG emissions. As economies mature – moving from carbon-intensive industrial processes to services-driven growth – energy intensity tends to decline. Exhibit 8 shows a negative correlation between GDP levels and carbon intensity for major developed and developing countries. This suggests that, even without active decarbonisation, growth of CO2 emissions should decline as the nature of Asian economies change. However, if the region relies purely on natural evolution, reaching the 2°C target would be extremely difficult, let alone achieving the 1.5°C target.

Exhibit 8: GHG emissions drop as economies mature



As part of the Paris Agreement, Asian countries must submit their plans for climate action, which are called Nationally

Adjusted Cost of Electricity (VALCOE) for India in comparison is only \$40/MWh. In addition, the cost difference between solar and gas for India is larger (\$50/MWh) compared to US (\$5/MWh) and EU (\$40/MWh).

Determined Contributions⁶ (NDC). Governments in Asia have started acting on their commitments. North Asia set earlier timelines in terms of achieving peak carbon emissions and carbon neutrality, whereas the Association of Southeast Asian Nations and India have later commitments⁷. In addition, many governments have announced targets to increase renewable energy capacities, and reduce the use of fossil fuels, particularly coal. India, for example, has made impressive progress in installing renewable power capacity, with the government pledging to grow these capacities by another 29% by 2030 (Exhibit 9).

The ability to switch to full renewable power also depends on the abundance of solar and wind resources. Exhibit 9 suggests that India, again, has the most realistic chance of reaching its 2030 renewable targets as it has high sufficiency in these natural resources. Countries with fewer resources, but greater variability in energy demand, will face a challenge unless there is a breakthrough in power storage technology.

Exhibit 9: Resource sufficiency is important for going green

Country	Resource		RE capacity		RE target		Target 2020
	Solar	Wind	Current	(GW)	Year		
China (CN)	HIGH	HIGH	1088	>1200	2030	Exceeded	
India (IN)	HIGH	HIGH	160	450	2030	Exceeded	
Indonesia (ID)	HIGH	LOW	11	35	2027	Missed	
Japan (JP)	LOW	MED	108(solar)	45(wind)	2040	-	
Malaysia (MA)	HIGH	LOW	1	7	2025	Missed	
South Korea (KR)	LOW	MED	30	185	2034	-	
Taiwan (TW)	LOW	MED	9	27	2025	-	
Thailand (TH)	HIGH	LOW	15	63	2030	-	
Vietnam (VN)	HIGH	LOW	8	14	2030	Exceeded	

Source: British Petroleum and AXA IM Research, 22 August 2022

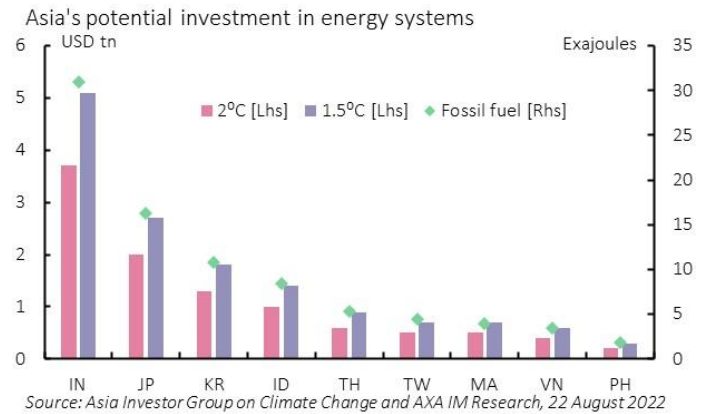
Other factors which determine a country's ability to decarbonise include the track record of achieving previous renewable targets, implementation of carbon taxes (only Singapore has this in place so far), and successful adoption of power storage solutions such as batteries and hydrogen—although these have yet to be commercialised at large scale.

Accomplishing the ambitious decarbonisation targets require a significant amount of investment. One study, which uses the same methodology as Tsinghua University's estimate⁸ of China's decarbonisation potential, suggests that the rest of Asia⁹ needs roughly US\$10tn of investment to reach the 2°C scenario and \$14tn for the 1.5°C scenario cumulatively from 2020 to 2050. Within that, India, Korea, and Japan will be responsible for most of the investment needs (Exhibit 10).

⁶ NDCs involve efforts by each country to reduce national emissions and adapt to the impacts of climate change.

⁷ Korea, Malaysia, Taiwan, Hong Kong, and Singapore have net zero ambitions by or before 2050, Indonesia by 2060, Thailand by 2065 and India by 2070. Philippines does not have a net zero target yet, but there are carbon reduction plans.

Exhibit 10: Decarbonisation needs significant investment



Hurdles along the net zero path

There is a myriad of challenges along Asia's journey to decarbonisation. Due to existing power grid limitations and unstable renewable production, a substantial shift in the energy mix cannot happen overnight. Countries need to ensure energy security and affordability to allow for continued economic development. Therefore, reliance on coal and gas-fired power will remain crucial in the short to medium term, while transition towards renewables will take place in the longer run. In addition, while adopting new green production technology and electric vehicles are essential in transitioning Asia's heavy industry and transport fleet, these pose significant challenges given the financial and infrastructure hurdles to be overcome.

What's more concerning is that, given its fossil fuel reliance, Asia – especially India¹⁰ – has several policies that continue to encourage high levels of emissions and technical inefficiency, such as extensive fossil fuel subsidies. In contrast, subsidies for renewables are little to none.

To overcome these challenges, governments need to continue to implement climate-friendly policies. Only by phasing out the fossil fuel subsidies can market distortions be removed. Doing so will be essential for freeing up public finance resources that can be reallocated towards green investments. Other measures such as strengthening air-quality regulations, implementing vehicle emission standards, introducing carbon pricing mechanisms, and developing green financing, are all important steps towards overcoming the decarbonisation hurdles.

⁸ Xie, Z.H. et al., "China's long-term low-carbon development strategy and pathway" Institute of Climate Change and Sustainable Development Tsinghua University, July 2020

⁹ Asia includes India, Indonesia, Korea, Taiwan, Japan, Thailand, Malaysia, Philippines, and Vietnam.

¹⁰ In India, the support for fossil fuels has increased over the past years. Study suggests the total subsidies for 2021 was 9X higher than for renewables and electric vehicles.

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