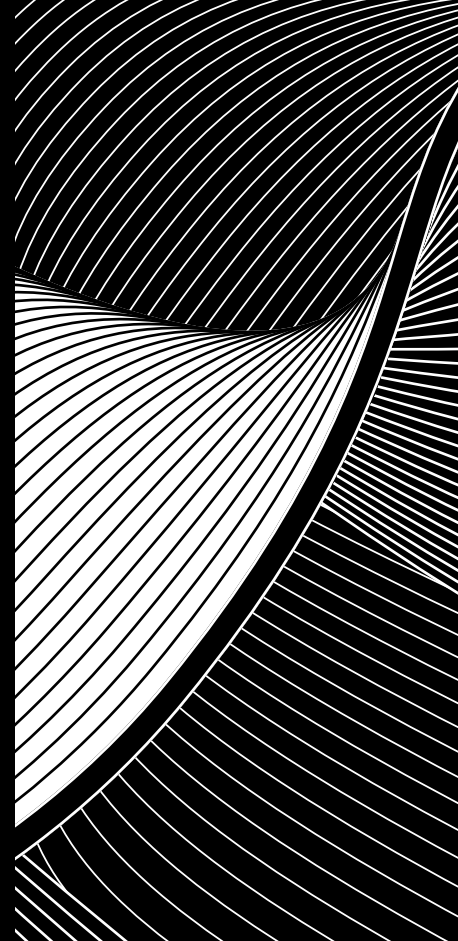


Pathways

Asia-Pacific infrastructure: A rapidly developing market with structural growth drivers

February 2025



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Executive summary



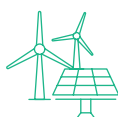
Historically, Asia-Pacific (APAC) has demonstrated rapid economic growth, outpacing the Group of Seven (G7) nations and showing strong potential to maintain this trend. Key drivers of this growth include catch-up productivity improvements, institutional development, and favourable demographic trends in areas such as South Asia.



APAC's infrastructure market has seen substantial growth, becoming the third-largest private infrastructure market globally, with an average deal flow of around \$US150 billion annually. This growth is supported by a diverse mix of highly developed and emerging economies, providing a blend of stability and growth potential. The market is also well-diversified across sectors, with renewable energy and digital infrastructure witnessing substantial increases in deal activity, while traditional energy's share has declined, reflecting a shift towards clean energy investments.



Digital infrastructure in APAC is rapidly evolving, driven by advancements in technology and increasing adoption of digital solutions. The data centre market is booming on the back of rising artificial intelligence (AI) adoption and cloud migration. Wireless infrastructure is also growing robustly, fuelled by rising mobile subscriptions and the rollout of 5G networks. Supportive government policies and enhanced data protection laws are playing a crucial role in fostering the development of digital infrastructure across the region.



In renewable energy, the APAC region offers competitive costs for solar and wind energy. APAC's geographical advantages and falling technology costs result in some of the lowest levelised costs of electricity (LCOE) for solar and wind globally. Ambitious decarbonisation targets across the region necessitate accelerated deployment of renewable energy, creating a strong foundation for the transition to clean energy and further investment opportunities.

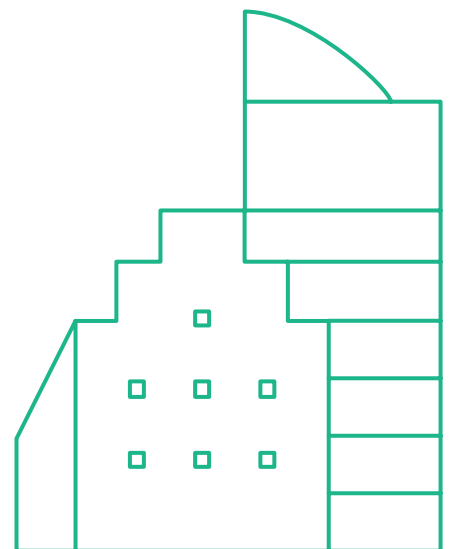


Transport infrastructure in APAC has a compelling long-term growth outlook, with volumes driven by gross domestic product (GDP) growth, rising car ownership, and increasingly middle-class consumption patterns. While there is uncertainty in the ports sector in the near term, longer-term trade dynamics are expected to continue to drive the development of port infrastructure.



Rapidly ageing populations in North Asia, combined with rising incomes per capita, are likely to see healthcare spending expand in coming decades. While financing models vary significantly by country, this creates a powerful structural growth backdrop for private capital looking to invest in this area.

Structural macroeconomic tailwinds and a rapidly developing infrastructure opportunity set





The APAC region is a fascinating one from both a macroeconomic and an infrastructure perspective. From an economic point of view, it has several advantages:

- **Rapid growth.** Historically, APAC has grown faster than the G7 and going forward is expected to continue to do so (Figure 1). It has powerful structural economic drivers in the form of catch-up productivity growth, institutional development, and, in South Asia, favourable demographics (Figure 2). North Asia is geared into the dynamic global trade cycle and so can be a play on the developed world consumer, the outlook for which is positive in 2025 in our view (see our “[Outlook 2025: Plan for growth, prepare for volatility](#)” for more details), while South Asia has powerful domestic demand dynamics driven by, *inter alia*, rising per capita incomes.
- **Increased economic stability.** Since the Asia financial crisis in the late 1990s, the region has made a number of changes to its economic structure and institutional arrangements to improve its stability. These include adopting inflation targeting and thereby freeing monetary policy to focus on domestic economic stability; increasing foreign exchange reserves to guard against currency depreciation; improving pensions systems and social safety nets to reduce household saving rates and unlock domestic consumption growth; and adopting a more conservative approach to fiscal policy and ensure medium-term sustainability.¹
- **Mix of highly developed and emerging economies.** APAC is also a mix of highly developed economies, particularly Australia and Japan but also South Korea and Singapore, and emerging economies such as the Philippines, India and Indonesia. From an investor perspective, this provides a nice mix of robust investor protections, economic stability and advanced policy and institutional arrangements, with all the structural growth and development attractions of the more emerging economies of the region.

Figure 1:
APAC has a high trend growth rate relative to the G7

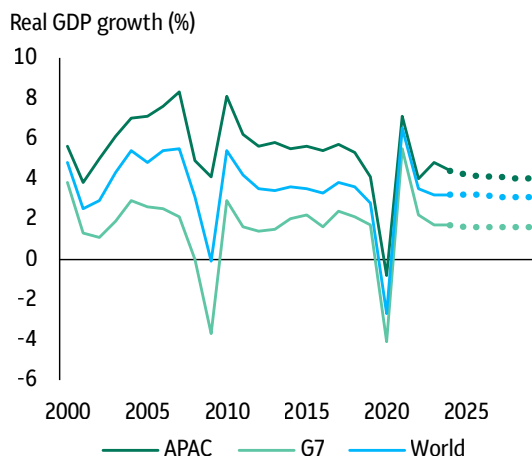
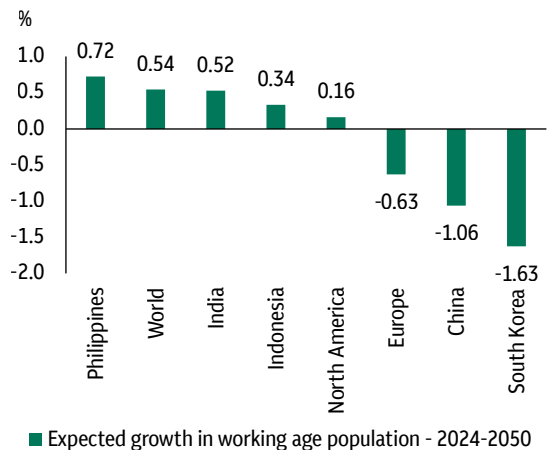


Figure 2:
South Asia has very favourable demographics



Source: International Monetary Fund, January 2025. United Nations Population Division, January 2025. Past performance is not indicative of future results.

1. For a detailed overview of the changes see our Pathways paper “Asia economies: From the late 1990s financial crisis to now” (February 2019).

APAC's infrastructure market has come a long way

From an infrastructure perspective, Asia's growing population, ongoing urbanisation and rapid economic expansion, as well as its large infrastructure gap and huge demand for robust next-generation infrastructure, can make it a region of tremendous opportunity. The APAC infrastructure market has made great strides – it is now the third-largest private infrastructure market in the world after North America and Europe, with average deal flow of around \$US150 billion per year (Figure 3). This represents a compound annual growth rate (CAGR) of 19.2% in deal activity,² and therefore the investable universe, over the past two decades (Figure 4).

Figure 3:
APAC is the third largest private infrastructure market in the world

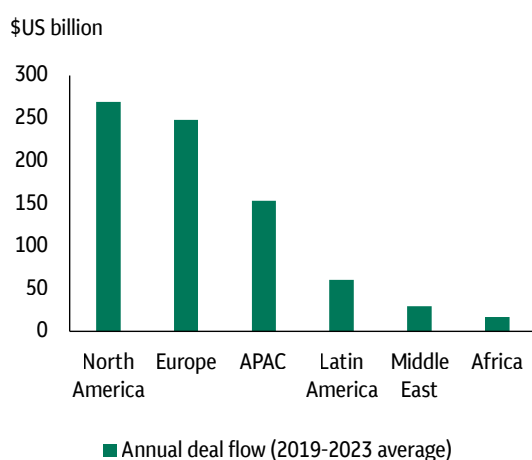
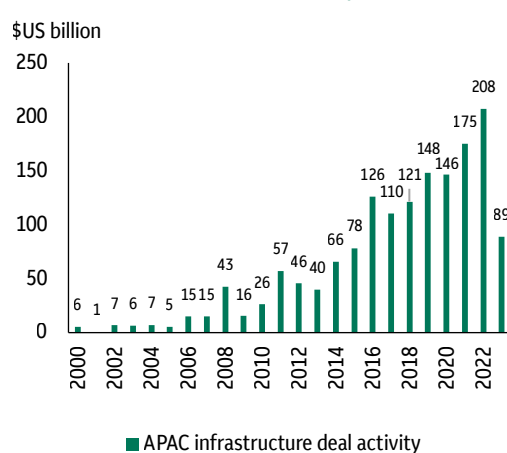


Figure 4:
Infrastructure deal activity in APAC has grown at a CAGR of 19.2% over the past two decades



Source: Infralogic by Inframation, December 2024. Past performance is not indicative of future results.

The composition of the market has also changed dramatically over that time, with it becoming more diversified from both a sector and a country perspective. By sector, renewable energy's share of deal activity has grown from 14% to 36% between 2013 and 2023, while digital infrastructure's share has also expanded dramatically from 2% to 16% (Figure 5). At the same time, the share of traditional energy deals³ has shrunk from 29% to 3%, emphasising the pivot of new investments to clean energy.⁴

2. Based on Infralogic by Inframation, December 2024. CAGR calculated as a growth in five-year average deal activity between 2003 and 2023.

3. Refers to energy midstream deals including LNG terminals, oil & gas pipelines, coal-fired generation, district heating.

4. Based on Infralogic database by Inframation, (October 2024).

From a country perspective, in 2013, Australia and New Zealand (ANZ) accounted for the largest share of APAC deal flow (47%), while in 2023 it is a much more diversified market, with India, ANZ and Southeast Asia accounting for 24%, 18% and 14%, respectively (Figure 6).⁵ Much of this shift is a result of the maturing of many of the previously early-stage infrastructure markets in the region.

While ANZ remains an active mergers and acquisitions (M&A) market, with corporate divestments of infrastructure businesses a common way for companies to streamline their operations and divest non-core services, other countries and regions have also developed active infrastructure markets. For example, Southeast Asia's deal flow is driven by a substantial investment requirement to fill the infrastructure gap created by growing populations and urbanisation. In India, the government has increased capital spending to target areas such as transport connectivity as well as upgrades to the electricity grid and power generation to help alleviate infrastructure bottlenecks, developments that are in turn driving additional deal flow.⁶

Figure 5:
Evolution of the APAC infrastructure by sector

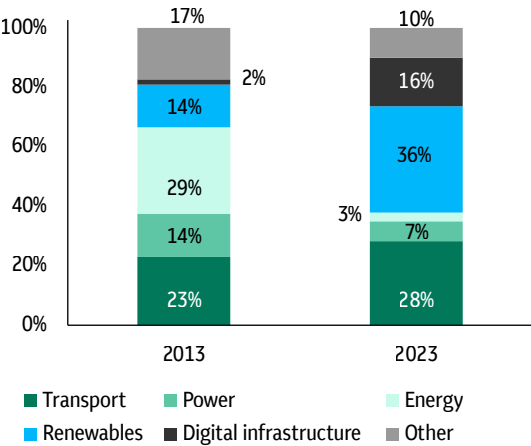
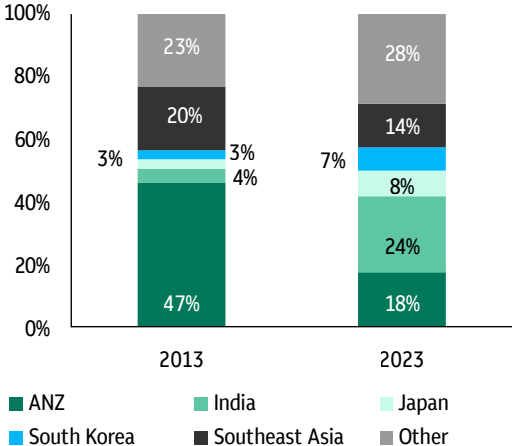


Figure 6:
Evolution of the APAC infrastructure by country



Source: Infralogic by Inframation, October 2024. Past performance is not indicative of future results. Energy deals refer to energy midstream including liquefied natural gas (LNG) terminals, oil & gas pipelines, coal-fired generation, district heating and excluding energy upstream and downstream.

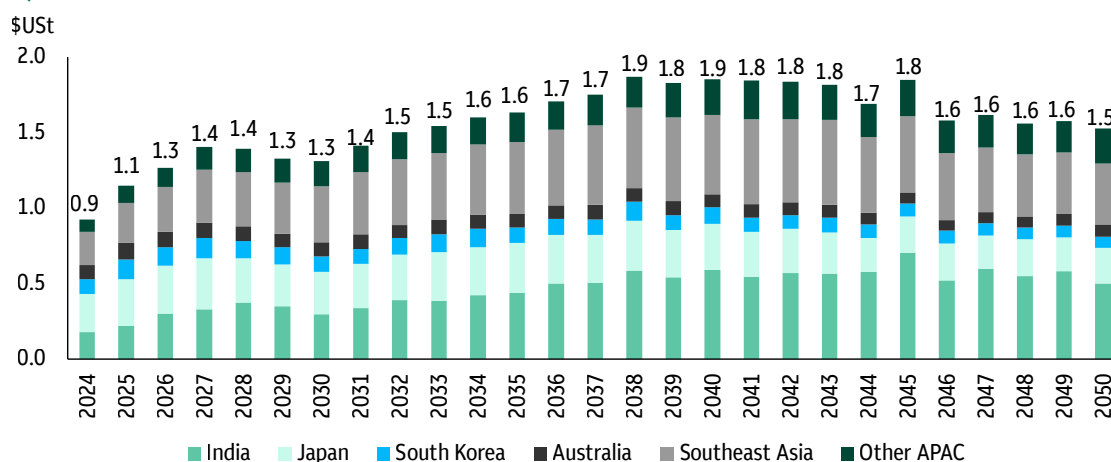
5. Based on Infralogic database by Inframation, (October 2024).
6. S&P Global, "Economic Research: Paving The Way: Efficient Infrastructure Key To Emerging Asia's Growth", (July 2024).

APAC's infrastructure investment needs are very large

According to the Asia Development Bank, for the ASEAN region⁷ to sustain economic growth and reduce poverty between 2023 and 2030, the annual infrastructure investment need is estimated at \$US184 billion.⁸ India will need to invest \$US55 billion per year into urban infrastructure, through 2036, to meet the needs of its fast-growing urban population.⁹ Beyond the investments required to sustain economic growth, substantial investments are required to limit global warming and achieve net zero carbon emissions by 2050. According to BloombergNEF (BNEF), the energy investment opportunity between 2024 and 2050 is estimated at an annual average of \$US1.6 trillion in the APAC (ex-China) region (Figure 7).¹⁰

Figure 7:

APAC (ex-China) needs investment of roughly \$US1.6 trillion per year to reach net zero emissions by 2050



Source: BNEF, "New Energy Outlook 2024" (December 2024).

Looking ahead, decarbonisation targets are expected to drive investment in renewables and the associated distribution infrastructure to support the electrification of transport, charging infrastructure, smart grid technologies, and energy distribution generally. Significant amounts of capital will also be required for the 5G network, fibre rollouts and the build-out of data centres, creating plenty of opportunities in the digital infrastructure sector. With increased urbanisation and the move towards digitalisation, new sectors including smart meters, waste and recycling, healthcare and logistics are also emerging as attractive asset classes with infrastructure-like characteristics.

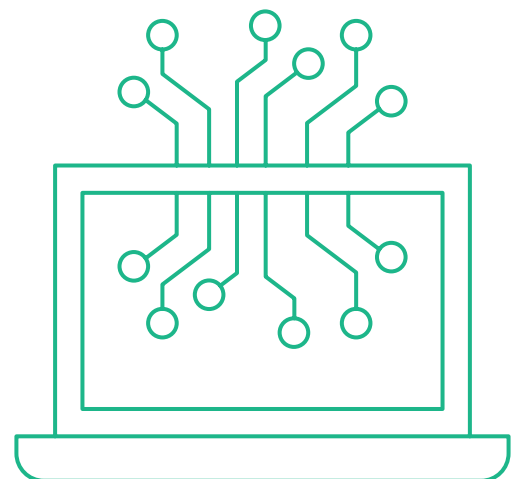
7. The Association of Southeast Asian Nations (ASEAN) comprises Indonesia, Vietnam, Laos, Brunei, Thailand, Myanmar, the Philippines, Cambodia, Singapore and Malaysia.

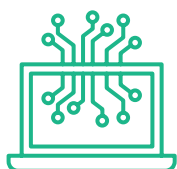
8. Refers to baseline estimate, Asian Development Bank, 'Innovative Financing Key to Private Sector Participation in ASEAN+3 Infrastructure Development', (May 2023).

9. World Bank, "Financing India's urban infrastructure needs: Constraints to commercial financing and prospects for policy action", (December 2021).

10. Calculation based on BNEF New Energy Outlook 2024. Includes India, Japan, South Korea, Australia, Southeast Asia, and other APAC countries. Excludes China.

Digital infrastructure: A rapidly evolving landscape unlocks new locations and business models





Digitalisation has deepened and broadened in the APAC region in recent years, driven by rapid technological advancements and increasing internet penetration and take-up of new technologies. COVID-19 further accelerated digital adoption, driving businesses and governments to prioritise digital solutions. The data centre market in APAC is expanding rapidly driven by AI adoption, cloud migration, and supportive government policies. The wireless infrastructure sector is also experiencing robust growth due to rising mobile subscriptions and 5G rollout. Fixed broadband subscriptions are also increasing on the back of the fibre rollout and the need for reliable high-speed internet. Finally, government policies and data protection laws are playing a crucial role in supporting the development of digital infrastructure in the region.

Data centres: Strong demand fuelled by technological advancements

The APAC data centre market is the second largest in the world by operational capacity and represents 31% of the global market.¹¹ In recent years, growth was accelerated by the region's rising internet penetration, rapid traffic growth, and supportive government policies. Going forward, demand for data centres is expected to continue on its robust trajectory, with the APAC data centre market forecast to expand at a CAGR of 18.8% between 2023 and 2028, with overall capacity projected to increase from about 10,500 megawatts (MW) to 24,800 MW (Figure 8).¹²

The future growth of the data centre market is primarily driven by two megatrends: technology advancements of the cloud platforms and compute-intensive AI workloads.¹³ According to Moody's, demand from "traditional" cloud services is more predictable and is expected to account for about 80% of the total data centre capacity in 2028, while new AI-related demand is expected to account for 20% of total data center demand and could easily over- or under-shoot the forecast (Figure 9).¹⁴ At the same time, increasing adoption of internet of things (IoT) devices and data-intensive applications, are likely to add further to demand for data centres.

11. Cushman & Wakefield, "2024 Global Data Center Market comparison". In 2024, APAC data center market operational capacity was estimated at 10,584 MW by Cushman & Wakefield, below the Americas (16,820 MW) and above Europe's (6,218 MW).

12. Moody's, "Data centers – Asia Pacific: Rapid expansion broadens into new markets, offers benefits for some sectors", (July 2024).

13. Moody's Ratings 2025 Global Data Center Outlook (January 2025).

14. Moody's Ratings 2025 Global Data Center Outlook (January 2025).

Figure 8:
Data centre capacity expected to increase
2.5 times in five years...

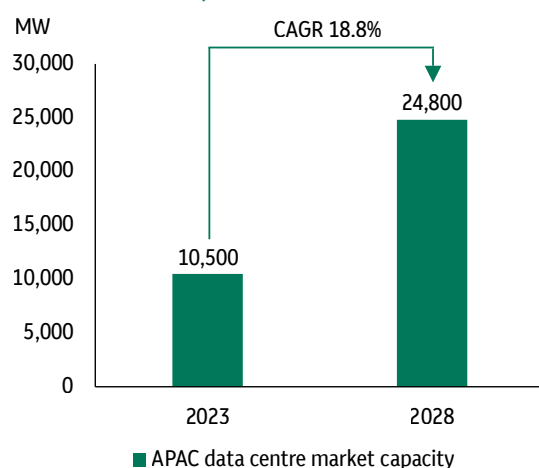
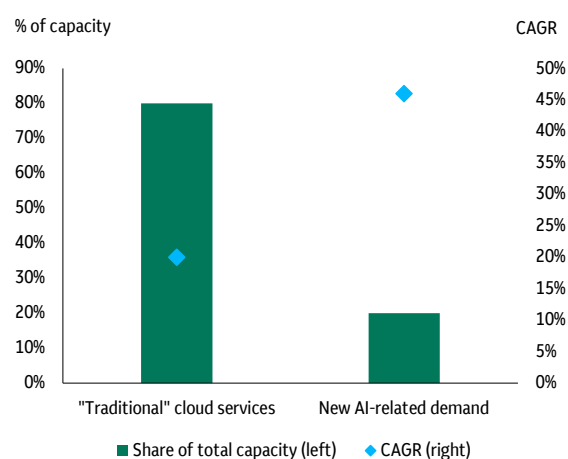


Figure 9:
...driven by cloud platforms and AI by 2028



Sources: Moody's, "Data centers – Asia Pacific: Rapid expansion broadens into new markets, offers benefits for some sectors", July 2024. Moody's Ratings 2025 Global Data Center Outlook, January 2025.

Unlocking new locations: Demand pushes market to expand beyond tier 1 cities

In the mature data centre markets outside of China – Japan, India, Australia, Singapore, Hong Kong and South Korea – capacity is expected to grow by 1.4 times to 3.1 times over the coming years depending on location (Figure 10).¹⁵ In North Asia, Greater Tokyo and Greater Seoul are the largest data centre markets with 1,054 MW and 476 MW of operational capacity, respectively, in 2024. In Seoul, the market is expected to more than double to 1,231 MW.¹⁶ Data centres in tier 1 locations such as Singapore are expected to maintain low vacancy rates and strong pricing power due to their strategic location and limited supply. However, land and power limitations may drive the data centre markets towards smaller tier 2 and tier 3 markets (Figure 11).¹⁷

15. Cushman & Wakefield, "APAC Data Centre Update: H1 2024".

16. Cushman & Wakefield, "APAC Data Centre Update: H1 2024".

17. S&P Global, "Can Operators Navigate Pitfalls In Asia-Pacific's Data Center Boom?" (September 2024).

Figure 10:
APAC (ex-China) data centre market
by country

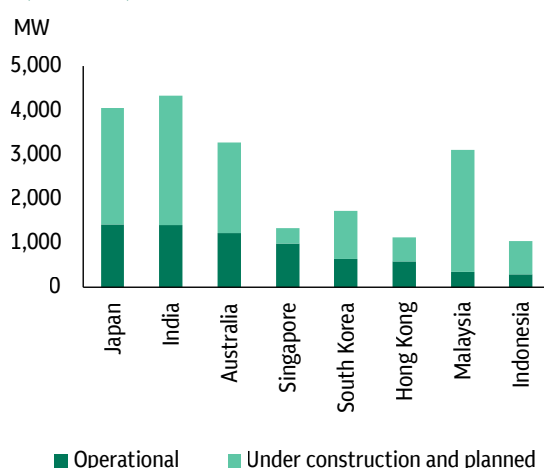
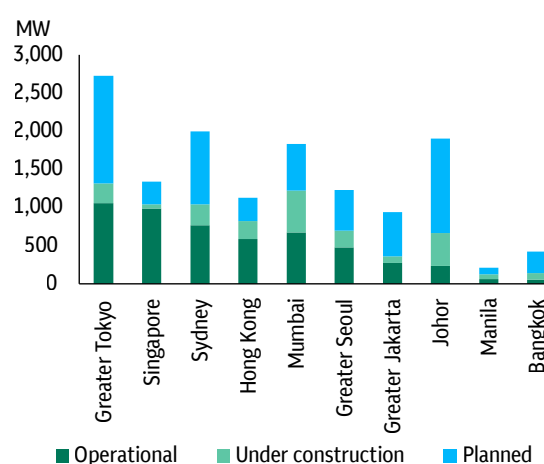


Figure 11:
APAC (ex-China) data centre market by city



Source: Cushman & Wakefield, "2024 Global Data Center Market comparison", "APAC Data Centre Update: H1 2024".

In our view, India and Southeast Asia are most favourably positioned to capitalise on the future growth in the APAC data centre market. Johor, for example, benefits from its proximity to Singapore, its potential as an alternative location with competitive land and power prices, and lower construction costs. Johor is forecast to become one of the largest data centre markets in the region, with an additional 1,666 MW expected over the coming years, which is about seven times its operational capacity in 2024 (Figure 11).¹⁸

Supportive government policy and regulatory tailwinds

Digitalisation is increasingly at the top of government policy agendas, in recognition of its significant positive impact on economic growth. For example, research shows that the economic impact of cloud spending on the economy is sizeable – in 2023 a 1% increase in cloud adoption led to a positive impact of between 0.02% and 0.15% on GDP across APAC countries.¹⁹

APAC governments are easing regulations on data centre ownership to increase domestic capacity as well as introducing incentives to attract foreign direct investment (FDI). Some of the most recent changes in the government policy include:

- In Malaysia, the government is actively focusing on attracting FDI through initiatives such as the KL20 plan, which provides incentives for high-tech industries.²⁰ In addition, in 1H24, the Cloud First Policy successfully attracted data centre investments of \$US15 billion.²¹

18. Cushman & Wakefield, "APAC Data Centre Update: H1 2024".

19. Katz, Jung, and Berry (2023), ADB Institute, "Cloud Computing Policies and Their Economic Impacts in Asia and the Pacific" (2024).

20. KL20 Summit 2024, "Unleashing the Full Potential of Malaysia's Startup Ecosystem".

21. "e-Conomy SEA 2024" report by Google, Temasek, Bain & Company.

- In Indonesia, the Ministry of Finance offers a tax holiday of up to 100% of the corporate income tax for 5 to 20 years for investments above IDR500 billion.²²
- In Thailand, the government has been focusing on attracting global technology companies and transforming the country into a hub for data centres and AI through various tax incentives,²³ a streamlined application process, and easier licence approvals.²⁴

Another important driver behind the growth of the data centre market in APAC is greater confidence in data protection legislation. Several APAC jurisdictions have either introduced comprehensive data protection laws or reformed their existing data privacy laws. Governments are increasingly mandating data localisation to promote a healthy digital economy, safeguard data, and ensure personal privacy. All these positively contribute to the global competitiveness of APAC data centres.²⁵ Many APAC jurisdictions are borrowing concepts from the European Union General Data Protection Regulation (EU GDPR) in their data privacy laws. However, it is worth noting that there is still lack of regulatory uniformity across countries, which limits the extent of cross-border data transfers.²⁶

Wireless infrastructure: Rise of TowerCos on the back of 5G rollout

APAC telecom tower infrastructure is experiencing rapid growth, driven by increasing mobile subscriptions and accelerating traffic per connection. The expansion and upgrading of towers will be necessary to support 5G deployment and to enhance network coverage and capacity. The trend towards tower sharing and the rise of independent tower companies (TowerCos) is expected to drive deal activity over the coming years as mobile network operators (MNOs) increasingly divest tower portfolios to roll out fibre and 5G, to service existing debt, and to focus on the consumer services aspect of their businesses.

In recent decades the region has experienced significant growth in both mobile broadband connections and mobile traffic. Between 2005 and 2023, the number of unique mobile subscriptions in APAC tripled from 0.6 billion to 1.8 billion.²⁷ Between 2018 and 2023, mobile data traffic per smartphone grew by a CAGR of 39.6% in Southeast Asia and Oceania and 28.9% in India, Nepal and Bhutan.²⁸

22. PwC, “Corporate - Tax credits and incentives – Indonesia” (June 2024).

23. PwC, “Corporate - Tax credits and incentives – Thailand” (October 2024). The Thailand Board of Investment (BOI) by virtue of the Investment Promotion Act of 1977 provides tax incentives for certain activities, including digital services. The incentives include a 50% reduction in the corporate income tax rate for a maximum of 10 years from the date of first earning income if no tax holiday is granted.

24. “e-Conomy SEA 2024” report by Google, Temasek, Bain & Company.

25. JLL, “How data centre ownership rules are changing” (October 2024). This dynamic should help encourage data repatriation and local storage. In this context, data repatriation refers to moving data stored in the cloud outside of APAC back to data centres located in the APAC region.

26. Morrison Foerster, “New Wave of Privacy Laws in the APAC Region” (January 2023).

27. 2005 is based on GSMA, “The Mobile Economy Asia Pacific 2013” report, and 2023 is based on GSMA, “The Mobile Economy Asia Pacific 2024” report.

28. Ericsson Mobility Report (June 2024).

Going forward, the tailwinds behind these trends are expected to continue. By 2030, APAC (ex-China) is forecast to experience the highest growth of both mobile internet users and unique mobile subscribers globally (CAGR of 3.0% and 2.1% respectively – see Figure 12).²⁹ Data traffic growth will be driven by enhanced device capabilities, network improvements, and an increase in data-intensive applications. The highest increase in mobile traffic (Figure 13) is expected in Japan and South Korea (4.8 times), followed by Southeast Asia (4.5 times) and India (4.1 times), all above the global average (3.7 times).³⁰

Figure 12:
APAC leads the world in growth in mobile internet users and mobile subscriptions

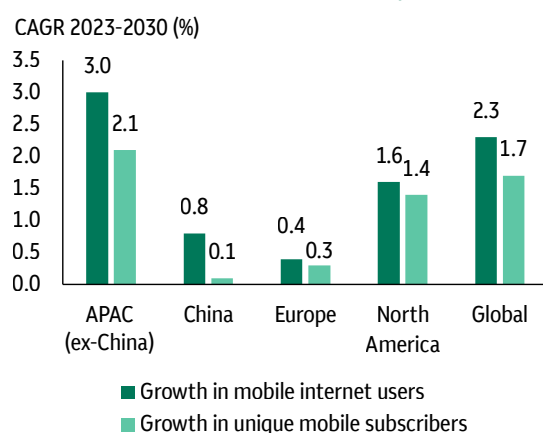
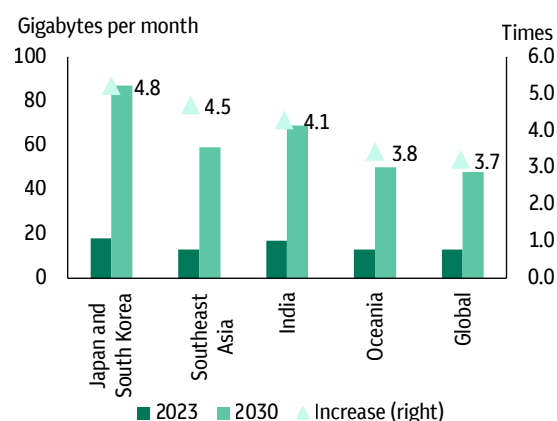


Figure 13:
Rapid growth in mobile internet traffic is expected across the region



Source: GSMA, “The Mobile Economy” report (2024) and “The Mobile Economy Asia Pacific” report (2024).

Increasing data traffic and the advancement of 5G that requires both coverage expansion and network densification are likely to drive demand for tower infrastructure. 5G technology requires more telecom towers primarily due to its reliance on higher frequency bands, which have shorter wavelengths and thus shorter ranges compared with previous generations such as 4G.³¹ In APAC, most mobile connections are currently on a 4G network (70% of all connections) with 5G penetration at 10% in 2023. By 2030, 5G is expected to account for 45% of all APAC connections (Figure 14).³²

29. GSMA, “The Mobile Economy Asia Pacific” report (2024).

30. GSMA, “The Mobile Economy Asia Pacific” report (2024).

31. For more details on the physics of 5G radio waves, please read our Pathways report “Digital infrastructure: Transmitting growth signals” (May 2022).

32. GSMA, “The Mobile Economy Asia Pacific” report (2024).

In addition, telecom tower density across the APAC region is not uniform. While tower density may depend on the extent of urbanisation and geography, the large amount of variation across the region suggests that some countries are yet to catch up on tower densification. For example, Japan and Malaysia have 1,754 and 1,330 towers per million people, respectively, while Indonesia and India have just 425 and 411 towers per million people, respectively (Figure 15).³³ In this context, we believe that the lower tower density in India and Indonesia suggests significant growth potential ahead.

Figure 14:
5G set to expand from 10% to 45% of APAC mobile connections by 2030

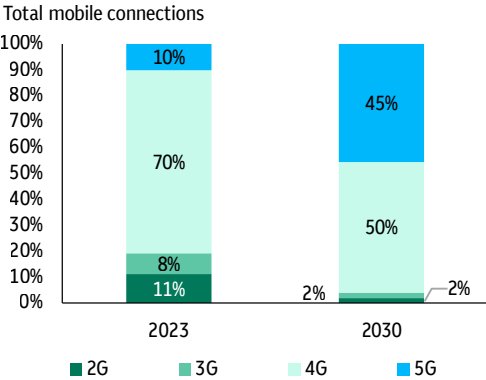
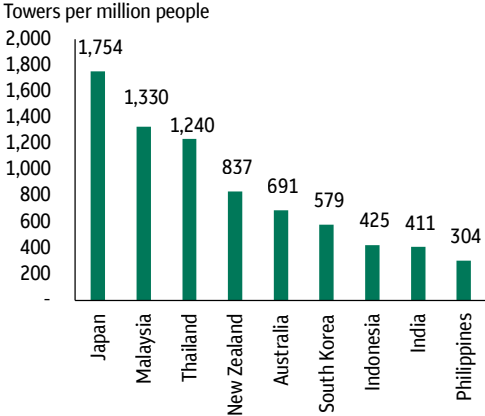


Figure 15:
Tower density varies significantly across the region



Sources: GSMA, “The Mobile Economy Asia Pacific” (2024), TowerXchange’s Asia guide (Q3 2023). Connections by technology exclude licensed cellular IoT connections.

In line with developments in other regions, the APAC tower industry is transitioning from an MNO-captive model to a TowerCo-led market. Under the latter model independent TowerCos provide a more efficient and scalable solution by offering shared infrastructure, while MNOs can generate substantial proceeds from divestments of tower portfolios to roll out fibre and 5G. Tower sharing supports stable, long-term revenue streams generated by leasing tower space to multiple tenants, which enhances the profitability and resilience of these assets. Compared with other regions – for example, in the US, independent TowerCos account for 90% of tower ownership³⁴ – Asia has significant growth potential (Figure 16). In Asia (ex-China), only 32% of towers are owned by independent TowerCos³⁵ and the recent divestments of towers by MNOs suggest this number is likely to increase going forward.

33. Based on GSMA, “The Mobile Economy Asia Pacific” (2024), TowerXchange’s Asia guide (Q3 2023).
34. EY-Parthenon, “A report for the European Wireless Infrastructure Association” (May 2024).
35. TowerXchange’s Asia guide (Q3 2023).

Indonesia has one of the most mature TowerCo markets in APAC, with the industry having gone through consolidation in recent years with 97% of the country's towers now held by independent TowerCos.³⁶ However, in other countries such as Thailand, Japan and South Korea, most of the towers are still owned by MNOs (Figure 17).³⁷ We expect deal activity to pick up in the coming years as a result of MNOs tower carveouts to delever balance sheets to fund 5G capital expenditures (capex).

Figure 16:
The sector transition to TowerCos is early stage in Asia (ex-China)

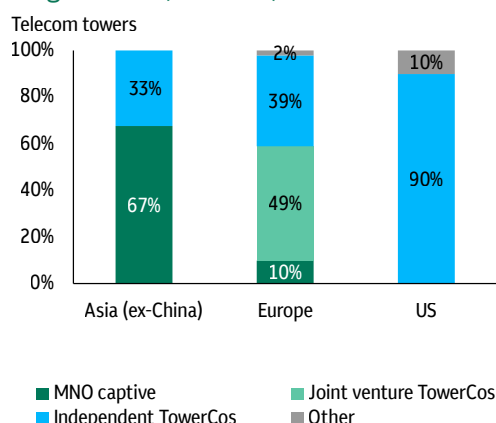
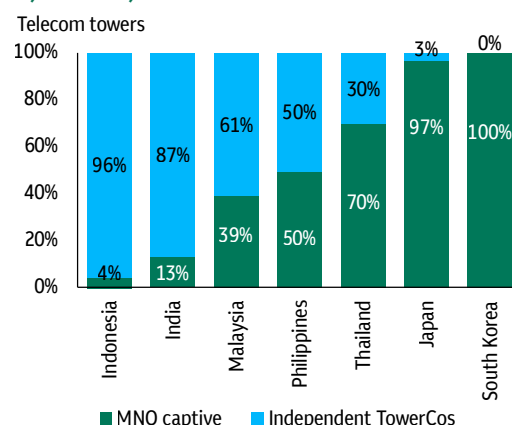


Figure 17:
The extent of the transition varies significantly by country in APAC



Sources: Calculations based on data from TowerXchange's Asia guide (Q3 2023); TowerXchange's European guide (Q3 2024); EY-Parthenon, "A report for the European Wireless Infrastructure Association" (May 2024).

Wireline infrastructure: Fibre as backbone network with fixed wireless access and satellite filling the gaps

Fixed networks provide the backbone of all communications as they connect data centres, businesses, homes, and telecommunication towers in one digital ecosystem. The APAC region's need for reliable and high-speed internet connectivity has been driven by the megatrends of rising internet penetration and growing data-intensive applications, which have in turn been supported by rapid urbanisation and robust economic growth.

36. S&P Global, "Asia-Pacific Towercos: More Construction, Colocation and Consolidation Ahead" (May 2024).

37. Calculations based on data from TowerXchange's Asia guide (Q3 2023).

Fixed broadband subscriptions grew at a 10.7% CAGR in developing APAC (ex-China) and 2.8% in developed APAC between 2012 and 2022 (Figure 18).³⁸ Despite the increasing broadband coverage there is a substantial gap between countries (Figure 19). In countries with high penetration rates such as South Korea – which was among the first countries to adopt nationwide broadband services in the early 2000s – the focus is likely to shift to improving network speeds.³⁹ In countries with low penetration rates such as India,⁴⁰ governments provide significant support and favourable policies through national initiatives to accelerate the deployment of fixed broadband infrastructure, particularly in urban and semi-urban areas.⁴¹

Figure 18:
Fixed broadband subscriptions are growing rapidly in APAC

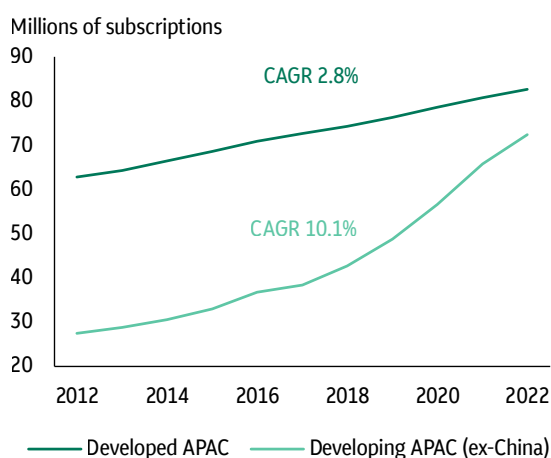
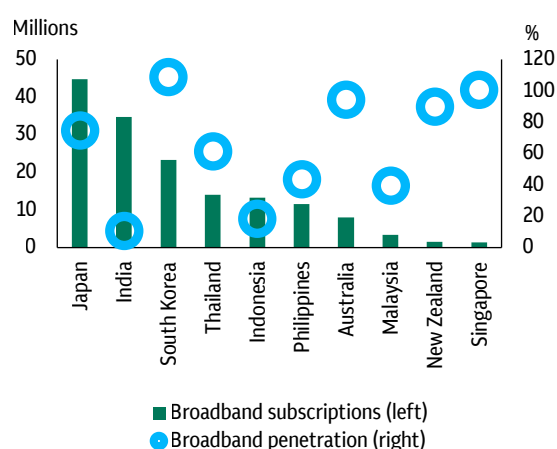


Figure 19:
Penetration rates vary significantly by country



Sources: ITU database (2022), Kagan, S&P Global Market Intelligence (December 2022). Developed APAC includes Australia, Japan, South Korea, New Zealand and Singapore. Developing APAC (ex-China) includes India, Indonesia, Malaysia, the Philippines and Thailand.

Fibre is the leading fixed broadband technology, reaching more than 80% of total fixed broadband subscriptions across most APAC countries.⁴² Fibre's share of broadband subscribers has increased rapidly from 21.4% in 2012 to 84.1% in 2022, driven by the growing demand for reliable and high-speed internet in the region (Figure 20).⁴³ The low subscription percentage for copper (DSL and cable) in most APAC countries indicates the region's preference for fibre for new deployments (Figure 21).⁴⁴ However, in countries such as Indonesia and the Philippines where servicing of fibre can be difficult due to geography (e.g. small islands), fixed wireless access (FWA) and satellite could provide an optimal solution to extend coverage to remote areas.

38. International Telecommunication Union (ITU) database (2022). Developed APAC includes Australia, Japan, South Korea, New Zealand and Singapore. Developing APAC (ex-China) includes India, Indonesia, Malaysia, the Philippines and Thailand.

39. Telecom Review Asia, "National Policies and Projects Driving Fiber Expansion in APAC" (October 2024).

40. Kagan, S&P Global Market Intelligence (December 2022).

41. Telecom Review Asia, "National Policies and Projects Driving Fiber Expansion in APAC" (October 2024).

42. Except Australia with fibre's share of 25%, New Zealand with 68% and Indonesia with 69%. Based on ITU database (2022).

43. S&P Global, "Fiber technology dominated Asia-Pacific broadband growth" (March 2023).

44. OECD, "Extending Broadband Connectivity in Southeast Asia" (2023).

Figure 20:
Fibre is the leading fixed broadband technology in APAC

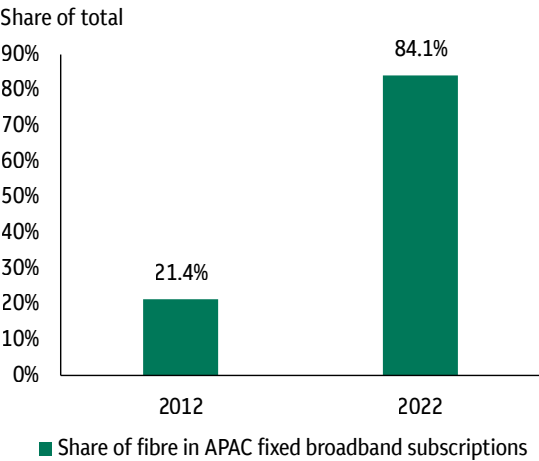
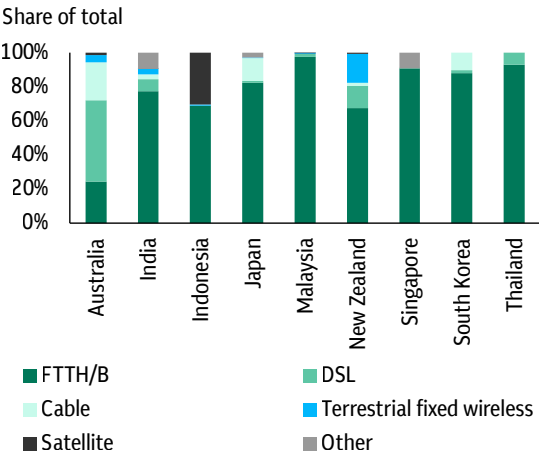


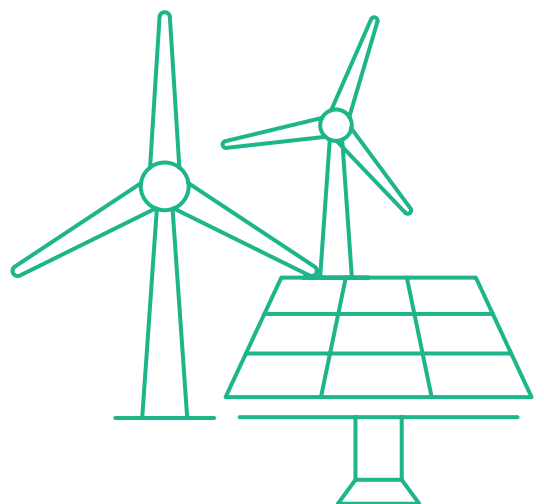
Figure 21:
The popularity of fibre is broad-based across the region

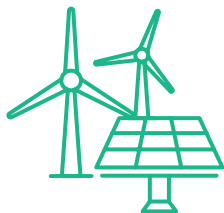


Sources: Kagan, S&P Global Market Intelligence (December 2022), ITU database (2022). FTTH/B = fibre to the home/building, DSL = digital subscriber line.

Overall, we believe that there is strong potential for fixed broadband growth in APAC, particularly in countries and regions such as India and Southeast Asia. As governments continue to prioritise broadband infrastructure development, APAC is well positioned to achieve higher penetration rates on the back of fibre rollouts in densely populated areas with opportunities for FWA and satellite to extend coverage to underserved areas.

Decarbonisation:
Cost competitiveness,
relatively low
penetration, and
strong demand drive
opportunities





APAC’s energy consumption and electricity demand are rising faster than the global average, driven by strong economic growth, ongoing industrialisation, and rising penetration rates of consumer durables. Accelerating energy demand, combined with the cost competitiveness of APAC renewables and their relatively low penetration in the region’s energy mix, is driving significant growth and investment opportunity in renewables across the region.

Between 2013 and 2023, energy consumption grew at 2.9%, almost 10 times the rest of the world’s CAGR (0.3%) over the same period (Figure 22). Electricity generation grew even more rapidly, expanding at a 4.5% CAGR during this period, which is about 6.5 times the rate of growth for the rest of the world.⁴⁵ However, this growth has come at a cost: carbon emissions from the region have surged, growing at 2% compared with -0.5% for the rest of the world, with APAC emissions now accounting for more than 50% of total global emissions in 2023 (Figure 23).

Figure 22:
Energy consumption is growing rapidly in APAC

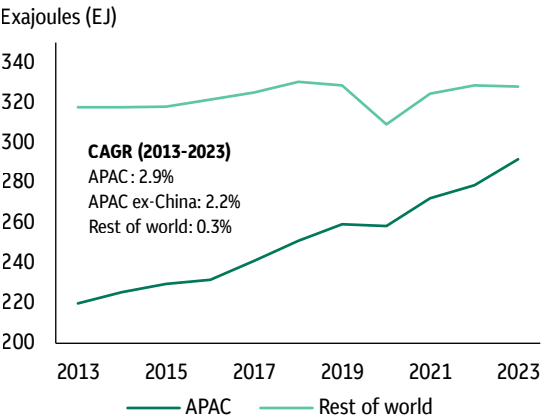
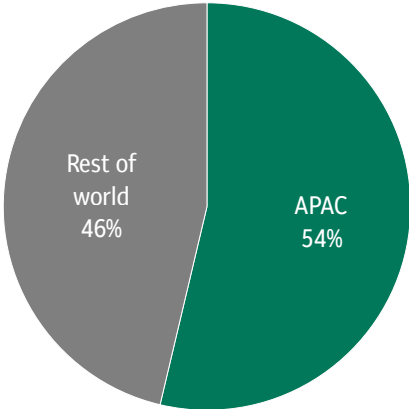


Figure 23:
APAC now accounts for more than 50% of global CO₂ emissions

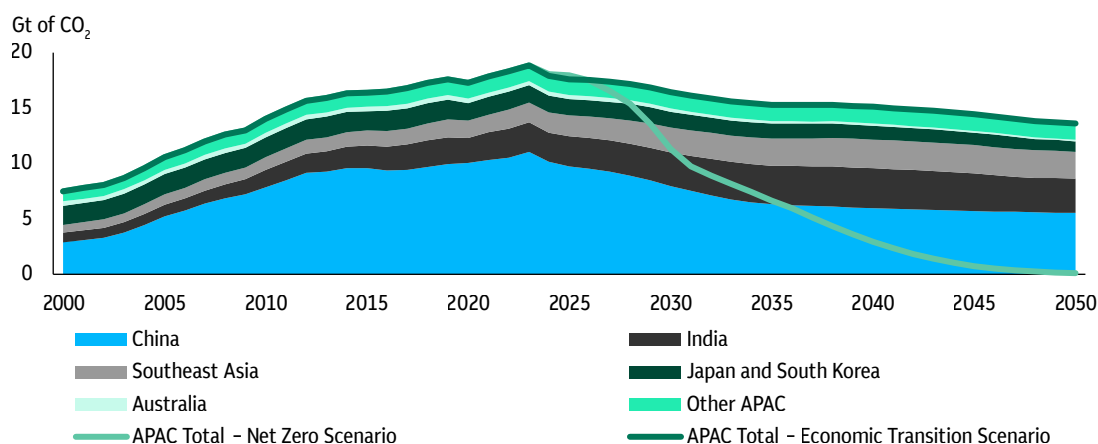


Source: Energy Institute, “2024 Statistical Review of World Energy” (2024).

45. Source: Energy Institute, “2024 Statistical Review of World Energy” (2024).

China and India, the region's most populous countries, are among the world's top emitters of carbon dioxide (CO₂). In 2023, China and India emitted 11 gigatonnes (Gt) and 3 Gt, respectively, of CO₂ (Figure 24). Other markets with a notable share of the region's CO₂ emissions include Southeast Asia, Japan, South Korea and Australia. Notably, Southeast Asia is projected to contribute 25% of the increase in global energy demand through 2025 and by the middle of the century its energy demand is expected to surpass that of the European Union (EU).⁴⁶ The correlation between energy demand and carbon emissions underscores the pressing need for accelerated decarbonisation in APAC.

Figure 24:
Energy-related CO₂ emissions have been growing rapidly in APAC, and a rapid correction is needed if the region is to achieve net zero by 2050



Source: BNEF, "New Energy Outlook 2024" (2024). Note: Economic transition scenario reflects the base-case scenario where policymakers provide no further support for clean technologies beyond existing measures and only rely on historical efficiency trends and economically competitive, commercially at-scale clean energy technologies.

In recent years, renewables capacity in APAC has been steadily rising, both in absolute terms and as a percentage of global renewable energy capacity: APAC's cumulative installed renewables capacity grew by about 1,000 gigawatts (GW) from 2019 to 2023, from 1,200 GW to 2,200 GW, and its share of global cumulative installed renewables capacity increased from 47% to 53% (Figure 25).

46. Source: International Energy Agency (IEA), "Southeast Asia's role in the global energy system is set to grow strongly over next decade" (October 2024).

Renewables' share of energy generation in APAC is also rising steadily, from 24% in 2019 to 28% in 2023.⁴⁷ Solar is the most popular type of renewable power in APAC, accounting for 46% of all installed renewables, with the rest being mostly wind (24%) and hydro (26%). That said, there remains huge opportunity for growth in renewables, especially outside of China, given their relatively low penetration of the energy mix. In 2023, renewable energy supplied only 11% of energy consumption in APAC excluding China, which was less than half the penetration rate in Europe (Figure 26). In addition, the ageing coal plants and the retirements of these assets in more developed parts of APAC, such as Australia, generate further growth and investment opportunities for renewables within the region.

Figure 25:
APAC has been accounting for an increasing share of global renewables capacity

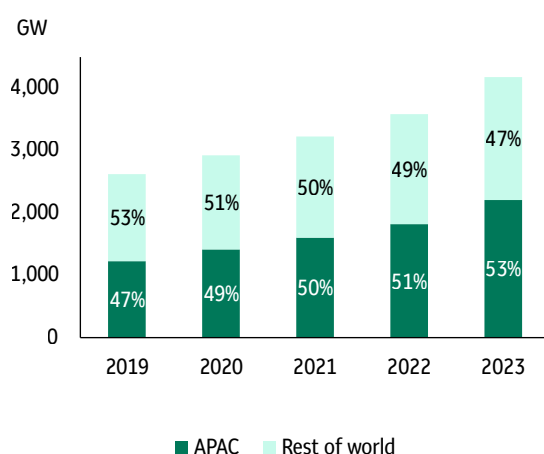
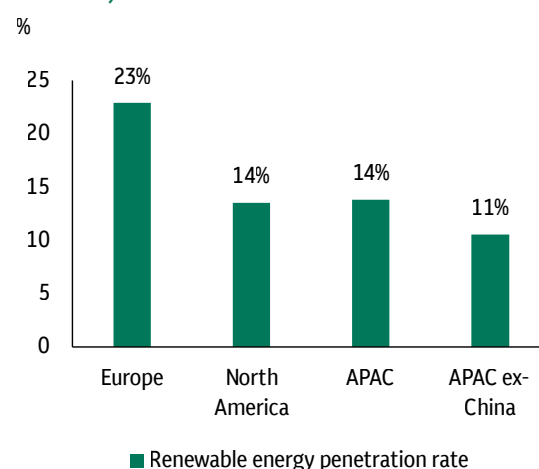


Figure 26:
Renewable energy's penetration is still relatively low in APAC



Sources: BNEF, "Capacity" (December 2024); Energy Institute, "2024 Statistical Review of World Energy" (2024).

Solar: Cheap and abundant in APAC

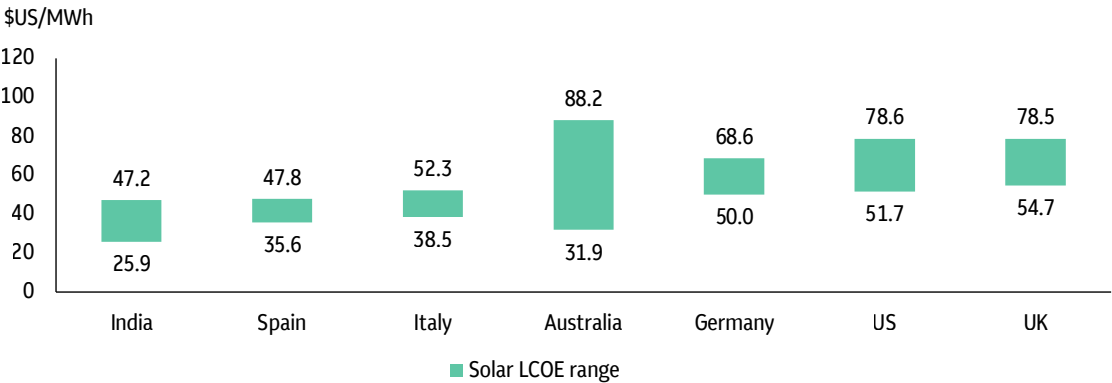
APAC encompasses some of the world's most favourable locations for solar energy production, offering low LCOE. Many countries within the region benefit from an abundance of solar radiation, which gives them an innate competitive edge in solar. For example, the annual solar radiation falling on Australia has the potential to generate a power output of approximately 15 terawatt-hours (TWh), which is about 10 times the amount that falls on Germany, France and Italy combined.⁴⁸

47. Source: BNEF, "Generation" (January 2025).

48. Source: Global Solar Atlas, "Global Photovoltaic Power Potential by Country" (2020). Figures are derived by multiplying annualised average theoretical potential (kWh/m²) and country total area and are inclusive of radiation that falls on area with no existing grid connection or transmission lines.

The abundance of solar radiation, together with falling technology cost, means that APAC has some of the lowest LCOEs in the world. In 2023, the LCOEs of fixed-axis photovoltaic (PV) systems in India and Australia were \$US34.1 per megawatt-hour (MWh) and \$US49.4 per MWh, respectively. Their LCOEs are comparable to or even lower than those in Europe and the US (Figure 27). The relatively cheap price of solar energy in APAC presents a tremendous opportunity for the region to expand its renewable energy capacity and reduce its reliance on fossil fuels.

Figure 27:
Australia and India have natural advantages in solar



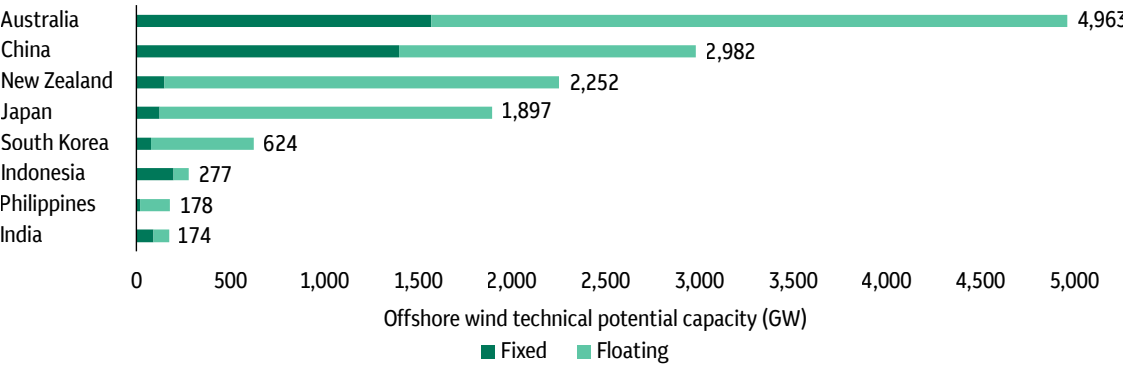
Source: BNEF, “2H 2023 LCOE Data Viewer” (December 2023).

Onshore and offshore wind: Favourable topography creates huge potential

In addition to solar, APAC also offers a competitive LCOE for wind. In 2023, the LCOE for onshore wind was \$US33/MWh and \$US45.6/MWh in China and India, respectively, more competitive than both Spain and the US where the costs are \$US53/MWh and \$US51.5/MWh, respectively.⁴⁹ The region also holds significant potential for offshore wind energy development, as indicated by estimates of technical potential based on wind speed and water depth in key APAC markets totalling over 13,000 GW (Figure 28). The dominance of fixed-bottom installations, especially in areas like China, is complemented by floating wind technology, which is becoming increasingly relevant in countries like Australia, Japan and South Korea with deeper coastal waters.

49. Source: BNEF, “2H 2023 LCOE Data Viewer” (December 2023). Figures represent a mid-scenario.

Figure 28:
APAC has huge offshore wind potential, with Australia, China and New Zealand having the largest potential capacity



Source: Global Wind Energy Council, “Discover the potential for offshore wind around the world” (2020).

Accelerated renewables deployment needed for APAC to achieve its decarbonisation targets

Decarbonisation policies are becoming increasingly ambitious in APAC, reflecting a collective commitment to transition to cleaner energy systems (Figure 29). For these targets to be met, an acceleration in renewables deployment is required. For example, in May 2024, South Korea announced a target to install 14.3 GW of offshore wind by 2030, which is about 10 times the offshore wind capacity it currently has.⁵⁰ Similarly, Japan aims to deploy 10 GW of offshore wind capacity by 2030, whereas it only had about 150 MW as at the end of 2023.⁵¹ This huge planned deployment of renewables will require substantial investment. Indeed, it is estimated that \$US89 trillion in investment is needed for APAC to achieve net zero by 2050, and \$US42.4 trillion for APAC excluding China.⁵² Overall, APAC’s journey toward decarbonisation presents plentiful investment opportunities. Its geographical advantages, competitive renewable energy costs, and ongoing policy efforts create a strong foundation for the transition to clean energy.

50. Source: Global Wind Energy Council, “Offshore wind to contribute positively to South Korea’s coastal cities economy with 87 trillion won in investments and 770,000 jobs: GWEC Report” (May 2024).
51. Source: Japan Wind Power Association, “Cumulative installed capacity of wind power in 2023 Japan: 5,213.4 MW 2,626 Units” (February 2024).
52. Source: BNEF, “New Energy Outlook 2024” (May 2024).

Figure 29:
Summary table on decarbonisation targets/policies in selected countries within APAC

Country	Target
Australia	Government recently announced \$A67 billion investment in clean energy projects to reach its target of 82% renewable generation in Australia by 2030.
Japan	Government targets net zero by 2040 and for renewables to account for 36-38% of total energy mix by 2030.
South Korea	Government targets 40% reduction in greenhouse gas (GHG) by 2030 compared with 2018 level.
India	India is targeting to reduce emissions by 45% from 2005 levels by 2030 and aims to have 500 GW of renewable energy capacity.
Malaysia	Government targets a 45% reduction in carbon intensity against GDP by 2030 compared with 2005 levels and net zero by 2050.

Sources: Australia Department of Climate Change, Energy, the Environment and Water; Japan Agency for Natural Resources and Energy; Korea Ministry of Industry and Commerce; India Ministry of New and Renewable Energy; Malaysia Ministry of Economy.

Investment opportunities in APAC: Strong growth in South Asia and improving regulatory structures in South Korea and Japan

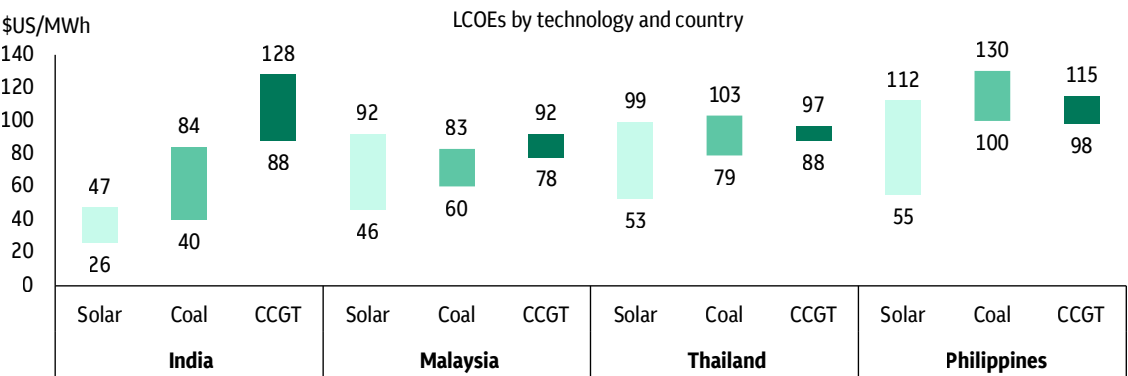
Within APAC, India and Southeast Asia – both markets experiencing rapid electricity demand growth and supply shortages – present attractive investment opportunities for renewables, in our view, especially for solar projects given their lower LCOE compared with fossil fuels in these markets (Figure 30). India, the fastest-growing major economy, is expected to see an 8% increase in electricity consumption in 2024, driven by robust GDP growth and rising cooling needs amid intensifying heatwaves.⁵³

Southeast Asia's electricity demand is projected to grow at a 4% CAGR until 2035, from more than 1,300 TWh to more than 2,000 TWh by 2035, which is more than double Japan's current electricity demand.⁵⁴ Projects that can incorporate storage options such as battery storage or flexible grid-connected electrolyzers are especially well positioned. This is because as renewables gain momentum in these markets, flexibility-enabling technologies will become increasingly important for meeting both short-term and seasonal variability in demand.

53. Source: IEA, "Electricity Mid-Year Update" (July 2024).

54. Source: IEA, "Southeast Asia Energy Outlook 2024" (October 2024).

Figure 30:
LCOEs of different technologies in India and selected countries in Southeast Asia in 2H23



Source: BNEF, "2H 2023 LCOE Data Viewer" (December 2023). CCGT = combined-cycle gas turbine.

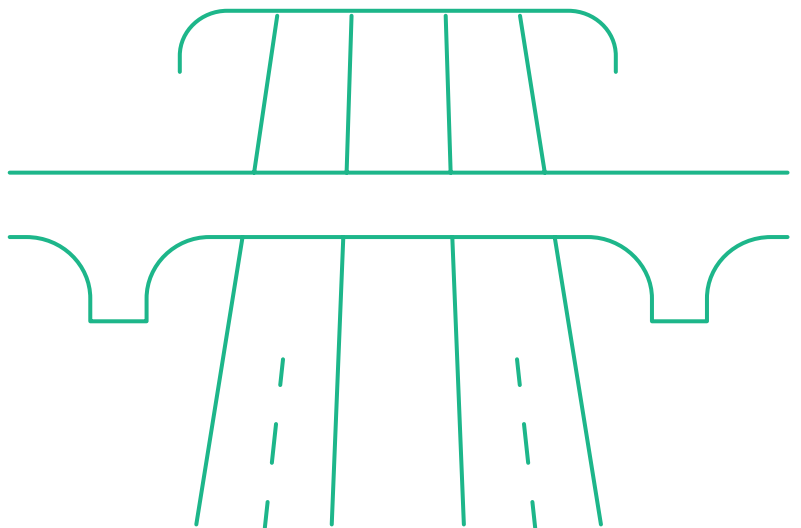
Across several APAC markets, governments are implementing reforms aimed at removing barriers to renewables projects alongside their aggressive decarbonisation targets. In South Korea, for instance, the complex regulatory framework – characterised by multiple authorities and lengthy procedural steps – has historically been an obstacle to offshore wind development. However, in August 2024, South Korea's Ministry of Trade, Industry and Energy (MOTIE) unveiled a comprehensive roadmap that outlines significant changes to the country's bidding procedures, evaluation criteria, and the overall structure of offshore wind energy projects. These measures aim to accelerate the development and supply of offshore wind power, bolstering prospects for the sector in South Korea.

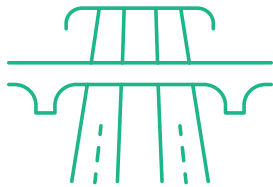
Similarly, the Japanese government has implemented annual offshore wind auctions to encourage development of offshore wind projects. Three rounds of auction have been announced thus far, involving eight locations with capacity totalling 4.5 GW.⁵⁵ These auctions also brought into focus a growing demand for vessels and the infrastructure crucial for project execution, highlighting investments in operations and maintenance and logistics as another angle to participate in Japan's growing offshore wind market.

In summary, growing electricity demand in APAC, coupled with supportive government policies presents substantial investment opportunities in renewable energy projects, particularly in India and Southeast Asia. In the offshore wind sector, regulatory reforms in South Korea and annual offshore wind auctions in Japan are accelerating development and creating new investment avenues in operations, maintenance, and logistics. These developments underscore the region's commitment to decarbonisation and its potential for significant growth in renewable energy capacity.

55. Sources: Baker McKenzie, "Review Results of Round 1 Offshore Wind Auction in Japan: Points of Further Improvements" (March 2022); White & Case, "Japan Offshore Wind Update – Round 2 Results & Round 3 Process" (April 2024).

Transport infrastructure: Demographics and rising incomes drive demand





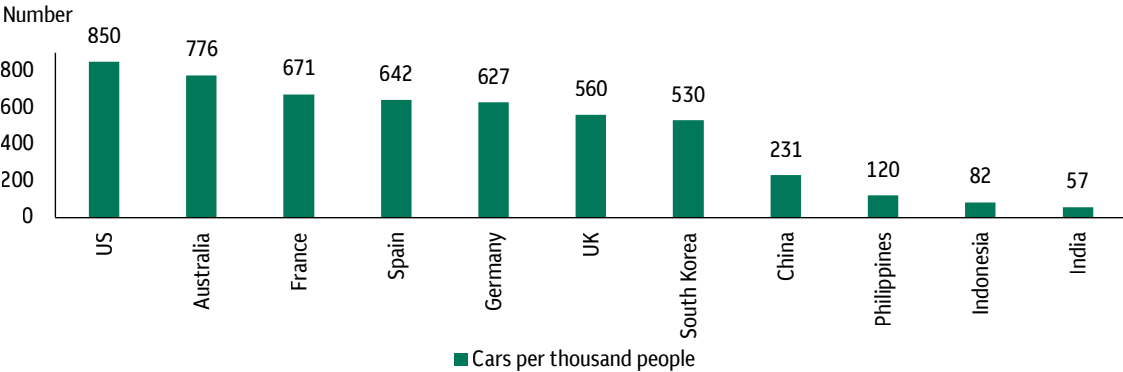
The returns on many transport infrastructure assets are linked to volume growth, which is in turn heavily influenced by GDP growth. Asia’s relatively strong long-run GDP growth outlook therefore bodes well for growth in the region’s transport assets. But other factors will also support growth in the sector, including the relatively low penetration of car ownership, limited high-quality road networks and, for air travel in particular, non-linear demand effects related to income per capita levels.

Road transport: Rising car ownership, strong GDP growth and a large infrastructure need will drive opportunities

The state of road infrastructure, both in terms of overall development and as an investable asset class, varies significantly across the APAC region. South Korea has a very sophisticated and well-established market for toll roads. In South Asia, the road infrastructure market is at earlier stage, although the low vehicle penetration, relatively small road networks, and favourable GDP growth backdrop in these countries creates a compelling long-term outlook.

Car ownership in APAC ranges from as high as 530 cars per thousand people in South Korea to as low as 57 cars per thousand in India (Figure 31). In South Asia generally, car ownership is lower than in North Asia and is a fraction of what it is in developed countries. As GDP per capita continues to increase in these countries, demand for automobiles is likely to rise, fuelling demand for the infrastructure required to facilitate this mode of transportation.

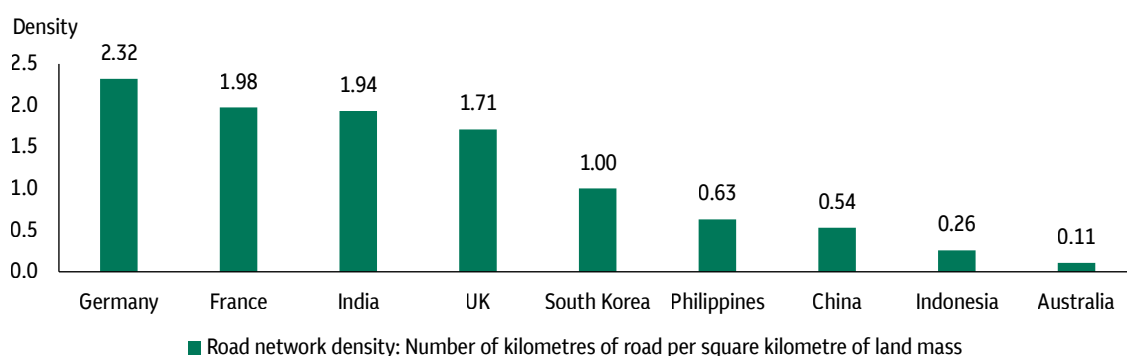
Figure 31:
South Asia has relatively low car ownership, creating significant growth potential



Source: World Population Review (January 2025).

Road infrastructure is also relatively limited. Indonesia and the Philippines have small road networks (relative to the size of the countries), with a density that is one-third to one-eighth that of Germany and France (Figure 32). India has a large road network, but much of it is poor quality and in need of significant upgrade. In short, significant investment in road infrastructure is going to be required in South Asia as car ownership increases and incomes rise.

Figure 32:
Road network density by country



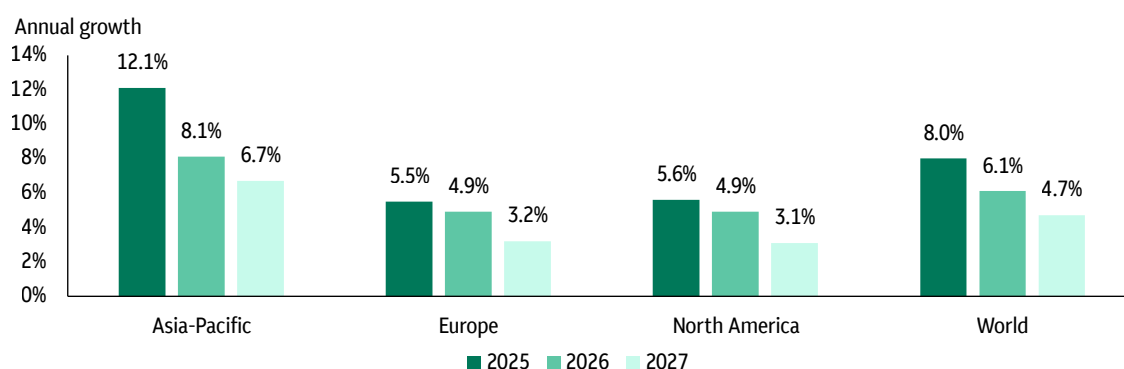
Source: World Population Review (January 2025).

Regulatory structures for road investment vary by country but generally speaking have an inflation-linked component for pricing and some volume exposure. Indonesia and India have well-established regulatory regimes, but the longest-standing and most sophisticated in the region is in South Korea, where investments in toll roads have been very popular. This model and the learnings of the government in recent decades could potentially serve as a model for other countries across the region looking to attract more private capital into the roads sector.

Air transport: Pent-up demand recovery in the near term and rising GDP per capita to drive long-term growth

Air travel was profoundly disrupted by COVID-19, and APAC was somewhat slower to remove travel restrictions than other regions, resulting in an initially more muted recovery. But there is now likely to be a period of catch-up as air travel in Asia returns rapidly to more normal levels, and this is contributing to a strong near-term growth outlook for volumes (Figure 33).

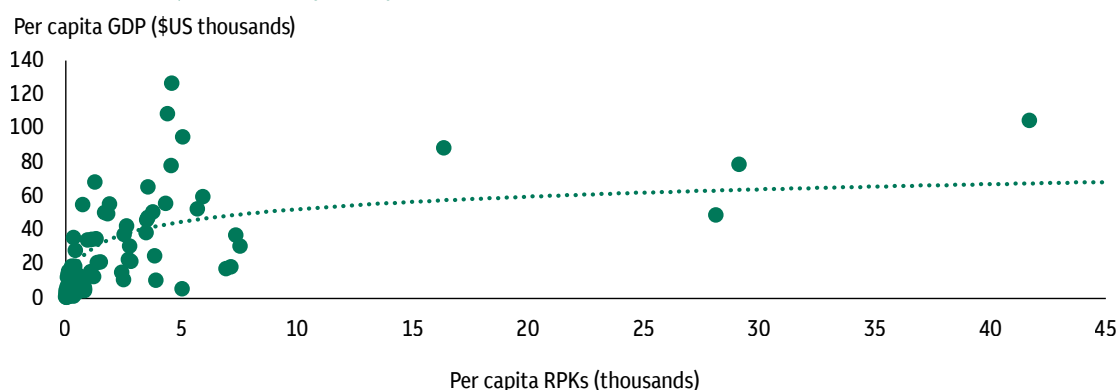
Figure 33:
Air passenger volumes near-term outlook



Source: International Air Transport Association (IATA), "Global Outlook for Air Transport" (June 2024).

The long-term outlook for air travel in APAC is even more compelling, in our view. Growth in air travel volumes is strongly linked to GDP growth,⁵⁶ so the region's relatively rapid economic growth – fuelled by productivity catch-up – suggests this is a sector likely to expand rapidly in the coming years and decades. Air travel is also a middle-class consumption option of choice, meaning that when countries enter middle-income status, spending on air travel can surge. This can be observed in cross-country data, such as in Figure 34 below, which shows that countries with higher GDP per capita see more intense air travel per capita.

Figure 34:
Travel intensity rises with per capita income

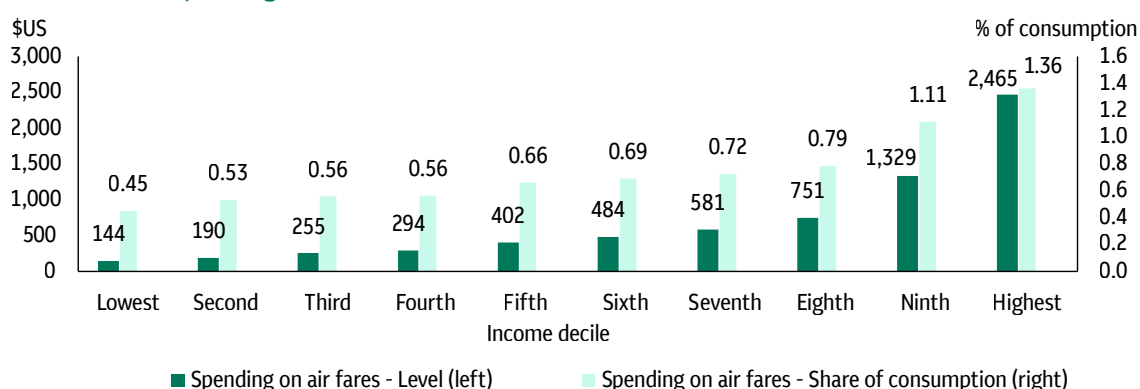


Sources: Our World in Data (January 2025), IMF (January 2025). RPKs = revenue passenger kilometres.

56. See our earlier Pathways paper, "The post-COVID-19 recovery in global air travel – The zoom effect versus pent-up demand" from April 2022 for a full analysis of the drivers of air travel.

There is also evidence in the detailed consumer spending data of developed countries that spending on air travel not only rises in absolute terms as incomes increase, but also as a share of total spending (Figure 35). This effect can turbocharge growth in air travel volume as household income rises.

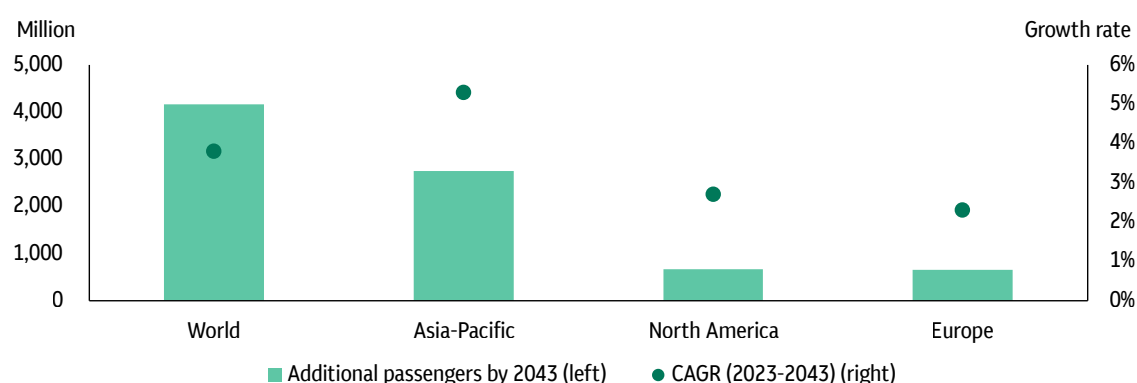
Figure 35:
US consumer spending on air fares increases – in level and share terms – as income rises



Sources: US Bureau of Labor Statistics, "Annual Consumer Expenditure Survey 2023" (accessed January 2025).

Forecasters and industry experts recognise the strong growth potential of air travel in APAC, with the International Air Transport Association (IATA) expecting APAC to see an additional 2.75 billion passengers by 2043, accounting for around two-thirds of the total growth in passengers globally (Figure 36). This is a 5% CAGR in passenger volumes, but our analysis suggests growth could be even stronger than that, particularly if APAC consumer spending on air travel rises as a share of total consumer spending as GDP per capita increases.

Figure 36:
APAC expected to dominate passenger growth globally through 2043

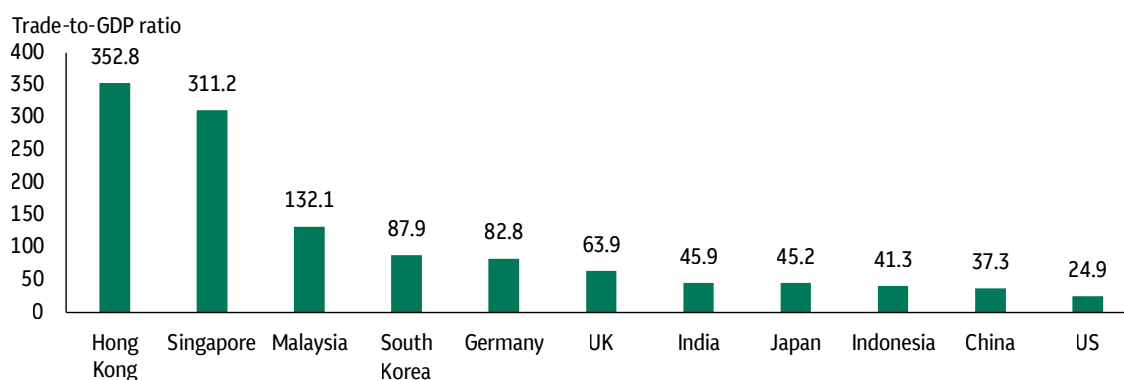


Source: IATA, "Global Outlook for Air Transport" (June 2024).

Ports and trade: Near-term uncertainty, although long-term dynamics are positive

APAC is an integral part of modern global supply chains, and a key development strategy of many countries in the region has been to provide consumer durables to the huge consumer markets of the US and Europe. The size of these markets has supported rapid growth in many Asian economies (which are much smaller by comparison and so need to grow rapidly to meet the expansion in demand in these large markets) and has meant that the region has a high trade exposure and a quite comprehensive port network and infrastructure.

Figure 37:
Trade to GDP ratios for selected countries



Source: World Bank (January 2025).

In the near term, policy uncertainty could weigh on the outlook for global trade, but over long time frames trade tends to grow at a multiple of GDP growth, a trend that is likely to reassert itself once policy uncertainty subsides. From an investor perspective, ports and related infrastructure can, for a range of reasons, be difficult to access in some countries in APAC. Most of the opportunities exist in the more developed markets, such as Australia, but it is an area of investment that could open up more over time as private capital is increasingly needed to build out more infrastructure and potentially improve operational outcomes.

Healthcare and ageing population: Opportunities in elderly and specialist care





Like the rest of the world, the APAC region's population is ageing: by 2050, its share of population aged 65 and over is expected to rise to 21.2%, up from 11.1% today.⁵⁷ This phenomenon is driven by increased life expectancy and declining fertility rates, resulting in a higher proportion of elderly individuals within the population.⁵⁸ The outlook, however, varies significantly by country, with much of North Asia – China, South Korea, Japan – facing a very rapid ageing profile, while the demographic picture in South Asia – India, the Philippines and Indonesia – shows a much more gradual ageing profile.

Japan and South Korea: Demand for elderly and specialist care is expected to grow

Countries such as Japan, South Korea, and China have the most rapidly ageing populations in APAC (Figure 38). For example, South Korea officially became a “super-aged” society in December 2024, as the share of its population aged 65 or over surpassed 20%.⁵⁹ Going forward, South Korea's portion of the elderly population is forecast to reach 39.7% in 2050, representing one of the fastest-ageing countries in the world.⁶⁰ As Japan and South Korea grapple with the challenges of an increasing number of elderly individuals, there is a growing demand for retirement homes and services.

Older populations are naturally more susceptible to chronic diseases such as dementia, diabetes, and cardiovascular conditions, which contribute significantly to higher disability. For example, among most APAC countries, the years lived with disability (YLDs) from diabetes per 100,000 population increased significantly between 2010 and 2021.⁶¹ Higher number of disabilities, coupled with longer life expectancies, drive demand for specialist care to address the healthcare needs.

57. Based on medium variant projection by United Nations (UN) World Population Prospects 2024. APAC number was calculated as a sum of Australia, New Zealand, China, Japan, India, South Korea and South-eastern Asia (based the UN definition).

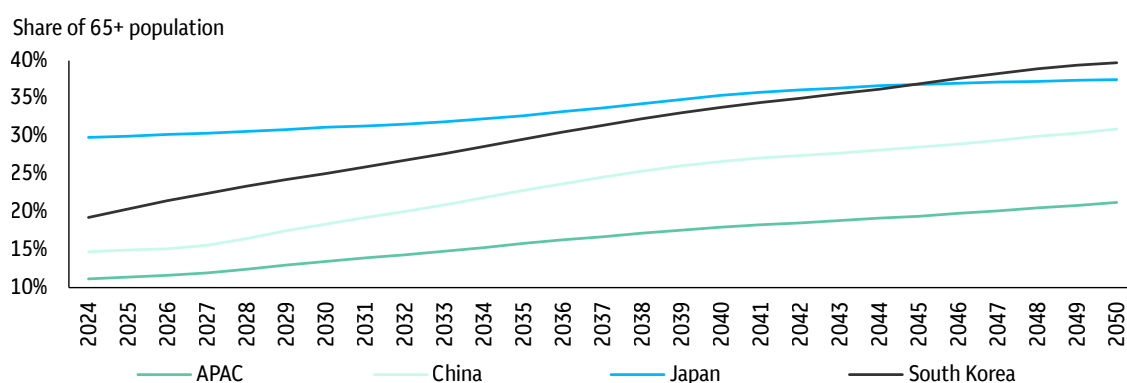
58. It is worth noting that this trend is not relevant for Southeast Asia where the ageing population is largely in line with the global average trend.

59. The UN classifies countries with more than 7% of the population 65 or older as an “aging society,” those with over 14% as an “aged society” and those with more than 20% as a “super-aged” society.

60. Based on medium variant projections by UN World Population Prospects 2024.

61. OECD, “Health at a glance: Asia Pacific 2024” report, page 73.

Figure 38:
APAC population is ageing faster than the global average



Source: UN World Population Prospects 2024.

Health expenditure to pick up on the back of fast-growing middle class

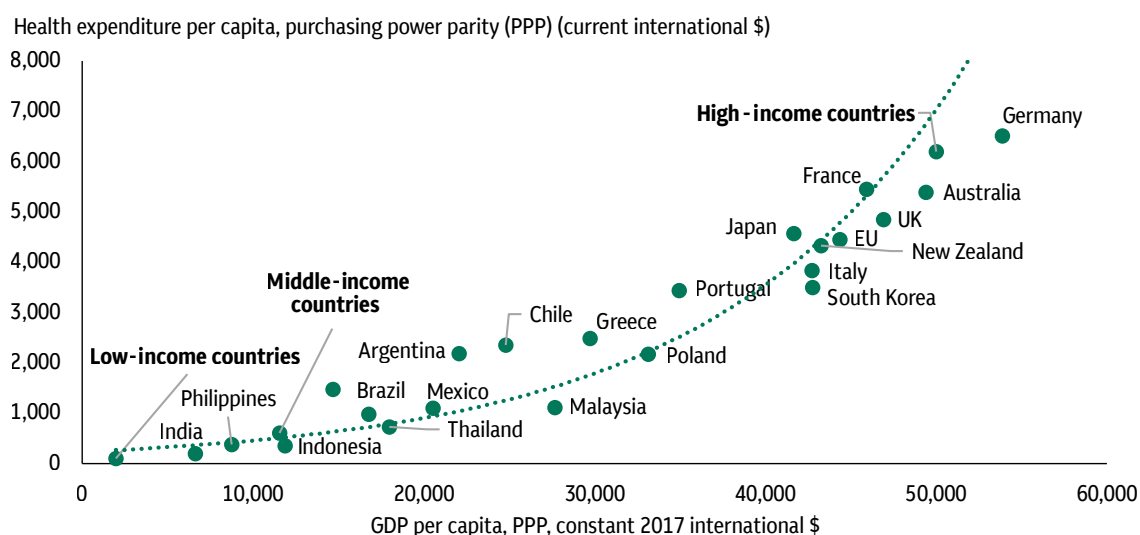
In the APAC region, current health expenditure accounted for 4.5% of GDP in low-income and lower-middle-income countries, 4.8% in upper middle-income countries, and 8.1% in high-income countries in 2021.⁶² Figure 39 suggests that there is a positive relationship between the GDP per capita and health expenditure per capita based on a large set of countries globally.⁶³ In other words, generally, the richer a country is, the greater the share of their income devoted to healthcare. The percentage of GDP spent on healthcare across the Organisation for Economic Co-operation and Development (OECD) countries is – on average – more than twice that of the APAC low- and middle-income countries (9.7% versus 4.5%).⁶⁴ As a result, we believe that the healthcare sector in APAC is poised for growth over the coming decades as the fast-growing middle class is expected to spend more on health services.

62. OECD, “Health at a glance: Asia Pacific 2024” report, page 143.

63. Based on Our World in Data, “Healthcare expenditure vs. GDP per capita” (2021).

64. OECD, “Health at a glance: Asia Pacific 2024” report, page 143.

Figure 39:
Positive relationship between the level of income and healthcare spending



Source: Our World in Data, "Healthcare expenditure vs. GDP per capita" (2021).

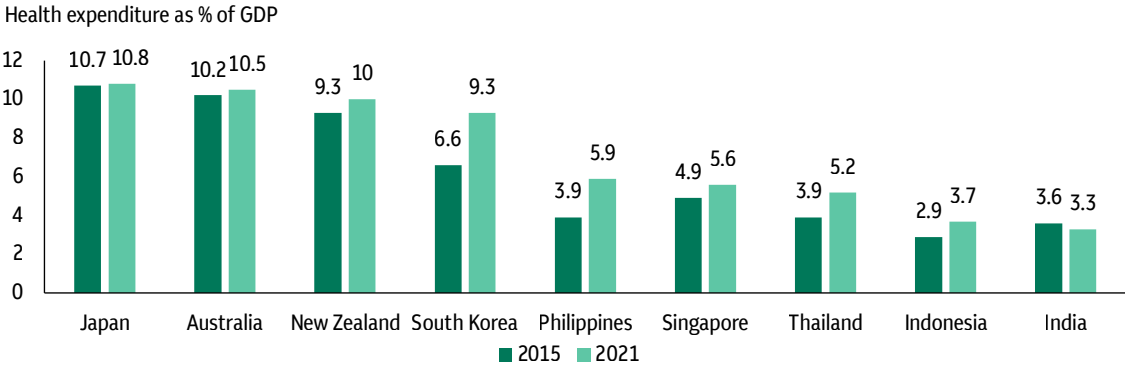
Healthcare sector across APAC is growing as a share of the economy

Overall, health expenditure as a share of GDP has been growing across the region. Figure 40 shows that most APAC countries experienced an increase in health spending relative to GDP between 2015 and 2021, with South Korea experiencing the largest increase from 6.6% of GDP in 2015 to 9.3% in 2021.⁶⁵ While this trend has been influenced by the COVID-19 pandemic, it is also in line with expectations: as discussed earlier, as countries grow richer and populations get older, health spending increases. The burden of paying for higher health spending largely depends on financing arrangements in place.

65. OECD, "Health at a glance: Asia Pacific 2024" report.

Financing arrangements for healthcare services vary significantly by country. In ANZ and Japan, more than 85% of all health expenditure was paid for through government schemes and compulsory health insurance in 2021. By contrast, in India, the Philippines and Malaysia, more than 30% of health expenditure was paid out of pocket⁶⁶ by households.⁶⁷ The financing schemes for healthcare services across APAC are complex, but overall the ageing of populations across the region (and particularly the rapid ageing taking place in North Asia), combined with rising income per capita (enhancing the ability to pay an increasing health expenditure per capita) means there is a powerful structural growth backdrop for private capital looking to invest in this area.

Figure 40:
APAC health expenditure as % of GDP has increased in recent years



Source: WHO Global Health Expenditure Database, OECD Health Statistics 2024.

66. Out-of-pocket payments are expenditures borne directly by patients and include cost-sharing arrangements and any informal payments to healthcare providers, but excludes prepayment to any insurance schemes.
67. World Health Organization (WHO) Global Health Expenditure Database; OECD Health Statistics 2024.

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