Asia and the Pacific's

Transport Infrastructure and Investment Outlook 2035

BEEHIVE.GOVT.NZ

Asian Transport Observatory

An Asian Transport Observatory (ATO) Publication

Asia and the Pacific's Transport Infrastructure and Investment Outlook 2035

February 2025

Asian Transport Observatory (2025). Asia and the Pacific's Transport Infrastructure and Investment Outlook 2035.https://asiantransportobservatory.org/

Contents

Photo: John Alvin Merin

Summary

Transport sectors across the world come with their own unique set of problems, challenges and needs. The same stands true for investment planning in the transport sector across regions. Determining the investment required by the transport sector in different parts of the world requires not only periodic re-evaluation, but also an evolving perspective. As times and mobility patterns change, so does the need to rejig priorities around investment in this sector.

In the corresponding paper, an attempt has been made to forecast the investment needs of the transport sector in Asia and the Pacific. But forecasting is a tricky business. Attempts at making predictions with any certainty are usually met with lacking comprehensive and comparable data on transport infrastructure spending across countries and the absence of standardized reporting practices, making the exercise an extremely difficult one.

Which is where the Asian Transport Observatory (ATO) comes in. The ATO was initiated by the Asian Development Bank (ADB) and subsequently supported by the Asian Infrastructure Investment Bank (AIIB). The ATO, an open-access platform, covers 51 economies across the Asia-Pacific and more than 600 national-level indicators to provide valuable data that is crucial in supporting the region's transport planning and decision-making.

In this paper, the ATO attempts to forecast investment needs in the Asia-Pacific transport sector for the next decade, until the year 2035. This study builds on an existing ATO study published in 2022, covering the period between 2000 and 2020. A lot has changed since then; for one, the COVID-19 pandemic changed the patterns of economic development, mobility and construction and, as a result, our priorities. This paper takes into account revised economic growth trajectories in the post-COVID world, uses new data and methodologies (especially on ports and airports), and includes the increased role of the transport sector in supporting landmark international agreements and objectives, such as the 2030 Sustainable Development Goals (SDGs) and the Paris Agreement.

Photo: Peter Chirko

To give readers a brief look into our methodology and process: our transport infrastructure investment estimate covers spending on new construction, improving existing networks, maintenance, and additional increments for climate-proofing. The estimation process leverages historical relationships between transport infrastructure development and key economic and demographic factors such as GDP, population density, and level of urbanization. We include policy targets and current projects in planning and execution. We do a deep dive and estimate demand for various transport infrastructure sub-sectors, determining construction and maintenance costs using cost multipliers based on the ATO cost database, adjusted for income levels. Overall, this exploration reviews the latest data on infrastructure spending across asset classes, updates projections of infrastructure demand, and pinpoints the gaps.

Charts and graphs throughout the paper provide clear insights into, for example, how spending on a particular mode has changed over the years or how different sub-sectors compare with each other. A number of key insights emerge from our exercise; for instance, our analysis shows that investment in urban rail will reach parity with heavy rail infrastructure investment for the first time by 2035, and that investment in the maintenance of transport assets will continue to remain low.

There is more such in-depth investigation across modes of transportation and subregions. We look at data relating to road, rail, and urban transport projects like Bus Rapid Transit (BRT), Light Rail Transit (LRT), metro, maritime ports, and airports in detail for a comprehensive and comparative analysis. We also look closely at regions like India, the People's Republic of China, and Central Asia as illustrative of how different economies choose to invest; for instance, a landlocked Central Asia doesn't need to invest in ports but has an extensive network of airports.

Ultimately, the ATO utilizes all the data available to it across time, sub-sectors and subregions to answer one central question:

How much will Asia invest in transport infrastructure over the next decade?

Background

“How much will Asia invest in transport infrastructure over the next decade?”

This is the central question being addressed in this report. Forecasting future transport infrastructure investment needs in Asia is crucial for effective decision-making. While providing a “panoramic overview,” such estimates offer valuable insights into which immediate development efforts need to be prioritized and targeted. Despite its obvious importance, the question proves surprisingly challenging to address. A significant lack of comprehensive and comparable data on transport infrastructure spending across countries and the absence of standardized reporting practices make generating precise forecasts extremely difficult.

To overcome these data gaps, the Asian Development Bank (ADB) initiated the Asian Transport Observatory (ATO), which the Asian Infrastructure Investment Bank (AIIB) has been subsequently supporting. This open-access platform, covering 51 economies and more than 600 national-level indicators, provides valuable data that is instrumental in informing the region's transport planning and decision-making. The ATO supports the ADB's and the AIIB’s transport initiatives and assists governments in strategic transport planning by providing a unique knowledge base and monitoring progress towards critical objectives such as the 2030 Sustainable Development Goals (SDGs), the Paris Agreement, and other transport-relevant international and regional declarations and initiatives.

In 2022, the ATO published a study on transport infrastructure needs in Asia, analyzing historical trends from 2000 and projecting future requirements up to 2030. The study, titled "Asian Transport 2030 Outlook," encompassed 51 Asian economies and focused on three sub-sectors: urban transport, road transport, and railways. The total investment needed for the period was estimated at US$ 6.8 trillion (current), or 1.6% of Asia and the Pacific’s GDP. The study identified that despite its vast size and geographical diversity, the Asia-Pacific region trailed significantly behind developed countries in providing necessary transport infrastructure across most sub-sectors. This gap is exacerbated by the region's diverse population growth patterns, economic development, and urbanization, leading to significant variations in infrastructure development across nations.

Photo: Rangga Cahya Nugraha

This study is an update to the original study. It now covers investment needs in Asia until 2035 and considers revised economic growth trajectories in the post-COVID world, the availability of better data and methodologies especially on ports and airports, and the increased role of the transport sector in tackling the SDGs and the Paris Agreement[1].

The unique contribution of this study lies in its fine-grained analysis of transport infrastructure, providing a detailed baseline and forecasts for eight sub-sectors in 51 economies across a 35-year horizon (2000 to 2035). This level of detail offers a novel perspective on the region's future transport landscape. The transport infrastructure investment estimate covers spending on new construction, improving existing networks, maintenance, and additional increments for climate-proofing. It includes road, rail, and urban transport projects like Bus Rapid Transit (BRT), Light Rail Transit (LRT), metro, maritime ports, and airports. The estimation process adopts a robust bottom-up approach. It leverages historical relationships between transport infrastructure development and key economic and demographic factors such as GDP, population density, and level of urbanization. Specifically, we estimate demand for various transport infrastructure sub-sectors and determine construction and maintenance costs using cost multipliers based on the ATO cost database, adjusted for income levels[2]. These sub-sector estimates are then aggregated to project total infrastructure investments for the Asia-Pacific region at subregional and sector levels. Overall, this exploration reviews the latest data on infrastructure spending across asset classes, updates projections of infrastructure demand, and pinpoints the gaps.

The unique contribution of this study lies in its fine-grained analysis of transport infrastructure, providing a detailed baseline and forecasts for eight sub-sectors in 51 economies across a 35-year horizon (2000 to 2035).

It is important to note that our approach has several limitations. First, it assumes a continuation of existing policies and historical trends and may not reflect optimal infrastructure spending aligned with ambitious goals like the SDGs or the Paris Agreement. It only reveals the gap between the SDGs, Paris Agreement goals, and current trends. Second, our analysis could lead to pronounced biases in estimates of infrastructure needs if the historical relationship fails to hold in the future. Third, climate change will significantly impact future infrastructure needs; our estimates include only a minor increment based on previous studies to roughly account for climate-proofing. The full extent of climate change's direct and indirect impacts is challenging to quantify comprehensively. Fourth, in this report, the implications of the energy transition on infrastructure costs are not included. Fifth, we do not account for sources of transport financing. Infrastructure can only be constructed if adequate and accessible finance is available. And

[1] A recent assessment of the Asian transport sector's contribution to the Sustainable Development Goals (SDGs) suggests that the Asian transport sector faces substantial challenges in reaching the 2030 SDG's.
[2] https://asiantransportobservatory.org/cost/

sixth, this study primarily examines how economic growth fuels infrastructure demand. Let us keep in mind, however, that this is a simplification, as infrastructure development can also be a powerful engine for economic growth, suggesting a more complex, potentially two-way relationship.

To enhance the rigor of our analysis, we need to move beyond the conventional assumption that increased infrastructure invariably leads to improved outcomes. Thus, our analysis incorporates real-world data and policy considerations. This includes integrating 2,300 existing infrastructure projects, accounting for established policy targets, utilizing two decades of data from Asia for regression analysis where relevant, and factoring in potential climate change impacts to produce climate-adjusted investment estimates. This comprehensive approach provides a nuanced and grounded perspective on infrastructure needs and projections.

Multifaceted approach enhances consistency of projections by accounting for both current trends and anticipated future disruptions.

Individual models were developed for the eight sub-sectors (road, rail, and urban transport projects like BRT, LRT, metro, maritime ports, and airports) examined in this study. This process was informed by a general-to-specific methodology to identify the principal measurable factors influencing infrastructure demand within each sub-sector. Based on the granularity and quality of the data, we modelled all the countries together in some places and, in other places, developed separate models for each income group. This multifaceted approach enhances the consistency of our projections by accounting for both current trends and anticipated future disruptions.

The methodology involves the following key steps (Figure 1):

Figure 1. Illustration of the Methodology

Is Asia closing the road infrastructure gap?

With rising income levels and growing motorization, Asian economies are building roads faster. Road kilometers in Asia and the Pacific increased by 3.1 million from 2000 to 2010 and by 4.5 million from 2010 to 2020. In 2000, the share of road infrastructure was 11% primary, 10% secondary, and 79% tertiary roads. If we extrapolate the historical relationship of road infrastructure with GDP and population density using a clustered and compositional regression model[3], we estimate that total road kilometers could increase from 21 million kilometers in 2020 to 26 million kilometers by 2035, an increase of 5 million kilometers. However, this growth remains inadequate considering the still significant need to provide proper access to populations in developing Asia. We estimate that the provision of road infrastructure is highly uneven across Asia and, in most instances, lags—and will continue to lag—the Global North.

Between 2025 and 2035, 57% of road infrastructure growth could be in upper-middle-income economies, followed by low and lower-middle-income at 40%, with high-income only sharing 3% of road infrastructure growth (Figure 2). However, this growth translates to uneven gains in road availability per person. While most new roads will be built in developing Asian economies, the greatest per capita benefits will accrue to those already possessing well-developed road networks (due to lower population growth). However, these aggregate figures mask wide diversity and imbalance in road development across the countries.

Regarding infrastructure typology, primary roads such as national highways and expressways comprised 12% of road infrastructure in 2020. By 2035, the share of primary roads could increase to 14% (an increase of 1 million kilometers). Secondary road share could increase marginally, from 12% to 13%, between 2020 and 2035 (an increase of 800 thousand kilometers). The share of tertiary roads is projected to decline, with only 2.8 million kilometers added between 2020 and 2035. The share of paved roads could increase from 67% in 2020 to 73% in 2025 and 79% by 2035, indicating improved road asset quality.

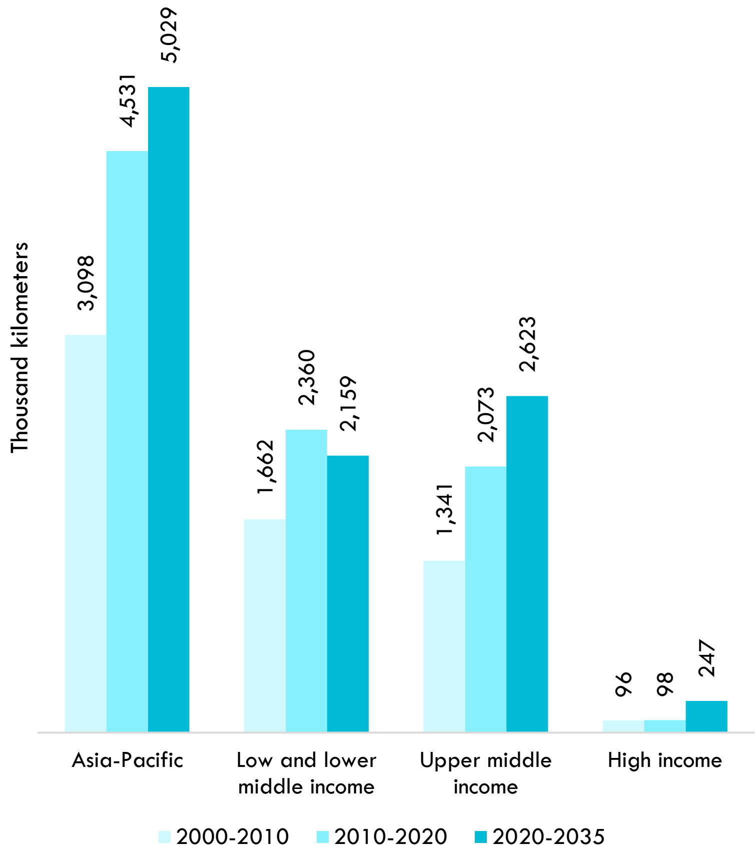

Figure 2. Road infrastructure kilometers added

[3] Road infrastructure kilometers were projected using separate linear regression models developed for three clusters of countries grouped by population density. Road hierarchy and pavement ratio were estimated using a Dirichlet regression model and a beta regression model, respectively.

Our estimate of a 1.5% annual increase from 2020 to 2030 is in range with other international estimates, such as from the AIIB (1.9%) (AIIB, 2018) and Vivien Fisch et al. (0.5% to 4.2%) (HAL, 2020). Our estimates reveal that even after adding 5 million kilometers by 2035, the per capita road availability would be significantly lower than the current 2020 levels in other regions. By 2035, we estimate that all income groups of countries, including upper-middle-income and high-income Asian countries, would continue to have lower road infrastructure per capita when compared with other regions, except when compared with Africa (Figure 3).

Our estimates suggest that all things being equal, a country's road infrastructure typically grows with increasing income, but the network's growth rate tapers off as GDP per capita reaches developed levels. Growth is intense in lower-income levels compared with higher-income levels. Thus, road construction's relation with economic growth isn't linear but offers a diminishing return effect, indicating optimality (Figure 4).

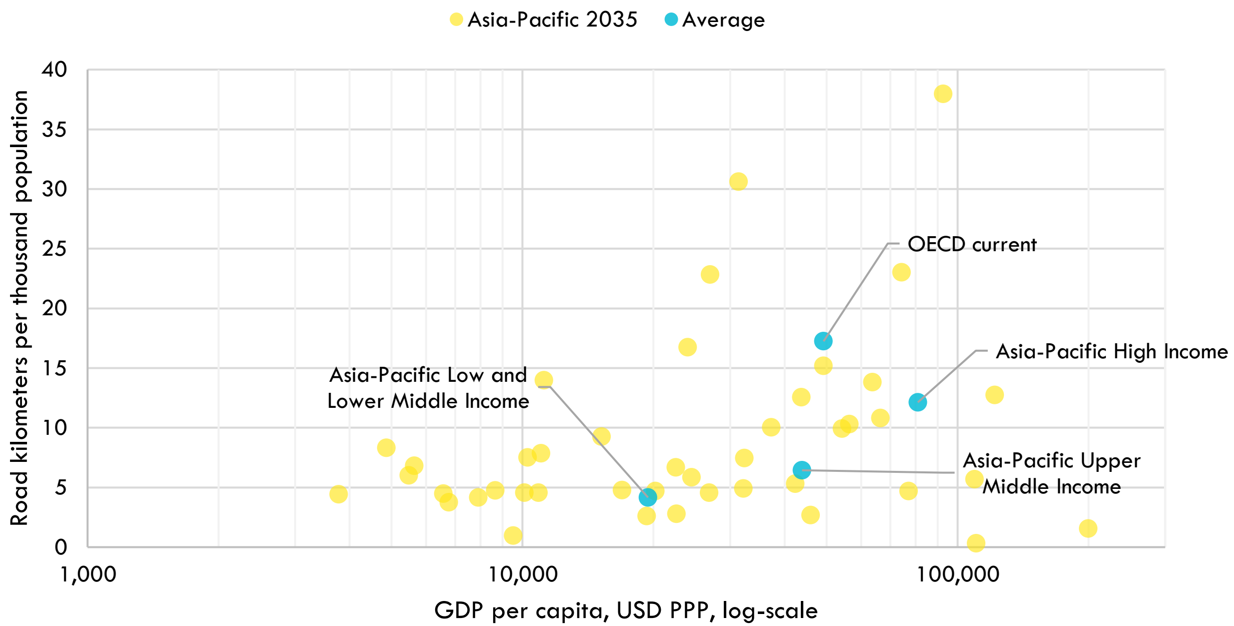

Figure 3. Road infrastructure availability

Provision of road infrastructure is highly uneven across Asia and, in most instances, lags behind the Global North

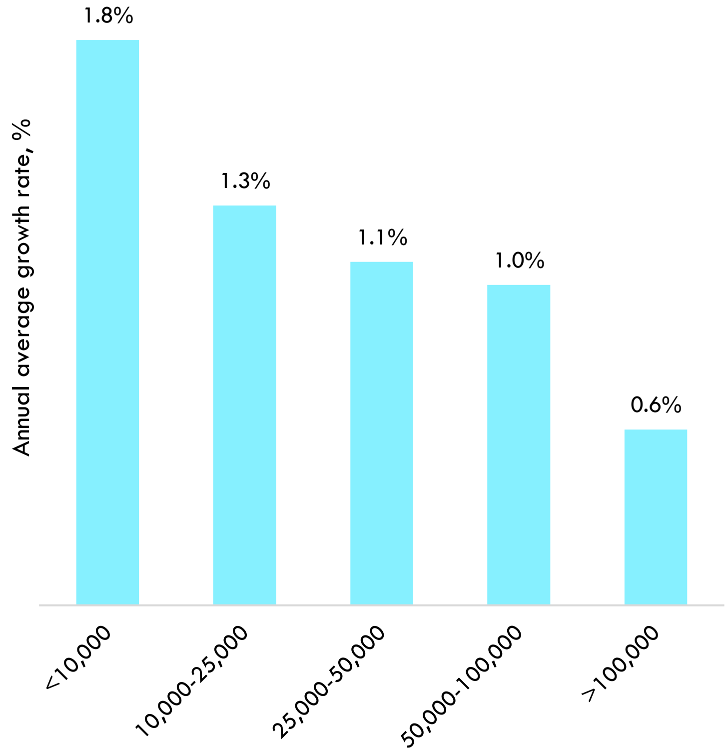

Figure 4. Road infrastructure average growth rate from 2020 to 2035, by GDP per capita (USD)

Is Asia closing the heavy railway infrastructure gap?

Heavy rail serves medium- to long-distance travel, up to 250 kph speeds, and shorter-distance suburban commutes. In Asia and the Pacific, heavy railway infrastructure growth rates have historically been modest compared to the road sector. As of 2024, Asia's railway network is estimated to be about 520 thousand kilometers. We estimate that by 2035, it will increase to 590 thousand kilometers (i.e. an increase of about 70 thousand kilometers). However, it is crucial to note the significant disparities in historical railway network growth across different economies. While substantial expansions have occurred in countries such as the People's Republic of China, the Russian Federation, India, and Turkmenistan, marginal decreases have been observed in Australia, Japan, Armenia, and Azerbaijan. Accordingly, the future development trajectory of heavy rail in Asia and the Pacific will be primarily shaped by policy decisions rather than solely by economic or demographic factors.

To get a realistic overview of railway's future growth, the ATO utilized detailed project data from the IRJ Pro database, which contains around 500 conventional railway projects at various implementation stages (under construction, planned, or in long-term planning stages), along with comprehensive information on proposed rail lengths and the estimated starting year of operations. This data was combined with published policy targets based on the ATO's policy database to estimate future infrastructure growth.

We estimate that Asia's heavy railway kilometers could increase from 493 thousand kilometers in 2020 to 589 thousand kilometers by 2035, an increase of 95 thousand kilometers. Most of this railway expansion, i.e., about 80% of this growth, would be in three countries—the PRC, India, and the Russian Federation (Figure 5). This shows that while the region's railway infrastructure has improved, it remains inadequate, and growth does not match the road sector (especially in upper-middle-income and high-income economies) with heavy rail kilometers average annual growth rate of 1.2% between 2020 and 2035 compared to 1.4% annual average growth of road kilometers (Figure 6).

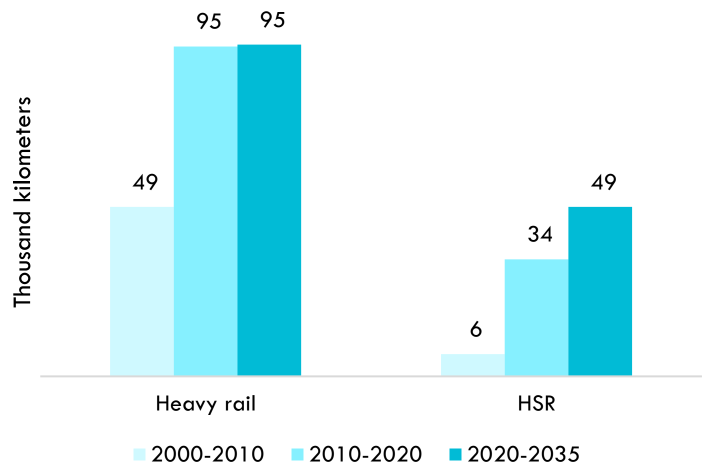

Figure 5. Heavy rail (including HSR) infrastructure kilometers added

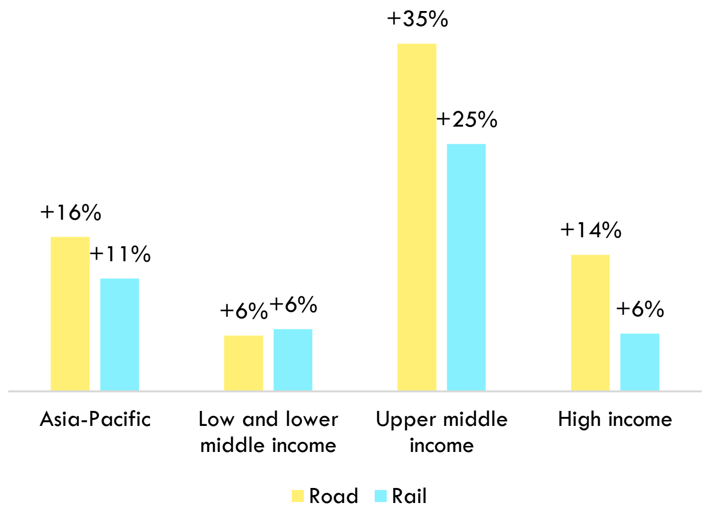

Figure 6. Improvement in infrastructure availability per capita from 2020 to 2035, road vs. rail

Between 2020 and 2035, 71% of railway infrastructure growth will be in upper-middle-income economies, followed by low and lower-middle income at 27%, with high-income only sharing 2% of railway infrastructure growth. However, this growth isn't uniform; it translates to uneven gains in railway per capita availability. While all income groups will see some improvement, upper-middle-income economies will see significant gains, rising from 180 to 226 kilometers per million population. In contrast, low and lower-middle-income economies will see only a marginal increase from 46 to 49 kilometers per million population. Across both income levels, these are significantly lower than current OECD levels of 342 kilometers per million people (Figure 7).

Our estimate of a 2.7% annual increase from 2020 to 2030 is in range with other international estimates from the AIIB (3.2%) (AIIB, 2018) and Vivien Fisch et al. (3% to 6.7%) (HAL, 2020).

Future development trajectory of heavy rail in Asia and the Pacific will be primarily shaped by policy decisions rather than solely by economic or demographic factors.

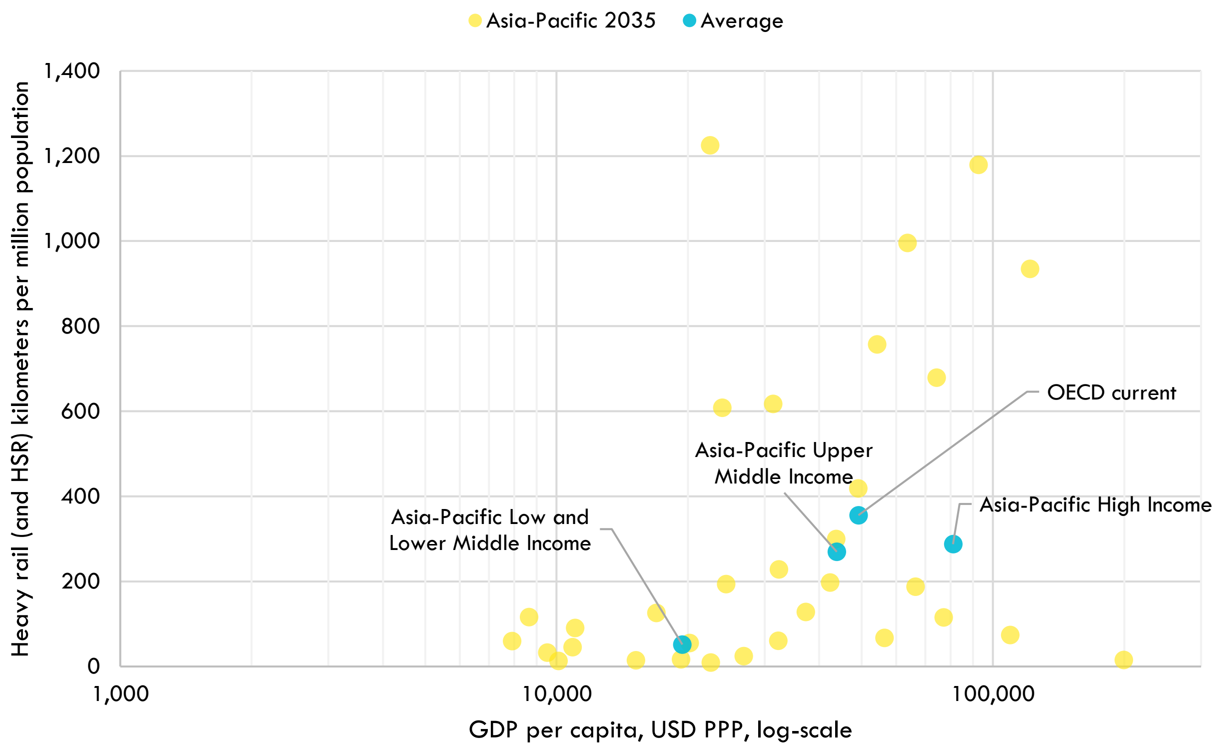

Figure 7. Heavy rail (including HSR) infrastructure availability (2035)

High-speed rail networks have rapidly expanded in the region. Since the launch of Japan's first high-speed rail (HSR) system in 1964, Asia has added 6,500 kilometers of HSR network between 2000 and 2010 and 34,000 kilometers between 2010 and 2020, with the PRC alone expanding more than 38,000 kilometers—more than the rest of the world combined.

The availability of HSR infrastructure and services expands intercity travel mode choices, thereby providing competition to the aviation and road sector, especially for medium-distance trips up to 750 kilometers. Dedicated HSR systems can also free up serious capacity on conventional heavy railway systems for passenger and freight services. Building on the PRC and Japan's considerable experience in constructing and operating HSR lines, several other Asian economies have started building, or are planning to develop, HSR systems at significantly lower income levels than countries in the Global North. This demonstrates the technology's viability in Asia, even at lower-income levels than typically seen in developed countries.

Based on existing construction plans and proposals, we estimate that by 2035, Asia could have an HSR network length of 91 thousand kilometers, an increase of about 49 thousand kilometers from 2020 (much higher than the combined 2000-to-2020 increase). Between 2020 and 2035, 15 Asia-Pacific countries, including Vietnam, India, Myanmar, Singapore, and Australia, could operate an HSR network.

This means that about one-third of all railway expansion in Asia from 2020 to 2035 would consist of high-speed rail. Our estimate of 3% annual growth is in range with other international estimates from the AIIB (3.2%) (AIIB, 2018) and Vivien Fisch et al. (3% to 6.7%) (HAL, 2020) .

Estimates suggest about one-third of all railway expansion in Asia from 2020 to 2035 would consist of high-speed rail.

Photo: FUNET

Closing the urban rapid transit gap

Urban rapid transit encompasses high-capacity modes such as light rail transit (LRT), metro systems, and bus rapid transit (BRT). As of 2025, 20 Asia-Pacific countries have a metro or LRT network. Research indicates that globally, on average, it takes about 10 to 12 years for cities to move from approving a metro or LRT line to opening the first line . This report analyses the current pipeline of planned projects to assess the future growth potential of metro and LRT infrastructure in the region.

Using the IRJ Pro database in combination with known country policy targets, we estimate that between 2025 and 2035, the Asia-Pacific region could build 15 thousand kilometers of metro and 2 thousand kilometers of LRT lines (Figure 8). This projected growth represents a potential expansion of the region's metro and LRT infrastructure, matching the development achieved over the past 25 years. An estimated 68% of upcoming urban railway expansion is concentrated in upper-middle-income economies, with East Asia emerging as a primary hub for these projects. By 2035, up to 26 Asia-Pacific countries could have a metro or LRT network.

Our BRT projections are based on the historical relationship (regression) of global BRT network length with GDP and urban population. We further integrated published policy targets for BRT systems across Asia and the Pacific countries. Based on this methodology, we estimate that between 2025 and 2035, the Asia-Pacific region could build 3 thousand kilometers of BRT lines.

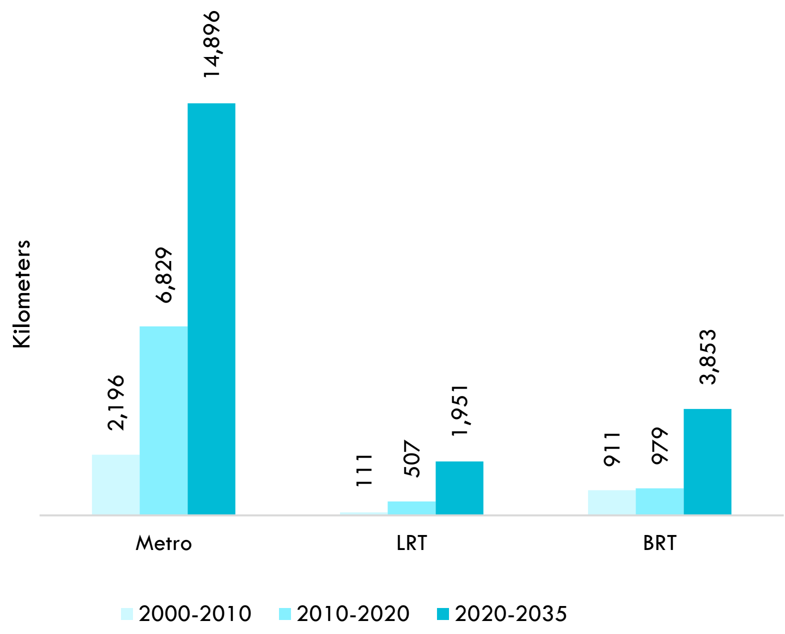

Figure 8. Urban rapid transit kilometers added

[4] https://www.nicolasgendroncarrier.com/_pdf/Gendron-Carrier_etal_WP_2020.pdf
[5] The database contains 1,000 metro and LRT projects at various implementation stages (under construction, planned, or in long-term planning stages), along with detailed information on proposed network lengths and the estimated starting year of operations.

The amount of rapid urban transit infrastructure varies significantly among Asian countries. For example, in 2020, the low and lower-middle-income, upper-middle-income, and high-income economies had about 2, 8, and 9 kilometers of rapid urban transport infrastructure per million urban population respectively. By 2035, this is expected to be about 6, 17, and 18 kilometers per million urban population. The average urban rapid transit kilometer availability per capita in Asia-Pacific will increase from 6 in 2020 to 12 kilometers per million population by 2035. To compare, OECD countries reached a similar availability level of 12 kilometers per million in 2016 while having a 40% higher GDP per capita (Figure 9).

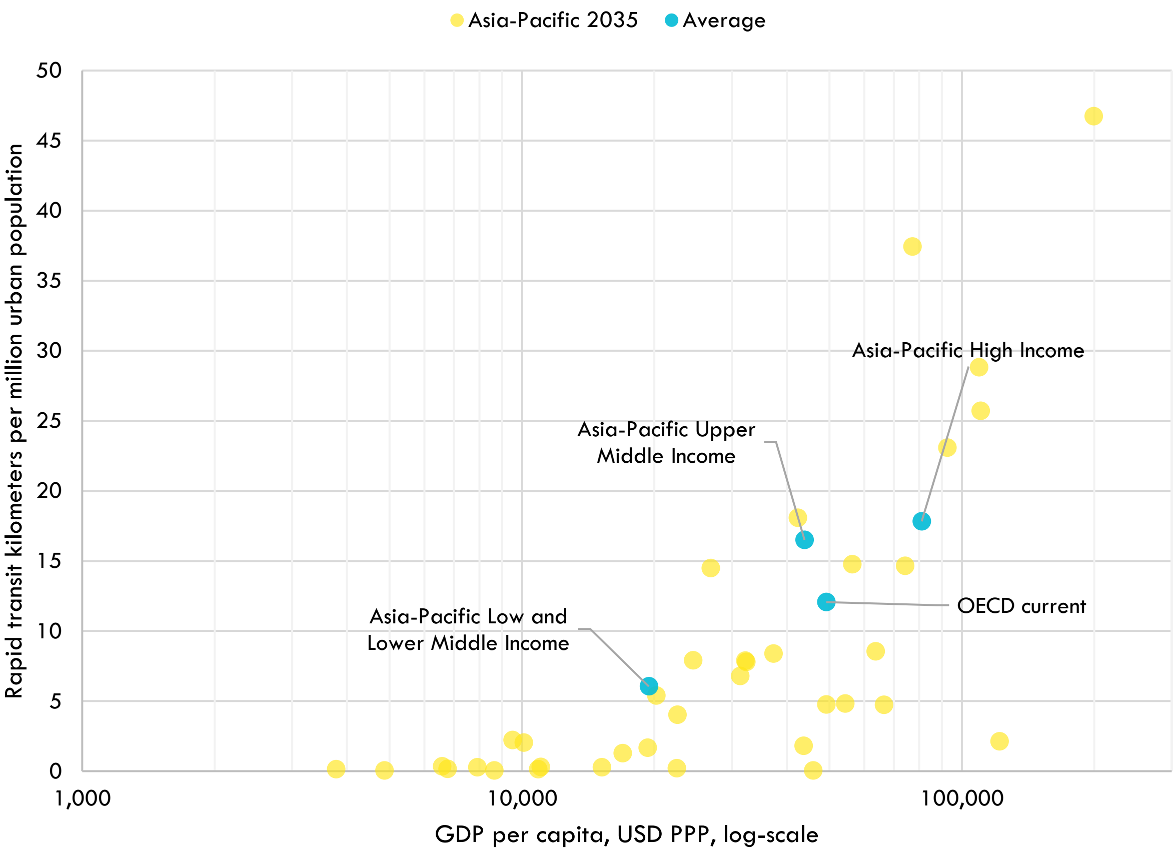

Figure 9. Urban rapid transit infrastructure availability per capita (2035)

Average urban rapid transit kilometer availability per capita in Asia-Pacific will increase from 6 in 2020 to 12 kilometers per million population by 2035- OECD countries reached a similar availability in 2016 while having a 40% higher GDP per capita.

Port expansion in Asia and the Pacific

Port infrastructure projections depend on future trade dictated by the mix and quantity of commodities traded, corresponding port handling techniques, and the necessary adjustments for sea-level rise. For this study, we have utilized existing port infrastructure projections by Hanson & Nicholls (2020) that investigate different climate policy scenarios and their impact on the type and amount of future maritime trade. The estimates suggest that the port area in Asia-Pacific could potentially expand from 900 sq km of port area in 2020 to 1,200 sq km by 2035 (Figure 10) —about a 35% increase, which will be much faster than Europe and North America—at a 28% increase from 2020 to 2035.

Within the Asia-Pacific region, high-income economies are expected to account for 41% of the infrastructure expansion, followed by upper-middle-income economies (36%) and low and lower-middle-income economies (23%). By 2035, East Asia is projected to hold the largest share of the region's port infrastructure area (approximately 640 sq km), with Southeast Asia following at 290 sq km.

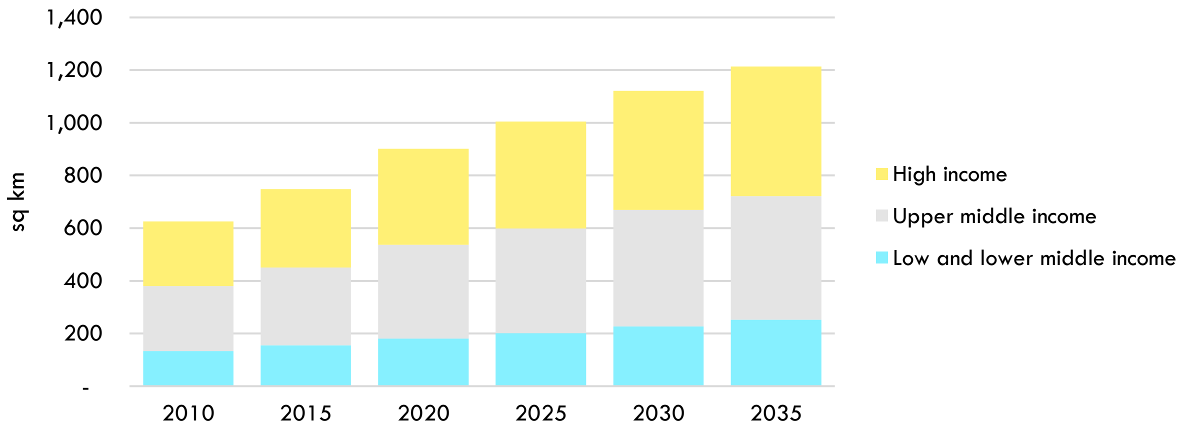

Figure 10. Port infrastructure area projections

Photo: Nathan Cima

Airport expansion in Asia and the Pacific

Predicting airport infrastructure expansion is challenging; the heterogeneity of travel demand necessitates a nuanced understanding of specific demand drivers, including competition from rail and high-speed rail. Comprehensive econometric modelling has proven valuable for travel demand forecasting. However, this requires access to extensive datasets and corresponding detailed modelling that captures travel demand dynamics. For this analysis, we employ a linear regression model utilizing global data on aerodrome area (Nirandjan et al., 2022) as the response variable, and country GDP, total population, and urban population as predictors.

Our projections indicate a substantial increase in aerodrome area, from 6,000 sq km in 2022 to 21,000 sq km by 2035. Notably, 90% of this growth is anticipated to originate from low to upper-middle-income economies, with the PRC and India leading the expansion at 600% and 800% respectively. Conversely, landlocked economies in the Asia-Pacific region are projected to experience only a 3% increase in aerodrome area between 2022 and 2035, attributed to moderate growth in socio-economic factors.

90% of the growth in aerodrome area is anticipated to originate from low to upper-middle-income economies-PRC and India leading the expansion

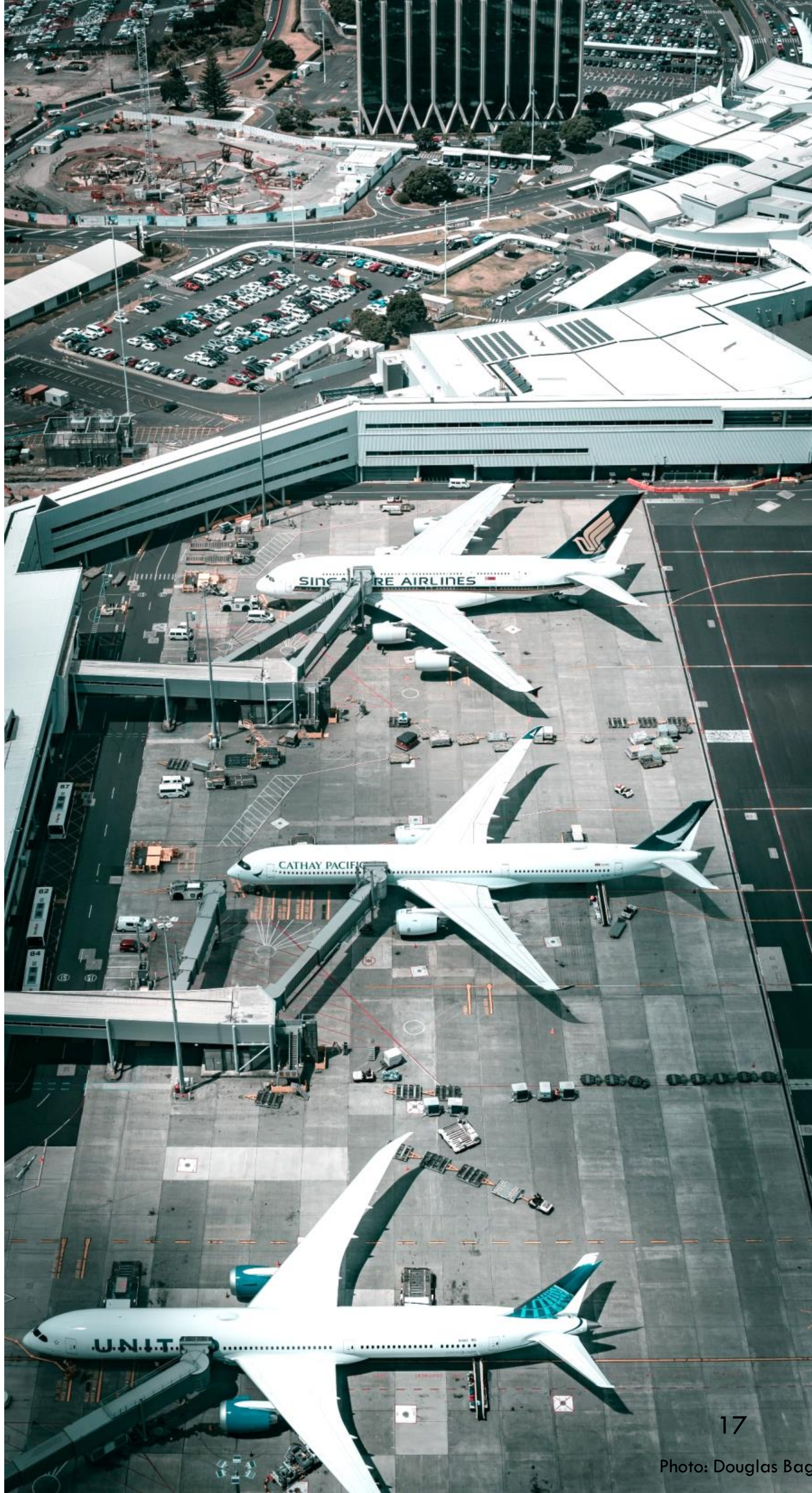

Photo: Douglas Bag

Transport Investment Outlook

Having examined the outlook on infrastructure in Asia, this report now turns to the critical investment question. This section delves into the projected financial requirements for developing, maintaining, and climate-proofing transport infrastructure across the Asia-Pacific region. We analyze these needs by transport mode, subregion, and expenditure type, providing a granular overview of the investment landscape. We also assess the role of maintenance, climate resilience, and the escalating need for private sector participation in financing sustainable and resilient transport networks. Our analysis provides key insights for navigating the complexities of transport infrastructure development in Asia.

The needs analyzed by transport mode, subregion, and expenditure type, providing a granular overview of the investment landscape

Photo: Scarbor Siu

Transport Investment Outlook

How much does Asia spend on constructing and maintaining a kilometer of transport infrastructure?

To estimate the scale of transport infrastructure investment in Asia over the next decade, the projected infrastructure needs are multiplied by unit cost estimates, incorporating income group-specific cost multipliers to ensure accuracy. These figures are then adjusted for annual inflation to reflect dynamic economic conditions. Finally, the resulting estimates are aggregated to provide a comprehensive picture of total infrastructure investment across the Asia-Pacific region, disaggregated by subregion and transport sector (Table 1).

Crucially, we've incorporated climate resilience into our calculations. Using the Coalition for Disaster Resilient Infrastructure (CDRI) data, we applied a 7% sketch multiplier to account for the average annual losses associated with climate-related damage[6]. This ensures that the estimated investment needs reflect the requirement of building transport infrastructure that can withstand the impacts of changing climate. This methodology allows for a more refined understanding of future investment requirements, facilitating effective planning and resource allocation.

Table 1. Unit cost multipliers by infrastructure type, including construction and maintenance

Mode	Type	ADB-2017	IEA-2013	AIIB-2018	Fisch-Romito et al. (2019)	ATO-2024 million $ constant 2015 USD per km		
						High income	Upper middle income	Low and lower middle income
Road	Construction	0.6 million $/km	1.2 million$/lane-km	1.7 M$/km	1.1 million$/lane-km			
	Primary road					2-10	1-8	1-7
	Secondary road					0.6-3	0.7-2	0.4-2.5
	Tertiary road					0.1-0.6	0.2-0.6	0.08-0.6
	Annual maintenance (% of Cons)		2.50%		0.75%	0.5%-1.6%	0.3%-1.0%	0.2%-1.0%
Heavy Rail	Construction	3.8 million $/km	4.5 million/track-km	9 M$/km	4.5 million/track-km	14-22	2-12	3-10
	Annual maintenance (% of Cons)		1%			0.5%-1.4%	0.2%-0.9%	0.3%-0.8%
HSR	Construction		24 million $/track-km	50.5 M$/km	24 million $/track-km	18-36	20-25	15-30
	Annual maintenance (% of Cons)		0.40%		0.40%	1.0%-1.4%	1.0%-1.1%	1.0%-1.0%
Metro	Construction					140-160	90-120	60-90
	Annual maintenance (% of Cons)					0.8%-1.4%	1.0%-1.1%	1.0%-1.0%
LRT	Construction					100-100	50-50	35-35
	Maintenance (% of Cons)					1.0%-1.4%	1.0%-1.0%	1.0%-1.0%
BRT	Construction		9 million per trunk-km		7 million per trunk-km	50-50	13-13	8-8
	Annual maintenance (% of Cons)		3%		1%	2.0%-2.0%	1.5%-1.5%	1.5%-1.5%

[6] A corresponding climate-proofing amount is already incorporated in the port estimates by Hanson & Nicholls (2020) through sea-level rise adjustment

Transport Investment Outlook

How much will Asia invest in transport assets over the next decade?

Our analysis shows that the Asia-Pacific region will require an estimated US$ 43 trillion in current US$ between 2020 and 2035 to develop, maintain, and repair its transport infrastructure, which roughly equates to 2% of the region's GDP (Figure 11).

The average investment demand will grow from US$ 750 billion annually between 2000 and 2020 to US$ 2.7 trillion annually between 2020 and 2035. The tripling of transport investment needs requires urgent proactive planning and resource mobilization (Figure 12).

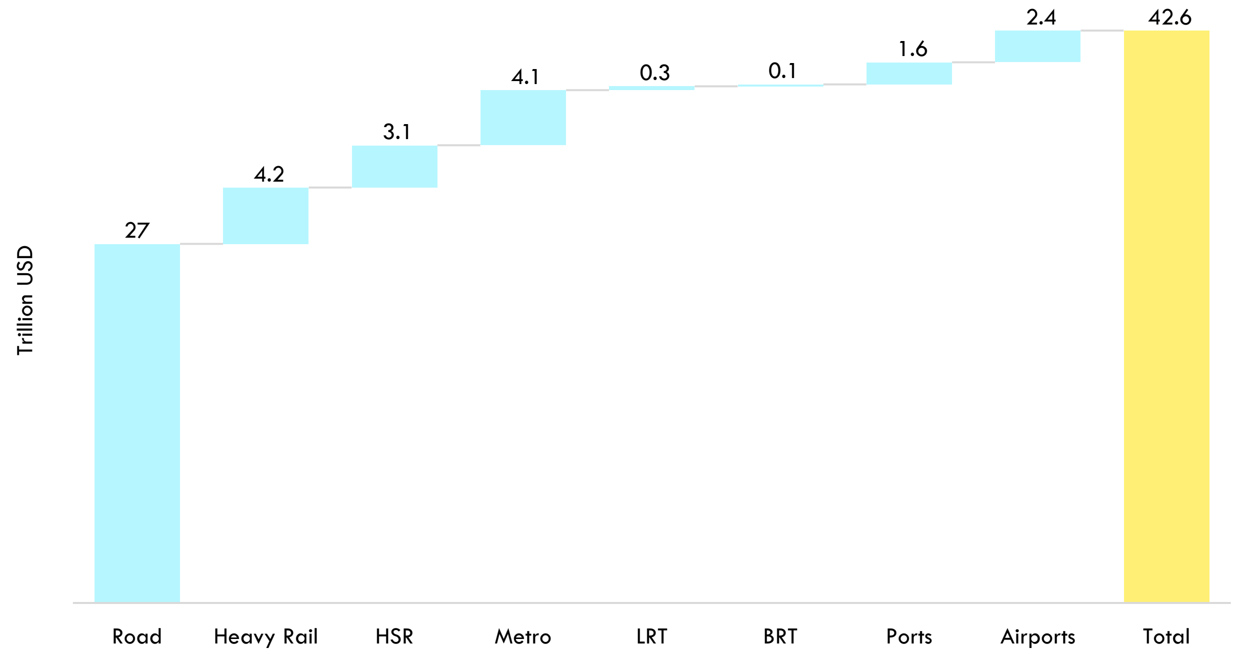

Figure 11. Urban rapid transit kilometers added

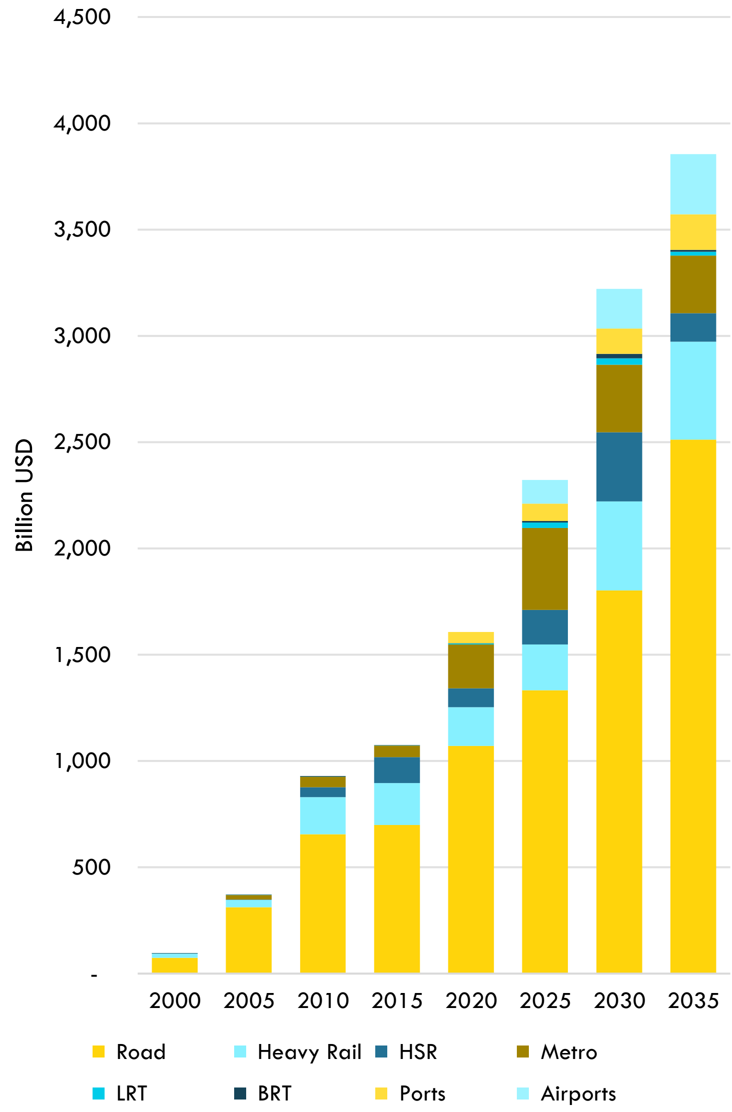

Figure 12. Transport infrastructure investment needs (construction, maintenance, climate-proofing), by sub-sector

Transport Investment Outlook

What are the variations in transport investments across different modes?

Road transport will continue to command the largest share of investments between 2020 and 2035, representing 63% of the total investment (about 1.3% of GDP). This sustained investment is necessary to accommodate the anticipated vehicle ownership growth and enhance access and connectivity. The remaining investment needs are distributed across various sub-sectors as follows: 17% for railways, including high-speed rail (about 0.4% of GDP), 11% for rapid urban transit (about 0.2% of GDP), 4% for ports (0.1% of GDP), and 5% for airports (0.1% of GDP) (Figure 13).

A notable observation from this exercise is that investment in urban rail will reach parity with heavy rail infrastructure investment for the first time. Investment in the metro will increase from 7% between 2000 and 2020 to 10% of the investments between 2020 and 2035 (Figure 14).

The overall structure of infrastructure spending has mainly remained, and will remain, consistent over the period, with modest investment shifts. This establishes that infrastructure projects are long-term in nature and show little agility in changing economic circumstances.

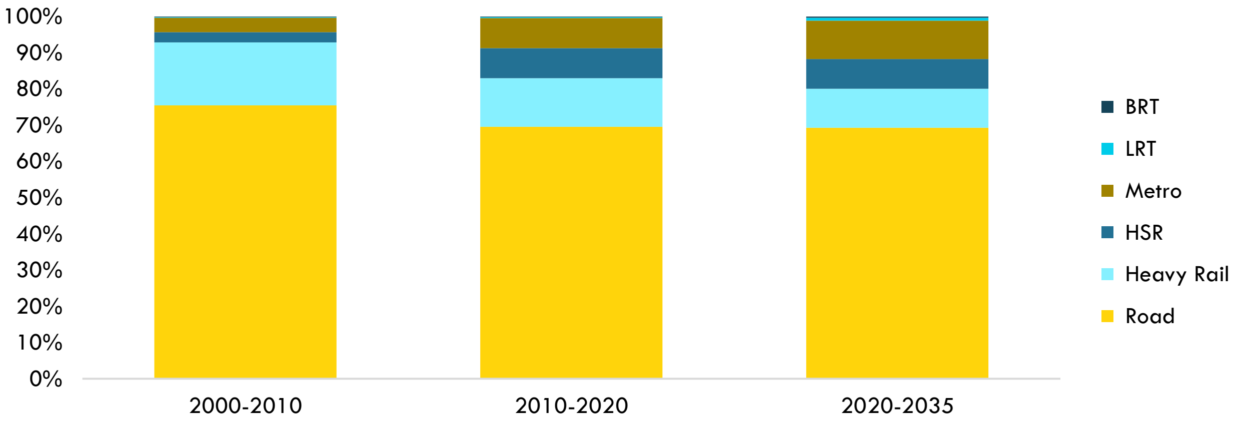

Figure 13. Transport infrastructure investment, share by mode

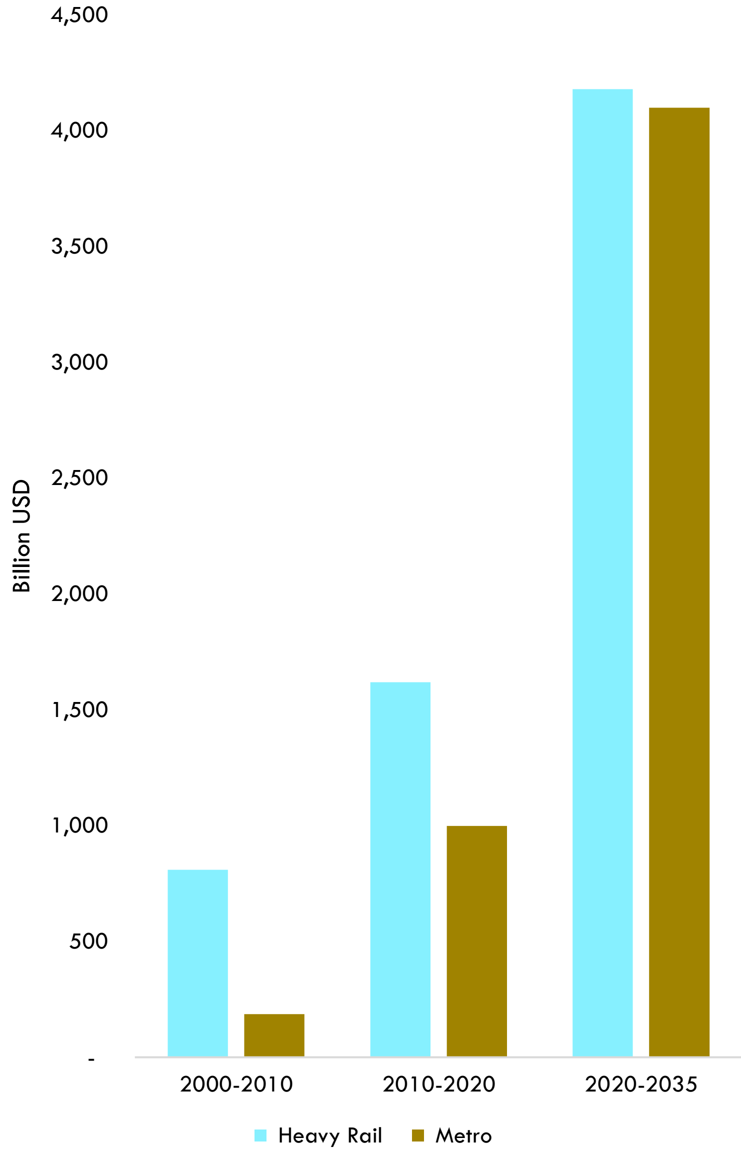

Figure 14. Heavy rail vs. metro infrastructure cumulative investment

Transport Investment Outlook

How much will Asia invest in maintaining transport assets over the next decade?

Maintenance is critical to transport infrastructure, ensuring the longevity, safety, and efficiency of these vital assets.

However, historical trends show a concerning pattern of underinvestment in this area. Our findings show a continuation of that trend, suggesting that underinvestment in maintaining existing infrastructure will carry on. On average, maintenance of transport infrastructure will account for about 24% of the total investment costs between 2020 to 2035. However, the specific maintenance spends vary across modes and countries. Typically, heavy rail has the highest share of maintenance spending, accounting for 39% of total investment. Only about one-quarter of the total road investment is for maintenance. Such low numbers pose risks to the overall performance and sustainability of transport networks. However, we also found that countries with a mature transport infrastructure have a higher investment in maintenance (Figure 15). Ultimately, addressing this historical underinvestment in maintenance and recognizing the modal variations in requirements will be crucial for ensuring sustainable and resilient transport infrastructure in the long term.

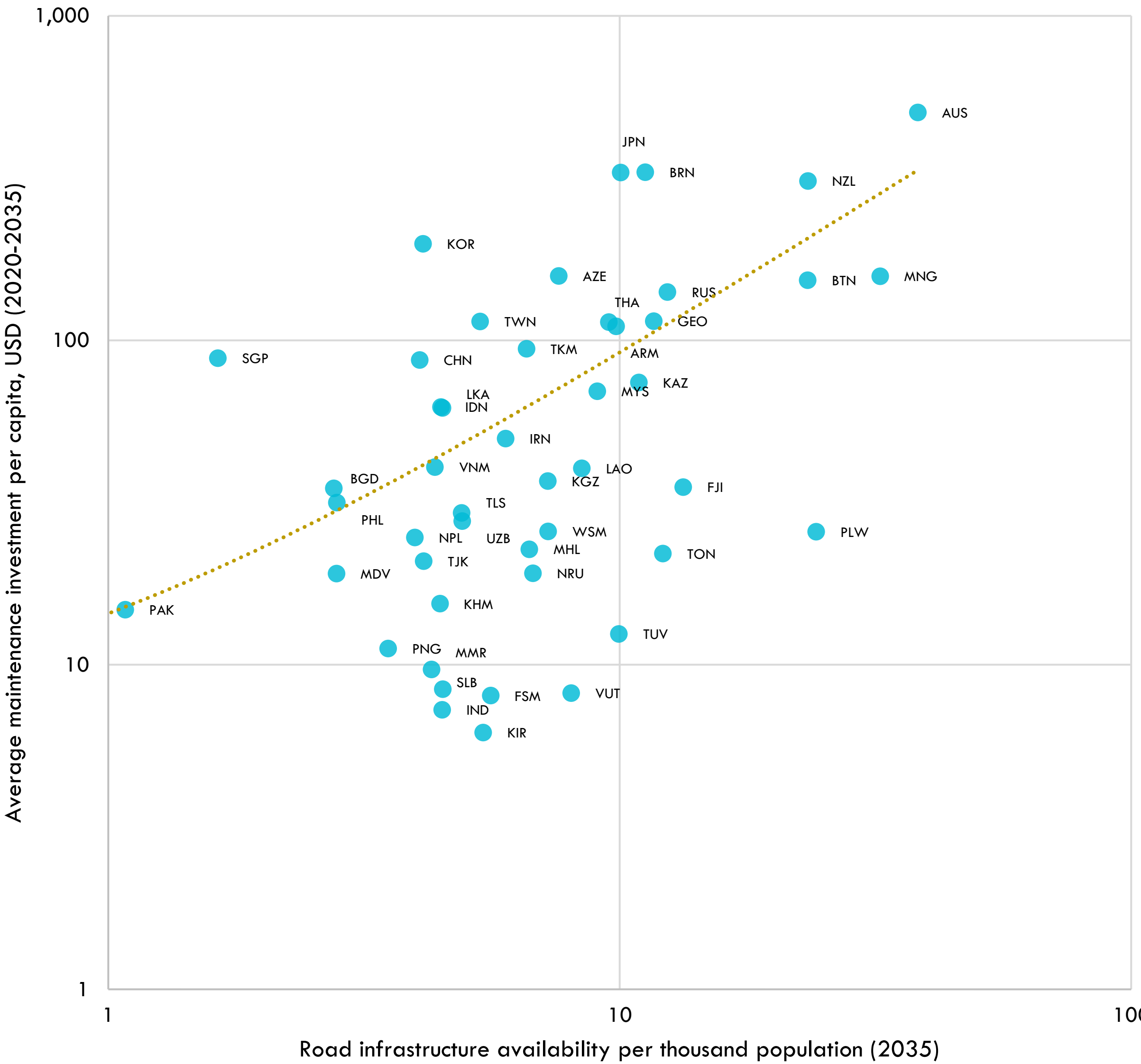

Figure 15. Road infrastructure availability vs. maintenance investment per capita

Transport Investment Outlook

What are the variations in transport investments across different subregions?

We also anticipate transport infrastructure investment in high-income economies tapering off by 2035, primarily due to plateauing travel demand and well-developed infrastructure networks. Conversely, low and middle-income economies are projected to experience robust growth in investment needs, driven by limited access to transport infrastructure and burgeoning demand for passenger and freight transport. Upper-middle-income economies are expected to lead the way in transport infrastructure investment, with their share of total investment keeping a substantial share of 67% between 2000 to 2020 and 65% between 2020 to 2035. East and South Asia will account for approximately 74% of the total investment requirement over the next decade, fueled by continued rapid growth in transport demand in India and the People's Republic of China (Figure 16).

We observe that the unique geographical features of each subregion in Asia-Pacific shape their infrastructure priorities. For instance, landlocked Central Asia does not need port infrastructure but has a dense network of airports, leveraging its geographical proximity to Europe for air travel. On the other hand, islands in the Pacific prioritize port investments. This highlights the importance of tailoring infrastructure development to the specific geographies of each subregion.

We should also point out that our infrastructure investment estimates neglect the critical role of energy transition. Despite that, it is imperative that future infrastructure investment should curb carbon emissions. The impact of energy transition on infrastructure development will be accounted for in future iterations of the outlook.

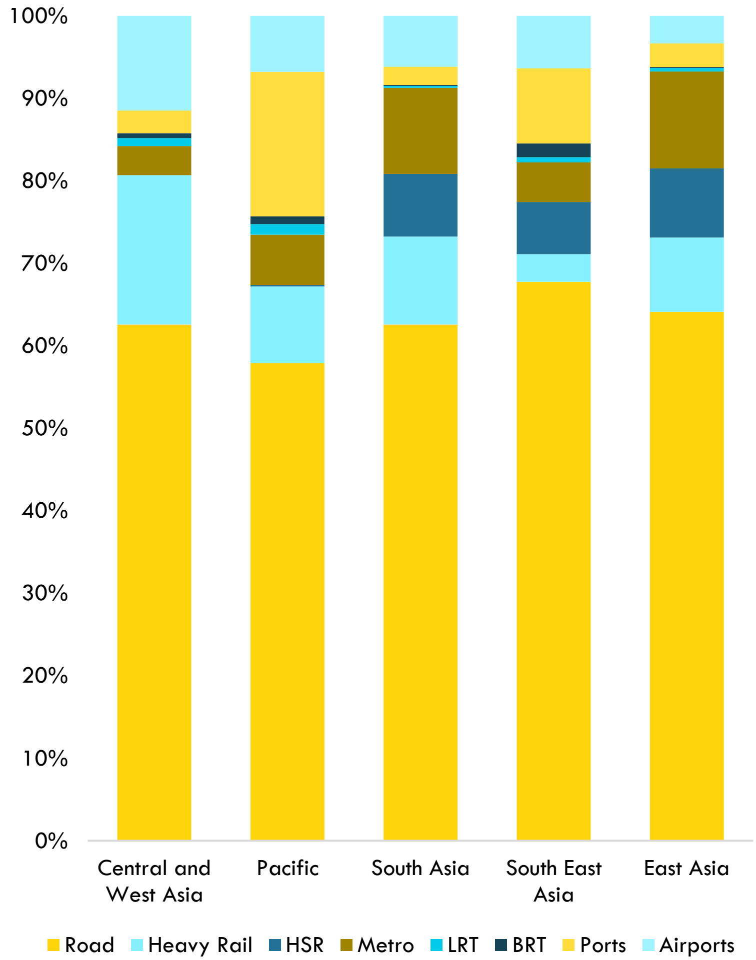

Figure 16. Transport infrastructure investment per subregion between 2020 to 2035

Transport Investment Outlook

How do our transport infrastructure investment estimates compare to other estimates?

Our projected annual investment need of US$ 42.6 trillion, or 2.1% of GDP, aligns with historical estimates by institutions such as the Asian Development Bank (ADB), the Asian Infrastructure Investment Bank (AIIB), the Global Infrastructure Hub (GI Hub) and the UNESCAP (Figure 17).

Significantly, while absolute investment in transport infrastructure increases, its share of GDP is projected to decline between 2020 and 2035, as GDP growth is expected to outpace infrastructure spending. This trend is reflected in the projected decline in transport infrastructure investment as a share of GDP from 2.3% between 2010 to 2020 to 2.1% between 2020 to 2035 (Figure 18). Sustaining an annual investment rate of 2.3% of GDP is a substantial task.

Who will be providing that investment is another complicated question.

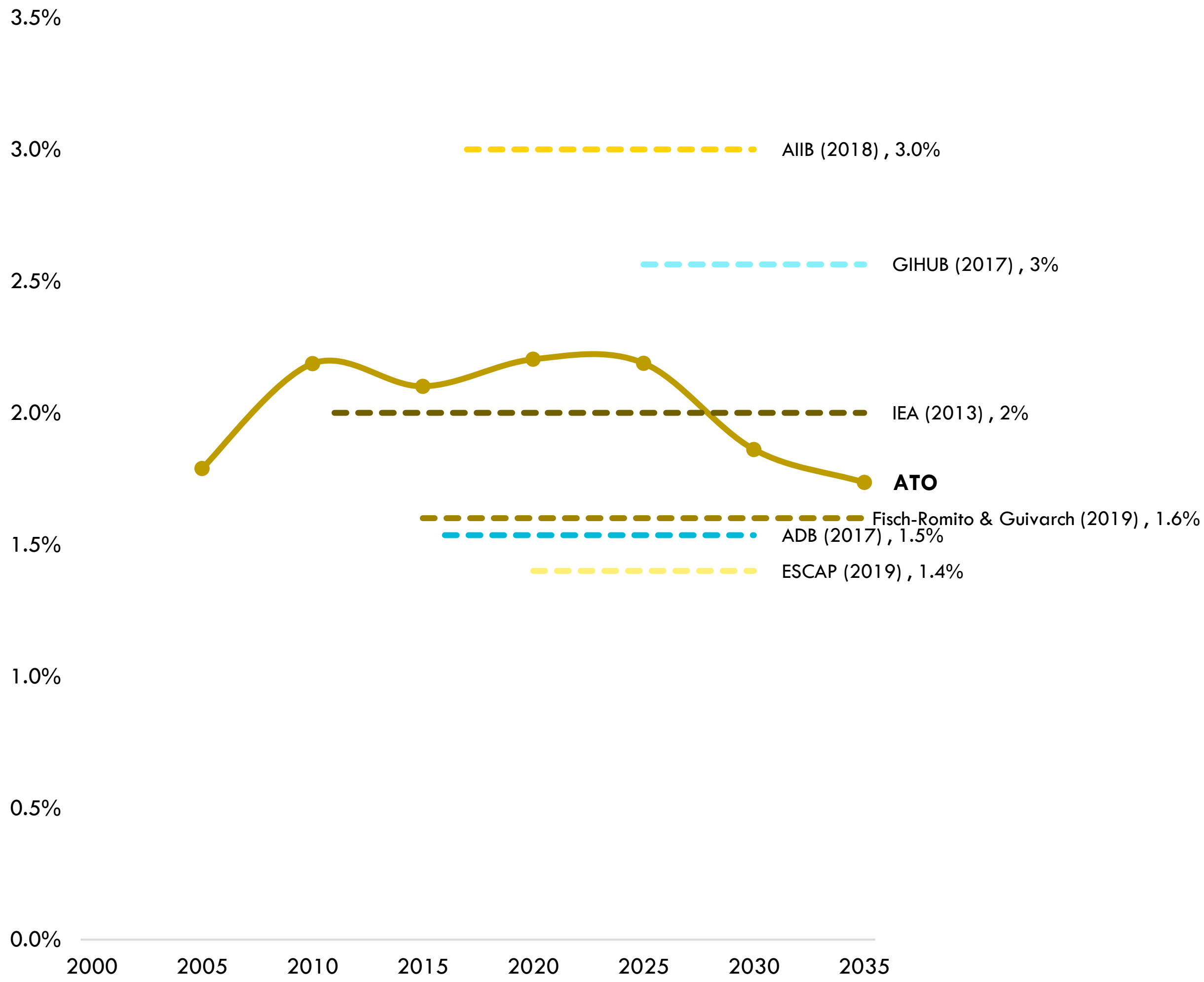

Figure 17. Transport infrastructure investment estimates as share of GDP vs. other estimates

Despite the undeniable socio-economic benefits of infrastructure development, investment in the sector has been shrinking as a percentage of GDP. This trend is concerning, especially given the limited role of private investment in the region's transport infrastructure. Traditionally, governments have shouldered the burden of financing. However, the post-COVID era has strained public budgets and elevated debt levels.

Public-Private Partnerships (PPPs) offer a glimmer of hope. However, their growth hasn't kept pace with the escalating demand for infrastructure. Our research underscores the urgent need for a significant increase in private-sector investment to bridge this gap. However, attracting private capital requires governments to create a more conducive regulatory and planning environment. Furthermore, there's considerable room for optimizing public infrastructure investment. Governments can explore alternative funding sources, such as raising user charges, capturing land value, and implementing innovative financing mechanisms. Achieving these goals also necessitates immediate institutional, regulatory, and administrative reforms. The transport infrastructure needs cannot be deferred indefinitely. The sector is ripe for change.

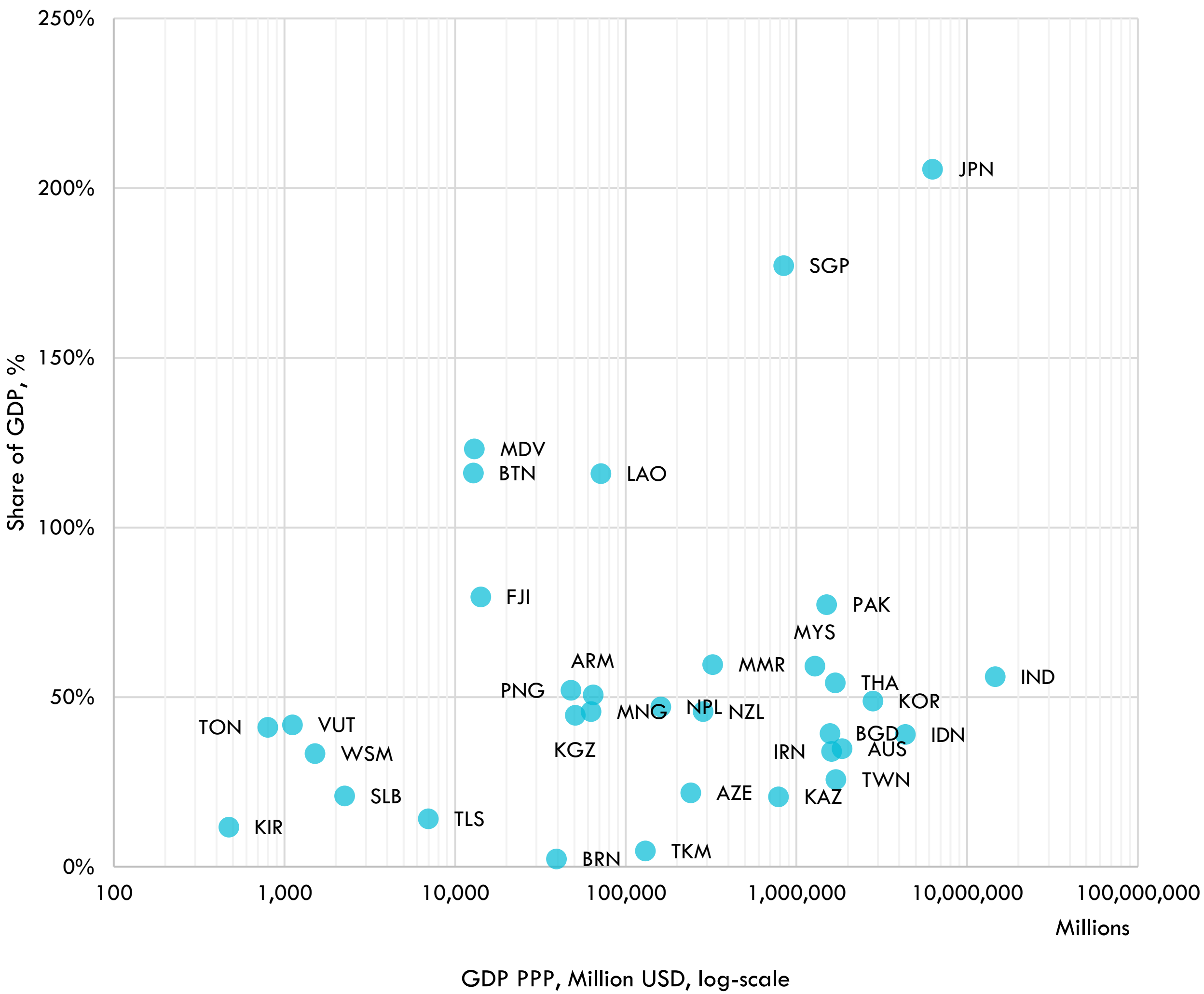

Figure 18. Central government debt in Asia-Pacific countries, as share of GDP (2023)

References

ADB-B. (2017). Meeting Asia's Infrastructure Needs. Retrieved from https://www.adb.org/publications/asia-infrastructure-needs

AIIB. (2018). Transport Sector Study. Retrieved from https://www.aiib.org/en/policies-strategies/_download/transport/2018_May_AIIB-Transport-Sector-Study.pdf

HAL. (2020). Transportation infrastructures in a low carbon world: An evaluation of investment needs and their determinants. Retrieved from https://hal.archives-ouvertes.fr/hal-02131954

UNESCAP. (2019). Costing the transport infrastructure component of SDGs in Asia and the Pacific. Retrieved from https://repository.unescap.org/handle/20.500.12870/781

Ryoji Iwata