

State of Play: Railways in the ASEAN Region

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460 Urban Centers (412 Asia-Pacific, 48 International)

47 Urban Centers with a detailed review * To be increased to 50







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Multiple Sources for single indicator



Historical & Outlook



Multiple

Dimensions &

Modes

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Partnerships









Data and Policy



Incremental Approach

2024-10-18

Asian Development Bank (ADB) has Won the 2024 IRF Award for Environmental Stewardship for Asian Transport Outlook!

The Asian Development Bank (ADB) has won the prestigious IRF Awards 2024 - Environmental Stewardship category for the ADB-initiated Asian Transport Outlook (ATO)! The IRF Awards recognizes outstanding projects and initiatives that foster innovation, safety, and sustainability in the road transport sector.



Asian Transport Outlook Asian Development Bank





Heavy rail (including HSR) availability, 2021



ASEAN has experienced moderate growth in its railway infrastructure increasing by at least 6 thousand kilometers to reach over 24 thousand kilometers by 2021.

However, since 2000, the expansion of road networks (1.8 per cent annual) has outpaced railway growth (1.3 per cent), leading to shift away from rail.

International Union of Railways. (2024). Railisa UIC Statistics. https://uic-stats.uic.org/ ATO. National Database (2024). https://asiantransportoutlook.com/snd/

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Heavy rail availability

The availability of heavy rail infrastructure in Southeast Asia stood at an average of 35 km per million population, **falling significantly short of the rest of Asia's** 99 km per million, especially compared to East Asia's 108 km per million

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Estimated using International Union of Railways. (2024). Railisa UIC Statistics. <u>https://uic-stats.uic.org/</u>; United Nations Department of Economic and Social Affairs Population Division. (2022). World Population Prospects 2022. https://population.un.org/wpp/



Urban Rail Network Lengths



Viet Nam
Thailand
Singapore
Philippines
Malaysia
Indonesia
foll

Southeast Asia's urban rail network, totaling about 587 kilometers in 2021 and dominated by metro systems (94%), is concentrated primarily in Singapore (39%), followed by Malaysia (26%) and Thailand

Institute for Transportation and Development Policy. (2020, October 11). Rapid Transit Database. I. https://itdp.org/rapid-transit-database/

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Urban Rail Availability

However, **urban rail availability in the subregion remains limited**, serving only about 1.7 kilometers per million urban residents. This is significantly lower than the Asia-Pacific average of 6 kilometers per million and less than East Asia's nearly 11 kilometers per million

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Utilization Rates for Railways in the ASEAN Region

The average utilization of rail (measured as total rail demand (passenger-km plus ton km) per kilometer of rail) has been falling in several countries indicating that rail investments are not being optimally used





Transport units and utilization trend



Transport units and utilization trend





Estimated using International Union of Railways. (2024). Railisa UIC Statistics. https://uic-stats.uic.org/



Rail Equipment Imports

The Asia-Pacific region saw a significant increase in rail equipment imports from 2003 to 2010, boasting a 17% annual growth rate. However, this growth slowed in the following years, dropping by -1% annually from 2010 to 2023.

In contrast, Southeast Asia, which exhibited a similar upward trend in the previous decade (11% per year), has maintained a moderate growth rate of 6% per year since 2010

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Investments (ODA and PPP)

Official development assistance for rail projects tripled from its average share in 2002 to 2010, accounting for 39 per cent of total transport assistance by 2010 to



Share of rail projects in public-private partnerships rising from 12 per cent in 2000-2010 to approximately 41per cent in 2011-2023



OECD. (n.d.). OECD Data Explorer. Retrieved October 13, 2024, from <u>https://data-explorer.oecd.org/</u> and World Bank. (2024). Private Participation in Infrastructure (PPI)—World Bank Group. https://pi.worldbank.org/en/ppi

Energy Intensity



🖸 Road 🔳 Rail KJ per USD of GDP 200 400 600 0 800 1000 1200 Cambodia 128 1,023 Thailand 837 2.8 Malaysia 1.3 727 Myanmar 586 Philippines 427 0.4 0.9 348 Viet Nam 295 Indonesia 2.7 Singapore 16 123

Estimated using United Nations Statistics Division. (2024). UNSD — Energy Statistics. https://unstats.un.org/unsd/energystats/data; World Bank. (2023). GDP, PPP (current international \$). World Bank Open Data. https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD

Between 2005 and 2021, the average energy intensity of rail transport in the region was reduced by half, falling from 8 to 4 kilojoules (KJ) per USD of GDP





Electrification of Railways

The region has also **seen electricity's average share in rail energy consumption double**, rising from 18% in 2000 to 37% in 2021. However, this amount still falls short of the Asia-Pacific average of 60% in 2021, highlighting further potential for electrification in Southeast Asia's rail sector



United Nations Statistics Division. (2024). UNSD — Energy Statistics. https://unstats.un.org/unsd/energystats/data





Carbon Emissions

The rail sector's contribution to transport CO2 emissions in Southeast Asia has marginally risen from 0.2% in 2000 to 0.7% in 2023, with the rail sector emitting 40 million tonnes of CO2 in 2021. Consequently, Southeast Asia's share of total rail CO2 emissions in the Asia-Pacific region has increased from just 1% in 2000 to 7% in 2023.

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Estimated using Crippa, M., Guizzardi, D., Pagani, F., Schiavina, M., Melchiorri, M., Pisoni, E., Graziosi, F., Muntean, M., Maes, J., Dijkstra, L., Van Damme, M., Clarisse, L., & Coheur, P. (2023). Insights on the spatial distribution of global, national and sub-national GHG emissions in EDGARv8.0. <u>https://doi.org/10.5194/essd-2023-514</u>; World Bank. (2023). GDP, PPP (current international \$). World Bank Open Data. https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD



Air Pollutant Emissions

Air pollutant emissions from the rail sector in Southeast Asia have increased, with rail PM2.5 emissions growing by 6% and 9% per year between 2000 to 2010 and 2010 to 2022, respectively.



Rail Domestic Navigation Domestic Aviation

Ferrario, F. M., Crippa, M., Guizzardi, D., Muntean, M., Schaaf, E., Banja, M., Pagani, F., & Solazzo, E. (2022). EDGAR v6.1 Global Air Pollutant Emissions. http://data.europa.eu/89h/df521e05-6a3b-461c-965a-b703fb62313e

Cisco Digital Readiness Index. (n.d.). https://www.cisco.com/c/en/us/about/csr/research-resources/digital-readiness.html

Digitalisation

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Digital Readiness Index from Cisco, which evaluates a country's preparedness for the digital economy based on factors like technology adoption, human capital, and infrastructure, reveals a wide disparity between AMS.

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2.4 Singapore 0.5 Malaysia 0.3 Thailand Viet Nam 0.2 -0.1 Indonesia -0.3 Philippines Cambodia -0.4 -0.8 Myanmar Lao People's Democratic Republic -0.9

Digital readiness index (2021)







Resilience

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While comprising only one per cent of the ASEAN's total transport infrastructure, **Southeast Asia's** railway infrastructure faces a disproportionately high risk, potentially accounting for 9 per cent of all annual infrastructure losses (varies from 2 per cent in Indonesia to 40 per cent in Malaysia).

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	Road, average annual losses due	Rail, average annual losses due	Ports, average annual losses due	Airports, average annual losses due	Share of transport
	to all potential hazards	to all potential hazards	to all potential hazards	to all potential hazards	in total average annual losses
		Millio	n USD		%
runei Darussalam	4.0		0.1	0.1	6.6%
Cambodia	4.1	0.3	0.0	0.0	0.7%
Indonesia	725.8	16.0	7.7	11.8	4.7%
Lao PDR	4.6	0.7		0.1	0.7%
Malaysia	88.7	60.6	1.7	0.7	5.3%
Myanmar	39.9	11.9	0.8	3.0	2.6%
Philippines	297.0	10.4	28.7	11.7	5.6%
Singapore	32.5	4.9	5.3	7.0	31.5%
Viet Nam	33.2	13.3	0.2	1.9	0.8%
Thailand	98.1	25.8	0.4	1.4	1.6%
Timor-Leste	3.4		0.1	0.1	6.4%

CDRI. (n.d.). Building & infrastructure | GIRI. https://giri.unepgrid.ch/facts-figures/building-infrastructures



Railway Policy Measures - Typology





ATO Rail Sector Profiles

- Developed by: ATO with UNESCAP's input on Trans-Asian Railway routes.
- Infrastructure: Overview of national and urban rail networks.
- Operations: Insights into passenger, freight trends, and energy use.
- Environment: Analysis of emissions and environmental impacts.
- Investments: Overview of funding patterns, including ODA and PPPs.
- Policy Measures: Insights into national strategies, targets, and rail-related actions.



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- Asian



Policy document	Year	Rail-related measures		
Green Technology Master Plan 2017- 2030	2017	Urban passenger rail infrastructure improvement, Non-urban passenger rail infrastructure improvement, High-speed rail (HSR), General transport target - Modal shift		
Malaysia Rail Supporting Industry Roadmap 2030	2014	Urban passenger rail infrastructure improvement, Non-urban passenger rail infrastructure improvement, General rail improvement, Technical standards for rail infrastructure		
National Physical Plan_Chapter 7 (Implementation)	2020	High-speed rail (HSR), Railway electrification		
Twelfth Malaysia Plan 2021-2025	2021	Urban passenger rail infrastructure improvement, Non-urban passenger rail infrastructure improvement, General rail improvement, Freight transport shifting to rail or inland waterways (IWT), Intermodality measures		
Railways Act 1991	2012			
Logistics and Trade Facilitation Master Plan 2015-2020	2015			
National Land Public Transport Master Plan	2013	Urban passenger rail infrastructure improvement, Non-urban passenger rail infrastructure improvement, General rail improvement, Intermodality measures, General transport target - Modal shift		
National Transport Policy 2019-2030	2019	Intermodality measures		
Low Carbon Mobility Blueprint 2021- 2030	2021	Freight transport shifting to rail or inland waterways (IWT), Intermodality measures		
National Energy Policy 2022-2040	2022	General transport target - Modal shift		

Policy Measures and Targets

Malaysia's rail network comprises 1,775 km of heavy rail and 152 km of metro lines. However, heavy rail routes have stagnated since 2002, with over 50% of tracks remaining single. This falls short of global standards in terms of per capita availability and density. Despite a significant expansion of electrified routes, overall rail infrastructure growth has lagged behind road infrastructure development since 2010.

Challenges Faced by the Sector

6,40

200

Railway utilization has declined by 40% between 2010 and 2020. This is reflected in the low share of railways in both transport energy consumption and total inland transport infrastructure. Additionally, railways face a disproportionately high risk of damage, accounting for 40% of average annual losses to transport infrastructure due to natural hazards.

Opportunities for Growth and Development

Despite these challenges, there has been a substantial increase in official development assistance for railways since the implementation of sustainable development goals. Furthermore, Malaysia has set ambitious targets for increasing the modal share of public transport and cargo volume via rail. Several priority plans and policies, including the Malaysia Rail Supporting Industry Roadmap 2030 and the National Transport Policy 2019-2030, highlight the importance of rail development in the country's future.

Policy Recommendations

Policy recommendations focus on expanding rail infrastructure, improving urban passenger rail systems, and promoting transit-oriented development (TOD). Enhancing intermodal connectivity to encourage a modal shift and increasing railway electrification are also prioritized. Additional measures include technology and knowledge transfer, capacity building, coordinated planning across government agencies, and the development of high-speed rail (HSR). Disaster monitoring and risk assessment for transport infrastructure are also critical components of these recommendations.



Key Messages

- Since 2000, ASEAN experienced a moderate growth in its heavy railway infrastructure. However, railway infrastructure growth is being outpaced by that of roads
- The availability of heavy rail infrastructure in Southeast Asia stands significantly lower when compared to the regional (Asia-Pacific) average
- Urban rail availability remains limited, and is concentrated in a few Southeast Asian countries
- The average utilization of rail has been falling since 2009, even with growing forecasts for future demand indicating that rail investments are not being optimally. Rail would need to increase it efficiency, reduce costs address customer's need to attract more traffic.
- The share of electrification in rail energy's consumption has doubled in Southeast Asia from the turn of the century
- Rail sector's contribution to transport carbon emissions in Southeast Asia remains minute. On the other hand, Southeast Asia's share of total rail carbon emissions in the Asia-Pacific region has increased from just one per cent in the last two decades.
- Digitalization, evidenced by wider digital readiness indicators, remain a challenge.
- The rail sector in Southeast Asia faces a disproportionately high risk from climate challenges



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"ATO translates data into insights, policies, and investments"

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