



# ASIA'S TRANSPORT FINANCE NEEDS

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16<sup>th</sup> High-Level EST Forum  
December 11, 2024



# Estimating Transport Sector Investment Requirements

	Road	Rail	Urban Transport	Port	Airport
Input datasets	<ul style="list-style-type: none"> <li>Country official statistics</li> <li>Nirandjan, et al. (2021).</li> <li>IRF statistics</li> </ul>	<ul style="list-style-type: none"> <li>IRJPro</li> <li>UIC (heavy rail, HSR)</li> <li>ITDP Rapid Transit Database (metro, LRT)</li> </ul>	<ul style="list-style-type: none"> <li>IRJPro</li> <li>ITDP Rapid Transit Database (metro, LRT, BRT)</li> </ul>	<ul style="list-style-type: none"> <li>Hanson &amp; Nicholls (2020)</li> </ul>	<ul style="list-style-type: none"> <li>Nirandjan, et al. (2021)</li> <li>GIHUB</li> </ul>
Estimation Methods	<p>A comprehensive historical dataset on roads was compiled and used for developing a <b>clustered linear regression</b> model. This model considered <b>population density</b> as the independent variable (and basis for clustering), and road density as the dependent variable.</p> <p>A <b>compositional regression model</b> was developed with <b>GDP/capita</b> as the independent variable to estimate its road infrastructure distribution. This was used in projecting the shares of primary, secondary and tertiary road.</p> <p>Paved and unpaved ratios were forecasted and applied using a similar <b>compositional regression</b> model that utilizes <b>GDP/capita</b> as the explanatory variable.</p>	<p>The <b>IRJPro database</b> was procured and utilized as the primary source for forecasting future developments in heavy rail, high-speed rail, metro, and LRT.</p> <p>This dataset has more than 2,300 projects at various stages of implementation (under construction, planned, or in long-term planning stages, along with detailed information on proposed rail lengths and the estimated starting year of operations).</p> <p><b>Linear interpolation</b> was used to fill in missing gaps as well as in accommodating China's published target of reaching 200,000 km of heavy rail by 2035.</p>	<p>The <b>IRJPro database</b> was procured and used as the primary source for forecasting future developments in metro, and LRT.</p> <p>A <b>linear regression</b> model was first conducted for BRT systems to identify patterns in current and future infrastructure development. Additionally, a separate <b>linear regression</b> was performed for overall rapid transit systems, combining metro, light rail transit (LRT), and BRT systems. Targets (such as Jakarta's +2,000 km BRT by 2030 were accommodated)</p>	<p>We had utilized the port area and expansion costs projections based on <b>Hanson &amp; Nicholls (2020)</b> who developed projections for future port area requirements across 184 countries, taking into account anticipated shifts in consumption patterns (we had taken the middle scenario) as well as changes in socioeconomic activity patterns.</p>	<p>To estimate the required airport area, a <b>linear regression analysis was performed</b>, utilizing key socioeconomic indicators such as <b>total population, urban population, and GDP</b> as the independent variables.</p> <p>The regression model used <b>aerodrome area</b> estimates from Nirandjan et al. (2022) as the dependent variable. To ensure consistency of the projections with historical trends, the predicted values were adjusted according to estimates for 2022.</p> <p>Following this, a second <b>linear regression</b> was employed to estimate the required investments for airport infrastructure expansion. This model used investment data from the <b>Global Infrastructure Hub</b>.</p>

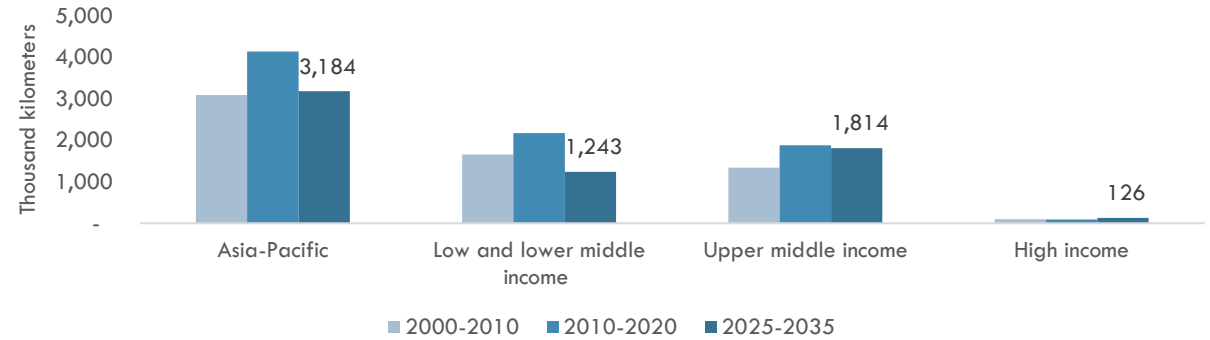
# Infrastructure projections

Based on the projections across Asia-Pacific:

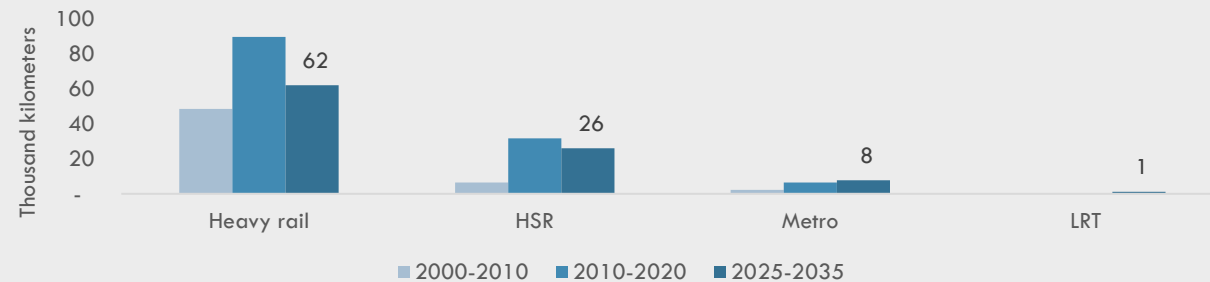
- **road networks** will continue to expand, albeit at a slower pace.
  - additional roads 2025-2035 is ~77% of what was built in the period 2010-2020.
  - Over 3 million km of road are projected to be built in low and lower middle income, and upper middle-income countries between 2025-2035.
- The **railway networks will continue to expand, but at a tapered pace.**
  - Heavy rail is projected to increase by 62 thousand kilometers,
  - HSR by 26 thousand,
  - Metro systems by 8 thousand,
  - LRT by 1 thousand.

The comparisons show that ATO's projections are within the ranges estimated by the other studies.

Road infrastructure kilometers added



Rail infrastructure kilometers added

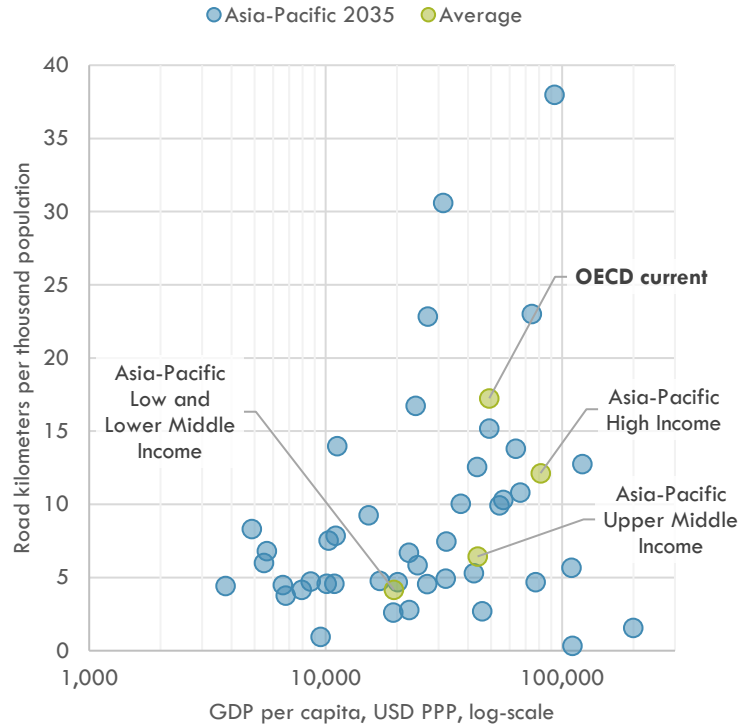


2020-2030 Infrastructure Growth Projections

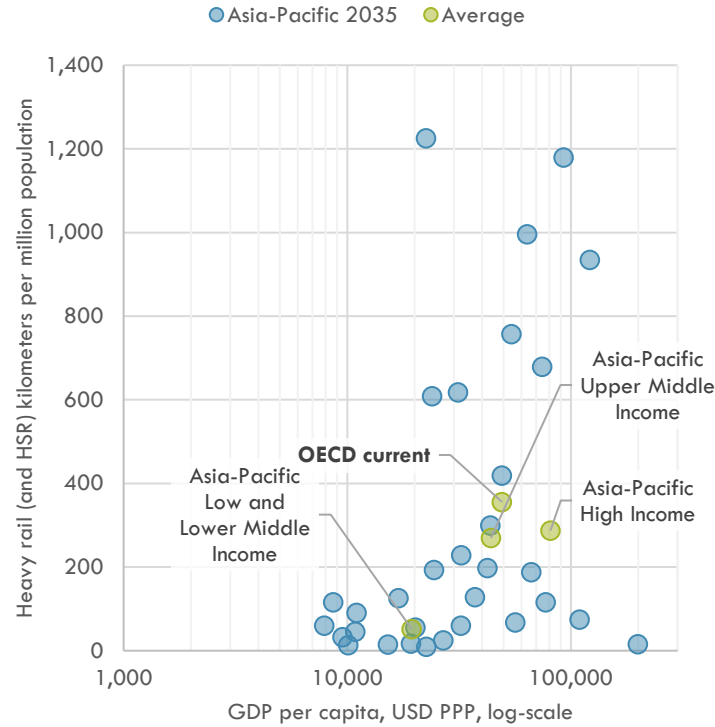
	ATO	AIIB (2018)	Fisch-Romito & Guivarch (2019)
Road	1.5%	1.9%	0.5% to 4.2%
Rail	2.7%	3.2%	3% to 6.7%

# Reasonableness check and Benchmarking Infrastructure Needs

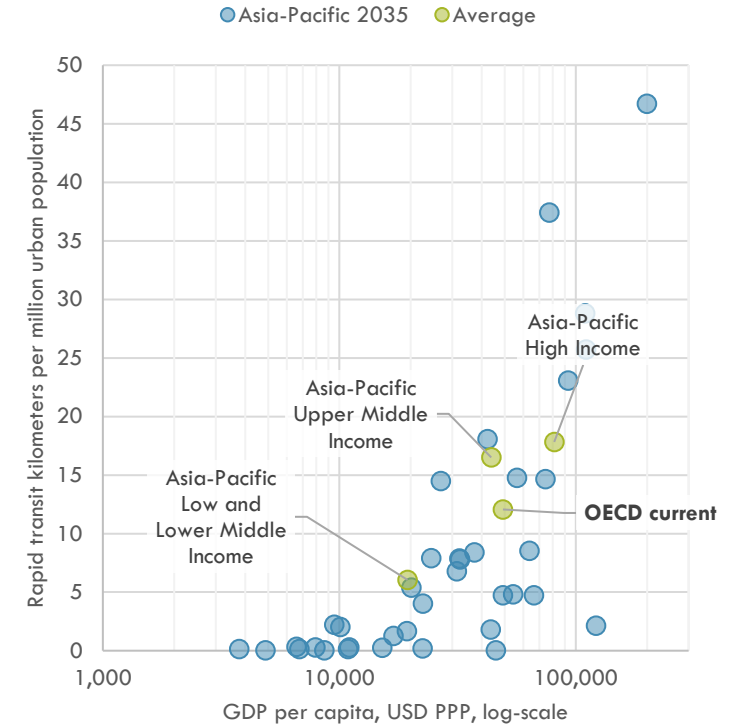
Road availability



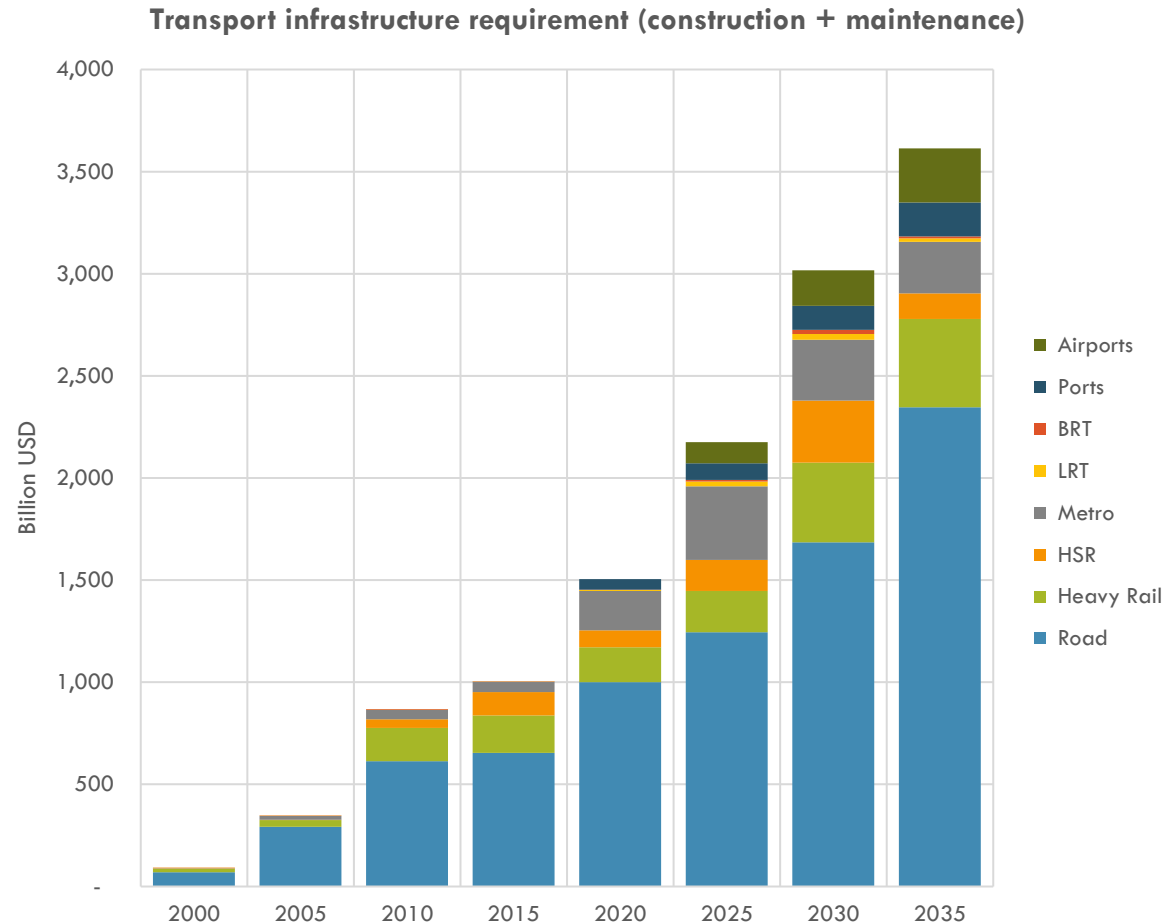
Heavy rail (and HSR) availability



Rapid transit availability



# Investment needs projections (Asia-Pacific)



## 2025-2035 Infrastructure Needs (Current USD)

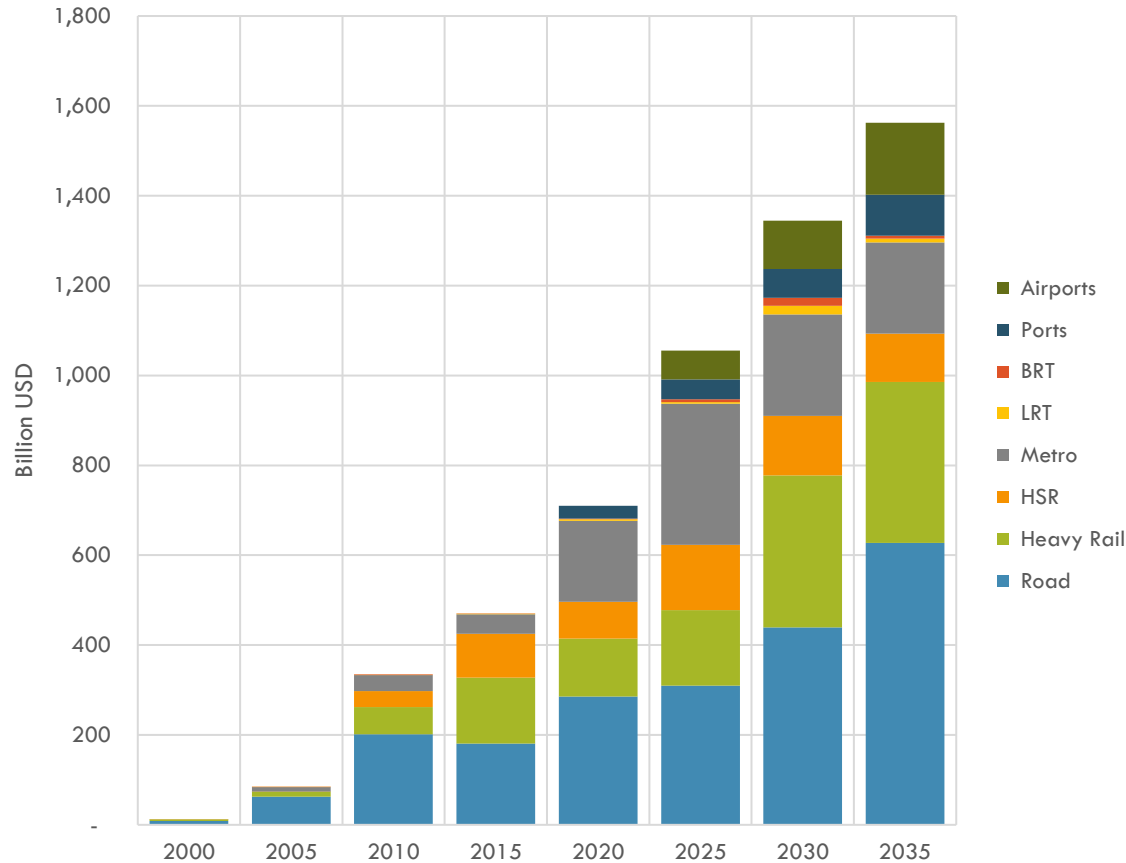
**30.5** Trillion USD for total transport  
**19.3** Trillion USD for road  
**8** Trillion USD for rail  
**1.3** Trillion USD for ports  
**2** Trillion USD for airports

- \* ATO's full coverage which includes the 51 economies



# Investment needs projections (ADB borrowing DMC)

Transport infrastructure requirement (construction + maintenance)



## 2025-2035 Infrastructure Needs \*

(Current USD)\*Excludes primary roads

**13.2** Trillion USD for total transport

**5.1** Trillion USD for road

**6.3** Trillion USD for rail

**720** Billion USD for ports

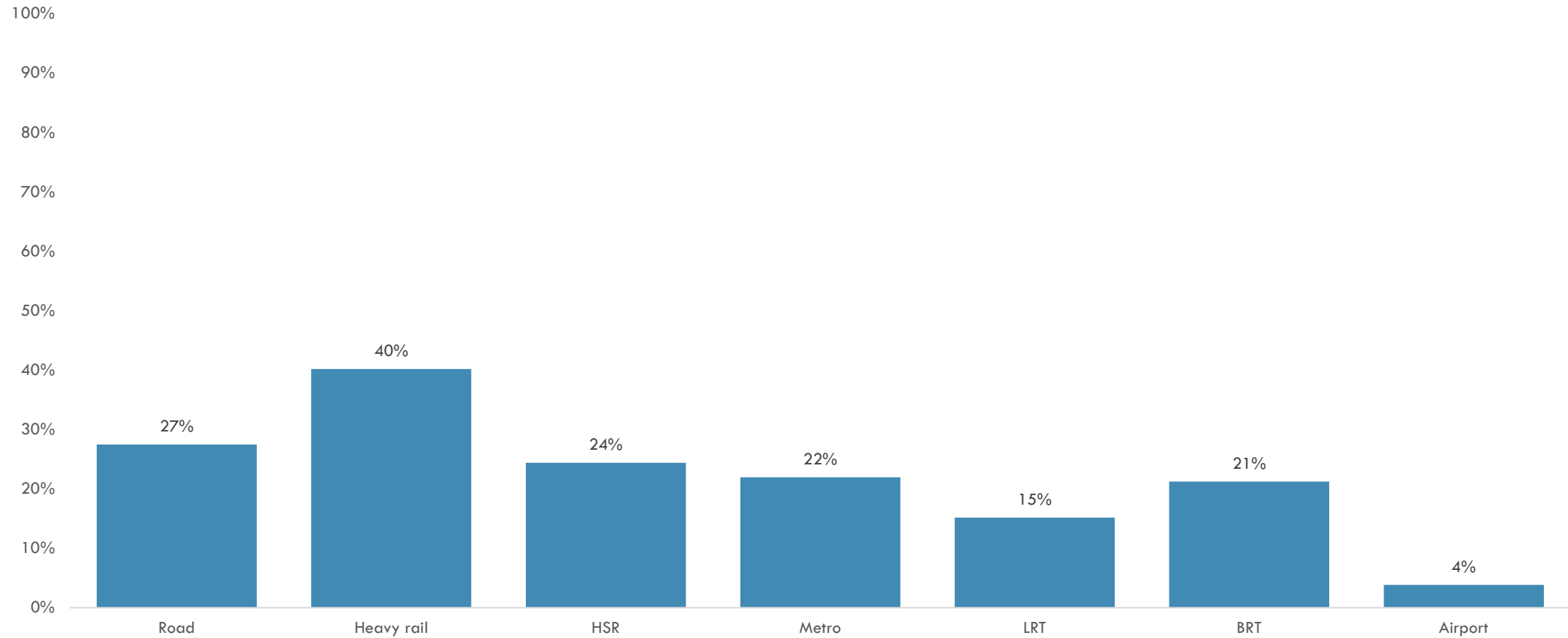
**1.2** Trillion USD for airports

Approximately \$13.2 Trillion is needed for accommodating the transport infrastructure expansion and maintenance for the ADB borrowing DMCs.

Primary roads have been excluded as it is assumed that investments will prioritize secondary and tertiary roads.

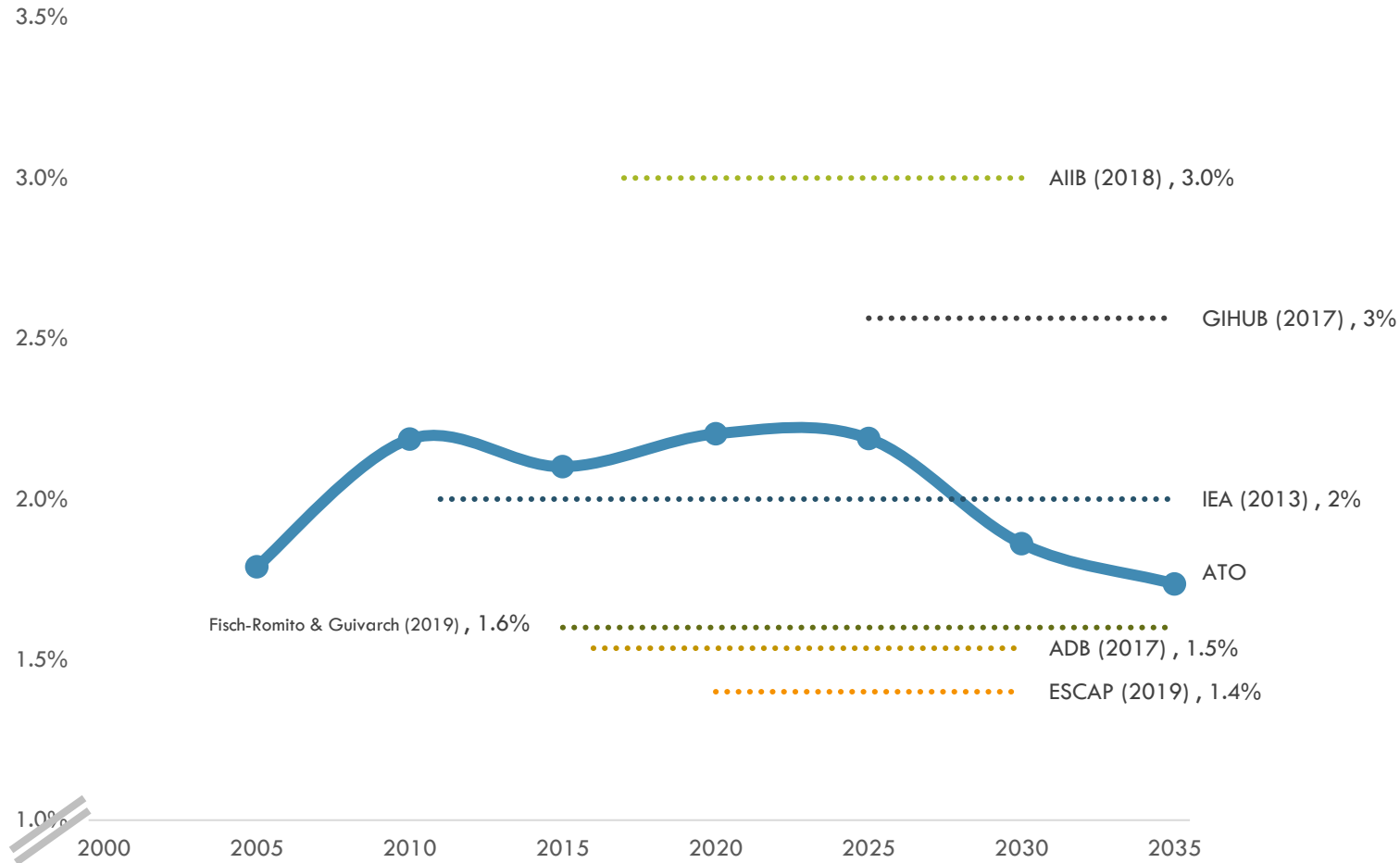
# Share of maintenance costs

Share of maintenance in total investment costs



# Corroborative Evidence – Transport Investments as a share of GDP

Transport investment estimates as share of GDP



Notes:  
 ATO 2000-2022 does not include port and airport investments  
 ATO 2030 Outlook only includes inland transport  
 IEA (2013) only includes inland transport  
 Includes all ATO countries



# Summary

- Significant investment in transport infrastructure is required. \$13.2 trillion in DMCs (2025-2035), or 2% of GDP
- Maintenance and operations budget will increase dramatically
- Donor assistance will grow but must be used as catalytic financial assistance
- ADB's potential investments to the transport sector ~**\$10 Billion per year.**
- Innovative finances such as sector loans, results based lending and policy loans are required to stimulate broad financing strategies for the transport sector
- Increased focus on capacity development linked to financial management of transport sector.
- Private sector has a very large role to play