ADB

The pathway to decarbonization and climate resilient transport

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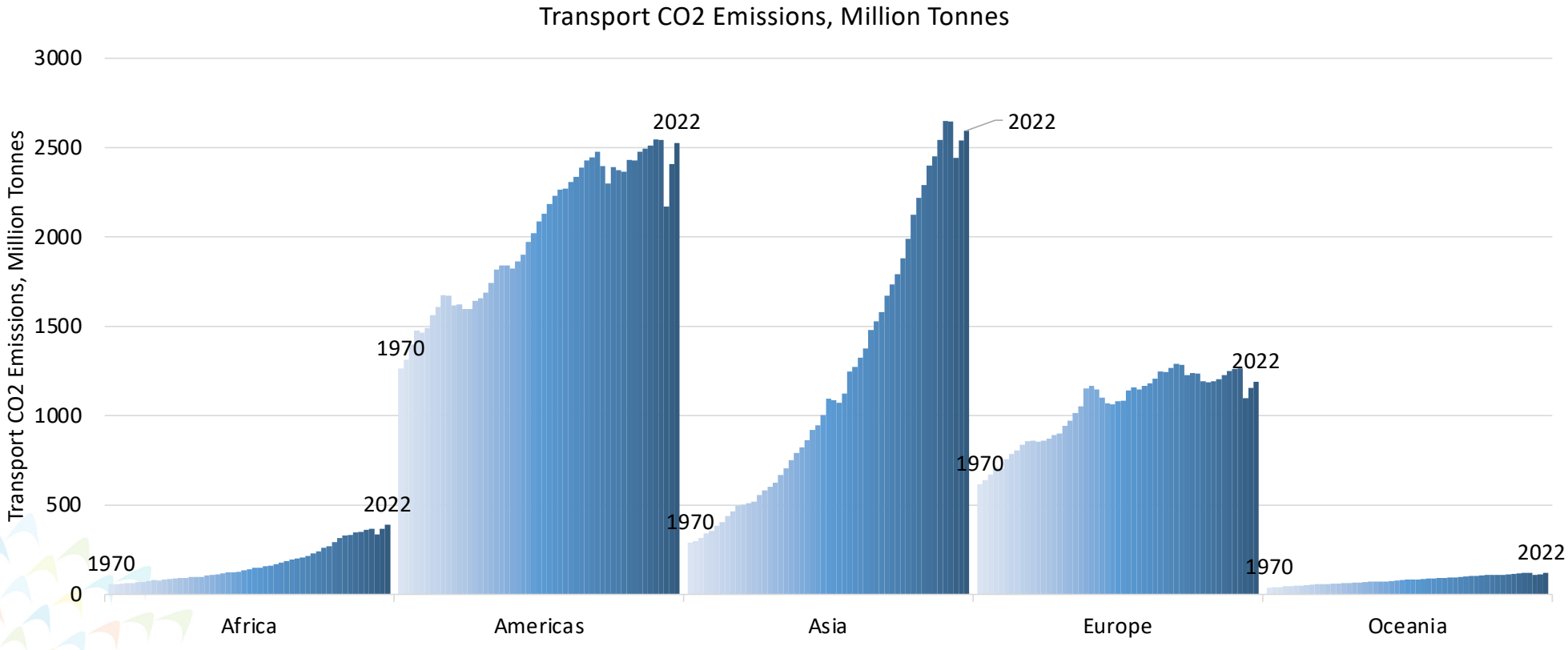
TRANSPORT FOSSIL CARBON EMISSIONS GROWTH



Asia currently contributes about 38% of global domestic transport fossil carbon emissions. Since 2010, Asia has added most transport-related CO_2 emissions, i.e., about 2/3 of the global increase in transport fossil CO_2 emissions.

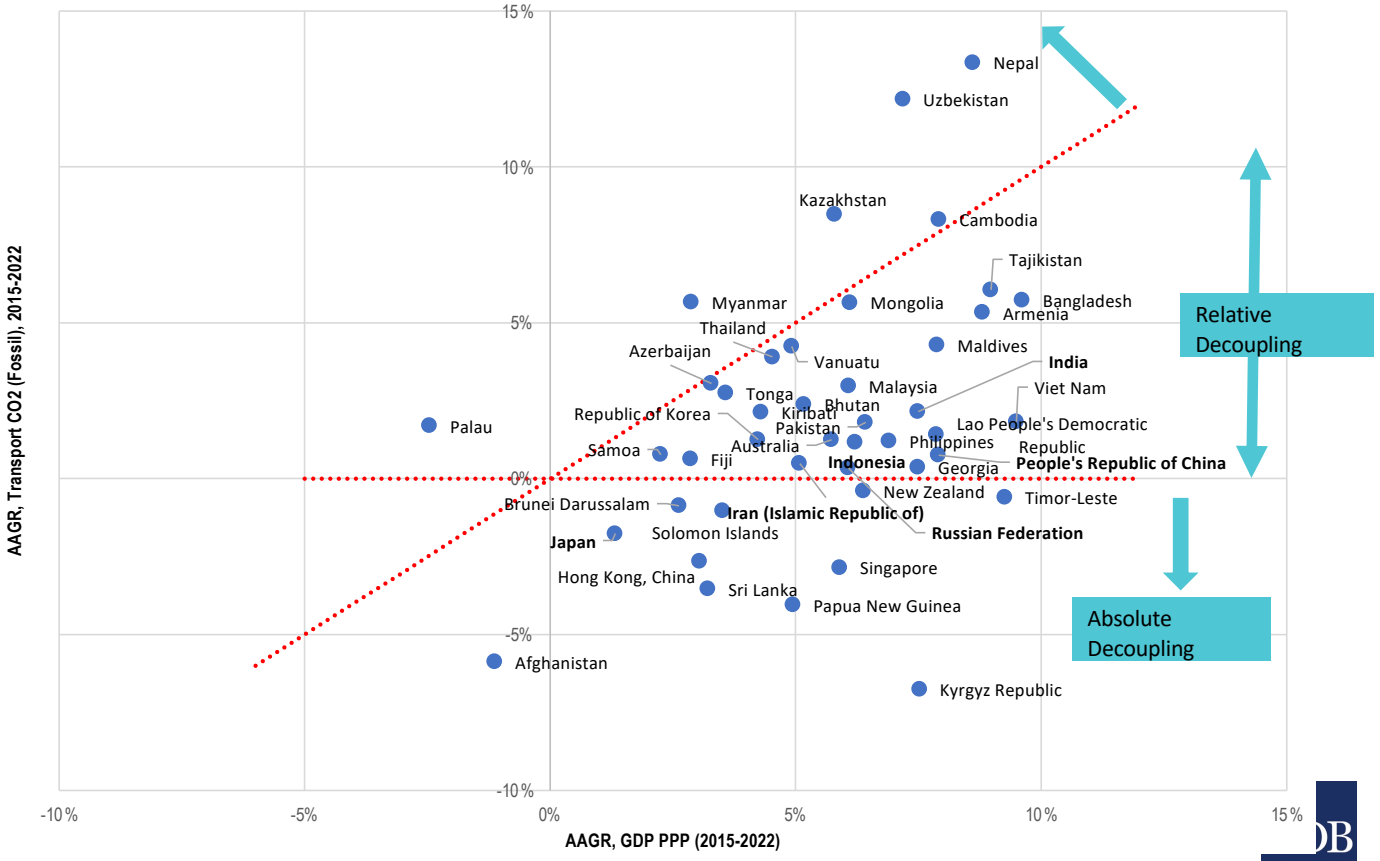
Source: EDGAR-2023

TRANSPORT CARBON EMISSIONS GROWTH IN ASIA & PACIFIC

Over the period 2000 – 2022 a growing decoupling of transport CO2 emissions and GDP can be observed.

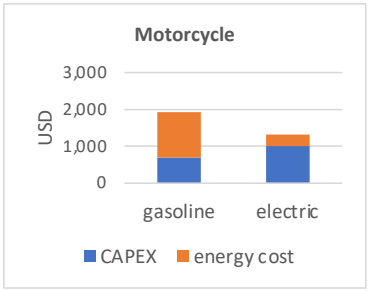
Since 2015,

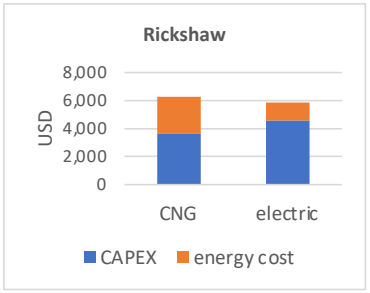
- GDP has increased at an annual rate of 6.5%,
- Total fossil CO_2 emissions by 2%.
- Transport fossil CO_2 emissions have only increased annually by 1%.
- Trends indicate that transport CO_2 emissions in Asia and the Pacific region are growing slower post-COVID when compared to other sectors.

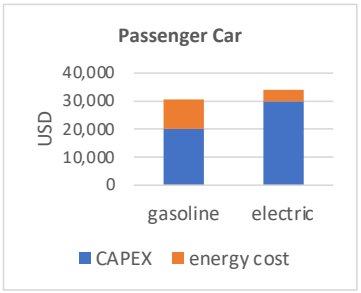


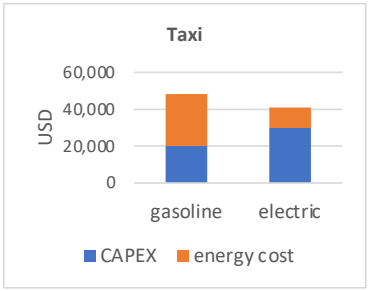
Source: EDGAR-2023, World Bank

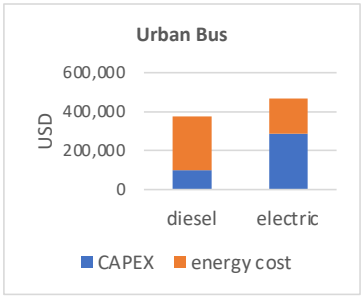
VEHICLE TYPE OWNERSHIP COSTS ($)

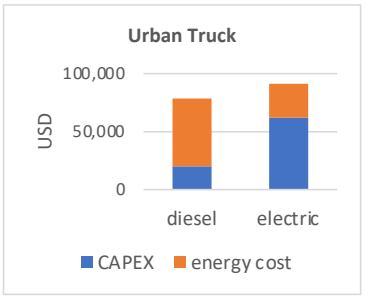










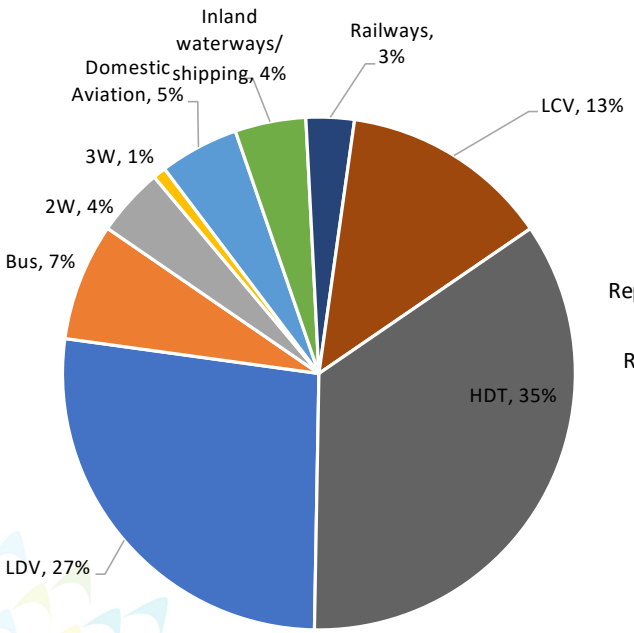


CAPEX = capital expenditure, CNG = compressed natural gas, DMC = developing member country, kWh = kilowatt-hour.
Source: All calculations by Grütter Consulting; non-discounted values; for data sets, see Appendix 1; based on average DMC fuel prices and an average electricity price of 0.16 $/kWh; CAPEX includes battery replacement during vehicle lifetime based on average battery life span with 50% of current battery prices.

The tipping point for certain vehicle types, especially in urban areas has been reached with e-vehicle business case better than that for ICE vehicles (2- and 3-wheelers and urban fleet vehicles such as buses and taxis.

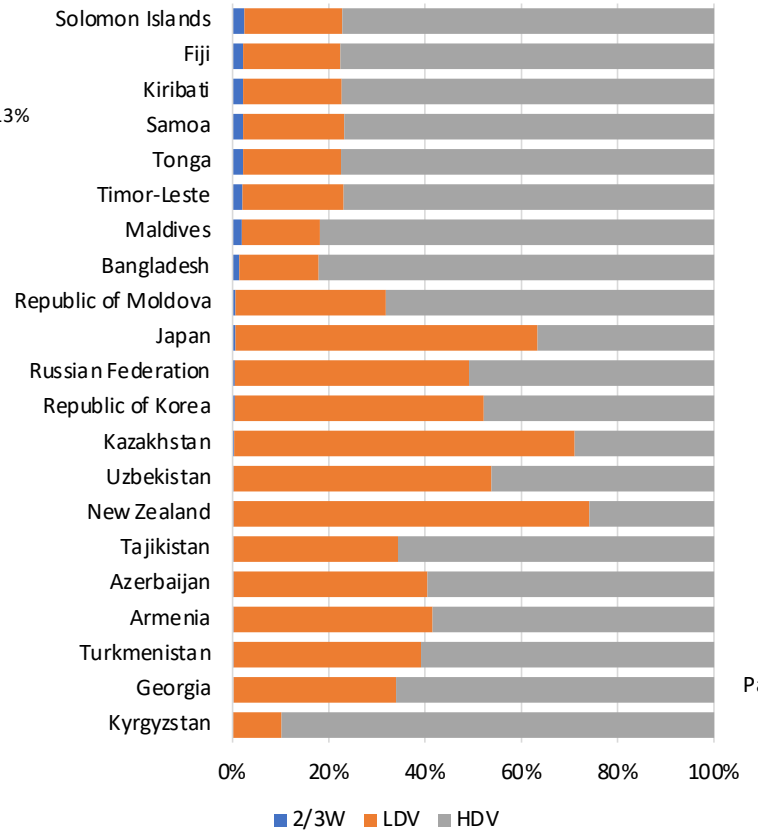
SHARE OF TRANSPORT EMISSIONS

Asia & Pacific, Transport CO2 Emissions Share (2018)

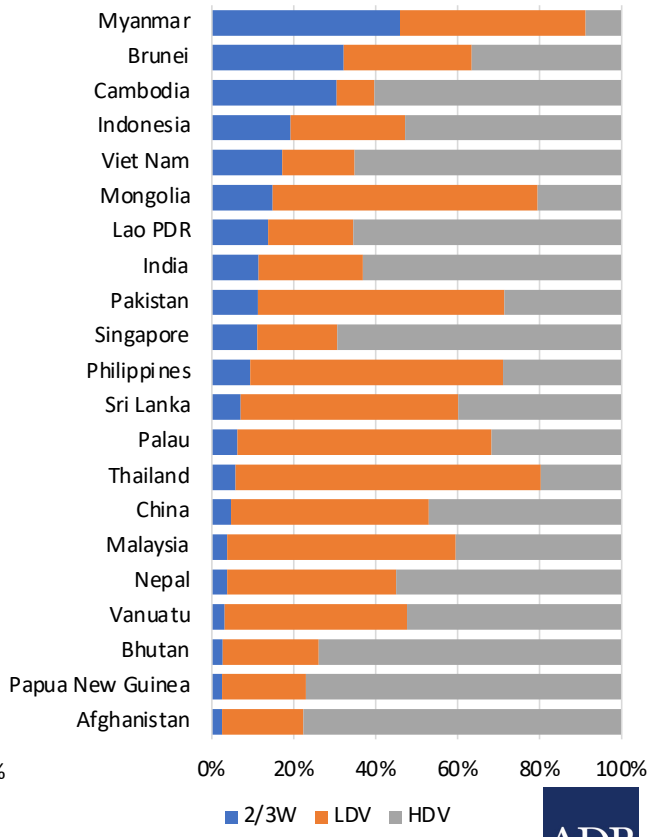


2W – Two-wheeler, 3w – Three-Wheeler, LCV – Light Commercial vehicle, LDV – Light-duty vehicle
HDV/HDT – Heavy-duty vehicle

Share of Road Transport CO2 Emissions, 2022 (W2W)



Share of Road Transport CO2 Emissions, 2022 (W2W)



Transport CO_2 Emissions mode shares vary significantly among countries.
Overall Heavy Duty Trucks contribute the largest share, followed by light-duty vehicles.

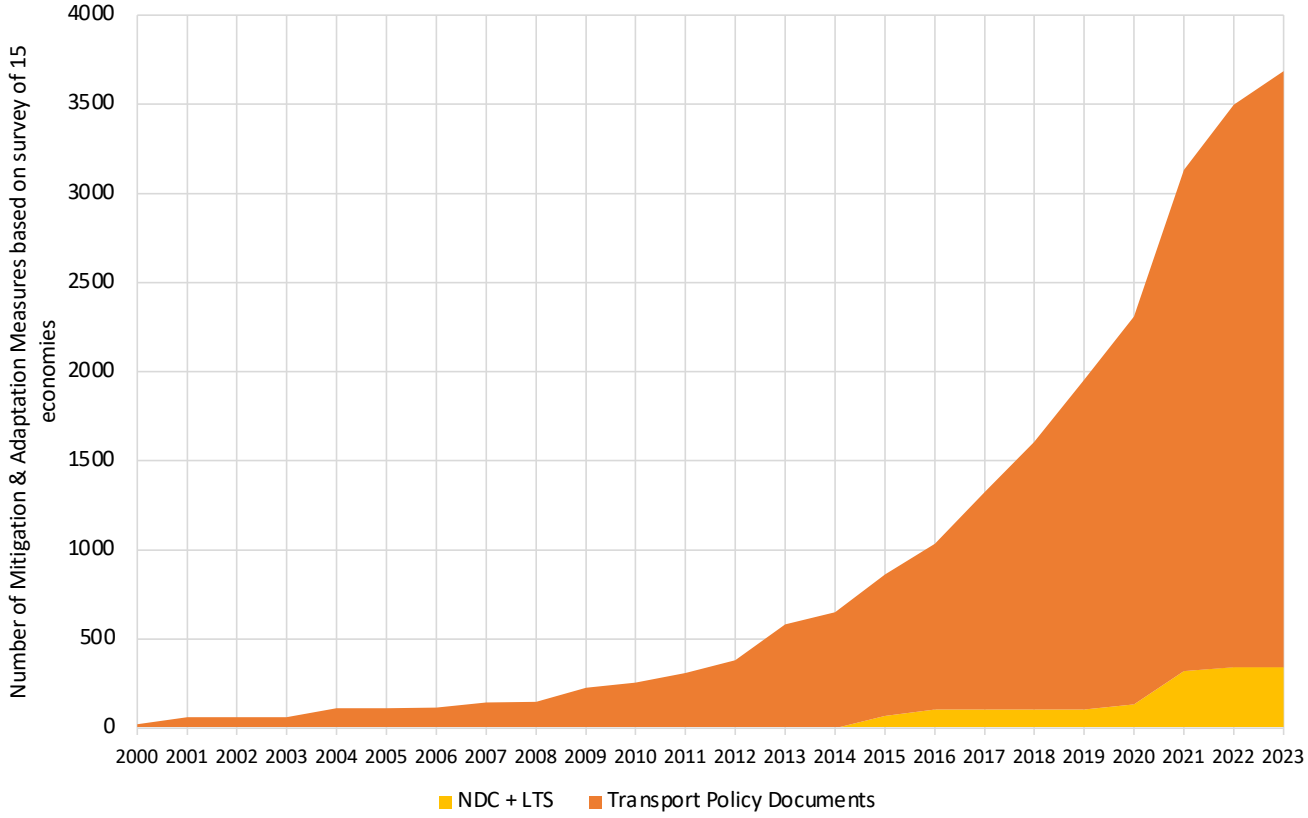
Source: Asian Transport Outlook, ICCT-2023

GROWTH IN TRANSPORT RELATED CLIMATE CHANGE MITIGATION AND ADAPTATION POLICY MEASURES

Based on the survey of 15 economies, ATO finds exponential growth in transport-related statements of ambition, targets, and policy measure recommendations across economies in Asia.

The survey demonstrates essential limitations to the nationally determined contributions (NDC) and Long-term strategies (LTS) as an indicator of low carbon transport policy and, thereby, action on the decarbonization of transport.

Based on a survey of 15 economies, we find that NDC-listed measures constitute only about **10%** of total recommended measures on transport climate mitigation and adaptation.

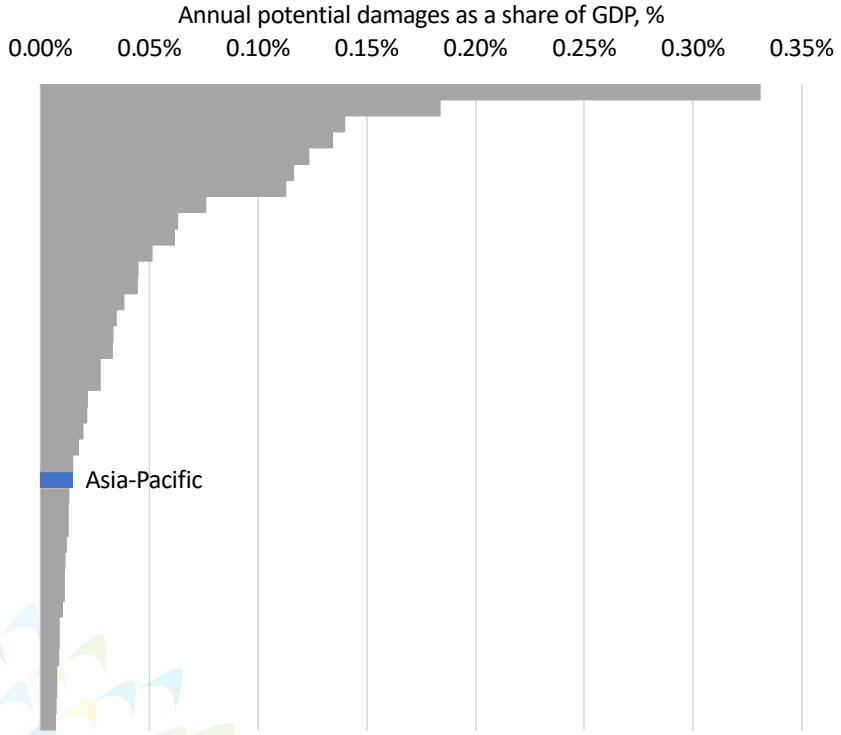


Countries considered – Bangladesh , Bhutan, Indonesia, Kazakhstan, Lao People's Democratic Republic, Malaysia, Maldives, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor-Leste, Uzbekistan & Viet Nam

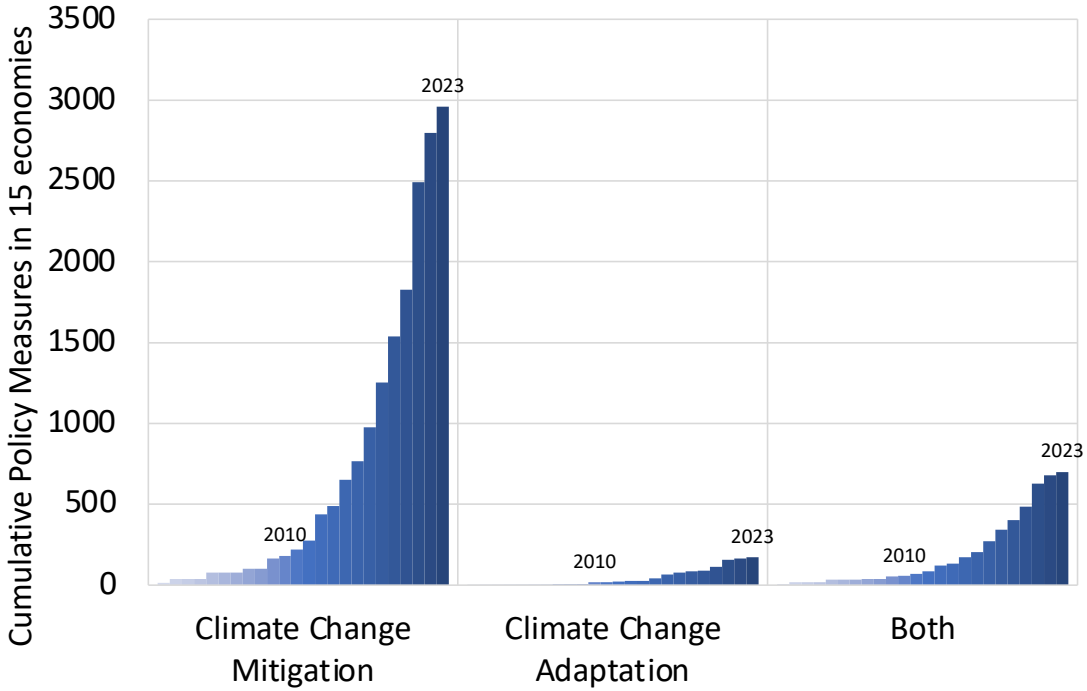
Source: National Policies

TRANSPORT ADAPTATION AND RESILIENCE

Expected annual damages to road, rail, and port infrastructure due to hazards as a share of GDP



Transport Policy Measures Based on 15 Countries Assessment



Despite only having 35% of the world's surface transport infrastructure, Asia-Pacific's share in potential multi-hazard damages is about 54%. Small island developing states are most vulnerable with infrastructure investments and potential damages costing higher proportions of their GDP.

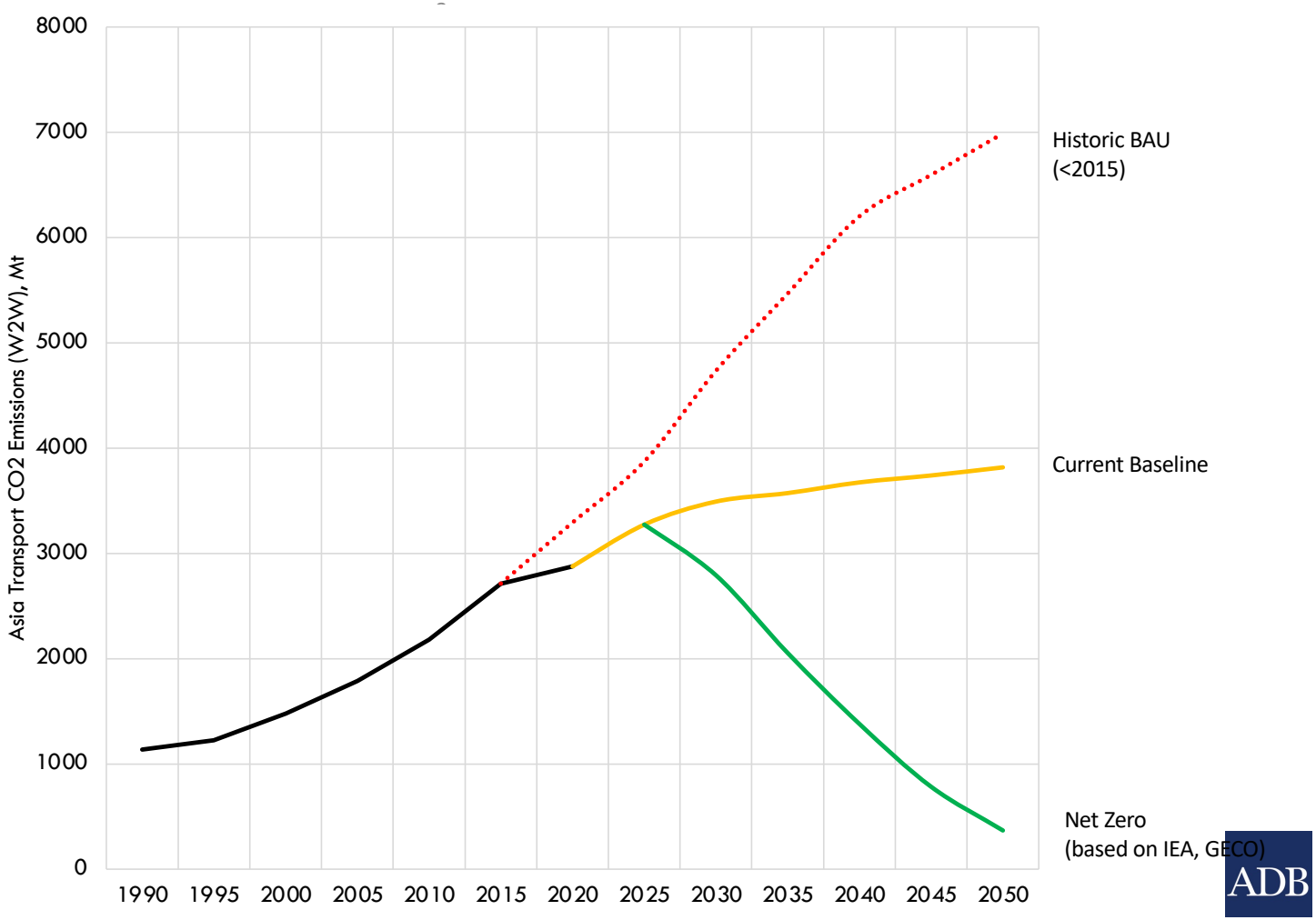
Compared to climate mitigation, climate resilience in the transport sector is not yet a significant policy priority. However, based on a survey of policies from 15 economies, trends show that over the last few years, transport climate resilience is increasingly being integrated into transport-related policies that cut across modes and sub-sectors.

OUTLOOK – TRANSPORT BAU EMISSIONS IN ASIA PACIFIC

Till recently it was believed that unrestrained growth in mobility could lead to transport CO_2 emissions in Asia increasing from about 2.9 Gt to about 7 Gt in 2050.

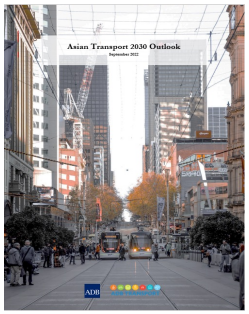
Following the adoption of the Paris Agreement in 2015, we see a change in transport emission trendlines, and a new scenario is emerging i.e., a reference scenario of just below 4Gt by 2050 for Asia.

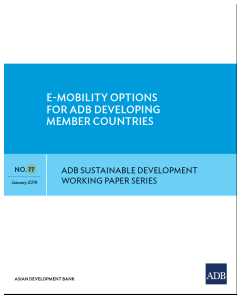
While this is an improvement over earlier scenarios, this still falls well short of what is considered necessary to be compliant with the objective of the Paris Agreement to keep temperature increases to well below 2°C above preindustrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The current consensus is that with such a target transport CO_2 emission by 2050 would need to be somewhere between 0.3 to 1 Gt

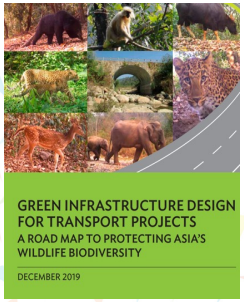


Note: The historic BAU and current baseline are based on the analysis of various studies

ADB E-VEHICLE STUDIES AND LOANS







ADB-financed E-Mobility Projects

As of 1 May 2023

Electric buses
- PRC: Shandong Spring City Green Modern Trolley Bus Demonstration Project
- PAK: Peshawar Sustainable Bus Rapid Transit Corridor Project
- KYG: Urban Transport Electrification Project
- VIE: VinFast Electric Mobility Green Loan Project
- IND: GreenCell Electric Bus Financing Project
- NEP: Kathmandu Sustainable Urban Transport Project

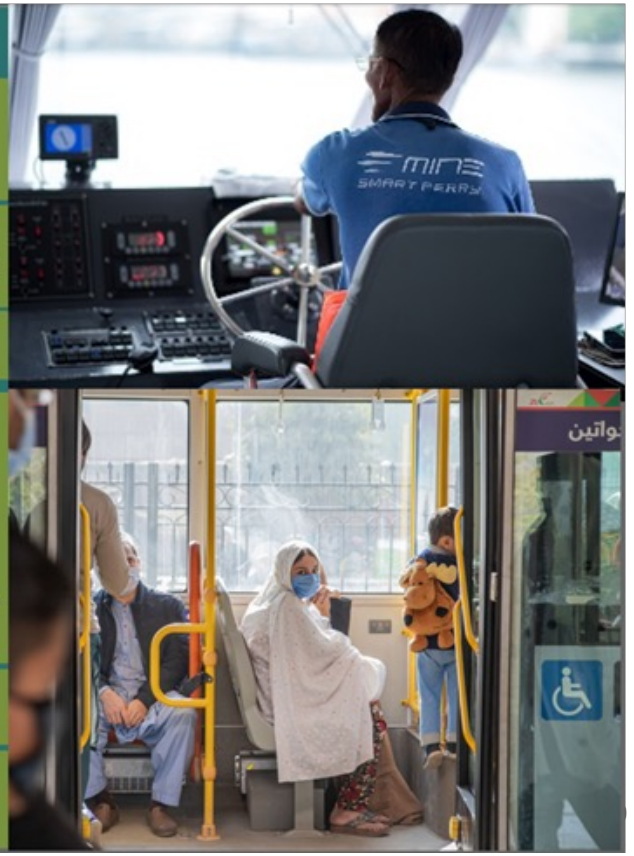
Electric maritime transport
- PRC: Guangxi Li River Comprehensive Ecological Management and Demonstration Project
- PHI/THA/INO: Pilot Deployment of E-boats for Fishing, Tourism and Public Transport
- THA: E Smart Bangkok Mass Rapid Transit Electric Ferries Project
- MLD: Preparing Outer Islands for Sustainable Energy Development Project

Electric two- and three-wheelers
- IND: ADB Ventures –Three Wheelers United
- IND: ADB Ventures – Euler Motors
- PHI: Market Transformation through Introduction of Energy-Efficient Electric Vehicles

Railway and metro systems
- THA: Bangkok Mass Rapid Transit Project (Pink and Yellow Lines)
- IND: Chennai Metro Rail Investment Project
- PHI: South Commuter Railway Project
- IND: Mumbai Metro Rail Systems Project
- PHI: Malolos–Clark Railway Project
- BAN: Railway Rolling Stock Operations Improvement Project
- IND: Delhi–Meerut Regional Rapid Transit System Investment Project
- UZB: Central Asia Regional Economic Cooperation Corridor 2 Railway Electrification
- IND: Kochi Metro Extension Project
- IND: Bengaluru Metro Rail Project
- UZB: Railway Efficiency Improvement Project
- BAN: South Asia Subregional Economic Cooperation Chittagong–Cox's Bazar Railway
- IND: Railways Track Electrification Project
- VIE: Ha Noi Metro Rail System Project (Line 3: Nhon–Ha Noi Station Section)
- IND: Railway Sector Investment Program

Enabling infrastructure for electrification
- THA: Green Loan for Renewable Energy and Electric Vehicle Charging Network
- VIE: VinFast Electric Mobility Green Loan Project
- PHI: Wyntron Electric Vehicle Charger Production Expansion Project

Policies and studies
- PRC: Beijing–Tianjin–Hebei Air Quality Improvement–Hebei Policy Reforms Program
- PRC: Study on the Development of Green Ports and Shipping
- IND: Promoting Clean Energy Usage through Enhanced Adoption of Electric Vehicles and Grid Integration of Battery Energy Storage Systems



A BALANCED APPROACH IS REQUIRED: TRANSPORT IN ASIA SINCE 2010

Road PM10 per GDP	**= -52%**
Road PM10 per capita	**= -30%**
Road PM10 per vehicles registered	**= -56%**
Change since 2010 (2018)	= -75 thousand tonnes

Road crash fatality per GDP	**= -43%**
Road crash fatality per capita	**= -13%**
Road crash fatality per vehicles registered	**= -48%**
Change since 2010 (2019)	= -42,000 premature deaths

Transport CO2 emissions per GDP	**= -34%**
Transport CO2 emissions per capita	**= +22%**
Transport CO2 emissions per vehicles registered	**= -34%**
Change since 2010 (2022)	= 644 million tonnes

We must remember that transport is an enabler of development, providing access to employment, education, health services and social interaction. There is still a large infrastructure gap across Asia and the Pacific that must be built and financed. Good quality access is still lowest in the region, with 1.3 billion urban residents fail to meet SDG 11.2 and 400 million rural fail to meet SDG 9.1.1. the externalities of transport include CO2 emissions but also PM, SOx, NOx as well as road fatalities. We must seek a future for transport that is low carbon, sustainable, safe, and inclusive.

Thank you

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