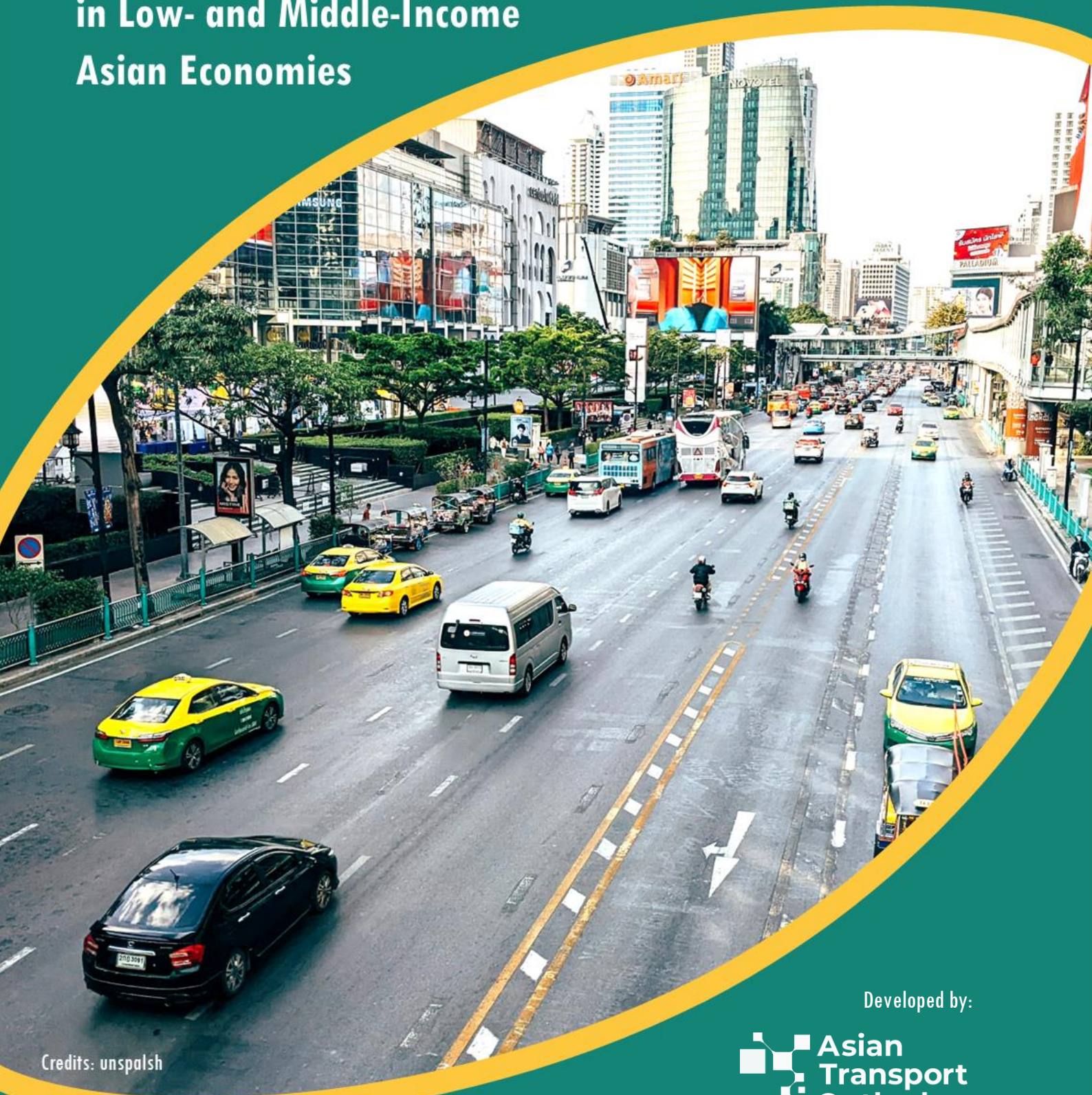
Bridging the Gap:

A Deep Dive into NDCs and Transport Policy Landscapes in Low- and Middle-Income Asian Economies



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HIGH VOLUME TRANSPORT
APPLIED RESEARCH

DT Global

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Preface

This report is part of the research work entitled "Transport NDC Gap Analysis for Low- and Middle-Income Countries (LMICs) in Asia and the Pacific," which is implemented, and builds on the work of the Asian Transport Outlook (ATO), a project initiated and supported by the Asian Development Bank (ADB). ATO is also being supported by the Asian Infrastructure Investment Bank (AIIB). ATO serves as the monitoring mechanism for the Aichi 2030 Declaration on Environmentally Sustainable Transport – Making Transport in Asia Sustainable (2021-2030) which has been adopted by participating countries to the Regional Environmentally Sustainable Transport Forum in Asia as organized by the United Nations Centre for Regional Development (UNCRD)-DSDG/UN DESA.

The research is being co-funded by UKAID through the UK Foreign, Commonwealth and Development Office (FCDO) under the High-Volume Transport (HVT) Applied Research Program managed by DT Global International Development UK LTD (DT Global). The research is being implemented under HVT057 (Transport Decarbonisation Index) whose lead research supplier is the Partnership on Sustainable, Low Carbon Transport. The HVT Programme is a seven-year, £18 million investment by the UK Foreign, Commonwealth & Development Office (FCDO) to undertake research into the complex and interrelated issues of sustainable transport development across Africa and South Asia.

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List of Abbreviations

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ATO	Asian Transport Outlook
BAU	Business as Usual
BRT	Bus Rapid Transit
CDM	Clean Development Mechanism
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
COP	Conference of the Parties
CPI	Consumer Price Index
DPS	Disaster Planning System
ERP	Enterprise Resource Planning
EV	Electric Vehicle
FCDO	Foreign, Commonwealth & Development Office
GDP	Gross Domestic Product
GHG	Greenhouse Gas
Gt	Gigatonne
HSR	High-Speed Rail
HVT	High Volume Transport
IEA	International Energy Agency
ICE	Internal combustion engine
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
ITDP	Institute for Transportation and Development Policy
ITF	International Transport Forum
LDV	Light-Duty Vehicle
LEDS	Low-emission development strategy
LMIC	Low- and Middle-Income Countries
LPG	Liquefied Petroleum Gas
LTS	Long-term strategy
MoFE	Ministry of Forests and Environment Government of Nepal
MRV	Measurement, Reporting, and Verification
NDC	Nationally Determined Contribution
ODA	Official Development Assistance
PPP	Public-Private Partnership
RTR	Rapid transit ratio
SDG	Sustainable Development Goal
UIC	International Union of Railways
UNCRD	United Nations Centre for Regional Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
TDI	Transport Decarbonisation Index

Executive Summary

The Asia-Pacific region plays a significant role in global transport-related carbon emissions. While high-income economies in Asia have seen a decline in their share of emissions, low- and middle-income Asian economies are increasingly playing key roles in driving the global increase in emissions. Various factors, including rapid population growth, urbanization, economic growth, and increased motorization, contribute to this trend. Improper or imbalanced provision of transport infrastructure and services also plays a significant role. While there have been efforts to reduce carbon intensity through various policy measures, these have not been sufficient to offset the growth in emissions due to the sheer increase in transport activity. These trends could very well continue into future. Estimates from various studies point towards significant expansion of transport activity - especially freight – and are projected to outpace the rates of growth of population and infrastructure over the next three decades.

The transport sector in Asia has substantial potential for emissions reduction. Ambitious policies and technological advancements could lead to significant reductions by 2050. However, realizing this potential requires a comprehensive approach that includes optimal and context-appropriate measures that avoid unnecessary travel, shift travel to more efficient modes of transport, and improve vehicles, fuels, and systems as a whole.

While most Asian and Pacific countries have submitted Nationally Determined Contributions (NDCs) outlining their climate commitments, these often lack specificity and ambition, particularly regarding transport. There seem to be significant gaps between NDCs and other transport policies, with many countries failing to set clear targets and identify effective and transformative measures.

Several key areas need to be addressed to achieve meaningful progress in decarbonizing the transport sector. These include:

- Raising the bar towards more ambitious targets and measures for reducing transport sector emissions
- Integrating climate considerations into broader transport policies and aligning them with sustainable development goals
- Prioritizing the expansion and improvement of public transportation systems
- Promoting electric vehicles and phasing out fossil fuel subsidies and internal combustion engine vehicles
- Strengthening transport adaptation and resilience to climate change impacts
- Addressing the growing emissions from freight transport
- Increasing the availability and accessibility of transport finance
- Building institutional capacity and technical expertise for effective policy implementation.

By addressing these challenges and opportunities, Asia can transition towards a more sustainable and climate-resilient transport system, contributing to global efforts to mitigate climate change and wider developmental goals.

1. Introduction

The intersection of climate change action and transportation policy presents a complex challenge, particularly for low- and middle-income economies (LMICs). As LMICs expand and improve their transport systems to support the pursuit of continued economic growth, and improved quality of life, they must simultaneously grapple with the increasing carbon emissions from mostly fossil fuel-dependent transport systems. This report, "Bridging the Gap: A Deep Dive into NDCs and Transport Policy Landscapes in Low- and Middle-Income Asian Economies," aims to explore such intricate landscapes, offering insights into the current situation, the major gaps, and thus, opportunities for improving climate action in the transport sector in LMICs in Asia-Pacific.

Transport plays a fundamental role in economic and social development, yet it also a significant source of externalities, such as greenhouse gas (GHG) emissions. The sector's rapid expansion, driven by factors such as rising incomes and increasing urbanization, poses both opportunities and challenges. On one hand, it offers the potential for modernization and the adoption of cleaner technologies and more efficient systems. On the other hand, without targeted and purposive interventions, the growth in transport demand could lock countries into high-carbon pathways for decades to come.

This report explores the nature and evolution of the Nationally Determined Contributions (NDCs) with respect to the transport sector in LMICs in Asia-Pacific, These NDCs are at the cornerstone of global climate action under the Paris Agreement which was adopted in December 2015 by 196 parties at the 21st Conference of Parties (COP) to the United Nations Convention on Climate Change (UNFCCC). These pledges, made by countries to reduce their greenhouse gas emissions and adapt to climate change impacts, serve as a critical framework for national policy and international cooperation. While NDCs serve as a crucial benchmark in the climate action framework, a comprehensive assessment of progress must extend beyond these formal commitments to capture the full spectrum of initiatives and developments (or lack thereof) that are being adopted. This report is accompanied by country-level "transport and climate change" profiles that are available through the Asian Transport Outlook (ATO) website. [1]

1.1. Objectives

Through a comprehensive analysis of NDCs, national transport policies, and case studies from across low- and middle-income Asian economies, the study aims to:

- Assess the current state of transport-related commitments and measures within NDCs and their alignment with national transport policies
- Identify key gaps in terms of transport-relevant commitments and measures in the NDCs, and between the NDCs and the wider transport policies
- Enable evidence-based discussions on actionable insights for policymakers, development partners, and other stakeholders working at the nexus of climate action and transport development.

1.2. Scope

This report encompasses insights on the intersection of transport and climate change landscapes in LMICs in the Asia-Pacific region. This report has adopted the general definition of "Asia-Pacific' that is employed by the Asian Transport Outlook (ATO) which includes the following 51 economies to define

the "Asia-Pacific"(or Asia) region: Afghanistan, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, People's Republic of China, Cook Islands, Fiji, Georgia, India, Indonesia, Japan, Kazakhstan, Kiribati, Kyrgyz Republic, Lao People's Democratic Republic, Malaysia, Maldives, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Niue, Nauru, Nepal, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tonga, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, Viet Nam, Hong Kong, China, Taipei, China, Iran (Islamic Republic of), Russian Federation.[1] Please note, however, that there are metrics and indicators that have been sourced directly from external reports and references which may have different coverage when it comes to what they define as "Asia." Whenever country-level data from the ATO database is used, this report utilizes the ATO definition of the Asia-Pacific region as described above.

Scope of the Policy analysis

At the core of this report is the policy analysis that was conducted, encompassing 25 LMICs. The countries were selected based on the requests of the partners of the ATO. The conduct of the whole process of document collection, codification, tagging, and analysis require significant time and effort, and the decision to go ahead with such steps were primarily determined by external demand. In several cases, relevant stakeholders (e.g. government officials) from the countries or other international organisations had conveyed requests to the ATO team which factored into the decision for inclusion of the countries in the policy analysis.

While we recognize that some of the major countries with high transport-related GHG emissions are not included in the 25-country list, the selected countries represent a well-balanced mix in terms of geographical distribution (Pacific, Central and West Asia, East Asia, Southeast Asia, South Asia), as well as in size and income categories. Overall, these 25 countries constitute 27% of the total population, and 19% of the total economic value in the Asia-Pacific region.

The policy analysis examining 53 Nationally Determined Contributions (NDCs) across all NDC cycles. The commitments contained in the NDCs are compared with 291 non-NDC transport sector-related national policy documents that have been collected for the countries (since 2015). These policy documents include 45 national development policies, 42 national reports submitted to international or regional processes, 50 national transport policies, laws, and regulations, 55 subsector plans, policies, and strategies, and 76 other policy documents. More details are contained in section 1.3.

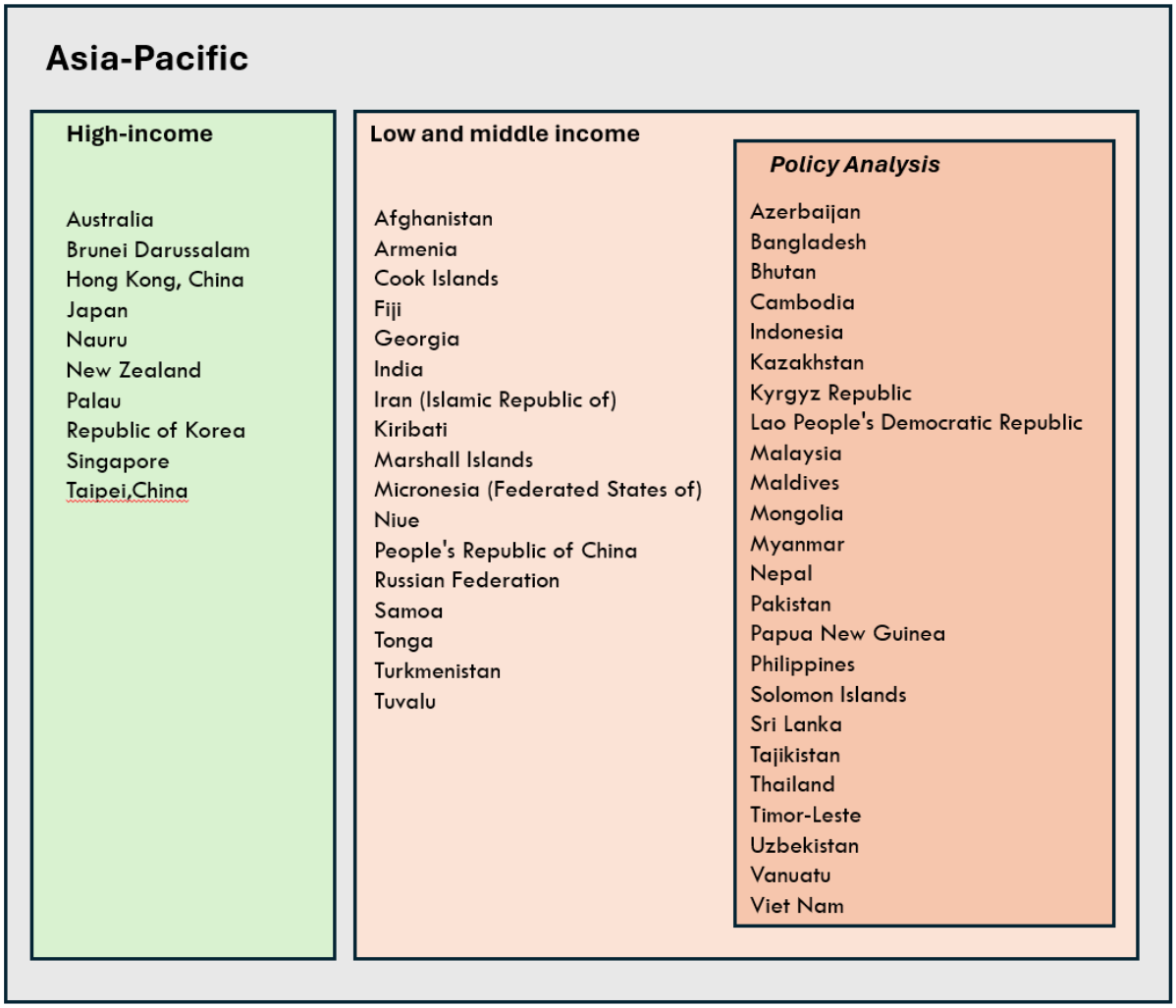

Figure 1. Geographical Scope Relevant to this Report – Asia Pacific Region, LMICs in Asia & the Sample LMICs included in the Policy Analysis

The scope of the analysis was primarily limited by the availability and accessibility of relevant policy documents. Some documents may be outdated or not publicly available. This study primarily focused on national-level documents, and had not accounted for subnational policies that might also influence transport sector developments. The inherent limitations are recognized, as some of the larger economies are not included in the set of countries that were subjected to the policy analysis. Subsequent iterations of such an analysis will strive to include more countries.

1.3. Methodology

The sections under Chapter 2 of this report—which provide insights on the state and trends relating to climate change-related and transport in Asia-Pacific— are primarily based on the analysis of the data as compiled by the ATO, and contained in its online database. [2] The data in ATO's databases had been processed using descriptive statistical techniques for the purposes of this research.

As mentioned, at the core of this report is the policy analysis, which consolidates insights for the 25 LMICs in Asia Pacific as defined in Figure 1 above. The following section depicts the process by which the policy analysis was conducted for this research.

Document Identification and Collection

The analysis of policy documents conducted through this research activity builds on the wider initiative of tracking policies that is being implemented by the ATO. ATO's policy tracker does not only contain NDC documents, but other transport-relevant policy documents, as previously mentioned.

This report includes an analysis of 53 NDC documents from the 25 countries. The NDCs included in this report refers to the various iterations of the NDCs - from Intended NDCs (INDCs) to first-generation, updated, and second-generation NDCs. Additionally, 291 non-NDC transport sector-related national policy documents were included in the analysis. These documents included were the ones that had been published from 2015 onwards. These non-NDC policy documents fall into several broad categories:

- national development policies (45),
- national reports submitted to international or regional processes (42),
- national transport policies, laws, and regulations (50),
- subsector plans, policies, and strategies (55) and,
- other policy documents that significantly impact the transport sector (76).[3]

Whenever available, policy documents related to adaptation are included in the document identification process and are included in the analysis in case they contain specific provisions relating to the transport sector.

Documents were retrieved through various channels, including online databases, government publications, and organizational websites. Steps were taken to ensure the authenticity (whenever deemed necessary) and relevance of each policy document. Special attention was given to ensure that the documents were the most recent versions available as of the study period.

Categorization and Tagging

A detailed qualitative content analysis was performed on the collected documents to understand the narrative and policy directions. This involved an examination of the language and commitments in policy documents to decode policy intent and specificity.

Each document has been meticulously analysed. Individual policy measure types, and targets are identified and are treated as individual observations in the policy tracker database. There are currently more than 260 policy measure types in ATO's policy tracker.

For each of the observations, various elements are then tagged based on several predefined criteria including thematic areas, policy pillars, and transport-specific actions. Tagging was done using binary (yes/no) schemes, exclusive categories, or free text to classify, and codify the documents under different focal themes which includes those that are relevant to this report (e.g. climate change mitigation and adaptation). Relevant elements such as targets and policy measures are identified, extracted, and categorized.

Table 1. Summary of the Information Coded into the Policy Tracker Database for each Observation

Column	Type	Description
Country/Economy	Exclusive category	Based on the 51 economies list of the ATO
Subregion	Exclusive category	Subregion of the economy
Document name	Free text	
Year published	Date	
Document Type	Exclusive category	Based on a pre-defined list (e.g. national transport policy, subsector policy, NDC, LTS, etc.)
Transport sector measure type	Exclusive category	Each transport sector measure type gets an individual row in the database, and subsequent tagging is done for each row based on the elements described in this table.
Dimension	Yes/no	In case the policy document covers relevant dimensions (e.g. climate change mitigation, climate change adaptation, among others), it is marked. Other levels or variations of dimensions or themes are also embedded in the policy tracker database (e.g. SDGs, etc…) which are marked yes in case the policy measure observation is related to such.
Mode	Yes/no	If the policy measure is relevant for a certain mode, it is marked as yes (e.g. road, rail, shipping, aviation)
Sector	Exclusive category	It is marked whether the policy measure type occurrence is relevant to passenger, freight, or both
Geographical level/type	Yes/no	In case the policy measure is relevant to national, urban, rural transport, it is marked as yes.
Transport measure category	Exclusive category	Several columns are dedicated in attaching categories to the policy measure (e.g. vehicles, infrastructure, capacity building, data, institutions, etc…)
Extracted text	Free text	Directly copied text from the policy document describing the policy measure type included in such.

Targets are also recorded and analysed. Transport-relevant climate mitigation targets are broadly tagged as direct (or indirect, otherwise) if the target explicitly states a reduction target (whether in total or in terms of percentage) specifically for transport sector (or its sub-sectors) together with a temporal component (when the target is to be achieved)

Specific text excerpts are also extracted and copied into the policy tracker, so that these can easily be retrieved. The coding included determining the frequency of certain themes across documents, enabling the identification of prevalent policy measures and themes.

Analysis

NDC commitments were cross-referenced with the non-NDC transport policy documents. This involved evaluating the alignment and discrepancies between the stated commitments in the NDCs and the documented national policies.

The comparison looked at key variables such as emission reduction targets, strategies for promoting electric vehicles, public transport expansion, and adaptation measures to climate impacts. Quantitative metrics were derived from the frequency and patterns observed in the qualitative coding.

To ensure the reliability and validity of the analysis, a workshop was held to gather comments and insights regarding the main findings of the research. This went was held online last 26th of September 2024. Feedback from experts in climate policy and transportation was solicited to validate findings, particularly in interpreting policy documents and understanding the practical implications of the commitments. [4]

2. Transport and Climate Change: Focus on Asian LMICs

2.1. Current Status of Carbon Emissions: Asia's Transport Sector

In 2023, Asia was a significant contributor to global transport-related carbon emissions, responsible for approximately 40% of the world's total.[5,] The region has been the primary driver of the rise in transport CO_2 emissions since 2010, responsible for about two-thirds of the global increase.

Globally, the domestic transport sector (which includes road, railways, aviation and shipping) makes up 18% of total fossil CO_2 emissions. In Asia, this figure stands lower 11%.[6] The latest global GHG emissions estimates for 2023 shows that GHG emissions from transport in Asia-Pacific has grown 6.6% compared to the previous year, which is the highest among all sectors across all regions globally.[7]

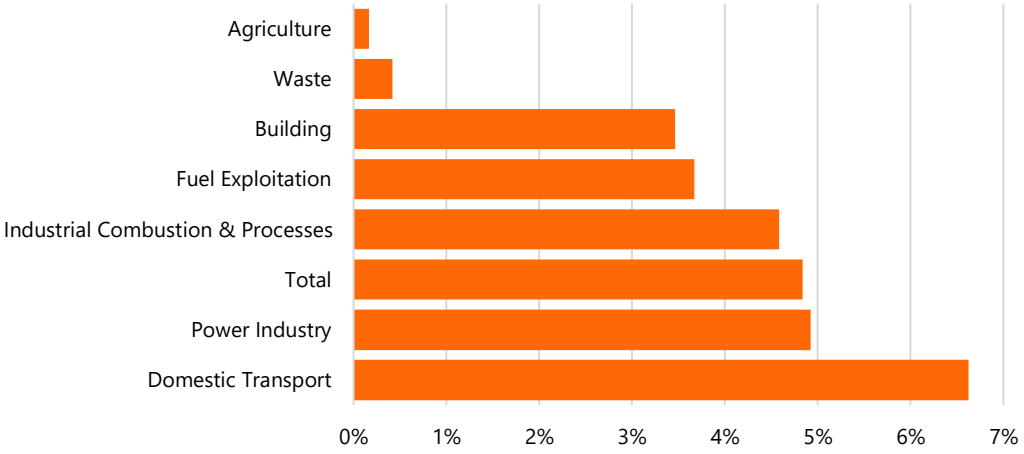

Figure 2. CO_2 Emissions in Asia Growth Rates by Sector (2022-2023)
Source: Own analysis based on European Commission. Joint Research Centre. & IEA (2024).

Furthermore, the emissions growth rate differs between high-income and low- and middle-income Asian economies. Notably, the share of high-income economies in total domestic transport CO_2 emissions has declined from 38% in 2000 to 16% in 2023, mirroring the shift in the distribution in GDP (from 33% to 16% from 2000 to 2023).[8]

Road transport dominates transport-related carbon emissions in Asia's LMICs, constituting approximately 88%. Railways, domestic aviation, and inland waterways collectively accounted for a significantly smaller share, contributing 2%, 5%, and 5%, respectively.[9] Since 2000, the emissions from fossil fuels in road transport, domestic aviation, and domestic navigation have increased annually by 2%, 5%, and 5%, respectively. The railway sector stands out as an exception to the trend of increasing emissions, with fossil CO_2 emissions only increasing at an average annual rate of 2% between 2000 and 2010 and decreasing at an average yearly rate of -1% between 2010-2023. This reduction is particularly noteworthy given the significant expansion of railway infrastructure by about 75,000 kilometres in lower and middle-income countries between 2010-2022,[10] highlighting the successful integration of cleaner energy policies within the Asian railway sector.

The proportion of carbon emissions attributed to various modes of road transport varies significantly across countries with different income levels. Light-duty vehicles are generally estimated contribute a substantial portion of road transport CO_2 emissions in the Asian region. A recent study estimates that

light-duty vehicles constitute 58% of road carbon emissions in high-income economies in the region, 50% in upper-middle-income economies, and 32% in low- and lower-middle-income economies. Two-wheelers' contribution also exhibits distinct patterns, accounting for 1% in high-income, 4% in upper-middle-income, and 14% in low- and lower-middle-income economies. Heavy-duty vehicles are estimated to account for 41% of road CO_2 emissions in high income economies, 45% in upper-middle-income ones, and 54% in lower and low-income economies. [11]

2.2. Key Drivers of Transport Carbon Emissions in Asia

The carbon emissions from the transport sector are determined by several factors: the total travel distance, the distribution of transport by modes, the energy and carbon intensities of each mode, and how these variables change over time. A complex interplay of external factors drives the demand for both passengers and goods transport.

Population Growth and Urbanization

Population growth tends to result in increased demand for transportation. It acts as a catalyst, significantly impacting other vital factors such as per-capita income, urbanization rates, the average age of the population, and regional population distribution. From 2000 to 2022, the Asian population grew significantly, with almost all the growth concentrated in middle and low-income countries (98%).[12] This population boom has also come with intensified urbanization, with more than half the population now residing in urban areas. While high-income countries normally exhibit higher urbanization rates, with 88% of their population living in urban areas, the urbanization trend in middle and low-income countries is also substantial, with 50% of their population now living in cities.[13] This rapid urbanization, coupled with population growth, is a significant driver of transport CO_2 emissions, as it necessitates increased demand for mobility.

Income Growth, Economic Activity and Motorisation

Efficient transportation systems are essential for economic activity and trade. Rising incomes often lead to increased private vehicle ownership and use, fuelling demand. On the other hand, freight transport is influenced by economic growth and shifts in the industrial makeup of economies, particularly towards services and higher-value goods. Motorization trends in LMICs, particularly the expected increase in vehicle ownership, are a significant factor in the growth of CO_2 emissions. While comprehensive data on transportation activity is crucial for a holistic understanding these trends, available motorization indexes provide us with valuable first-cut insights. Despite a preference for more efficient two- and three-wheelers in LMICs in Asia, there are those LMICs which are following the car intensive motorization pathways of the other developed economies. Moreover, there are those LMICs which are reaching high levels of motorization both in terms of smaller 2&3wheelers and in terms of light-duty vehicles). This expected growth suggests a potentially substantial increase in CO_2 emissions.

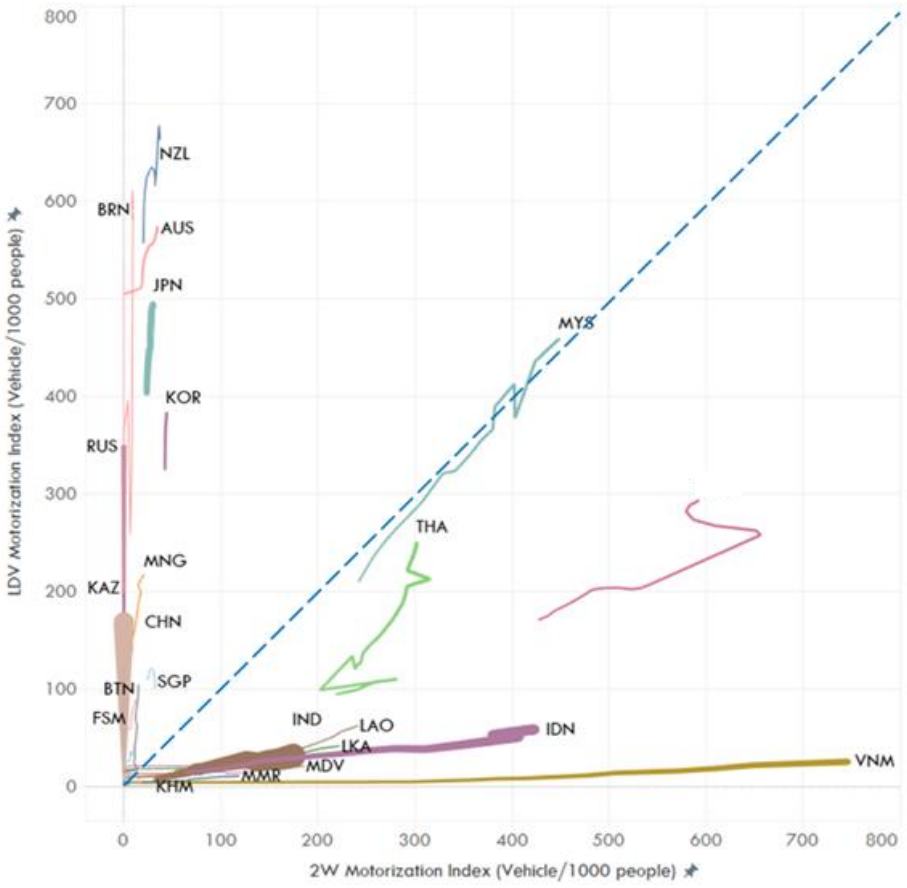

Figure 3. Motorization rates (vehicles/1000 people for) Light-Duty Vehicles (LDVs) and 2-wheelers
Source: Own analysis based on country statistics

Infrastructure Development

Infrastructure enables the provision of transportation services and is a primary driver of CO_2 emissions in LMICs, in general. Since 2000, Asia-Pacific has experienced significant transport infrastructure growth, with the road network expanding from 12 million kilometres to about 22 million kilometres in 2022. While traditional railway infrastructure has gradually expanded, high-speed rail infrastructure has grown significantly, particularly in China. The expansion of bus rapid transit, light rail transit, and metro systems in LMICs also contributes to this trend. A substantial portion of global infrastructure growth has occurred in Asian LMICs since 2000.

Roads constitute the majority of surface land transport infrastructure in LMICs in Asias. Since 2000, the roadway network has expanded significantly, with the total length increasing from 12 million kilometres to about 22 million kilometres in 2022.[14] Nearly the entire road expansion (97%) was concentrated in LMICs.

The railway development provides a contrasting picture when compared with road development. In Asian LMICs, railway expansion has been slower than road expansion. The railway infrastructure mainly remained stagnant from 2000 to 2010. Overall, roughly 45,000 rail route-km has been constructed from 2000 to 2010 in low- and middle-income Asian countries.[15] While traditional railway infrastructure has gradually expanded, the total high-speed railway (HSR) infrastructure in emerging economies has expanded significantly (primarily due to China). Over the last two decades, China has led the

development of high-speed railway infrastructure, and now, nearly 68% of the global high-speed rail infrastructure exists within China.[16]

The Rapid Transit to Population Ratio (RTR) indicator, which compares a country's urban population with the length of rapid transit lines (including rail, metro, and BRT) that serve them, shows significant improvement in many LMICs. Since 2000, the bus rapid transit system, light rail transit, and metro system infrastructure in LMICs in Asia have expanded by 1,500 kilometres, 500 kilometres, and 9,200 kilometres, respectively.[17] It must be noted though that majority of the LMICs in the region are still at the lower spectrum compared to higher income economies in terms of rapid transit infrastructure per urban population.

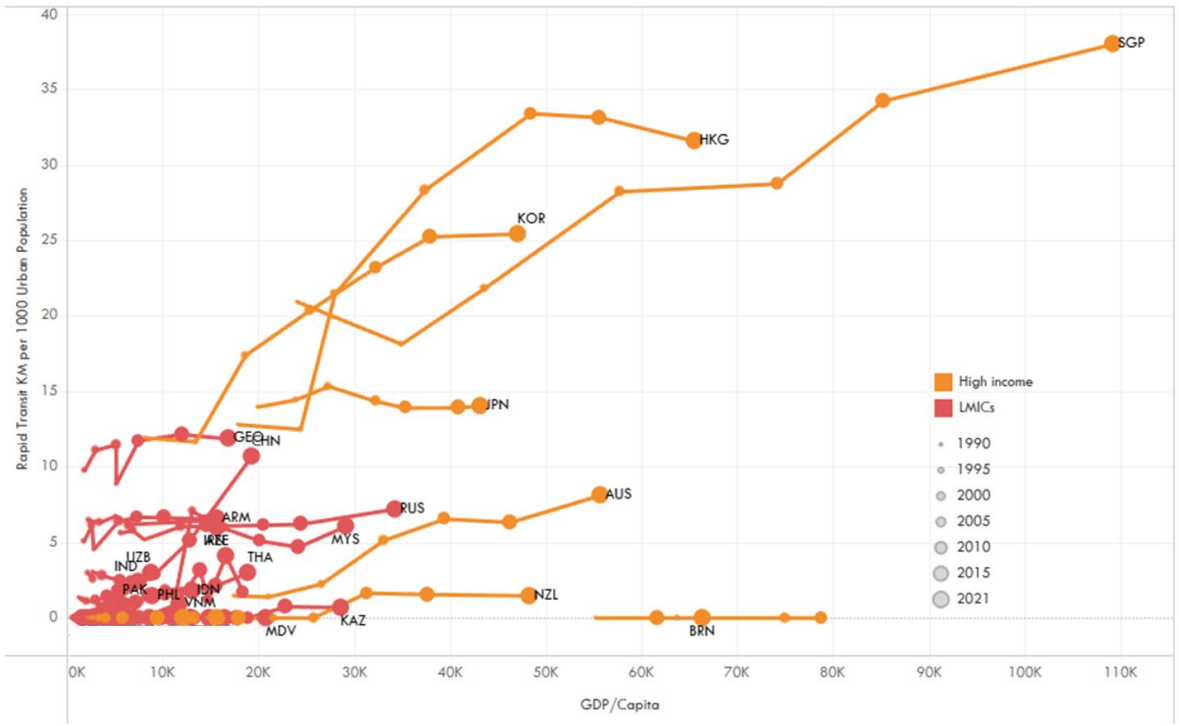

Figure 4. Rapid Transit Infrastructure (kilometre) per Urban Population vs GDP/Capita
Source: Own analysis based on country statistics

Energy and Carbon Intensity

The transport sector in LMICs in Asia is currently the least diversified energy end-use sector.[18] Despite policies aimed at energy transition, fossil fuels still hold a significant share in Asian LMICs, contributing 93% of the sector's energy share in 2021. However, the share in electric energy consumption within transport sector, increasing from 2% to 4% between 2010 and 2021, is an emerging—albeit a slow one—trend.[19]

Since 2000, Asia's transport sector has had notable strides in reducing its carbon intensity across all income segments.[20] However, the extent to which transport-related CO_2 emissions have decoupled from GDP growth varies significantly across countries with different income levels.

In high-income Asian countries, 13% of economies have experienced a stronger coupling between transport CO2 emissions and GDP, suggesting their economic growth remains reliant on carbon-intensive transportation. Conversely, 38% of these economies have achieved absolute decoupling, demonstrating decreased transport emissions despite continued economic expansion.

The situation in low-income, and middle-income Asian countries is more nuanced. Meanwhile, 8% have seen a strengthening of the coupling between transport CO2 emissions and GDP. Nearly 92% of countries have reached relative decoupling, where transport emissions have grown slower than economic growth.

Figure 5. Transport Fossil CO_2 and GDP Per Capita (Average Growth Rates 2000-2022)
Source: Own analysis based on country statistics

2.3. Asian LMICs' Progress Towards Transport Decarbonisation

The evolving landscape of transport demand is critical in assessing progress towards transport decarbonization in Asia. Current trends and policies point towards continued growth in transport activity, mainly freight, potentially exceeding population and infrastructure growth. The International Transport Forum (ITF)[21] and ATO's projections highlight this trend, with estimates of 100% and 200%

growth in passenger and freight transport demand between 2020 to 2050 considering current policies. In essence, Asia would add about 50% of the total global transport demand increase.[22]

It is important to note that the impacts of mitigation actions on CO_2 emissions may not necessarily be linear. Despite policy shifts and technological advancements since the adoption of the Paris Agreement in 2015, the progress on transport decarbonization in Asia remains insufficient. The scenarios before the implementation of the Paris Agreement projected a trajectory wherein Asian transport CO_2 emissions would increase to about 7 Gt by 2050, primarily to be driven by the emission growth in LMICs.

Meanwhile, ATO's reference scenario suggests emissions will be just above 3 Gt by 2050.[23] Even with the updated scenarios embodying the most recent decarbonization policies, the trajectories still seem to be insufficient from fully achieving decarbonisation in the region's transport sector i.e., an estimated average of 0.3 Gt by 2050. The set of current NDCs suggests that global emissions from fuel combustion will be reduced by about 1% annually, i.e., a 7% total reduction from 2015 to 2022. [24]

To illustrate the impact of transition, imagine a scenario where the carbon intensity of the transport sector in LMICs had remained stagnant at 2000 levels. In this hypothetical situation, the carbon emissions of the transport systems of Asian- Pacific LMICs would have increased to 4.6 Gt by 2022, more than double the estimated figure of 2 Gt, highlighting the impact of technological advancements and policy measures that have helped decrease carbon intensity over the years.

However, despite the progress, the overall CO_2 emissions from the transport sector in Asia have continued to rise. In particular, the CO_2 emissions for the transport sector in lower and lower middle-income countries in Asia have increased by an annual average of 4.2% since the beginning of the century, while high income countries in the region achieved an annual average reduction of -0.4%.

These trends indicate that the reductions in carbon intensity have not been enough to counteract the growth in transport activity in the region. Therefore, while the decrease in carbon intensity is a positive development, it's clear that more comprehensive measures are needed to address the rising transport emissions in Asia and achieve sustainable transportation goals.

Although the changing trendlines and emerging scenarios signify progress, considerably more ambitious action is necessary to align the transport sector with the Paris Agreement's climate objectives. This underscores the need for a comprehensive approach to transport decarbonization, encompassing demand management strategies and further advancements in low-carbon technologies and policies.

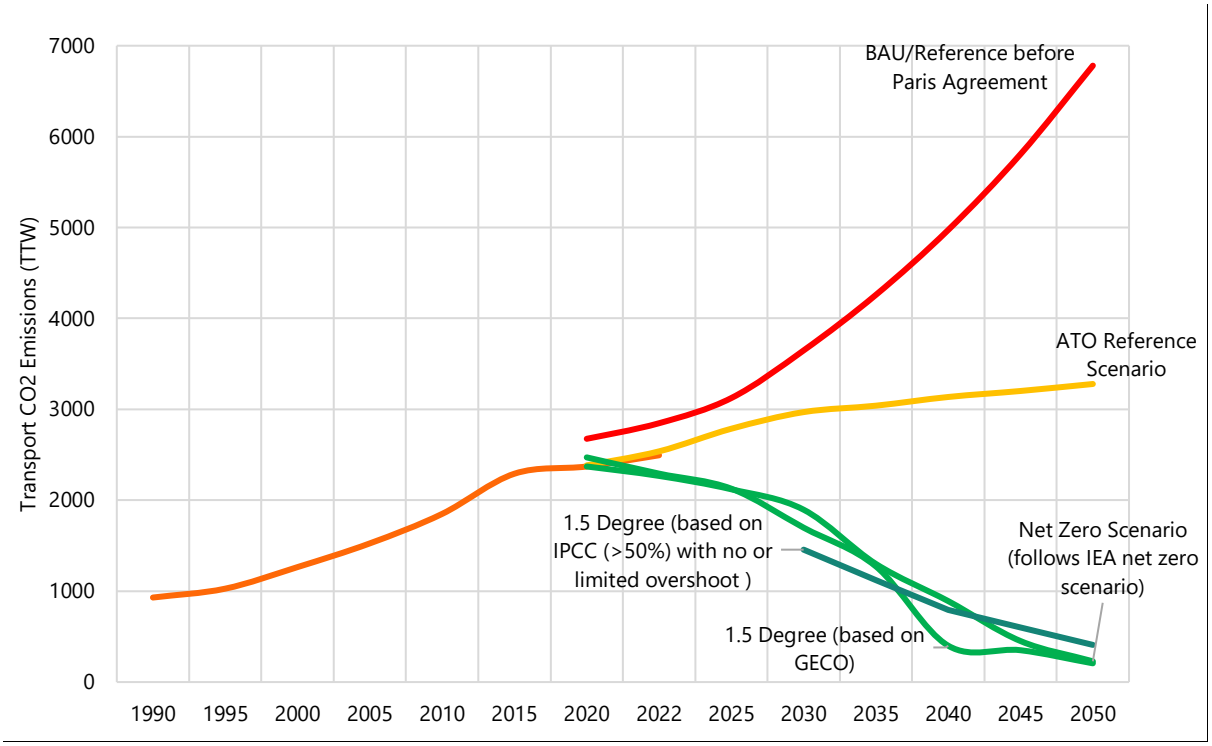

Figure 6. Transport CO_2 Emissions in Asia
Source: Own analysis based on ITF (2023), ATO (2022), IEA (n.d.)[25]

2.4. The Transport Sector in Asia has Significant Mitigation Potential

There is much potential in terms of achieving significant emissions reduction in the transport sector.[26] The ITF suggests that ambitious "avoid-shift-improve" policies could lead to a peak in CO_2 emissions by 2025, followed by an 80% reduction compared to 2019 levels by 2050, aligning with the 1.5-degree pathway.[27] However, this potential varies across income levels, with high-income countries projecting steeper reductions than middle-income countries[28]. While middle-income countries anticipate peaking emissions around 2030, low-income countries may experience continued growth until 2050.

A comprehensive meta-analysis of low-carbon scenarios reveals that Asian economies can significantly reduce their transport carbon emissions by implementing low-carbon transport policies. [29] The said analysis suggests that 2050 transport Carbon emissions could be kept to 16% above 2015 levels. Furthermore, if countries collectively maximize their efforts to implement comprehensive low-carbon measures, the sector could achieve reductions that align with some of the 1.5-degree pathways.

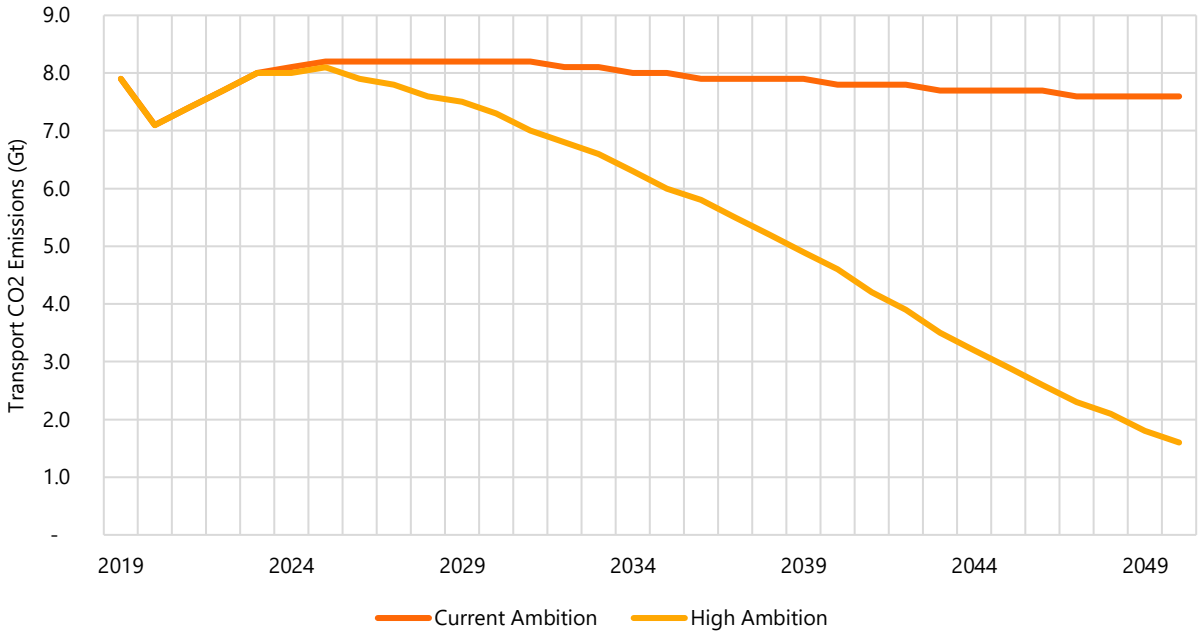

Figure 7. Global Transport CO_2 Emissions (2019 – 2050)
Source: Own visualization based on ITF (2023), Gota and Huizenga (2022), IEA (n.d.)[30]

Realizing the transport sector's full mitigation potential necessitates a balanced implementation of low-carbon mitigation policies. These policies should focus on avoiding or reducing the need for transport trips, promoting a shift toward more efficient travel modes, and improving the performance of vehicles and fuels. The likelihood of successfully implementing such a comprehensive approach increases significantly if countries, cities, and companies establish long-term commitments to transport decarbonization.

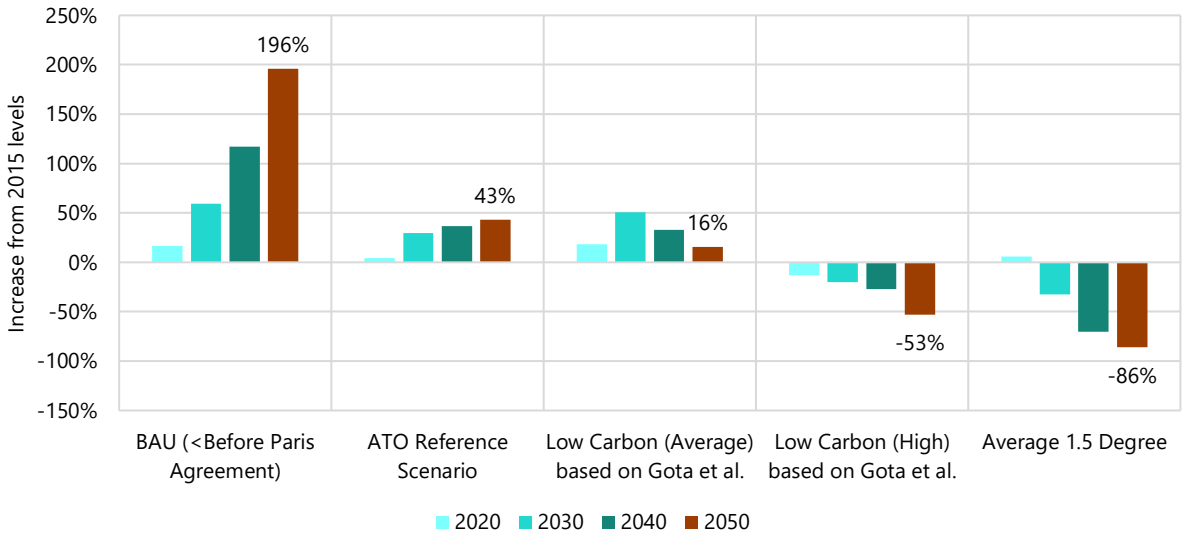

Figure 8. Asia's Transport Sector CO_2 Emissions Pathway
Source: Own analysis based on various sources[31]

3. NDCs and Transport Policies in LMICs in Asia

While nearly all Asian and Pacific countries have submitted their NDCs to the international community, the transport commitments often lack specificity and ambition. This study conducts a first-of-its kind comprehensive assessment of policy instruments in Asian LMICs to better understand the magnitude and implications of these shortcomings, and potential strategic points of intervention. The gap between NDCs and transport policies is examined through the lens of a policy tracker developed by the ATO as explain in the methodology section. This tracker provides a clear picture of ambition, targets, and policies in national-level policy documents, combining transport sector plans with related sub-sectoral and connected policies such as energy plans, industrial plans, logistics policies, air quality-related policies, national decarbonization strategies, and more.

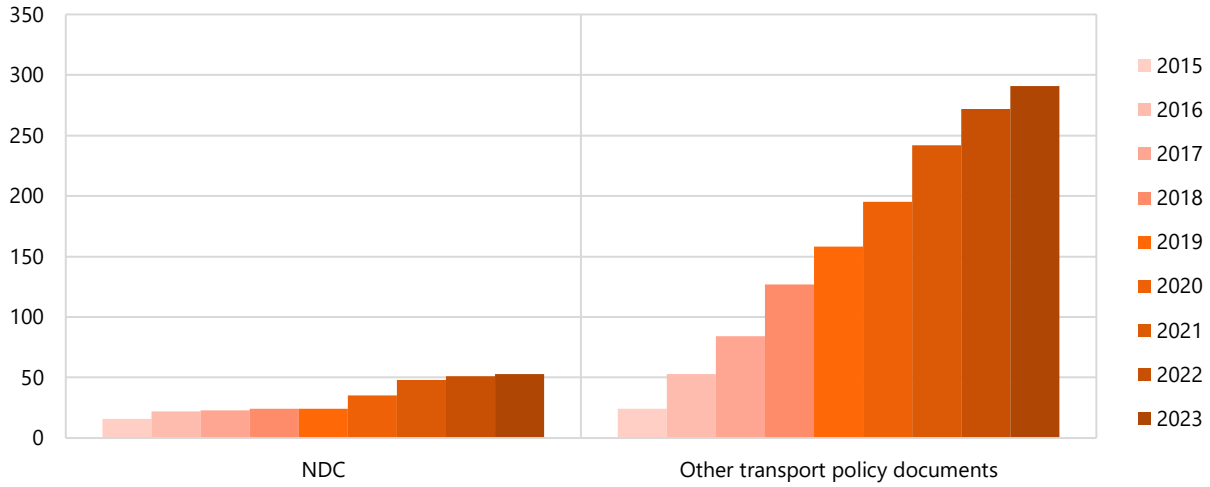

Figure 9. Cumulative Distribution of Policy Documents by Year of Publication (2015-2023) in the 25 Sample Countries
Source: Own analysis of the national policy documents

3.1. NDCs Fall Short on Transport Ambitions

The ATO policy tracker records 3,589 transport climate mitigation and adaptation measures and 490 targets from NDCs and other policy documents for the 25 countries included in this research. By comparing the "other" (non-NDC) policy documents with the NDCs, we find a significant gap between the NDCs and the non-NDC policy documents in terms of reflecting the ambitions of the transport sector in relation to climate change. Only about 24% of countries have included a direct transport sector emission target in NDCs, and 44% have proposed climate-focused indirect transport sector targets.[32] However, this does not necessarily mean the transport sector lacks climate ambition, per se. Fifty-two percent (52%) of the countries have established direct transport sector emission targets, and 80% have proposed indirect transport sector targets in transport policy documents. Thus, the NDCs only report about one-fourth of total transport sector emission targets (direct and indirect).

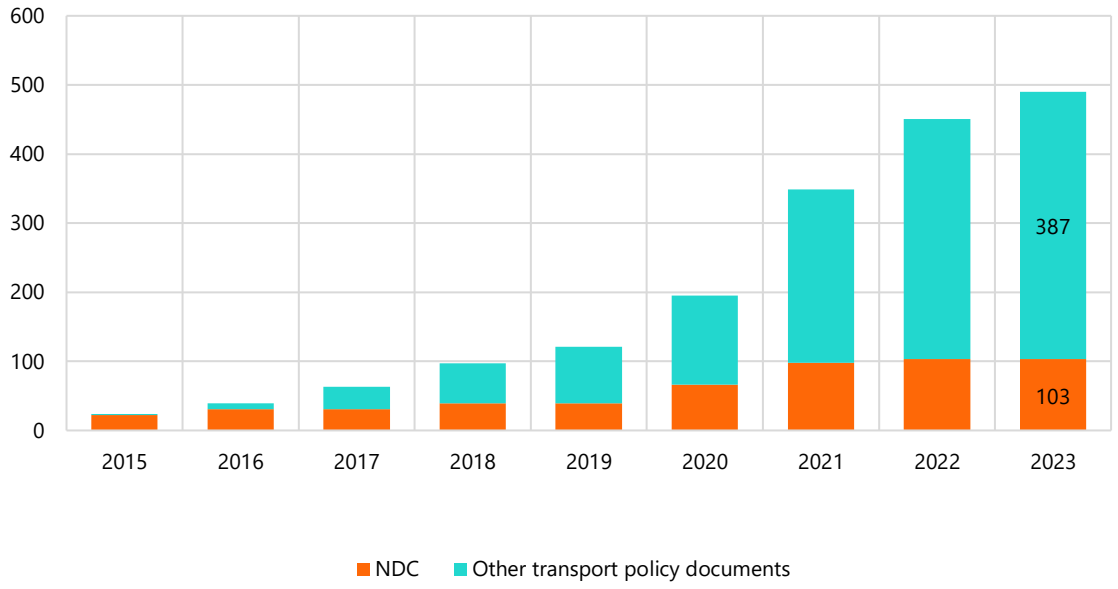

Figure 10. Cumulative Distribution of targets by Year of Publication (2015-2023)
Source: Own analysis of the national policy documents

Of the 3,589 total mitigation and adaptation measures found in the policy documents, the NDCs report only 10% of these. Thus, the NDCs do not capture transport sectors' climate ambition in LMICs in Asia.

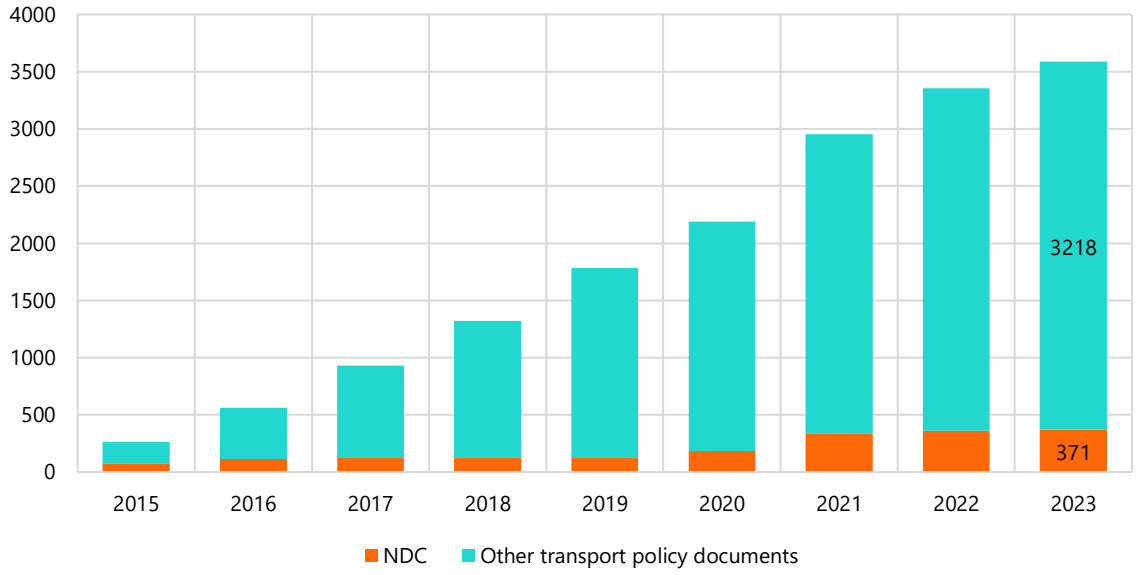

Figure 11. Cumulative Distribution of measures by Year of Publication (2015-2023)
Source: Own analysis of the national policy documents

In their official NDC communications, only a few countries have explicitly anchored their national climate targets for the transport sector. Only six countries (Bangladesh, Bhutan, Cambodia, Marshall Islands, Mongolia, and Sri Lanka) directly include explicit transport emission reduction targets within the 25 middle and low-income countries considered. Eleven other countries do so indirectly by mentioning targets like modal shift to more energy efficient modes, electrification, public transport enhancement, use of alternate fuels, and various vehicle improvement and maintenance-related measures.

Figure 12 below illustrates that NDCs document only a limited number of strategies as compared to those that are contained in the non-NDC policy documents. For example, while transport asset management is considered a priority by all the twenty-five countries considered in the analysis, less than half make a mention in the NDC's.

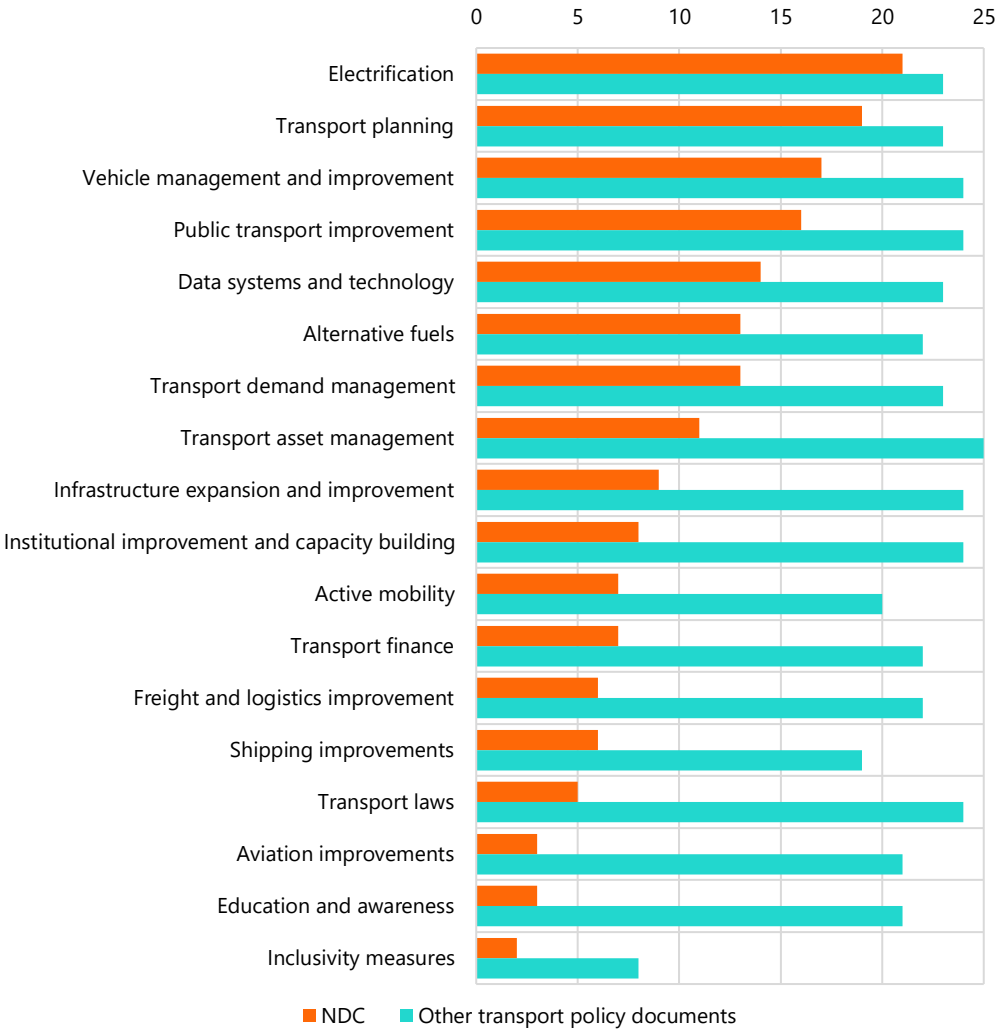

Figure 12. Number of countries (out of the 25 sample countries) integrating specific climate measures in NDC vs. Transport policy documents
Source: Own analysis of the national policy documents

While the NDC transport landscape is significantly underdeveloped, there is reason for optimism. Most low—and middle-income economies that submitted new or updated NDCs have strengthened their transport sector commitment to reducing or limiting greenhouse gas emissions. Between 2015 and 2019, there were 53 unique direct transport measure types in NDCs. By 2020-2023, there were 88 unique direct transport measure types included in the NDCs.

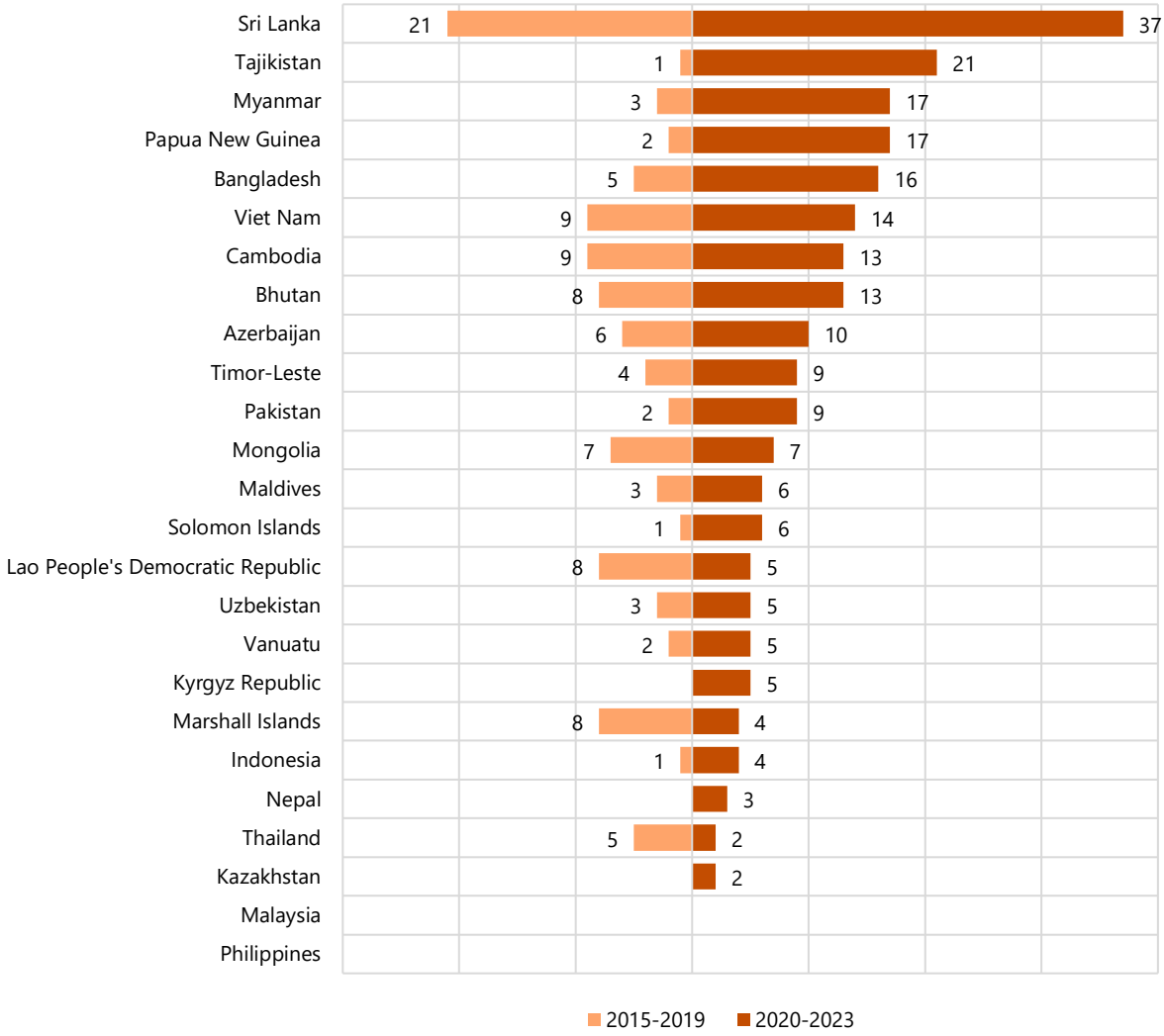

Figure 13. Number of unique direct transport measure types in NDCs 2015-2019 vs. 2020-2023
Source: Own analysis of the national policy documents

Figure 13 above also depicts the diversity by which the different countries are elaborating the measures that they would take. Elaboration, while not necessarily an indication of commitment nor effectiveness, opens possibilities for leveraging such statements towards enabling action and providing clarity in terms of direction. Sri Lanka, in this regard, has been very thorough in elaborating specific actions in its NDC (by sector).

"Emerging economies need more detailed and ambitious transport-related commitments in their NDCs."

3.2. Incremental Progress in the Integration of Climate Considerations into Wider Transport Policies

NDCs are a critical first step in incorporating climate change mitigation and adaptation into wider national policies and strategies. While they set national goals and commitments, their successful implementation requires active engagement from various institutions and stakeholders throughout the process. Transport ministries oversee the development and implementation of policies and measures within the transport sector. NDCs, on the other hand, are normally the responsibility of environment ministries, and multi-agency coordination is heavily important in ensuring cohesive action.

An examination of broader transport sector plans and strategies reveals that many countries have begun to effectively align and realign sectoral plans with overarching NDC goals and targets. However, this progress in climate-focused transport policies is gradual and varies across countries. This may perhaps be due to a complex interaction of factors, such as previous climate action, socio-political conditions, current ambitions, emissions profiles, and technological capabilities.

Since the implementation of the Paris Agreement, there has been a clear trend towards emissions reduction, with countries actively integrating climate considerations into their transport sector and implementing their NDCs. However, the pace and nature of policy development are not uniform and are largely influenced by each country's unique context, resulting in diverse policy approaches.

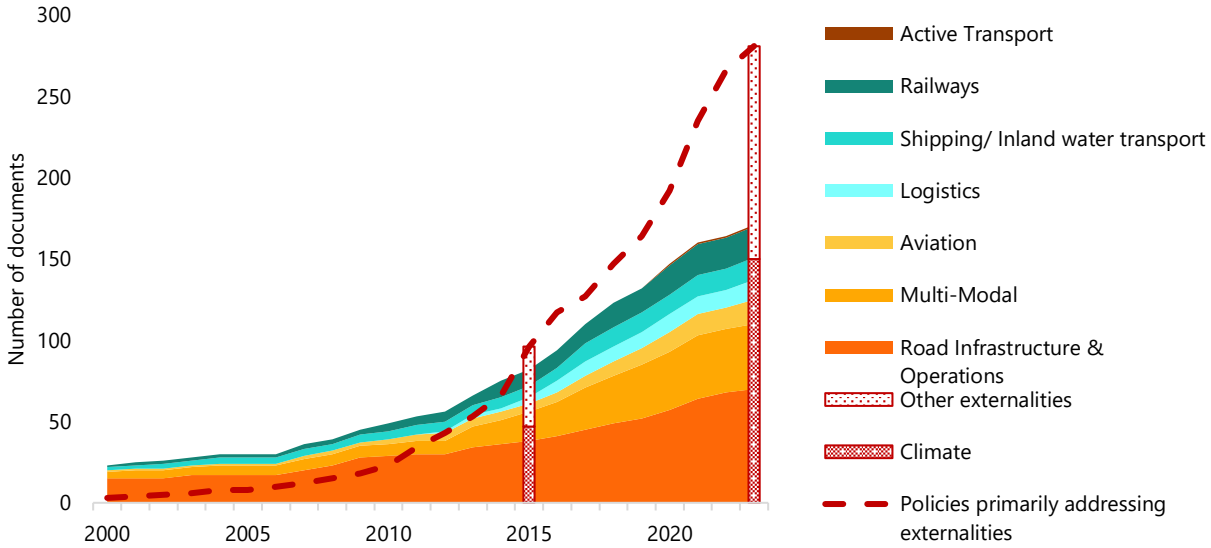

Figure 14. Transport Policy Documents by Theme
Source: Own analysis of the national policy documents

The analysis of the "non-climate-focused" transport policy documents shows that across the different types and sectoral policies, there is an increase in uptake of measures that are relevant to addressing climate change in the transport sector. Such a trend is quite prominent in the national development policies, and those that aim at addressing externalities.

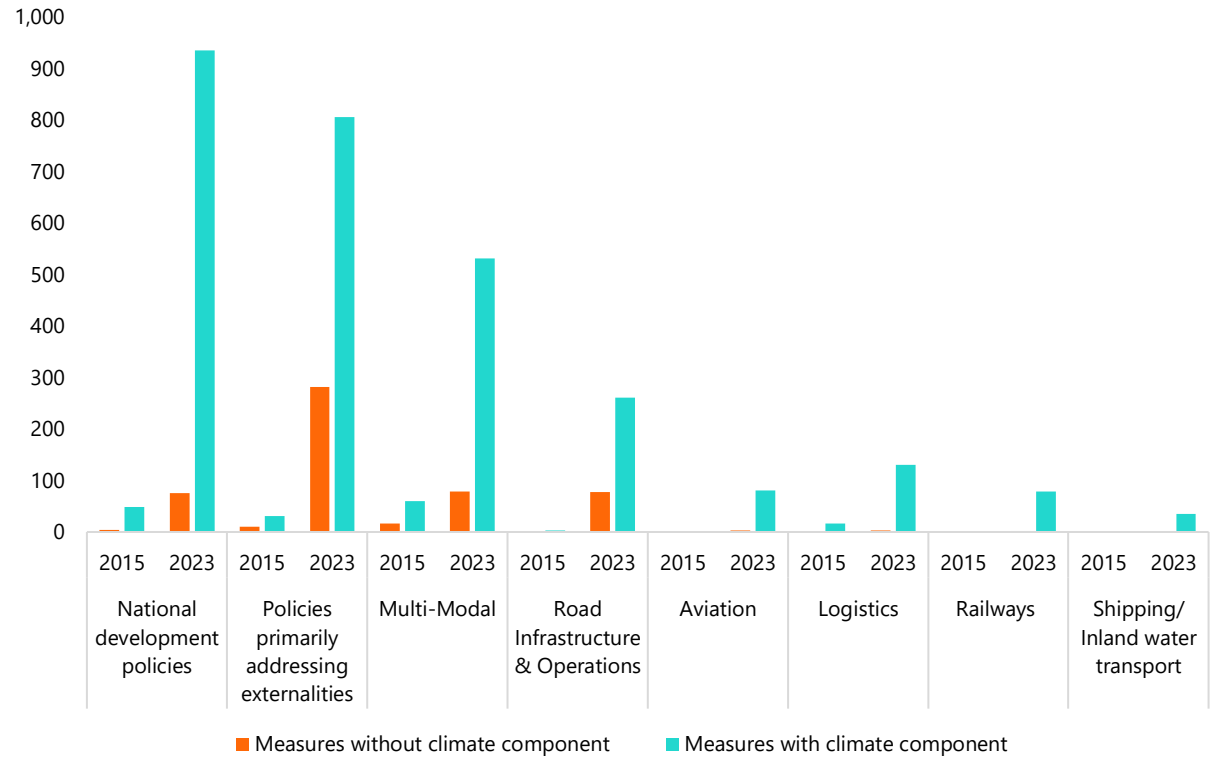

Figure 15. Cumulative Number of Climate Measures in Non-Climate Policy Documents
Source: Own analysis of the national policy documents

Many LMICs are recognizing the importance of detailed action plans to effectively implement their NDCs in the transport sector. Bangladesh, for example, has created a "Roadmap and Action Plan" that reinforces measures from their Updated First NDC, like expanding urban rail and bus rapid transit, improving pedestrian infrastructure, and promoting alternative fuels. The plan also aims to enhance rural connectivity by integrating inland water transport with road systems. Similarly, Viet Nam has developed an action plan called "Implementation of NDC for Transport in Viet Nam," which supports their goal to shift from private to public transportation. This plan details the development of multiple BRT routes and the addition of hundreds of CNG buses by 2030. It also sets ambitious targets for electric vehicle adoption, aiming for a significant share of electric motorbikes and cars by the end of the decade.

"While transport policies are increasingly addressing climate concerns, progress has been gradual, and more substantial action is needed"

3.3. Lack of Long-Term Ambition, and Delays in Setting Targets for Peaking of Transport Emissions

Long-term ambition for mitigating climate change in the transport sector remains insufficient in LMICs in Asia-Pacific. While net-zero emissions pledges exist, only a few have outlined clear targets and timelines in their Nationally Determined Contributions (NDCs) or in other policy documents. Notably,

Bhutan, Maldives, and Papua New Guinea report targets, but most have not specified a timeline for the peaking of economy-wide emissions, showcasing a significant gap in the region's climate ambition.

Nine (9) out of 25 countries have set direct carbon emissions targets for the transport sector as stated in the non-NDC transport policies (right-most column of Table 2). Only the Solomon Islands and Vanuatu have established long-term (2050) transport sector GHG mitigation goals based on these non-NDC documents. The Intergovernmental Panel on Climate Change (IPCC)[33] underlines the urgency for pursuing substantial emission reductions. It states that it is necessary to achieve a 43% reduction of GHGs by 2030 compared to 2019 levels to stay on track towards achieving the goal of the Paris Agreement to limit global temperature rise to 1.5 degrees Celsius by the end of the century and preventing catastrophic impacts due to the changing climate. For Asia, the transport sector alone may require around 43% reduction by 2030.[34] Alarmingly, most LMICs in the region have not yet set targets to achieve peak emissions by this deadline, highlighting the need for immediate action.

On the other hand, a positive example of increased commitment towards long-term, more ambitious transport emissions targets is the voluntary adoption of the Aichi 2030 Declaration on Environmentally Sustainable Transport – Making Transport in Asia Sustainable (or Aichi 2030 Declaration), where 21 Asian countries agreed on an ambitious target to peak transport carbon emissions by 2030 and initiate reductions towards decarbonization by 2050. [35, 36] This declaration signifies a collective effort towards sustainable transport, with participating economies accounting for 86% of current Asian transport CO_2 emissions. The challenge, however, lies in implementing these aspirations. Most of these countries are experiencing rapid economic growth and a surge in mobility, making it imperative to prioritize sustainable transport solutions to avoid locking in high-emission pathways. The urgency to peak and reduce emissions in the transport sector is essential to align with global climate goals and mitigate the adverse impacts of climate change.

Table 2. Summary of Climate-relevant Targets for the Transport Sector in LMICs in Asia (25 Countries)

Country	Net zero and Carbon neutrality	NDC			Non-NDC Transport Policy Documents
		Economy-wide emissions	Transport GHG emission	Indirect transport targets	Transport GHG emission
Azerbaijan		2030			
Bangladesh		2030	2030	Modal shift, transport energy consumption	
Bhutan	2050		2030	Vehicle restrictions (import, age, access, sale, taxation)	
Cambodia	2050	2030	2030		2030
Indonesia	2060 or sooner	2030			
Kazakhstan	2060	2030			
Kyrgyz Republic		2025, 2030, 2050			
Lao People's Democratic Republic		2030		Biofuels, E-mobility	2030
Malaysia	2050	2030			2030
Maldives	2030	2030			
Marshall Islands	2050			2025, 2030, 2035	2025, 2030
Mongolia		2030	2030	E-mobility	
Myanmar		2030			
Nepal	2045			E-mobility, public transport, railway electrification	
Pakistan		2030		E-mobility	
Papua New Guinea	2030, 2050				
Philippines		2030			2028
Solomon Islands	2050	2025, 2030, 2050			2030, 2050
Sri Lanka	2050	2030	2030	Vehicles scrappage scheme	
Tajikistan		2030			
Thailand	2030, 2050, 2065	2030	2030		2027, 2030
Timor-Leste					
Uzbekistan		2030		E-mobility, LPG/ CNG/ LNG	2025, 2035
Vanuatu	2050	2030		Biofuels, E-mobility, Ship efficiency improvements, Vehicle efficiency standards	2050
Viet Nam	2050	2030			

Source: Own analysis of the national policy documents

Current NDCs and transport policies often need more ambitious long-term targets for emissions reduction in the transport sector.

3.4. Need for Integrated Development Priorities

A recent multi-dimensional assessment of Asia's transport sector and its interlinkages with the sustainable development goals (SDGs) provides a pessimistic update regarding the progress towards achieving the relevant SDG targets by 2030.[37] The sector has made limited progress, and achieving all transport-related SDG targets in the remaining seven years will be difficult in Asia's LMICs.

Decarbonizing the transport sector LMICs in Asia will unfold in a vastly different context than that of the global north. Despite comprising roughly half the world's population and global GDP in 2022, LMICs in Asia have only about one-third of the global surface infrastructure[38]. Consequently, Asia is still far from achieving two crucial access-related SDGs: providing all-season road access to 400 million rural residents (SDG 9.1),[39] and ensuring efficient urban public transit for 1.4 billion urban dwellers (SDG 11.2).[40] This means that decarbonization efforts in Asia must occur while the transport sector is still expanding, with more infrastructure and increased passenger and freight activity to accommodate economic growth. Progressing towards attaining several of the SDGs' economic goals will likely further increase transport activity. Increasing passenger and freight transport activity will make it more challenging to realize several sustainability-related SDG targets related to air pollution, road safety, energy efficiency, and climate change.

This unique challenge also presents significant opportunities. With much of the necessary transport infrastructure yet to be built and a substantial share of the vehicle fleet not yet manufactured or sold, policymakers in Asia can learn from the mistakes made in the global north. Understanding the connections between the transport climate change and sustainable development agendas is crucial to fostering coherence in implementing both agendas. Policy coherence involves systematically integrating policies, processes, and institutions to achieve the coherent implementation of sustainable development and the Paris Agreement.

The analysis of the climate-related policy documents reveals that policymakers have begun connecting, prioritizing, and documenting the synergies between low-carbon transport strategies and other economic, social, and environmental objectives. Recognizing these synergies is essential, as it can significantly enhance the cost-effectiveness of measures, reduce rebound effects, mobilize resources, and garner political support for their implementation.

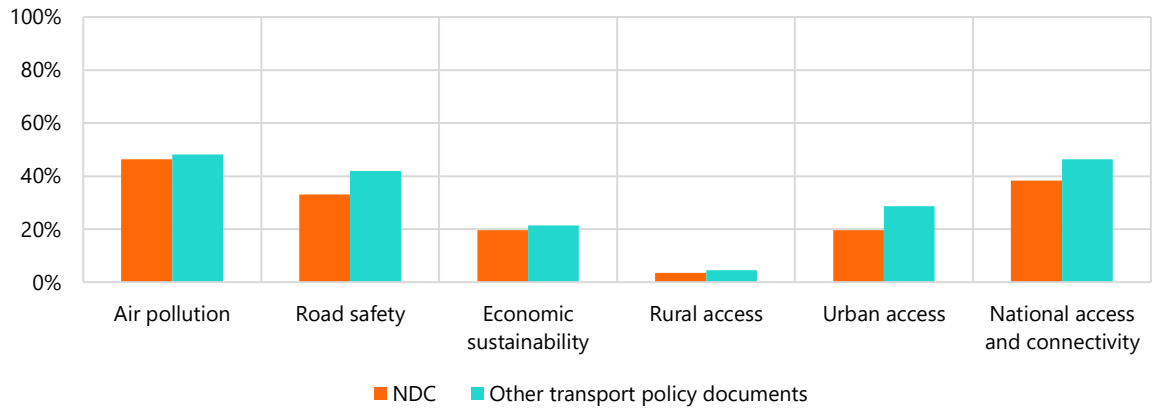

Figure 16. Share of Climate Documents that also cover Other Development Goals
Source: Own analysis of the national policy documents

"Effective transport mitigation and adaptation policies must align with broader development goals"

3.5. Addressing the Public Transit Gap

The International Panel on Climate Change's (IPCC) sixth assessment report[41] emphasizes that increasing the share of trips taken by public transit is "essential" to combatting climate change. Moreover, expanding access to reliable public transport brings additional benefits to society, such as reduced air pollution, lower traffic fatality rates, increased active mobility, and broader access to employment, education, and urban services. This makes public transit a key driver of equitable and sustainable development in LMICs.

The Asia-Pacific region has built rapid urban transit infrastructure significantly, tripling since 2000 and doubling since 2010. It has surpassed Europe and North America's total rapid transit kilometres at lower GDP per capita rates. However, despite this expansion rate, rapid transit availability per million urban population remains lagging behind the developed world's levels.

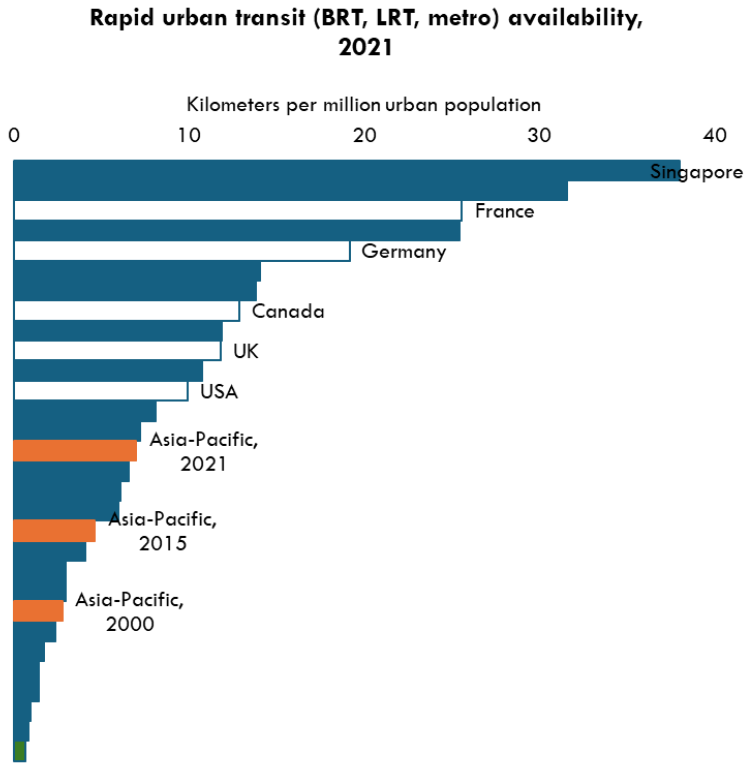

Figure 17. Rapid Urban Transport Availability (km/million urban population)
Source: ITDP (2022)[42]

Enhancing public transport is recognized in broader transport policy documents and the NDCs. All 25 countries included in the analysis have proposed public transport improvements in their transport policy documents, while 64% have mentioned them in their NDCs. Although references to public transit measures in NDCs tripled between 2015 and 2023, the increase was much more substantial (over 17 times) in transport policy documents during the same period.

Interestingly, the way public transit is mentioned differs between these two types of documents. NDCs tend to mention the introduction and improvement of public transit in general terms. On the other hand, transport policy documents provide a more comprehensive perspective on transit, outlining a wide range of solutions to enhance transit infrastructure and operational efficiency.

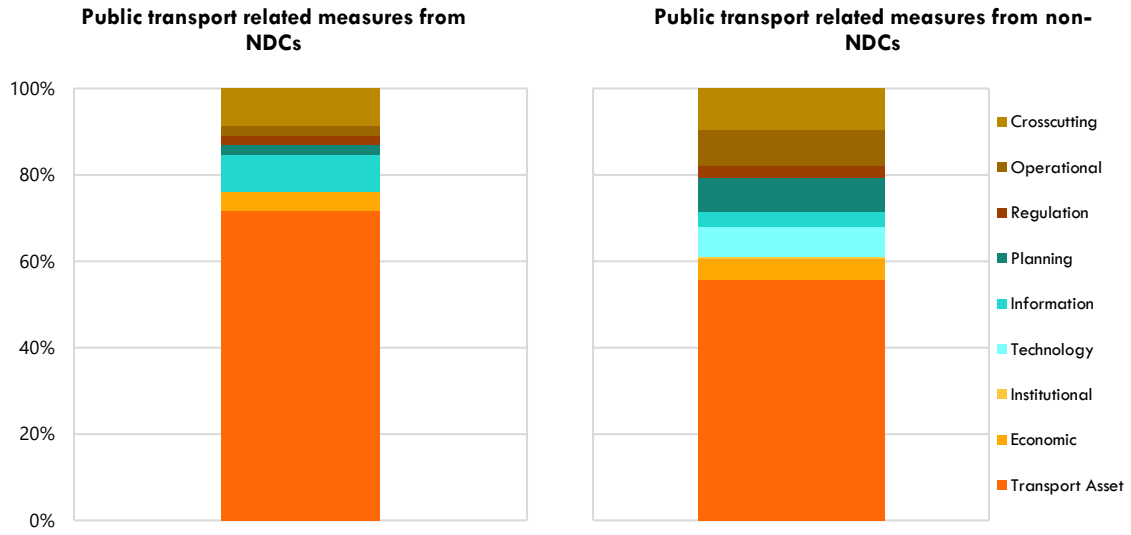

Figure 18. Public Transport-related Measures in Policy Documents
Source: Own analysis based on national policy documents

Table 3 below shows an example of how public transport relevant policy measures that are included in NDCs as well as in non-NDC documents in Bhutan.

Table 3. Diversity of Public Transport Measures in National Policy Documents Compared to NDCs, Case Example of Bhutan

	Policy measure	Document	Year
Policy measures from NDC	• Mass transit improvements in bus systems and the introduction of open-bus rapid transit (BRT) network (electric and diesel) and light rail transit.	Second Nationally Determined Contribution - BTN	2021
Selected policy measures from national policy documents	• Implement Passenger Information System (PIS) for all public buses and taxis • Promote and provide e-ticketing services for all modes of transport • 314 intra-city and 358 inter-city buses	Low Emission Development Strategy (LEDS) - Surface Transport	2021
	• Provide government subsidy for non-profitable routes • Revision and printing of Bus and Taxi Fares • Procurement of security equipment at all bus terminals (CCTV cameras)	12th Five Year Plan 2018-23	2019
	• Provide consumers a fair choice between alternatives modes of transport • Provide subsidies on non-profitable bus routes • Bus route rationalization • Reduce headways (from current 10-15 min to lower levels) • Regulatory mechanism for private operators to operate	National Transport Policy 2017 - Policy Protocol Report	2017

	Policy measure	Document	Year
	• Explore possibilities of introducing electric/hybrid public transport system in major urban centres	Economic Development Policy (2016)	2016

Source: Own analysis of the national policy documents

"Prioritizing the expansion and improvement of public transportation systems is crucial for both climate action and sustainable development"

3.6. Promoting Electric Mobility and Reducing Fossil Fuel Dependency

Globally, there's a consensus that electric mobility is a critical measure in combating climate change and urban air pollution and improving energy security. While many LMICs are in the early stages of electric mobility adoption, some have reached a significant turning point. However, these countries have a vast income, infrastructure, and policy landscape disparity.

The shift towards electric mobility is a multi-faceted endeavour. The United Nations Environment Programme (UNEP) has created a comprehensive framework tailored for the Global South to streamline this transition and evaluate nations' readiness.[43] This framework encompasses four equally weighted dimensions, each assessed by 5 indicators: Technology and Market, Policy, Energy, and Financial. These dimensions collectively represent the cornerstones of the energy transition. Analysis of this framework reveals that many low- and middle-income economies are not yet equipped to embrace electric mobility.

The effectiveness of electric mobility in reducing emissions is directly tied to the electricity generation mix, further emphasizing the need for tailored strategies and multi-sectoral approaches. There is a need for a comprehensive approach encompassing fiscal policies, infrastructure development, technological advancements, and policies that promote equity and inclusivity in EV deployment. Recent trends like internal combustion engine vehicle bans and budget-neutral feebate schemes that tax fossil fuels and vehicles and subsidize electric vehicles have proven powerful catalysts.

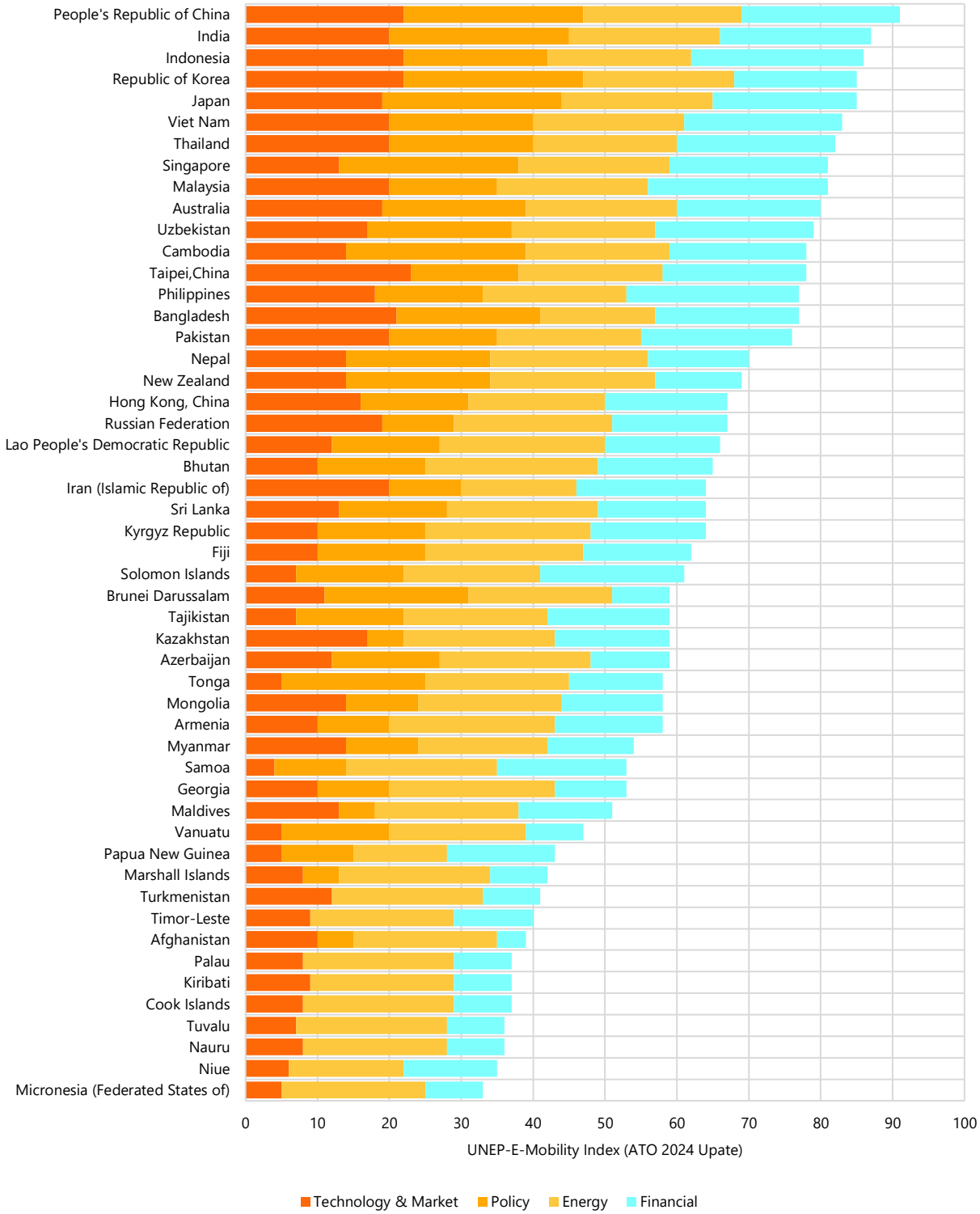

Figure 19. UNEP E-mobility Index[44]
Source: UNEP (2024)

While most countries have e-mobility measures in place, a more holistic approach incorporating "exnovation" policies[45] such as old vehicle scrappage, banning of internal combustion engine sales, and fossil fuel subsidy elimination is needed. For example, Nepal's second NDC sets ambitious targets for electric vehicle sales by 2025 and 2030. To achieve these goals, Nepal's Ministry of Forests and

Environment (MoFE) outlines several supporting measures.[46] These include banning petroleum-powered vehicles in major cities by 2028, adjusting vehicle taxes to favour electric vehicles, building solar-powered charging infrastructure, and promoting domestic electric vehicle manufacturing by improving the availability of parts and batteries.

Out of the 25 countries considered in this report, 72% of countries cover e-mobility in NDCs alone without explicit mention of supporting exnovation policies. In the broader transport policies and strategies, 96% of the countries have measures and targets on e-mobility in various forms. Targets come in terms of those related to sales, stock, charging infrastructure. Measures vary in terms of types as seen in Figure 21 below. However, the strategies may not necessarily be mutually reinforcing. The countries with measures on vehicle scrappage, banning of ICE sales, and fossil fuel subsidy elimination in all policy documents are limited to 56%, 24%, and 12%, respectively.

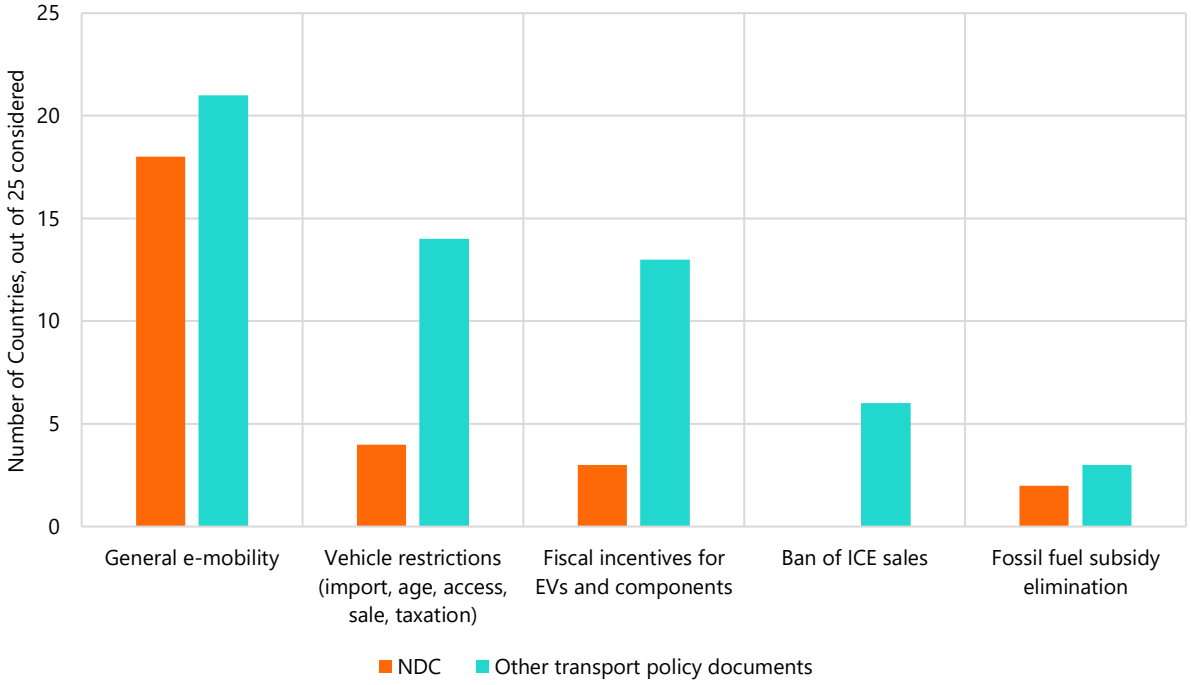

Figure 20. Countries with Explicit Measures on E-mobility and Phasing Out of Vehicles
Source: Own analysis based on national policy documents

A separate and more detailed assessment of e-mobility policies in selected LMICs in the region shows the disproportionate attention that is currently being given to supporting the production and provision of EVs and EV components, comprising 60% of the overall measures in the space of e-mobility (more than a third of the measures being fiscal-related ones, and a third being regulations).[47]

A more balanced approach that accounts for the importance of services, infrastructure, and charging technologies is needed in order to accelerate the shift towards electric mobility. More importantly, incentives must focus reinforcing more sustainable modes such as public transport vehicles as electrification provides opportunities towards increasing the integration and the quality of such services. Measures should also be investigated towards boosting the improvement of paratransit and intermediate public transport services which play significant roles in LMIC passenger transport systems. Moreover, the integration of light electric vehicles (LEVs) (which includes 2 and 3 wheelers) into urban

freight and logistics systems could be a worthwhile endeavour for many LMICs due to their inherent advantages brought about by their size, propulsion, and flexibility.

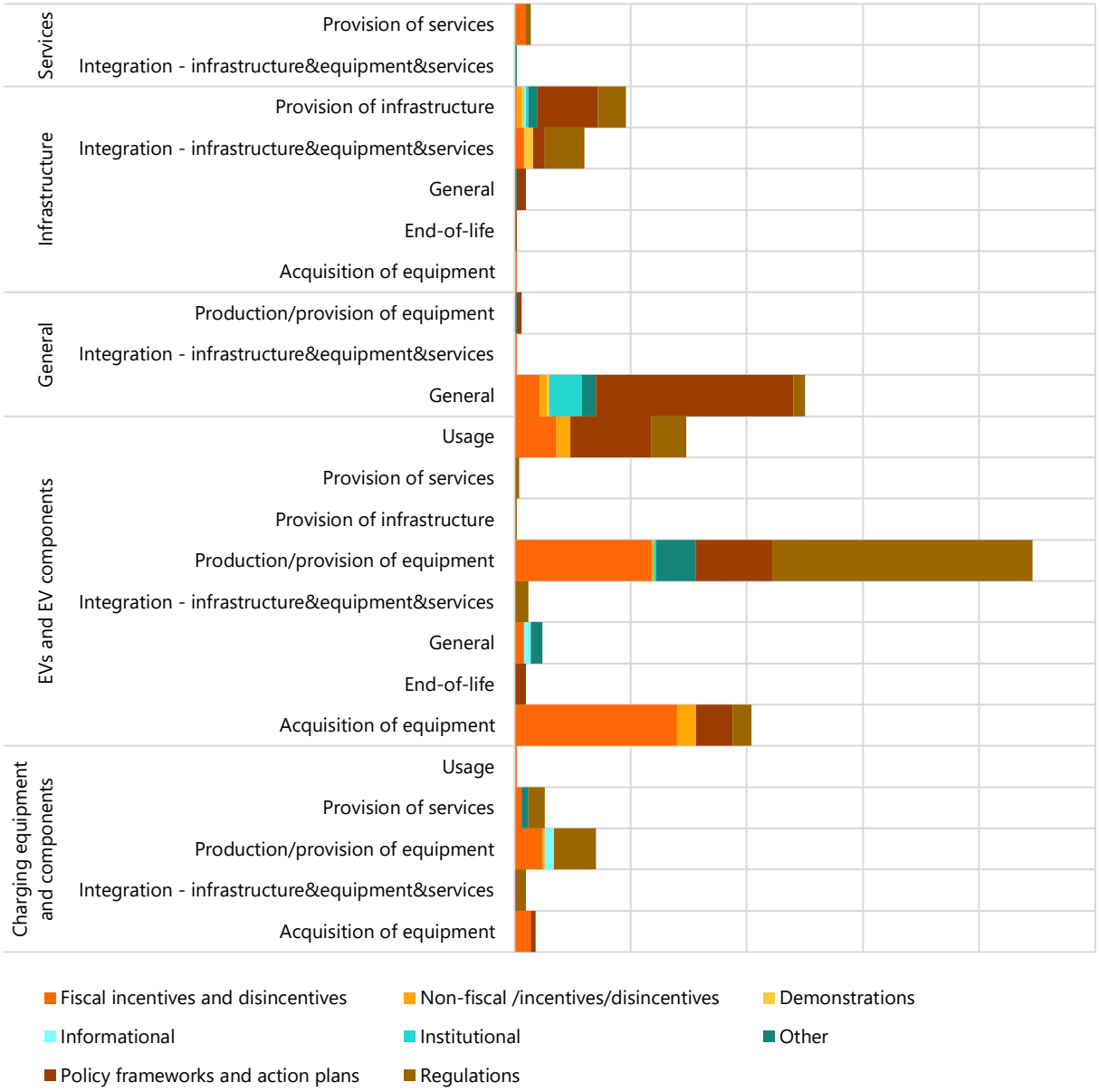

Figure 21. Pillars, Themes and Types: E-mobility Policies in Selected Countries
Source: See endnote 47.

"While electric vehicles are gaining traction, bolder action is needed to phase out fossil fuel subsidies and ICE vehicles"

3.7. Strengthening Transport Adaptation and Resilience

Transport infrastructure and services are vital for individuals, society, and the economy. Such infrastructure faces increasing threats from extreme weather events, exacerbated by climate change.

Climate change can hinder economic growth through damage and disruption to transportation networks, with interconnected systems amplifying impacts and causing widespread regional disruptions that necessitate inter-regional cooperation.

Climate change will affect transport unevenly, impacting different modes and infrastructure across regions. Asian LMICs, despite possessing a limited portion (nearly 34%) of global transport infrastructure, disproportionately experience the impacts of climate and natural hazards, incurring an estimated 42% of annual damage. Railways, representing about 2% of total infrastructure, are especially vulnerable, accounting for 39% of transport sector losses caused by climate-related events.[48]

Targeted investments and measure towards enhancing resilience offer substantial long-term cost savings. However, while high-income countries actively explore innovative solutions for planning, designing, constructing, operating, and maintaining resilient transportation systems, LMICs in Asia lag in this critical effort. Although 84% of the countries included in this analysis implicitly address transport adaptation in their NDCs, explicit measures lack comprehensive coverage, particularly in infrastructure resilience (44%), climate-resilient design standards (16%), and service adaptation (4%).

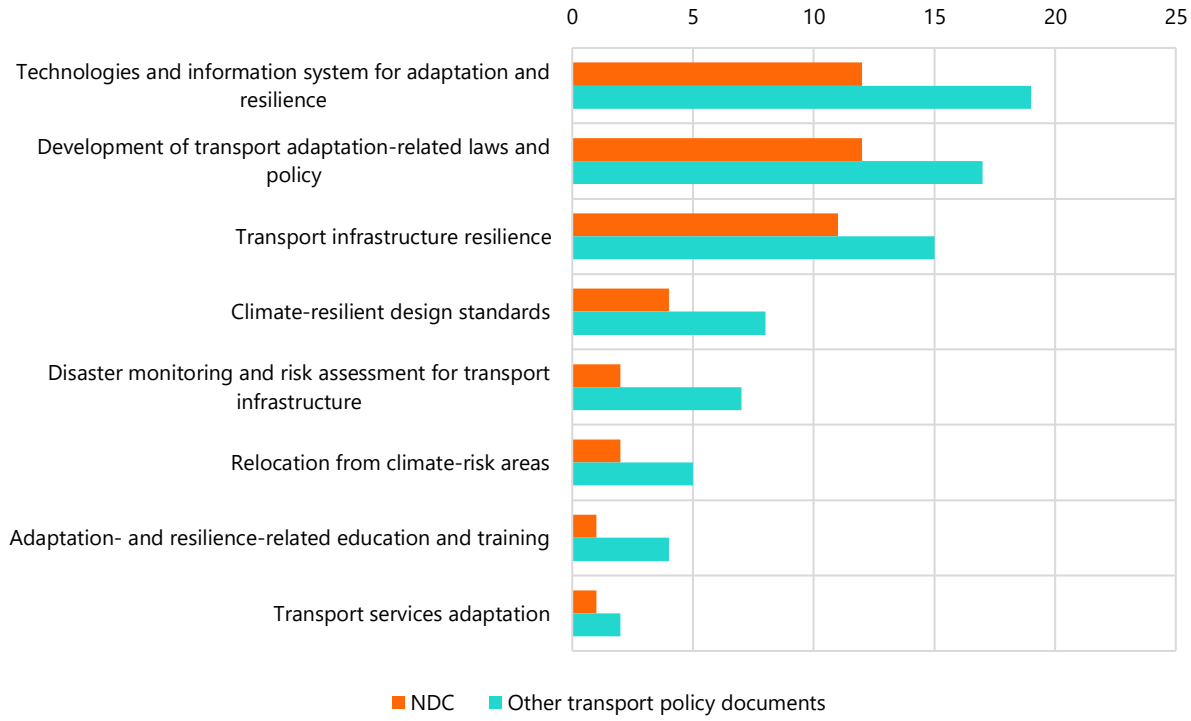

Figure 22. Number of Countries with NDCs that Incorporate Climate Adaptation and Resilience in the Transport Sector
Source: Own analysis based on national policy documents

Cumulatively, the various iterations of the NDC documents for the countries included in the analysis shows that the measures had been lopsided towards climate mitigation (81%), while adaptation and resilience are accounted for in 9% of the measures (with the remaining 9% features combined adaptation and mitigation). This share is even lower when the non-NDC transport policy documents are accounted for, as only 3% of the measures are focused on adaptation and resilience. NDCs in Asian LMICs further reflect limited ambition, with only 4% of targets addressing transport adaptation.

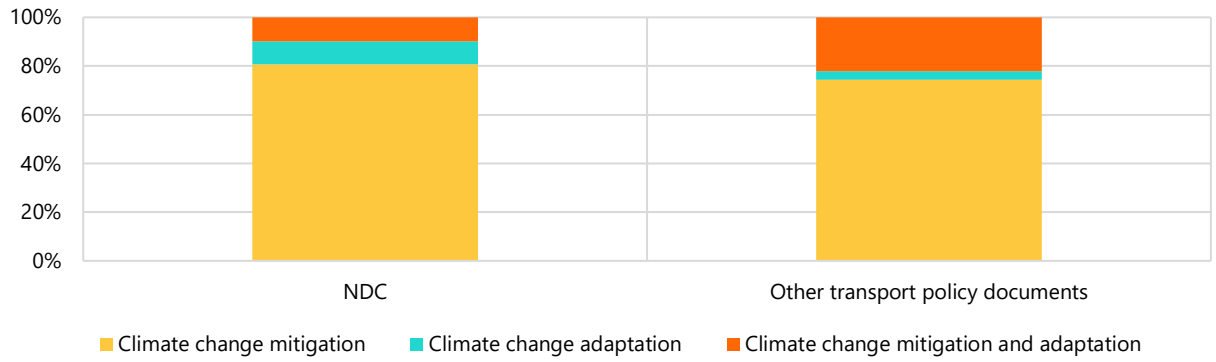

Figure 23. Share of Transport-relevant Measures – Mitigation and Adaptation
Source: Own analysis based on national policy documents

Huge uncertainty exists in terms of anticipating disruptions in the future. LMICs are taking steps towards progressing in adopting and integrating risk assessment procedures. For example, the Vanuatu Roads for Development Program recommends developing and implementing a fit-for-purpose digitalization strategy to improve information management and automate key business and work processes in systems such as the Road Asset Management System. The Sri Lanka National Road Master Plan 2021-30 proposes the development of a Disaster Planning System (DPS) that allows recording information related to natural disasters such as flooding, landslides, river/sea erosion, etc. Sri Lanka National Transport Policy of Sri Lanka 2017 suggests using disaster impact assessment to identify adverse effects and incorporate mitigatory measures at the planning and design stages. Identify alternatives for any emergency (evacuation or diversion).

A handful of the LMICs have started recognizing road infrastructure management and maintenance as an essential tool for climate mitigation and resilience. For example, the Cambodia National Strategic Development Plan 2019-2023 proposes strengthening the quality of maintenance, repair, and construction work and ensuring the flow of the national budget for routine and periodic maintenance of the network road network.

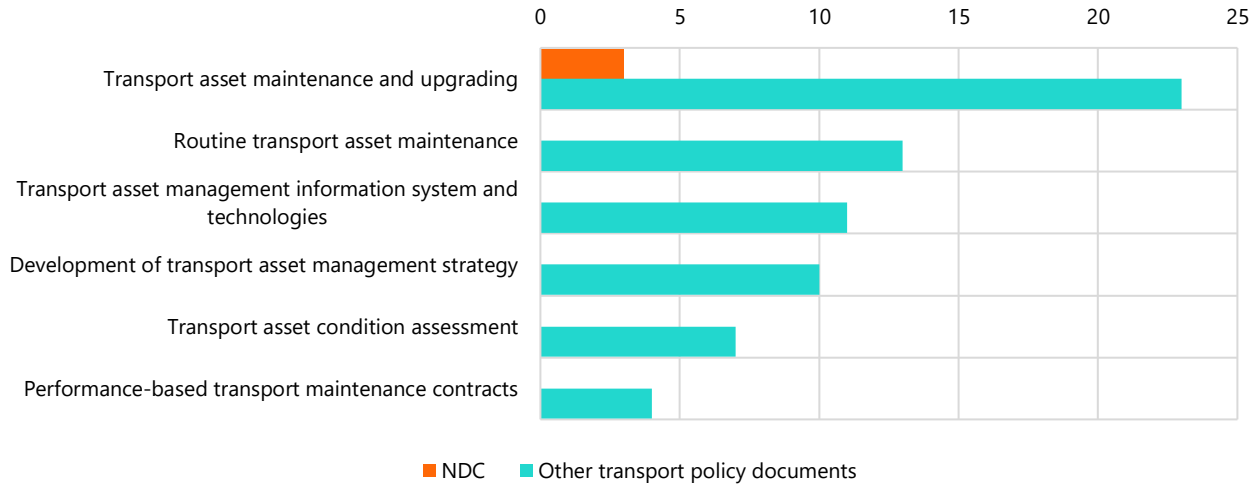

Figure 24. Number of Countries with Explicit Measures on Transport Asset Management in NDCs and Other Policies
Source: Own analysis based on national policy documents

"NDCs and transport policies often overlook measures to adapt transport systems to the impacts of climate change and build resilience to extreme weather events"

The low levels of adoption of adaptation and resilience targets and measures in the transport sector in the NDCs is consistent with existing evidence of climate finance flows. The Climate Policy Initiative estimates that only 0.13% of the committed funds for transport-related climate finance in Asia in 2022 is earmarked towards supporting adaptation, and only 0.06% are earmarked for actions that have multiple objectives (including mitigation and adaptation). The distribution becomes doubly alarming as transport, together with sectors that are intertwined as pre-requisites for decarbonisation of the transport sector (infrastructure and buildings, and energy systems) has the lowest shares of climate finance that are allocated to adaptation.[49]

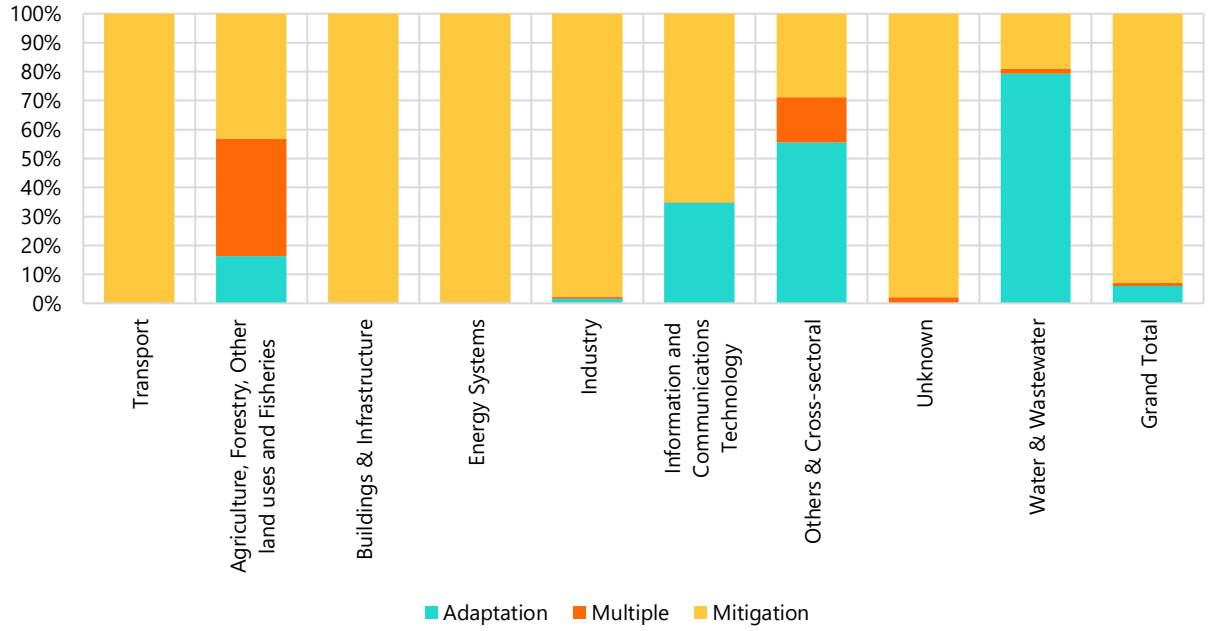

Figure 25. Climate Finance Flows by Sector (% Breakdown – Mitigation and Adaptation): Asian Region 2022
Source: Buchner, et al. (2023)[50]

3.8. Freight Decarbonization: A Climate Blind Spot Amidst Rapid Growth

Over the past decade, progress in enhancing freight transport and logistics performance across Asia-Pacific has been uneven. While some economies have made significant strides, particularly China, India, Indonesia, Thailand, and Vietnam, others have lagged. This disparity has led to a widening performance gap between high, middle, and low-income Asian economies, as highlighted by the World Bank's Logistics Performance Index.[51]

Despite infrastructural limitations, freight activity in Asian LMICs has grown substantially, increasing by 5.3% annually since 2000. This growth is projected to continue, with domestic freight demand expected to increase at an annual rate of 3.7% between 2020 and 2050, outpacing the growth of passenger transport demand[52].

Freight transport is estimated to account for 60% of total domestic transport emissions in the region, underscoring its critical role in climate change mitigation efforts. [53] However, the freight sector remains a climate blind spot in many national climate strategies.

Only 24% of countries have explicitly addressed freight decarbonization in their NDCs, and even fewer (19%) countries have included explicit measures to promote freight sector decarbonization. In contrast, broader transport sector strategies demonstrate a greater focus on freight, with 40% of countries proposing relevant measures.

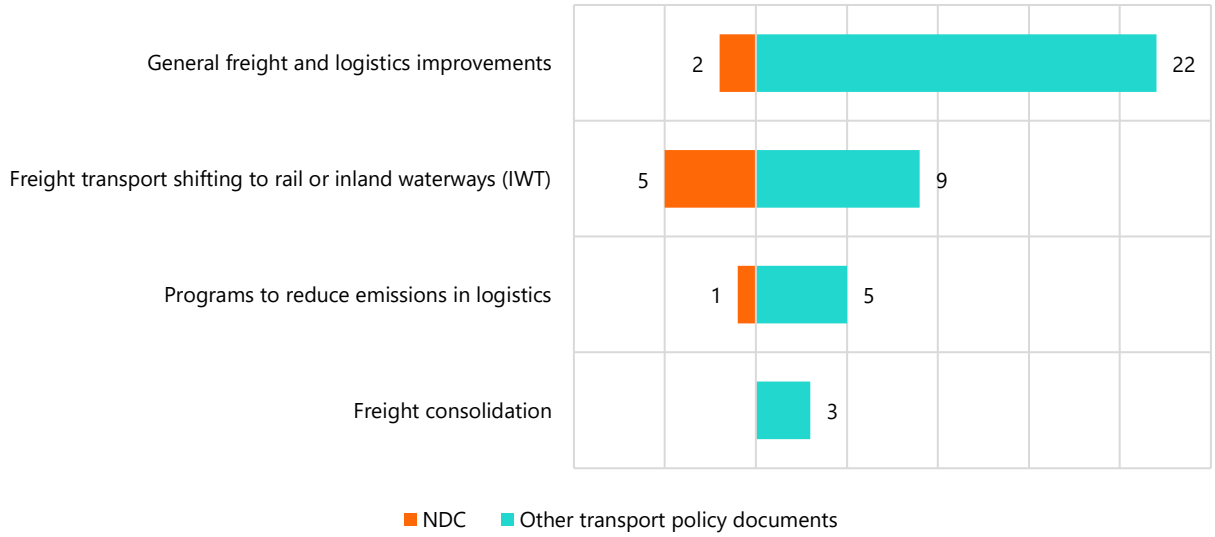

Figure 26. Number of Countries with Measures on Freight and Logistics in NDCs and Other Policy Documents
Source: Own analysis based on national policy documents

Such a gap highlights the need for a more comprehensive and targeted approach to freight decarbonization within national climate policies. Integrating freight-specific measures into NDCs and aligning them with broader transport strategies is crucial to addressing this critical emissions source and achieving a sustainable and climate-resilient transport system in Asia.

The documented freight-specific measures in the NDCs and the other policy documents is shown in the Figure 27 below.

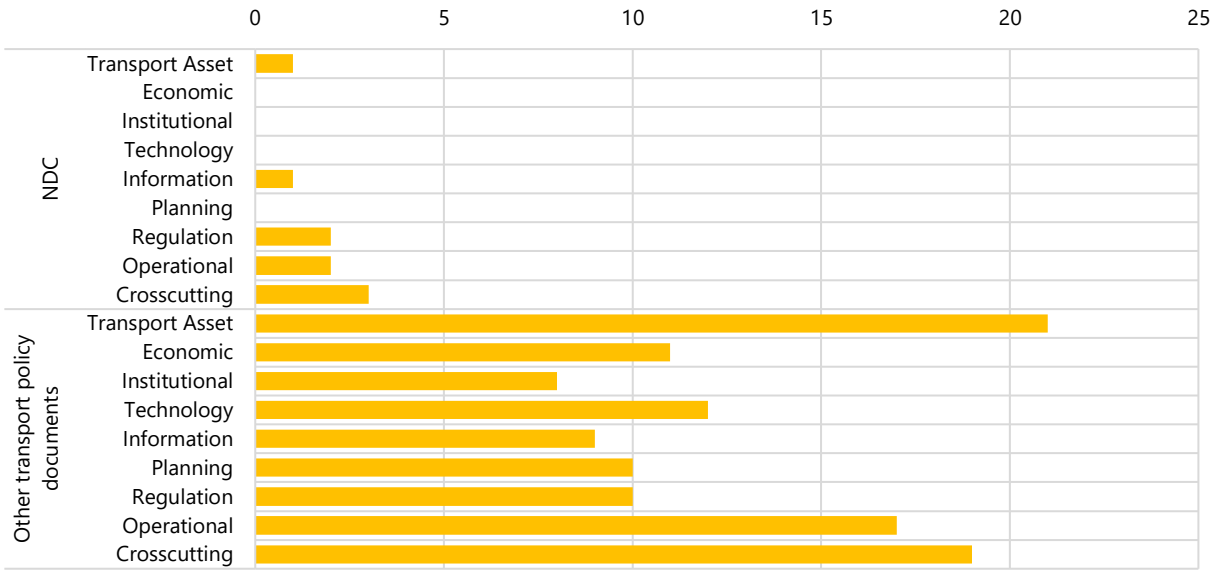

Figure 27. Number of Countries with Measures on Freight and Logistics in NDCs and Other Policy Documents (By Measure Type)
Source: Own analysis based on national policy documents

Table 4 below juxtaposes the freight and logistics measures as mentioned in the NDCs vis-à-vis the measures that have been mentioned in the wider policy documents. The shift to railway freight transport has been mentioned in most of the NDCs that had freight-specific measures.

Table 4. General Freight-related Measures in NDCs and Other Policy Document

Country	Document	Policy measure
Bhutan	NDC	• Low emission freight transport system for heavy and commercial trucks and freight trains
	Selected policy measures from other transport policy documents	• Develop a logistics policy • Develop inland container depots or dry ports including railway links together with supporting facilities such as customs, immigration, quarantine etc. at the border crossings • Introduce low emission freight trucks including EV trucks • Land use planning to develop land use controls to ensure urban renewal near Freight Terminal is compatible with the terminal's operations • Optimize freight vehicles loading, improve utilization, reduce vehicle kilometre travelled
Cambodia	NDC	• Shift long distance freight movement from trucks to train
	Selected policy measures from other transport policy documents	• Prepare a logistic system master plan to serve as an efficient, reliable and highly competitive platform for trade facilitation • The MPWT (Ministry of Public Works and Transport) has proposed to shift long distance freight movement by 40% and 75% from trucks to, train by 2030 and 2050 • Promoting the implementation of agreements on cross-border transport along the Cambodian-Thai Railways • Promoting investment in logistics centres, warehouse, container terminal and dry port
Sri Lanka	NDC	• Switch back to rail from road transport
	Selected policy measures from other transport policy documents	• A key focus of the Strategy is on reforming the logistics ecosystem by adjusting key regulations such as the Sri Lanka Port Authority Act, Electronic Transactions Act and Commercial Hub Regulations in order to increase the sophistication and quality of services • Relocation of freight & container yards closer to express way entry points & railway • Use train for freight transport

		• Development of new business models to enhance freight transport by railways in consultation with relevant public and private agencies
Thailand	NDC	• Promote road-to-rail modal shift for both freight and passenger transport
	Selected policy measures from other transport policy documents	• Adopt intelligent logistics management systems which will increase efficiency by increasing the use of freight distribution networks, reducing the number of empty truck journeys while simultaneously shifting to more efficient and low-emission transport modalities • Promote the transportation of both domestic and international goods to use rail and water transportation • Establishment of a distribution centre • Upgrading standards of transportation management by trucks to support Enhancing energy efficiency and reducing greenhouse gas emissions
Viet Nam	NDC	• Restructure freight towards a reduction in the share of road transport in exchange for an increase in the share of transportation via rail and inland waterways;
	Selected policy measures from other transport policy documents	• Promote the transition of freight transport from roads to railways, waterways and coastal transport • Reduce the proportion of empty runs of vehicles, reduce congestion of goods in transportation activities and logistics service supply chains • Establishing a network of multi-level distribution centres (inland ports, warehouses, cargo yards) and freight collection and collection routes in major cities and key economic regions

Source: Own analysis based on national policy documents

Urban freight represents a significant climate blind spot within the freight sector. With 50% of Asia's population now residing in cities, the efficiency of urban freight transport has become paramount. In 2022, urban freight transport in Asia constituted 15% of domestic freight activity but produced a disproportionate 43% of domestic freight-related CO_2 emissions, due to frequent deliveries of small quantities in congested traffic.[54]

Urban freight significantly contributes to traffic congestion, resulting in substantial economic costs and adverse health effects from air pollution. ITF estimates suggest that with current policies, domestic urban freight demand could grow at an annual rate of 3.7% between 2020 and 2050, surpassing urban passenger transport demand growth (2.1%).

Despite its growing impact, urban freight-related measures are largely absent in NDCs and broader transport policy documents. Addressing this oversight is crucial to mitigating the environmental and economic consequences of unchecked urban freight growth in Asia.

Table 5. Urban Freight-related Measures in NDCs and Other Policy Document

Country	Document	Policy measure
Bangladesh	Mujib Climate Prosperity Plan	• We will leverage PPP models to create green distribution networks for freight using integrated distribution facilities and electric vehicles to fulfil the freight demands of urban areas. • We will encourage the use of electric and hydrogen-powered vehicles to transport goods
Bhutan	Low Emission Development Strategy (LEDS) - Surface Transport	• Develop a city level freight delivery strategy including an analysis of freight movements and options for consolidation and low impact distribution • Plan and implement more efficient and less intrusive freight delivery options, especially for intra-city delivery of merchandize and goods • Land use planning to develop land use controls to ensure urban renewal near Freight Terminal is compatible with the terminal's operations
Nepal	National Sustainable Transport Strategy (NSTS) for Nepal (2015-2040)	• Minimize empty running of trucks • Provision of appropriately located freight station: Design of efficient distribution logistics, clean vehicles

Pakistan	National Freight and Logistics Policy	• Facilitate the night operations for transfer and movement of cargo • Establish, cross-dock stations on the outskirts of the cities. • These stations should be located near strategic well accessible locations to facilitate transfer, collection and repacking of cargo • For large urban cities, final mile distribution centres will be established where appropriate.
Viet Nam	National Logistics Master Plan - VNM	• Last mile delivery system Develop last-mile system for urban consumers
	Master Strategy for Vietnam's Service Sector Development in the 2021-2030 period, with a vision to the year 2050	• Establishing a network of multi-level distribution centres (inland ports, warehouses, cargo yards) and freight collection and collection routes in major cities and key economic regions

Source: Own analysis based on national policy documents

"Urgent action is needed to decarbonize the freight and logistics sector, which currently remains a significant source of emissions"

3.9. Increasing the Availability and Access to Transport Finance

Transport infrastructure is a fundamental pillar for economic growth and social development. Historical trends indicate a significant need for investment in this sector, with estimates suggesting a requirement of 14.5 trillion USD or 1.6% of GDP (in PPP) in the Asia-Pacific region alone over the next decade.[55] Thus, there is a need to find innovative solutions to finance low-carbon transport infrastructure and services.

The CPI (Buchner et al., 2023) [56] estimates that in 2022, climate finance flows amounted to 1.4 trillion USD, nearly doubling the flows in 2019/2020. Out of the 1.4 trillion, 29% or 409 billion was accounted for by the transport sector, with 63% of the transport-related climate finance flows moving to Asia-Pacific.[57] However, the growth is neither sufficient, nor consistent, with a handful of countries accounting for the increased funds. Ninety-four percent (94%) of the finance flows to Asia-Pacific is in East Asia and Pacific. Considering that CPI's East Asia & Pacific grouping primarily includes non-OECD countries, one can impute that the figures are mostly impacted by China's climate finance.[58] It should also be noted that 94% of the climate finance flows in Asia-Pacific's transport sector are domestic in nature.

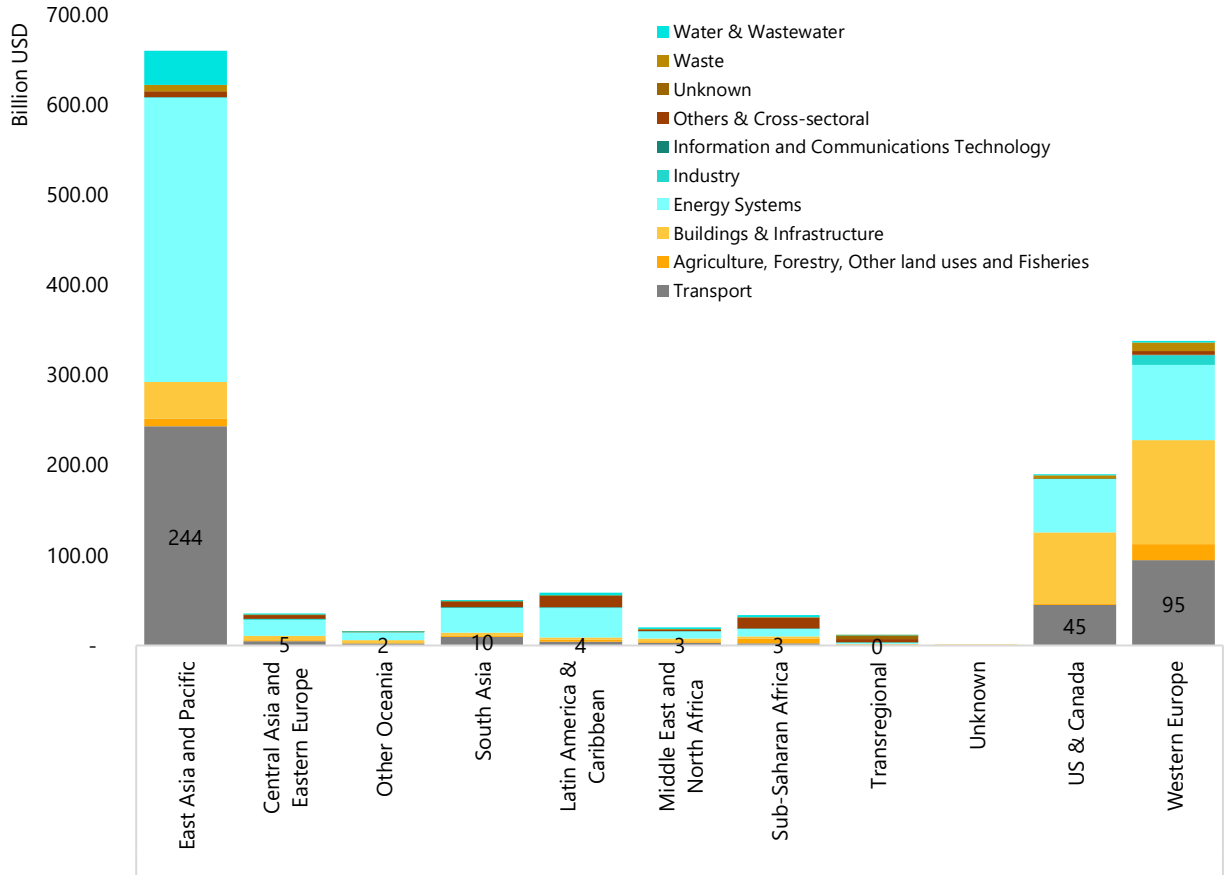

Figure 28. Climate Finance Flows (2022) by Sector and Regions
Source: Buchner et al. (2023)[59]

It is also important to gauge how the transport sector figures in project approvals made by multilateral climate change funds. The data from the Heinrich Böll Stiftung shows that 7% of the total funding approved for multilateral climate-related projects involving countries in Asia-Pacific (cumulative, since 2003) has gone to the transport sector.[60,61]

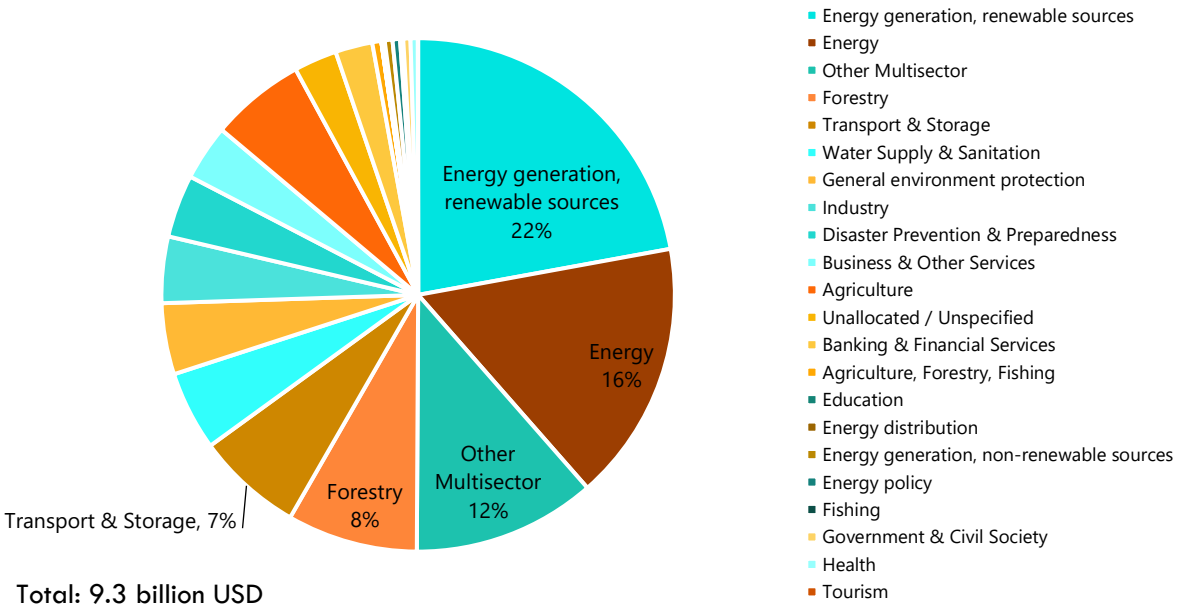

Figure 29. Total Funding Approved - Projects by Multilateral Funds in Projects Solely Involving LMICs in Asia (Cumulative, from 2003)
Source: Heinrich Böll Stiftung (2024)[62]

A closer look at the transport sector projects shows that more than half of the funds committed by the multilateral climate funds for the sector are for road transport (54%). The data also shows that only 1% of these committed funds for transport projects in Asia-Pacific are allotted to low-income countries (80% for lower middle-income countries; 19% for upper middle-income countries).

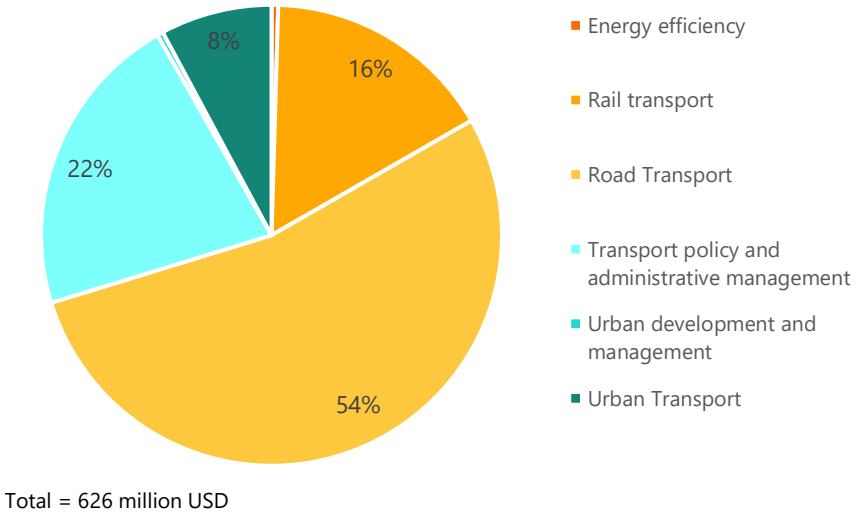

Figure 30. Total Funding Approved – Transport Projects by Multilateral Funds in Projects *Solely Involving LMICs in Asia (Cumulative from 2003)*
Source: Heinrich Böll Stiftung (2024)

The dataset shows that the cumulative approved funding for transport and storage projects involving Asian countries have almost doubled since 2015. On the other hand, such an increase is low as compared with other sectors such as forestry, industry, and energy generation.[63]

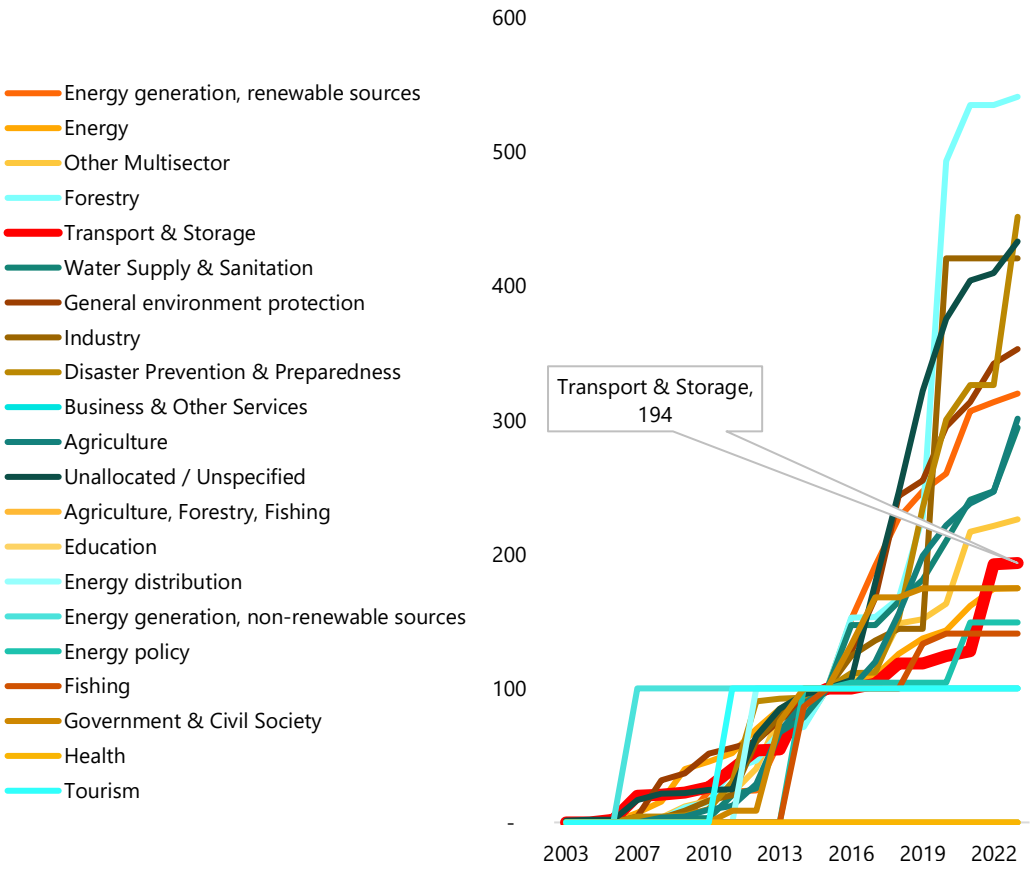

Figure 31. Total Funding Approved (2015 = 100) - Projects by Multilateral Funds in Projects Solely Involving LMICs in Asia
Source: Heinrich Böll Stiftung (2024)

Traditionally, the public sector has been the primary source of funding for infrastructure development in Asia, accounting for 92% of investments.[64] This includes central and local governments, various governmental agencies, and national and multilateral development banks. While these have played a crucial role in past development, there is growing recognition of the need to diversify funding sources and encourage private sector participation.

Several Asian LMICs are expanding access to transport finance using a multifaceted approach. This includes promoting public-private partnerships (PPPs) to leverage private capital and expertise and exploring innovative financing mechanisms such as infrastructure bonds and project finance. Between 2015-2023, cumulative PPP for the transport sector in Asian LMICs amounted to 200 billion USD with a share of 62% for road, 21% for rail, 5% for ports, and 12% for airports.[65]

Official development assistance (ODA) also plays a vital role in providing financial and technical assistance to developing countries. Between 2015-2022, cumulative ODA for the transport sector in Asian LMICs amounted to 52 billion USD with a share of 38% for roads, 49% for railways, 7% for ports, and 6% for airports.[66]

Around 64% of countries mention economic and financing measures in their NDCs, often lacking specific details. However, almost all (96%) address them in broader transport policy documents. Over time, NDCs and policy documents have become more comprehensive, incorporating more economic and financing measures.

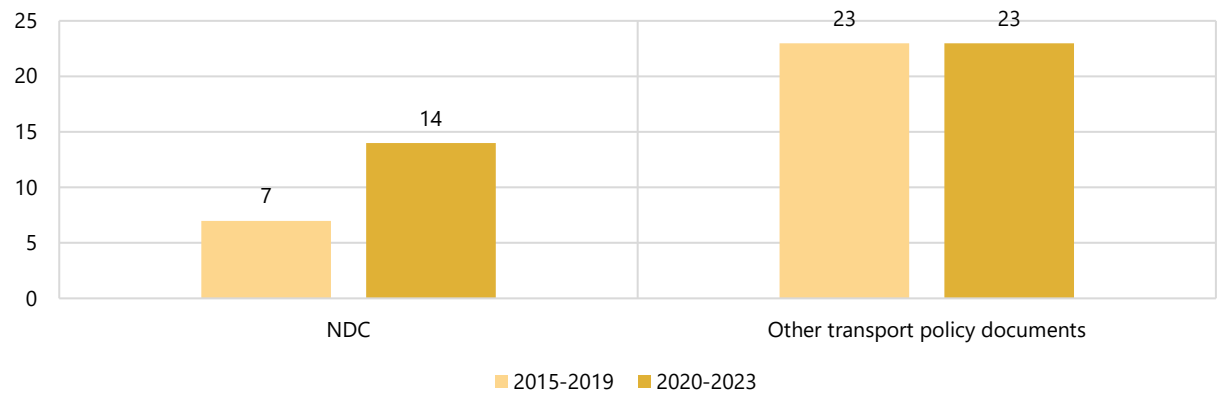

Figure 32. Number Of Countries with Reference to Investment and Economic Instruments in NDC vs. Other Transport Policy Documents
Source: Own analysis based on national policy documents

Between 2015 and 2019, only 20% of countries included direct measures on economic and financing instruments within NDCs, compared to 40% in other transport policy documents. However, by 2020-2023, 84% of countries had included such references in NDCs and other transport policy documents, indicating significant progress in integrating economic and financial considerations into climate and transport strategies.

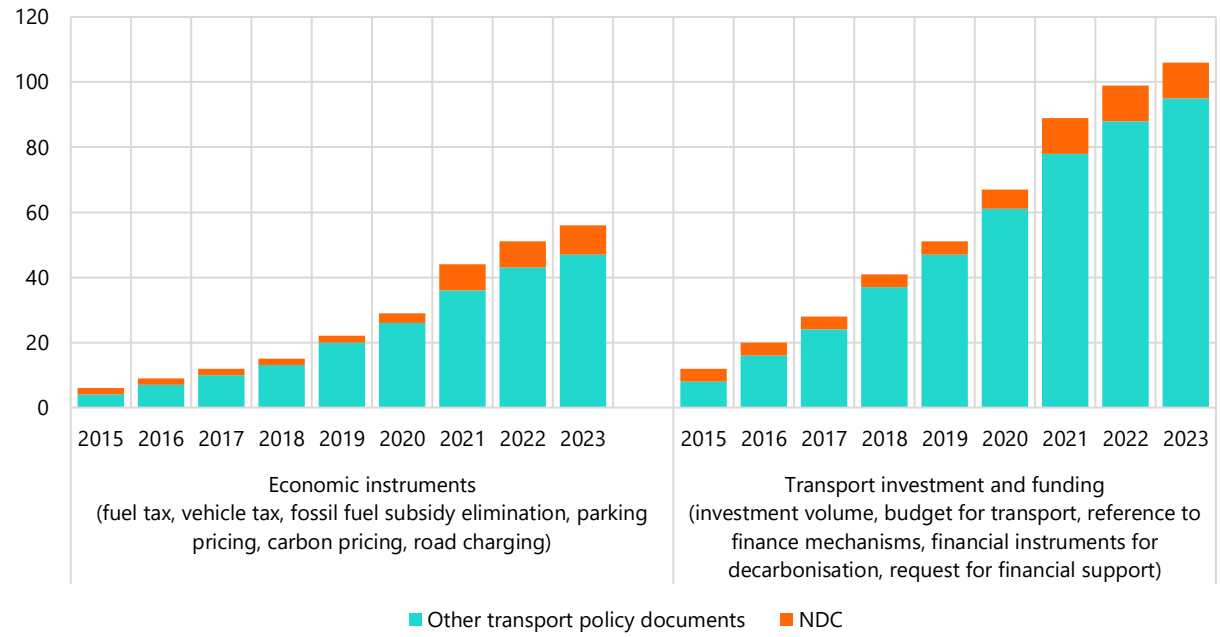

Figure 33. Cumulative Number of Documents with Reference to Investment and Economic Instruments
Source: Own analysis based on national policy documents

An ideal strategy that cuts across all sectors, including transport, is the implementation of mandatory carbon pricing. This is particularly crucial for challenging subsectors like aviation, shipping, and long-distance trucking. A higher carbon price can help reduce transport demand, encourage a shift towards lower-carbon modes of transport, and make alternative low-carbon fuels more attractive. Despite its potential benefits, carbon pricing in the transport sector is conspicuously absent from most NDCs and transport policy documents. This lack of recognition highlights a significant gap in current climate and transport strategies. It presents an opportunity for policymakers to consider carbon pricing and other economic instruments to finance measures towards the promotion of shifting towards low-carbon modes of passenger and freight transport.

"Facilitating access to adequate financing is crucial for implementing necessary transport projects and reforms"

Table 6. Examples of Finance and Economic-related Measures

Country	Document Name	Year Published	Text/Remarks
Bangladesh	First Nationally Determined Contributions (Updated)	2021	Electronic Road Pricing (ERP) or congestion charging
Bhutan	Second Nationally Determined Contribution - BTN	2021	Mix of investments from relatively inexpensive low hanging interventions to large infrastructure investments up to an overall total investment requirement of USD 3,233 million till 2030.
Solomon Islands	Solomon Islands 2021 Nationally Determined Contributions	2021	Charging carbon levies, setting aside value added tax charged for fuel
Sri Lanka	Updated Nationally Determined Contributions	2021	Introduce fuel-based carbon tax
Tajikistan	Updated Nationally Determined Contribution	2021	Promoting the introduction of incentives and regulations for fuel-efficient vehicles
Myanmar	Updated Nationally Determined Contributions - MMR	2021	Myanmar thus seeks international public and/or public-private sector engagement and grants for technical and financial assistance, estimated at US$ 2.3 million; - in the Inland Marine sector for GHG Emission Reductions (US$ 1.2million) and the Green Ship Strategy for coastal shipping (US$ 1.1 million).
Bangladesh	Mujib Climate Prosperity Plan	2021	Implement carbon pricing or tax with dividends that disproportionately benefit low-income households. Leverage PPP models to create green distribution networks for freight. Phase out all fossil fuel subsidies and redirect them to loss and damage, adaptation, renewable energy, and storage technology
	Eighth Five Year Plan	2020	Fossil fuel will be priced efficiently, and consideration will be given to the introduction of a carbon tax.
Bhutan	Technology Action Plan Report	n.d.	Rationalization of the budget for farm road development in accordance with the technical standards for climate-resilience
Bhutan	National Transport Policy 2017 - Policy Protocol Report	2017	Differential taxes and charges based on fuel efficiency or greenhouse gas emissions (or proxies such as engine size or vehicle weight)
Indonesia	Indonesia Blue Economy Roadmap	2023	Promotion of carbon removal and offset for achieving net-zero company pledges, followed by renewable energy use and energy efficiency improvements.

Country	Document Name	Year Published	Text/Remarks
Indonesia	Mitigation Action Outline on Truck Fleet Modernization Scheme in Indonesia	2021	Reform toll road charge design to require lower charge for cleaner and efficient trucks and higher charge to older and dirtier trucks.
Malaysia	Twelfth Malaysia Plan 2021-2025	2021	In addition, a feasibility study will be conducted on carbon pricing, such as carbon tax and the Emission Trading Scheme.
Malaysia	National Transport Policy 2019-2030	2019	Develop green index and incentives to encourage transport operators to go green
Malaysia	National Energy Policy 2022-2040	2022	Rationalise transport fuel subsidies, with only targeted exception-based for low-income households.
Malaysia	Green Technology Master Plan 2017-2030	2017	Enhancing the current road tax system by incorporating a mechanism which considers the Green Engine, carbon emission rate, as well as engine performance and safety
Pakistan	Technology Needs Assessment Report for Climate Change Mitigation	2016	Promote the scope of CDM projects in the transport sector. Support the private transport sector by providing incentives for reducing emissions and environmentally friendly transport services;
Pakistan	National Clean Air Plan	2022	Introduce mechanisms for regulation on non-compliant vehicles, such as emission taxation or penalties
Solomon Islands	Solomon Islands National Climate Change Policy 2023-2032	2023	Develop and implement carbon trading policy.
Sri Lanka	Sustainable Sri Lanka 2030 Vision and Strategic Path	2019	Discontinue differential pricing of fuel between different fuel types to better manage transport pricing, while maintaining affordability.
Thailand	Climate change Master Plan 2015-2050	2015	Decrease the demand for travel by introducing distance-based insurance premiums and service fees Set fuel prices which reflect the true cost and use tax mechanisms
Thailand	Thailand Greenhouse Gas Reduction Action Plan for Transport Sector	2021	Improving excise tax rates Based on CO_2 emissions (reflecting direct fuel consumption)

Source: Own analysis based on national policy documents

3.10. Prioritizing Institutional Strengthening and Capacity Development

Institutional improvement and capacity-building elements in climate documents are still limited compared to non-climate documents. Only 28% of the 25 countries have NDCs that mention capacity building and institutional strengthening in relation to the transport sector. The need for such measures is made more prominent as most of the countries have transport policies that refer to needs relating to institutional improvements and capacity building.

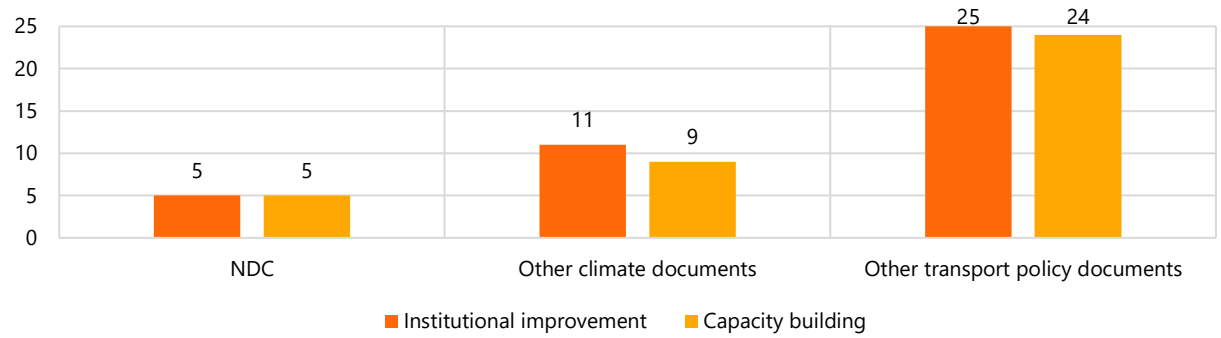

Figure 34. Number of Countries with Reference to Institutional Improvement or Capacity Building in NDCs vs. *Other Transport Policy Documents*
Source: Own analysis based on national policy documents

These are some of the examples of how the countries refer to institutional strengthening and capacity building in their NDCs and other policies. Lao PDR – in its INDC, mentions that capacity building is one of the biggest requirements to further the development of technical capacities across sectors, across all levels of government, and should encompass mitigation and adaptation. In relation to the transport sector, it mentions that capacity building support for financial models, traffic controls, transport technologies, and accessing favourable infrastructure funding are of priority. In its NDC (2021), it requests continuous institutional capacity building support for various items (e.g. MRV, data collection, modelling, enhanced mainstreaming into policies, etc…) that impact the transport sector, but nothing specific to the transport sector.

Pakistan, through its INDC released in 2015, states the need to establish organizational structure at national and subnational levels as one of the key areas that it needs to focus on. In its NDC (2021), Pakistan mentions capacity building as a key priority that needs utmost attention. It also states that a whole-of-government approach is necessary for effective climate action. For the transport sector, it mentions transition needs relating top bus rapid transport, and vehicle tuning.

Sri Lanka's 1st NDC (2016) also recognises the importance of developing appropriate institutional mechanisms and mentions its intention to launch an ambitious strategy for mainstreaming climate change adaptation across all economic drivers. In its updated NDC (2021) which elaborates the sectoral commitments and priority actions, no capacity building items were included for the transport sector.

The non-climate policy documents refer to institutional measures such as the following: better coordination among government agencies; clearer definition of roles, increased involvement of subnational levels of government; specification of lead agencies; institutionalization of reporting, transparency, and feedback mechanisms; and overall institutional reforms. In terms of capacity building, examples include institutionalization of accreditation, certification, and training of authorities.

"Building institutional capacity and technical expertise will be vital for successful implementation as the policy landscape evolves."

4. Conclusion

This report has illustrated the pressing need for stronger integration of climate considerations within the transport policies of low- and middle-income Asian economies. The analysis of NDCs revealed significant gaps and a lack of specificity in transport-related commitments, underscoring the urgent necessity for more ambitious and concrete targets. Efforts must focus not only on the adoption of cleaner technologies but also on systemic changes in transport infrastructure and urban planning to address the root causes of escalating emissions. To achieve meaningful progress in decarbonizing the transport sector, several areas need focus:

- **Raising the bar towards ambitious targets and measures:** The paper emphasizes the need for LMICs in Asia to set more ambitious emission reduction targets and more comprehensive measures for their transport sector in their NDCs. In many cases, the other policy documents have already reflected targets and measures that can be incorporated towards setting higher ambition levels in the NDCs. Most of the NDCs from the LMICs often lack specificity and high ambition, particularly regarding transport. The report highlights the gap between these commitments and actual policies, illustrating the importance of setting clearer and more ambitious goals to achieve significant emissions reductions.
- **Integration and alignment between climate and wider development goals:** Effective climate action should not only address emissions but also be compatible with broader objectives. Embedding climate action into transport policies (and vice versa) ensures that emission reduction strategies support broader developmental objectives, rather than being seen as isolated measures.
- **Expanding and improving public transportation systems:** The paper identifies the prioritization of the expansion and improvement of public transportation systems as a critical element towards effective climate action in the transport sector. It notes that increased motorization and inadequate transport infrastructure in many Asian economies result in higher emissions. Expanding and improving public transportation could provide a less carbon-intensive alternative to private vehicles, thereby reducing overall transport emissions. Investment in efficient, reliable, and extensive public transport networks can also contribute to reducing urban congestion, improving air quality, and fostering sustainable urban growth.
- **Promoting electric mobility and phasing out fossil fuel subsidies**: Promoting e-mobility serves as a crucial strategy for reducing the carbon intensity of the transport sector. The electrification of public transport (including paratransit), as well as the integration of light electric vehicles into urban freight systems should be provided with attention. This paper highlights the importance of phasing out fossil fuel subsidies, as well as the exploration of other exnovation policies such as the phasing out of pollutive vehicle technologies. It notes that despite policies aimed at energy transition, fossil fuels still dominate the transport sector in LMICs in the region. The phasing out of fossil fuel subsidies could make EVs more financially attractive while fostering investment in necessary infrastructure such as charging stations. This transition would also help reduce dependency on fossil fuels and alleviate economic vulnerabilities related to volatile global oil prices.
- **Strengthening resilience to climate change impacts within transport sectors**: Strengthening transport adaptation and resilience to climate change impacts is identified as a critical measure towards effective climate action in the transport sector. This involves ensuring that transport infrastructure is robust and capable of withstanding climate-related disruptions

such as extreme weather events. It emphasizes the need for adaptive measures in the planning and construction of transport networks to mitigate risks and ensure continuity of service. These measures are essential for maintaining economic stability and quality of life in the face of increasing climate variability and extremes.

- **Addressing the freight blind spot**: Addressing the growing emissions from urban freight transport is another priority discussed in the paper. The rise in e-commerce and urbanization has increased the volume of goods transported within cities, contributing to higher emissions. The paper suggests targeted interventions for urban freight operations, such as the adoption of cleaner technologies, optimization of delivery routes, and support for electric freight vehicles. Implementation of these measures can reduce the carbon footprint of freight and logistics and alleviate associated externalities such as air pollution and congestion.
- Increasing access to innovative financing mechanisms and uptake of innovative financing measures: The paper highlights the importance of increasing the availability and accessibility of transport finance through innovative mechanisms and carbon pricing. Many low- and middle-income countries face financial constraints that hinder the adoption of cleaner transport technologies and infrastructure improvements. Exploring options such as public-private partnerships, green bonds, and international climate finance can unlock the necessary investments. Additionally, implementing innovative financing measures can create economic incentives for reducing emissions, promoting investment in low-carbon technologies, and generating revenue for further climate initiatives.
- Building institutional capacity for effective policy implementation: Building institutional capacity and technical expertise is necessary for the effective implementation of transport policies. The paper points out that the gap between NDC commitments and actual policy measures often results from a lack of technical capacity and institutional weaknesses. Strengthening these capacities involves training government officials, improving data collection and analysis, and fostering inter-institutional coordination. This would ensure that policies are not only well-designed but also effectively executed, monitored, and adjusted as needed to achieve the desired climate and developmental outcomes.

The complexities involved in the transport sectors of diverse LMICs in the region call for tailored approaches that consider local contexts. High-income economies in Asia have made strides in decoupling emissions from economic growth, a paradigm that lower- and middle-income countries must aim to emulate. However, a blanket approach will not suffice; strategies must be context-specific and reflect each country's unique economic, social, and infrastructural nuances.

Ultimately, the transition towards a low-carbon transport sector in LMICs in Asia necessitates a multipronged approach that includes purposive measures and programs that are directed at systematically avoids unnecessary travel, shifts transport towards more efficient modes, and improves vehicle, fuel and system components' performance. This holistic strategy will ensure not only the reduction of carbon emissions but also the advancement of sustainable development objectives.

In conclusion, as LMICs in Asia continue to develop, concerted and coordinated efforts are essential in achieving the goals of the Paris Agreement. By bridging the gap between NDCs and actual transport policies, integrating climate considerations into broader transport agendas, and prioritizing structural and technological advancements, Asia can pave the way toward a more sustainable, climate-resilient future. This journey will be instrumental in global efforts to mitigate climate change and adapt to its

impacts, emphasizing that the stakes and opportunities have never been higher. Such an integrated approach is also important to emphasize in the pursuit of aspirations to be set for the UN Decade on Sustainable Transport (2026-2035) based on closer cooperation between the various entities globally towards advancing sustainable transport to achieve the SDGs.

Endnotes

[1] Please go to https://asiantransportoutlook.com/analytical-outputs/transportclimateprofiles/

[2] The term "economies" in this report primarily refers to countries, but includes special administrative regions, territories.

[2] See asiantransportoutlook.com

[3] This may include policies outside the transport sector but may contain elements that are highly relevant to the transport sector and its components. The search and collection of policy documents included those that are directly relevant to climate change mitigation and adaptation (including National Adaptation Programmes of Action).

[4] The documentation of the event is found in ATO (2024).

[5] Based on European Commission. Joint Research Centre. & IEA (2024).

[6] Includes road, railways, aviation, and shipping based on European Commission, Joint Research Centre (JRC), & International Energy Agency (IEA). (2023).

[7] Based on European Commission. Joint Research Centre. & IEA (2024).

[8] See endnote 7.

[9] See endnote 7.

[10] Analysis based on UIC (2024).

[11] Analysis using Sen et al. (n.d.). The data set employed by the study includes the following: Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Brunei, Cambodia, China, DPR Korea, Fiji, French Polynesia, Georgia, India, Indonesia, Japan, Kazakhstan, Kiribati, Kyrgyzstan, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Republic of Moldova, Russian Federation, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tonga, Turkmenistan, Uzbekistan, Vanuatu, Viet Nam.

[12] Based on United Nations, Department of Economic and Social Affairs, Population Division (2022).

[13] See endnote 12.

[14] Analysis based on country official statistics and Nirandjan, S., Koks, E.E., Ward, P.J. *et al.* (2022)

[15] Analysis based on UIC. (2023).

[16] See endnote 15.

[17] Analysis based on ITDP's "Rapid Transit Database." (ITDP, 2022)

[18] Analysis based on energy statistics from the United Nations Statistics Division. (2024).

[19] See endnote 18.

[20] See endnote 8

[21] Based on ITF Outlook 2023 (ITF, 2023).

[22] Gota, S., & Huizenga, C. (2022).

[23] See endnote 22. Includes policy commitments that had been put in place when the source study was developed.

[24] Analysis based on the numbers from Wetzel, et al. (2023)

[25] ITF (2023), Gota, S., & Huizenga, C. (2022)., IEA (n.d.), and Keramidas et al. (2023).

[26] IEA (2023)

[27] Based on ITF (2023)

[28] Based on Gota et al. (2019).

[29] Based on Gota et al. (2019).

[30] See endnote 25 .

[31] Based on Gota et al. (2019).

[32] This research refers to climate-focused "indirect" targets as those targets that influence important determinants of transport GHG emissions (e.g. mode shares, activity, energy intensity, emission factors).

[33] Based on Calvin et al. (2023).

[34] Based on Shukla et al. (2022). It is recognized that overall reductions in transport GHGs from LMICs in the regions are heavily dependent on those countries that have significant contributions which are not currently part of this report.

[35] Participants to the Fourteenth Regional Environmentally Sustainable Transport (EST) Forum in Asia. (2021).

[36] Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Indonesia, India, Islamic Republic of Iran, Japan, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, the Philippines, Russian Federation, Singapore, Sri Lanka, Thailand, and Viet Nam

[37] Gota et al. (2023).

[38] ATO conditioned data based on country official statistics; Nirandjan, et al. (2022); International Union of Railways. 2021 ; ITDP (2022)

[39] Analysis based on figures from Columbia University (2023).

[40] See endnote 39.

[41] Shukla et al. (2022)

[42] ITDP (2022).

[43] Based on UNEP (2024).

[44] See endnote 43.

[45] Graaf et al. (2021).

[46] Government of Nepal Ministry of Forests and Environment. (2021).

[47] Based on the analysis conducted by Mejia, A. (2024, May). Snapshots and Insights: E-mobility in Asia & the Pacific—Trends and Actions. The countries included in the analysis are Armenia, Bangladesh, Fiji, Indonesia, Kazakhstan, Mongolia, Nepal, Pakistan, Philippines, Tajikistan, Thailand, Uzbekistan, Vietnam.

[48] Based on the following: CDRI. (n.d.); ITDP (2022); UIC. (2024).

[49] Based on figures from Buchner et al. (2023).

[50] See endnote 49.

[51] Based on World Bank (2023).

[52] Gota, S., & Huizenga, C. (2022).

[53] For the period 2020 to 2030 based on Gota, S., & Huizenga, C. (2022).

[54] Based on ITF (2023)

[55] See endnote 52.

[56] See endnote 49.

[57] In this case, Asia-Pacific includes sub-regions as defined by CPI : East Asia and Pacific; Central Asia and Eastern Europe; Other Oceania, South Asia. No further disaggregation is made available.

[58] CPI's grouping for East Asia & Pacific includes American Samoa, Brunei, Cambodia, People's Republic of China, Cook Islands, Democratic People's Republic of Korea, Fiji, Indonesia, Kiribati, Lao PDR, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Viet Nam

[59] See endnote 49.

[60] Analysis based on numbers from Heinrich BöllStiftung. (2024).

[61] This includes regional level projects that only include countries in Asia-Pacific.

[62] See endnote 60.

[63] See endnote 49.

[64] Asian Development Bank. (2017).

[65] World Bank. (2024).

[66] OECD. (n.d.). *OECD Data Explorer*.

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